Vegetation Surveys of Winter Cover Crop Fields

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November 2022 – March 2023

Image 1: A Winter Cover Crop in January (top) and in March (bottom)

Program Background

Agricultural fields in the Fraser River delta provide important foraging and overwintering habitat for waterfowl. For the past six years, DFWT has been conducting waterfowl surveys throughout Delta and south Richmond 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 croplands. The purpose of this vegetation study was to quantify the amount of grazing occurring on cover crop fields and to assess the value of different types of cover crops.

Survey Methods

Winter cover cropped fields throughout Delta and south Richmond were surveyed three times over the winter season to measure vegetation height, cover, and the intensity of waterfowl grazing. Initial measurements were taken at three points in each field in November 2022. A second round of measurements were taken in January 2023 within the same fields and final measurements took place in March 2023. At each sample point, maximum vegetation height was measured to the nearest centimeter and the percentage of vegetation cover was estimated within a 1 m by 1 m quadrat *(Figure 1*). The level of intensity of grazing was recorded as a number between zero and four, with zero being no grazing and four being completely grazed (*Figure 2*).

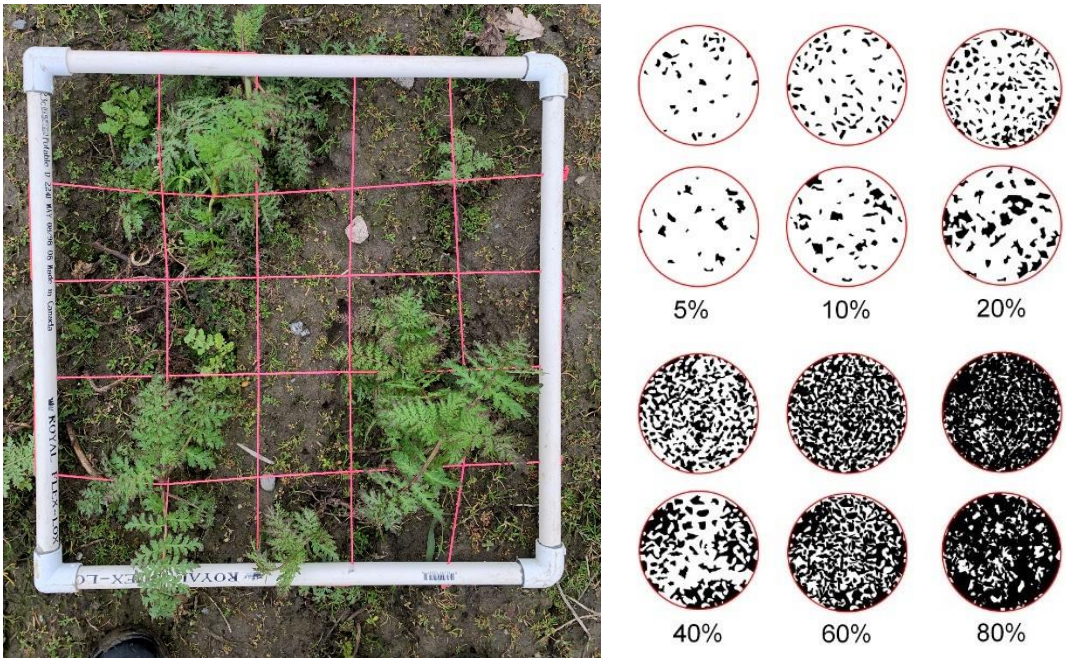

Figure 1. Example of 40% vegetation cover in a 1 m by 1 m quadrat using the Ministry of Forests, Lands and Natural Resource Operation's comparison chart for estimating cover percent.

Intensity 0	*Intensity 1*	*Intensity 2*	*Intensity 3*	*Intensity 4*
No grazing	<50% of vegetation height grazed	>50% of vegetation height grazed	Only stubs left	No cover crop left

Figure 2. Photos showing levels of intensity of grazing from lowest on the left to highest on the right.

Results

Crop Type and Cover

Fields were planted with either a Spring Cereal or a Novel Mix cover crop. The crops included in the Spring Cereal were barley (n = 27), oats (n = 8), wheat (n = 2), or an oat mixture (n = 2). The Novel Mix included a pollinator mix (n = 23), and daikon (n = 2).

Throughout the surveys, mean percent vegetation cover remained low, peaking at 23% in November (*Table 1*). The wet spring of 2022, which resulted in delayed planting and harvesting of crops, paired with extended dry conditions in the fall, may have contributed to the poor establishment of 17 (27%) cover crop fields, which experienced zero grazing but had less than 25% vegetation cover in November.

