COLORADO PARKS AND WILDLIFE - AVIAN RESEARCH PROGRAM
Progress Report
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TITLE: Pilot study to evaluate avian response to conservation reserve program mid-contract management practices in northeastern Colorado

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EXTENDED ABSTRACT

The Conservation Reserve Program (CRP) is a government program in which landowners are paid to maintain grass cover on land that was, and would otherwise be, used for row-crop agriculture. Overall, the CRP has had many documented benefits to wildlife, specifically grassland birds, many of which are experiencing range-wide declines due to habitat loss and degradation. However, as CRP fields age with no disturbance, litter increases, bare ground decreases, vegetation density increases, and plant species and structural diversity decrease, which can reduce the value of CRP fields to certain bird species. Therefore, beginning in 2004, some type of "mid-contract management" was required on CRP fields. In northeastern Colorado this management typically consists of haying, disking, or disking and interseeding with forbs. Although there is some evidence that disking and interseeding can provide benefits to ring-necked pheasants in other regions, we lack a thorough understanding of how these various management practices affect pheasants and grassland dependent songbirds in northeastern Colorado. In an effort to provide guidance to managers and landowners regarding grassland management on CRP fields in northeastern Colorado, we will monitor the response of pheasants and songbirds to the three most common CRP mid-contract management practices (haying, disking, disking & interseeding).

I will randomly assign treatments to halves of each study field so each treatment is paired with a control. Beginning in late winter, we will capture pheasants on and around study fields using nightlighting techniques. All captured females will be fitted with a necklace-style radio transmitter and released at the capture site. We will locate all marked birds three times per week and determine nest sites by locations occurring in the same spot on multiple occasions. For successful nests, we will locate broods three times per week and flush broods at days 10 and 21 post-hatch to estimate brood survival. We will conduct vegetation samples at nest and brood flush sites as well as paired random points to assess factors affecting nest and brood survival and nest and brood site selection. We will conduct two rounds of songbird point counts at six points within each study field throughout the summer.

In 2016, we conducted a pre-treatment pilot study to gather baseline demographic information on pheasants and songbirds in the study area. We captured and monitored 34 female pheasants and surveyed songbirds on two occasions in six fields. Adult pheasant survival during the breeding season (four months) was low 0.29 ± 0.09 and 76% of the mortality occurred during May and June. Nest survival was influenced by whether nests were located in wheat fields (0.43 ± 0.20) or CRP fields (0.33 ± 0.18). For nests in CRP fields, the amount of visual obstruction at the nest site positively influenced nest survival (Fig 2). Pheasants selected nest sites with a greater percentage of warm-season grasses (nest sites: 45.8 ± 8.3 %, random points: 27.3 ± 3.7 %). We was able to monitor eight pheasant broods, two of which survived to 10 days post-hatch and one survived to 21 days post-hatch. Estimates from a constant survival model predicted brood survival to 21 days post-hatch was 0.07 ± 0.07. Western meadowlarks were the most common bird detected during point counts, followed by grasshopper sparrows, and mourning doves.

INTRODUCTION

Widespread loss and alteration of grasslands in the United States has had many consequences, most notably, increased wind erosion of soil and the loss and deterioration of habitat for grassland-dependent wildlife (Samson and Knopf 1994). Due to these and other concerns, conservation programs have been developed by governmental and other organizations to maintain or increase the amount of grassland on the landscape. The Conservation Reserve Program (CRP) is one of these programs in which landowners are paid to maintain grass cover on land that was, and would otherwise be, used for row-crop agriculture. In 2012, over 11 million ha of land were enrolled in CRP, costing about 1.7 billion dollars (U.S. Department of Agriculture 2012).

