

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



Image 1 A grassland set-aside field in Delta, 2023.

Introduction

Grasslands have been identified as important habitats for birds, including species at risk, such as the Barn Owl (*Tyto alba*), 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 asides 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 20, 2023, and March 15, 2024. The survey included seventeen 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



Image 2 A Great-Blue Heron in a grassland set-aside in Delta.

1.1 Methods

Pacific Great Blue Heron surveys were conducted in 17 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

A total of 48 herons were observed in each of the 17 GLSAs surveyed. Overall, herons were observed with the greatest densities in fields planted in 2022 (*Table 1*). Most herons were seen individually and there were never more than two in each field at the same time.

Year Planted	Number of Fields	Sum of Hectare	Herons	Herons/Ha	Herons/Ha/Survey
2018	1	7.69	2	0.26	0.02
2019	4	29.14	12	0.41	0.03
2020	2	17.81	4	0.22	0.01
2022	3	14.16	11	0.78	0.05
2023	7	48.56	19	0.39	0.03

Table 1 Comparison of herons observed per hectare/Survey Day by year of establishment of the GLSA

Grassland Set-Asides planted with a Pollinator mix hosted the highest number of herons (25) at 0.037 Herons per Hectare per Survey (*Table 2*). In previous years the Pollinator Mix had held the fewest heron observations, with the DFWT Mix having the highest number of observations. Herons

were also most observed in fields smaller than 5 hectares (*Table 3*). Though the differences observed between each of the fields was not statistically significant.

Seed Mix	Number of Fields	Hectares	Herons	Heron/Ha	Herons/Ha/Survey
DFWT Mix	3	37.64	6	0.159422686	0.011
Grass	5	35.21	17	0.482849169	0.032
Pollinator	9	44.52	25	0.561602643	0.037

Table 2 Comparison of herons observed in fields based on GLSA seed type

Hectares	Number of Fields	Hectares	Herons	Heron/Ha	Herons/Ha/Survey
0-5	7	23.471788	17	0.724273754	0.0482849
5-10	7	50.58575	26	0.513978739	0.0342652
10-15	2	23.876474	4	0.167528924	0.0111686
15-20	1	19.424928	1	0.051480242	0.003432

Table 3 Comparison of herons observed in fields based on hectares.

2.0 Raptor Survey



Image 3 A Northern Harrier foraging over a grassland set-aside in Delta.

2.1 Methods

Diurnal raptor surveys were conducted in 17 GLSA fields from November 20, 2023, to March 14, 2024. Fields were selected for variety of field locations, year planted, and seed mix. Each field was sampled fifteen times as a 20-minute point count once a 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.

2.2 Results

A total of seven raptor species were observed in the survey (*Figure 1*). Northern Harriers were the most abundant species and were found in every field surveyed, followed by the Bald Eagle, which was observed in 16 of the 17 fields. The Rough Legged Hawk was present in 41% of fields, followed by the Red-Tailed Hawk (35%), American Kestrel (24%), Coopers Hawk (18%), and the Merlin (12%) (*Figure 1*). This year, the Northern Harrier had the largest number of observations, compared to the previous year of raptor surveys, where Bald Eagle had the most observations.

