

Cassidy Carpenter

Oregon Bee Atlas Collection and Identification Report

1 Your 2023 Collections

Cassidy Carpenter caught 64 bees across 4 counties from July 14, 2023 to August 11, 2023, representing 3 unique taxa, including 3 unique species.

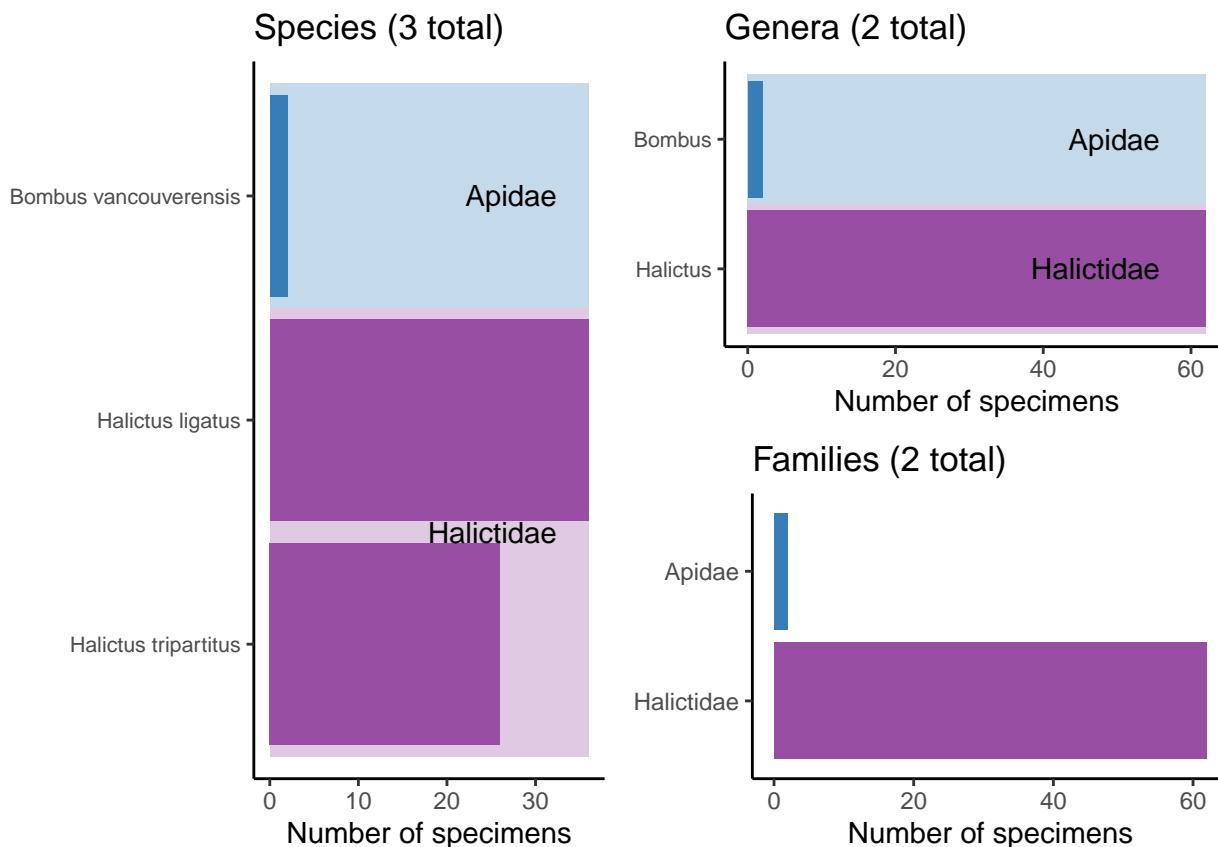


Figure 1: Bees caught by Cassidy Carpenter, broken down by species, genus, and family.

2 All Your Collections

Cassidy Carpenter caught 64 bees across 4 counties from July 14, 2023 to August 11, 2023, representing 3 unique taxa, including 3 unique species.

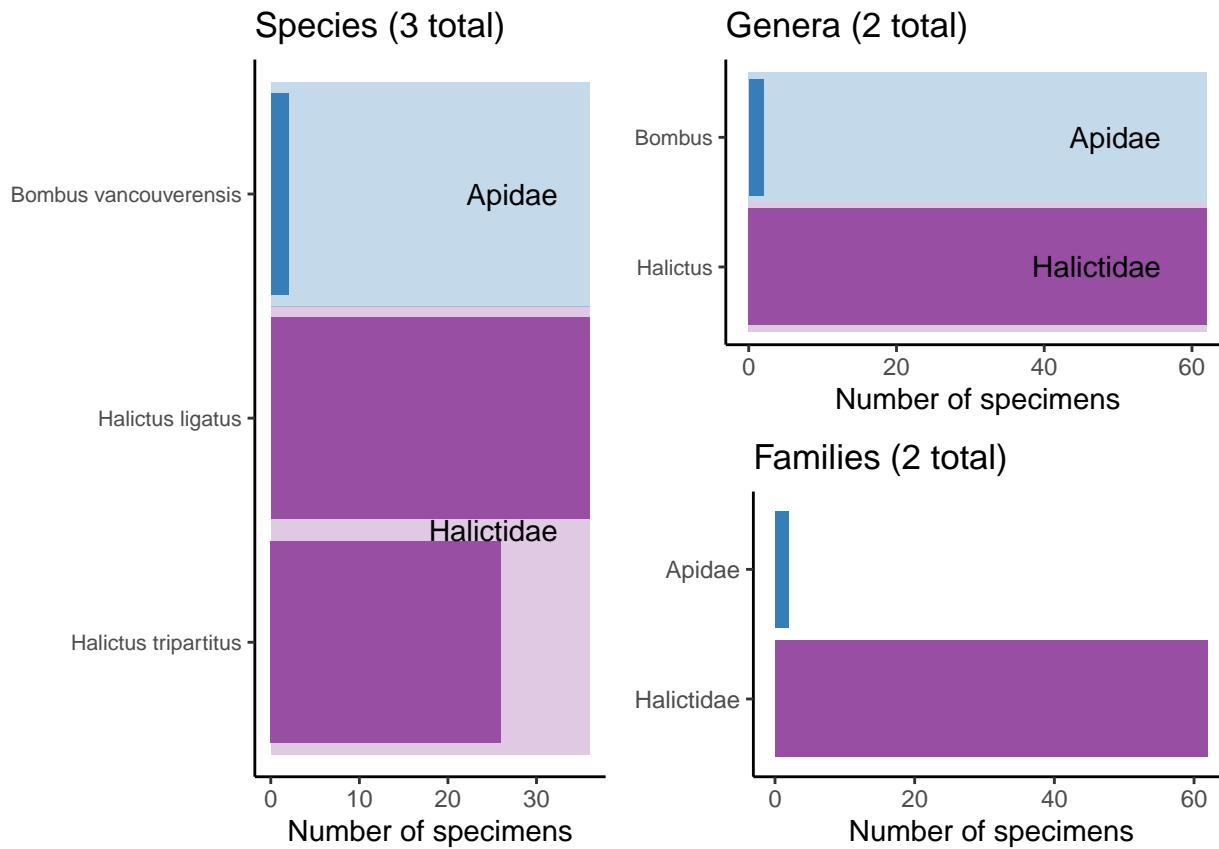


Figure 2: Bees caught by Cassidy Carpenter, broken down by species, genus, and family.