Overall, the CRP has had many documented benefits to wildlife, specifically grassland birds (Patterson and Best 1996, O'Connor et al. 1999, Ryan et al. 1998). Many grassland bird species are experiencing continental wide declines (Vickery and Herkert 1999, Peterjohn 2003, Brennan and Kuvlesky 2005). In the western United States, this is mainly the result of habitat fragmentation due to modern row-crop agriculture and rangeland deterioration (summarized in Brennan and Kuvlesky 2005). In a countrywide analysis, O'Connor et al. (1999) found that the abundance of many grassland bird species, including ring-necked pheasants (*Phasianus colchicus*; hereafter 'pheasants'), were strongly associated with CRP enrolment. Ryan et al. (1998) found that grassland bird relative abundance was up to 10.5 times greater, nest abundance was 13.5 times greater, and nest success was 4% greater in CRP fields than rowcrop agriculture fields. Pheasant populations increased in Minnesota and Dixon County, Nebraska as CRP acreage increased (summarized in Ryan et al. 1998). King and Savidge (1995) found that pheasant counts were significantly greater in areas with high CRP enrollment. Pheasant numbers in Iowa increased significantly in areas composed primarily of cropland as the CRP was initiated and landowners began to enroll their lands (Riley 1995). Nielson et al. (2008) found in a nine state analysis, that pheasant counts increased 22% with every 319 ha increase in CRP.

However, not all studies have been able to detect these positive benefits of CRP to grassland birds. Rodgers (1999) reported that in western Kansas pheasant populations did not respond to CRP and speculated that this was due to the simultaneous deterioration of weedy wheat stubble fields as a result of increased herbicide use. Furthermore, the value of CRP for various life stages (nesting, brood rearing, overwintering) may be dependent on the age of the field or level of succession that has occurred (Berthelsen and Smith 1995, King and Savidge 1995, Millenbah et al. 1996, Ryan et al. 1998, Rodgers 1999, McCoy et al. 2001, Matthews et al. 2012*a*,*b*). As CRP fields age, litter increases, bare ground decreases, vegetation density increases, and plant species and structural diversity decrease (McCoy et al. 2001). Rodgers (1999) suggested that this litter accumulation may restrict the movements of pheasants. In Michigan, young (1 – 2 year) CRP fields had the greatest relative abundance and diversity of birds whereas older (3 – 6 year) fields had greater nest density and success (Millenbah et al. 1996).

Due to this possible reduction in value to wildlife as CRP fields age, beginning in 2004 some type of disturbance was required prior to the end of year 6 for 10 year contracts and year 9 for 15 year contracts ('mid-contract management', U.S. Department of Agriculture 2015) and additional management may occur except during the last three years of the contract. Disturbance is designed to "ensure plant diversity and wildlife benefits, while ensuring protection of the soil and water resources" and may include haying, grazing, burning, herbicide, light disking, inter-seeding, or light disking and interseeding (U.S. Department of Agriculture 2015:428). The results of this mid-contract management have generally been positive for birds. In Nebraska, overall avian abundance, avian species richness, and diversity was greater in fields that had been disked and interseeded with legumes compared with unmanaged fields (Negus et al. 2010). Also in Nebraska, Matthews et al. (2012*b*) found that ring-necked pheasant nests in CRP fields that had been recently disked and interseeded had a greater survival rate than nests in unmanaged grasslands and brood survival increased with the amount of time spent in disked and interseeded fields. Hen pheasants selected disked and interseeded portions of fields for nesting and brood rearing over unmanaged fields (Matthews et al. 2012*a*). However, disking and interseeding are not the only management practice used and there has been little evaluation of alternatives.

Another practice under the CRP is management for Pollinator Habitat (CP42, hereafter 'pollinator plots'). The purpose of pollinator plots are to "establish habitat to support a diversity of pollinator species" (U.S. Department of Agriculture 2015:257). Under this program, plots of at least 0.2 ha are seeded with at least 9 pollinator-friendly wildflowers, legumes, and/or shrubs, and less than 25% grasses; native, preferably bunchgrasses (U.S. Department of Agriculture 2015). Increased forb components in fields have been shown to support greater invertebrate biomass (Jamison et al. 2002). Pheasant chicks primarily consume invertebrates (Wiens and Totenberry 1979) and chick survival may be directly linked to invertebrate density (Hill 1985). Therefore, pollinator plots are thought to represent excellent bird habitat specifically for pheasant brood rearing. However, this linkage between pheasant brood site selection and pollinator plots has not been formally studied. Furthermore, the size at which these pollinator plots might be beneficial is completely unknown. Currently plots must be at least 0.2 ha to qualify for the CRP. However, if plots smaller than 0.2 ha prove beneficial, it would be a less expensive way for landowners and managers to provide quality brood-rearing habitat. Or alternatively, if plots must be larger than 0.2 ha to be selected, fewer, larger plots in a field may be a more worthwhile strategy.

