**Supporting Information for:**

Structure of Bee Communities in Marginal Lands of the Puget Sound, USA

Evan Sugden, Will Peterman, Robert Redmond, Riley M. Anderson, and David W. Crowder

**References used to Identify Bees**

All bees were identified using resources at the USDA ARS Bee Biology & Systematics Laboratory in Logan, UT. Some identifications also used Discover Life keys (discoverlife.org), and were checked against reference specimens at the Bee Biology and Systematics Laboratory. References used to identify different bee genera are listed below.

**References for Andrenidae, *Andrena***

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**Table S1.** Number of specimens of each species. Counts are shown for the total collection, the Port of Seatle (POS) site, the Boeing Paine Field (BPF) site, and the Seattle City Light (SCL) site. Specimens collected by trap and sweep netting, and by sex, are also reported. Species are arranged by descending abundance. The records column indicates whether species are county or state records as follows: crSNO, a species record for Snohomish County; crKING, a species record for King County; crSNO\_G, a genus record for Snohomish County; crKING\_G, a genus record for King County; sr, a statewide species record; srG, a statewide genus record; srSG, a statewide subgenus record. Species with blank records have been detected before.

† Species found at all three sites

◊ Species collected only by net

§ Only females of species collected

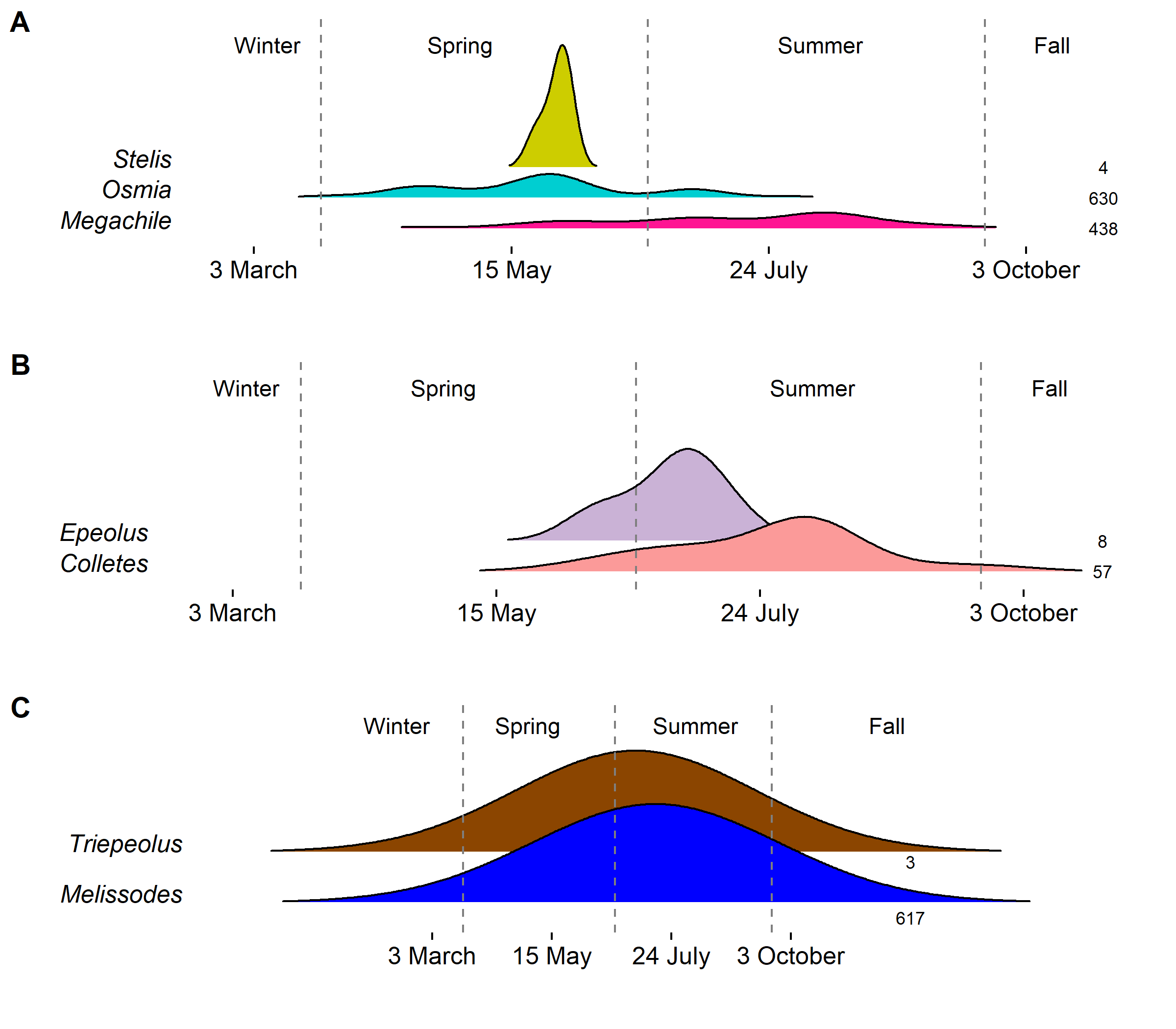
|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID#** | **Species** | **Records** | **Total** | **POS** | **BPF** | **SCL** | **Trap** | **Net** | **Female** | **Male** |
| 1 | *Halictus tripartitus* †§ | crSNO | 11787 | 11603 | 38 | 146 | 10831 | 956 | 11787 | 0 |
| 2 | *Agapostemon subtilior* † | crSNO | 2568 | 2269 | 24 | 275 | 2554 | 14 | 2420 | 148 |
| 3 | *Bombus vosnesenskii* † |  | 2148 | 1556 | 248 | 344 | 2102 | 46 | 2048 | 100 |
| 4 | *Halictus rubicundus* † |  | 1047 | 666 | 220 | 161 | 936 | 111 | 936 | 111 |
| 5 | *Ceratina acantha* † | crSNO\_G | 867 | 670 | 78 | 119 | 805 | 62 | 658 | 209 |
| 6 | *Bombus flavifrons* † |  | 782 | 523 | 242 | 17 | 755 | 27 | 556 | 226 |
| 7 | *Bombus mixtus* † |  | 619 | 433 | 135 | 51 | 572 | 47 | 532 | 87 |
| 8 | *Apis mellifera* † |  | 575 | 444 | 8 | 123 | 362 | 213 | 571 | 4 |
