Alberta Conservation Association

2018/19 Project Summary Report

Project Name: Enchant Project – Strong Farmlands. Thriving Habitat.

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Partnerships

Haggins Family
Stamp Farms

Key Findings

- The density of partridge pairs decreased from 187 pairs (35.2 pairs/km^2) in spring 2017 to 137 pairs (25.2 pairs/km^2) in spring 2018.
- Counts in October revealed very poor recruitment in 2018 with only 315 individuals remaining from a spring pair count of 137. By comparison, 187 pairs in 2017 returned a fall count of 1,087 individuals in the same year.
- We captured a total of 283 grey partridge (likely some recaptures), and two ring-necked pheasant hens from December to mid-March and fitted radio-collars to 93 partridge hens and the two hen pheasants.
- Of the 93 collared grey partridges, 43 were censored (not monitored), 35 succumbed to natural mortality over the winter, and 15 were monitored during the nesting season.
- Initial resource selection function analysis indicates that grey partridge have a very strong selection of shrub rows and shelterbelts.

- We detected 40 bird species in our 2018/19 biodiversity surveys on the demo farm.

Introduction

Crop production has evolved dramatically since the post-war recovery following WWII. Advances in equipment, knowledge, irrigation and chemical applications have increased yields and decreased farm risk, but these advances have also had the unintended consequence of reducing resources important for game birds. With more than 24 million acres now under cultivation in Alberta, hunting opportunity for upland game birds has diminished substantively.

We have a long-term working relationship with a farm to evaluate approaches for re-establishing vibrant upland game bird densities while maintaining a profitable farming operation. We also monitor a range of non-target species to assess how these treatments impact biodiversity (amphibians and songbirds). We trial enhancements that focus on improving habitat features important for nesting, brood rearing, and winter survival of pheasants and grey partridge. This includes approaches within the crop, the juxtaposition of crops types and rotation, harvest method, field edge improvements, water management and wetlands, and seed trial plots. Beginning in 2014, the initial two years of the project focused on collecting baseline data to allow for comparisons in the future.

Methods

The farm is located near Enchant in a landscape highly fragmented by a mix of irrigated and dryland farming. The farm has 953 acres of irrigated land under cultivation and is rented to a local seed producer. The cultivated land is divided among seven fields, all with modern irrigation pivots. The farm is not a natural system, so our approach is to target enhancements that are compatible with modern farming and take advantage of marginal areas. For example, chick survival is closely linked to insect abundance, so we are testing seed varieties in mixes to evaluate their suitability as brood-rearing habitat. A brood-rearing mix is being trialed in dryland areas that currently lack insect-rich habitat.

A similar approach is taken with seed varieties that mimic the tall structure provided by shrubs. Tall structure is an important resource for gamebirds. Males defend their territory from other males of the same species, so we are hoping that by providing additional tall edge habitat we can increase densities because their territory size will be reduced with more edge habitat.
We initially trialed tall seed varieties in plots (sorghum, millet, and corn) and assessed germination and growth in dry and irrigated locations. In 2019, we will develop seed blends to trial on the farm to see how they grow and how wildlife responds to them. Shrubs take at least five years to grow tall enough to be beneficial to these species, so these annuals provide a short-term alternative. Annuals are cheaper over the short term, and for some operators they may be the only viable option for creating territorial edge habitat.

We also plan to explore *within* crop strategies that may improve chick survival, site fidelity and winter survival. Secondary cover crops that sit below the primary crop may provide more invertebrates for chicks and offer hiding cover over the fall and winter after the primary crop is cut. Cover crops may also benefit farm operations by adding nutrients to the soil. Stripper headers are a new technology that cut very near the top of cereal stems, removing only the grain head. They leave much taller stubble, which may provide better escape and roosting cover, and possibly improve site fidelity and overwinter survival. These headers may benefit farmers if they improve moisture retention, reduce erosion, and contribute organic content to the soil.