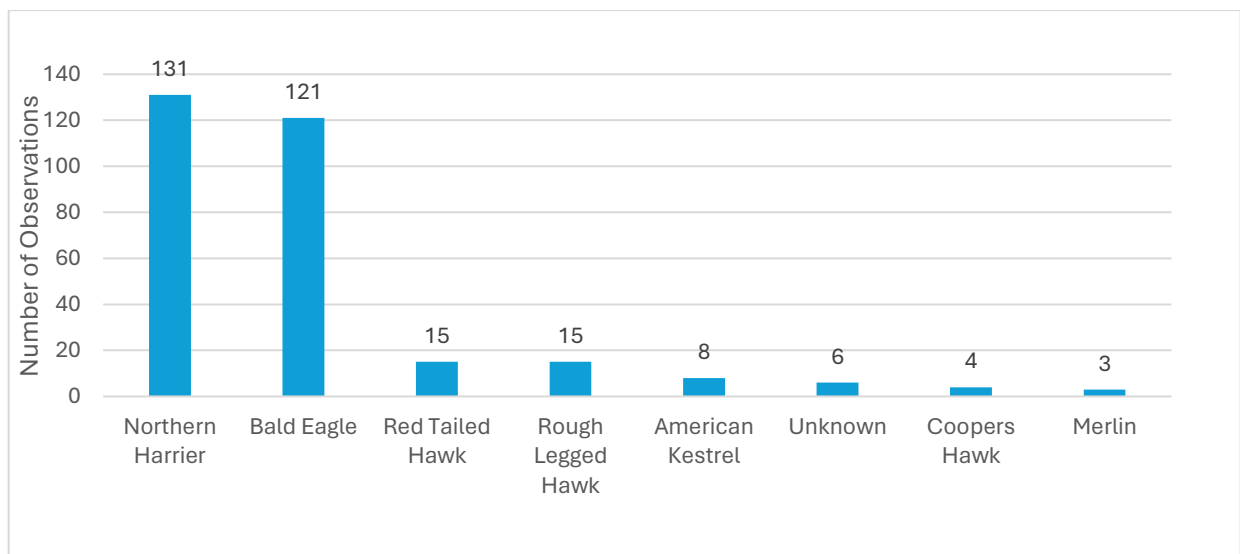


Figure 1 Number of individuals observed per species in the Grassland Set Aside Survey

Overall, the highest number of raptors were found in grasslands planted with a Pollinator seed mix. This seeding mix also supported the most diverse range of raptor species, as all seven species observed were seen in a set-aside planted with a Pollinator Mix. (*Figure 2*). Though the differences observed between each of the fields was not statistically significant.

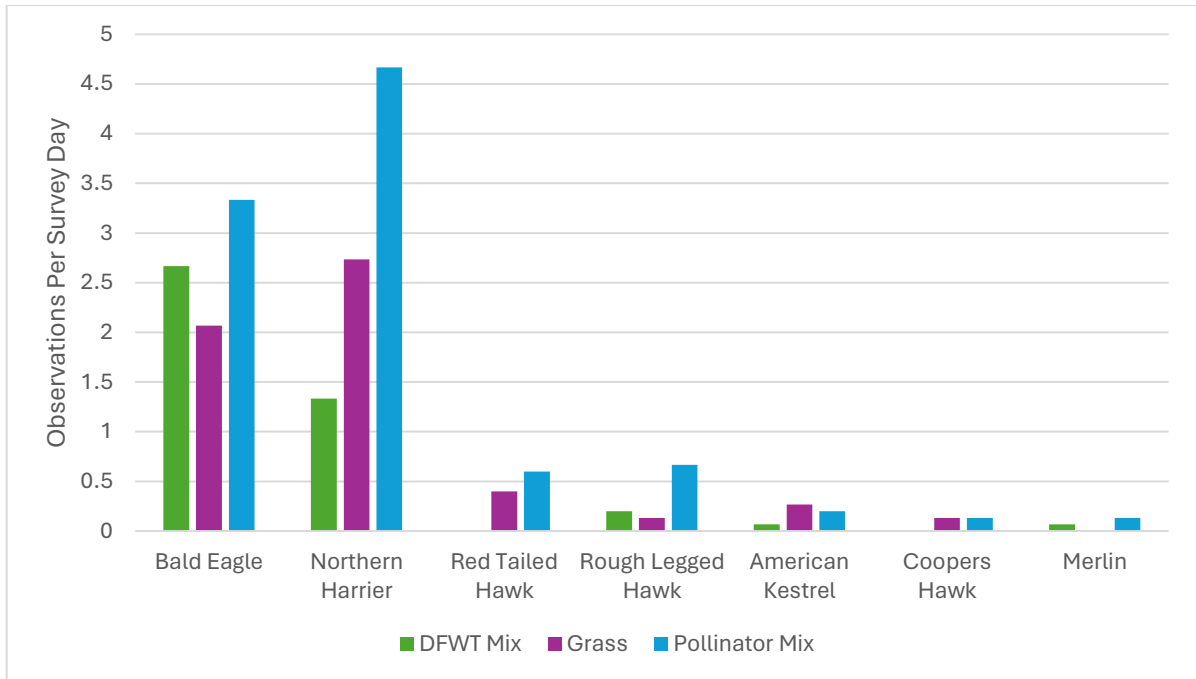


Figure 2 Number of individuals observed per survey day based on species and GLSA plant mix.

The bulk of observations were of raptors flying through or across a field (<1 minutes) (Figure 3) or were passive for majority of the survey (>10 minutes) (Figure 4). This pattern of activity has been observed historically throughout the past two years of raptor surveys. Fields planted in 2018 had less raptors spending over 10 minutes passively in the field compared to each other year, which may be due to the availability of more desirable GLSAs close to this field (Figure 4).

