Alberta Conservation Association

2021/22 Project Summary Report

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

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Partnerships

Alberta Environment and Parks
Haggins Family
Stamp Farms

Key Findings

- The density of partridge pairs decreased from 79 pairs (13.3 pairs/km^2) in spring 2020 to 70 pairs (11.8 pairs/km^2) in spring 2021.
- Partridge counts in October revealed very poor recruitment again in 2021 with only 135 individuals remaining from a spring pair count of 70.
- We detected 49 wildlife species during our 2021 wetland and point-count biodiversity surveys at the Enchant farm and control sites.
- We are trialling different seed blends to provide a suite of wildlife habitat, with some blends specifically for partridge and pheasants.
- We completed vegetation assessments for graminoids and forbs at the Enchant farm.
- We are trialling two soft-release methods to re-establish pheasants. The first is a small pen design with a trickle release over 4 – 5 weeks. The second is a large open-top pen design. The landowner released 45 pheasants spread between three small pens, and 253 pheasant poults into the large pen in July 2021.

Abstract

We have a long-term working relationship with a modern 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 crop types and rotation, harvest method, field edge improvements, water management and wetlands, and trialling seed mixes important for chick survival. In 2021, we completed a vegetation inventory of the plant species present at the Enchant farm. We planted Roundup Ready Corn to provide escape and thermal cover but also to help control unwanted weeds. ACA staff and the farm habitat managers planted 2.75 km of additional shrub rows (2,750 shrubs) to increase territorial space for pheasants and grey partridge at the farm. We planted approximately 1,000 willow stakes around three wetlands. The density of partridge pairs decreased from 79 pairs (13.3 pairs/km^2) in spring 2020 to 70 pairs (11.8 pairs/km^2) in spring 2021. In autumn, partridge totals also decreased from 172 in October 2020 to 135 in 2021. We trialled two different soft-release methods, releasing a total of 298 pheasants at the 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 the Enchant 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 ring-necked pheasants (*Phasianus colchicus*) and grey partridge (*Perdix perdix*). This includes approaches within the crop, the

juxtaposition of crop 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 974 acres of irrigated land under cultivation and is rented to a local seed producer. The cultivated land is divided among eight 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.

Seed blend trials

Trialling different seed varieties is an integral part of our efforts at the Enchant farm. Legume and forbs blends can increase insect abundance when compared to grass-dominated areas, and invertebrates are vital for providing chicks with the protein required for growth and feather development. A brood-rearing mix is being trialled in dryland areas that currently lack insect-rich habitat. The brood-rearing mix contains 11 species of forbs and graminoids. We use a diversified seed blend because a careful selection of diverse plant species can meet the needs of a variety of wildlife species through their various life stages and weather events associated with different seasons. In addition to the benefits to wildlife, heterogenous plant stands can be designed so that it is beneficial to the plants themselves (e.g., nitrogen fixing plants and nitrogen using plants in the same mix). The success of our brood mixes will be determined by vegetation inventories of the brood mix plantings completed by Alberta Conservation Association's (ACA) agrologists. Over the years we hope to see retention of the species planted.

A similar approach is taken with seed varieties that mimic the tall structure provided by shrubs. Tall structure is an important resource for game birds. Male partridges defend their territory from other males of the same species, and by providing additional tall edge, we predict that additional high-quality territorial space will become available. We initially trialled tall seed varieties in plots (sorghum, millet, and corn) and assessed germination and growth in dry and irrigated

locations. We trialled three different varieties of sorghum (*Sorghum sp.*) seeds at the farm. Two seed varieties were sorghum/sudan grass hybrids, and the third variety was a pure sorghum variety. Additionally, we trialled two varieties of millet including pearl millet (*Cenchrus americanus*) and red proso millet (*Panicum miliaceum*). The variety of corn trialled at the Enchant farm was Roundup Ready. Shrubs starting as single stems take roughly five years to grow tall and full enough to be beneficial to game birds; so these annual blends provide a short-term alternative form of structure. Annuals are cheaper over the short term, and for some operators they may be the only viable option for creating territorial edge habitat.

Vegetation inventory

In 2021, we completed a vegetation inventory of the graminoid and forb species at the farm. The vegetation inventory was completed by agrologists through visual assessments. Species in each area of the farm were identified, and then plant communities were assigned to each area based on the dominant species identified in those areas. The vegetation inventory was completed to gain a better understanding of the graminoid and forb species at the farm and for future potential use in data analysis.

