Alberta Conservation Association

2022/23 Project Summary Report

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

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Partnerships

Alberta Environment and Protected Areas
Haggins Family
Stamp Farms

Key Findings

- The density of partridge pairs decreased from 70 pairs (11.8 pairs/km^2) in spring 2021 to 53 pairs (8.9 pairs/km^2) in spring 2022.
- Partridge counts in October 2022 revealed the best recruitment we have had in the past four years with 391 individuals remaining from a spring pair count of 53.
- We detected 53 wildlife species during our 2022 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 among three small pens, and 455 pheasant poults separated into the two large pens in July 2022.

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 birds). We trial enhancements that focus on improving habitat features important for nesting, brood rearing, and winter survival of ring-necked 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 2022, 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 for pheasants, but also to help control unwanted weeds. We assisted farm staff with planting 0.5 km of additional shrub rows (500 shrubs) to increase territorial space for pheasants and grey partridge at the farm. We planted approximately 1,000 willow stakes along a decommissioned canal bed.

The density of partridge pairs decreased from 70 pairs (11.8 pairs/km^2) in spring 2021 to 53 pairs (8.9 pairs/km^2) in spring 2022, our lowest count to date. However, our autumn counts were very promising and the highest since 2018 at 391 individuals. We trialled two different soft-release methods, releasing a total of 500 pheasants at the farm.

Introduction

Crop production has evolved dramatically since the post-war recovery following World War II. 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 birds). 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, Alberta, 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; 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 2022, 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 used 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 2022, we worked with the landholder to trial two soft-release methods to establish a breeding population of pheasants at the farm.

Large Pens: We released a mix of male and female poults at six and eight weeks of age into two large open-topped pens: 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 pens have 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 eight weeks of age. Unlike the large pen, we selected females for the small pens. Pens were all the same size and each pen received 15 poults. To improve site fidelity, 2–3 poults were released from each pen after three weeks; subsequently, an additional 2–3 birds were 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 were 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 re-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 2022, 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 37 locations within the farm (Figure 1). Alfalfa (*Medicago sativa*) was a dominant forb for 24.3% of the polygons. Crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and meadow brome (*Bromus biebersteinii*) were the dominant graminoids at 56.8%, 21.6%, and 13.5% of the polygons, respectively. Other graminoid species observed within the polygons assessed were intermediate wheatgrass (*Agropyron intermedium*), tall wheatgrass (*Agropyron elongatum),* and Kentucky bluegrass (*Poa pratensis*). Other forb species included red-root pigweed (*Amaranthus retroflexus*) and cicer milkvetch (*Astragalus cicer*).