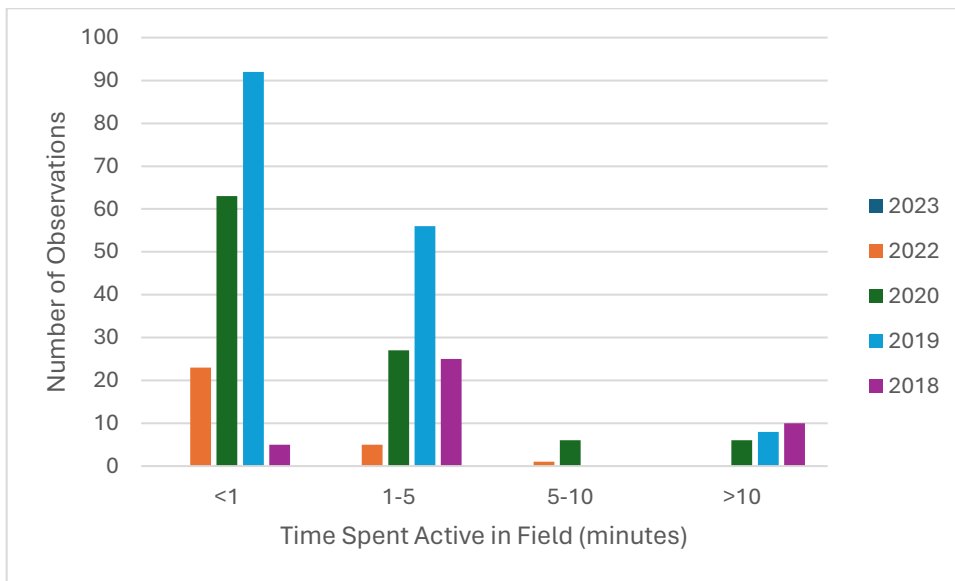


Figure 3 Number of observations of raptors spending time in GLSAs based on year planted.

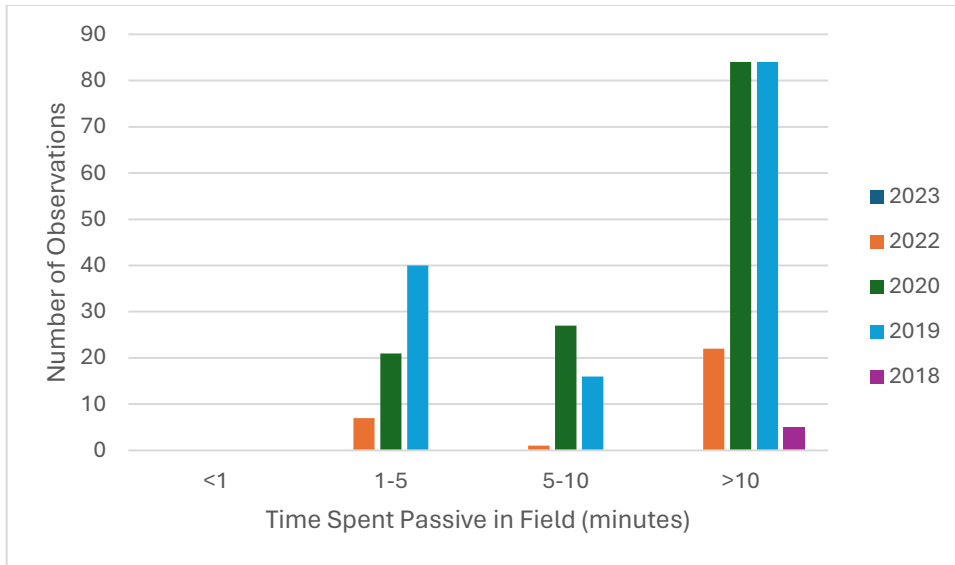


Figure 4. Number of observations of raptors observed passively spending time in GLSAs based on year planted.

When comparing GLSAs, fields which were 31-45 acres supported the largest amount of raptors, at 2.73 raptors per survey. Smaller fields from 16-30 acres and 1-15 acres also supported raptors but at a lower rate of 1.41 and 1.20 mean raptors per survey, respectively (Figure 5). This coincides with findings from 2021-2023 which also suggested that raptors more readily utilize fields larger than 20 acres. It was also found that GLSAs between the ages of 3-4 supported higher amounts of raptors, 2.33 per survey compared to older or newer GLSAs, which supported 1.10 and 1.35 raptors per survey, respectively. Results from the 2021-2023 raptor surveys also recorded the highest number of observations in fields which were three years or older. (Figure 6).