In northeast Colorado prairies, pheasants are an important recreational and thus economic resource. In 2012, it was estimated that over 27,000 pheasant hunters harvested about 95,000 pheasants (Colorado Parks and Wildlife 2012). Due to the importance of pheasants in the region, there is substantial incentive to maximize the utility of already protected grasslands (e.g., CRP) to pheasants. Furthermore, a number of songbird species likely to use CRP fields in northeastern Colorado are listed as species of concern in the Conservation Plan for Grassland Species

(Colorado Division of Wildlife 2003): Cassin's sparrow (*Aimophila cassinii*; tier 1), grasshopper sparrow (*Ammodramus savannarum*; tier 2), and dickcissel (*Spiza americana*; tier 2), as well as the State Wildlife Action Plan (Colorado Parks and Wildlife 2015): bobolink (*Dolichonyx oryzivorus,* tier 2), grasshopper sparrow (tier 2), and Cassin's sparrow (tier 2). In 2012, there were over 880,000 ha of land in Colorado enrolled in CRP (U.S. Department of Agriculture 2012) which, if managed optimally, could provide additional recreation opportunity by producing more pheasants and serve to increase grassland songbird populations, especially those of conservation concern. Whereas evaluation of grassland management practices on songbirds and pheasants has occurred in other regions little information exists on optimal management strategies in northeast Colorado. Because optimal grassland management strategies may depend on local factors such as site productivity (Spears et al. 1993), it is important to not generalize across regions or species. In an effort to provide guidance to managers and landowners regarding grassland management on CRP fields in northeastern Colorado, we will monitor the response of pheasants and songbirds to the three most common CRP mid-contract management practices (haying, disking, disking & interseeding) as well as pollinator plots.

OBJECTIVES

1. Estimate pheasant adult female, nest, and brood survival in relation to CRP practices (haying, disking, disking & interseeding, pollinator plots) and general vegetation characteristics.

2. Assess how various CRP practices influence pheasant nest and brood site selection.

3. Estimate songbird density or occupancy in CRP fields with different management practices.

METHODS

Study area and site selection

I will conduct this study in Logan, Phillips, Sedgwick, Washington, and Yuma Counties in northeastern Colorado. We will identify two study sites at least 20 km apart, in areas with high densities of CRP.

Year one (2016) will serve as a pilot study to gather pre-treatment baseline demographic information. We will select study sites where treatments are scheduled to be conducted in the near future. During years one and two, we will work with management personnel and landowners to create experimental treatments after the primary nesting season, which will be used in years two and three. We will divide each field within the study site in half and randomly assign a treatment (haying, disking, disking & interseeding) to one half, while the other half will serve as a control. We will also randomly select fields in which to plant pollinator plots. We will randomly select 3 fields at each study site and establish two to four pollinator plots of varying sizes (0.2, 2, 8, and 40 ha) in each field.

Field Methods

Generally, methods will follow Matthews et al. (2012*a,b*).