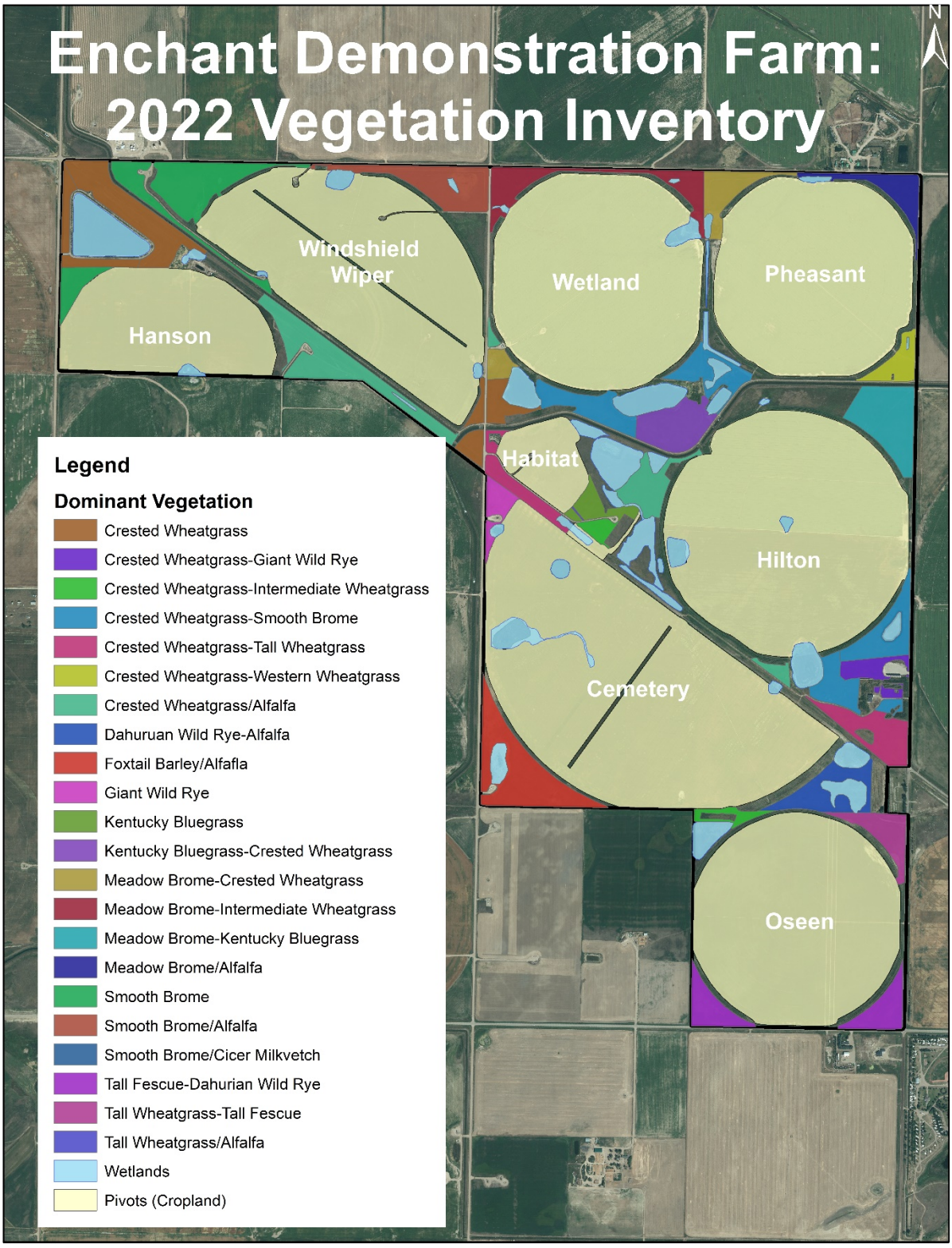

Figure 1. A map of the 2022 vegetation inventory conducted at the Enchant farm, Alberta.

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 that was planted in 2021 did not establish well, but monitoring will continue in the upcoming years to see if it improves.

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 0.5 km of additional shrub rows (500 shrubs) to increase territorial space for partridge and pheasants at the farm. Additionally, 1,000 willow stakes were harvested and planted along a decommissioned canal that runs through the property. The willow stakes help to establish riparian areas and provide soil stabilization and habitat.

Re-establishing pheasants

Large Pens: 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. We also installed perching deterrents on posts near the pen to discourage owls and raptors from landing near the area. The soft release worked very well for establishing site fidelity and we felt most released birds remained on the property and dispersed well throughout the habitat.

Small Pen: The small pen approach was also successful. Once all the birds were released from the small pens, they remained in the areas around the pens for about two weeks and then began to disperse into the winter habitat.

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 during winter 2022/23, the 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 Roundup Ready Corn stands and the shrub rows throughout the farm are also being used heavily with birds consistently being detected on the cameras and by the gamekeepers. We will be completing game bird surveys throughout the entire farm in the spring of 2023. 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 70 pairs (11.8 pairs/km^2) in spring 2021 to 53 pairs (8.92 pairs/km^2) in spring 2022. Pair density was still much greater at the farm than at control sites (1.3 pairs/km^2) in 2022. In autumn, partridge densities increased from 135 in October 2021 to 391 in October 2022 suggesting high recruitment going into 2023. Figure 2 provides a comparison of partridge pair density throughout the years 2014–2022.

