

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

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November 2022 – March 2023



Image 1. A Grassland Set Aside 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 28, 2022, and March 16, 2023. The survey included fourteen 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 eating insects in a GLSA in Delta, 2023

1.1 Methods

Pacific Great Blue Heron surveys were conducted in fourteen GLSA fields in Delta and Richmond. Each field was surveyed once per week, a total of sixteen 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 twenty-four herons were observed throughout the season in ten out of fourteen GLSA fields (*Figure 1*). The surveyed GLSA fields were planted between 2017 and 2022, and were seen in greatest abundance in 2018, 2021, and 2022 fields, with no sightings occurring in fields planted in 2017. Most herons were seen individually and there were never more than two in each field at the same time. Compared to the 2021-2022 heron survey, which found the greatest number of herons in set asides 3 years or older, this year's survey found that herons were most frequently found in newer GLSAs, which had been planted 1 year ago. The preference of Great Blue Herons to newer fields was also observed in the 2020-2021 heron survey. Though a greater number of herons were observed in younger fields, there was no significant difference between the density of herons found in fields by year planted ($p=0.52$).

Year Planted	Number of Fields	Hectares	Number of Herons	Herons/Ha/Day
2018	2	12.95	5	0.024
2019	2	12.95	3	0.014
2020	2	17.81	4	0.014
2021	2	16.19	6	0.023
2022	2	10.52	6	0.036
Total	10	70.42	24	0.021

Figure 1. Table comparing herons observed per hectare/Survey Day by year of establishment of the GLSA.

Hérons were observed in the greatest density in fields planted with a DFWT mix, followed by the Grass and Clover Mix, and then the Pollinator Mix (Figure 2). Though there was no statistical significance ($p=0.44$) between the density of herons across different seed mixtures. The previous year's survey also found that the DFWT seed mix had supported the highest density of herons, followed by the grass and clover mix, and lastly the pollinator mix.

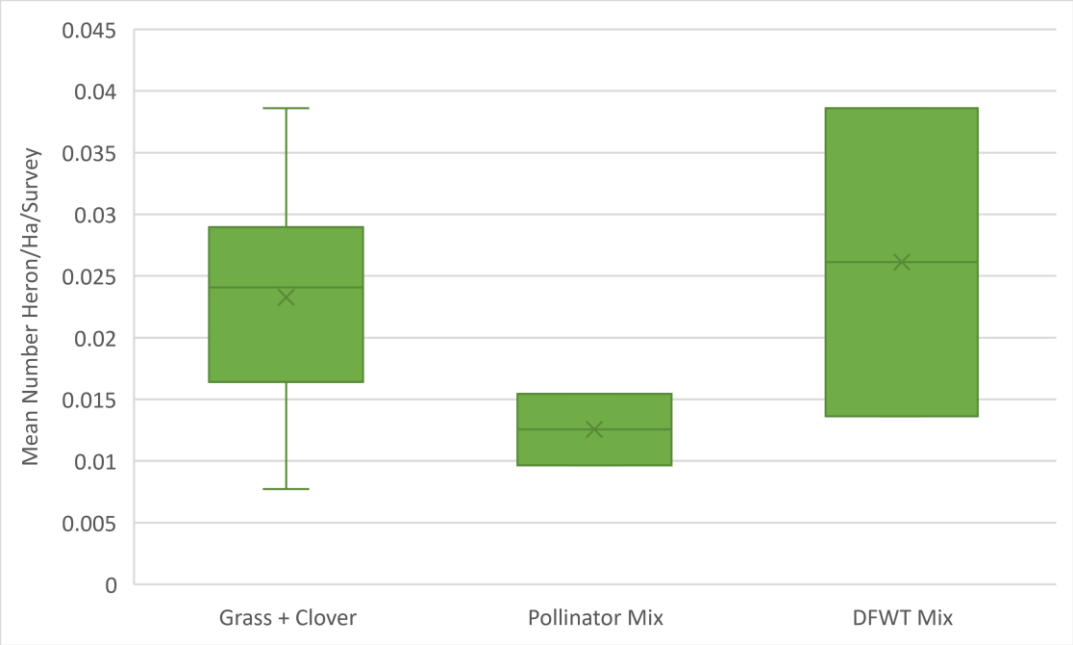


Figure 2. Density of herons per hectare per survey by type of seed mix.

