Grassland Set-aside surveys of Pacific Great Blue Heron and Birds of Prey

Introduction

Grasslands have been identified as important habitats for birds, including species at risk, such as the American Barn Owl (Tyto furcata), Short-eared Owl (Asio flammeus), and Pacific Great Blue Heron (Ardea Herodias fannini). The Delta Farmland and Wildlife Trust (DFWT) aims to improve grassland habitat in the Fraser River delta by entering into stewardship agreements with farmers to manage farmland as Grassland Set-Asides (GLSA). These set-asides support a high density of small mammals, such as the Townsend's Vole (Microtus townsendii) and provide valuable foraging and roosting habitat for birds. This study aims to assess the effectiveness of GLSAs in restoring habitat for predatory birds, focusing on species at risk. The objectives of the study were as follows:

1. To evaluate the use of grassland set aside fields by Pacific Great Blue Heron.
2. To evaluate the use of grassland set aside fields by diurnal raptors.
3. To evaluate the use of grassland set aside fields by Barn Owls and Short-eared Owls.

Grassland Set Aside fields were surveyed for herons, raptors, and owls between November 25, 2024, and March 15, 2025. The survey included nineteen active fields in the GLSA program. Fields were selected to represent various seeding types, field ages, sizes, and geographical locations.

1.0 Pacific Great Blue Heron

1.1 Methods

Pacific Great Blue Heron surveys were conducted in nineteen Grassland Set-Aside fields in Delta. Each field was surveyed once per week, a total of fifteen times. Surveys took place between 8:30 am and 6:00 pm and the route was altered weekly to ensure each field was observed at various times of the day.

Upon arrival, the field was scanned with binoculars for 20 minutes, and any visible herons were counted. The heron surveys were completed in conjunction with surveys for diurnal raptors. A one-way ANOVA was performed to test for significance between mean encounter rate and set-aside age, and seed mixes.

1.2 Results

Each Grassland set aside was surveyed over 15 field days between November 23rd, 2024, and March 12th, 2025. A total of 37 herons were observed in 17 of the 19 GLSA fields surveyed throughout Delta.

Heron densities were highest in fields planted in 2022 although they were also observed in more recently planted fields (Table 1). Great Blue Herons are often solitary outside of mating season. During the survey, most herons were observed individually and there were never more than two in each field at the same time.

While herons appeared most frequently in 2022 GLSA fields, the difference in densities across field ages was not statistically significant ($p = 0.37$) (Figure 1). Compared to the surveys conducted in 2022-2024, fields planted in 2022 have consistently supported the highest heron densities over the past three survey years.

Table 1 Total number of herons and average number of herons per hectare per survey day by year

Age	*Number of Fields*	*Count of Herons*	*Hectares*	*Herons/Ha/Day*
2024	5	12	36.0	0.022
2023	7	15	48.6	0.021
2022	2	5	6.1	0.055
2021	0	0	0.0	0.000
2020	1	1	4.0	0.016
2019	3	4	19.0	0.014
2018	1	0	7.7	0.000