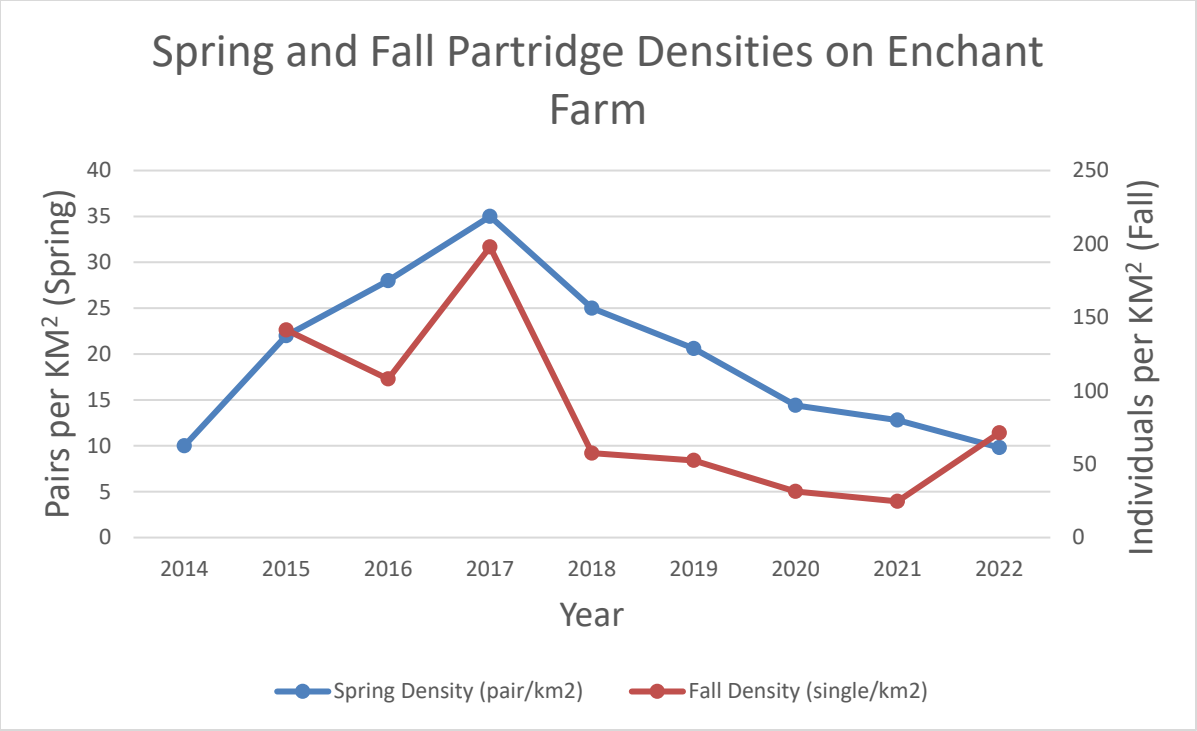

Figure 2. A graph illustrating change in partridge densities per km^2 in the years 2014–2022.

Our wetland and point-count biodiversity surveys recorded 47 bird species, three mammal species, and one amphibian species at the farm (Table 3). In contrast, the control site biodiversity surveys recorded only 20 bird species. In 2022, the yellow-headed blackbird (*Xanthocephalus xanthocephalus*) was the most frequently detected species in the farm wetland surveys, followed by red-winged blackbird (*Agelaius phoeniceus*) and mallard (*Anas platyrhynchos*). The clay-colored sparrow (*Spizella pallida*) was the most frequently detected species during farm point-count surveys with an average of 2.5 individuals detected per point count, followed by red-winged blackbird with an average of 2.2 individuals detected per point count, and western meadowlark (*Sturnella neglecta*) with an average of 1.3 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 5.9 individuals detected per point count, followed by vesper sparrow (*Pooecetes gramineus*) with an average of 1.9 individuals detected per point count, and brown-headed cowbird (*Molothrus ater*) and Savannah sparrow (*Passerculus sandwichensis*) both with an average of 1.6 individuals detected per point count. A comparison of the most frequently detected species throughout 2018–2022 surveys can be seen in Tables 4 and 5. Figures 3 and 4

illustrate the number of the most frequently detected species observations during the 2018–2022 Enchant farm surveys.