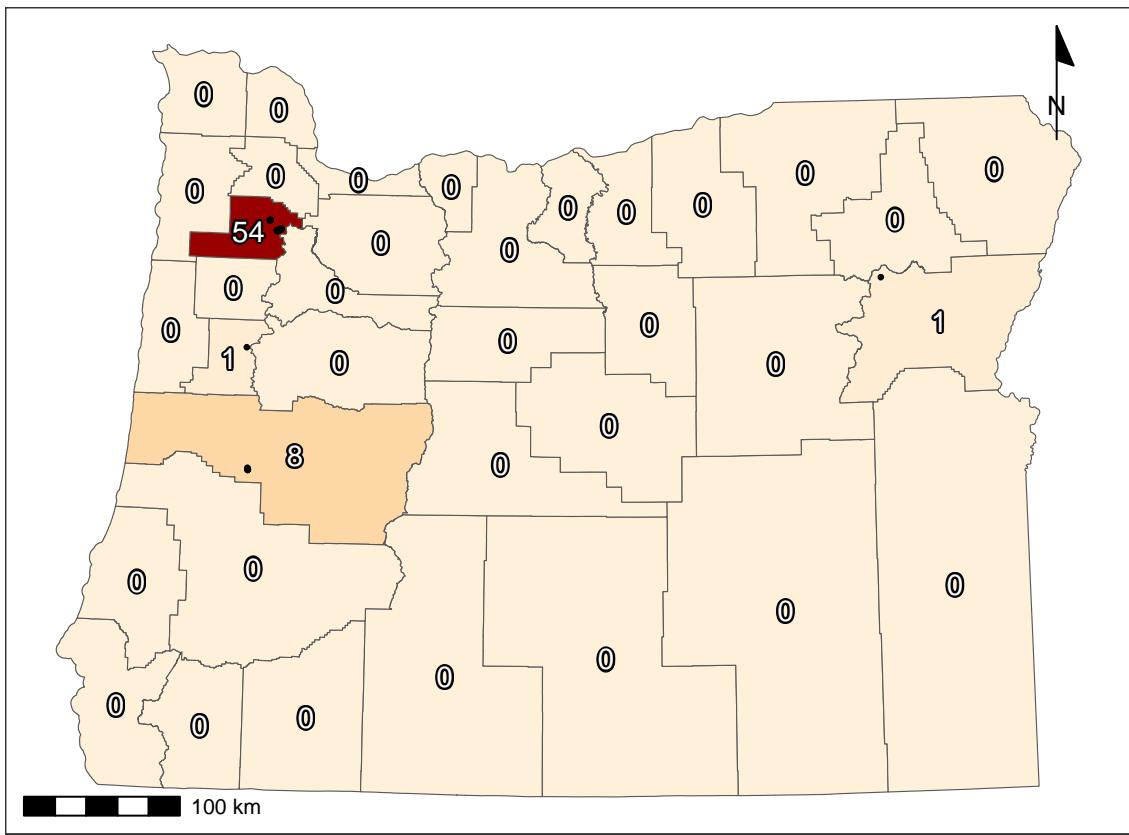


Figure 3: Bee catch locations for Cassidy Carpenter (within Oregon), along with total catches per county.

3 Total Catches

Volunteers from the Oregon Bee Atlas project caught 22478 bees across 36 counties from January 24, 2023 to December 13, 2023, representing 90 unique species and 48 unique genera. The **Nimble Net Kudos** (most specimens collected) goes to Scott Sublette, Dan O'Loughlin, and Michael O'Loughlin, who caught a total of 2274, 1283, and 1255 specimens. The *positive* kind of **Darwin Award** (most species collected) goes to Scott Sublette, Ellen Silva, and Michael O'Loughlin, who caught a total of 77, 74, and 72 unique species. Well done!



Figure 4: Bees caught by all volunteers, broken down by species, genus, and family.

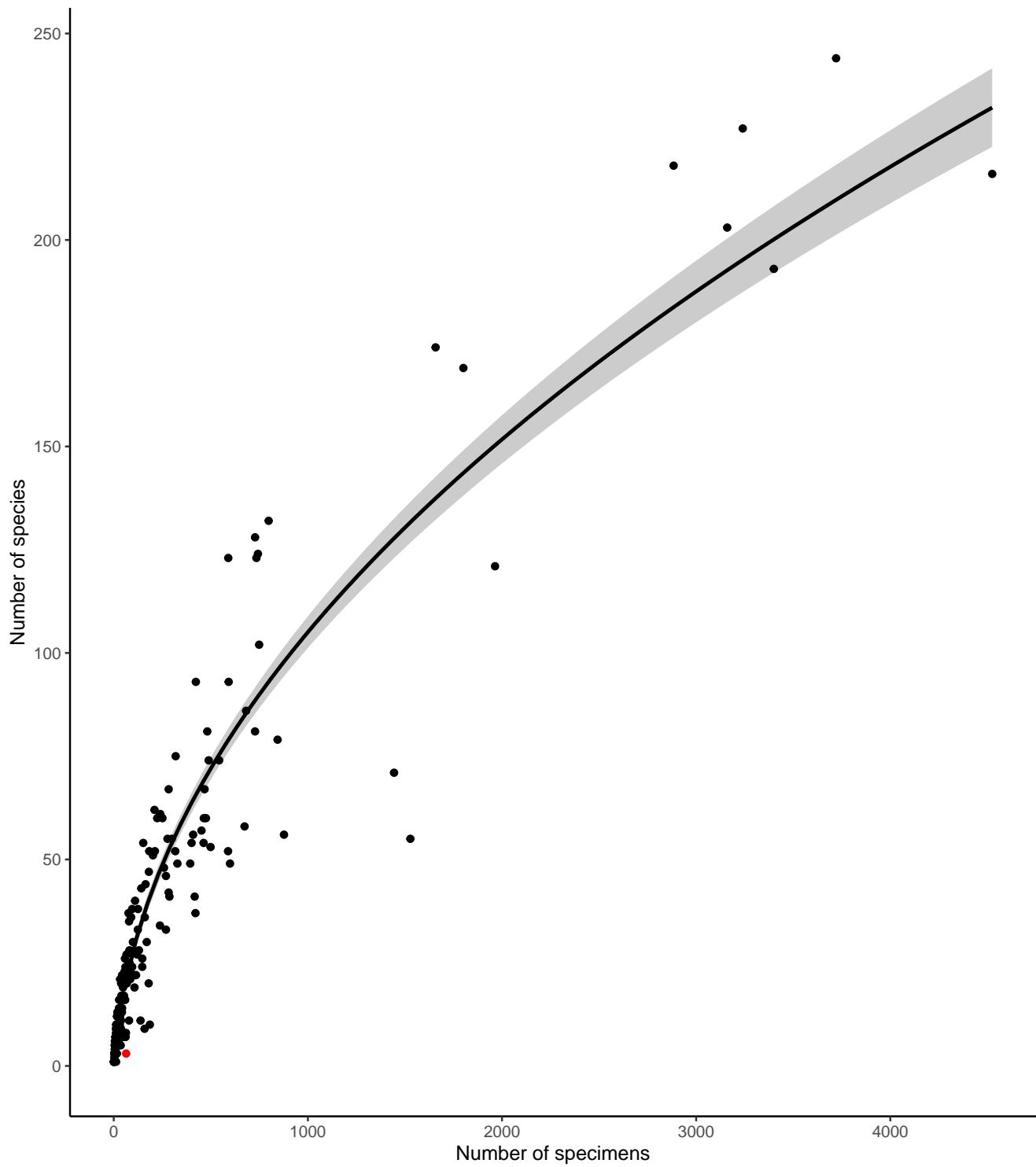


Figure 5: Number of bee specimens and unique bee species caught by all volunteers, with your effort shown in red. This graph should give you an idea of how many specimens you would need to catch to begin seeing rarer bee species.