		November		*January*		*March*	
Cover Crop	**Number of Fields**	**Mean Intensity of Grazing**	**Mean Percent Cover (%)**	**Mean Intensity of Grazing**	**Mean Percent Cover (%)**	**Mean Intensity of Grazing**	**Mean Percent Cover (%)**
Spring Cereal	39	0.9	20.5	2.4	19.7	0.7	20.7
Novel Mix	25	0.6	26.9	2.5	15.1	0.6	18.1
Total	**64**	**0.8**	**23.0**	**2.5**	**17.9**	**0.6**	**19.7**

Table 1. Mean intensity of grazing, and mean percent cover in November 2022, January 2023, and March 2023 based on type of cover crop.

Vegetation had a poor chance of establishment, and average crop height was measured to be 11.7cm in November, which decreased to 8.4 cm in March (*Figure 4*). In comparison, cover crops grown in 2021-2022 showed greater vegetation height when compared to this year. On average cover crops surveyed in 2022 reached a maximum height 1.9 times that of 2023 (*Figure 4*).

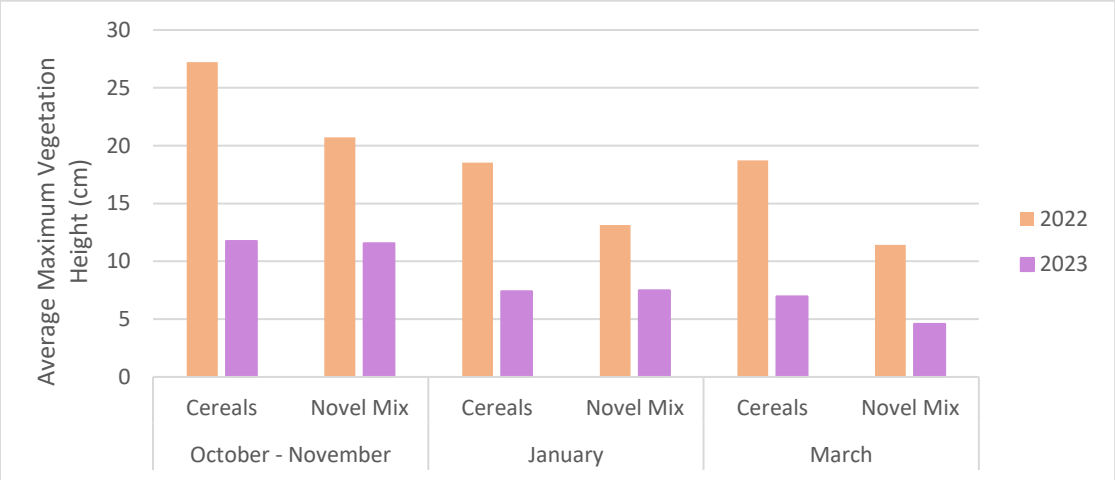

Figure 4. Comparison of the average maximum vegetation height based on seed mix and month of survey between 2022 and 2023.

The mean percentage of vegetation cover in fields planted with spring cereals remained consistent throughout the winter, while Novel Mix crops experienced a larger dip from November to January. From January to March both Spring Cereal and Pollinator Mix cover crops began to show evidence of regrowth, with an increase in percent cover (*Figure 5*) and a decrease in the mean intensity of grazing (*Table 1*).