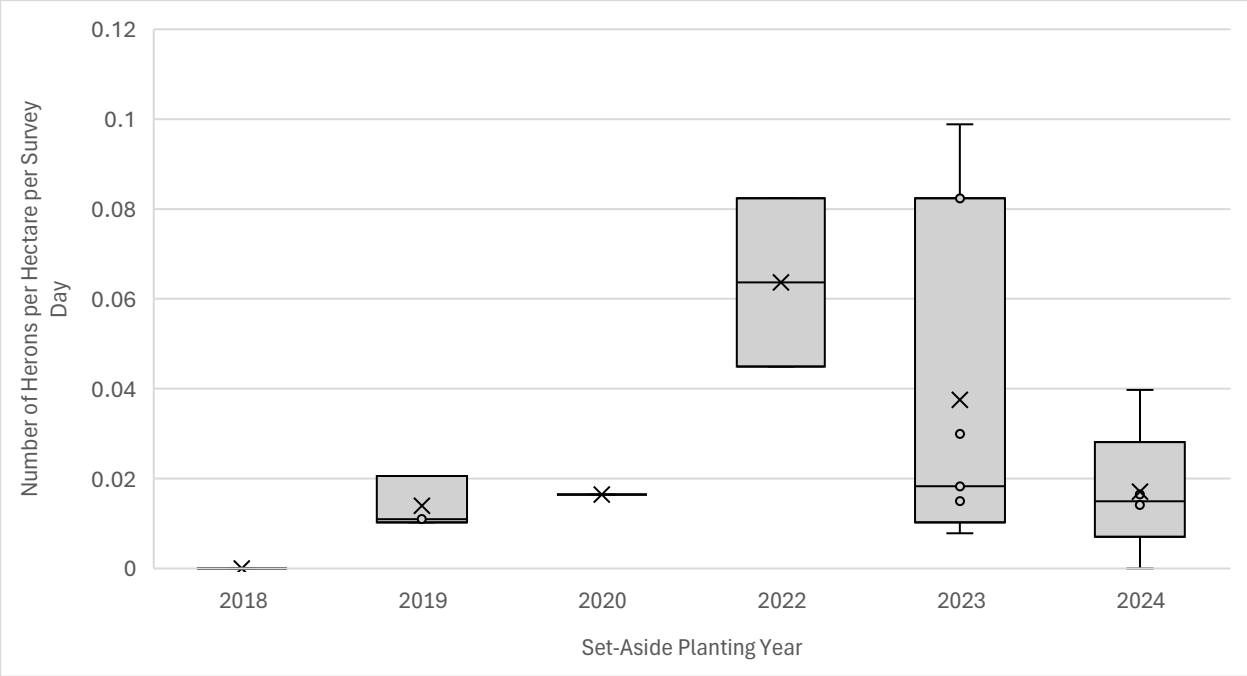

Figure 1 Number of herons per hectare per survey by planting year; quartiles represented by boxes, maximum and minimum values represented by whiskers, mean value represented by an "x", and outliers represented by dots.

Different seed mixtures used in planting grassland set-asides were compared to evaluate how they affected Pacific Blue Heron density. Fields planted with a Grass mix supported the lowest observed heron density, while both the Pollinator mix and DFWT mix supported comparably higher densities (Figure 2). However, these differences were not statistically significant ($p = 0.75$). Additional field characteristics, including field size and age, were also evaluated but no significant correlations were found between these variables and heron density.

Figure 2 Number of herons per hectare per survey by seed type; quartiles represented by boxes, maximum and minimum values represented by whiskers, mean value represented by an "x".

2.0 Barn Owl and Short Eared Owl

2.1 Methods

Owl surveys were completed in 12 grassland set-asides and 1 blueberry rest set-aside field, each field was surveyed twice from January 2nd to March 15th at dusk for 90 minutes surrounding sunset. When adjacent fields were close enough to observe without moving, both fields were surveyed at the same time. Surveys were conducted by finding a position where the entire field to be surveyed was visible with minimal movement. The area was then visually scanned continuously, alternating between binoculars and normal sight. All owl activity was recorded, including the species, time of entering and exiting the field. Surveys were not performed in inclement conditions such as rain over 1 mm per hour or high winds.

2.2 Results

Owl species were detected in eight grassland set-aside fields and one blueberry rest set-aside field on eight survey days (Table 2). Short-eared Owls were observed in six different fields and Barn Owls were seen in two different fields.

Table 2 Number of individual owls observed during evening surveys, with date of observation and the seeding mix of each field.