Figure 6: Total specimens caught per county, along with catch location of each specimen (black dots). For genus- and species-specific information for each county, see Tables 3 and 4.



Figure 7: Total catches per (Level III) ecoregion, along with catch location of each specimen (black dots).

4 Flight Phenology

West of (and including) the Cascade Mountains, most bees (90%) were caught between April 13 and September 02, but the peak of season (50% of specimens) was from May 21 to July 26.



Figure 8: Phenology plot for all bee species caught in or West of the Cascade Mountains, sorted by median abundance times. Percentiles of overall emergence times (50th & 90th) are shown in grey shaded regions. Date ranges for each species (minimum, first, second, third quartiles, and maximum) are shown only for species with >10 specimens.

East of the Cascade Mountains, most bees (90%) were caught between April 28 and September 16, but the peak of season (50% of specimens) was from June 02 to August 07.

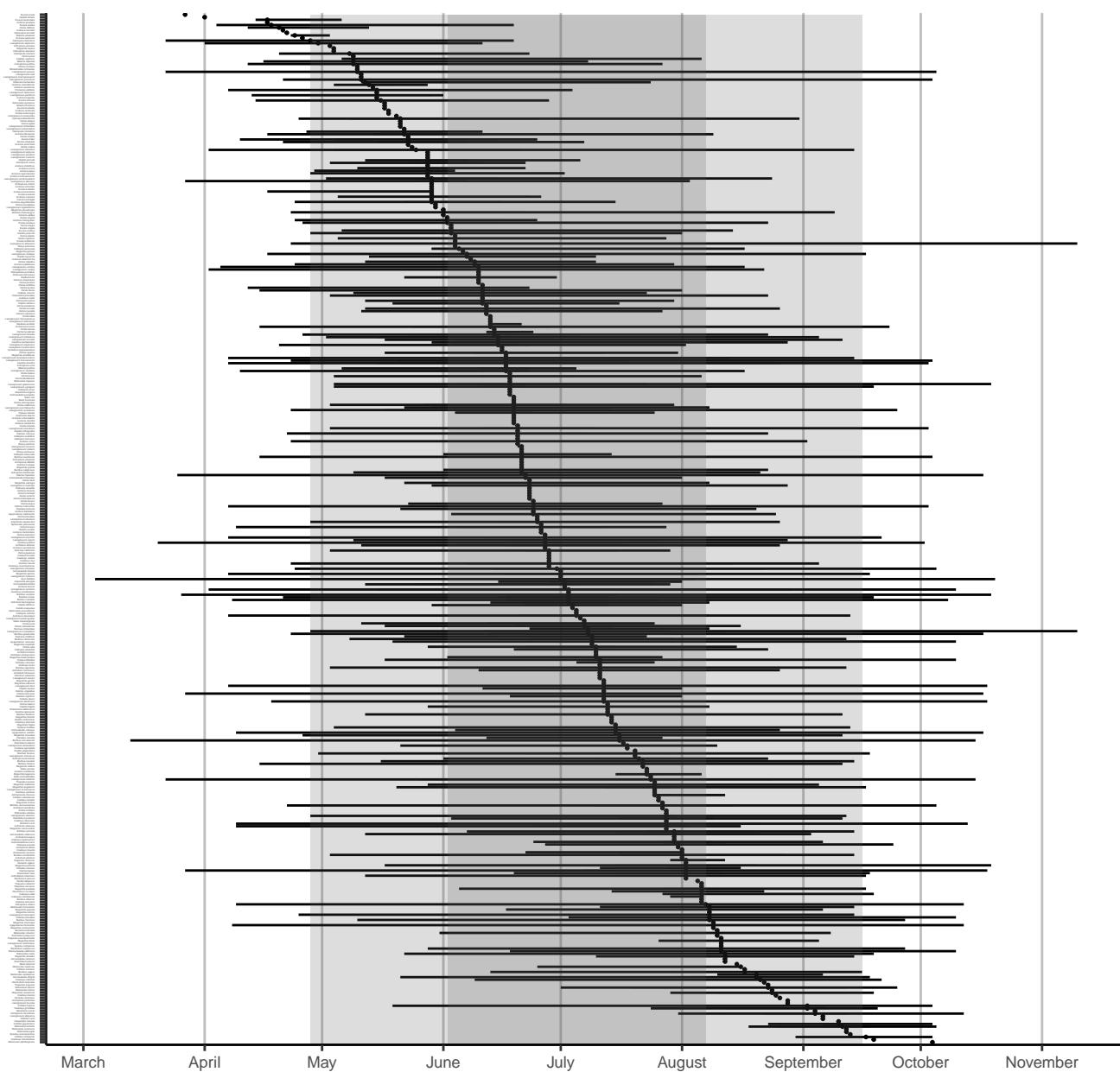


Figure 9: Phenology plot for all bee species caught east of the Cascade Mountains, sorted by median abundance times. Percentiles of overall emergence times (50th & 90th) are shown in grey shaded regions. Date ranges for each species (minimum, first, second, third quartiles, and maximum) are shown only for species with >10 specimens.

5 Plant genera

Volunteers collected specimens from a total of 636 unique flower genera, with most volunteers sampling from 19 flower genera (median value). The **Flower Power Kudos** (most sampled flower genera) goes to Michael O'Loughlin, Lori Humphreys, and Dan O'Loughlin, who collected bees from a total of 246, 210, and 188 genera of flowers. Well done!

The flower genera that had the most specimens caught on them were *Ericameria*, *Phacelia*, and *Penstemon*, which yielded a total of 6308, 4129, and 3411 specimens. The flower genera that were popular with the most species of bees were *Phacelia*, *Penstemon*, and *Ericameria*, hosting a total of 179, 167, and 140 unique bee species. See Tables 1 and 2 for more details.



Figure 10: Recorded number of flower genera per county.

7 Taxonomic Accuracy, 2023

In 2023, you identified 2 of your 64 specimens to genus level and 2 to species level, with a genus-level identification accuracy of 100% and a species-level identification accuracy of 100% (see Table 5). In total, volunteers from the Oregon Bee Atlas project identified 44.5 % (9993) of the 22478 bee specimens to the level of genus, with an average accuracy of 94.5%. Volunteers also identified 8.4% (1887) of the specimens to species level, and had an average accuracy of 88.9% (see Table 6). Nicely done!

