Delta Farmland and Wildlife Trust: Grassland Set-Aside Bumblebee Survey

June - September 2024

Figure 1. A bumblebee in a grassland set aside, June 2024.

Program Background

Bumblebees play an important role throughout many ecosystems in British Columbia. As one of the most efficient pollinators, they are often found both in agriculture and in the wild. Though their importance, pollinator trends are still decreasing because of factors such as loss of habitat, pesticide use, climate change, and competition with invasive species. There are currently 32 known species of bumblebee found within British Columbia, with several populations in decline or endangered (Cannings, 2011; Williams et al., 2014).

Habitat loss is one of the main drivers of conservation concern for local pollinator species. Delta Farmland and Wildlife Trust (DFWT) aims to improve pollinator habitat in the Fraser River delta by entering into stewardship agreements with farmers to manage farmland as Grassland Set asides (GLSA). Grassland fields are planted to provide essential wildlife habitat in the Fraser River delta. These spaces are planted with diverse flowering resources to support local pollinators in farmland.

The aim of this study was to monitor and identify the abundance and diversity of bumblebees utilizing flowering GLSAs. By conducting point surveys, we were able to determine which species of bumblebee are using GLSAs for foraging and determine which flowering species were used most abundantly. DFWT hopes to increase the understanding of bumblebee abundance and diversity, especially as these species face a loss of habitat and diverse floral resources.

Survey Methods

Grassland set asides were selected for the survey if they were planted with a seed mix containing a flowering plant, therefore 8 fields were surveyed in Delta, BC. Fields were surveyed twice throughout the summer season from June to September between 10am and 3pm. Surveys were 45 minutes long and conducted within a hectare (~2.5 acre) subdivision of each field. Fields surveys were not conducted if temperatures were below 12 °C, or during the rain.

During point surveys, bumblebees were captured while visiting floral resources, placed in a vial in a cooler, and photographed for later identification. The survey time of 45-minutes counted only while searching for bees, when catching or processing a sample the timer would be paused. The species of flower was recorded. All bumblebees were released back into the GLSA after they were photographed.

Results and Discussion

Throughout the season, a total of six bumblebee species were observed, with 190 individual bees recorded (Table 1). The Eastern Bumblebee (*bombus impatiens)*, an introduced species in British Columbia, was the most frequently observed, followed by the Red-belted Bumblebee (*bombus rufocinctus),* Yellow-faced bumblebee (*bombus vosnesenskii),* Fuzzy-horned bumblebee (*bombus mixtus),* Two-form bumblebee (*bombus bifarius),* and Indiscriminate Cuckoo bumblebee (*bombus insularis)*. Both the Eastern Bumblebee and the Red-belted Bumblebee were detected in every GLSA survey. On average, four species of bumblebees were recorded during each point survey.

During each point survey, the dominant flowering species was recorded. GLSA fields were seeded with a mixture of red clover, phacelia, black oil sunflower, slender wheat grass, annual rye, saltlander wheat grass, and tall fescue. Fields planted in 2023 or older had a dominant vegetation of grass, while fields planted in 2024 had dominant flowering species during the first round of surveys of phacelia, followed by sunflowers in the second round. Fields were also observed to have light weed pressure, which also provided flowering resources to bumblebees. A similar number of bumblebees were surveyed on the three most abundant flowering resources: phacelia, sunflowers, and clover, with 54, 62, and 52 bees observed, respectively (*Table 2*). Bumblebees were observed in Grassland Set-asides with each dominant vegetation type (*Figure 1).*

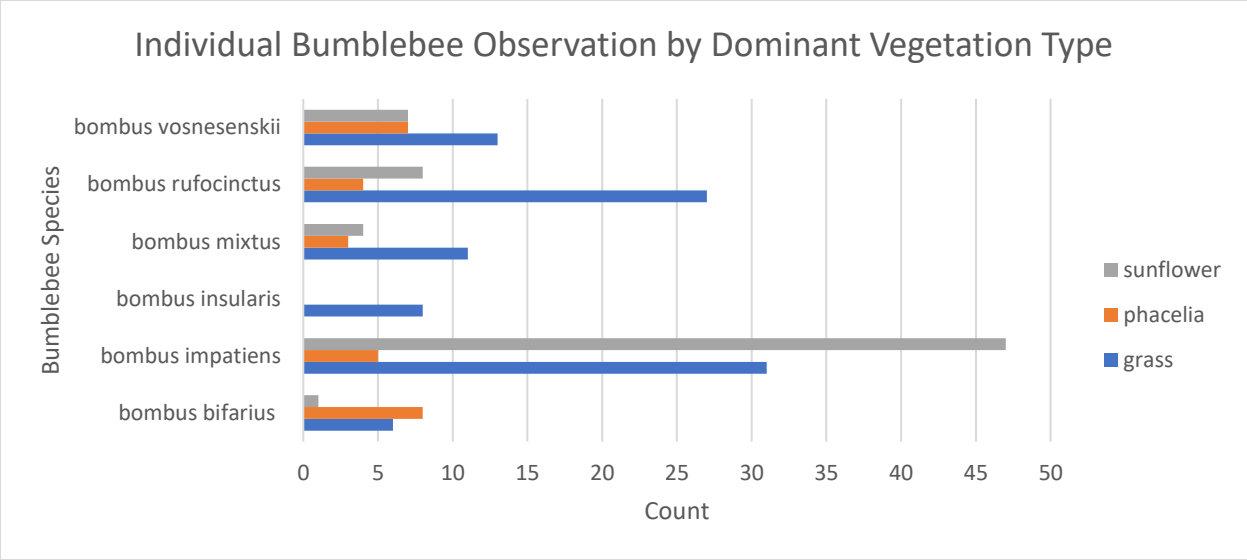

Figure 1 Number of each bumblebee species observed based on dominant vegetation type in GLSAs

