

## Multi-year (2017 – 2021) analysis of Waterfowl Use of Agricultural Lands in Delta & Richmond, BC

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*Photo 1: Trumpeter Swans foraging in a field in Delta on December 3<sup>rd</sup>, 2020.*

### **Introduction**

Agriculture fields in the Fraser River delta provide important foraging and overwintering habitat for waterfowl. For the past five years, Delta Farmland and Wildlife Trust (DF&WT) has been conducting waterfowl surveys throughout Delta and south Richmond by using a road transect grid method to assess waterfowl use of these fields. Surveys have been conducted in cooperation with Canadian Wildlife Service and Ducks Unlimited Canada, and they provide a useful overview of the abundance and diversity of waterfowl species on different types of cropland. Each year, the transect grid also includes a few additional Winter Cover Crop and Cereal Habitat Enhancement Program fields. More than 180 individual agricultural fields located within 500 m of each transect were surveyed each year once per week over the winter and spring months. Surveys were completed between 7:00 am and 5:00 pm. To account for time-of-day effects, the direction and starting point for the survey was alternated weekly.

This report aimed to examine the waterfowl density in different crop fields using the last four years' survey data. The waterfowl survey data from 2017-18, 2018-19, 2019-20, and 2020-21 surveys were sorted and merged, and a statistical analysis was completed. The mean waterfowl density per survey day was estimated to compare among the different crop fields. For the statistical analysis, the data were log-transformed to run a one-way ANOVA test, and posthoc analysis was performed using a Tukey test in R Studio (Version 1.2.1335).

**Results:**

Over the last four years, 10 waterfowl species were recorded in agricultural fields (Figure 1). Snow goose (*Anser caerulescens*) was the most abundant species sighted, followed by Mallards (*Anas platyrhynchos*), American Wigeon (*Mareca americana*), Trumpeter Swan (*Cygnus buccinator*), Northern Pintail (*Anas acuta*), Canada Goose (*Branta canadensis*), Cackling Goose (*Branta hutchinsii*), Green-winged Teal (*Anas crecca*), Gadwall (*Mareca strepera*), Northern Shoveler (*Spatula clypeata*). Other notable avifauna included Gulls (Family Laridae), European Starlings (*Sturnus vulgaris*), Bald Eagles (*Haliaeetus leucocephalus*), Killdeer (*Charadrius vociferus*), Northwestern Crows (*Corvus caurinus*), Great Blue Herons (*Ardea Herodias*), and Waders (Order Charadriiformes).

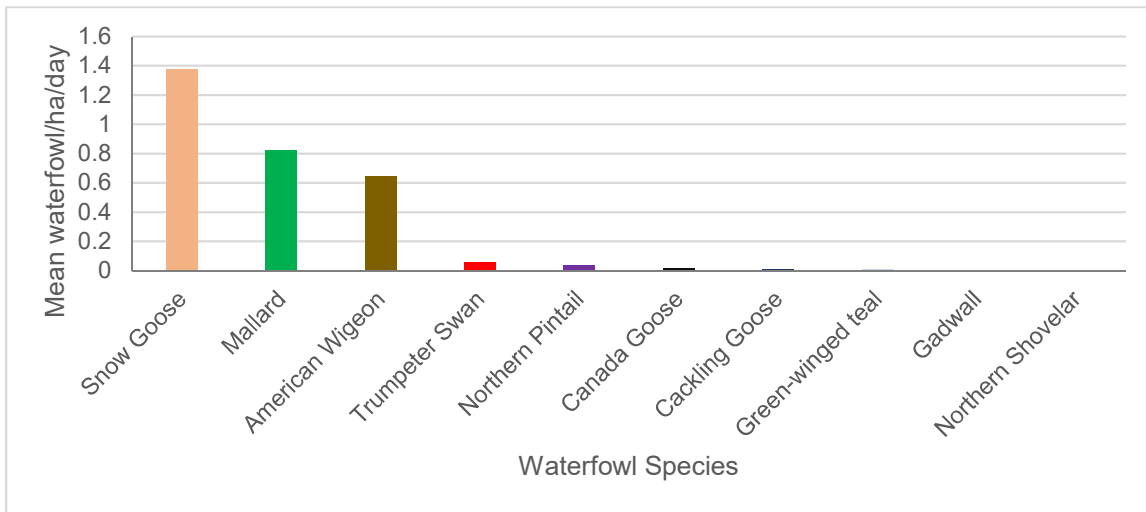


Figure 1: Mean waterfowl density per survey day observed on agricultural fields between 2017 and 2021.

The mean waterfowl density was significantly higher in cover crop fields (4.52 birds/ha/survey day) than all other crop types included in the surveys ( $p < 0.05$ ) except for potato, forage, and corn fields (Table 1, Figure 2). The second highest mean waterfowl density was observed in potato fields (4.48 birds/ha/survey day). It was significantly greater than all other crop fields ( $p < 0.05$ ) except for cover crop fields.

Table 1. Mean waterfowl/ha/survey day observed on each field type from 2017 to 2021.