2.0 Raptor Survey



Image 3. A Northern Harrier found in a GLSA in Delta, 2023.

2.1 Methods

Diurnal raptor surveys were conducted in fourteen GLSA fields from November 28, 2022, to March 16, 2023. Fields were selected for variety of field locations, year planted, and seed mix. Each field was sampled sixteen 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 eight raptor species were observed in the survey (*Figure 3*). Bald eagles were the most abundant species, followed by the Northern Harrier, which were both observed in 100% of fields surveyed. The Rough Legged Hawk was present in 71% of fields, followed by the Red-Tailed Hawk (64%), Merlin (21%), Cooper's Hawk and American Kestrel (14%), and the Peregrine Falcon (7%) (*Figure 3*). This year, the Bald Eagle had the largest number of observations, compared to the past two years of raptor surveys, where the Northern Harrier has had the most observations.

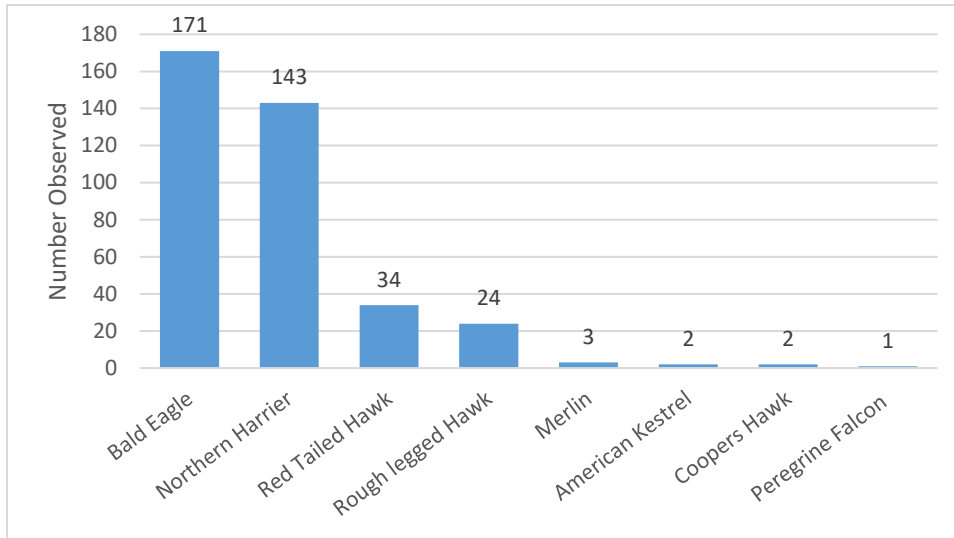


Figure 3. Number of individuals observed per species in the Grassland Set Aside Survey.

Overall, the highest number of raptors were found in grasslands planted with a Grass + Clover seed mix. This seeding mix also supported the most diverse range of raptor species, other than the Peregrine Falcon which was only detected in the Pollinator Mix. The Pollinator mix GLSAs also supported a diverse range of species, other than the American Kestrel, which was only found in the Grass + Clover mix. The DFWT seed mix supported the second highest amount of Bald Eagles and Northern Harriers (Figure 4).