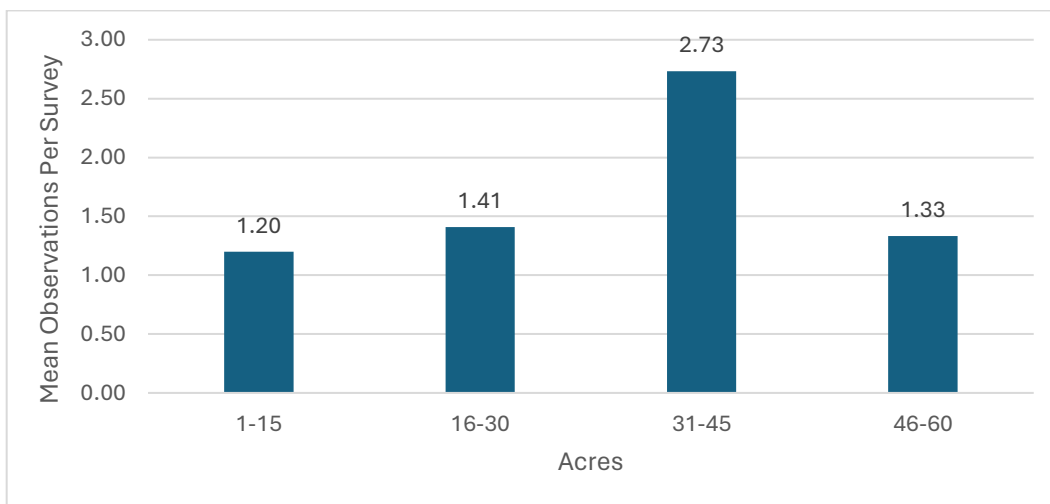


Figure 5 Mean observation of raptors per survey based on field size.

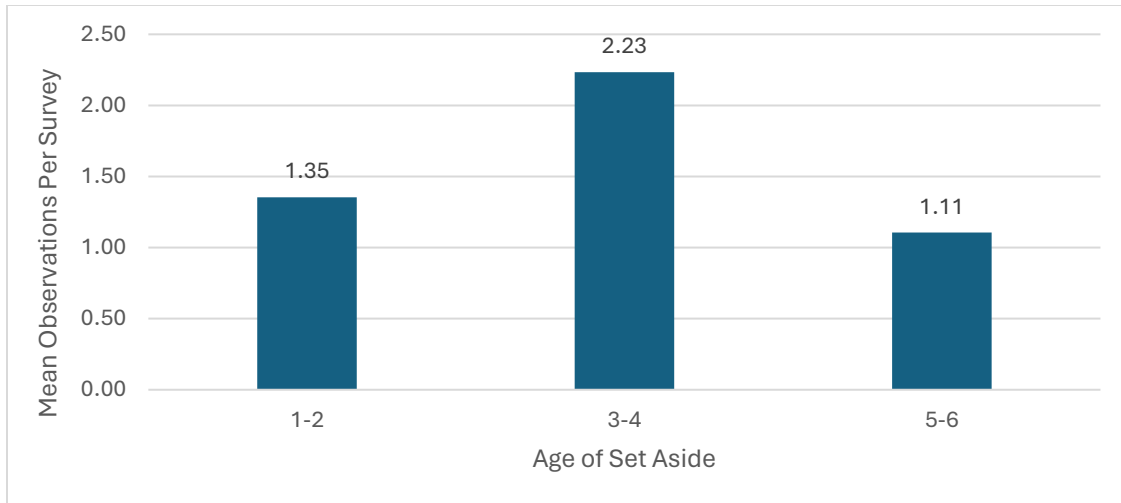


Figure 6 Mean observations per survey based on age of set aside.

3.0 Barn Owl and Short-eared Owl



Image 4 Short-Eared owl flying over a grassland set aside in Delta.

3.1 Methods

Owl surveys were conducted in fourteen grassland-set aside fields in Delta and Richmond from November 20, 2022, to March 14, 2023. Each field was surveyed twice over the season. Surveys were 90 minutes long, surrounding sunset. Surveys were conducted from a point location at the edge of the field where the entire field would be visible with binoculars with minimal movement. All owl activity was recorded including species observed, time first observed, and description of activity (e.g., active or passive). Surveys were not performed when rain exceeded 1mm/h or wind exceeded 16km/h.

