

# SURVEY OF LANDOWNERS IN THE GRAND RIVER GRASSLANDS: MANAGING WILDLIFE, CATTLE, AND NON-NATIVE PLANTS

A Technical Report



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**Front cover caption:** Aerial photograph of pastures in the Grand River Grasslands taken July 2017. Photo credit Timothy M. Swartz.

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## EXECUTIVE SUMMARY

The Grand River Grasslands (GRG) is a 62,000-ha conservation priority area found in Ringgold County, Iowa and Harrison County, Missouri. This rolling working landscape consists primarily of diversified livestock and crop production. These agricultural systems drive management decisions and affect the grassland ecosystems in a variety of ways. To better understand landowners' perceptions of grasslands management practices, we surveyed 456 landowners in spring 2017. Survey items focused on attitudes toward wildlife, knowledge and perceptions about grasses and their forage value, concerns about invasive plants and woody encroachment, use of prescribed fire, and grazing practices. Many of the questions in this survey replicated questions from a 2007 survey of 261 landowners, providing a longitudinal look at management practices and underlying values, beliefs, and attitudes over a ten-year period. We received a 32% response rate (N=149, compared to a 51% response rate in 2007).

This technical report summarizes key findings of the survey and compares selected items to the 2007 survey. Although landowner demographics in 2007 and 2017 are very similar, several findings reflect changes that occurred over the ten-year period. The percent of respondents owning land for over 25 years in Ringgold, Iowa and Harrison County, Missouri increased from 59% in 2007 to 67% in 2017. A corresponding finding shows respondents owning land ten years or less dropped from 20% in 2007 to 7% in 2017. This suggests that there has been very little turnover in ownership over the last ten years.

There was a 31% increase in landowners living locally, 68% compared to a little more than half (52%) in 2007. In 2007, 10% of absentee landowners reported living 50-100 miles from their land; ten years later almost one-quarter lived 50-100 miles away. Although there was little change in average ha owned in 2007 (183 ha) compared to 2017 (181 ha), average ha rented increased 83% (104 ha) during this period.

GRG landowners had on average 127 ha of open pasture and grassland; 59 ha of corn/soybean; 59 ha of woodland including 1 ha of eastern redcedar (*Juniperus virginiana*), and about 2 ha of small grains. Eighty percent reported having one to four ponds on their property. About half of the respondents in 2017 farmed row crops. Respondents using their land for a weekend retreat or vacation home more than doubled from 2007 (5%) to 2017 (11%). Although most GRG landowners value income from agriculture, there was a drop from 81% to 70% in how agricultural income influenced management.

Over this ten-year period, restoring grasslands and prairies, and protecting wildlife habitat had less influence on management decisions while the influence of other goals such as controlling invasive plants and reducing soil erosion remained relatively stable. Ring-necked pheasants (*Phasianus colchicus*), northern bobwhite quail (*Colinus virginianus*), and wild turkey (*Meleagris gallopavo*) were among the most highly valued species in both years, but there was a decline in importance over the decade (80% very/extremely important to 60%). Four species were highly valued by greater than 60% of respondents: Bobwhite quail (71%), bees (63%), pheasants (62%), gamebirds (60%). Songbird importance dropped from 62% of landowners listing them as very or extremely important to 41%, a 21% drop from 2007 to 2017.

Most surveyed landowners in 2007 (78%) and 2017 (63%) thought natural resource use should balance economic and environmental considerations. However, the proportion of respondents who gave economic considerations the highest priority increased from 7% to 18%. This may reflect the downturn in the farm economy during this period. More research is needed to understand these relationships.

Cattle production is a major land use in the GRG. We found that 95% of cattle ranchers were moderately to extremely satisfied with their growing season forage. Less than a quarter of respondents would adopt a management practice that reduced stocking rate and beef production per acre, even if this reduction in stocking would improve gamebird populations, reduce tall fescue (*Schedonorus arundinaceus*), protect wildlife, restore grasslands, or increase native plants. A few more respondents thought they would be very to extremely likely to try this trade-off if it reduced soil erosion (35%) or controlled invasive plants (32%). Too much tall fescue on grazing pastures concerned almost half of cattle producers, and fescue toxicosis (60%) and fescue foot/fescue tail (57%) were the most concerning for producers.

We also asked landowner about their perceptions of forage composition on their land. Alfalfa/clover (*Medicago spp.*) was moderately to extremely abundant in more than half (58%) of pastures/hay fields, followed by tall fescue (50%), and brome (*Bromus spp.*, 46%). One-fifth of respondents said they were not knowledgeable about non-native grass tall fescue or native warm-season grasses. Almost 70% reported they were moderately to extremely knowledgeable about non-native grasses, including brome, orchard grass (*Dactylis spp.*), and Kentucky bluegrass (*Poa pratensis*), with 72% preferring these grasses to be moderately abundant on their land. In contrast, more individuals (28%) believed that the non-native grass tall fescue should be completely removed from their land. Notably, more landowners believed that native warm season grasses are better for wildlife and grazing when compared with tall fescue.

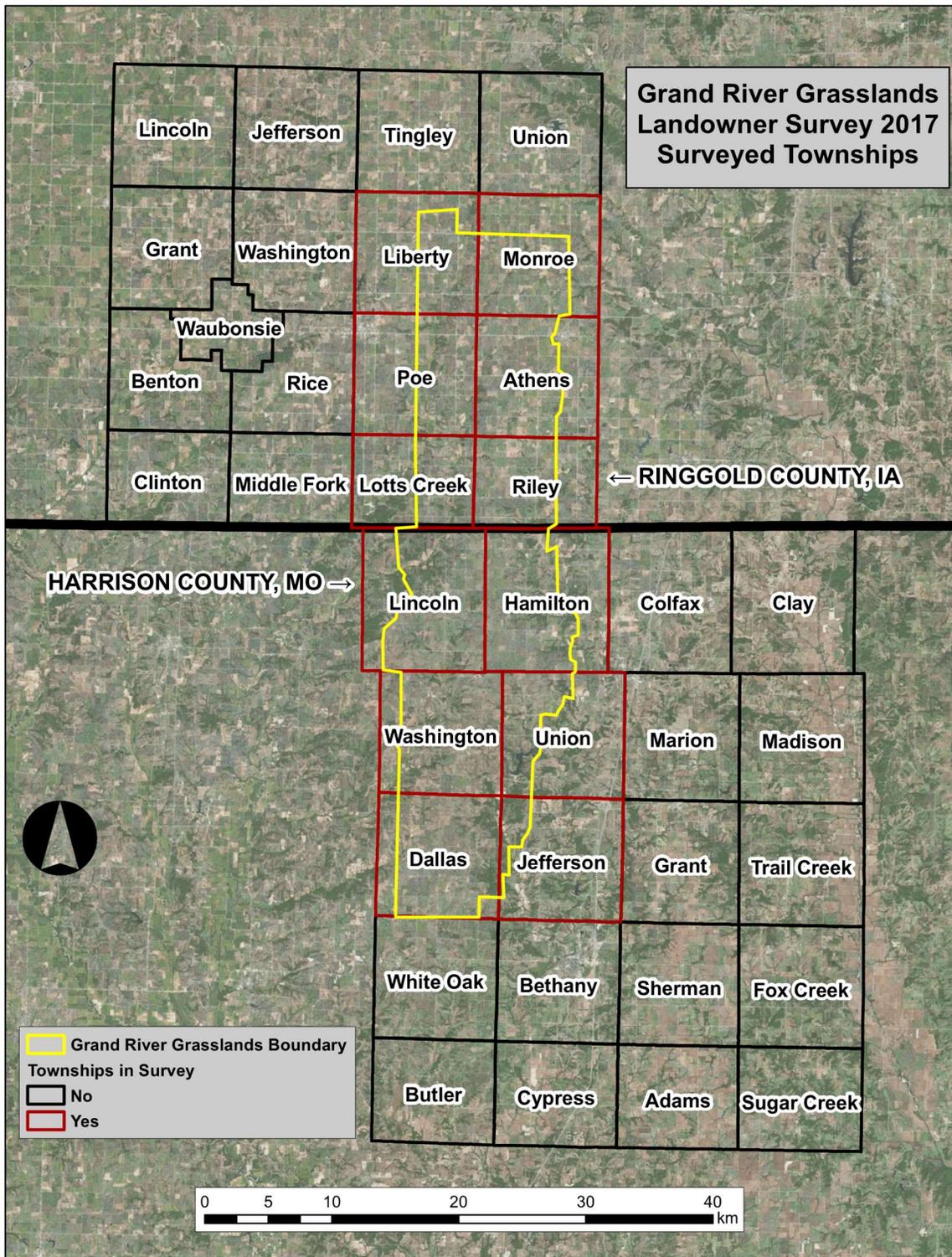
Managing pastures to achieve the desired mix of vegetation can be achieved using herbicides, manual removal of woody plants, or prescribed fire. While most respondents were concerned about risks associated with using herbicides, they were most concerned about soil erosion (72% very/extremely concerned) and herbicide resistance (69%). Views on eastern redcedar and other trees were stable from 2007 to 2017, with over half perceiving encroachment as a major problem and one-third perceiving it to be a minor problem. Most landowners reported using mechanical or manual removal of woody plants annually to every ten years. Over the ten-year period there was a substantial increase in landowners using prescribed fire to manage woody encroachment (25% in 2007; 41% in 2017). However, 60% of landowners had not experimented with new grassland management practices because they were content with the status quo, and 28% perceived that it was too costly to change practices.

Conversion between land-types was relatively common for respondents. One-third reported converting 1807 ha of cropland to grassland over five years. During this same period 19% of landowners converted 878 ha of grassland to cropland. This suggests a net gain of almost 929 ha of grassland in the region.

Overall, positive attitudes toward conservation seem to have eroded, with fewer landowners believing that restoration on their land is important in 2017 compared with 2007. However, more landowners are engaging in practices that are thought to support conservation. For example, landowners are removing woody plants and using prescribed fire at higher rates, and there have been net gains in grassland area in the region. Further, while many wildlife species have become less important to residents, northern bobwhite and bees are both highly important to residents. Positive attitudes toward these species alongside increased use of management that supports biodiversity suggest that private lands in the Grand River Grasslands have the potential to benefit both wildlife conservation and cattle production.

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**Figure 1.** A map of the Grand River Grasslands, a conservation priority area on the Iowa-Missouri border. Townships where landowners were surveyed in 2017 are in red, and the current Grand River Grasslands boundary is in yellow. The 2017 surveyed area relative to the 2007 survey was expanded because the Grand River Grasslands boundary was enlarged by The Nature Conservancy



## INTRODUCTION

Over 95% of the North American tallgrass prairie has been lost to agriculture, with high rates of land conversion now reaching areas previously considered marginal for crop production [1, 2]. This loss has negatively affected biodiversity, with many common grassland species, including birds, amphibians, and pollinators, experiencing declines in recent years [3-7]. Biodiversity loss can have adverse effects on many stakeholder groups, with potential impacts on cattle production, soil erosion, loss of carbon retention, and reduced opportunities for hunting, fishing, and birdwatching [8, 9.] However, most remaining grasslands are privately owned. Thus, managing the few grasslands we have left affects both wildlife conservation and private land interests. Understanding the prospects for conservation on these private-land parcels requires an understanding of landowner perceptions of grassland management.

### ***The Grand River Grasslands***

This report summarizes a survey that we implemented in the Grand River Grasslands (GRG; Figure 1), a region in southwest Iowa and northwest Missouri. Select items are compared to a 2007 survey. The GRG is a tallgrass prairie region comprised of public lands managed for biodiversity embedded in a matrix of private lands devoted to cattle ranching and recreational uses [10]. Many Midwest grasslands were converted to agricultural row crop production as the region was settled in the 1800s. However, a number of these prairie landscapes reverted to grassland after the drought of the Dust Bowl era (1930s) and are now managed for livestock grazing [11, 12].

Today nearly 15% of the GRG landscape is publicly- and privately-owned conservation lands

and about 80% are private working lands, primarily diversified livestock, cropping, and recreational acreages. In 2008, The Nature Conservancy identified the region as the best-known opportunity to restore a functional, deep-soil, tallgrass prairie landscape in North America [13], partially because, relative to the rest of the Midwest, a large portion of the landscape is composed of protected reserves. However, conserving grassland biodiversity in the region cannot be accomplished by management of protected lands alone. Both land managers and private landowners face similar problems that cross land ownership boundaries. The challenge is to devise strategies that will be embraced by livestock producers and recreational landowners and improve conditions for native grassland species [10].

### ***Conservation in Working Landscapes Research Group***

To address the potential synergies and conflicts among the ecological, ecological and social systems in this important region, an interdisciplinary research team was formed in 2006. The Conservation in Working Landscapes Research Group has included social and natural scientists from Iowa State University, University of Nebraska-Lincoln, Oklahoma State University, and the University of Illinois at Urbana-Champaign. In collaboration with private landowners, the Iowa Department of Natural Resources, the Missouri Department of Conservation, and The Nature Conservancy. These scientists have been conducting research in the GRG for more than ten years (2006-2018). The project has a dual focus on grassland biodiversity and managing the grassland landscape to support a robust cattle industry. Recent research in the



**Figure 2.** This prescribed grassland burn was conducted in March 2016 on a cattle pasture to control woody encroachment. Photo by Scott B. Nelson



**Figure 3.** Researchers conduct bird surveys on a pasture in the Grand River Grasslands. Photo by Scott B. Nelson



**Figure 4.** Human-constructed ponds are numerous in the Grand River Grasslands, providing water for cattle, habitat for frogs and ducks, and fishing opportunities for landowners. Photo by Scott B. Nelson

GRG includes response of eastern redcedar to prescribed fire and grazing (Figure 2); tall fescue response to fire, grazing, and herbicide; fire effects on external parasites of cattle; grassland bird abundance and diversity (Figure 3); pollinator abundance, including regal fritillary (*Speyeria idalia*) and other resident butterflies; and farm ponds and wetland ecology (Figure 4).

### ***Including Private Landowners***

Since its inception in 2006, project leaders have sought to include landowners in the project. Interactions with landowners have included field days, one-on-one discussions, on-farm demonstrations, surveys, and listening sessions, which have offered opportunities for scientists to share findings and landowners to offer feedback that reflects their livelihoods, recreational goals, and personal values.