Trapping

In March, we will begin trapping pheasants using baited walk-in traps and/or night-lighting techniques (Labisky 1959, Wilbur 1967, Matthews et al. 2012*a*,*b*). Walk-in traps will be made of 14 gauge welded wire with a funnel made of welded wire or chicken wire leading into the trap and a cloth mesh top of trap (Smith et al. 1999, Flock and Applegate 2002). We will distribute 5 – 10 traps throughout each study site and check traps twice daily (mid-morning and at sunset). Traps will be closed overnight because pheasants are not active at night (Giudice and Ratti 2001). Night-lighting (Labisky 1959) is one of the most commonly used and successful ways to capture pheasants (Whiteside and Guthery 1983, Perkins et al. 1997, Matthews et al. 2012*a*,*b*, T. Matthews personal communication). Night-lighting consists of driving through fields with an ATV or truck and using flood and spotlights to scan the field for pheasants. When a pheasant is detected, the light is kept on the bird while another person approaches and puts a net over the bird. We will distribute night-lighting efforts throughout each study area with the goal of capturing and radio-tagging 30 females (15 at each site). Year one (2016) will be treated as a pilot study and data from this year will be used to determine sample sizes for the following years. We will weigh and estimate age for each captured hen as well as affix a leg band and an 18 g necklace style radio transmitter (1.9% of mean adult female body mass reported in Giudice and Ratti 2001). Marcstrom et al. (1989) showed that recovery rates of pheasants with necklace style radio transmitters weighing 15 and 25 g were not different than pheasants with leg bands only. Captured males will receive a leg band and be released immediately. Every effort will be made to avoid injuring birds. However, if an injury should occur, observers will decide whether the injury will invariably result in the bird's death, and if so, the bird will be euthanized by rapid cervical dislocation.

Nest and brood monitoring

Beginning in mid-April, we will locate each radio-marked pheasant three times per week using a homing technique (White and Garrott 1990). Observers will walk toward the bird and when they approach it, they will circle the bird at around 30 m to pinpoint an exact location. We will then estimate the location based on the compass bearing and distance to the bird from the observers location. Every attempt will be made to avoid flushing pheasants.

Nests sites will be determined by observing pheasant hens in the same location on multiple, subsequent days. When a hen is deemed to be nesting, we will approach her to about 10 m and place a stake with or without flagging, 10 m to the North and South of the estimated nest location. If visually oriented nest predators (e.g., ravens) are regularly observed around study fields, flagging will not be used near nests. Every effort will be made to not flush hens during this visit. Any time observers approach nests, they will take a different, circuitous route to avoid making a path directly to the nest for predators to follow. We will continue to monitor the locations of nesting hens ≥ 3 times per week and if the hen is found to be off the nest, we will go to the nest location to get an exact GPS point for the nest, count the number of eggs, and note the status of the nest (active, successful, depredated, or abandoned). If we do not have the opportunity to visit the nest while the incubating hen happens to be off the nest, we will flush the hen during the last week of incubation to get an exact location and count eggs. Nests will be deemed successful if ≥ 1 egg hatches.

I will continue to locate hens from successful nests (presumably with a brood) ≥ 3 times per week using triangulation or homing. On day 10 and 21 post-hatch, we approach hens at dawn when they are still at nocturnal roost sites and visually confirm chick presence by flushing if necessary. We will also note the UTMs of these specific brood sites.

Vegetation sampling

I will conduct a vegetation sample at each nest and each brood site (day 10 and 21 flush site), within a week of obtaining the location. To represent available habitat, we will sample vegetation at 4 random points within 200 m (about the daily movement of a hen pheasant, Whiteside and Guthery 1983, Matthews et al. 2012*a*) of each nest or brood site. At each point we will estimate the percentage canopy coverage of each plant species and bare ground within a 1 m^2 frame centered on the point. We will also assess visual obstruction using a Robel pole (Robel et al. 1970) and record the lowest dm visible on a 2.5 cm diameter pole, read from 4 m away, 1 m high, in 4 directions, 90° apart.

I will digitize all study fields into a GIS to assess landcover characteristics at and around nest and brood sites. Landcover categories will include: 1) disked, 2) disked and interseeded, 3) hayed, 4) pollinator plot, 5) grass field: no management, and 6) active crop field (split into specific crop type, e.g., corn, wheat). For each point, we will calculate the percentage of each landcover type within a 200, 400, and 800 m radius circle centered on the point to evaluate the scale at which hens select nest and brood sites. Lastly, we will calculate the size of the occupied patch.