Foxtail barley control

To investigate different methods of reducing the abundance of foxtail barley (*Hordeum jubatum*) at the farm, we trialled three different control methods. We use chemical applications, mowing, and discing. We tried seeding the foxtail areas with two different seed varieties: AC Saltlander (*Elymus hoffmannnii var. ac saltlander*) and reed canary grass (*Phalaris arundinacea*), and one seed blend to see if we could get these species to establish and outcompete the foxtail.

Water management

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 leach into groundwater. We are mapping contours and constructing 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. Broad-leaved cattail (*Typha latifolia*) complexes also serve as refuge areas for pheasants during cold winter periods.

Biodiversity monitoring

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.

Re-establishing pheasants

In summer 2021, we worked with the landholder to trial two soft-release methods to establish a breeding population of pheasants at the farm.

Large Pen: We released a mix of male and female poults at six weeks of age into a large open-topped pen: 45.1 m x 27.1 m. Before release, we clipped at least five primary feathers on one wing to delay the ability of flight for roughly one week. The large pen has no top netting; so by clipping one wing, the birds are confined to the pen while they gain sight fidelity. After one week, some birds can fly out of the pen but are pressured back into the pen each morning and evening. The birds walk along the outside edge of the pen and enter by walking in through pop holes that funnel them back inside. Pheasants were moved back into the pen by two people walking behind them and pressuring them into the pop holes. Funnels surrounding the pop holes were designed in a way that pheasants find it difficult to locate this exit once they are inside the pen. Pop-hole slots are large enough for a pheasant poult but too narrow for a fox to pass through.

Three weeks after release into the large pen, most of the pheasants were flying out as a group in the morning and returning to roost in the trees within the pen in the evening. At this point, the habitat managers stopped actively herding them back into the pen. Whole wheat and water were available within the pen and water was always available outside of the pen. The whole wheat was only offered outside of the pen after three weeks once the birds had been conditioned to return to the pen. Whole wheat and water are available in the immediate area around the pen indefinitely.

Pheasants from the large pen eventually dispersed into the habitat throughout the farm. Additional feeders and waterers were placed around the farm in areas where pheasants were observed in person or with remote cameras. In winter months, feed was spread on the ground along roadways and heavily utilized areas. This was done periodically once or twice a week

usually in good weather and before any poor weather was forecasted. Normally the feed used was whole wheat. However, if very cold weather was forecasted, turkey grower pellet was also used to give pheasants a protein boost.

Small Pen: Three small pens were strategically placed individually around the farm in locations we considered high-quality habitat. Pens were a portable design made of 5' x 10' mesh panels with 1" x 4" wood borders. Panels were tethered together using zip ties and wire into a 10' x 20' pen with a centre divider. The pens' interior was brushed out, and a net was fastened to the top of each pen. Electric wiring was fit around the outside perimeter of each pen to discourage predators from entering the pen. Reflectors were also placed around the pen to deter avian predators.

The poults used were older than those in the large pen at roughly 8 – 9 weeks of age. Unlike the large pen, we selected females for the small pens, although one accidentally received two males. Pens were all the same size though the quantity of poults varied to trial ideal stocking capacity within the small pens. One pen contained ten birds, another 15, and the third 20. To improve site fidelity, 2 – 3 poults were released from each pen after 3 weeks, and then an additional 2 – 3 birds were subsequently released from each pen every four days until the pens were empty. This trickle release was undertaken to encourage those outside the pen to stay close by, while also limiting the risk of predation to fewer birds as they were conditioned to this new environment. Releases were completed in the morning, and birds were allowed to simply walk out into the cover surrounding the pens. Whole wheat and water were made available inside and outside of the pens. Once birds were out of the small pens, they were unable to get back in. Once all birds in the pen were released, the pens were left open. Whole wheat and water were continually available inside and outside of the pens.

Game bird monitoring

We monitored grey partridge and pheasant numbers twice per year. Each survey was done systematically from field to field across the entire farm, as well as on four control sites off the farm. We used working gun dogs to locate and flush birds in all non-cropped areas in April and again in October once all the crops are off. The stubble areas were driven by two vehicles in parallel while 50 m apart at 5 – 10 km/h using a circular grid until the entire field is covered.

