**Common Acre/BeeSearch**

**Puget Sound Bee Diversity Study Site, Methods, & Data Explication**

Sites & Stations.

The study was divided into 3 areas we call “Sites”. Each was divided into subsides we call “Stations”. These stations were initially chosen as potential revegetation plots to be used by The Common Acre (TCA). The bee study began as a comparative experiment run in parallel with the revegetation effort but evolved into an inclusive area-wide diversity study beyond the revegetation context. The sites share the characteristics of 1) lowland, 2) disturbed, 3) open unforested (although close to stands of mixed native/introduced trees), 4) highly weedy, and 5) “peri-urban”, i.e. close to developed industrial and/or suburban property.

1. Abbreviated “POS”. Port of Seattle, roughly 50 ha of open land South of the runways as SeaTac airport. Chosen by TCA as a revegetation area, much of the land was formerly a golf course, now derelict, with prominent sand pits. This was divided over time into 28 stations which were trapped up to 8 per session on a rotating basis. Most of the 28 stations have distinctive characteristics; it could be worth comparing the local diversity between stations but in aggregate, they are clustered closely enough that the entire Site would be considered as the operative unit for most analysis. (Stations 13-19 are subdivisions of a single large, open grassy area, and may be treated as a single location.)
2. Abbreviated “SCL”. Seattle City Light open land adjacent to a power corridor. Chosen by TCA as a revegetation area. Intermittently along the corridor were established 5 stations. starting at 1) the first station in a highland meadow in the Rainier View neighborhood. 2) second site on a marshy slope dropping westward to I-5 along a power line service road, 3) the third on a flat, somewhat marshy area just north of “Duwamish Hill Preserve” adjacent to a platform used as an equipment storage area, and 4) an in-process revegetation riparian area along a shallow bow of the Duwamish River and South of a major power transfer station. These stations were about 1 mile apart by map. 5) A fifth Station was established just East of Station 1 and used during the last 2 years of trapping at SCL. It was close enough to SCL1 to be considered an extension, but we entered data from it as “SCL5”.
3. Abbreviated “BPF”. Boeing Paine Field in Snohomish County. We established 3 subsites adjacent to the service road West and North of the maintenance area North of the runways. Two of these were initially set up by TCA as revegetation plots. In two subsites we set up 3 trapping Stations and in a third we set up 2 Stations, for a total of 8.

Collection techniques and periodicity.

The stations were trapped on a monthly basis for a 24-hour period (1 trap day) generally from April through September. The trapping years for each Site overlapped but only POS was used throughout the entire 7 years of trapping. There were a few events where one or more stations were trapped for a single 24-hour period that was not repeated, usually as tests of the effects of differences in trapping materials. This is most notable in 2017, when sites POS13-POS21 were used for that purpose and were not part of the season-long effort.

We established a standard trap set that was used at all Stations throughout the entire study. This trapping unit enables comparison between sites based on trapping effort. The trapping set consisted of 15 ground-level bowls of 3 colors (bright blue, white, fluorescent yellow) set in 5 clusters of 3 bowls, one of each color, plus 3 “blue vane traps” interspersed between the bowl clusters. The bowl clusters were spaced at approximately 10 meters. Both bowls and BVTs were filled with scentless soapy water. At BPF we had a conservation issue because this Site was within flight distance of one of the last known colonies of *Bombus occidentalis* to be observed in the region (2013-2015,) which compelled us to reduce the number of blue vane traps at this site to 1 per set (cf. 3) to avoid affecting any residual population. This resulted in a trapping unit of somewhat less power (, which we have estimated to be approximately 0.6), which should be taken into account when time interval vs trapping effort is considered in analyses.

This study was *not* designed to test trapping efficacy of different trap types, so the trap catch is lumped from each Station per date. We know both from our experience and from that of other studies, that blue vane traps are highly efficient at collecting bees and bowl traps are less so but each trap type tends to collect a different spectrum of species, with the BVTs amassing by far the largest number of large and fast-flying bees. The reduction of BVTs per trap set at BPF means that comparison of species collected at that site with the other 2 sites must take the trap reduction into consideration. Total specimens collected can be compared using the 0.6 X reduction factor but we have no direct way of comparing the difference in richness of species collected.

Sweep net collecting was carried out fortuitously depending mostly on weather. The sweeping bouts were standardized at approximately 100 swings per bout.

Trapping and sweeping effort for the entire study are summarized in the attached spreadsheet, which totals trap effort for each Site, Station, and per year.

Processing

Specimens were collected from bowls and BVTs by straining the soapy water through a tea strainer and placing the catch in 70% EtOH in prelabeled 4 oz specimen vials. Sweep net samples were dispatched with ethyl acetate and placed in blotter paper “layers”. In the lab, bowl samples were roughly sorted into either pinnable or archival groups then either air dried with a blow dryer on medium heat until a pinnable or returned to EtOH in high quality museum glass vials. Layered specimens were rehydrated for approximately 12 hours, then selectively pinned or archived in EtOH.

Data Recording

All collected bee specimens were recorded in the database spreadsheet. The total number of recorded specimens, including both pinned and archived, is 26,030. Determinations were made at the pinning/archiving stage or later as identification resources became available. Every pinned specimen received a 4-digit unique specimen number (= accession number) which appears on the bottom specimen label. There are 8059 records of individual pinned specimens. Archived specimens, often representing large series, were recorded with Site, Station, Date and Sex data as a single record but were not given a unique number. There are a total of 1340 such archival records, describing 17,971 specimens. *For analyses involving total specimen numbers per Site or Site/Station, these archival records, per species and per sex would need to be included with the corresponding pinned specimen numbers, linking on Site, Station, and Date.* *This would be a logical first step in analyses, resulting in a subsidiary data set with all specimens per Station, Site, and Date and a second set of the same but broken down into sex.*

Column (field) descriptions appear as a separate sheet in the attached Excel file.