A survey of GRG landowners and community leaders was implemented in 2007 to provide baseline data on land use practices, livestock grazing, control of invasive species, perceptions of eastern redcedar encroachment, and prescribed fire. A second survey, conducted in 2017, was designed to assess changes in landowner perceptions and practices in the GRG since 2007. This report summarizes key findings from this survey and offers a longitudinal comparison with select 2007 data.

## **METHODS**

### ***Survey Context***

The GRG (Figure 1) encompasses 62,000 ha of rolling, dissected, glacial till plains with both native and non-native grasslands. Mean annual precipitation for the region is 889 to 1016 mm (National Climatic Data Center), although intra- and inter-seasonal precipitation can vary

widely. In the GRG, pastures and prairie remnants alike consist of a mixture of native and non-native plants. Native grasses include big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*) and Indiangrass (*Sorghastrum nutans*). Non-native grasses include brome (*Bromus spp.*), orchard grass (*Dactylis glomerata*), Kentucky bluegrass (*Poa pratensis*), tall fescue, timothy grass (*Phleum pratense*). Non-native legumes include alfalfa (*Medicago sativa*), and clover (*Trifolium spp.*).

In recent years, the increase in demand for soybean and corn, higher commodity prices, and the expiration of 10-to-20-year Conservation Reserve Program contracts resulted in high rates of conversion to row-crop production [14]. An additional region-wide phenomenon is an increase in nonresident and often recreational landowners who frequently remove lands from production altogether [9, 15].

The landowner survey area (see Figure 1 townships in red) was expanded relative to the area surveyed in 2007 to match the expanded Grand River Grasslands boundary created by The Nature Conservancy in 2017. All landowners with >8 ha (approx. 20 acres) of land in the GRG were identified with county plat maps purchased from Farm and Home Publishers.

### **Survey Design**

The survey included items about livelihoods, biodiversity, demographics, and use of management techniques that were also present in the 2007 survey. New items measured attitudes toward invasive and non-native plants, native wildlife, and factors related to grassland management using prescribed fire, grazing, and herbicide (see Appendix for survey items).

We focused on two problematic invasive species prevalent in the Central U.S. in particular. The first, the invasive grass tall fescue, has a complicated history. Some tout it as “one of the

most important pasture grasses in the Eastern United States” [16]. Despite tall fescue’s popularity and tolerance to drought and stress, when cattle eat tall fescue, they can experience weight loss and decreased reproduction [17, 18]. Although planted widely, tall fescue is now considered invasive in 14 states [19, 20], and landowners may believe the control method, herbicide, is worse than having high abundances of tall fescue. The second problematic invasive is eastern redcedar. Fire exclusion in grasslands in the Midwest has led to notable increases in woody encroachment by eastern redcedar, leading to grassland loss. While many landowners do not like woody encroachment, they also perceive the control method, prescribed fire, as high-risk [11]. Further study of these species is warranted to untangle the potential conflicts between the problems these invasives cause and the risks associated with control methods.

### **Survey Implementation - 2017**

The survey was pilot tested by cattle producers in Nebraska (N=8), who evaluated readability, content relevance, and the clarity of the vocabulary. This pilot test resulted in small changes to language and formatting. The Institutional Review Boards from the University of Illinois and Iowa State University reviewed the instrument and survey protocol and approved the use of human subjects [IRB #16389].

To collect survey responses, we used a multiple contact system with reminders for non-respondents [21] to obtain the highest response rate possible. In addition to the mailed survey, an online version was also offered. Contacts included use of post cards, brown, individually stamped envelopes, as well as telephone calls to non-respondents [21].

In February 2017, 528 landowners were first contacted with a postcard that alerted them, “Survey Coming!” The postcard provided brief



**Figure 5.** Postcards used for waves 1, 3, and 5 of the survey

information about the purpose of the study and a link where they could take an online version (Figure 5). At two-week intervals, landowners who had not yet responded were contacted again and encouraged to complete the survey, for a total of seven possible contacts (waves) per household. For the seventh wave, any non-respondents with publicly available phone numbers were called as a final reminder.

## RESULTS

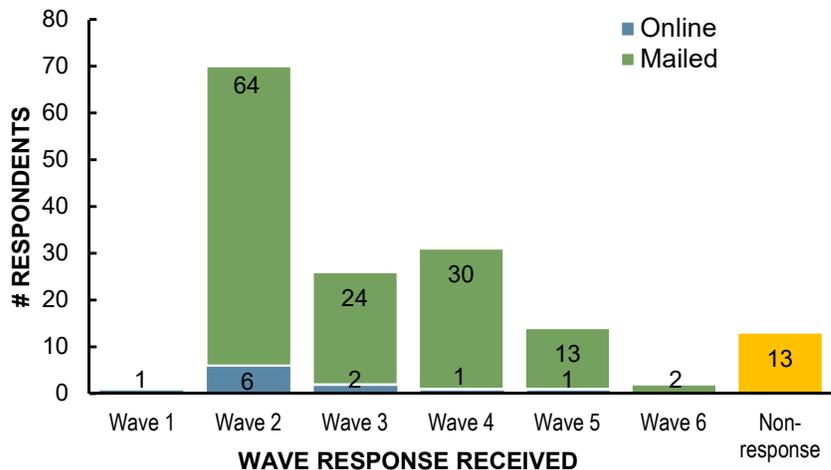
### *Response Rate and Non-response Bias*

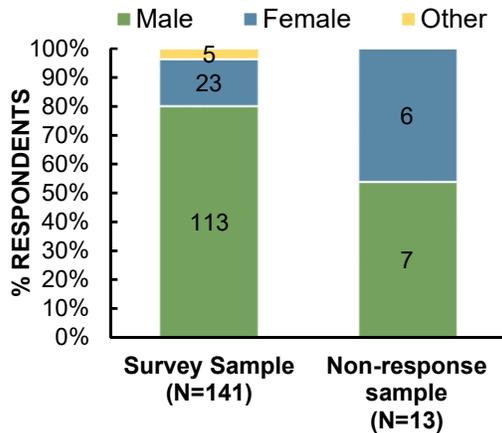
Of the 528 households initially contacted, 72 were found to be vacant, not deliverable as addressed, or the addressee was no longer at that address, yielding 456 valid addresses for the following four survey rounds.

Over the course of five mailings and a phone call, 162 total responses were received (34.3% response rate). However, only 32.7% of respondents completed at least one section of the survey (N=149), so we considered this to be our effective response rate (Figure 6).

We also assessed non-response bias to confirm that our respondents were representative of the population living in and around the GRG. This bias is defined as a difference between those that turned in the survey and those that

**Figure 6 (right).** Number of respondents for each round of the survey process. 149/456 (32.7%) individuals returned the survey, and 13/456 (2.9%) individuals answered questions over the phone used to assess non-response bias. The wave the survey was returned was not recorded for a few of the respondents (N=5), so these are not represented in the graph





**Figure 7.** Gender differs between the regular survey sample and those that answered follow-up phone calls, with more women represented in the non-response call ( $p=0.029$ )

did not that effects interpretation of results. To assess non-response bias, during the seventh wave of reminder phone calls (N=154), we asked 13 non-respondents basic questions (age, gender, number of acres owned, years of land ownership in Ringgold/Harrison counties).

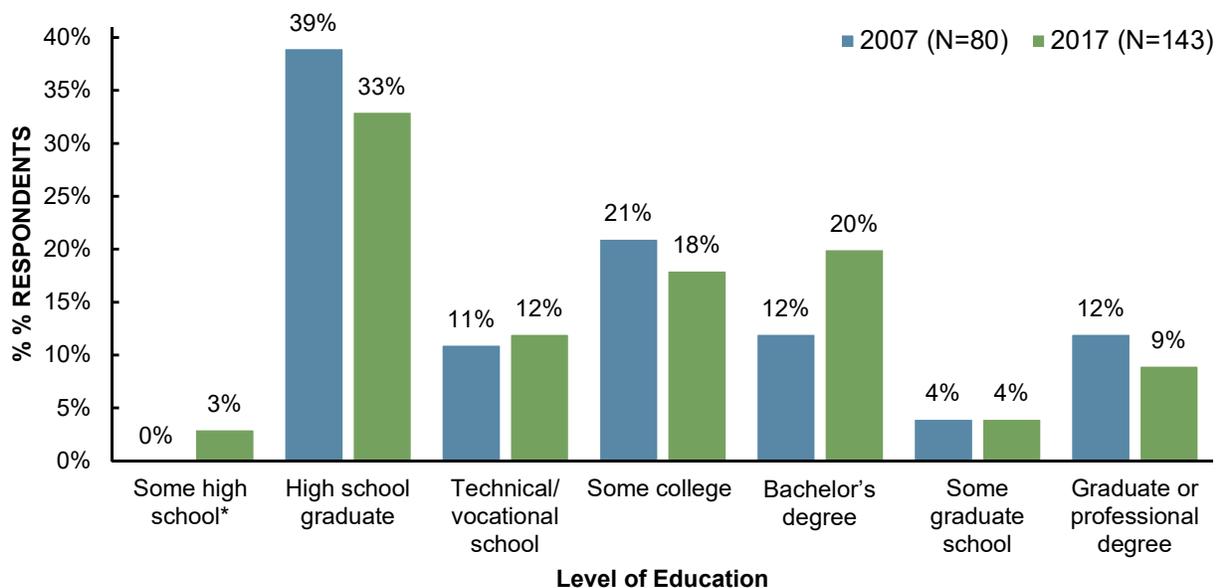
We found no detectable differences in age between respondents and nonrespondents. An in-

crease in age between the 2007 sample (average 62) and the 2017 sample (average 67) reflects a broader pattern of aging farm operators in Iowa [22, 23]. Women were less likely to respond to our survey (Figure 7), but this is likely because men comprise a higher percentage of farm operators than women [22]. Based on this, our sample accurately reflects the GRG population of landowners.

### Surveyed Population

Respondents were 98% white, 1% Native American/Indian, and 2% were members of Amish communities. The sample was predominantly composed of men (79%) with 15% women and 4% other. The respondents ranged from age 36 to 90, with an average age of 66 years. In 2007, the average age of respondents was 62 years with a range of 33-92 years old.

Almost all respondents were high school graduates (Figure 8) with 63% having additional education ranging from technical school to college or professional degrees. Levels of education in both 2017 and 2007 surveys were similar.



**Figure 8** Responses to “What is highest level of education you have completed?” (2007 vs. 2017). Some high school includes those with 8th grade education

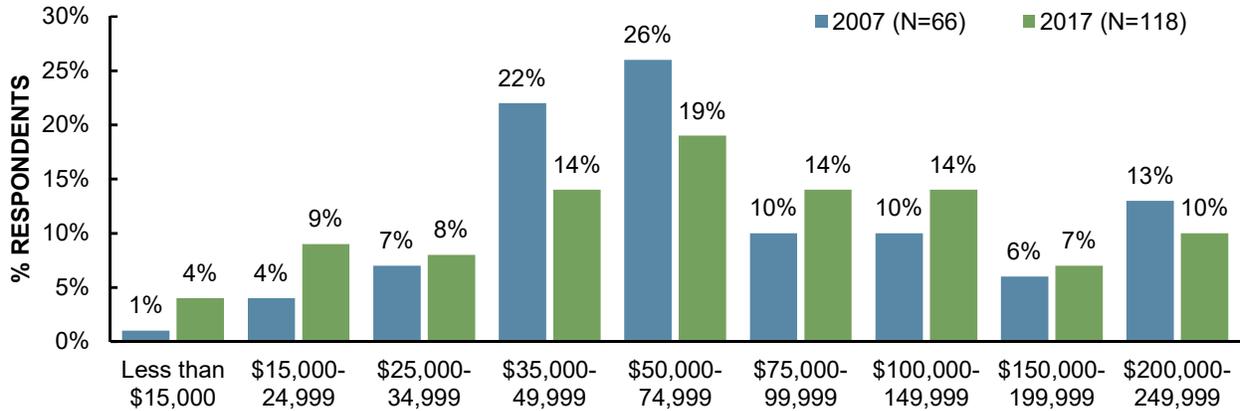


Figure 9. “Annual household income before taxes” (2007 vs. 2017)

Sixty-four percent of respondents had annual household incomes of \$50,000 or above. This is similar to 2007, when 65% reported annual household incomes of \$50,000 or above (Figure 9). Slightly more respondents derived more than half of their income from their land (32%) compared with 2007 (29%).

Most respondents were landowners (N=138), although some rented land (N=40; Table 1). Ownership of land was slightly lower on average (180 ha) in 2017 compared to 2007 (183 ha). However, acres rented was considerably higher in 2017 (230 ha) compared to 2007 (125 ha). A few respondents managed for absentee

property owners (N=9). On average, these respondents managed 140 ha, compared to 134 ha in 2007 (Table 1).

Landowners have owned land in the GRG for longer when compared with 2007, with an increase from 59% to 67% for ownership greater than 25 years (Figure 11). Furthermore, only 7% have owned land in the GRG for ten years or less, compared with 20% of 2007 respondents.