These counts were done systemically with similar effort both within each year and among years. We observed where birds landed after being flushed and avoided double counts. We did not include birds in the count if we had any doubt as to whether a double count may have occurred. We assume our totals for each field are minimum counts as we could miss some birds, although we undertook similar effort year to year. Occasionally, we surveyed a field where a count was unusually low based on historical counts in that same field. Birds can be pushed away from a field when it is heavily used by farm activity the previous day. In these cases, we re-surveyed 5 – 7 days later on the same field to attain a more accurate count. Counts taken on two separate days were not summed together.

Results

Seed blend trials

In 2021, we continued to monitor the growth of the brood mix (Table 1). We will continue to monitor this seed blend for the next couple of years to determine the success of the blend in all seeded locations around the farm.

Table 1. Seed varieties and percentages that were used in the Brood 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 Roundup Ready Corn seed grew very well in both irrigation and dryland areas over the last few years. It provided excellent vertical structure and was easy to control weeds within. Overall,

sorghum performed well at the farm, providing good vertical structure, a well-developed seed mass for food, and strong germination and resiliency. Some disadvantages of sorghum included the plant laying flat when it experienced heavy, wet snow, and difficulties controlling weeds because of the limited number of chemicals that can be used with sorghum. Pearl millet is an annual that grew well at the farm. It germinated well and provided strong vertical structure. The mature plants produced an abundance of seed that provided a good source of food for wildlife. A disadvantage of pearl millet was its tendency to bend severely under heavy snowfall and thereby decreasing its value of providing vertical structure for thermal escape cover.

Vegetation inventory

We completed a vegetation inventory using visual assessments at 24 locations within the farm (Figure 1). Alfalfa (*Medicago sativa*) was a dominant forb for 87.5% of the polygons. Crested wheatgrass (*Agropyron cristatum*) and brome sp. (*Bromus sp.*) were the dominant graminoids of 50.0% and 37.5% of the polygons. Other dominant vegetative species observed within the polygons assessed were tall wheatgrass (*Thinopyrum ponticum*), tall fescue (*Festuca arundinacea*), Dahurian wildrye (*Elymus dahuricus*), fescue sp. (*Festuca sp.*), slender milk-vetch (*Astragalus flexuosus*), and yellow sweet-clover (*Melilotus officinalis*).