Table 5: Your determination accuracy in 2023.

| | Taxon | Specimens ID-ed | Correct ID | % Correct |
|------------------------------|-------|-----------------|------------|-----------|
| Family | | | | |
| <i>Apidae</i> | | 2 | 2 | 100 |
| <i>TOTAL</i> | | 2 | 2 | 100 |
| Genus | | | | |
| <i>Bombus</i> | | 2 | 2 | 100 |
| <i>TOTAL</i> | | 2 | 2 | 100 |
| Species | | | | |
| <i>Bombus vancouverensis</i> | | 2 | 2 | 100 |
| <i>TOTAL</i> | | 2 | 2 | 100 |

Table 6: Determination accuracy for all volunteers in 2023.

| | Taxon | Specimens ID-ed | Correct ID | % Correct |
|----------------------|-------|-----------------|------------|-----------|
| Family | | | | |
| <i>Andrenidae</i> | | 1171 | 1121 | 95.7 |
| <i>Apidae</i> | | 3080 | 3039 | 98.7 |
| <i>Colletidae</i> | | 422 | 396 | 93.8 |
| <i>Halictidae</i> | | 2297 | 2266 | 98.7 |
| <i>Megachilidae</i> | | 3020 | 2970 | 98.3 |
| <i>Melittidae</i> | | 4 | 1 | 25.0 |
| <i>TOTAL</i> | | 9994 | 9793 | 98.0 |
| Genus | | | | |
| <i>Agapostemon</i> | | 86 | 86 | 100.0 |
| <i>Andrena</i> | | 682 | 662 | 97.1 |
| <i>Anthidiellum</i> | | 30 | 7 | 23.3 |
| <i>Anthidium</i> | | 125 | 124 | 99.2 |
| <i>Anthophora</i> | | 198 | 184 | 92.9 |
| <i>Apis</i> | | 85 | 85 | 100.0 |
| <i>Ashmeadiella</i> | | 58 | 47 | 81.0 |
| <i>Atoposmia</i> | | 46 | 44 | 95.7 |
| <i>Biastes</i> | | 3 | 3 | 100.0 |
| <i>Bombus</i> | | 1671 | 1670 | 99.9 |
| <i>Brachymelecta</i> | | 5 | 5 | 100.0 |
| <i>Calliopsis</i> | | 21 | 10 | 47.6 |
| <i>Ceratina</i> | | 273 | 268 | 98.2 |
| <i>Chelostoma</i> | | 27 | 24 | 88.9 |
| <i>Coelioxys</i> | | 43 | 42 | 97.7 |
| <i>Colletes</i> | | 265 | 245 | 92.5 |
| <i>Diadasia</i> | | 71 | 59 | 83.1 |
| <i>Dianthidium</i> | | 97 | 78 | 80.4 |
| <i>Dioxys</i> | | 2 | 1 | 50.0 |
| <i>Dufourea</i> | | 53 | 52 | 98.1 |
| <i>Epeolus</i> | | 10 | 9 | 90.0 |

Table 6: Determination accuracy for all volunteers in 2023. (*continued*)

| Taxon | Specimens ID-ed | Correct ID | % Correct |
|--------------------------------|-----------------|------------|-----------|
| <i>Eucera</i> | 60 | 57 | 95.0 |
| <i>Habropoda</i> | 49 | 47 | 95.9 |
| <i>Halictus</i> | 902 | 862 | 95.6 |
| <i>Heriades</i> | 40 | 29 | 72.5 |
| <i>Hesperapis</i> | 4 | 1 | 25.0 |
| <i>Holcopasites</i> | 1 | 1 | 100.0 |
| <i>Hoplitis</i> | 231 | 195 | 84.4 |
| <i>Hylaeus</i> | 157 | 151 | 96.2 |
| <i>Lasioglossum</i> | 1163 | 1101 | 94.7 |
| <i>Megachile</i> | 562 | 546 | 97.2 |
| <i>Melecta</i> | 21 | 20 | 95.2 |
| <i>Melissodes</i> | 370 | 322 | 87.0 |
| <i>Micralictoides</i> | 14 | 14 | 100.0 |
| <i>Neolarra</i> | 3 | 3 | 100.0 |
| <i>Nomada</i> | 207 | 201 | 97.1 |
| <i>Osmia</i> | 1670 | 1639 | 98.1 |
| <i>Panurginus</i> | 140 | 120 | 85.7 |
| <i>Perdita</i> | 319 | 249 | 78.1 |
| <i>Protandrena</i> | 8 | 7 | 87.5 |
| <i>Protosmia</i> | 48 | 33 | 68.8 |
| <i>Pseudoanthidium</i> | 4 | 1 | 25.0 |
| <i>Sphecodes</i> | 79 | 65 | 82.3 |
| <i>Stelis</i> | 31 | 21 | 67.7 |
| <i>Trachusa</i> | 6 | 5 | 83.3 |
| <i>Triepeolus</i> | 43 | 41 | 95.3 |
| <i>Xylocopa</i> | 10 | 9 | 90.0 |
| TOTAL | 9993 | 9445 | 94.5 |
| Species | | | |
| <i>Anthidiellum robertsoni</i> | 7 | 7 | 100.0 |
| <i>Apis mellifera</i> | 68 | 68 | 100.0 |
| <i>Bombus appositus</i> | 8 | 7 | 87.5 |
| <i>Bombus caliginosus</i> | 32 | 24 | 75.0 |
| <i>Bombus centralis</i> | 43 | 38 | 88.4 |
| <i>Bombus fervidus</i> | 43 | 43 | 100.0 |
| <i>Bombus flavidus</i> | 23 | 22 | 95.7 |
| <i>Bombus flavifrons</i> | 57 | 54 | 94.7 |
| <i>Bombus frigidus</i> | 3 | 0 | 0.0 |
| <i>Bombus griseocollis</i> | 46 | 46 | 100.0 |
| <i>Bombus huntii</i> | 50 | 46 | 92.0 |
| <i>Bombus insularis</i> | 9 | 7 | 77.8 |
| <i>Bombus kirbiellus</i> | 1 | 0 | 0.0 |
| <i>Bombus melanopygus</i> | 42 | 20 | 47.6 |
| <i>Bombus mixtus</i> | 139 | 121 | 87.1 |
| <i>Bombus morrisoni</i> | 4 | 4 | 100.0 |
| <i>Bombus nevadensis</i> | 13 | 12 | 92.3 |
| <i>Bombus occidentalis</i> | 5 | 3 | 60.0 |
| <i>Bombus rufocinctus</i> | 6 | 4 | 66.7 |
| <i>Bombus sitkensis</i> | 29 | 15 | 51.7 |
| <i>Bombus sylvicola</i> | 45 | 14 | 31.1 |
| <i>Bombus vagans</i> | 4 | 2 | 50.0 |
| <i>Bombus vancouverensis</i> | 259 | 257 | 99.2 |