Date	*SPECIES*	*SEED*
1/29/2025	SEOW	Pollinator Mix
2/6/2025	SEOW	Pollinator Mix
2/7/2025	SEOW	Pollinator Mix
2/12/2025	SEOW	Pollinator Mix
2/12/2025	BAOW	Pollinator Mix
2/13/2025	SEOW	Grass
2/13/2025	SEOW	Pollinator Mix
2/20/2025	BAOW	Pollinator Mix
2/27/2025	SEOW	DFWT Mix
3/12/025	BAOW	Pollinator Mix

Short-eared Owls were more likely to be present longer in fields, while Barn Owls were observed in the fields for less than five minutes. Both Short-eared Owls and Barn Owls were observed both before and after sunset (Figure 3).

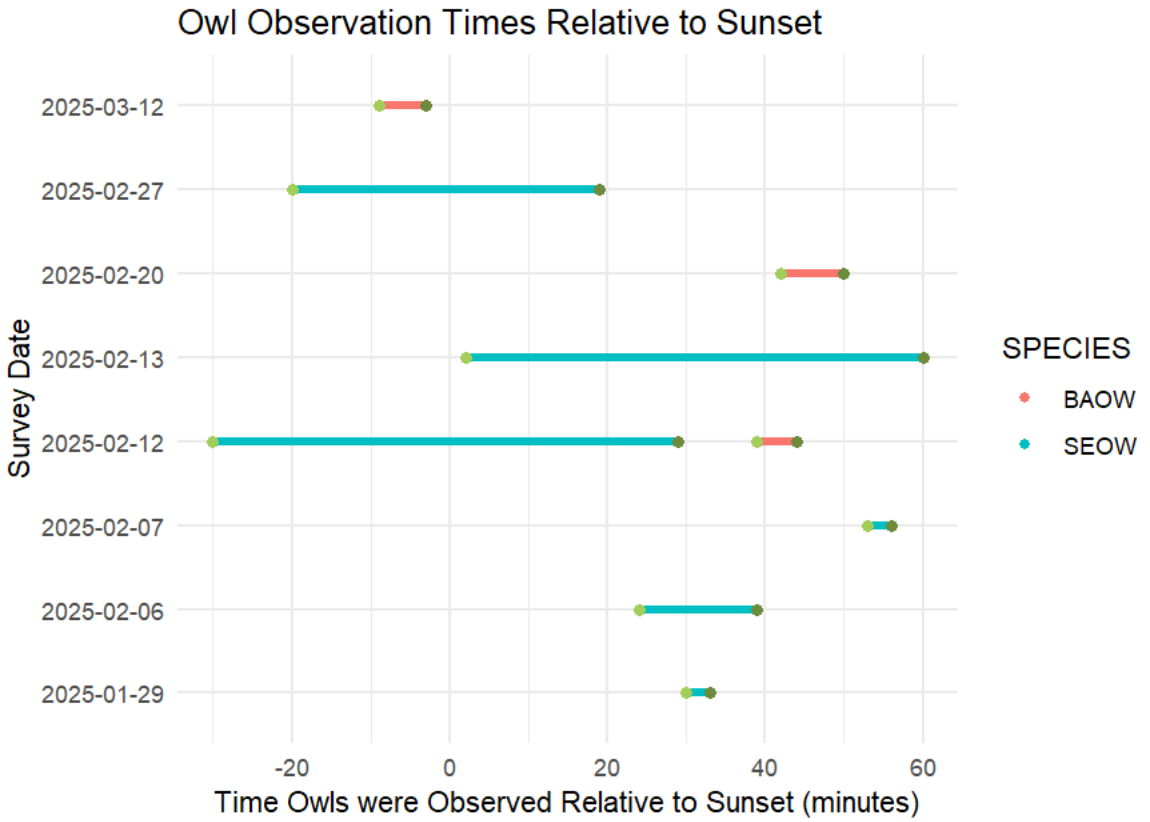

Figure 3. Time owls were observed relative to sunset, with negative values representing minutes before sunset and positive values representing minutes after sunset. Green dots on left represent time owl entered field, grey dots on the right represent time owl was last seen.