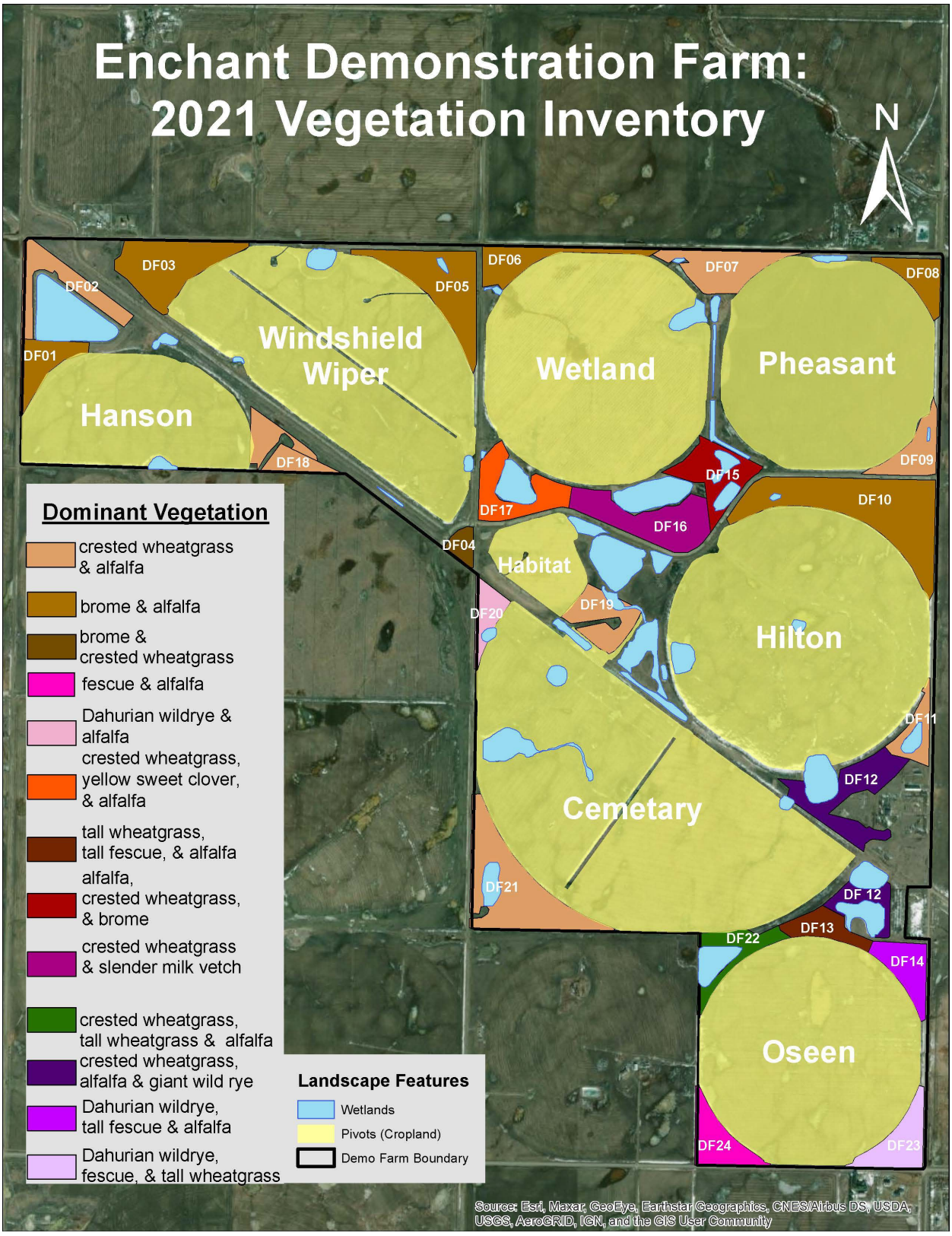

Figure 1. A map of the 2021 vegetation inventory conducted at the Enchant farm, Alberta.

Foxtail barley control

The results of trialling different treatments to control foxtail at the farm had limited success. We trialled discing, mowing, and spraying chemical herbicides to eradicate the foxtail patches. Discing worked well, by essentially killing the plants and burying them. However, if the areas were not continually disced, the foxtail re-established. Chemical applications had limited success and were highly dependent on the chemical used, the spraying conditions and timing of the application.

Mowing foxtail patches worked well to remove the seed heads to reduce spreading, but it was labour intensive and never killed the plants, so the foxtail always regenerated. Because the foxtail patches grew in predominately saline soils a saline-tolerant seed blend (Table 2) and two saline-tolerant seed varieties—AC Saltlander and reed canary grass—were sown in combination with the discing, mowing, and spraying. The seed blend was planted in spring 2020 and did not establish well. By having a seed blend with both grass species and forb species, we discovered the limitations of what chemicals we could use to control the foxtail without killing the seed blend. The reed canary grass and AC Saltlander were planted in 2021; so results will be monitored in this upcoming year to see if the planting was successful.

Table 2. Saline soils seed blend.

Seed Variety	Percentage (%)
AC Saltlander	20
HPS tall wheatgrass	20
Barolex tall fescue	20
Halo alfalfa	40

ACA staff and the farm habitat managers planted 2.75 km of additional shrub rows (2,750 shrubs) to increase territorial space for partridge and pheasants at the farm. Additionally, 1,000 willow stakes were harvested and planted around the wetlands to help establish riparian areas, provide soil stabilization, and habitat.

Re-establishing pheasants

Large Pen: Overall, the large pen approach was successful, but there were some challenges. The open top of the large pen allowed owls to kill pheasants with enhanced success while the

pheasants were confined in the enclosure. Three motion sensing lights were installed on the large pen to deter owls, which appeared to be moderately successful. Moving forward, more motion sensing lights and perch deterrents will be installed on the large pen.

Small Pen: The small pen approach was also successful as there were no issues with stocking numbers in any of the small pens. Once all the birds were released from the small pens, they held in the areas around the pens for about two weeks and then began to disperse into the winter habitat.

One challenge of the small pen approach was coercing pheasants to leave the pen through the doors during releases. Pop holes may be added to the small pens for easier releases in 2022. In addition, nighttime roosting opportunities were limited in the small pen design. The pheasants were driven to roost off the ground at night; however, the small pen did not provide as many off-ground roosting opportunities as the large pen. We will consider adding more roosting options in the smaller pens moving forward.

The largest challenge of the small pen approach was the top material. Netting was used exclusively on one pen, and a mix of netting and chicken wire were used on the other two. Both top designs had issues with wild birds getting into the pens, so we will be implementing a better design in 2022.