Overall, the most bumblebees (127 individuals) were recorded during the first round of surveys in early summer (June-July), compared to the second round of surveys in late summer (August-September) where only half the number of bumblebees were recorded (63 individuals). During both rounds of the survey the Eastern Bumblebee was the most recorded species, 43% of bumblebees identified during round 1 were Eastern Bumblebees, and 46% during round 2.

Compared to the previous year's survey, there was a slight decline in the total number of bumblebees observed, from 218 individuals in 2023 to 190 in 2024 (*Table 1*). Although the overall number of individuals decreased, the count of Eastern Bumblebees (*Bombus impatiens*) increased from 68 to 83 individuals (*Table 1)*. However, there is insufficient data to determine any clear trends in population dynamics.

As an introduced species, the Eastern Bumblebee poses a potential threat to native bumblebee populations. First brought to British Columbia in the early 2000s, Eastern Bumblebees were initially, and continue to be, used for greenhouse pollination due to their efficiency as pollinators. This advantage allows them to outcompete native species for resources. Additionally, the introduction of non-native species carries the risk of spreading diseases to native bumblebees when they escape from greenhouses (Looney, 2019). As the Eastern bumblebee is rapidly spreading through British Columbia, and Washington, many of the greater ecological effects are still unknown (Looney, 2019).

With this baseline data, DFWT can conduct further research studies to monitor and track the abundance and diversity of native and introduced pollinators throughout Delta, and Metro Vancouver.

Works Cited

Cannings, R. (2011, July). Checklist of the Bumble Bees of British Columbia. Royal BC Museum.

Looney, C., Strange, J. P., Freeman, M., & Jennings, D. (2019). The expanding Pacific Northwest range of Bombus impatiens cresson and its establishment in Washington State. *Biological Invasions*, *21*(6), 1879–1885. doi:10.1007/s10530-019-01970-6

Williams, P., Thorp, R. W., Richardson, L., & Colla, S. (2014). *Bumble Bees of North America: An identification guide*. Princeton, NJ: Princeton University Press.

Appendix

Row Labels	Count of Bumblebee 2023	Count of Bumblebee 2024
Eastern Bumblebee (*bombus impatiens)*	68	83
Red-belted Bumblebee (*bombus rufocinctus)*	49	39
Fuzzy-horned Bumblebee (*bombus mixtus)*	34	18
Yellow-faced Bumblebee (*bombus vosnesenskii)*	34	27
Two-form Bumblebee (*bombus bifarius)*	16	15
Indiscriminate Cuckoo Bumblebee (*bombus insularis)*	15	8
Black-tailed Bumblebee*(bombus melanopygus)*	2	0
Total	218	190

Table 1 Count of bumblebees by species in 2023 and 2024

Flowering Species	Count of Bumblebee
Phacelia	54
Sunflower	62
Clover	52
Weeds	22

Table 2 Type of floral resource, and number of bumblebees surveyed visiting that flower.

Sample Identification Photos

Figure 2 Common eastern bumblebee (Bombus impatiens)

Figure 3 Red-belted bumblebee (Bombus rufocinctus)

Figure 4 Yellow-faced bumblebee (Bombus vosnesenskii)

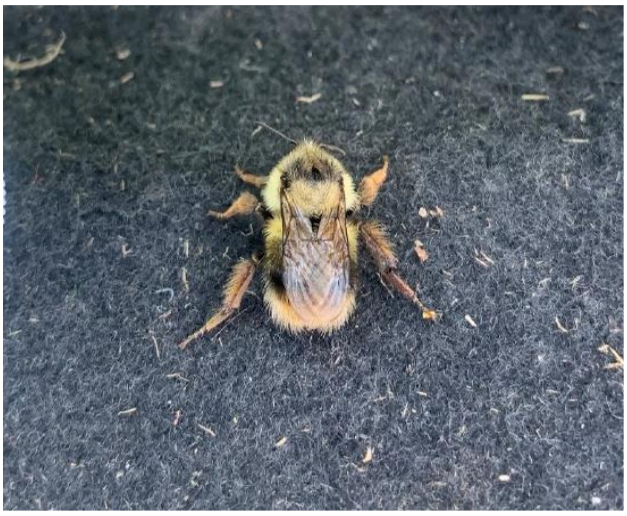

Figure 5 Fuzzy-Horned bumblebee (Bombus mixtus)

Figure 6 Two-form bumblebee (Bombus bifarius)