Short-eared Owls were also observed more frequently during diurnal raptor surveys, with an additional 20 observations recorded during daytime surveys (Table 3). Unlike other owl species, such as the Barn owl, which is primarily nocturnal, Short-eared owls are diurnal so they are more active during the day. This observation is a large increase compared to previous 2022 and 2023 surveys where only 2 and 1 short-eared owls, respectively, were observed during the day (Figure 4).

Table 3 Total number of short-eared owls per hectare per survey day by seed mix.

	Fields	*Count of Short Eared Owls*	*Hectare*	*Owls/Hectare/Day*
DFWT Mix	1	3	11.7	0.017
Grass	3	10	22.7	0.029
Pollinator Mix	4	7	21.0	0.022

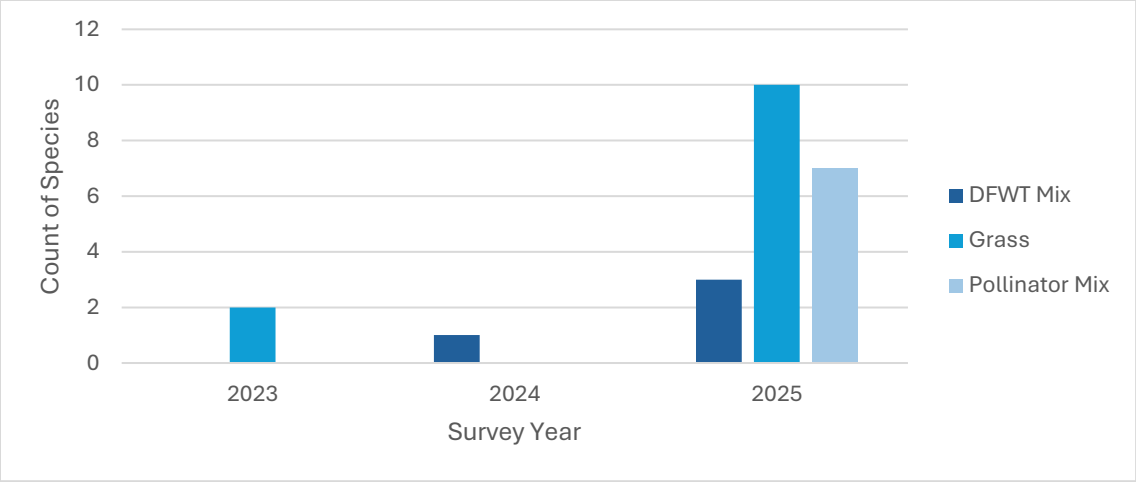

Figure 4 Count of owl species observed in each Grassland Set-Aside type over the past three survey years.

3.0 Diurnal Raptors

3.1 Methods

Diurnal raptor surveys were conducted in nineteen GLSA fields from November 23, 2024, to March 13, 2025. Fields were selected based on a variety of field locations, year planted, and seed mix. Each field was sampled fifteen times during a 20-minute point count, once per week, between 8:30 am and 6:00 pm. The survey time was altered weekly to ensure each field was observed at various times of the day. The maximum number of individuals observed for each raptor species was recorded to calculate the mean encounter rate for species in every set-aside field. One-way ANOVA was performed to test for significant difference between mean encounter rate and set-aside age, size, and seed mixes.

3.2 Results

A total of nine raptor species were observed during the survey. Northern Harriers were the most abundant species, observed in 100% of surveyed fields. They were followed by the Bald Eagle, present in 84% of fields, and the Red-Tailed Hawk which was present in 47% of fields. Short-eared Owls were present in 42% of fields, followed by the Rough-Legged Hawk which were present in 21%. The Cooper's Hawk, American Kestrel, and the Peregrine Falcon were each observed in 11% of fields, and Merlin's were recorded in 5% (Figure 5). This year, the Northern Harrier had the largest number of observations, in the 2023-2024 survey year Norther Harriers were also the most observed species.