We captured grey partridge using walk-in funnel traps baited with grains from early December 2017 until March 2018. We fit hens with radio-telemetry collars and tracked survival over winter at one-week intervals until April. From April 9th to August 20th we monitored hens to determine nest success.

Habitat use was characterized using Resource Selection Function (RSF) models and compared to randomly available points throughout the property. RSF models will inform us on which habitat features partridge are selecting (i.e., proportional use higher than expected based on availability) or avoiding (i.e., proportional use less than expected based on availability). Constructing multiple RSF models will allow us to determine if there is any change in the habitat features

occurring in the top RSF models or if the strength at which these habitat features are selected/avoided by partridge changes between years/seasons.

We have been using grain feeders spaced across the farm from early winter through the nesting season since 2016. To better understand their importance as a resource for partridge, we used habitat features most important for predicting the location of pairs to distribute feeders in winter 2018/19. The feeders are kept filled throughout the winter, and we will observe the location of pairs in the spring to assess their use in relation to other resources available (i.e., tall shrub rows).

We also investigate ways to gain more utility from runoff and irrigation water while reducing unintended consequences. Surface water causes erosion and can move unwanted nutrients into canals and reservoirs; these nutrients may also leech into groundwater. We are mapping contours and siting wetlands that will act as water filters. Wetland areas are important for wildlife, and the surrounding vegetation is a hotbed for insects that are vital for chick survival. Cattail complexes also serve as refuge areas for pheasants during cold winter periods.

Baseline biodiversity monitoring is completed each year at sites on and off (control sites) the farm to allow for a comparison of patterns over time. As the project continues, we will establish graduate student projects in partnership with universities to help answer specific questions.

Results

In 2018, we trialed another edge habitat mix (Table 1) in areas with and without irrigation. The edge mix under irrigation grew well and we observed an abundance of head seeds from both the sorghum and millet; however, the mix did not stand well following a snowfall in early October. We intend to trial seeding rates to ideally increase the diameter of stocks. The brood rearing mix (Table 2) germinated and grew well under irrigation, and we anecdotally noticed an abundance of insects. The brood mix seeded in 2018 in dryland had sporadic gemination and limited growth. We will monitor this mix for development in the next two years.

Table 1. Seed varieties and percentages that were used in the Edge Habitat Mix.

Seed Variety	**Percentage (%)**
Cerise Red Proso Millet	20
Pearl Millet	20
GW 400 Sorghum	60

Table 2. Seed varieties and percentages that were used in the Brood Rearing Mix.

Seed Variety	**Percentage (%)**
Alsike Clover	10
Birdfoot Trefoil	10
Red Clover	10
HPS Yellow Blossom Sweet Clover	10
Grindstad Timothy	5
Crimson Clover	5
Hairy Vetch	10
Berseem Clover	10
Veldt Cicer	10
Phacelia	10
Sainfoin	10

The landowner planted 6.6 km of additional shrub rows (7 rows using 7,225 shrubs) to increase territorial space for partridge and pheasants on the farm. We seeded an annual mix of sorghum/millet (Table 1) and a perennial brood mix (Table 2) along side the new shrub rows.

The density of partridge pairs decreased from 187 pairs (35.2 pairs/km^2) in spring 2017 to 137 pairs (25.2 pairs/km^2) in spring 2018. Counts in October 2018 revealed very poor recruitment in 2018 with only 315 individuals remaining from a spring pair count of 137. By comparison the 187 pairs in 2017 returned a fall count of 1,087 in the same year. Winter was prolonged and severe with snowpack covering the farm from late November 2017 to mid-May 2018. This was the most snowpack observed on the landscape in memory. High mortality for partridge at the farm was recorded throughout the winter. Poor recruitment may be associated with the condition of hens entering the breeding season, and perhaps the delayed nesting season.