Table 6: Determination accuracy for all volunteers in 2023. (*continued*)

| Taxon | Specimens ID-ed | Correct ID | % Correct |
|--------------------------------------|-----------------|------------|-----------|
| <i>Bombus vandykei</i> | 31 | 24 | 77.4 |
| <i>Bombus vosnesenskii</i> | 269 | 252 | 93.7 |
| <i>Brachymelecta californica</i> | 3 | 3 | 100.0 |
| <i>Ceratina pacifica</i> | 1 | 0 | 0.0 |
| <i>Halictus confusus</i> | 35 | 28 | 80.0 |
| <i>Halictus farinosus</i> | 28 | 24 | 85.7 |
| <i>Halictus ligatus</i> | 208 | 207 | 99.5 |
| <i>Halictus rubicundus</i> | 16 | 15 | 93.8 |
| <i>Halictus tripartitus</i> | 108 | 107 | 99.1 |
| <i>Halictus virgatellus</i> | 7 | 6 | 85.7 |
| <i>Holcopasites pulchellus</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum anhypops</i> | 3 | 3 | 100.0 |
| <i>Lasioglossum aspilurum</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum boreale</i> | 2 | 2 | 100.0 |
| <i>Lasioglossum cooleyi</i> | 23 | 0 | 0.0 |
| <i>Lasioglossum cressonii</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum diatretum</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum diversopunctatum</i> | 4 | 4 | 100.0 |
| <i>Lasioglossum glabriventre</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum helianthi</i> | 1 | 0 | 0.0 |
| <i>Lasioglossum incompletum</i> | 74 | 72 | 97.3 |
| <i>Lasioglossum inconditum</i> | 2 | 2 | 100.0 |
| <i>Lasioglossum kincaidii</i> | 2 | 2 | 100.0 |
| <i>Lasioglossum nevadense</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum olympiae</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum ovaliceps</i> | 5 | 5 | 100.0 |
| <i>Lasioglossum pavonotum</i> | 10 | 10 | 100.0 |
| <i>Lasioglossum pruinosum</i> | 4 | 4 | 100.0 |
| <i>Lasioglossum pulveris</i> | 6 | 6 | 100.0 |
| <i>Lasioglossum quebecense</i> | 1 | 0 | 0.0 |
| <i>Lasioglossum ruidosense</i> | 3 | 3 | 100.0 |
| <i>Lasioglossum sisymbrii</i> | 19 | 19 | 100.0 |
| <i>Lasioglossum titusi</i> | 24 | 20 | 83.3 |
| <i>Lasioglossum zephyrus</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum zonulum</i> | 4 | 4 | 100.0 |
| <i>Megachile perihirta</i> | 1 | 0 | 0.0 |
| <i>Micralictoides ruficaudus</i> | 14 | 14 | 100.0 |
| <i>Osmia atrocyanea</i> | 1 | 0 | 0.0 |
| <i>Osmia brevis</i> | 2 | 0 | 0.0 |
| <i>Osmia coloradensis</i> | 1 | 0 | 0.0 |
| <i>Osmia cyanella</i> | 3 | 0 | 0.0 |
| <i>Osmia densa</i> | 5 | 0 | 0.0 |
| <i>Osmia sculleni</i> | 3 | 0 | 0.0 |
| <i>Protosmia rubifloris</i> | 15 | 15 | 100.0 |
| <i>Trachusa timberlakei</i> | 5 | 5 | 100.0 |
| TOTAL | 1887 | 1678 | 88.9 |

8 Taxonomic Accuracy, All Years

Over your time in the Atlas you identified 2 of your 64 specimens to genus level and 2 to species level, with a genus-level identification accuracy of 100% and a species-level identification accuracy of 100% (see Table 7). In total, volunteers from the Oregon Bee Atlas project identified 45 % (53168) of the 118170 bee specimens to the level of genus, with an average accuracy of 94.2%. Volunteers also identified 11.3% (13393) of the specimens to species level, and had an average accuracy of 89.9% (see Table 8). Nicely done!

Table 7: Your determination accuracy.

| | Taxon | Specimens ID-ed | Correct ID | % Correct |
|------------------------------|-------|-----------------|------------|-----------|
| Family | | | | |
| <i>Apidae</i> | | 2 | 2 | 100 |
| <i>TOTAL</i> | | 2 | 2 | 100 |
| Genus | | | | |
| <i>Bombus</i> | | 2 | 2 | 100 |
| <i>TOTAL</i> | | 2 | 2 | 100 |
| Species | | | | |
| <i>Bombus vancouverensis</i> | | 2 | 2 | 100 |
| <i>TOTAL</i> | | 2 | 2 | 100 |

Table 8: Determination accuracy for all volunteers.

| | Taxon | Specimens ID-ed | Correct ID | % Correct |
|----------------------|-------|-----------------|------------|-----------|
| Family | | | | |
| <i>Andrenidae</i> | 6786 | 6064 | 89.4 | |
| <i>Apidae</i> | 17614 | 17375 | 98.6 | |
| <i>Colletidae</i> | 2847 | 2685 | 94.3 | |
| <i>Halictidae</i> | 14510 | 14302 | 98.6 | |
| <i>Megachilidae</i> | 11434 | 11275 | 98.6 | |
| <i>Melittidae</i> | 4 | 1 | 25.0 | |
| <i>TOTAL</i> | 53195 | 51702 | 97.2 | |
| Genus | | | | |
| <i>Agapostemon</i> | 965 | 961 | 99.6 | |
| <i>Andrena</i> | 4750 | 4155 | 87.5 | |
| <i>Anthidiellum</i> | 56 | 24 | 42.9 | |
| <i>Anthidium</i> | 546 | 539 | 98.7 | |
| <i>Anthophora</i> | 1213 | 1144 | 94.3 | |
| <i>Apis</i> | 594 | 585 | 98.5 | |
| <i>Ashmeadiella</i> | 342 | 291 | 85.1 | |
| <i>Atoposmia</i> | 137 | 93 | 67.9 | |
| <i>Biastes</i> | 8 | 6 | 75.0 | |
| <i>Bombus</i> | 7802 | 7774 | 99.6 | |
| <i>Brachymelecta</i> | 95 | 71 | 74.7 | |
| <i>Calliopsis</i> | 98 | 57 | 58.2 | |
| <i>Ceratina</i> | 2971 | 2923 | 98.4 | |
| <i>Chelostoma</i> | 82 | 63 | 76.8 | |
| <i>Coelioxys</i> | 152 | 143 | 94.1 | |
| <i>Colletes</i> | 1346 | 1229 | 91.3 | |
| <i>Diadasia</i> | 368 | 322 | 87.5 | |
| <i>Dianthidium</i> | 314 | 280 | 89.2 | |
| <i>Dioxys</i> | 6 | 3 | 50.0 | |
| <i>Dufourea</i> | 260 | 217 | 83.5 | |
| <i>Epeolus</i> | 61 | 43 | 70.5 | |