Crop type	Mean waterfowl/ha/survey day
Cover Crop	4.52
Potato	4.48
Grain	1.77
Vegetable	1.54
Uncultivated	1.52
Forage	1.48
Corn	1.34
Berries	0.48
Grassland set-aside	0.43

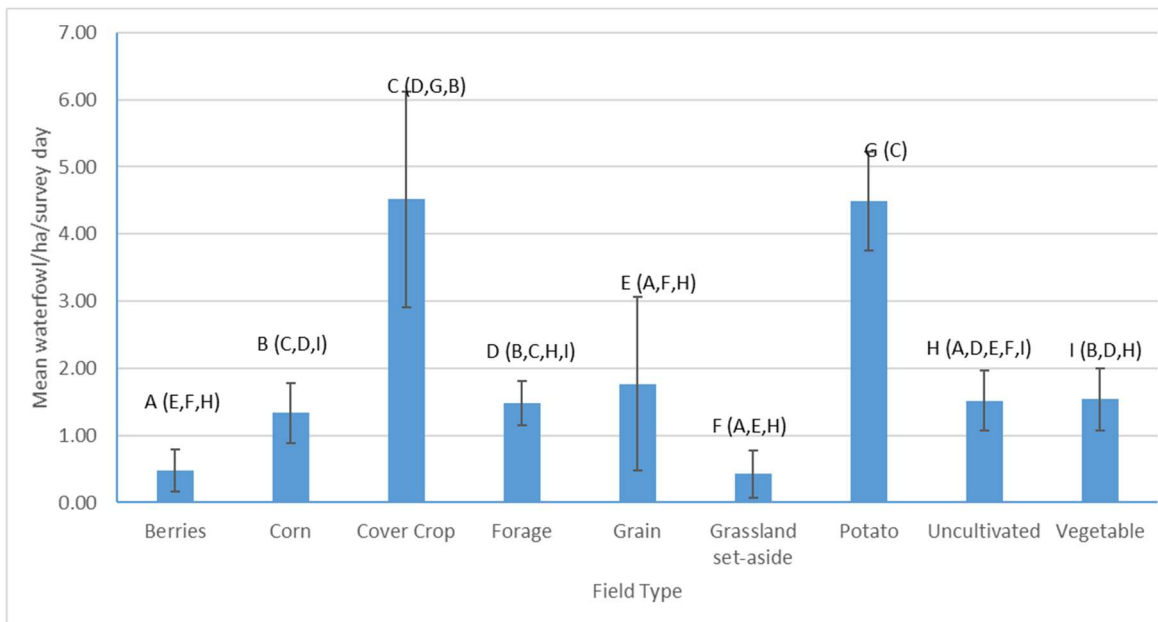


Figure 2: Mean waterfowl/ha/survey day ( $\pm$ SE) observed on each field type from 2017 to 2021. Letter outside the bracket are unique to field type and have insignificant difference with letters inside the brackets.

Overall, cover crop fields supported relatively higher waterfowl density than non-cover fields (Figure 3), but the difference was statistically insignificant ( $p > 0.05$ ). Also, no statistical difference was found for mean waterfowl density between winter cover crop (6.18 birds/ha/survey day) and non-cover crop fields (2.31 birds/ha/survey day) ( $p > 0.05$ ) (Figure 4). On the contrary, winter cover crop fields supported a significantly high waterfowl density compared to Cereal Habitat Enhancement Program (CHEP) fields (0.98 birds/ha/day) ( $p < 0.05$ ) and grassland set-aside fields (0.43 birds/ha/survey) ( $p < 0.05$ ).