Table 3. Species list for all wildlife detected during farm surveys, 2022.

American avocet	Clay-colored sparrow	Lesser scaup	Ruddy duck
American coot	Common goldeneye	Mallard	Savannah sparrow
American crow	Common grackle	Marbled godwit	Song sparrow
American robin	Common yellowthroat	Mourning dove	Sora
American wigeon	Eared grebe	Mule deer	Spotted sandpiper
Barn swallow	Eastern kingbird	Muskrat	Vesper sparrow
Black-necked stilt	Eurasian collared dove	Northern pintail	Western meadowlark
Blue-winged teal	Franklin's gull	Northern shoveler	White-tailed deer
Brewer's blackbird	Gadwall	Pied-billed grebe	Wilson's phalarope
Brown thrasher	Gray partridge	Redhead	Wilson's snipe
Brown-headed cowbird	Green-winged teal	Red-winged blackbird	Yellow-headed blackbird
Bufflehead	Horned lark	Ring-billed gull	
California gull	House sparrow	Ring-necked duck	
Canada goose	Killdeer	Rock dove	

Table 4. The most frequently detected species during point-count surveys, 2018–2022.

	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	

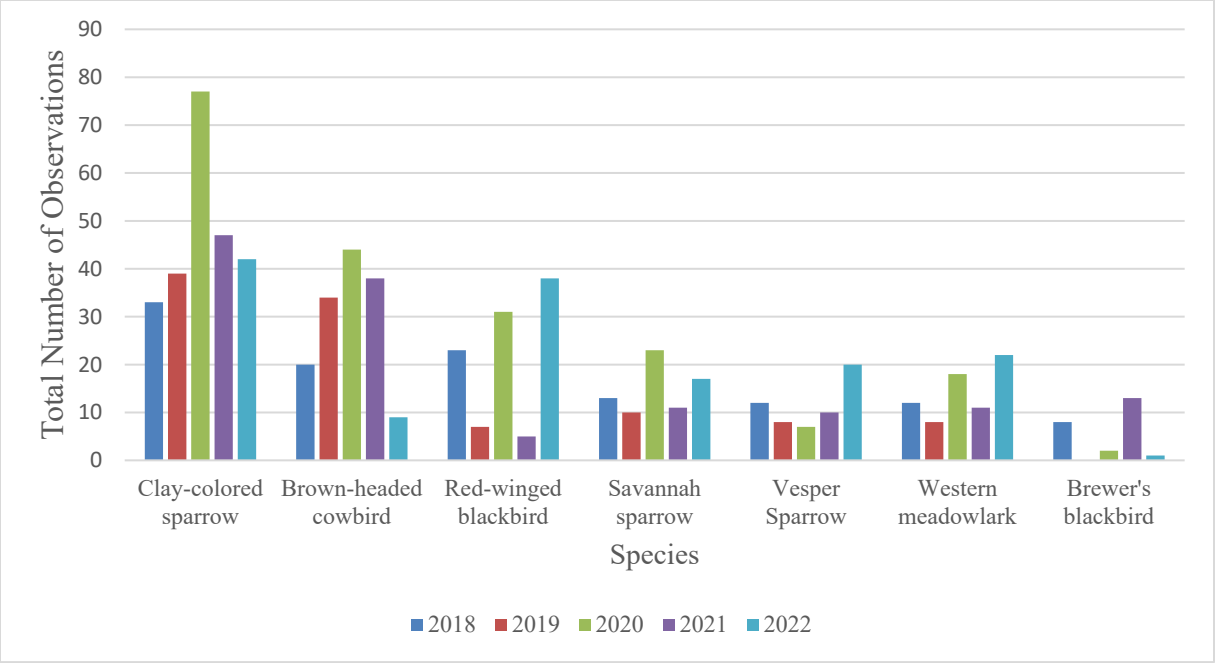

Figure 3. A graph illustrating number of most frequently detected species observations during point-count surveys, 2018–2022.