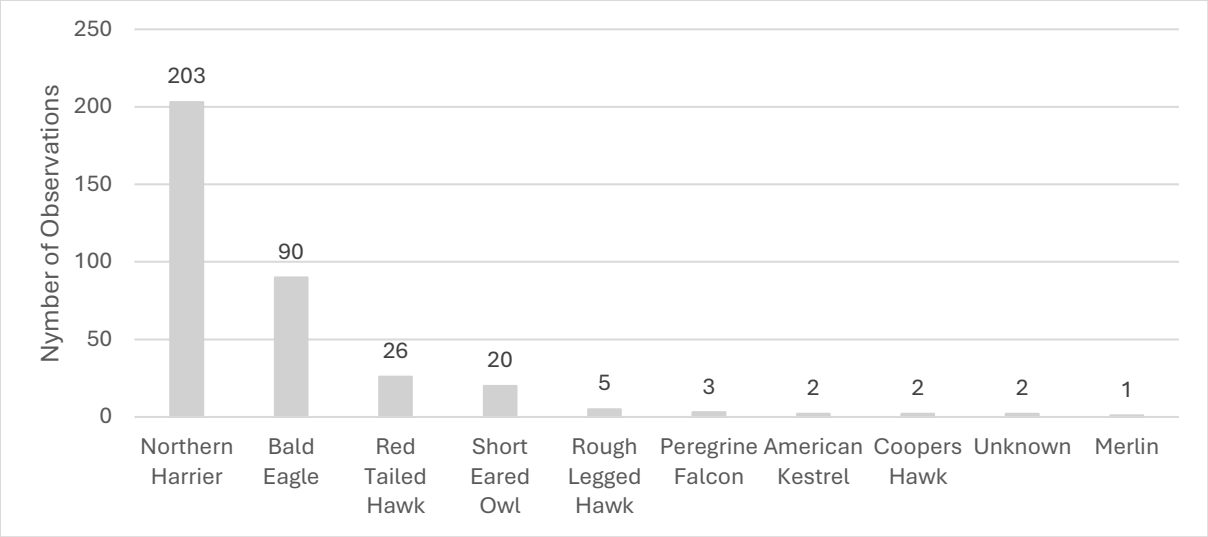

Figure 5 Number of individuals observed per species in the Grassland Set Aside Survey

Overall, the highest number of raptors were found in grasslands planted with a Pollinator seed mix (Figure 6). This seeding mix also supported the most diverse range of raptor species, as each species was observed in a set-aside planted with a Pollinator Mix.