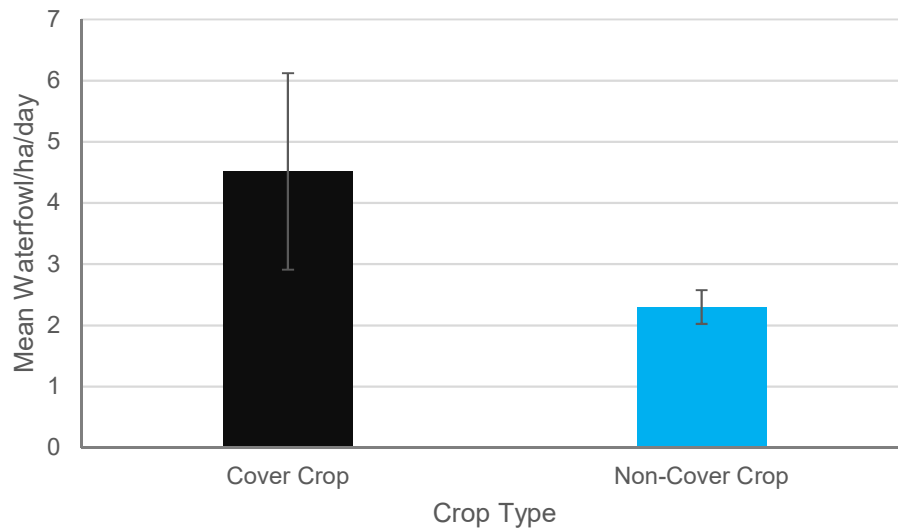
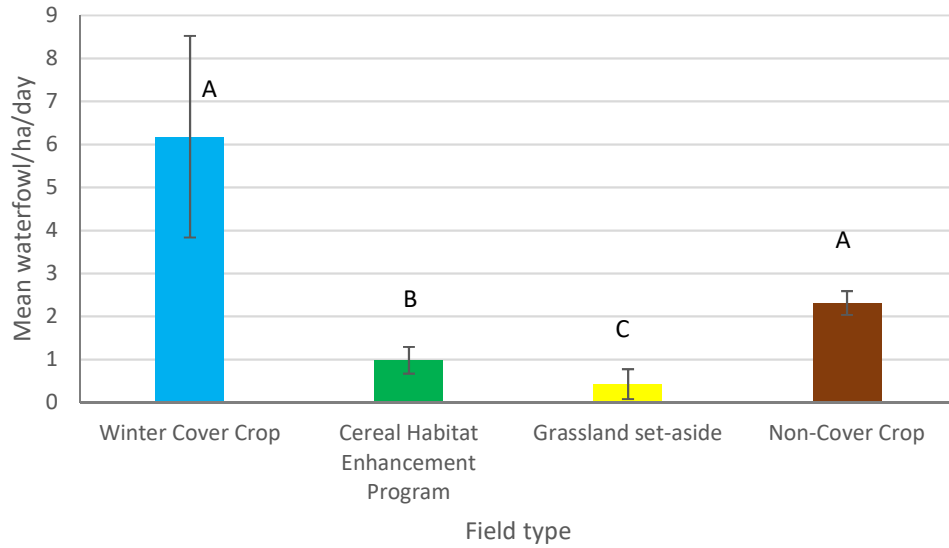
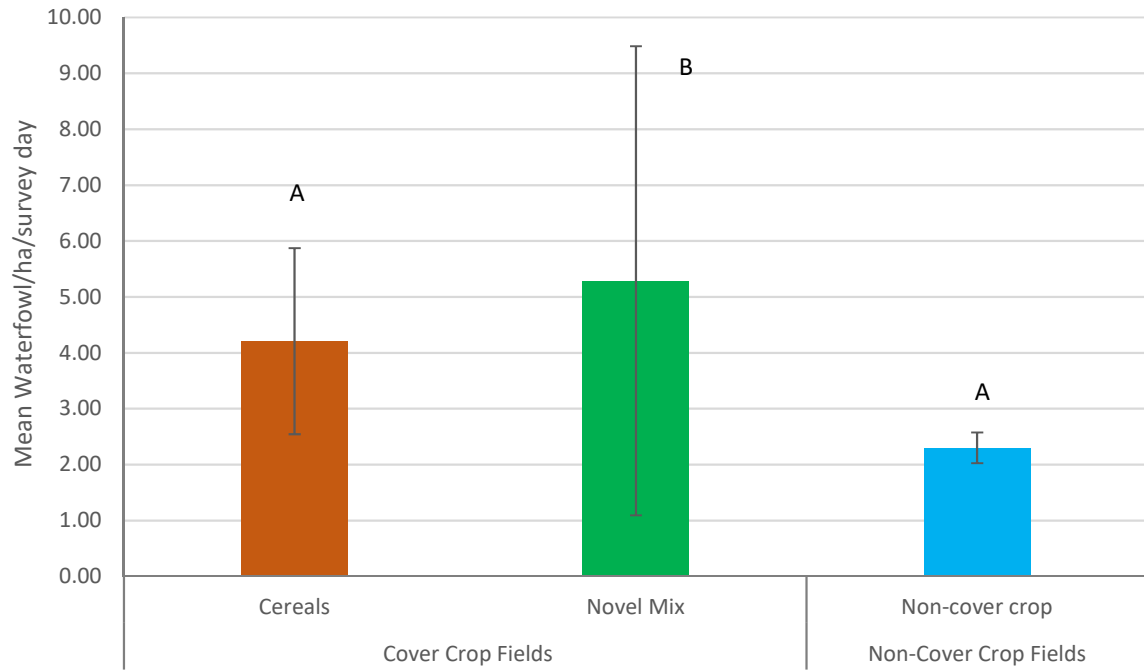


Figure 3: Mean waterfowl density ( $\pm SE$ ) observed on cover crop and non-cover crop fields from 2017 to 2021.



*Figure 4: Mean waterfowl density ( $\pm$ SE) observed on Winter Cover Crop, Cereal Habitat Enhancement Program Fields, Grassland set-aside fields, and Non-Cover Crop fields from 2017 to 2021. Significant difference are indicted by different letters.*

Further crop analysis showed that there was no significant difference in waterfowl density between non-cover crop fields and cover crop cereal fields (Figure 5), whereas mean waterfowl density was significantly higher in cover crop novel mix fields than in cover crop cereal ( $p < 0.05$ ) and non-cover crop fields ( $p < 0.05$ ). This supports the significant value of cover crop novel mix fields for waterfowl use.



*Figure 5: Mean waterfowl density ( $\pm$ SE) observed on winter cover crop (cereals, novel mix) and non-cover crop fields from 2017 to 2021. Significant differences are indicated by different letters.*