There was an increase in landowners currently living on their land (68%) compared with 2007 (52%). Of those who did not live on their land, the average distance was 141 miles (range

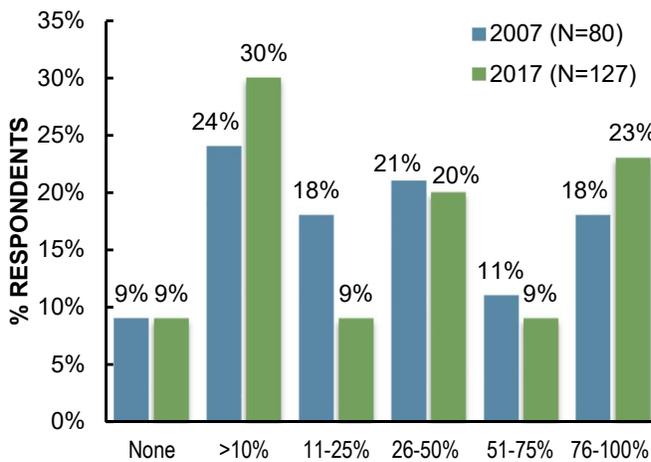


Figure 10. “Responses to “What percentage of your household income comes from your land” (2007 vs. 2017)

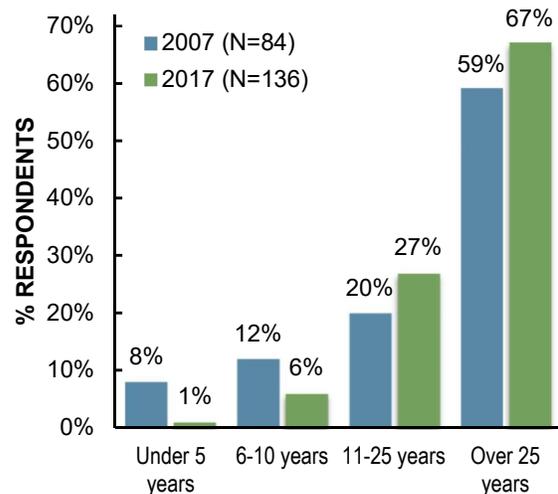
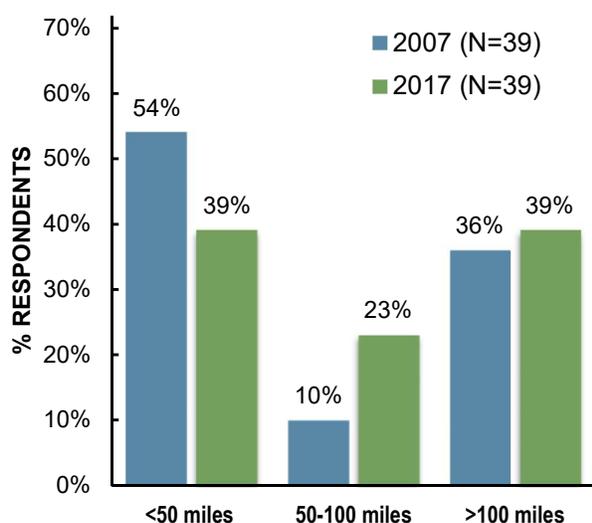


Figure 11. Responses to “How long have you or your family owned land in the GRG region?”

**Table 1.** Responses to “How many hectares do you own/rent/manage in southern Iowa or northern MO” (2007 vs. 2017)

|               | 2007 (ha)     |         |           | 2017 (ha)   |         |           |
|---------------|---------------|---------|-----------|-------------|---------|-----------|
|               | Mean          | Range   | Std. Dev. | Mean        | Range   | Std. Dev. |
| <b>Own</b>    | 183<br>(N=80) | 16-1315 | 230       | 180 (N=138) | 6-1214  | 229       |
| <b>Rent</b>   | 125<br>(N=14) | 12-502  | 162       | 230 (N=40)  | 10-1012 | 261       |
| <b>Manage</b> | 134<br>(N=8)  | 32-405  | 121       | 140 (N=9)   | 4-607   | 197       |



**Figure 12.** Responses to “If you do not live on your land, how far away do you live from your land?” (2007 vs. 2017)

0.25-860). While the *number* of absentee landowners was the same, there was 15% decrease in the percent that lived less than 50 miles from their land (Figure 12), indicating that absentee landowners are now living farther away from their landholdings.

### Land Uses

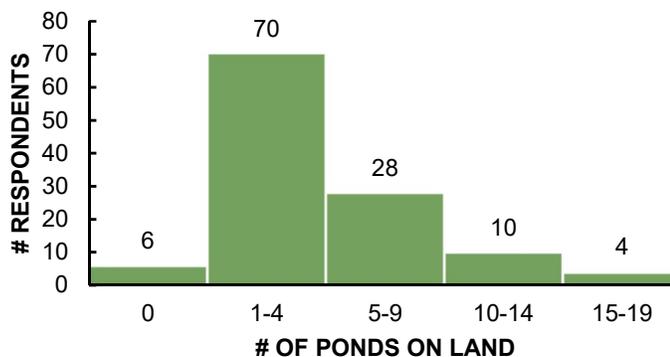
Although the GRG primarily consists of grasslands, landowners’ properties also included woodlands and cultivated row crops. Respondents reported 127 ha of open pastures and grasslands on average, with 82 ha of grazed grassland, 34 ha of hay, and about 23 ha of other ungrazed grassland (Table 2). Landowners have about 19 ha of woodland on average, with 1 ha in eastern redcedar. Corn or soybean

**Table 2.** Responses to “How many hectares do you own/rent/manage in the following categories” (2007 vs. 2017)

|  | Mean Ha<br>(or # of ponds) | Range  | Std. Dev. |
|--|----------------------------|--------|-----------|
| <b>Open pasture/ grassland all types (N=133)</b>       | 127                        | 0-1133 | 200       |
| <b>Grazed Grassland (N=118)</b>                        | 82                         | 0-1036 | 153       |
| <b>Hay (N=125)</b>                                     | 34                         | 0-546  | 65        |
| <b>Other un-grazed grassland (N=119)</b>               | 23                         | 0-607  | 174       |
| <b>Woodland all types (N=134)</b>                      | 19                         | 0-405  | 43        |
| <b>Red cedar only (N=130)</b>                          | 1                          | 0-121  | 11        |
| <b>Corn/soy (N=133)</b>                                | 59                         | 0-688  | 130       |
| <b>Small grains, oats, wheat, barley, etc. (N=132)</b> | 2                          | 0-81   | 9         |
| <b>Number of ponds on land (N=125)</b>                 | 7                          | 0-50   | 9         |



**Figure 13.** Photo of farm pond in Ringgold County, IA (Photo by Timothy M. Swartz)



**Figure 14.** Responses to "How many ponds do you have on your land?" (2017)

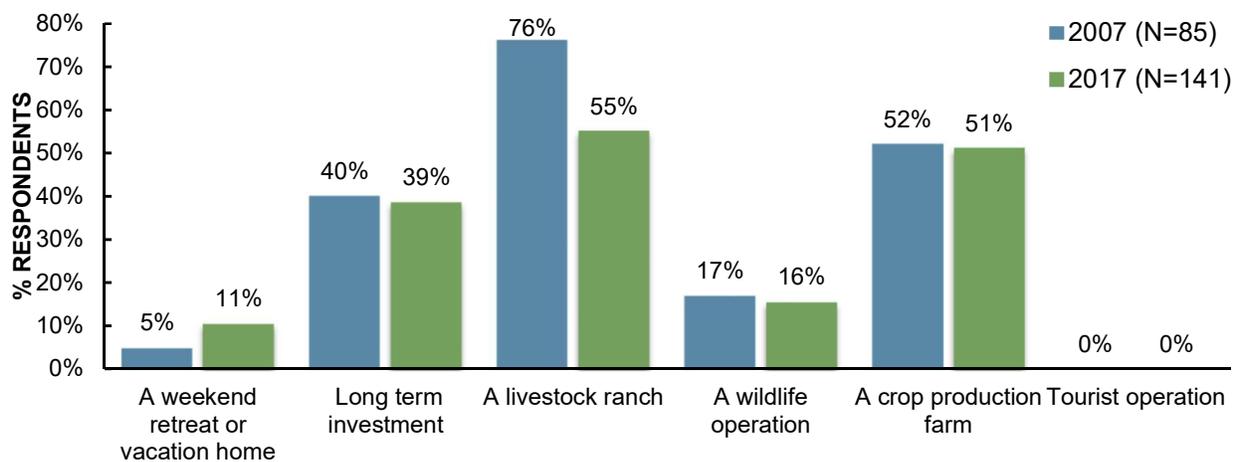
comprised 59 ha, and small grains such as oats, barley, and wheat on average were about 2 ha.

Human-constructed ponds were almost universally present on landowners' properties. Respondents had an average of 7 ponds (range 0-50; Table 2; Figure 13), and most had 1-4 ponds (Figure 14).

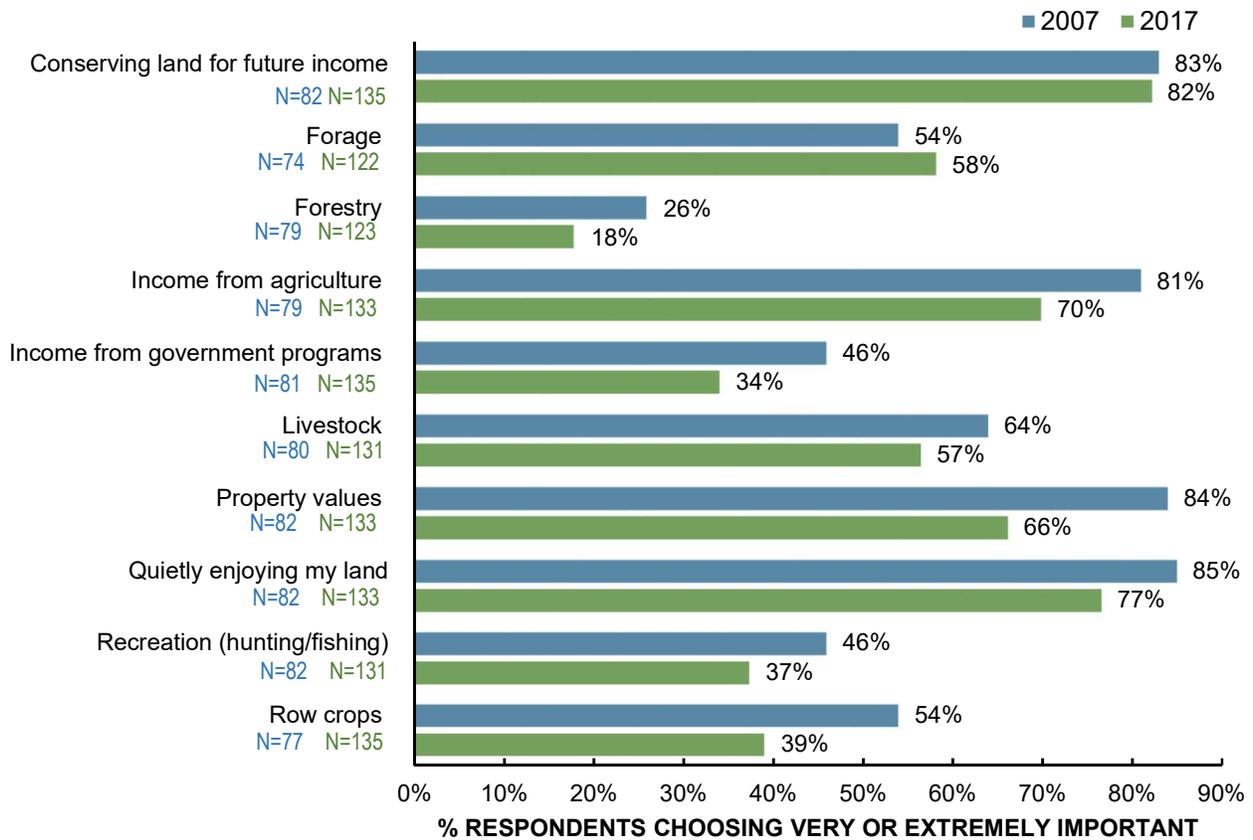
Landowners used their property in multiple ways, with livestock (55%) and crop production (51%) dominating (Figure 15). Over half of respondents reported crop production uses in both 2017 and 2007 surveys. There was a 21% decrease in the percentage of landowners who reported using their land as a livestock ranch, with only 55% now reporting this as a major

land use. However, 70% of landowners in another question reported that they graze cattle on their land (see p. 13). This discrepancy could be due to the increase in the average rented land (Table 1), which may be used for cattle grazing. The percent of landowners using their property for a wildlife operation has not changed much (~16%), but more respondents (11%) reported using their property as a weekend retreat or vacation home than in 2007 (5%).

To understand landowner values that underlie land use decisions, both 2007 and 2017 surveys asked respondents about how important different land uses were to them (Figure 16). Agricultural uses that were sources of current and fu-



**Figure 15.** Responses to "How do you use your property?" (2007 vs. 2017)



**Figure 16.** Responses to “How important are each of the following when deciding how to manage your land?” (2007 vs. 2017), reporting the percent of respondents choosing very or extremely important for each item

ture income were considered of great importance to most of the respondents in both years. There were decreases in the percent giving high importance to row crops (54 to 39%), livestock (64 to 57%), and forestry (26 to 18%). Conversely, the percent of respondents who thought forage was very to extremely important increased from 54% in 2007 to 58% in 2017.

A large proportion of respondents in both years emphasized the importance of quietly enjoying their land (85% very to extremely important in 2007; 77% in 2017) and property values (84% in 2007; 66% in 2017). A smaller but sizable percent rated recreational uses such as hunting and fishing as very to extremely important in both years 2007 (46%) and 2017 (37%).

We also asked landowners to rate the importance of various management goals to determine how priorities may have shifted over the course of a decade (Figure 17). Reducing soil erosion was highly important to almost all respondents in both years (>90%), followed closely by controlling invasive plants (>80%). There was a 17% decrease in the proportion of landowners who believe protecting wildlife habitat was very to extremely important, from 68% to 51%. Another drop was seen for restoring prairies and grasslands, from 51% to 31%. However, increasing biodiversity as a management goal was relatively stable over the decade (45% in 2007; 41% in 2017).