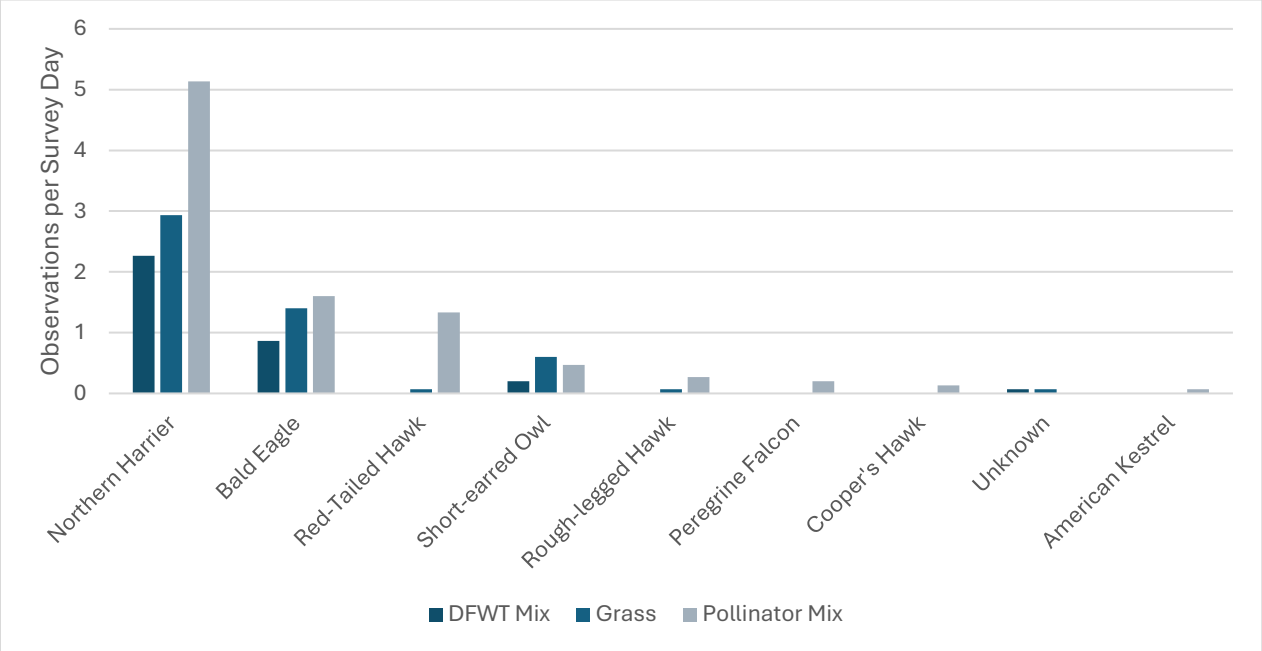

Figure 6 Number of individuals observed per survey day based on species and GLSA seed mix.

Fields which had been left in a set-aside for 7-8 years seemed to support a higher number of raptor observations per survey day (Figure 7), though there was found to be no significant difference between the age of the set aside and the density of raptors ($p=0.16$). Species

richness was observed to be higher in younger fields planted in 2024 or 2023, though there was no significance between habitat age and species richness (p=0.29).

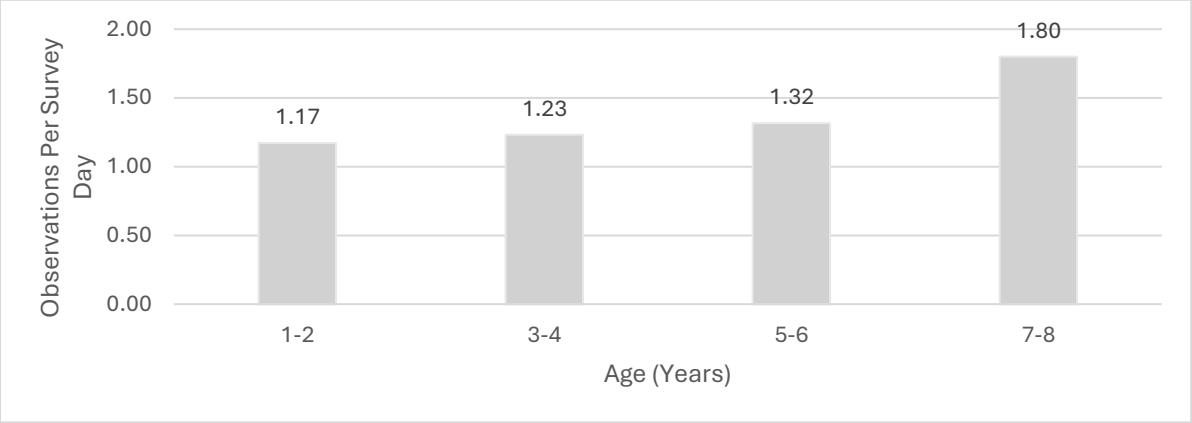

Figure 7 Number of individuals observed per survey day based on species and GLSA age.