Winter pheasant monitoring

The full-time gamekeepers at the farm monitored pheasant activity on a daily basis over the winter via sight, camera checks, and tracks whenever there was snow accumulation. To date, pheasants have been overwintering at the farm and visiting the feeders consistently. The key areas of use appear to be the central wetland area within the cattails, spruce trees adjacent to the central area, the northeast section of the cemetery pivot, and the wetland pivot within the willow stands (Figure 1). The shrub rows throughout the farm are also being used heavily with birds consistently being detected on the cameras. We will be completing game bird surveys throughout the entire farm in the spring of 2022. At that time, we will look for the presence of pheasants so that overwinter retention can be assessed.

Game bird monitoring

The density of partridge pairs decreased from 79 pairs (13.3 pairs/km^2) in spring 2020 to 70 pairs (11.8 pairs/km^2) in spring 2021. Pair density was still much greater at the farm than at control sites (1.8 pairs/km^2) in 2021. In autumn, partridge densities also decreased from 172 in October 2020 to 135 in 2021 suggesting low recruitment again going into 2022. Figure 2 provides a comparison of partridge pair density throughout the years: 2014 – 2021.

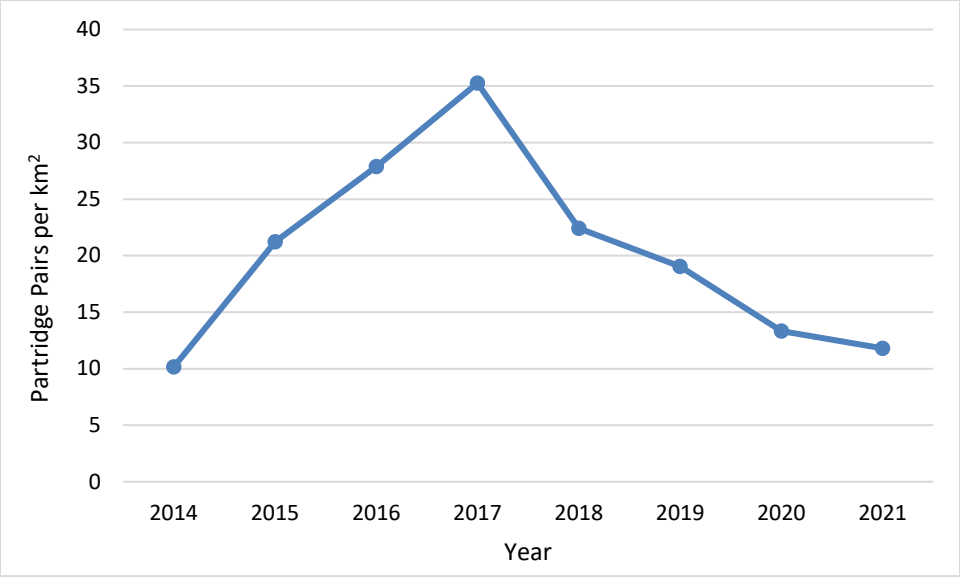

Figure 2. A graph illustrating change in partridge pairs per km^2 in the years 2014 – 2021.

Our wetland and point-count biodiversity surveys recorded 45 bird species, three mammals, and one amphibian at the farm (Table 3). In contrast, the control site biodiversity surveys recorded only 16 bird species and two mammal species. In 2021, the red-winged blackbird (*Agelaius phoeniceus*) was the most frequently detected species in the farm wetland surveys, followed by yellow-headed blackbird (*Xanthocephalus xanthocephalus*) and blue-winged teal (*Anas discors*). The clay-colored sparrow (*Spizella pallida*) was the most frequently detected species during farm point-count surveys with an average of 3.1 individuals detected per point count, followed by brown-headed cowbird (*Molothrus ater*) with an average of 2.5 individuals detected per point count, and Brewer's blackbird (*Euphagus cyanocephalus*) with an average of 0.9 individuals detected per point count. The red-winged blackbird was the most frequently detected species in the control site point-count surveys with an average of 3.3 individuals detected per point count, followed by brown-headed cowbird with an average of 1.0 individuals detected per point count,

and clay-colored sparrow with an average of 0.9 individuals detected per point-count.

A comparison of the most frequently detected species throughout 2018 – 2021 surveys can be seen in Tables 4 and 5. Figures 3 and 4 illustrate the number of most frequently detected species observations during the 2018 – 2021 Enchant farm surveys.