Table 8: Determination accuracy for all volunteers. (*continued*)

| Taxon | Specimens ID-ed | Correct ID | % Correct |
|---------------------------------|-----------------|------------|-----------|
| <i>Eucera</i> | 635 | 583 | 91.8 |
| <i>Habropoda</i> | 279 | 259 | 92.8 |
| <i>Halictus</i> | 5622 | 5393 | 95.9 |
| <i>Heriades</i> | 223 | 179 | 80.3 |
| <i>Hesparapis</i> | 4 | 1 | 25.0 |
| <i>Holcopasites</i> | 1 | 1 | 100.0 |
| <i>Hoplitis</i> | 748 | 605 | 80.9 |
| <i>Hylaeus</i> | 1500 | 1454 | 96.9 |
| <i>Lasioglossum</i> | 7189 | 6828 | 95.0 |
| <i>Megachile</i> | 2279 | 2223 | 97.5 |
| <i>Melecta</i> | 72 | 69 | 95.8 |
| <i>Melissodes</i> | 2045 | 1860 | 91.0 |
| <i>Micralictoides</i> | 16 | 14 | 87.5 |
| <i>Neolarra</i> | 3 | 3 | 100.0 |
| <i>Nomada</i> | 1220 | 1164 | 95.4 |
| <i>Nomia</i> | 2 | 2 | 100.0 |
| <i>Oreopasites</i> | 3 | 0 | 0.0 |
| <i>Osmia</i> | 6165 | 6055 | 98.2 |
| <i>Panurginus</i> | 750 | 567 | 75.6 |
| <i>Perdita</i> | 1147 | 1060 | 92.4 |
| <i>Protandrena</i> | 27 | 9 | 33.3 |
| <i>Protosmia</i> | 268 | 212 | 79.1 |
| <i>Pseudoanthidium</i> | 6 | 3 | 50.0 |
| <i>Sphecodes</i> | 454 | 354 | 78.0 |
| <i>Stelis</i> | 97 | 64 | 66.0 |
| <i>Trachusa</i> | 8 | 7 | 87.5 |
| <i>Triepeolus</i> | 176 | 147 | 83.5 |
| <i>Xylocopa</i> | 62 | 60 | 96.8 |
| <i>Zacosmia</i> | 1 | 1 | 100.0 |
| TOTAL | 53168 | 50100 | 94.2 |
| Species | | | |
| <i>Agapostemon femoratus</i> | 181 | 171 | 94.5 |
| <i>Agapostemon melliventris</i> | 14 | 14 | 100.0 |
| <i>Agapostemon subtilior</i> | 228 | 214 | 93.9 |
| <i>Agapostemon virescens</i> | 109 | 95 | 87.2 |
| <i>Andrena angustitarsata</i> | 18 | 18 | 100.0 |
| <i>Andrena astragali</i> | 1 | 1 | 100.0 |
| <i>Andrena chlorogaster</i> | 2 | 2 | 100.0 |
| <i>Andrena crataegi</i> | 1 | 1 | 100.0 |
| <i>Andrena cupreotincta</i> | 14 | 14 | 100.0 |
| <i>Andrena fuscicauda</i> | 2 | 2 | 100.0 |
| <i>Andrena illinoiensis</i> | 1 | 1 | 100.0 |
| <i>Andrena nigrocaerulea</i> | 2 | 2 | 100.0 |
| <i>Andrena pallidifovea</i> | 1 | 1 | 100.0 |
| <i>Andrena perplexa</i> | 1 | 1 | 100.0 |
| <i>Andrena piperi</i> | 3 | 2 | 66.7 |
| <i>Andrena prunorum</i> | 34 | 34 | 100.0 |
| <i>Andrena salicifloris</i> | 2 | 2 | 100.0 |
| <i>Andrena vicina</i> | 4 | 3 | 75.0 |
| <i>Anthidiellum robertsoni</i> | 19 | 19 | 100.0 |
| <i>Anthidium atrifrons</i> | 3 | 3 | 100.0 |
| <i>Anthidium banningense</i> | 5 | 5 | 100.0 |

Table 8: Determination accuracy for all volunteers. (*continued*)

| Taxon | Specimens ID-ed | Correct ID | % Correct |
|-----------------------------------|-----------------|------------|-----------|
| <i>Anthidium duomarginatum</i> | 1 | 0 | 0.0 |
| <i>Anthidium emarginatum</i> | 5 | 0 | 0.0 |
| <i>Anthidium manicatum</i> | 53 | 44 | 83.0 |
| <i>Anthidium mormonum</i> | 12 | 12 | 100.0 |
| <i>Anthidium oblongatum</i> | 14 | 14 | 100.0 |
| <i>Anthidium palliventre</i> | 33 | 30 | 90.9 |
| <i>Anthidium placitum</i> | 1 | 1 | 100.0 |
| <i>Anthidium tenuiflorae</i> | 2 | 2 | 100.0 |
| <i>Anthidium utahense</i> | 3 | 3 | 100.0 |
| <i>Anthophora bomboides</i> | 3 | 3 | 100.0 |
| <i>Anthophora californica</i> | 1 | 0 | 0.0 |
| <i>Anthophora neglecta</i> | 3 | 0 | 0.0 |
| <i>Anthophora pacifica</i> | 3 | 3 | 100.0 |
| <i>Anthophora urbana</i> | 251 | 249 | 99.2 |
| <i>Anthophora ursina</i> | 2 | 0 | 0.0 |
| <i>Apis mellifera</i> | 492 | 488 | 99.2 |
| <i>Ashmeadiella aridula</i> | 1 | 0 | 0.0 |
| <i>Ashmeadiella californica</i> | 1 | 1 | 100.0 |
| <i>Ashmeadiella clypeodentata</i> | 1 | 0 | 0.0 |
| <i>Ashmeadiella cubiceps</i> | 2 | 1 | 50.0 |
| <i>Ashmeadiella difugita</i> | 1 | 0 | 0.0 |
| <i>Ashmeadiella eurynorhyncha</i> | 1 | 0 | 0.0 |
| <i>Ashmeadiella timberlakei</i> | 1 | 1 | 100.0 |
| <i>Atoposmia abjecta</i> | 3 | 3 | 100.0 |
| <i>Atoposmia copelandica</i> | 6 | 6 | 100.0 |
| <i>Atoposmia oregonia</i> | 4 | 3 | 75.0 |
| <i>Atoposmia triodonta</i> | 1 | 0 | 0.0 |
| <i>Bombus Griseocollis</i> | 1 | 0 | 0.0 |
| <i>Bombus Mixtus</i> | 8 | 0 | 0.0 |
| <i>Bombus Nevadensis</i> | 1 | 0 | 0.0 |
| <i>Bombus appositus</i> | 48 | 36 | 75.0 |
| <i>Bombus caliginosus</i> | 345 | 273 | 79.1 |
| <i>Bombus centralis</i> | 201 | 187 | 93.0 |
| <i>Bombus fervidus</i> | 362 | 325 | 89.8 |
| <i>Bombus flavidus</i> | 145 | 134 | 92.4 |
| <i>Bombus flavifrons</i> | 541 | 454 | 83.9 |
| <i>Bombus frigidus</i> | 5 | 0 | 0.0 |
| <i>Bombus griseocollis</i> | 140 | 138 | 98.6 |
| <i>Bombus huntii</i> | 160 | 139 | 86.9 |
| <i>Bombus insularis</i> | 33 | 25 | 75.8 |
| <i>Bombus kirbiellus</i> | 1 | 0 | 0.0 |
| <i>Bombus melanopygus</i> | 328 | 274 | 83.5 |
| <i>Bombus mixtus</i> | 956 | 877 | 91.7 |
| <i>Bombus morrisoni</i> | 11 | 10 | 90.9 |
| <i>Bombus nevadensis</i> | 65 | 58 | 89.2 |
| <i>Bombus occidentalis</i> | 33 | 27 | 81.8 |
| <i>Bombus rufocinctus</i> | 58 | 36 | 62.1 |
| <i>Bombus sitkensis</i> | 195 | 147 | 75.4 |
| <i>Bombus suckleyi</i> | 2 | 0 | 0.0 |
| <i>Bombus sylvicola</i> | 69 | 31 | 44.9 |
| <i>Bombus vagans</i> | 24 | 8 | 33.3 |
| <i>Bombus vancouverensis</i> | 829 | 802 | 96.7 |