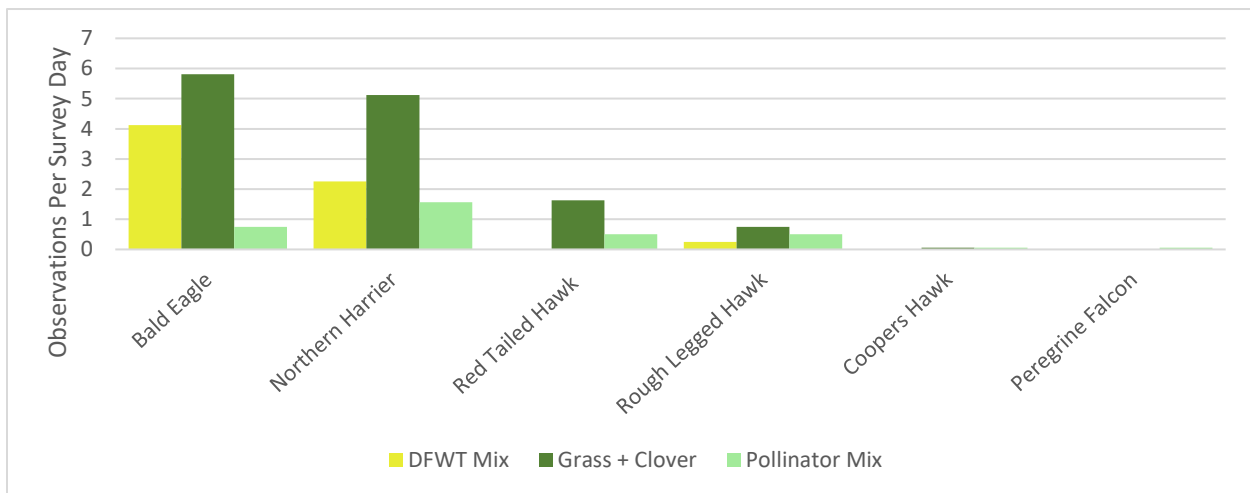


Figure 4. Number of individuals observed per survey day based on species and GLSA plant mix.

Well established GLSAs, 3 years or older, hosted the highest number of raptor observations. Similarly aged fields which were planted 4 years ago, or 2 years ago also hosted a high number of raptors. The bulk of observations were of raptors flying through or across a field (<1 minutes) (Figure 5) or were passive for majority of the survey (>10 minutes) (Figure 6). Fields planted in 2019 had less raptors spending more than 10 minutes passively in the field, which may have been due to high noise levels, as both fields are directly adjacent to a heavily trafficked highway (Figure 6).

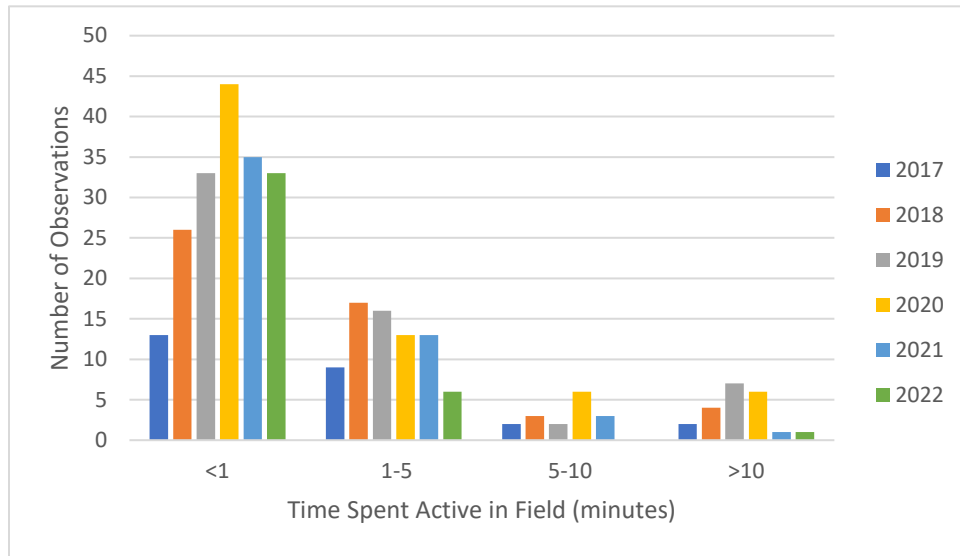


Figure 5. Number of observations of raptors spending time in GLSAs based on year planted.