Songbirds

To assess songbird density in relation to management practice, we will conduct point counts in the study fields. We will conduct point counts in three patches of each treatment type and, in years one and two, in 3 fields scheduled for treatment the following years. These untreated fields will serve as a control the first year they are sampled and also as a baseline for which to compare post-treatment. We will establish 6 points spaced 250 m apart along a line in a random direction and starting position. Point counts will follow the Integrated Monitoring in Bird Conservation Regions protocol (Hanni et al. 2015). Counts will be six minutes in duration and we will note the species, distance to each bird heard or seen, as well as the time that the bird was detected. We will conduct point count surveys in early June and July in each field. The number of points may be adjusted based on the number of detections during initial surveys according to Buckland et al. (1993).

Statistical Analysis

Adult survival

We will use the nest survival model in Program Mark (White and Burnham 1999, Dinsmore et al. 2002) to estimate the daily survival rate of adult female pheasants. The nest survival model is useful for estimating survival when detections occurred at irregular intervals (i.e., lacks some of the assumptions of the known-fate data type). To extrapolate from daily survival rate (DSR) to breeding season survival (May – August) we will raise DSR to the power of the number of days in May, June, July and August and calculate the standard error using the delta method (Powell 2007). For the first year pilot study, we present estimates from a null model (constant survival) only, but thereafter we will assess covariates related to date and percentage of locations in habitat treatment areas and compare models using an information-theoretic approach (Burnham and Anderson 2002).

Nest and brood survival

We will use the nest survival model in program Mark (White and Burnham 1999, Dinsmore et al. 2002) to estimate nest and brood survival. We will group the predictor variables into a vegetation group (% coverage of bare ground, forb, warm-season grass, cool-season grass, etc. and visual obstruction), a landcover group (landcover of site, % landcover at various scales), and date. We will find the most parsimonious model within the vegetation and landcover groups and then compare those models to each other and combined. Lastly, we will add date and date^2 to account for temporal effects, if it increases model parsimony. We will also include a null model for comparison. We will evaluate candidate models using an information-theoretic approach (Burnham and Anderson 2002), using ΔAIC_c and model weights (w_i).

Nest and brood site selection

We will use discrete choice models (Cooper and Millspaugh 1999) in the mlogit package (Croissant 2013) in program R (R Core Team 2015) to evaluate nest and brood site selection. The choice set for each nest or brood site will consist of five alternatives (the chosen point and four random points). We will use the same modeling strategy and variables as described above.

Songbirds

We will use distance sampling and/or time removal to estimate detection probability and density of each species in each field and treatment type according to Buckland et al. (1993), Farnsworth et al. (2002), and Amundson et al. (2014). If low sample sizes preclude estimating density for some species, we will attempt to estimate occupancy (MacKenzie et al. 2006). We will test for differences in density or occupancy among treatment types by comparing a null model with a model including field landcover type as a predictor variable.

RESULTS AND DISCUSSION FROM YEAR ONE PILOT STUDY

Pheasants

Capture and adult female survival

We captured and affixed radio transmitters on 34 female pheasants and we had four collars slip off soon after capture. Overall, we had 23 mortalities. Of the collars we were able to recover and assess cause of mortality, we estimated that one mortality was due to hail, one ran into a powerline, one was avian predation, and 10 were mammalian predation. Most mortalities occurred early in the summer with 76% occurring during May and June. Based on initial analysis, a model estimating constant survival over the breeding season predicted a daily survival rate of 0.990 ± 0.002. Extrapolating over the entire four month breeding season (May – August), the estimated overall breeding season survival was 0.291 ± 0.087. These estimates are lower than that reported in the literature (Leif 1994, Schmitz and Clark 1999). In northeastern Colorado, Snyder (1985) found six month breeding season survival was 0.56 with greatest mortality occurring in April. My results of low adult female breeding season survival are interesting and counter to field observations of abundant pheasants in the area. It is possible that radio packages negatively influenced survival although previous research has shown that similar weight transmitters did not affect recovery rates (Marcstrom et al. 1989). Furthermore, we never deployed transmitters on birds where the mass of the transmitter would make up more than 3% of body mass.