Table 8: Determination accuracy for all volunteers. (*continued*)

| Taxon | Specimens ID-ed | Correct ID | % Correct |
|----------------------------------|-----------------|------------|-----------|
| <i>Bombus vandykei</i> | 86 | 62 | 72.1 |
| <i>Bombus vosnesenskii</i> | 1378 | 1284 | 93.2 |
| <i>Brachymelecta californica</i> | 45 | 43 | 95.6 |
| <i>Calliopsis zonalis</i> | 1 | 0 | 0.0 |
| <i>Ceratina acantha</i> | 679 | 665 | 97.9 |
| <i>Ceratina micheneri</i> | 44 | 43 | 97.7 |
| <i>Ceratina nanula</i> | 3 | 2 | 66.7 |
| <i>Ceratina neomexicana</i> | 1 | 1 | 100.0 |
| <i>Ceratina pacifica</i> | 8 | 6 | 75.0 |
| <i>Ceratina sequoiae</i> | 5 | 0 | 0.0 |
| <i>Ceratina tejonensis</i> | 7 | 2 | 28.6 |
| <i>Ceratina timberlakei</i> | 5 | 0 | 0.0 |
| <i>Chelostoma minutum</i> | 1 | 1 | 100.0 |
| <i>Coelioxys alternatus</i> | 1 | 0 | 0.0 |
| <i>Coelioxys rufitarsis</i> | 4 | 0 | 0.0 |
| <i>Coelioxys sayi</i> | 2 | 2 | 100.0 |
| <i>Coelioxys texanus</i> | 4 | 0 | 0.0 |
| <i>Diadasia angusticeps</i> | 7 | 7 | 100.0 |
| <i>Diadasia australis</i> | 4 | 4 | 100.0 |
| <i>Diadasia diminuta</i> | 17 | 17 | 100.0 |
| <i>Diadasia enavata</i> | 100 | 99 | 99.0 |
| <i>Diadasia lutzi</i> | 28 | 6 | 21.4 |
| <i>Diadasia nigrifrons</i> | 9 | 9 | 100.0 |
| <i>Diadasia opuntiae</i> | 8 | 0 | 0.0 |
| <i>Dianthidium curvatum</i> | 22 | 22 | 100.0 |
| <i>Dianthidium heterulkei</i> | 9 | 0 | 0.0 |
| <i>Dianthidium pudicum</i> | 12 | 12 | 100.0 |
| <i>Dianthidium subparvum</i> | 3 | 3 | 100.0 |
| <i>Dianthidium ulkei</i> | 24 | 17 | 70.8 |
| <i>Dioxys aurifuscus</i> | 2 | 2 | 100.0 |
| <i>Eucera actuosa</i> | 11 | 10 | 90.9 |
| <i>Eucera cordleyi</i> | 18 | 4 | 22.2 |
| <i>Eucera edwardsii</i> | 48 | 20 | 41.7 |
| <i>Eucera frater</i> | 8 | 8 | 100.0 |
| <i>Eucera speciosa</i> | 19 | 0 | 0.0 |
| <i>Habropoda depressa</i> | 4 | 4 | 100.0 |
| <i>Habropoda miserabilis</i> | 7 | 6 | 85.7 |
| <i>Habropoda tristissima</i> | 3 | 2 | 66.7 |
| <i>Halictus Ligatus</i> | 4 | 0 | 0.0 |
| <i>Halictus confusus</i> | 149 | 122 | 81.9 |
| <i>Halictus farinosus</i> | 284 | 246 | 86.6 |
| <i>Halictus ligatus</i> | 1475 | 1464 | 99.3 |
| <i>Halictus rubicundus</i> | 361 | 333 | 92.2 |
| <i>Halictus tripartitus</i> | 723 | 684 | 94.6 |
| <i>Halictus virgatellus</i> | 114 | 109 | 95.6 |
| <i>Heriades carinata</i> | 2 | 0 | 0.0 |
| <i>Holcopasites pulchellus</i> | 1 | 1 | 100.0 |
| <i>Hoplitis albifrons</i> | 5 | 5 | 100.0 |
| <i>Hoplitis boharti</i> | 2 | 2 | 100.0 |
| <i>Hoplitis coleii</i> | 1 | 0 | 0.0 |
| <i>Hoplitis emarginata</i> | 1 | 1 | 100.0 |
| <i>Hoplitis fulgida</i> | 7 | 7 | 100.0 |

Table 8: Determination accuracy for all volunteers. (*continued*)