Table 3. Species list for all wildlife detected during farm surveys, 2021.

American wigeon	cinnamon teal	lesser yellowlegs	sora
barn swallow	common grackle	mallard	spotted sandpiper
black-billed magpie	common yellowthroat	mourning dove	vesper sparrow
boreal chorus frog	eastern kingbird	mule deer	western meadowlark
brown-headed cowbird	Franklin's gull	northern pintail	willet
black-necked stilt	gadwall	northern shoveler	Wilson’s phalarope
Brewer's blackbird	grey partridge	ring-billed gull	Wilson’s snipe
brown thrasher	greater yellowlegs	Richardson’s ground squirrel	white-tailed jackrabbit
blue-winged teal	horned lark	redhead	yellow-headed blackbird
Canada goose	house sparrow	ruddy duck	
California gull	killdeer	red-winged blackbird	
clay-colored sparrow	lesser scaup	Savannah sparrow	

Table 4. The most frequently detected species during point-count surveys, 2018 – 2021.

	2018	**2019**	**2020**	**2021**
1st	clay-colored sparrow	clay-colored sparrow	clay-colored sparrow	clay-colored sparrow
2nd	brown-headed cowbird	brown-headed cowbird	brown-headed cowbird	brown-headed cowbird
3rd	red-winged blackbird	Savannah sparrow	red-winged blackbird	Brewer's blackbird
4th	barn swallow	Franklin's gull	Savannah sparrow	Savannah sparrow and western meadowlark
5th	Savannah sparrow	vesper sparrow and western meadowlark	western meadowlark	

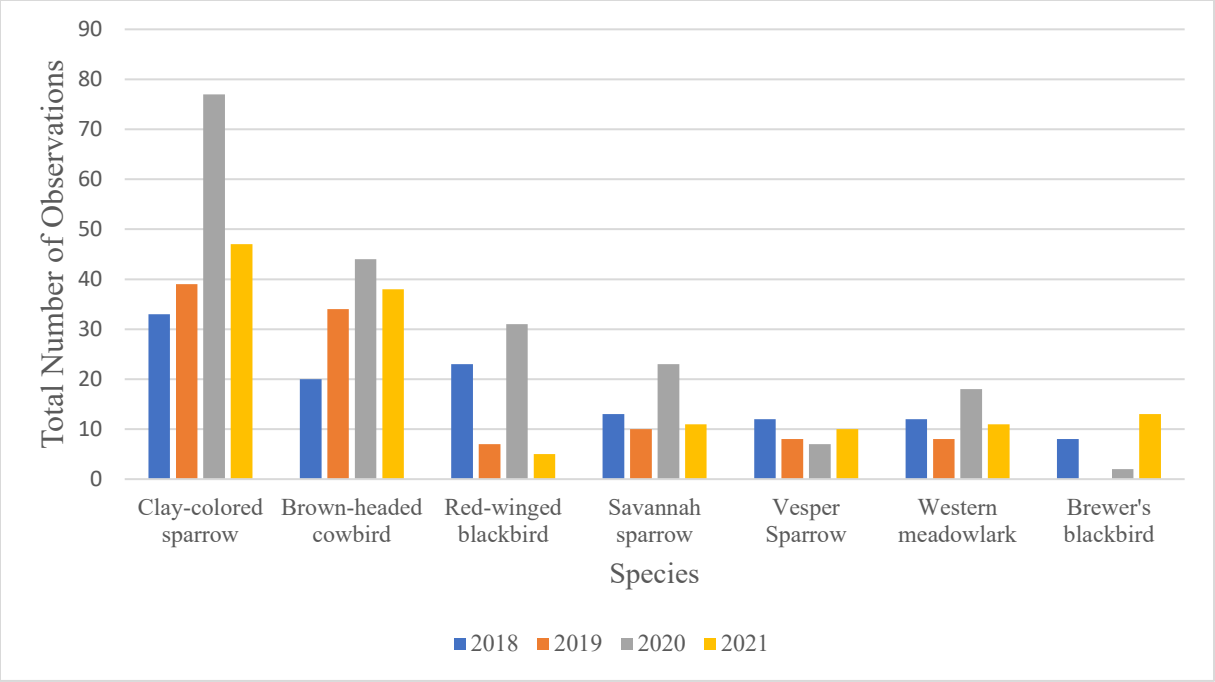

Figure 3. A graph illustrating number of most frequently detected species observations during point-count surveys, 2018 – 2021.