When comparing set-aside fields, field size has historically played a significant role in the number of observations of raptors in each field. Surveys completed in 2021-2024 showed that raptors were more often observed in larger fields, 31-45 acres. This year's survey shows that fields between 31-45 acres had the lowest number of observations per survey, compared to last year (2.73) (Figure 8) Fields between 46-60 acres had the highest number of observations, at 2 per day, which is an increase from 2024 at 1.33 observations/survey day.

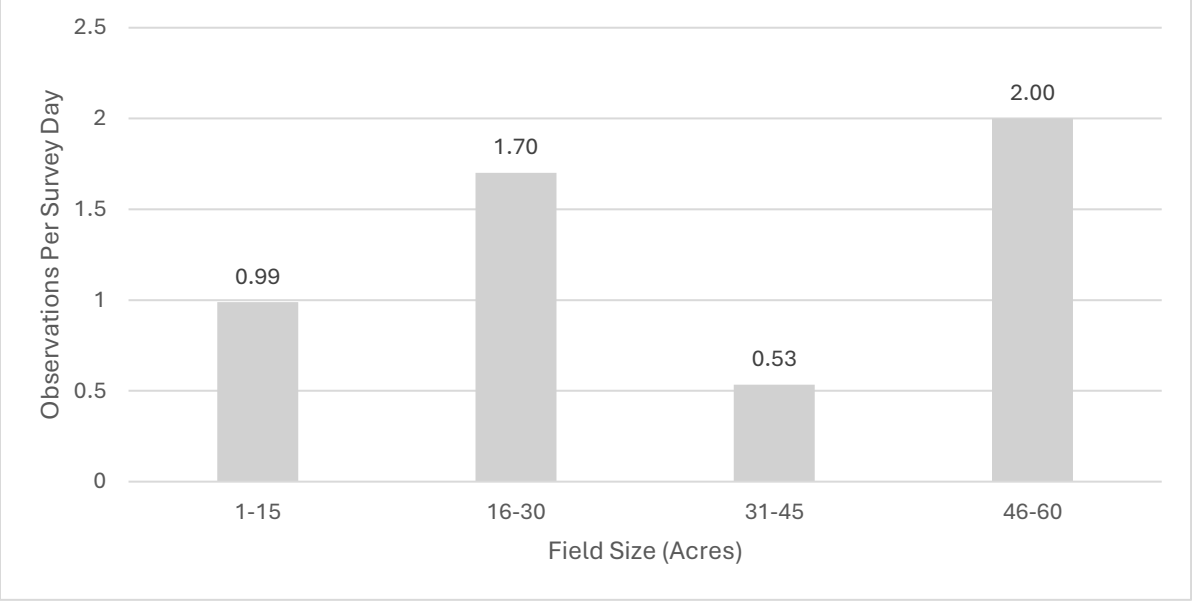

Figure 8 Number of individuals observed per survey day based on species and GLSA size (acres).

Conclusion

The results of this study support the value of grassland set-asides in providing habitat for species at risk. Herons were detected in 89% of fields and owls were detected in three quarters of fields surveyed. Given the cryptic nature of both Short-eared Owls and Barn Owls, actual owl activity is likely higher than reported here. Raptors, owls, and herons were observed to be active in set-aside fields, indicating the abundance of prey species in these fields. Additionally, the 22 incidental observations of Short-eared Owls flushed from set-asides during the day suggest set-asides provide valuable roosting habitat.

Pollinator Mix fields supported the highest Pacific Great Blue Heron and raptor use, as was seen in the 2023-2024 survey. This year, sampling time for evening owl surveys was extended to an hour after sunset. Two of the three Barn Owls were sighted on average 40 minutes after sunset, which supports that survey times after sunset recorded most of the Barn Owl activities, while Short-eared Owls were observed both before and after sunset.

A total of 9 raptor species were observed in diurnal raptor surveys, each field supported observations of multiple raptor species throughout the survey period, demonstrating the intensive use of these set-aside fields by raptors