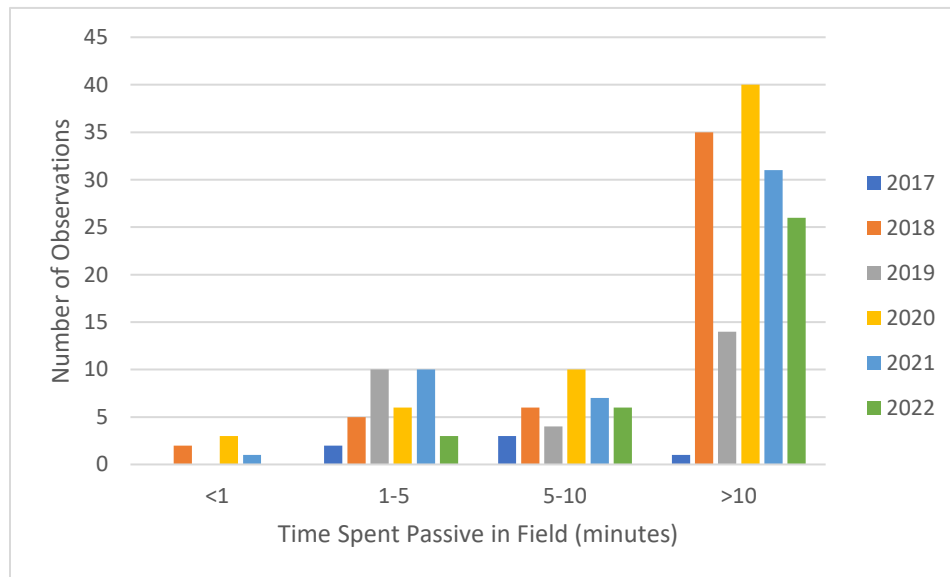


Figure 6. Number of observations of raptors observed passively spending time in GLSAs based on year planted.

When comparing GLSAs, fields which were larger than 30 acres supported the largest amount of raptors, at 4.13 raptors per survey. Smaller fields from 16-30 acres and 1-15 acres also supported raptors but at a lower rate of 1.95 and 1.38 mean raptors per survey, respectively (Figure 7). This coincides with findings from 2021-2022 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, 2.16 per survey compared to older or newer GLSAs, which supported 1.98 and 1.45 raptors per survey, respectively. Results from the 2021-2022 raptor surveys also recorded the highest number of observations in fields which were three years or older. (Figure 8).

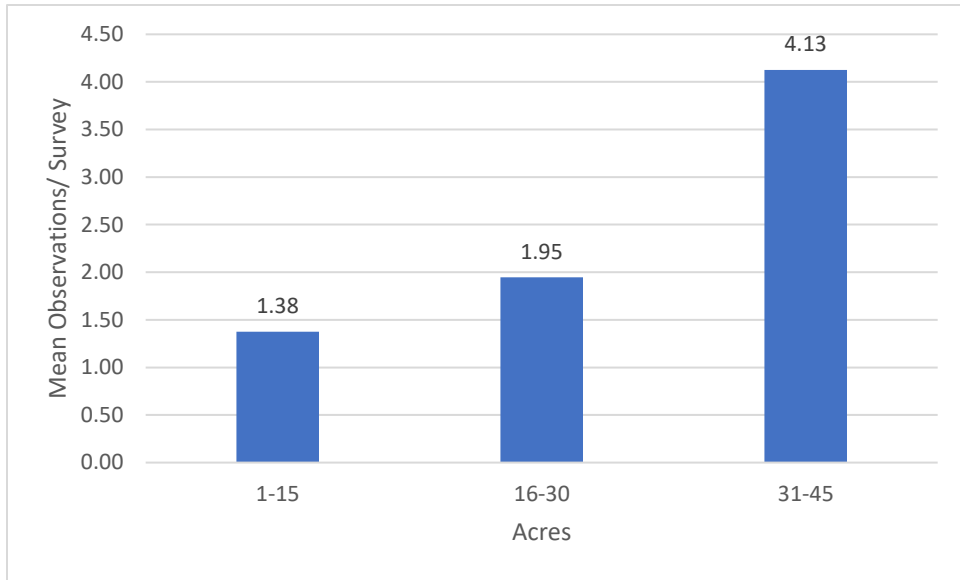


Figure 7. Mean number of raptor observations per survey in GLSAs based on acreage.