Table 5. The most frequently detected species during wetland surveys, 2019 – 2021.

	2019	**2020**	**2021**
1st	red-winged blackbird	yellow-headed blackbird	red-winged blackbird
2nd	yellow-headed blackbird	red-winged blackbird	yellow-headed blackbird
3rd	mallard	mallard	blue-winged teal
4th	blue-winged teal	blue-winged teal	mallard
5th	lesser scaup	lesser scaup	gadwall

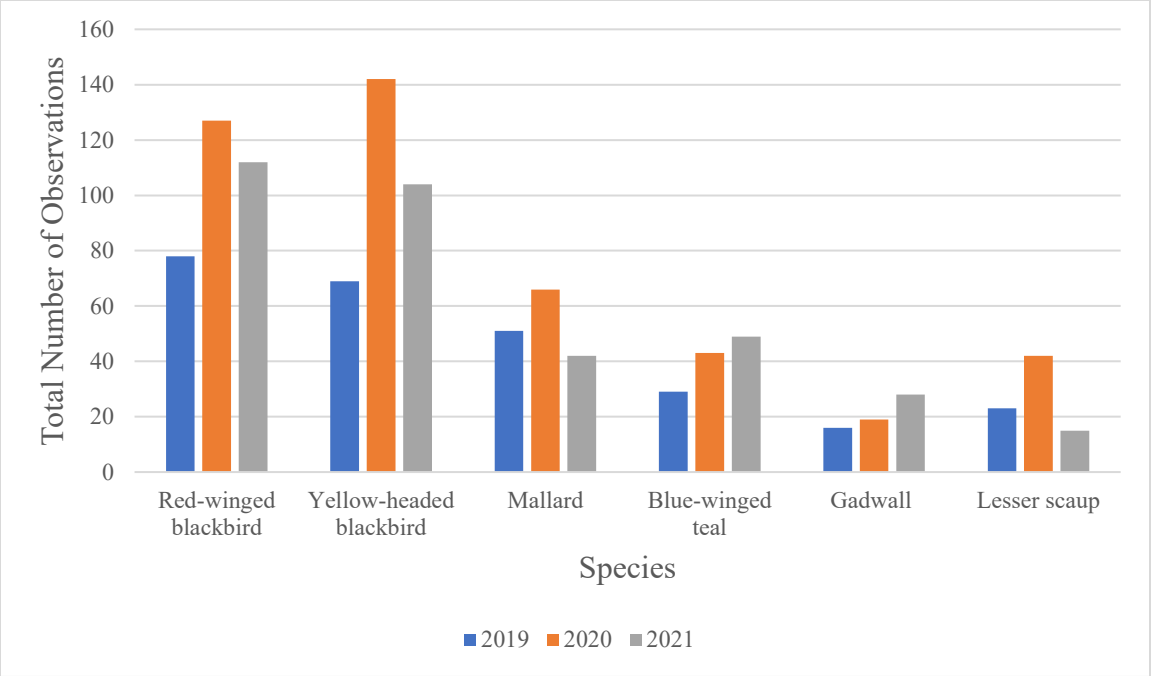

Figure 4. A graph illustrating number of most frequently detected species observations during 2019-2021 Enchant farm wetland surveys.

Hunting occurs annually at the farm. For the past 6 years harvest has occurred with waterfowl, deer, and pen-reared male pheasants. The landowners hope to establish, a huntable breeding population of pheasants that will no longer require the supplementation of pen-reared pheasants.

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. Establishing a breeding population of pheasants will demonstrate that habitat establishment can provide prime hunting opportunities for popular game species. We anticipate that overall species biodiversity and abundance will benefit from enhancements targeted toward game birds.

Communications

- Gave an online presentation in collaboration with Stamp Farms information series about the work that has been done at the Enchant farm.

- Collaborated with Farming Smarter to write an article about the Enchant farm.

Literature Cited

Not applicable

Photos

Photo 1. A ring-necked pheasant seen at the farm during the summer. Photo: Samuel Vriend

Photo 2. A ring-necked pheasant seen at a feeder at the farm. Photo: Samuel Vriend

Photo 3. White-tailed deer at the farm during the winter. Photo: Samuel Vriend

Photo 4. A ring-necked pheasant during the winter. Photo: Samuel Vriend

Photo 5. Waterfowl taking off from one of the wetlands at the Enchant farm.
Photo: Samuel Vriend