We captured a total of 283 grey partridge (likely some recaptures) and two pheasants. We fitted radio-telemetry collars to 93 grey partridge hens and two pheasant hens. We censored (were unable to monitor) 43 of the 93 grey partridge. We observed high rates of natural mortality for the monitored partridge over the winter period. By May 15, 2018, 15 collared partridge and one pheasant were being monitored for nesting activity. We found evidence that ten of the 15 hens attempted to nest, of which four had apparent nest success. One of the hens attempted to nest a second time after an unsuccessful first attempt. The one collared pheasant hatched a successful nest, on her second nest attempt with a clutch of ten eggs around July 8. On August 22, we observed the hen with six of her chicks.

The habitat variables that were used as predictors in the resource selection function analysis for the occurrence of 2018 spring grey partridge pairs on the farm were: grassland, cropland, woody vegetation (which includes shrub rows and shelterbelts), wetlands, and anthropogenic habitat types (developed areas such as houses, bin yards, and roads). Distance to cropland, wetland, woody vegetation, grassland, roads, feeders, and near partridge pair were also used. We ran analysis for all models and then combined the top predictor models. Model averaging results showed that the probability of occurrence of grey partridge pairs on the Enchant farm increased as distance to woody vegetation increased and was lower in cropland than other habitat types (Figure 1).

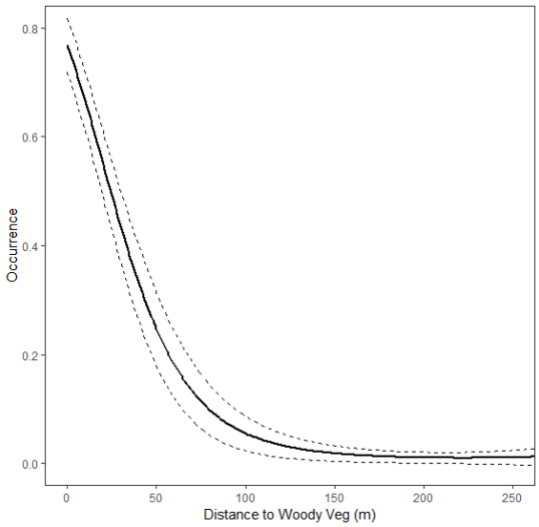

Figure 1. Probability of grey partridge pair occurrence as distance to woody vegetation (shrub rows and shelterbelts) increases.

Since 2016, we have been adding feeders to the farm and monitoring their usage. Anecdotally, the 93 feeders we had placed on the farm, seemed to be selected for by grey partridge pairs in the spring when we were completing the pair counts. In order to better understand how selective grey partridge are being for the feeders, we added another 110 feeders late winter 2019. These feeders are not placed in optimum habitat and will allow us to determine how selective partridge pairs are being for the feeders as compared to other habitat features.

Our biodiversity surveys discovered 40 different bird species on the farm with clay-colored sparrow being the most detected species followed by Savannah sparrow and red-winged blackbird. Nine waterfowl species were detected on the farm with Canada goose being the most common.

Hunting occurs annually on the farm. For the past four years harvest has occurred with waterfowl, deer, and pen reared male pheasants. We did not have a grey partridge harvest this year due to the decrease in their numbers. The landowner releases pen-reared male pheasants each fall for harvest in the same year. The site was also used in 2017 by Pheasants Forever to host a mentored hunt with students from a local college. Pen reared male pheasants were used for this event.

Conclusions

Finding approaches that increase game bird densities while complementing or minimizing impacts to farm operations is key for convincing producers that both goals are attainable on the same farm. We anticipate that overall species biodiversity and abundance will benefit from enhancements targeted for game birds.

Communications

- Published an article in the spring/summer edition of *Conservation Magazine* highlighting some of the findings and accomplishments of the Enchant Farm.

Literature Cited

None

Photos

Brood mix strip planted beside a strip of sorghum/millet mix. Photo: Layne Seward

Sorghum/millet mix planted along a shrub row to help create territorial edge habitat. Photo: Layne Seward

A female grey partridge hen that has just been fitted with a radio collar. Photo: Kyle Prince

A successfully hatched pheasant nest that was discovered by following a radio-collared hen. Photo: Kyle Prince