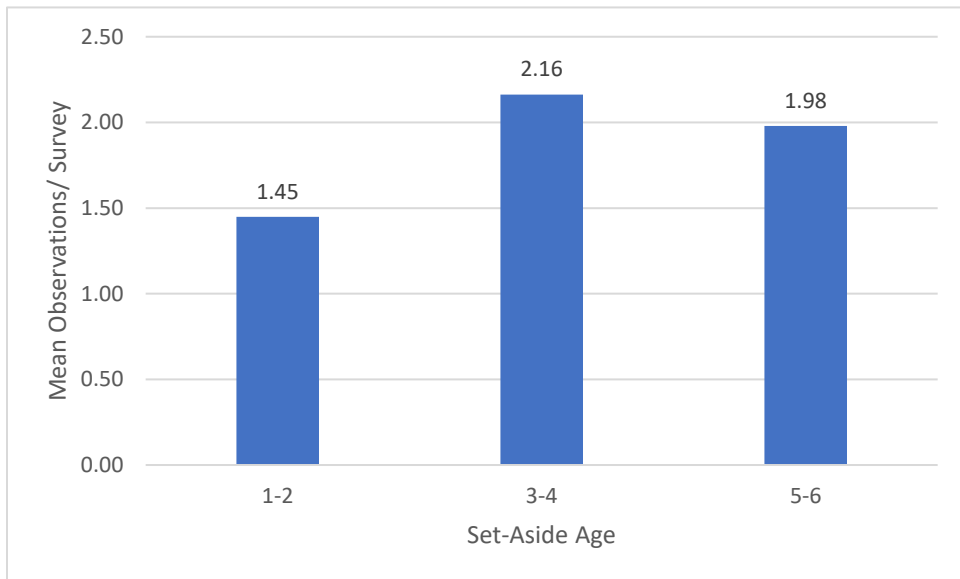


Figure 8. Mean number of raptor observations per survey in GLSAs based on age of Set-Aside.

3.0 Barn Owl and Short-eared Owl



Image 4. A Short-Eared Owl hunting over a GLSA in Delta, 2023.

3.1 Methods

Owl surveys were conducted in fourteen grassland-set aside fields in Delta and Richmond from November 28, 2022, to March 16, 2023. Each field was surveyed twice over the season. The first round of surveys were 60 minutes long, surrounding sunset, the second round of surveys were increased to 75 minutes due to a lack of sightings. 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 on seven survey days (*Figure 9*), an additional three owls were observed outside of the owl survey in participating GLSAs during other field work. A total of eight Short-eared owls were observed in seven GLSA fields and two Barn Owls were observed in two GLSA fields, additionally a Great-Horned owl was also observed. 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 and Barn Owls were observed on Grass/Clover and Pollinator Mix fields, and one Great Horned Owl was observed on a field planted with a DFWT Mix. Owls were observed in fields 1-6 years old, but no owls were sighted in new fields planted in 2022. The previous two years of owl surveys have also noted a lack or minimal presence of owls in newly planted fields, indicating that they may prefer older, well-established grasslands as a better resource for hunting.

Date	Species	Seed	Number of Individuals
7/11/2022	*SEOW	Grass + Clover	1
12/29/2023	SEOW	Grass + Clover	1
2/9/2023	BANO	Grass + Clover	1
2/21/2023	GHOW	DFWT Mix	1
3/2/2023	SEOW	Grass + Clover	1
3/8/2023	*SEOW	Grass + Clover	1
3/8/2023	*BANO	Pollinator Mix	1
3/9/2023	SEOW	Pollinator Mix	1
3/15/2023	SEOW	Grass + Clover	1
3/16/2023	SEOW	Grass + Clover	1

Figure 9. Date and species of owls observed, and the species of seed mixture of the GLSA. * Owls were observed during other field surveys occurring on GLSAs.

4.0 Conclusion

Grassland set asides provide valuable resources to herons, raptors, and owls, including many species at risk. Throughout the 2022-2023 survey, herons were observed in 71% of fields surveyed, raptors in 100%, and owls in 57% of surveyed fields. Observations show that both owls and raptors are actively in fields, 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.