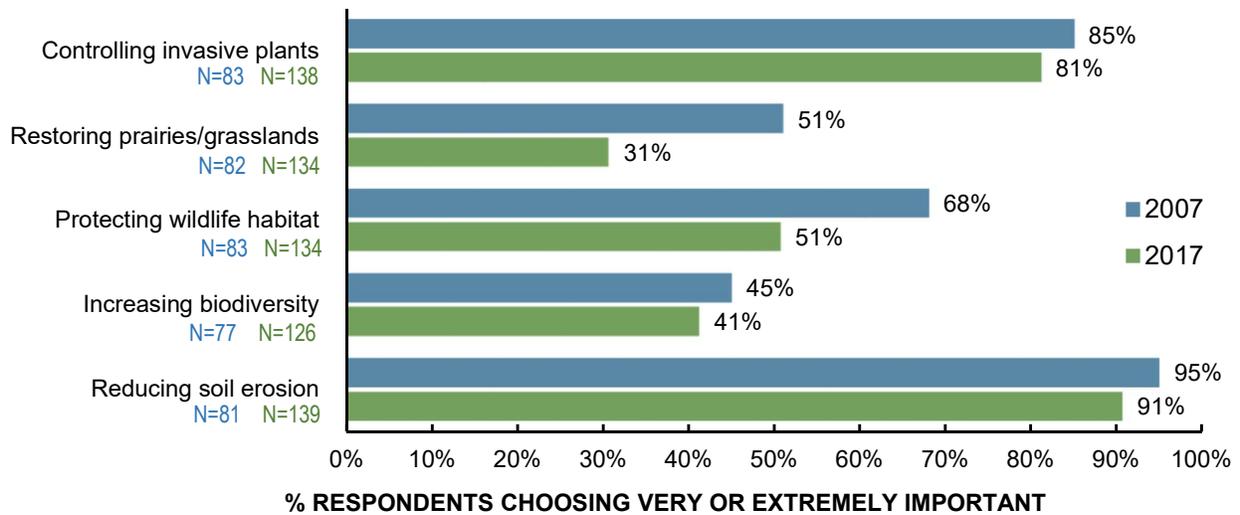


Figure 17. Responses to “How important are each of the following when deciding how to manage your land (2007 vs. 2017), reporting the percent of respondents choosing very or extremely important for each item

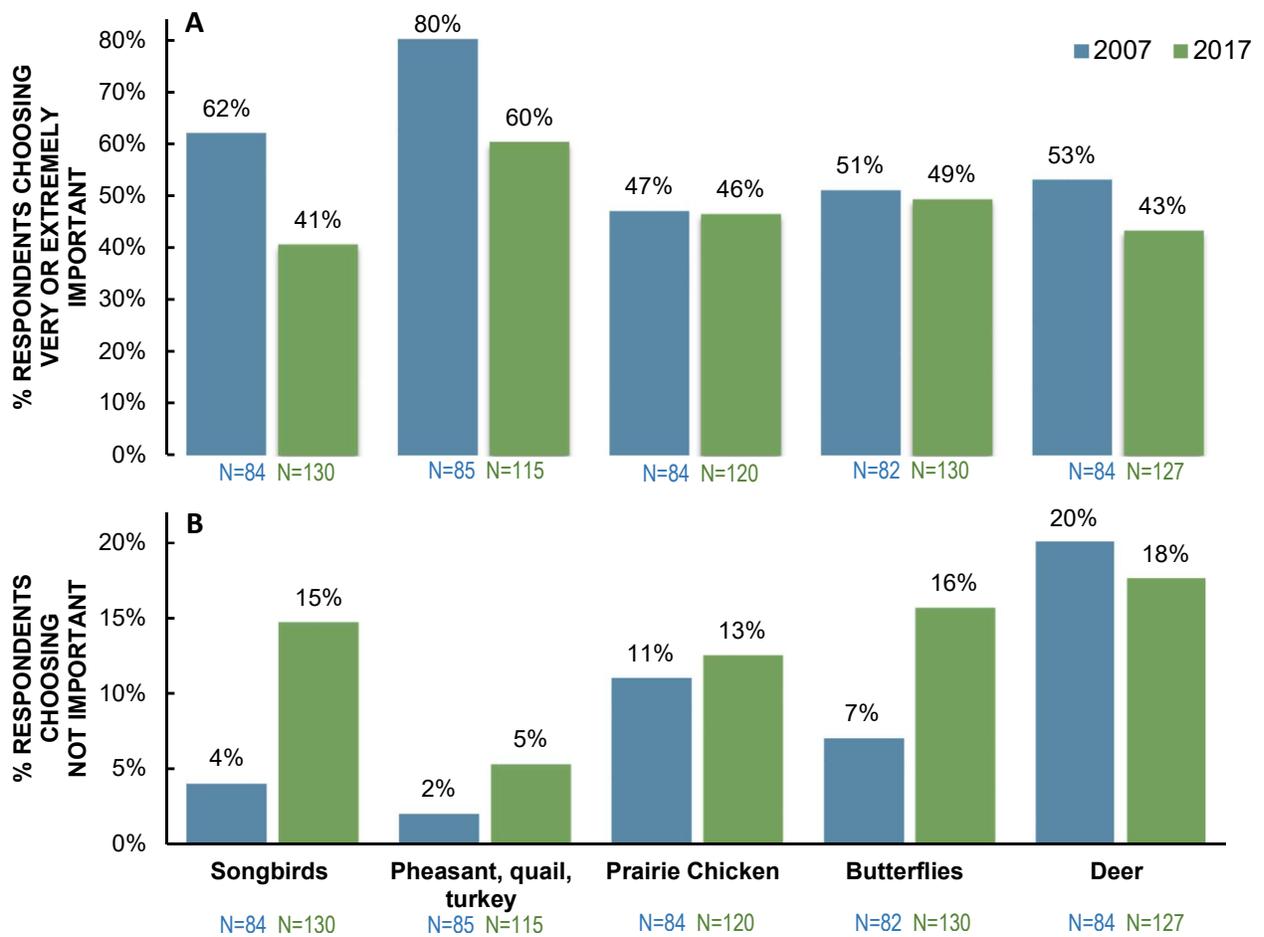
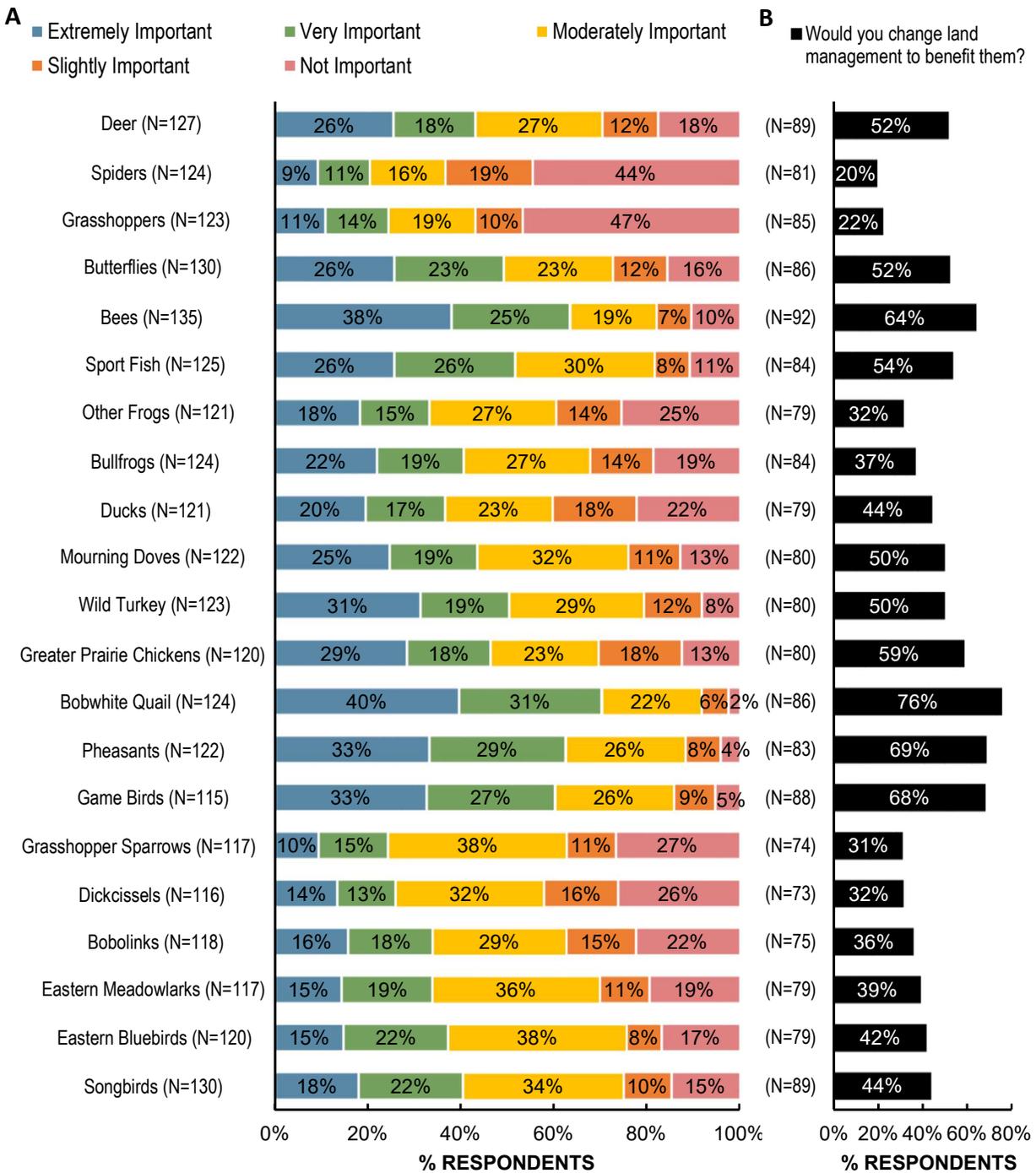


Figure 18. Responses to “How important is it to you to have the following animals/insects on your land.” (A) shows only those respondents choosing very or extremely important (2007 vs. 2017) and (B) shows only those choosing not important (2007 vs. 2017). Note that the axis scales are different between (A) and (B)



**Figure 19.** “How important is it to you to have the following animals/insects on your land” (A; 2017) and “Would you change management to benefit them?” (B; 2017)

### Attitudes Toward Grassland Wildlife

Landowners were asked their views on the importance of having specific animals on their land to determine which species are most valued (Figure 18). There were decreases in the

percent of landowners who highly valued both game and non-game species between 2007 and 2017: a 21% drop for songbirds, 20% for gamebirds, and 10% for deer. Greater Prairie Chicken (47%, 46%) and butterflies (51%, 49%) were similarly valued in 2007 and 2017. While there

was a decrease in the importance of game birds generally, we did find that a large proportion of landowners viewed northern bobwhite positively (40% extremely important).

We also asked landowners if they would be willing to change management practices to benefit these animals (Figure 19). Among the animals that landowners were most willing to change practice for were northern bobwhite (76%), pheasants (69%), songbirds (68%), greater prairie chicken (59%), wild turkey (50%), mourning dove (50%).

Bees (38%) and butterflies (26%) were also extremely important to a sizable portion of landowners. Grasshoppers/katydid (11%) and spiders had a much lower percent of landowners (9%) who thought they were extremely important. Sixty-four percent of landowners would change management to benefit bees while only 5% would do something different for butterflies.

A small proportion of landowners thought songbirds (18%) and specific bird species such as bobolinks (16%), Eastern Meadowlarks (15%), eastern bluebirds (15%), dickcissels (14%), and grasshopper sparrows (10%) were extremely important. However, a much higher percent of landowners (31-44%) were willing to

change management to benefit them. Wetland species were extremely important to some landowners: sport fish (26%), bullfrogs (22%), other frogs (18%) and ducks (20%). Willingness to change management to benefit these aquatic species ranged from a high of 54% for sport fish to 37% for bullfrogs and 32% for other frogs.

### Balancing Conservation and Economic Values

Landowners were asked how they balanced economic and environmental considerations when making decisions about natural resources (Figure 20). Responses were similar to 2007, yielding a bell curve with most respondents falling in the center of the continuum (78% in 2007; 63% in 2017). There were similar percentage of individuals selecting environmental concerns as their highest priority in 2017 (19%) and 2007 (15%). However, there was an erosion from the center to the left, with respondents who prioritize economic concerns increasing from 7% in 2007 to 18% in 2017.

### Cattle Production and Forage

About 70% of respondents grazed livestock on their land, nearly identical to 2007 (71%). Cattle producers were asked to what extent they

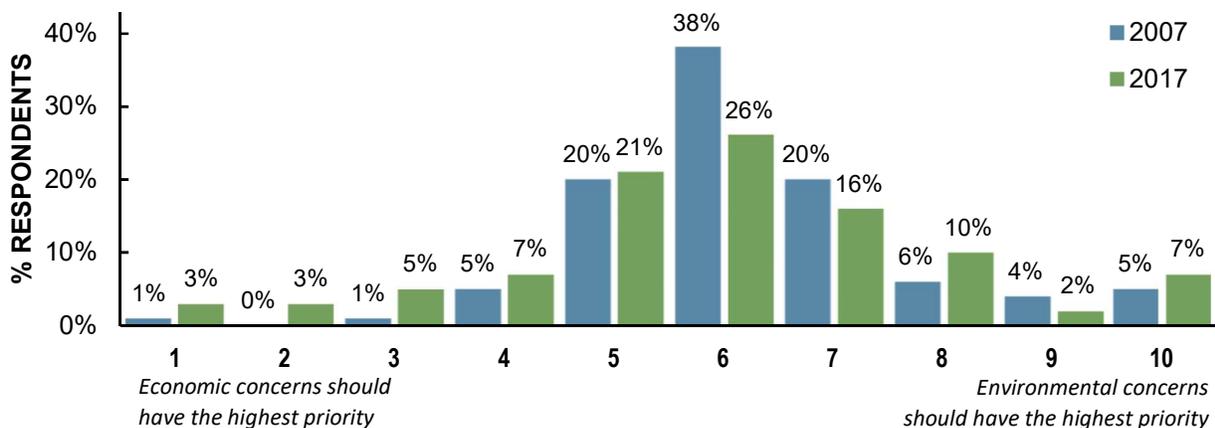
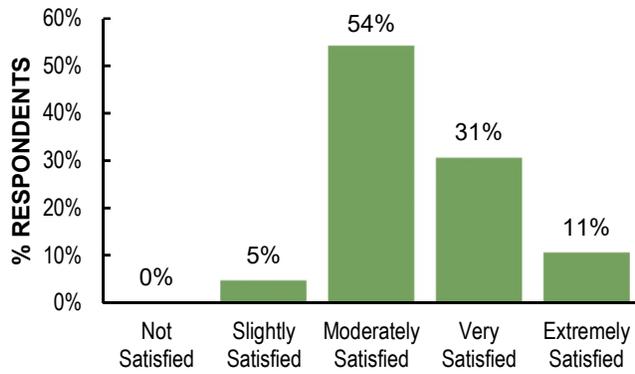


Figure 20. Responses to “Please locate yourself on the following scale regarding natural resource use” (2007 vs. 2017)



