

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

June - September 2023



Figure 1. A bumblebee visiting a phacelia flower in a grassland set aside, July 2023.

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. Despite 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 grassland 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 for species that rely on Fraser River delta grasslands. 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 determined which species of bumblebee are using GLSAs for foraging and 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 at least two flowering plants, therefore, five fields were surveyed in Delta, BC. Fields were surveyed twice throughout the summer from June to September between 10 am and 3 pm. Surveys were 45 minutes long and conducted within a hectare (~2.5 acre) subdivision of each field. Fields surveys were not completed 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 also recorded. All bumblebees were released back into the GLSA after they were photographed.

Results and Discussion

A total of 7 species were identified during ten point surveys throughout the season, and 218 individual bumblebees were observed (Table 1). The most frequently observed species was the Eastern Bumblebee, which is an introduced species in British Columbia. The Eastern, Red-belted, and Two-form bumblebees were detected in every GLSA. On average, 5.3 species of bumblebee were recorded during each point survey.

During each point survey, the dominant flowering species was recorded. Four fields were seeded with a mixture of red clover, phacelia, black oil sunflower, slender wheat grass, annual rye, saltlander wheat grass, and tall fescue. The remaining field was planted with a mix of phacelia, sunflower, and clover. The dominant flowering species during the first round of surveys was phacelia in each field, followed by sunflowers in the second survey round. Fields were also observed to have light weed pressure, providing additional flowering resources to bumblebees. A similar number of bumblebees were surveyed on both phacelia and sunflowers, 100 and 96, respectively (Table 2).

Overall, the most diverse species of bumblebees were recorded during the first round of surveys in early summer (June-July). During the second round of surveys (August-September), the Eastern Bumblebee was the most recorded species, 48% of bumblebees identified during round 2 were Eastern Bumblebees, compared to 15% during round 1.

As an introduced species, the Eastern bumblebee poses a potential threat to native bumblebee species. First imported to British Columbia in early 2000, Eastern Bumblebees were, and are still, used for greenhouse pollination, as they are efficient pollinators. Because of these qualities, it is easier for the Eastern bumblebee to outcompete native species. Imported species

also pose the risk of spreading disease to native bumblebees when they escape greenhouses (Looney, 2019). As the Eastern bumblebee rapidly spreads 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

Bumblebee Species	Count
Eastern Bumblebee (<i>bombus impatiens</i>)	68
Red-belted Bumblebee (<i>bombus rufocinctus</i>)	49
Yellow-faced Bumblebee (<i>bombus vosnesenskii</i>)	34
Fuzzy-horned Bumblebee (<i>bombus mixtus</i>)	34
Two-form Bumblebee (<i>bombus bifarius</i>)	16
Indiscriminate Cuckoo Bumblebee (<i>bombus insularis</i>)	15
Black-tailed Bumblebee (<i>bombus melanopygus</i>)	2

Table 1 Count of each species of bumblebee observed during surveys.

Flowering Species	Count of Bumblebee
Phacelia	100
Sunflower	96
Clover	11
Weeds	11

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*)

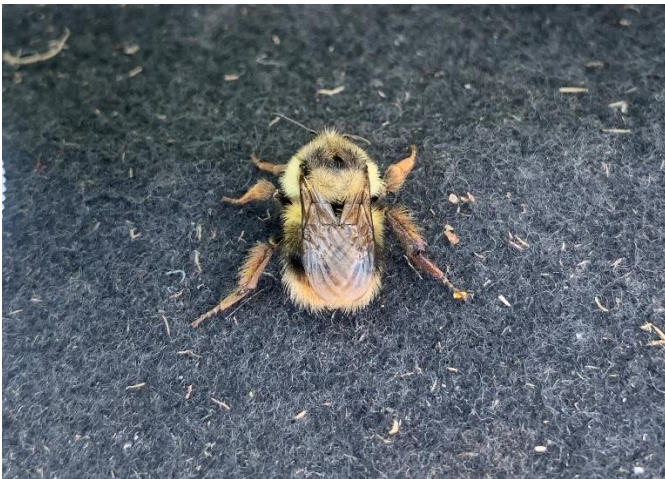


Figure 5 Fuzzy-Horned bumblebee (*Bombus mixtus*)



Figure 6 Two-form bumblebee (*Bombus bifarius*)