3.2 Results

Owls were detected in seven GLSA fields during six survey days (*Table 4*), one owl was observed outside of the owl survey in participating GLSAs during raptor and heron field surveys. A total of six Short-eared owls were observed in three GLSA fields and three Barn Owls were observed in three GLSA fields, additionally a single Great-Horned owl was also observed.

Contract	Date	Species	Seed Mix	Number of Individuals
20-02	12/8/2023	SEOW	DFWT Mix	1
23-09	12/13/2023	BAOW	Pollinator Mix	1
23-04	12/18/2023	GHOW	DFWT Mix	1
19-05	12/21/2023	SEOW	Grass	1
22-06	1/4/2024	BAOW	Pollinator Mix	2
20-02	2/6/2024	SEOW	DFWT Mix	1
23-07	2/8/2024	SEOW	Pollinator Mix	1
19-05	2/22/2024	SEOW	Grass	1
22-11	2/23/2024	BAOW	Grass	1
20-02	3/13/2024	SEOW	DFWT Mix + Barley	1

Table 4 Date and species of owls observed, and the species of seed mixture of the GLSA.

The behaviour most often observed during owl surveys was actively flying over the field and was observed during every owl observation for at least a portion of the survey. Short-eared owls were observed on all field types, while Barn Owls were only observed in Pollinator and Grass fields, the one Great Horned Owl was observed on a field planted with a DFWT Mix. Owls were observed in fields 1-4 years old. The previous three years of owl surveys noted a lack or minimal presence of owls in newly planted fields, though in this year's survey, owls were observed in three newly planted fields

During the 90-minute interval around sunset when the surveys were conducted, the time first seen was recorded for each owl observation (*Figure 7*). Both Barn Owls and Great Horned Owls were observed approximately 45 minutes after sunset, but the Short-eared Owl was more often first seen earlier in the evening directly during sunset. There were two instances of Short-eared Owl being observed before sunset.

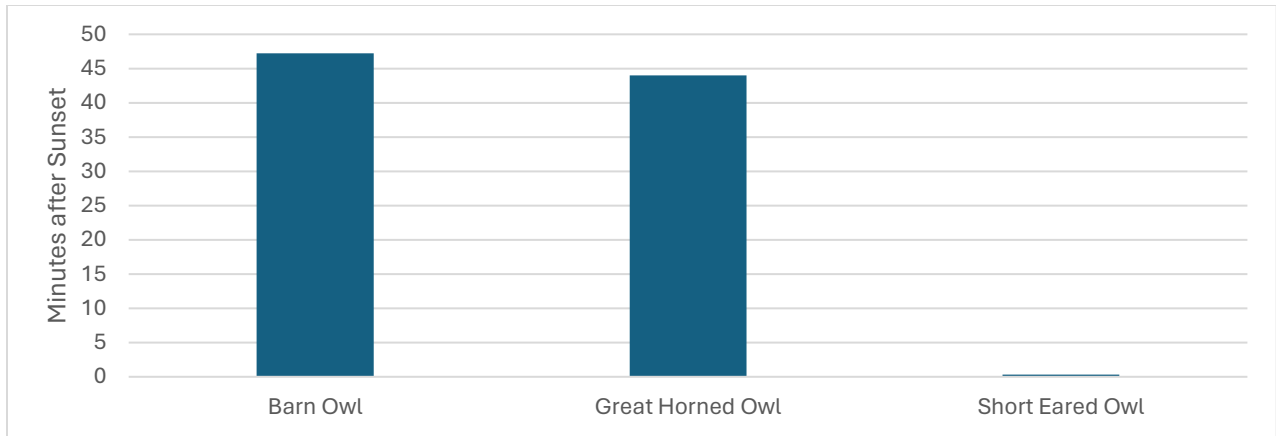


Figure 7 The mean number of minutes after sunset where each species was first seen.

4.0 Conclusion

Grassland set asides provide valuable resources to herons, raptors, and owls, including many species at risk. Throughout the 2023-2024 survey, herons and raptors were observed in 100% of fields surveyed, and owls in 41% of surveyed fields. Observations show that both owls and raptors are actively using grassland set asides for foraging, indicating the presence of prey species in these fields. Fields larger than 30 acres supported the highest raptor sightings, as well as fields three years as older, which was also found in previous years surveys. Overall grassland set asides provide important foraging resources to many distinct species of birds.