| 9 | *Melissodes microsticta* † | crSNO\_G | 538 | 389 | 67 | 82 | 503 | 35 | 379 | 159 |
| 10 | *Lasioglossum villosulum* † |  | 484 | 348 | 98 | 38 | 307 | 177 | 414 | 70 |
| 11 | *Bombus fervidus* † |  | 256 | 196 | 9 | 51 | 253 | 3 | 202 | 54 |
| 12 | *Lasioglossum incompletum* † | crKING : crSNO | 235 | 176 | 2 | 57 | 210 | 25 | 211 | 24 |
| 13 | *Lasioglossum nevadense* † | crKING : crSNO | 235 | 174 | 52 | 9 | 208 | 27 | 227 | 8 |
| 14 | *Megachile perihirta* † |  | 216 | 169 | 25 | 22 | 203 | 13 | 173 | 43 |
| 15 | *Osmia albolateralis* † | crKING : crSNO | 215 | 204 | 2 | 9 | 203 | 12 | 133 | 82 |
| 16 | *Halictus confuses* † | crSNO | 208 | 108 | 97 | 3 | 191 | 17 | 143 | 65 |
| 17 | *Osmia proximav* † | crKING : crSNO | 160 | 117 | 30 | 13 | 150 | 10 | 152 | 8 |
| 18 | *Lasioglossum cooleyi* † | crKING : crSNO | 121 | 89 | 17 | 15 | 116 | 5 | 118 | 3 |
| 19 | *Lasioglossum zonulus* † | crSNO | 115 | 86 | 15 | 14 | 113 | 2 | 112 | 3 |
| 20 | *Megachile melanophaea* † | crSNO | 115 | 100 | 4 | 11 | 115 | 0 | 88 | 27 |
| 21 | *Bombus melanopygus* † |  | 114 | 23 | 89 | 2 | 114 | 0 | 73 | 41 |
| 22 | *Lasioglossum knereri* † | crSNO | 105 | 77 | 22 | 6 | 95 | 10 | 83 | 22 |
| 23 | *Agapostemon virescens* † |  | 92 | 88 | 1 | 3 | 88 | 4 | 67 | 25 |
| 24 | *Melissodes rivalis* † | crSNO\_G | 77 | 17 | 32 | 28 | 77 | 0 | 29 | 48 |
| 25 | *Andrena salicifloris* † |  | 72 | 28 | 21 | 23 | 54 | 18 | 19 | 53 |
| 26 | *Ceratina nanula* † | crKING : crSNO\_G | 71 | 64 | 5 | 2 | 66 | 5 | 55 | 16 |
| 27 | *Hylaeus mesillae* | crKING | 71 | 69 | 0 | 2 | 6 | 65 | 36 | 35 |
| 28 | *Osmia giliarum* † | crSNO | 66 | 28 | 22 | 16 | 65 | 1 | 3 | 63 |
| 29 | *Osmia trifoliama* † | crKING : crSNO | 65 | 48 | 16 | 1 | 58 | 7 | 48 | 17 |
| 30 | *Andrena angustitarsata* † | crSNO | 62 | 6 | 44 | 12 | 22 | 40 | 13 | 49 |
| 31 | *Colletes fulgidus* † | crKING : crSNO\_G | 56 | 38 | 1 | 17 | 38 | 18 | 48 | 8 |
| 32 | *Lasioglossum pacatum* †§ | crKING : crSNO | 52 | 36 | 9 | 7 | 51 | 1 | 52 | 0 |
| 33 | *Lasioglossum sisymbrii* |  | 48 | 46 | 0 | 2 | 27 | 21 | 34 | 14 |
| 34 | *Lasioglossum pacificum* † | crSNO | 45 | 42 | 1 | 2 | 33 | 12 | 41 | 4 |
| 35 | *Panurginus atriceps* | crSNO\_G | 45 | 23 | 0 | 22 | 37 | 8 | 29 | 16 |
| 36 | *Osmia dolerosa* † | crSNO | 43 | 39 | 1 | 3 | 42 | 1 | 34 | 9 |
| 37 | *Megachile montivaga* † | crKING : crSNO | 36 | 27 | 3 | 6 | 36 | 0 | 31 | 5 |