Nest site selection

The most parsimonious model of nest microhabitat selection indicated that percent warm-season grass within the 1 m^2 sampling frame was the most influential factor determining nest site selection (Table 1) and this relationship was positive (Fig. 1). Nest sites had 45.8 ± 8.3 % and random points had 27.3 ± 3.7 % warm-season grasses in the sampling frame. These results are consistent with Matthews et al. (2012*a*) in Nebraska who found a weak positive selection for warm-season grasses and noted the majority of hens nesting in CRP nested in areas dominated by warm-season grasses.

Nest survival

We monitored 23 pheasant nests. Of these, 17 were first nest attempts, four were second nest attempts, and two were third nest attempts. Two nests were abandoned after observers accidentally flushed the hen off their nest early in incubation. Two nests were abandoned unrelated to observers and one nest was in a wheat field that was harvested. Overall, seven nests were in wheat and 16 were in CRP. The most parsimonious model of pheasant nest survival included an interaction between visual obstruction and field type (CRP vs. Wheat; Table 2). Wheat fields had very little variation in visual obstruction readings and the model predicted values show no effect of visual obstruction on nest survival in wheat fields (Fig. 2). However, in CRP fields, visual obstruction had a positive effect on nest survival (Fig. 2). In other words, when the CRP field vegetation was taller and denser, nests had greater survival rates. Holding visual obstruction values at their mean for wheat field nests, daily survival rate of nests in wheat were 0.964 ± 0.020 giving a 23 day nest survival estimate of 0.428 ± 0.203. Holding visual obstruction values at their mean for CRP nests, daily nest survival rate was 0.952 ± 0.023, giving a 23 day nest survival estimate of 0.326 ± 0.181. Our CRP estimate is similar to that reported in Matthews et al. (2012*b*) of 0.31 for unmanaged CRP fields in Nebraska, however for disced and interseeded fields, they report much greater nests success (0.70). The fields we used in the year one pilot study had not had any management action recently and were probably similar to Matthews et al. (2012*b*) unmanaged fields.

Brood survival

We monitored 8 pheasant broods. Two broods survived (at least one chick) to the 10 day brood flush and one brood survived to the 21 day brood flush (two chicks) giving apparent brood survival to 21 days of 0.125. Based on a constant survival model, daily survival rate of broods ± SE was 0.879 ± 0.045. Extrapolating to the 21 day period gives a model estimated 21 day brood survival of 0.066 ± 0.071. This is much lower than Matthews et al. (2012b) who reported brood survival to 21 days was 0.71 in Nebraska. However, our low sample size precludes any meaningful comparison.

Brood habitat selection

Due to time constraints we did not sample vegetation with regard to pheasant broods in 2016. However, we plan to examine patterns in brood site selection in relation to field type (i.e., CRP vs. crops).

Songbirds

We conducted point counts at six points within six fields, twice during the summer. The first round of point counts occurred 8-11 June and the second, 13-20 July. Western meadowlarks were the most common bird detected, followed by grasshopper sparrow, and mourning dove (Table 3). Initial attempts to estimate songbird density revealed a major assumptions of distance sampling was violated (detection probability at the point = 1). Therefore, we are currently exploring other ways to estimate density, namely removal models (Farnsworth et al. 2002) or fixed-area methods which assume constant detection probability (Hutto 2016).

CURRENT PROGRESS

We are currently finishing up analyses from the 2016 pilot study and planning for the 2017 field season.

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Table 1. Nest site selection models for ring-necked pheasants in northeastern Colorado.

Model	K[a]	ΔAIC_c	w_i[b]
Percent warm-grass	1	0.0	0.9
Percent bare ground	1	6.0	0.0
Visual obstruction	1	7.4	0.0
Tallest vegetation	1	7.6	0.0
Percent cool-grass	1	7.8	0.0
Percent grass	1	8.0	0.0
Percent forb	1	9.5	0.0

[a] Number of parameters in the model
[b] Model weight

Table 2. Nest survival models for ring-necked pheasants in northeastern Colorado.