| Taxon | Specimens ID-ed | Correct ID | % Correct |
|--------------------------------------|-----------------|------------|-----------|
| <i>Hoplitis grinnelli</i> | 8 | 5 | 62.5 |
| <i>Hoplitis hypocrita</i> | 1 | 1 | 100.0 |
| <i>Hoplitis louisae</i> | 2 | 2 | 100.0 |
| <i>Hoplitis orthognatha</i> | 7 | 7 | 100.0 |
| <i>Hoplitis producta</i> | 12 | 10 | 83.3 |
| <i>Hoplitis uvulalis</i> | 3 | 3 | 100.0 |
| <i>Hoplitis viridimicans</i> | 6 | 4 | 66.7 |
| <i>Hylaeus basalis</i> | 6 | 3 | 50.0 |
| <i>Hylaeus mesillae</i> | 1 | 0 | 0.0 |
| <i>Hylaeus verticalis</i> | 1 | 0 | 0.0 |
| <i>Lasioglossum albipenne</i> | 3 | 3 | 100.0 |
| <i>Lasioglossum albohirtum</i> | 7 | 7 | 100.0 |
| <i>Lasioglossum allonotus</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum anhypops</i> | 6 | 5 | 83.3 |
| <i>Lasioglossum aspilurum</i> | 2 | 2 | 100.0 |
| <i>Lasioglossum athabascense</i> | 2 | 0 | 0.0 |
| <i>Lasioglossum boreale</i> | 2 | 2 | 100.0 |
| <i>Lasioglossum brunneiventre</i> | 4 | 4 | 100.0 |
| <i>Lasioglossum buccale</i> | 3 | 3 | 100.0 |
| <i>Lasioglossum colatum</i> | 1 | 1 | 100.0 |
| <i>Lasioglossum cooleyi</i> | 24 | 1 | 4.2 |
| <i>Lasioglossum cordleyi</i> | 5 | 5 | 100.0 |
| <i>Lasioglossum cressonii</i> | 30 | 30 | 100.0 |
| <i>Lasioglossum diatretum</i> | 5 | 3 | 60.0 |
| <i>Lasioglossum diversopunctatum</i> | 4 | 4 | 100.0 |
| <i>Lasioglossum egregium</i> | 4 | 1 | 25.0 |
| <i>Lasioglossum glabriventre</i> | 4 | 4 | 100.0 |
| <i>Lasioglossum helianthi</i> | 1 | 0 | 0.0 |
| <i>Lasioglossum imbrex</i> | 7 | 0 | 0.0 |
| <i>Lasioglossum incompletum</i> | 79 | 73 | 92.4 |
| <i>Lasioglossum inconditum</i> | 7 | 5 | 71.4 |
| <i>Lasioglossum kincaidii</i> | 10 | 10 | 100.0 |
| <i>Lasioglossum macroprosopum</i> | 2 | 2 | 100.0 |
| <i>Lasioglossum mellipes</i> | 3 | 0 | 0.0 |
| <i>Lasioglossum nevadense</i> | 9 | 9 | 100.0 |
| <i>Lasioglossum novascotiae</i> | 1 | 0 | 0.0 |
| <i>Lasioglossum occultum</i> | 3 | 2 | 66.7 |
| <i>Lasioglossum olympiae</i> | 138 | 127 | 92.0 |
| <i>Lasioglossum ovaliceps</i> | 12 | 12 | 100.0 |
| <i>Lasioglossum pacificum</i> | 64 | 55 | 85.9 |
| <i>Lasioglossum pavonotum</i> | 59 | 58 | 98.3 |
| <i>Lasioglossum pruinorum</i> | 12 | 12 | 100.0 |
| <i>Lasioglossum pulveris</i> | 27 | 27 | 100.0 |
| <i>Lasioglossum quebecense</i> | 1 | 0 | 0.0 |
| <i>Lasioglossum rubicundus</i> | 1 | 0 | 0.0 |
| <i>Lasioglossum ruidosense</i> | 5 | 5 | 100.0 |
| <i>Lasioglossum sequoiae</i> | 6 | 0 | 0.0 |
| <i>Lasioglossum sisymbrii</i> | 105 | 101 | 96.2 |
| <i>Lasioglossum titusi</i> | 260 | 214 | 82.3 |
| <i>Lasioglossum villosulum</i> | 11 | 8 | 72.7 |
| <i>Lasioglossum zephyrus</i> | 2 | 2 | 100.0 |
| <i>Lasioglossum zonulum</i> | 25 | 22 | 88.0 |

Table 8: Determination accuracy for all volunteers. (*continued*)

| Taxon | Specimens ID-ed | Correct ID | % Correct |
|----------------------------------|-----------------|------------|-----------|
| <i>Megachile angelarum</i> | 25 | 22 | 88.0 |
| <i>Megachile anograe</i> | 6 | 0 | 0.0 |
| <i>Megachile apicalis</i> | 4 | 4 | 100.0 |
| <i>Megachile brevis</i> | 23 | 1 | 4.3 |
| <i>Megachile fidelis</i> | 6 | 5 | 83.3 |
| <i>Megachile melanophaea</i> | 2 | 1 | 50.0 |
| <i>Megachile mellitarsis</i> | 4 | 4 | 100.0 |
| <i>Megachile montivaga</i> | 1 | 0 | 0.0 |
| <i>Megachile nevadensis</i> | 8 | 0 | 0.0 |
| <i>Megachile perihirta</i> | 61 | 55 | 90.2 |
| <i>Megachile pugnata</i> | 8 | 4 | 50.0 |
| <i>Megachile rotundata</i> | 23 | 22 | 95.7 |
| <i>Megachile wheeleri</i> | 4 | 4 | 100.0 |
| <i>Melecta edwardsii</i> | 8 | 8 | 100.0 |
| <i>Melecta pacifica</i> | 5 | 3 | 60.0 |
| <i>Melecta separata</i> | 4 | 4 | 100.0 |
| <i>Melecta thoracica</i> | 2 | 0 | 0.0 |
| <i>Melissodes agilis</i> | 1 | 1 | 100.0 |
| <i>Melissodes bimatratus</i> | 2 | 0 | 0.0 |
| <i>Melissodes metenueus</i> | 3 | 3 | 100.0 |
| <i>Melitta americana</i> | 2 | 0 | 0.0 |
| <i>Micralictoides ruficaudus</i> | 14 | 14 | 100.0 |
| <i>Nomia melanderi</i> | 1 | 1 | 100.0 |
| <i>Osmia aglaia</i> | 10 | 0 | 0.0 |
| <i>Osmia albolateralis</i> | 1 | 0 | 0.0 |
| <i>Osmia atrocyanea</i> | 10 | 9 | 90.0 |
| <i>Osmia brevis</i> | 2 | 0 | 0.0 |
| <i>Osmia bruneri</i> | 8 | 7 | 87.5 |
| <i>Osmia californica</i> | 2 | 0 | 0.0 |
| <i>Osmia calla</i> | 6 | 0 | 0.0 |
| <i>Osmia coloradensis</i> | 1 | 0 | 0.0 |
| <i>Osmia cornifrons</i> | 10 | 10 | 100.0 |
| <i>Osmia cyanella</i> | 3 | 0 | 0.0 |
| <i>Osmia densa</i> | 6 | 1 | 16.7 |
| <i>Osmia kincaidii</i> | 3 | 3 | 100.0 |
| <i>Osmia laeta</i> | 2 | 0 | 0.0 |
| <i>Osmia lignaria</i> | 11 | 11 | 100.0 |
| <i>Osmia montana</i> | 3 | 3 | 100.0 |
| <i>Osmia nemoris</i> | 5 | 1 | 20.0 |
| <i>Osmia sculleni</i> | 3 | 0 | 0.0 |
| <i>Perdita nevadensis</i> | 1 | 1 | 100.0 |
| <i>Protosmia rubifloris</i> | 168 | 167 | 99.4 |
| <i>Pseudoanthidium nanum</i> | 2 | 2 | 100.0 |
| <i>Stelis laticincta</i> | 5 | 5 | 100.0 |
| <i>Trachusa timberlakei</i> | 5 | 5 | 100.0 |
| <i>Triepeolus concavus</i> | 4 | 4 | 100.0 |
| <i>Triepeolus utahensis</i> | 5 | 2 | 40.0 |
| <i>Xylocopa californica</i> | 1 | 1 | 100.0 |
| <i>Xylocopa tabaniformis</i> | 16 | 16 | 100.0 |
| <i>Xylocopa virginica</i> | 1 | 0 | 0.0 |
| <i>Zacosmia maculata</i> | 1 | 1 | 100.0 |
| <i>bombus flavifrons</i> | 1 | 0 | 0.0 |

Table 8: Determination accuracy for all volunteers. (*continued*)

| Taxon | Specimens ID-ed | Correct ID | % Correct |
|----------------------------|-----------------|------------|-----------|
| <i>bombus melanopygus</i> | 1 | 0 | 0.0 |
| <i>bombus sitkensis</i> | 1 | 0 | 0.0 |
| <i>bombus vosnesenskii</i> | 1 | 0 | 0.0 |
| <i>TOTAL</i> | 13393 | 12047 | 89.9 |