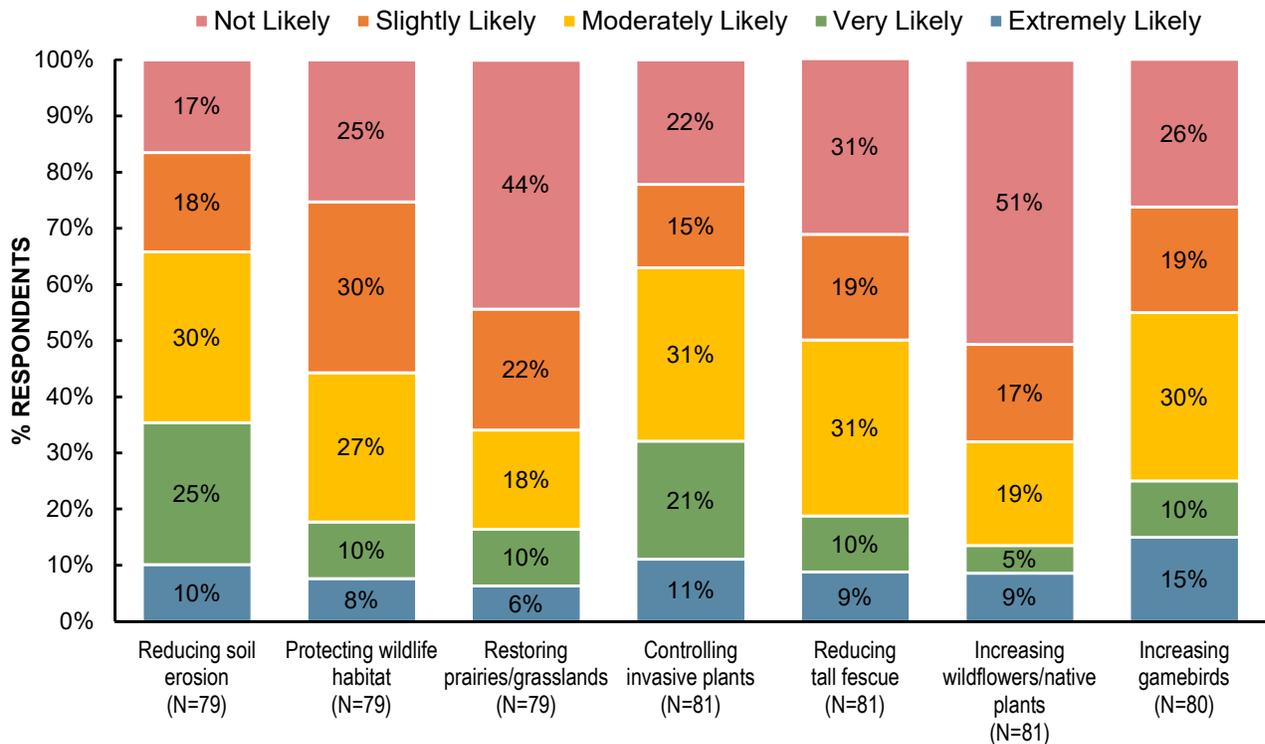
**Figure 21.** Responses to “to what extent are you satisfied with your growing season forage?” (2017)

were satisfied with their growing season forage (Figure 21), and a majority (54%) were moderately satisfied. Only 5% were less than moderately satisfied.

Cattle producers were also asked if they would be willing to reduce cattle stocking rate if this reduction resulted in particular outcomes. Producers were most likely to reduce stocking rate

to reduce soil erosion or control invasive plants (>60% moderately to extremely likely; Figure 22). Respondents were rather evenly split between moderate to extremely likely to reduce stocking rate and beef production per acre if it reduced tall fescue (50%); increased gamebirds (55%); and protected wildlife habitat (45%). However, a majority were *not* likely or were only slightly likely to adopt lower stocking that would result in restoring prairies/grasslands (66%), increasing wildflowers and native plants (68%), and protecting wildlife habitat (55%).

Cattle producers were also asked about the risks associated with having high levels of tall fescue on their pastures (Table 3). Over 60% were moderately to extremely concerned about fescue toxicosis and similarly extremely concerned about fescue foot and fescue tail (57%). Cattle producers were also moderately to extremely concerned about lower forage productivity (51%) and having fewer native



**Figure 22.** Responses to “How likely is it that you would adopt a management practice that would reduce stocking rate and beef production per acre if it resulted in the following.” (2017)

**Table 3.** Responses to “Please indicate to what extent you are concerned about the possible effects of having too much tall fescue on your grazing pastures.” (2017)

| Possible effects of having too much fescue on your land | % Cattle Producers<br>Moderately-Extremely Concerned |
|---|--|
| Fescue toxicosis (N=83)                                 | 60%  |
| Fescue foot/fescue tail (N=82)                          | 57%  |
| Lower forage productivity (N=82)                        | 51%  |
| Fewer native plants (N=81)                              | 48%  |
| Decreased milk production (N=80)                        | 46%  |

plants (48%). A little over 46% were moderately to extremely concerned about decreased milk production.

**Managing native and non-native plants**

Landowners were asked their perceptions of the vegetation composition on their land to get a coarse measure of the dominant plant types on private-land pastures in the GRG. It was reported that tall fescue was moderately abundant on 40% respondents’ properties, and extremely abundant on ~15% in both 2007 and 2017. Landowners also perceived that other

non-native grasses and legumes were abundant on their lands. Alfalfa/clover were reported to be moderately to extremely abundant on 58% of lands, and brome on 46% of them (Figure 24). Big bluestem and indiagrass were found occasionally (24% and 18% respectively).

We also asked landowners their self-perceptions concerning knowledge of native and non-native grasses, including tall fescue specifically. Respondents knew the least about native warm-season grasses (big bluestem, little bluestem, and indiagrass), with 21% rating themselves as not knowledgeable, 31% as



**Figure 23.** Photos of some of the common grass species in the Grand River Grasslands that were the focus of the 2017 survey, including a native warm-season grass (big bluestem, left), a non-native cool-season grass (tall fescue, middle), and a native-grass clump surrounded by a field of non-native grasses (right)

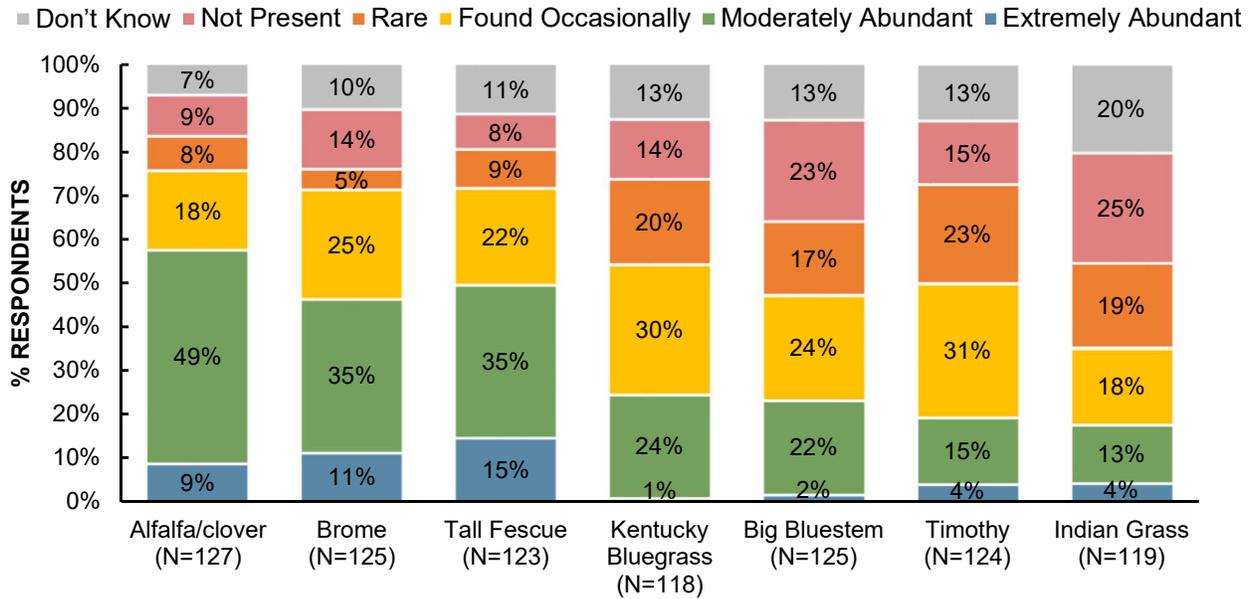


Figure 24. Responses to “How abundant are the following cover types on your land?” (2017)

slightly knowledgeable (Figure 25). Respondents believed they were more knowledgeable about non-native grasses (brome, orchard grass, and Kentucky bluegrass), with 68% moderately to extremely knowledgeable. Although, tall fescue was abundant on many GRG properties, 47% of respondents reported slight or no knowledge about this non-native grass.

Beyond knowledge, we also asked landowners what their attitudes were toward these three grass types (native warm-season grasses, non-

native grasses other than tall fescue, and tall fescue). To do this, we asked landowners to choose whether they think that 1) the grass must be removed from their land, 2) some of the grass allowable or preferable, or 3) the grass should be abundant on their land (Figure 26). One-third of landowners expressed preference for an abundance of native warm-season grasses and non-native grasses other than tall fescue on their land; and conversely, only 17% thought tall fescue should be abundant on their

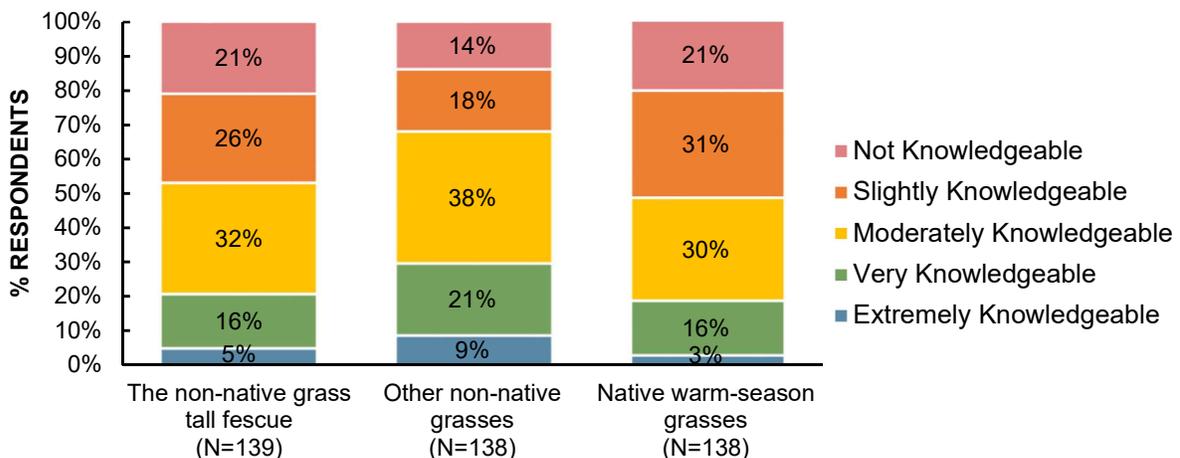
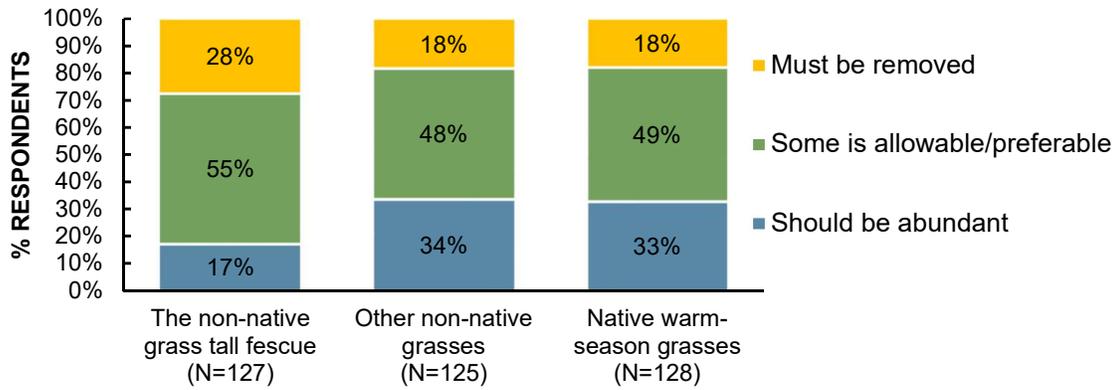


Figure 25. “Please rate your knowledge on the following grasses” (2017). We identified non-native grasses as brome, orchard grass, and Kentucky bluegrass; and native warm-season grasses as big bluestem, little bluestem, and indiagrass

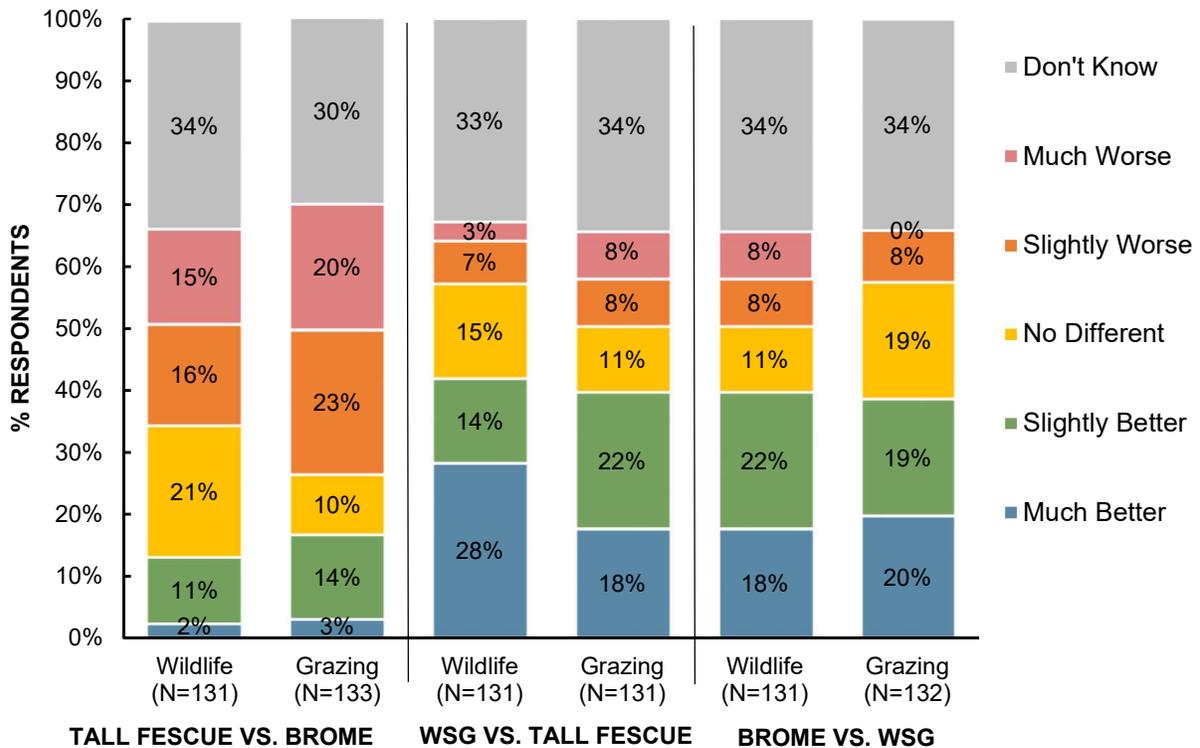


**Figure 26.** Responses to “Please locate yourself on the following scale regarding grasses on your land” (2017)

land. Twenty-eight percent thought tall fescue must be removed from their land, in comparison to only 18% that thought other non-native grasses and native warm-season grasses must be removed from their land.