Model	K[a]	ΔAIC_c	w_i[b]
Field * VO	4	0.0	0.18
Field + VO	3	0.3	0.15
Tallest	2	0.9	0.11
VO	2	1.9	0.07
Field + tallest	3	2.9	0.04
Null	1	4.0	0.02
Field * tallest	4	5.0	0.01
Forb	2	5.1	0.01
Cool-season	2	5.3	0.01
Grass	2	5.5	0.01
Bare ground	2	5.8	0.01
Warm-season	2	5.8	0.01
Field	2	5.9	0.01

[a] Number of parameters in the model
[b] Model weight

Table 3. Grassland bird detection during point counts.

Species	Num. of detections
Western meadowlark	108
Grasshopper sparrow	78
Mourning dove	69
Brewer's blackbird	20
Lark bunting	20
Common grackle	17
Ring-necked pheasant	16
Dickcissel	12
Red-winged blackbird	9
Barn swallow	6
Western kingbird	5
Killdeer	3
Brown-headed cowbird	2
Eastern kingbird	2
Mallard	2
Red-tailed hawk	2
Turkey vulture	2
Unknown	2
American robin	1
European starling	1
Great-horned owl	1
Horned lark	1
House sparrow	1
Unknown sparrow	1

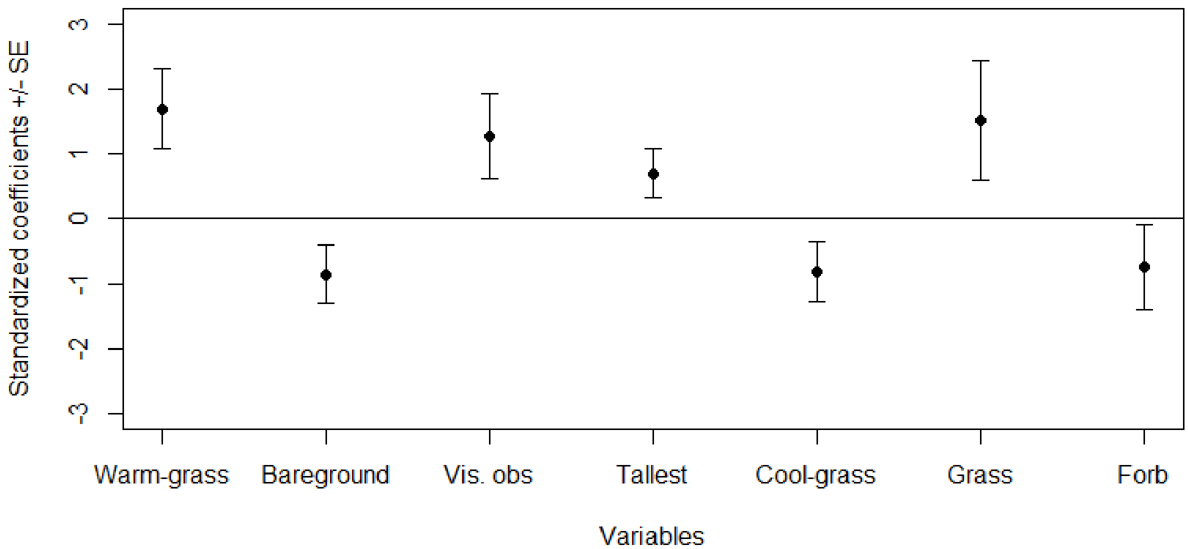

Figure 1. Standardized coefficients ± SE from discrete choice models predicting nest site selection of ring-necked pheasants in northeastern Colorado. Positive values indicate selection for a variable and negative values indicate selection against a variable. All coefficients are taken from single variable models.