| 38 | *Lasioglossum cressonii* † |  | 35 | 21 | 3 | 11 | 34 | 1 | 33 | 2 |
| 39 | *Lasioglossum kincaidii* †§ | crSNO | 31 | 28 | 1 | 2 | 31 | 0 | 31 | 0 |
| 40 | *Hoplitis producta* † | crKING\_G : crSNO\_G | 28 | 6 | 20 | 2 | 28 | 0 | 13 | 15 |
| 41 | *Lasioglossum tenax* † | crKING : crSNO | 26 | 17 | 7 | 2 | 20 | 6 | 24 | 2 |
| 42 | *Megachile brevis* | crKING | 26 | 22 | 0 | 4 | 23 | 3 | 20 | 6 |
| 43 | *Andrena nigrihirta* † | crSNO | 25 | 1 | 1 | 23 | 25 | 0 | 1 | 24 |
| 44 | *Andrena prunorum* † |  | 23 | 20 | 2 | 1 | 18 | 5 | 20 | 3 |
| 45 | *Osmia lignaria* † |  | 23 | 2 | 10 | 11 | 23 | 0 | 16 | 7 |
| 46 | *Coelioxys rufitarsis* † | crSNO\_G | 21 | 17 | 1 | 3 | 20 | 1 | 7 | 14 |
| 47 | *Hylaeus modestus* † | crKING : crSNO\_G | 20 | 13 | 2 | 5 | 19 | 1 | 19 | 1 |
| 48 | *Anthidium oblongatum* |  | 19 | 16 | 0 | 3 | 16 | 3 | 14 | 5 |
| 49 | *Heriades carinatus* |  | 19 | 3 | 0 | 16 | 15 | 4 | 17 | 2 |
| 50 | *Andrena candida* † | crSNO | 18 | 9 | 4 | 5 | 17 | 1 | 13 | 5 |
| 51 | *Megachile angelarum* |  | 15 | 8 | 0 | 7 | 11 | 4 | 5 | 10 |
| 52 | *Lasioglossum laevissimum* † |  | 14 | 9 | 2 | 3 | 6 | 8 | 10 | 4 |
| 53 | *Osmia pusilla* † | crKING : crSNO | 14 | 6 | 7 | 1 | 13 | 1 | 6 | 8 |
| 54 | *Anthidium manicatum* † |  | 13 | 7 | 5 | 1 | 13 | 0 | 9 | 4 |
| 55 | *Megachile gemula* | crKING | 12 | 9 | 0 | 3 | 12 | 0 | 5 | 7 |
| 56 | *Osmia pinorum* | crKING : crSNO : sr | 12 | 1 | 11 | 0 | 12 | 0 | 0 | 12 |
| 57 | *Andrena scurra* ◊ | crKING | 11 | 11 | 0 | 0 | 0 | 11 | 5 | 6 |
| 58 | *Andrena hemileuca* |  | 10 | 3 | 0 | 7 | 9 | 1 | 1 | 9 |
| 59 | *Coelioxys sodalis* | crKING | 9 | 9 | 0 | 0 | 9 | 0 | 3 | 6 |
| 60 | *Lasioglossum buccale* † | crKING : crSNO | 8 | 4 | 1 | 3 | 8 | 0 | 7 | 1 |
| 61 | *Lasioglossum inconditum* | crSNO | 8 | 1 | 7 | 0 | 8 | 0 | 7 | 1 |
| 62 | *Osmia tristella* † | crSNO | 8 | 6 | 1 | 1 | 6 | 2 | 6 | 2 |
| 63 | *Lasioglossum zephyrus* § | crKING | 7 | 0 | 0 | 7 | 7 | 0 | 7 | 0 |
| 64 | *Megachile rotundata* | crSNO | 7 | 0 | 2 | 5 | 7 | 0 | 3 | 4 |
| 65 | *Andrena piperi* ◊§ | crKING | 6 | 6 | 0 | 0 | 0 | 6 | 6 | 0 |
| 66 | *Bombus sitkensis* † |  | 6 | 1 | 3 | 2 | 6 | 0 | 2 | 4 |
| 67 | *Coelioxys porterae* | crKING : sr | 6 | 5 | 0 | 1 | 6 | 0 | 1 | 5 |
| 68 | *Epeolus compactus* |  | 6 | 5 | 0 | 1 | 4 | 2 | 0 | 6 |
| 69 | *Hoplitis albifrons* § | crKING\_G : crSNO\_G | 6 | 3 | 3 | 0 | 6 | 0 | 6 | 0 |