Table 5. The most frequently detected species during wetland surveys, 2019–2022.

	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

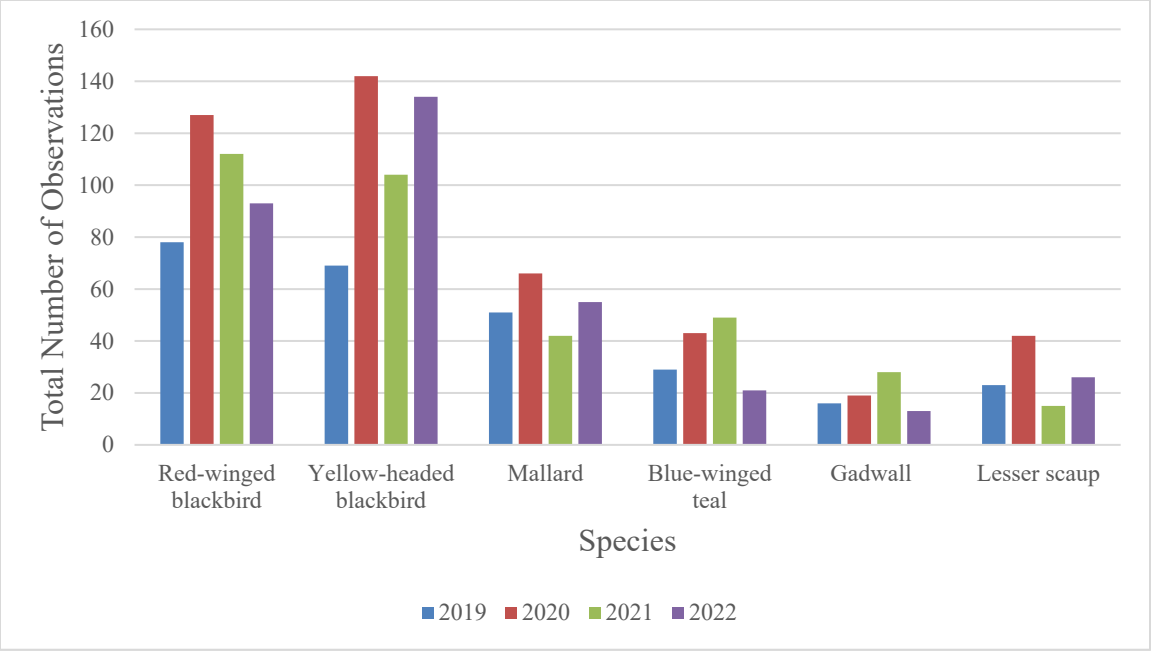

Figure 4. A graph illustrating number of most frequently detected species observations during 2019–2022 Enchant farm wetland surveys.

Hunting occurs annually at the farm. For the past six years, harvest has occurred with waterfowl, deer, and pen-reared male pheasants released as adult birds for put and take. 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

- Doug Manzer was a guest on The Hunter Conservationist Podcast with Mark Hall where they talked about all things upland gamebirds including many of their habitat needs.

Literature Cited

Not applicable

Photos

Photo 1. Mule deer at the farm during the winter. Photo: Samuel Vriend

Photo 2. A motley of habitat at the farm during the winter. Photo: Samuel Vriend

Photo 3. Wetland habitat at the farm during the winter. Photo: Samuel Vriend

Photo 4. Corn and permanent cover at the farm during the winter. Photo: Samuel Vriend