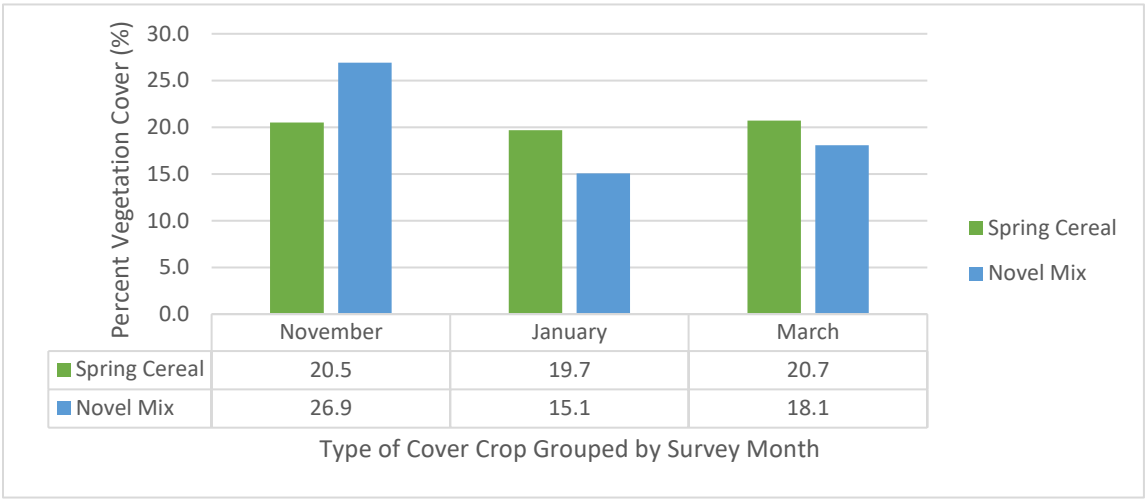

Figure 5. The mean percent of vegetation cover based on type of cover crop in each survey month.

Grazing

A total of 64 fields in both Delta and Richmond were surveyed over 9 days. In November only a single field had been grazed completely to the roots (grazing intensity = 4), grazing had peaked in January, where 22 fields were grazed completely (34%), and then decreased to 4 (6%) fields in March. In November, 28 fields showed no signs of waterfowl grazing, which decreased to 12 (19%) in January, but in March, 42 (66%) fields had shown no new evidence of grazing (*Figure 3)*.

Surveys from 2021-2022 and 2022-2023 both demonstrate heavy grazing occurring on cover crop fields, where waterfowl had grazed vegetation to the ground throughout the survey period. In 2023 the highest amount of grazing was recorded in January, as 34% of fields had been completely grazed, while in 2022, grazing intensity peaked with 22% of fields being completely grazed in March. Crops in 2023 experienced more grazing overall, as by March only 6% of fields had shown no evidence of grazing throughout the winter, compared to 43% in 2022.

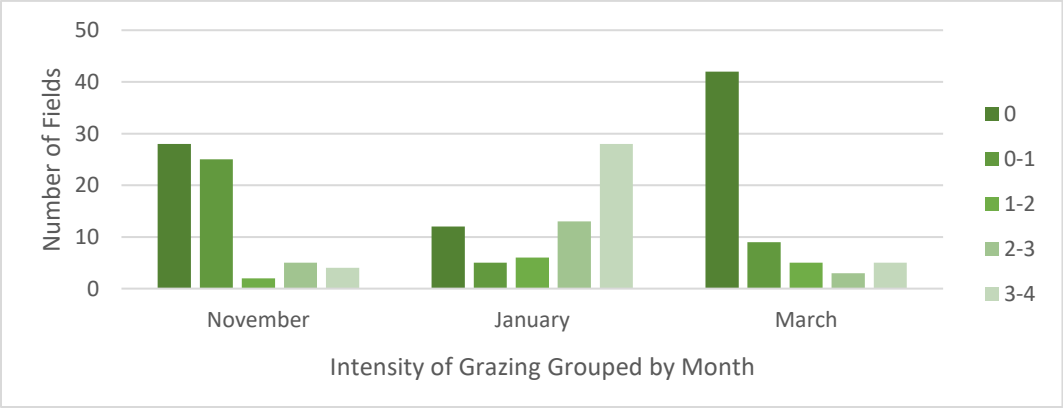

Figure 3. The number of fields and the grazing intensity which they had experienced, grouped by survey month.

Cover crops with poorly established vegetation cover would take less effort to be grazed to the ground. But with a mild winter, fields began to regrow vegetation towards the end of the survey in March, demonstrating how though above ground biomass may be diminished, but root structures remain in the soil, providing benefits for the field throughout the winter (*Image 2)*.

Image 2. Winter cover crop field in January (left) compared to the same field in March (right)

Season Summary

Winter cover crops continue providing valuable resources to both farmers and wildlife in the Fraser River delta. With only 6% of cover crop fields remaining ungrazed throughout the winter of 2022-2023, it is evident that these fields are heavily utilized by waterfowl throughout the season, and act as an important resource for migratory birds. Cover crops experienced the most intensive grazing throughout January, on both Spring Cereal and Novel Mix crops, with grazing dropping off in March, providing crops with an opportunity for regrowth. Poor conditions leading up to the planting of winter cover crops possibly hindered the establishment of vegetation, compared to previous years the average cover and maximum vegetation height were both lower in 2023.