| 70 | *Lasioglossum ruidosense* †§ | crKING : crSNO | 6 | 1 | 4 | 1 | 5 | 1 | 6 | 0 |
| 71 | *Andrena frigida* |  | 5 | 5 | 0 | 0 | 4 | 1 | 2 | 3 |
| 72 | *Andrena knuthiana* § |  | 5 | 5 | 0 | 0 | 3 | 2 | 5 | 0 |
| 73 | *Andrena nigrocaerulea* § |  | 5 | 5 | 0 | 0 | 5 | 0 | 5 | 0 |
| 74 | *Andrena pallidifovea* ◊§ | crKING | 5 | 5 | 0 | 0 | 0 | 5 | 5 | 0 |
| 75 | *Andrena vicina* ◊ |  | 5 | 5 | 0 | 0 | 0 | 5 | 2 | 3 |
| 76 | *Andrena thaspii* § |  | 4 | 3 | 1 | 0 | 3 | 1 | 4 | 0 |
| 77 | *Hylaeus punctatus* § | crKING | 4 | 3 | 0 | 1 | 1 | 3 | 4 | 0 |
| 78 | *Megachile lapponica* | crKING | 4 | 0 | 0 | 4 | 3 | 1 | 1 | 3 |
| 79 | *Osmia coloradensis* |  | 4 | 1 | 0 | 3 | 4 | 0 | 2 | 2 |
| 80 | *Stelis subcaerulea* | crKING | 4 | 4 | 0 | 0 | 4 | 0 | 0 | 4 |
| 81 | *Andrena perplexa* | crKING | 3 | 2 | 0 | 1 | 3 | 0 | 2 | 1 |
| 82 | *Andrena rufosignata* |  | 3 | 3 | 0 | 0 | 3 | 0 | 2 | 1 |
| 83 | *Coelioxys octodentata* § | crKING | 3 | 3 | 0 | 0 | 3 | 0 | 3 | 0 |
| 84 | *Lasioglossum cordleyi* § | crKING : crSNO | 3 | 1 | 2 | 0 | 2 | 1 | 3 | 0 |
| 85 | *Nomada suavis* | crKING | 3 | 3 | 0 | 0 | 3 | 0 | 1 | 2 |
| 86 | *Osmia nanula* § |  | 3 | 2 | 0 | 1 | 3 | 0 | 3 | 0 |
| 87 | *Osmia texana* § | crKING | 3 | 2 | 0 | 1 | 2 | 1 | 3 | 0 |
| 88 | *Andrena crataegi* § |  | 2 | 2 | 0 | 0 | 1 | 1 | 2 | 0 |
| 89 | *Andrena trevoris* | crSNO | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 1 |
| 90 | *Andrena vicinoides* |  | 2 | 0 | 0 | 2 | 2 | 0 | 0 | 2 |
| 91 | *Anthophora terminalis* | crKING : crSNO\_G | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 1 |
| 92 | *Bombus rufocinctus* § | crKING | 2 | 2 | 0 | 0 | 1 | 1 | 2 | 0 |
| 93 | *Diadasia enavata* § | crKING : srG | 2 | 2 | 0 | 0 | 2 | 0 | 2 | 0 |
| 94 | *Epeolus olympiellus* | crKING | 2 | 2 | 0 | 0 | 2 | 0 | 1 | 1 |
| 95 | *Lasioglossum titusi* ◊§ | crKING | 2 | 2 | 0 | 0 | 0 | 2 | 2 | 0 |
| 96 | *Megachile frigida* | crSNO | 2 | 1 | 1 | 0 | 2 | 0 | 1 | 1 |
| 97 | *Osmia bucephala* | crSNO | 2 | 1 | 1 | 0 | 2 | 0 | 1 | 1 |
| 98 | *Osmia caerulescens* | crSNO | 2 | 1 | 1 | 0 | 2 | 0 | 1 | 1 |