Landowners also compared the utility of these grass types for both wildlife habitat and cattle production. One-third of respondents did not

know which grass type was best for either wildlife or cattle forage (Figure 27). Of those who believed they knew the difference, more landowners saw native grasses as better than tall fescue for both wildlife and grazing purposes. Twenty-eight percent of respondents thought that native warm-season grasses were much better for wildlife than tall fescue, and 18% thought warm-season grasses were better for



**Figure 27.** Responses to “Please respond to the following statements comparing grass types to the best of your knowledge,” comparing the non-native plants tall fescue and brome with native warm-season grasses (WSG) (2017)

grazing than tall fescue, compared to 3% who thought tall fescue was better for wildlife and 8% who thought fescue was better for grazing. Similarly, more respondents believed that tall fescue was worse than brome (another non-native grass) for both wildlife and grazing, but landowners perceived native warm-season grasses and brome similarly (Figure 27).

In general, landowners were more open to controlling non-native grasses (34.4% slightly or very positive) compared to eradicating them (19.5% slightly or very positive). Over a third of landowners reported using herbicide in the last 10 years to control non-native grasses, compared to 32.9% using prescribed fire, 32.3% physical removal, 28.6% increased grazing pressure, and 39.6% seeding native grasses.

A quarter of landowners reported having the financial resources to utilize these management techniques, 27% had access to the equipment necessary and 37.9% believed they had the overall ability to remove non-native grasses on their land. More than 41% of landowners were moderately to extremely willing to remove tall fescue on their land using herbicide vs. 40% for prescribed fire, 42% for physical removal/disking, 38% for increased grazing pressure, and 47% for seeding native grasses.

Respondents also evaluated whether they thought other people were willing to control non-native grasses. A little over 35% of respondents believed that it is moderately to extremely likely that *other landowners* supported the removal of non-native grasses. A much larger proportion of respondents believed that agency and university personnel support the removal of non-native grasses (52-54%).

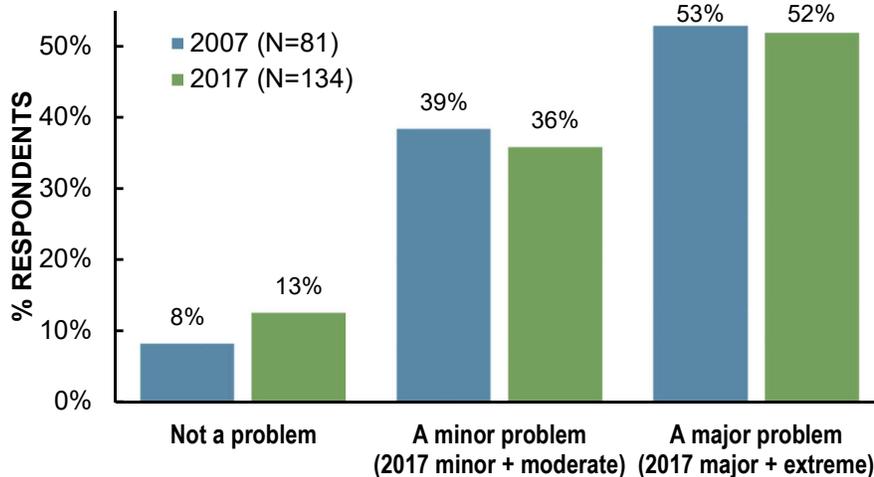
However, landowners were concerned about the side effects of managing non-native grasses. When asked about the possible negative effects of using herbicide (Table 4), the greatest percent of respondents were moderately to extremely concerned about soil erosion (72%) and herbicide resistance (69%). Many landowners were also moderately to extremely concerned about loss of forage (66%), risk to human safety (63%), loss of wildlife habitat (61%) and harm to wildlife (61%).

### ***Eastern Redcedar***

There has been very little change in the proportion of respondents who are concerned about eastern redcedar between 2007 and 2017. More than a third of landowners believe encroachment is a minor problem (29% 2007;

**Table 4.** Responses to “Please indicate to what extent you are concerned about the possible effects of using herbicide” (2017)

| <b>Risks of using herbicide</b>         | <b>% Moderately-Extremely Concerned</b> |
|---|---|
| <b>Risk to human safety (N=134)</b>     | 63%                                     |
| <b>Harm to wildlife (N=134)</b>         | 61%                                     |
| <b>Loss of wildlife habitat (N=132)</b> | 61%                                     |
| <b>Reduced scenic quality (N=130)</b>   | 50%                                     |
| <b>Soil erosion (N=131)</b>             | 72%                                     |
| <b>Loss of forage (N=129)</b>           | 66%                                     |
| <b>Herbicide resistance (N=131)</b>     | 69%                                     |



**Figure 28.** Responses to “Do you think the increase in redcedar and other trees in grasslands is a problem?” (2007 vs. 2017). In 2017, we used a 5-pt scale that has been collapsed for comparison to 2007. Collapsed categories are indicated on the graph



**Figure 29.** A landowner participating in a prescribed fire in the Grand River Grasslands in 2008

**Table 5.** ‘Yes’ responses to “Have you ever used/participated in the following techniques?” (2007), and “Have you used the following techniques on your land in the last 10 years?” (2017)

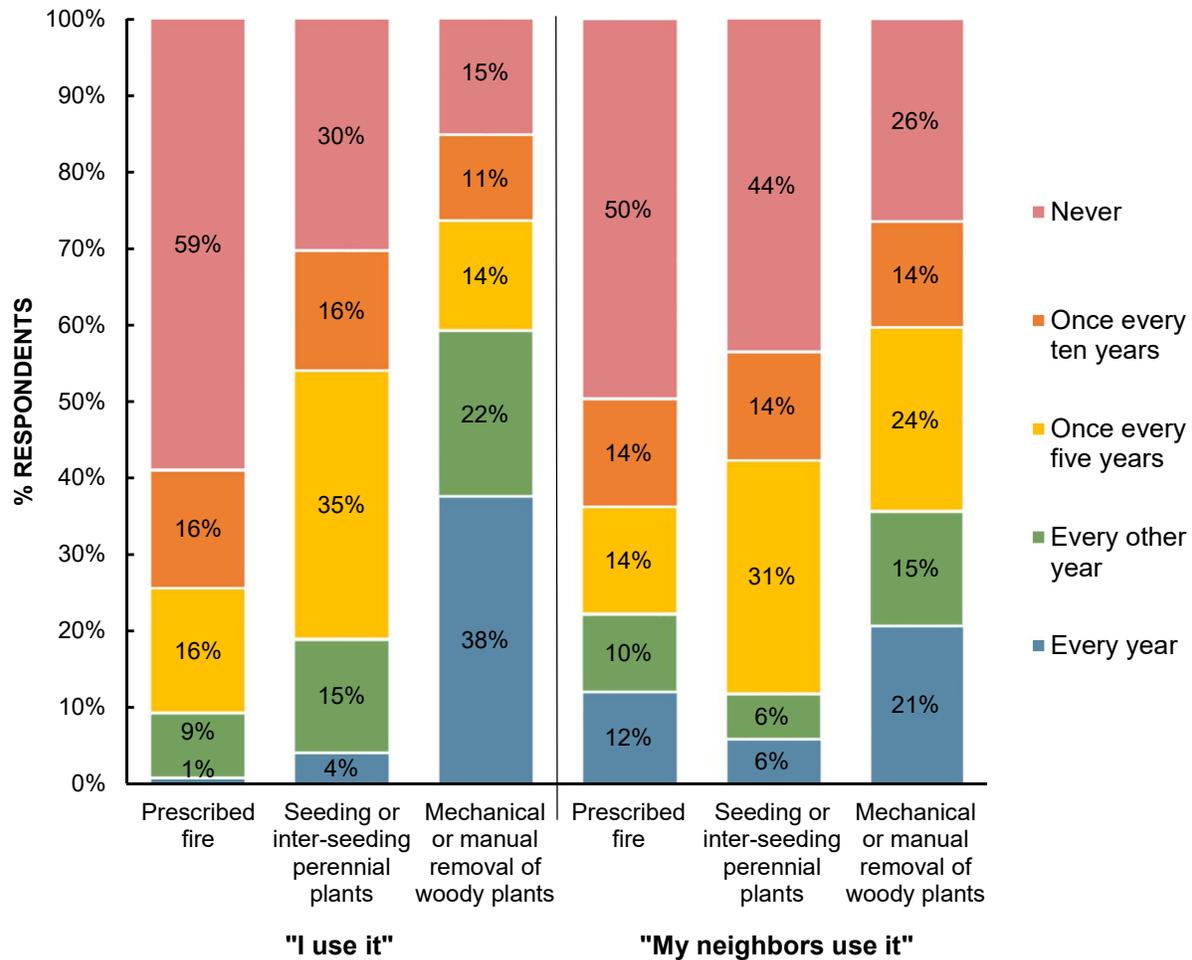
|   | 2007          | 2017           |
|---|---------------|----------------|
| <b>Prescribed fire</b>                    | 25%<br>(N=84) | 41%<br>(N=129) |
| <b>Mechanical removal of woody plants</b> | 75%<br>(N=69) | 85%<br>(N=125) |

36% 2017; Figure 28) and over half viewing encroachment as a major problem (53% 2007; 52% 2017). This indicates some stability in the attitudes toward eastern redcedar over this decade.

### **Grassland Management Techniques**

Management techniques commonly used to remove eastern redcedar, including physical removal of woody plants and prescribed fire (Figure 29), increased between 2007 and 2017, with the proportion of landowners who use mechanical removal of woody plants increasing by 10%, from 75% to 85% (Table 5). Many landowners reported using mechanical or manual removal of woody plants every year (38%), every other year (22%), or once every 5 years (14%; Figure 30).

We also found a 16% increase in the use of prescribed fire, from 25% to 41%. Twenty-six percent of these landowners report using prescribed fire at least every five years (Figure 30). This compared to 36% of respondents observing that their neighbors used prescribed fire at least once every five years (Figure 30).



**Figure 30.** Responses to "Please choose the best response regarding who uses certain grassland management techniques" (2017)

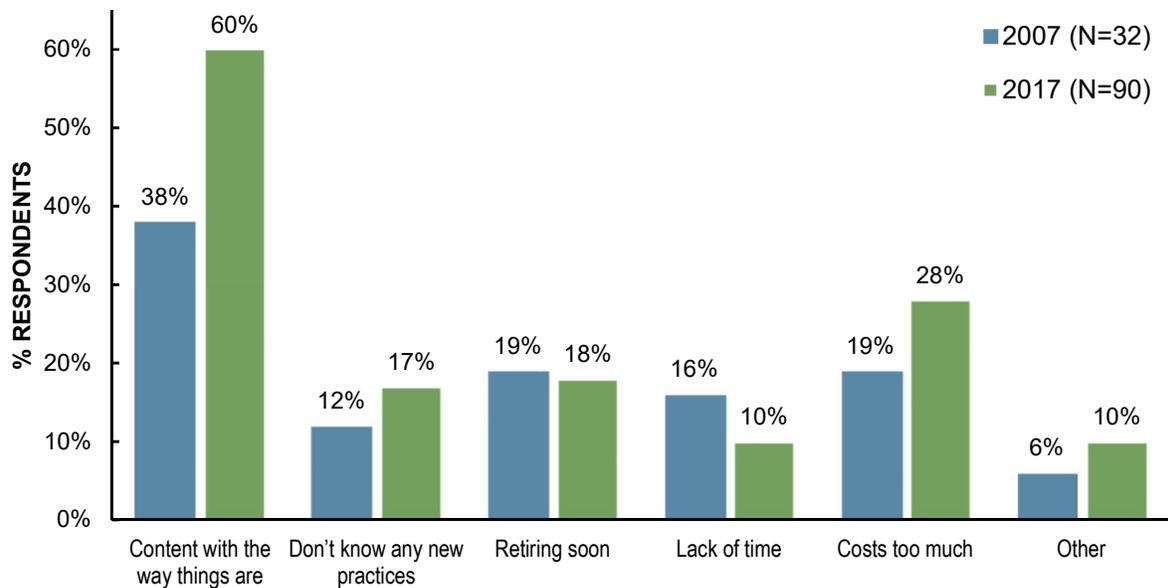
Fifty-four percent of landowners seed or inter-seed perennial plants once every five years (35%), every other year (25%), or every year (4%). This compares to 43% of their neighbors who were reported to seed perennial plants at least every five years.

With increases in woody removal and prescribed fire use and high rates of perennial seeding, it would follow that more landowners are experimenting with new management techniques. However, only 30% reported experimenting over that last ten years with new grassland management practices, compared with 33% of landowners in 2007 (Figure 28). The primary reason for not experimenting was

that the landowners reported being content with the way things are (38% 2007; 60% 2017). In 2017, more individuals perceived that new practices would cost too much (19% 2007; 28% 2017). Smaller proportions of landowners claimed they either did not know any new practices (12% 2007; 17% 2017), they expected to retire soon (~20% in both years), and lacked time to take on new practices (16% in 2007; 10% in 2017).

### Land-use Conversion

Public policies, macro- and micro-economic factors, and personal situations all contribute to landowners' decisions to convert grassland to cropland and woodlands as well as convert



**Figure 31.** Reasons why respondents answered "No" to "Have you ever experimented with new pasture/grassland management practices that differ from those you have traditionally used?" (2007 vs. 2017)

cropland and woodlands into grassland. Table 6 offers a snapshot of landowners' land use changes and conversions in the last five years. Over this time period, 19% of landowners converted 878 ha of grassland into cropland, with 65% coming out of the Conservation Reserve Program (CRP). During this same time period, almost 33% of landowners converted 1807 ha of cropland into grassland, with 65% of these going into CRP. Overall, this seems to have resulted in a net gain of 929 ha into grassland.