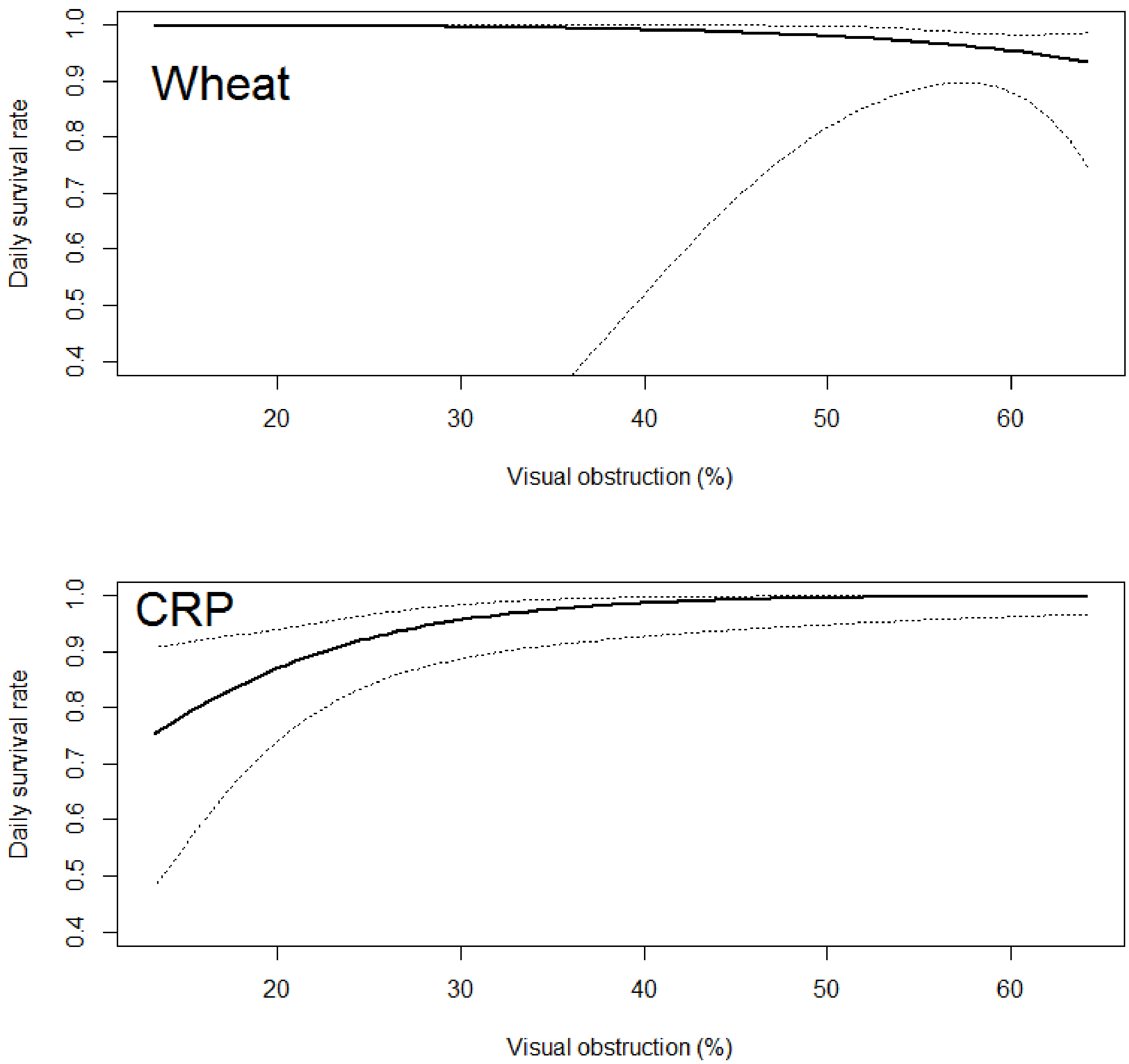

Figure 2. Model predicted values and 95% confidence interval of nest daily survival rate in relation to visual obstruction reading for nests in wheat (top) and Conservation Reserve Program (bottom) fields.