| 99 | *Agapostemon femoratus* § | crKING | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 100 | *Andrena buckelli* | crKING | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 101 | *Andrena gordoni* ◊§ | crKING | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 102 | *Andrena hippotes* § | crKING | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 103 | *Andrena miranda* § |  | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 104 | *Andrena subaustralis* | crKING | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 105 | *Andrena subtilis* ◊§ |  | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 106 | *Andrena transnigra* |  | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 107 | *Coelioxys gilensis* ◊§ | crKING : srSG | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 108 | *Colletes kincaidii* | crKING | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 109 | *Lasioglossum nigroviride* | crSNO | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| 110 | *Lasioglossum ovaliceps*§ |  | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 111 | *Lasioglossum punctatoventre* ◊§ | crKING | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 112 | *Lasioglossum sedi* ◊§ |  | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 113 | *Lasioglossum yukonae* § | crSNO : sr | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 114 | *Megachile fidelis* ◊§ |  | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 115 | *Megachile gravita* | crKING | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 116 | *Megachile onobrychidis* § | crKING | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 117 | *Nomada formula* § | crSNO : sr | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 118 | *Osmia densa* § |  | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |

**Fig. S1**. Collecting effort across years at all sites. BPF = Boeing Paine Field, SCL = Seattle City Lights, POS = Port of Seattle. a) Trap days expressed as a standard trap set over a 24-hour period. (BPF values expressed as equivalents with reference to numbers of specimens collected by standard trap sets at other sites.) b) Net collecting events.

**A graph of different colored bars

Description automatically generated**

**Fig. S2.** Estimated genus-level seasonal distributions for parasites: (A) *Stelis*, (B) *Epeolus*, and (C) *Triepeolus*. Beneath each parasite genera are presumed host genera. Sample sizes on the right are the total records for each genus. Vertical dashed lines are 21 March, 21 June, and 21 September. These parasites have low sample sizes limiting accurate estimation.

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