Almost three percent of landowners converted grassland into woodland for a total of 26 ha. About 89% of these came out of CRP. During this same five-year period, about 10% of the surveyed landowners converted 110 ha of woodland into grassland, with less than 4% of these acres enrolled into CRP. This was a net gain of 84 ha into grassland.

**Table 6.** Response to "In the past five years, have you converted...?" (2017)

| Conversion from grassland  | Conversion to grassland   |
|--|---|
| <p><b>Grassland → Cropland (N=134)</b><br/>           19.4% of landowners (N=26)<br/>           878 total ha<br/>           65.2% of these acres came out of CRP<br/>           Mean= 35; Std. Dev.=37</p> | <p><b>Cropland → Grassland (N=135)</b><br/>           32.6% of landowners (N=44)<br/>           1807 total ha<br/>           64.8% of these acres went into CRP<br/>           Mean= 47.6; Std. Dev.=94.9</p> |
| <p><b>Grassland → Woodland (N=135)</b><br/>           3.0% of landowners (N=4)<br/>           26 total ha<br/>           89.2% of these acres came out of CRP<br/>           Mean=7.6; Std. Dev.=5.6</p>   | <p><b>Woodland → Grassland (N=134)</b><br/>           10.4% of landowners (N=14)<br/>           110 total ha<br/>           3.7% of these acres went into CRP<br/>           Mean=8.5; Std. Dev.=11.9</p>     |



## CONCLUSIONS

This technical report is a longitudinal look at GRG landowners' grassland management practices, their knowledge of grassland systems, and their perceptions of biodiversity. Over the ten-year period, positive attitudes toward conservation seem to have eroded in some areas (with exceptions). However, more landowners are taking part in activities that are good for conservation. Fewer landowners believe that grassland restoration on their land is important in 2017 when compared to 2007. But, more landowners are using prescribed fire and physically removing woody plants, activities that promote grassland restoration.

There has also been a net gain in grassland area in the region, but quite a few hectares continue to shift back and forth between crop and grassland in the last five years, indicating some instability in cropland conversion trends.

Game species, especially northern bobwhite, remain important to residents, but most non-game wildlife have less importance to landowners in 2017 compared with 2007.

The exception to this are bees, which respondents find very important to have on their lands. It is likely landowner awareness and concern have been raised as threats to bee health and habitats have been heavily documented over the last several years.

There seems to be a knowledge gap concerning native and non-native grasses. More learning opportunities about the characteristics of native and non-native grasses could help landowners make better forage-management decisions.

We found evidence for social, agricultural and ecological co-benefits concerning management of tall fescue. More landowners believed that native warm season grasses are better for wildlife and grazing compared to fields dominated by the invasive grass tall fescue. Furthermore, many cattle producers were very concerned about the effects of having too much tall fescue on their land. If this leads to a willingness to manage and reduce tall fescue in grazing and forage fields, there is strong potential for habitat restoration and benefits to cattle production.

## References

1. Samson, F. and F. Knopf, *Prairie conservation in North America*. BioScience, 1994: p. 418-421
2. Wright, C.K. and M.C. Wimberly, *Recent land use change in the Western Corn Belt threatens grasslands and wetlands*. Proceedings of the National Academy of Sciences, 2013. (10)110 p. 4134-4139
3. Leja, W.T., *Aquatic habitats in the Midwest: waiting for amphibian conservation initiatives*. Status and conservation of midwestern amphibians. University of Iowa Press, Iowa City, 1998: p. 345-353
4. Sauer, J., et al., *The North American breeding bird survey, results and analysis 1966-2012, Version 02.19. 2014*. US Geological Survey, Patuxent Wildlife Research Center, Laurel, Maryland, USA, 2014
5. Brennan, L.A. and W.P. Kuvlesky, *North American grassland birds: An unfolding conservation crisis?* Journal of Wildlife Management, 2005. (1)69 p. 1-13
6. Lannoo, M.J., *Status and conservation of midwestern amphibians*. 1998: University of Iowa Press.
7. Gixti, J.C., et al., *Decline of bumble bees (Bombus) in the North American Midwest*. Biological conservation, 2009. (1)142 p. 75-84
8. Guo, L.B. and R. Gifford, *Soil carbon stocks and land use change: a meta analysis*. Global change biology, 2002.(4)8 p. 345-360
9. Morton, L.W., et al., *Perceptions of landowners concerning conservation, grazing, fire, and eastern redcedar management in tallgrass prairie*. Rangeland Ecology & Management, 2010.(6)63 p. 645-654
10. Miller, J.R., et al., *Nature reserves as catalysts for landscape change*. Frontiers in Ecology and the Environment, 2012. (3)10 p. 144-152
11. Harr, R.N., et al., *Landowners' perceptions of risk in grassland management: woody plant encroachment and prescribed fire*. Ecology and Society, 2014, (2)19
12. Samson, F.B., F.L. Knopf, and W.R. Ostlie, *Great Plains ecosystems: past, present, and future*. Wildlife Society Bulletin, 2004. (1)32
13. The Nature Conservancy, *Draft Grand River Grasslands Conservation Action Plan*. 2008: St. Louis, Missouri, U.S.A.
14. Diffenbaugh, N.S., et al., *Response of corn markets to climate volatility under alternative energy futures*. Nature climate change, 2012. (7)2 p. 514
15. Duffy, M., *Farmland tenure and ownership in Iowa 2007*. Iowa State University Extension Publication, 2008
16. Arachevaleta, M., et al., *Effect of the tall fescue endophyte on plant response to environmental stress*. Agronomy Journal, 1989. (1)81 p. 83-90
17. Hemken, R., et al., *Interaction of environmental temperature and anti-quality factors on the severity of summer fescue toxicosis*. Journal of animal science, 1981. (4)52 p. 710-714
18. Stuedemann, J.A. and C.S. Hoveland, *Fescue endophyte: History and impact on animal agriculture*. Journal of Production Agriculture, 1988. (1) p. 49-44
19. Fribourg, H.A., D.B. Hannaway, and C.P. West, *Tall fescue for the twenty-first century*. Vol. 53. 1991: ASA-CSSA-SSSA.
20. Barnes, T.G., S.J. DeMaso, and M.A. Bahm, *The impact of 3 exotic, invasive grasses in the Southeastern United States on wildlife*. Wildlife Society Bulletin, 2013. (3)37 p. 498-502.
21. Dillman, D.A., J.D. Smyth, and L.M. Christian, *Internet, phone, mail, and mixed-mode surveys: the tailored design method*. 2014: John Wiley & Sons
22. NASS, U., *Census of Agriculture*. US Department of Agriculture, National Agricultural Statistics Service, Washington, DC, 2012
23. Duffy, M. and A. Johanns, *Farmland Ownership and Tenure in Iowa*. 2014. Iowa State University Extension: Ames, IA

# Appendix

## Section 1 of 5: Land Information

1. For how long have you/your family owned land in southern IA/northern MO? \_\_\_\_\_ years

2. How many acres do you own, rent, or manage in southern IA/northern MO?

Number of Acres

Own ..... \_\_\_\_\_

Rent ..... \_\_\_\_\_

Manage land for absent property owners ..... \_\_\_\_\_

3. Do you currently live on your land?                      **Yes**                      **No**      (*circle one*)

a. If no, how far do you live from your land? ..... \_\_\_\_\_ miles

4. How do you use your property? (*check all that apply*)

A residence ..... \_\_\_\_\_      A crop production farm ..... \_\_\_\_\_

A weekend retreat or vacation home ..... \_\_\_\_\_      A livestock ranch ..... \_\_\_\_\_

Long term investment ..... \_\_\_\_\_      Tourist operation (dude ranch, bed & breakfast) ..... \_\_\_\_\_

A wildlife operation ..... \_\_\_\_\_      Other, please specify: \_\_\_\_\_

5. Please estimate the current percentage (0-100) of each cover type on your land. Categories can add to more than 100.

|   | <u>% of Land</u> |   | <u>% of Land</u> |
|---|------------------|---|------------------|
| Open pasture/grassland (all types)..... | _____            | Woodland (all types) .....                    | _____            |
| - Grazed grassland.....                 | _____            | - Red cedar (only).....                       | _____            |
| - Hay.....                              | _____            | Corn/soy.....                                 | _____            |
| - Other ungrazed grassland .....        | _____            | Small grains (oats, wheat, barley, etc) ..... | _____            |

6. Do you think the increase in red cedar and other trees in grasslands is a problem?

|               |                 |                    |               |                    |
|---------------|-----------------|--------------------|---------------|--------------------|
| Not a problem | A minor problem | A moderate problem | A big problem | An extreme problem |
| 1             | 2               | 3                  | 4             | 5                  |

7. Please estimate the current abundance of each cover type on your land

|                         | Not Present | Rare | Found Occasionally | Moderately Abundant | Extremely Abundant | Don't know |
|-------------------------|-------------|------|--------------------|---------------------|--------------------|------------|
| Alfalfa/clover .....    | 1           | 2    | 3                  | 4                   | 5                  | 6          |
| Big Bluestem .....      | 1           | 2    | 3                  | 4                   | 5                  | 6          |
| Brome .....             | 1           | 2    | 3                  | 4                   | 5                  | 6          |
| Indian Grass .....      | 1           | 2    | 3                  | 4                   | 5                  | 6          |
| Kentucky Bluegrass..... | 1           | 2    | 3                  | 4                   | 5                  | 6          |
| Tall Fescue .....       | 1           | 2    | 3                  | 4                   | 5                  | 6          |
| Timothy.....            | 1           | 2    | 3                  | 4                   | 5                  | 6          |

## Section 2 of 5: Making Land Management Decisions

### 8. How important to you are each of the following when deciding how to manage your land?

|  | Not Important | Slightly Important | Moderately Important | Very Important | Extremely Important |
|--|---------------|--------------------|----------------------|----------------|---------------------|
| Conserving land for future income..... | 1             | 2                  | 3                    | 4              | 5                   |
| Forage .....                           | 1             | 2                  | 3                    | 4              | 5                   |
| Forestry .....                         | 1             | 2                  | 3                    | 4              | 5                   |
| Income from agriculture .....          | 1             | 2                  | 3                    | 4              | 5                   |
| Income from government programs.....   | 1             | 2                  | 3                    | 4              | 5                   |
| Livestock .....                        | 1             | 2                  | 3                    | 4              | 5                   |
| Property values.....                   | 1             | 2                  | 3                    | 4              | 5                   |
| Quietly enjoying my land .....         | 1             | 2                  | 3                    | 4              | 5                   |
| Recreation (hunting/fishing).....      | 1             | 2                  | 3                    | 4              | 5                   |
| Row crops.....                         | 1             | 2                  | 3                    | 4              | 5                   |

### 9. How important to you are each of the following issues?

|  | Not Important | Slightly Important | Moderately Important | Very Important | Extremely Important |
|--|---------------|--------------------|----------------------|----------------|---------------------|
| Reducing soil erosion .....                | 1             | 2                  | 3                    | 4              | 5                   |
| Increasing biodiversity .....              | 1             | 2                  | 3                    | 4              | 5                   |
| Protecting wildlife habitat.....           | 1             | 2                  | 3                    | 4              | 5                   |
| Restoring prairies/grasslands .....        | 1             | 2                  | 3                    | 4              | 5                   |
| Controlling invasive plants .....          | 1             | 2                  | 3                    | 4              | 5                   |
| Increasing wildflowers/native plants ..... | 1             | 2                  | 3                    | 4              | 5                   |
| Protecting against drought.....            | 1             | 2                  | 3                    | 4              | 5                   |

### 10. Please choose the best response regarding who uses certain grassland management techniques.

| Technique  | Who uses technique       | Never | Once every ten years | Once every five years | Every other year | Every year |
|--|--------------------------|-------|----------------------|-----------------------|------------------|------------|
| Prescribed fire .....                              | I use it.....            | 1     | 2                    | 3                     | 4                | 5          |
|  | My neighbors use it..... | 1     | 2                    | 3                     | 4                | 5          |
| Seeding or inter-seeding perennial plants .....    | I use it.....            | 1     | 2                    | 3                     | 4                | 5          |
|  | My neighbors use it..... | 1     | 2                    | 3                     | 4                | 5          |
| Mechanical or manual removal of woody plants ..... | I use it.....            | 1     | 2                    | 3                     | 4                | 5          |
|  | My neighbors use it..... | 1     | 2                    | 3                     | 4                | 5          |

### 11. Please locate yourself on the following scale regarding natural resource use:

|  |   |   |   |   |   |   |  |   |    |
|--|---|---|---|---|---|---|--|---|----|
| Economic considerations should have the highest priority |   |   | Both economic and environmental considerations should have equal priority |   |   |   | Environmental consideration should have the highest priority |   |    |
| 1  | 2 | 3 | 4   | 5 | 6 | 7 | 8  | 9 | 10 |

**12. How important is it to you to have the following animals/insects on your land?**

|                              | Not Important | Slightly Important | Moderately Important | Very Important | Extremely Important | Don't Know | Would you change land management to benefit them? |
|------------------------------|---------------|--------------------|----------------------|----------------|---------------------|------------|---|
| Songbirds (all types) .....  | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Eastern Bluebirds .....      | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Eastern Meadowlarks .....    | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Bobolinks .....              | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Dickcissels .....            | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Grasshopper Sparrows .....   | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Game birds (all types) ..... | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Pheasants .....              | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Bobwhite Quail .....         | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Greater Prairie Chicken      | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Wild Turkey .....            | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Mourning Dove .....          | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Bullfrogs .....              | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Other frogs .....            | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Sport fish (e.g. bass) ..... | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Bees .....                   | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Butterflies .....            | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Grasshoppers/Katydid .....   | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Spiders .....                | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |
| Deer .....                   | 1             | 2                  | 3                    | 4              | 5                   | 6          | Yes / No  |

**13. In the last five years, have you...? (approximate number of acres is fine, check all that apply):**

|  |   |
|--|---|
| <input type="checkbox"/> Converted existing pasture/grassland to crop production | If yes, how many acres? _____<br>If yes, how many acres <b>came out of CRP</b> ?* _____ |
| <input type="checkbox"/> Converted cropland to pasture/grassland                 | If yes, how many acres? _____<br>If yes, how many acres <b>went into CRP</b> ? _____    |
| <input type="checkbox"/> Converted pasture/grassland to woodland/red cedar land  | If yes, how many acres? _____<br>If yes, how many acres <b>came out of CRP</b> ? _____  |
| <input type="checkbox"/> Converted woodland/red cedar land to pasture/grasslands | If yes, how many acres? _____<br>If yes, how many acres <b>went into CRP</b> ? _____    |
| <input type="checkbox"/> Other; converted _____ to _____                         | If yes, how many acres? _____   |
| <input type="checkbox"/> Not changed my land use                                 |   |

\*Conservation Reserve Program

**14. Have you ever experimented with new pasture/grassland management practices that differ from those you have traditionally used?**

|                                       | Yes   | No    | If no, why not?             |
|---------------------------------------|-------|-------|-----------------------------|
| Content with the way things are ..... | _____ | _____ | Lack of time..... _____     |
| Don't know any new practices .....    | _____ | _____ | Costs too much .....        |
| Retiring soon .....                   | _____ | _____ | Other, please specify _____ |

### Section 3 of 5: Management of Non-Native Grasses

#### 15. Please rate your knowledge on...

|   | Not Know-<br>edgeable | Slightly Know-<br>edgeable | Moderately<br>Knowledgeable | Very Know-<br>edgeable | Extremely<br>Knowledgeable |
|---|-----------------------|----------------------------|-----------------------------|------------------------|----------------------------|
| The non-native grass tall fescue.....   | 1                     | 2                          | 3                           | 4                      | 5                          |
| Other non-native grasses (brome, orchard<br>grass, Kentucky bluegrass, etc.) .....      | 1                     | 2                          | 3                           | 4                      | 5                          |
| Native warm-season grasses (big bluestem,<br>little bluestem, indian grass, etc.) ..... | 1                     | 2                          | 3                           | 4                      | 5                          |

#### 16. Please locate yourself on the following scale regarding grasses on your land:

|                                 | Must be removed from my land | Some is allowable or preferable | Should be abundant on my land |
|---------------------------------|------------------------------|---------------------------------|-------------------------------|
| Tall fescue .....               | 1                            | 2                               | 3                             |
| Other non-native grasses .....  | 1                            | 2                               | 3                             |
| Native warm-season grasses .... | 1                            | 2                               | 3                             |

#### 17. Please respond to the following statements comparing grass types to the best of your knowledge

|   | Much<br>Worse | Slightly<br>Worse | No<br>Different | Slightly Bet-<br>ter | Much<br>Better |
|---|---------------|-------------------|-----------------|----------------------|----------------|
| Tall fescue is ___ than brome for wildlife .....              | 1             | 2                 | 3               | 4                    | 5              |
| Tall fescue is ___ than brome for grazing .....               | 1             | 2                 | 3               | 4                    | 5              |
| Warm-season grasses are ___ than tall fescue for wildlife ... | 1             | 2                 | 3               | 4                    | 5              |
| Warm-season grasses are ___ than tall fescue for grazing ...  | 1             | 2                 | 3               | 4                    | 5              |
| Brome is ___ than warm-season grasses for wildlife .....      | 1             | 2                 | 3               | 4                    | 5              |
| Brome is ___ than warm-season grasses for grazing .....       | 1             | 2                 | 3               | 4                    | 5              |

#### 18. Please respond to the following statements about non-native grass management.

|   | Very Nega-<br>tive | Slightly<br>Negative | Neutral | Slightly<br>Positive | Very Posi-<br>tive |
|---|--------------------|----------------------|---------|----------------------|--------------------|
| <b>Planting</b> non-native grasses on my land would be .....      | 1                  | 2                    | 3       | 4                    | 5                  |
| <b>Controlling</b> non-native grasses on my land would be .....   | 1                  | 2                    | 3       | 4                    | 5                  |
| <b>Reducing</b> non-native grasses on my land would be .....      | 1                  | 2                    | 3       | 4                    | 5                  |
| <b>Eradicating</b> non-native grasses from my land would be ..... | 1                  | 2                    | 3       | 4                    | 5                  |

#### 19. How often have you used the following methods to control non-native grasses on your land?

|                                    | Not At All | Once in 10 years | Once in 5 years | Every other year | Every Year |
|------------------------------------|------------|------------------|-----------------|------------------|------------|
| Herbicide .....                    | 1          | 2                | 3               | 4                | 5          |
| Prescribed fire .....              | 1          | 2                | 3               | 4                | 5          |
| Physical removal (e.g. disking) .. | 1          | 2                | 3               | 4                | 5          |
| Increased grazing pressure .....   | 1          | 2                | 3               | 4                | 5          |
| Seeding native grasses .....       | 1          | 2                | 3               | 4                | 5          |

**20. How likely is it that...**

|  | Not Likely | A Little Likely | Moderately Likely | Very Likely | Extremely Likely |
|--|------------|-----------------|-------------------|-------------|------------------|
| Most landowners who live near me <b>would support control of non-native grasses</b> on private land.....   | 1          | 2               | 3                 | 4           | 5                |
| Most landowners who live near me <b>control non-native grasses</b> on their own land .....   | 1          | 2               | 3                 | 4           | 5                |
| Controlling non-native grasses <b>is encouraged</b> by public institutions that I value input from (i.e. Natural Resources Conservation Service, state agencies, university researchers) | 1          | 2               | 3                 | 4           | 5                |

**21. To what extent do you agree with the following statements controlling non-native grasses?**

|  | Strongly Disagree | Disagree | Neither Agree or Disagree | Agree | Strongly Agree |
|--|-------------------|----------|---------------------------|-------|----------------|
| I feel obligated to eradicate non-native grasses on my land .....                              | 1                 | 2        | 3                         | 4     | 5              |
| I would feel guilty if I didn't stop the spread of non-native grasses in my neighborhood ..... | 1                 | 2        | 3                         | 4     | 5              |
| I am concerned about the unwanted effects of controlling non-native grasses on my land .....   | 1                 | 2        | 3                         | 4     | 5              |
| It is my responsibility to reduce non-native grass presence in my neighborhood .....           | 1                 | 2        | 3                         | 4     | 5              |

**22. Please indicate to what extent you are concerned about the possible effects of using herbicide.**

|                                | Not Concerned | Slightly Concerned | Moderately Concerned | Very Concerned | Extremely Concerned |
|--------------------------------|---------------|--------------------|----------------------|----------------|---------------------|
| Risk to human safety .....     | 1             | 2                  | 3                    | 4              | 5                   |
| Harm to wildlife .....         | 1             | 2                  | 3                    | 4              | 5                   |
| Loss of wildlife habitat ..... | 1             | 2                  | 3                    | 4              | 5                   |
| Reduced scenic quality.....    | 1             | 2                  | 3                    | 4              | 5                   |
| Soil erosion.....              | 1             | 2                  | 3                    | 4              | 5                   |
| Loss of forage .....           | 1             | 2                  | 3                    | 4              | 5                   |
| Herbicide resistance*.....     | 1             | 2                  | 3                    | 4              | 5                   |

*\*Defined as the inherited ability of a plant to survive after herbicide, which may lead to more herbicide-resistant plants over time.*

**23. To what extent do you agree with the following statements about the resources needed to control any non-native grasses on your land?**

|  | Strongly Disagree | Disagree | Neither Agree or Disagree | Agree | Strongly Agree |
|--|-------------------|----------|---------------------------|-------|----------------|
| I have the <b>financial resources</b> to control non-native grasses .....                          | 1                 | 2        | 3                         | 4     | 5              |
| I have the <b>skills or access to the skills</b> required to control non-native grasses .....      | 1                 | 2        | 3                         | 4     | 5              |
| I have the <b>equipment or access to the equipment</b> required to control non-native grasses..... | 1                 | 2        | 3                         | 4     | 5              |

**24. How willing are you to control the specified grasses on your land with the following methods?**

| Method                                | Managed Grass/es                   | Not Willing | A Little Willing | Moderately Willing | Very Willing | Extremely Willing |
|---------------------------------------|------------------------------------|-------------|------------------|--------------------|--------------|-------------------|
| Herbicide .....                       | Tall fescue.....                   | 1           | 2                | 3                  | 4            | 5                 |
|                                       | Non-native grasses (all types).... | 1           | 2                | 3                  | 4            | 5                 |
| Prescribed fire .....                 | Tall fescue.....                   | 1           | 2                | 3                  | 4            | 5                 |
|                                       | Non-native grasses (all types).... | 1           | 2                | 3                  | 4            | 5                 |
| Physical removal (e.g. disking) ..... | Tall fescue.....                   | 1           | 2                | 3                  | 4            | 5                 |
|                                       | Non-native grasses (all types).... | 1           | 2                | 3                  | 4            | 5                 |
| Increased grazing pressure .....      | Tall fescue.....                   | 1           | 2                | 3                  | 4            | 5                 |
|                                       | Non-native grasses (all types).... | 1           | 2                | 3                  | 4            | 5                 |
| Seeding native grasses .....          | Tall fescue.....                   | 1           | 2                | 3                  | 4            | 5                 |
|                                       | Non-native grasses (all types).... | 1           | 2                | 3                  | 4            | 5                 |

**Section 4 of 5: Grazing Management**

*Please fill out this section if you graze livestock. If you do not graze livestock, proceed to section 5 on the following page.*

**25. To what extent are you satisfied with the productivity of your growing-season forage?**

|               |                    |                      |                |                     |
|---------------|--------------------|----------------------|----------------|---------------------|
| Not Satisfied | Slightly Satisfied | Moderately Satisfied | Very Satisfied | Extremely Satisfied |
| 1             | 2                  | 3                    | 4              | 5                   |

**26. How likely is it that you would adopt a management practice that would reduce stocking rate and beef production per acre if it resulted in:**

|  | Not Likely | Slightly Likely | Moderately Likely | Very Likely | Extremely Likely |
|--|------------|-----------------|-------------------|-------------|------------------|
| Reducing soil erosion .....                | 1          | 2               | 3                 | 4           | 5                |
| Protecting wildlife habitat.....           | 1          | 2               | 3                 | 4           | 5                |
| Restoring prairies/grasslands .....        | 1          | 2               | 3                 | 4           | 5                |
| Controlling invasive plants.....           | 1          | 2               | 3                 | 4           | 5                |
| Reducing tall fescue .....                 | 1          | 2               | 3                 | 4           | 5                |
| Increasing wildflowers/native plants ..... | 1          | 2               | 3                 | 4           | 5                |
| Increasing gamebirds (e.g. quail) .....    | 1          | 2               | 3                 | 4           | 5                |

**27. Please indicate to what extent you are concerned about the following possible effects of having too much tall fescue on your grazing pastures.**

| Potential effects of tall fescue | Not Concerned | Slightly Concerned | Moderately Concerned | Very Concerned | Extremely Concerned |
|----------------------------------|---------------|--------------------|----------------------|----------------|---------------------|
| Decreased milk production .....  | 1             | 2                  | 3                    | 4              | 5                   |
| Fescue foot/fescue tail.....     | 1             | 2                  | 3                    | 4              | 5                   |
| Fescue toxicosis .....           | 1             | 2                  | 3                    | 4              | 5                   |
| Lower forage productivity .....  | 1             | 2                  | 3                    | 4              | 5                   |
| Fewer native plants .....        | 1             | 2                  | 3                    | 4              | 5                   |

**Section 5 of 5: About You**

**28. Gender**    \_\_\_Female    \_\_\_Male    \_\_\_Other

**29. Year born** \_\_\_\_\_

**30. Annual household income before taxes (choose one)**

|                          |       |                         |       |
|--------------------------|-------|-------------------------|-------|
| Less than \$15,000 ..... | _____ | \$75,000-99,999 .....   | _____ |
| \$15,000-24,999 .....    | _____ | \$100,000-149,999 ..... | _____ |
| \$25,000-34,999 .....    | _____ | \$150,000-199,999 ..... | _____ |
| \$35,000-49,999 .....    | _____ | \$200,000-249,999 ..... | _____ |
| \$50,000-74,999 .....    | _____ | \$250,000 or more.....  | _____ |

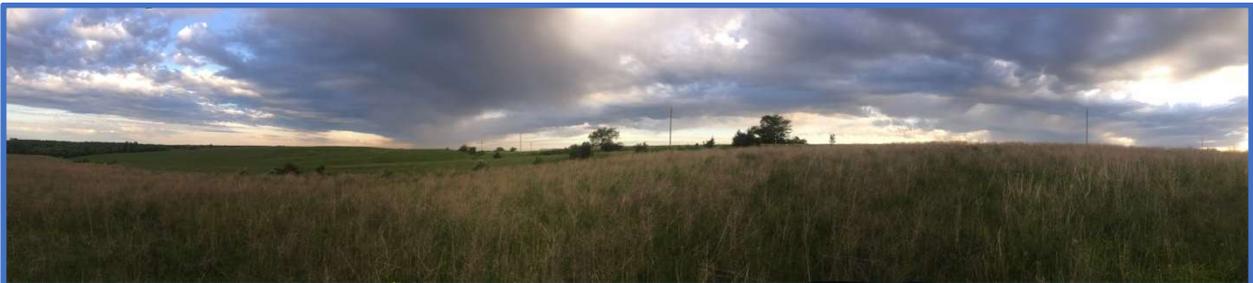
**31. What portion of your household income comes from your land? \_\_\_\_\_%**

**32. What is the highest level of education you have completed?**

|                                  |       |                                       |       |
|----------------------------------|-------|---------------------------------------|-------|
| Some high school .....           | _____ | Bachelor's degree .....               | _____ |
| High school graduate.....        | _____ | Some graduate school .....            | _____ |
| Technical/vocational school..... | _____ | Graduate or professional degree ..... | _____ |
| Some college .....               | _____ |                                       |       |

**33. Are you interested in any of the following?**

|   | Not Interested | A Little Interested | Moderately Interested | Very Interested | Extremely Interested |
|---|----------------|---------------------|-----------------------|-----------------|----------------------|
| Receiving education materials on non-native grass control ..... | 1              | 2                   | 3                     | 4               | 5                    |
| Attending an herbicide application demonstration .....          | 1              | 2                   | 3                     | 4               | 5                    |



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