

DOCKETED	
Docket Number:	22-SPPE-02
Project Title:	San Jose Data Center 04
TN #:	255409
Document Title:	Microsoft SJ04 - Crotch's BB Survey Report
Description:	N/A
Filer:	Scott Galati
Organization:	DayZenLLC
Submitter Role:	Applicant Representative
Submission Date:	4/2/2024 10:39:04 AM
Docketed Date:	4/2/2024



H. T. HARVEY & ASSOCIATES

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50 years of field notes, exploration, and excellence



**Microsoft San José Data Center SJC04 and SJC06
Crotch's Bumble Bee Survey Report**

Project #4658-01

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September 7, 2023

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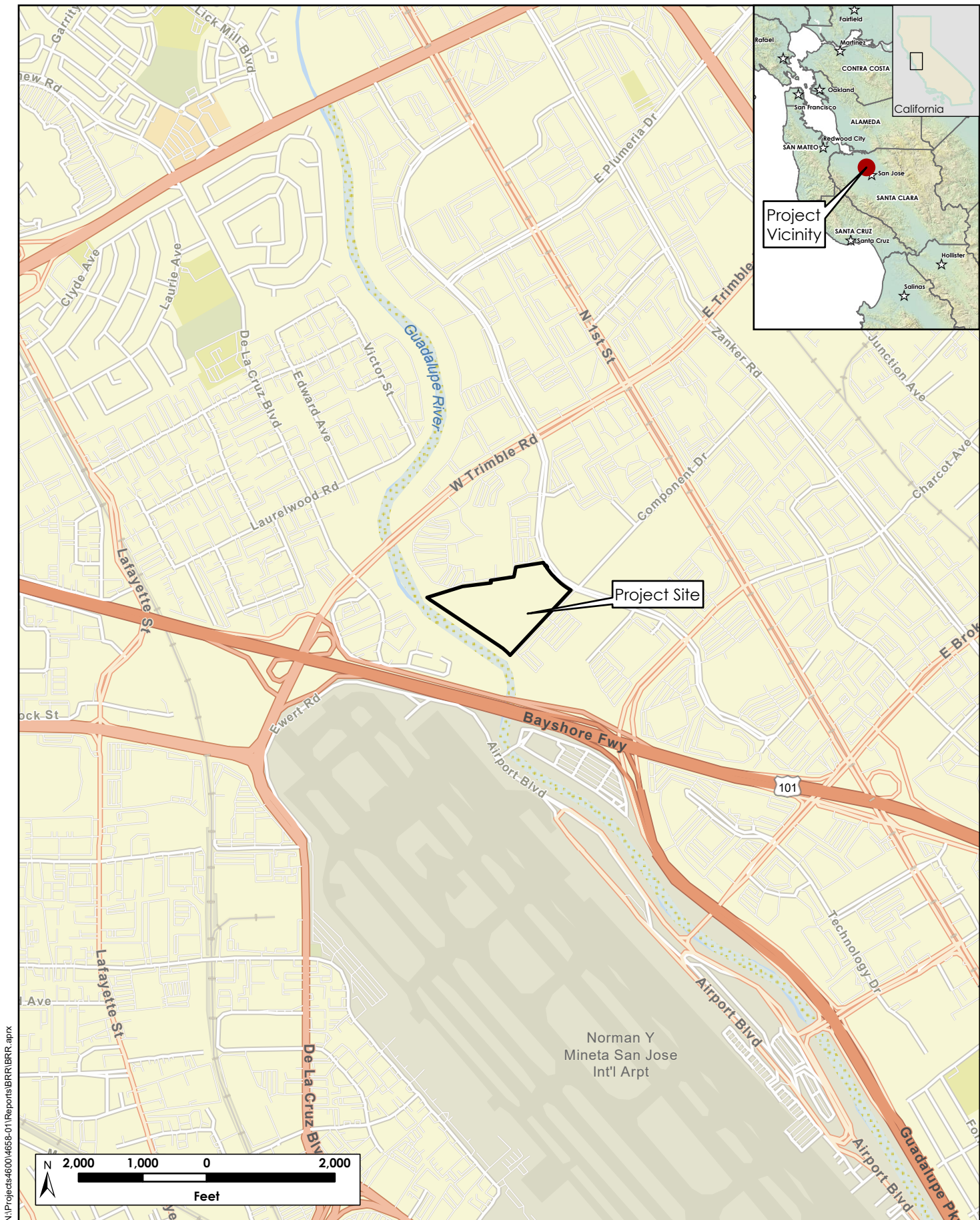
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Section 1. Introduction

H. T. Harvey & Associates has conducted a survey and habitat assessment for Crotch's bumble bee (*Bombus crotchii*) in support of the proposed Microsoft San José Data Center 04 and 06 project located at 350 and 370 West Trimble Road in San José, California. The California Energy Commission requested information on the suitability of habitat on the project site for this species, and on the potential for occurrence of the species. This report describes our survey and habitat assessment methodology and findings.

1.1 Project Location

The project site is located at 350 and 370 West Trimble Road in San José, California (Figures 1 and 2). The 22.3-acre site is currently undeveloped, and the Guadalupe River flows south to north along the southwest boundary of the project site. Surrounding areas consist of dense urban development in San José, several undeveloped vacant parcels to the northeast, and the Norman Y. Mineta San José International Airport across U.S. Highway 101 to the south.



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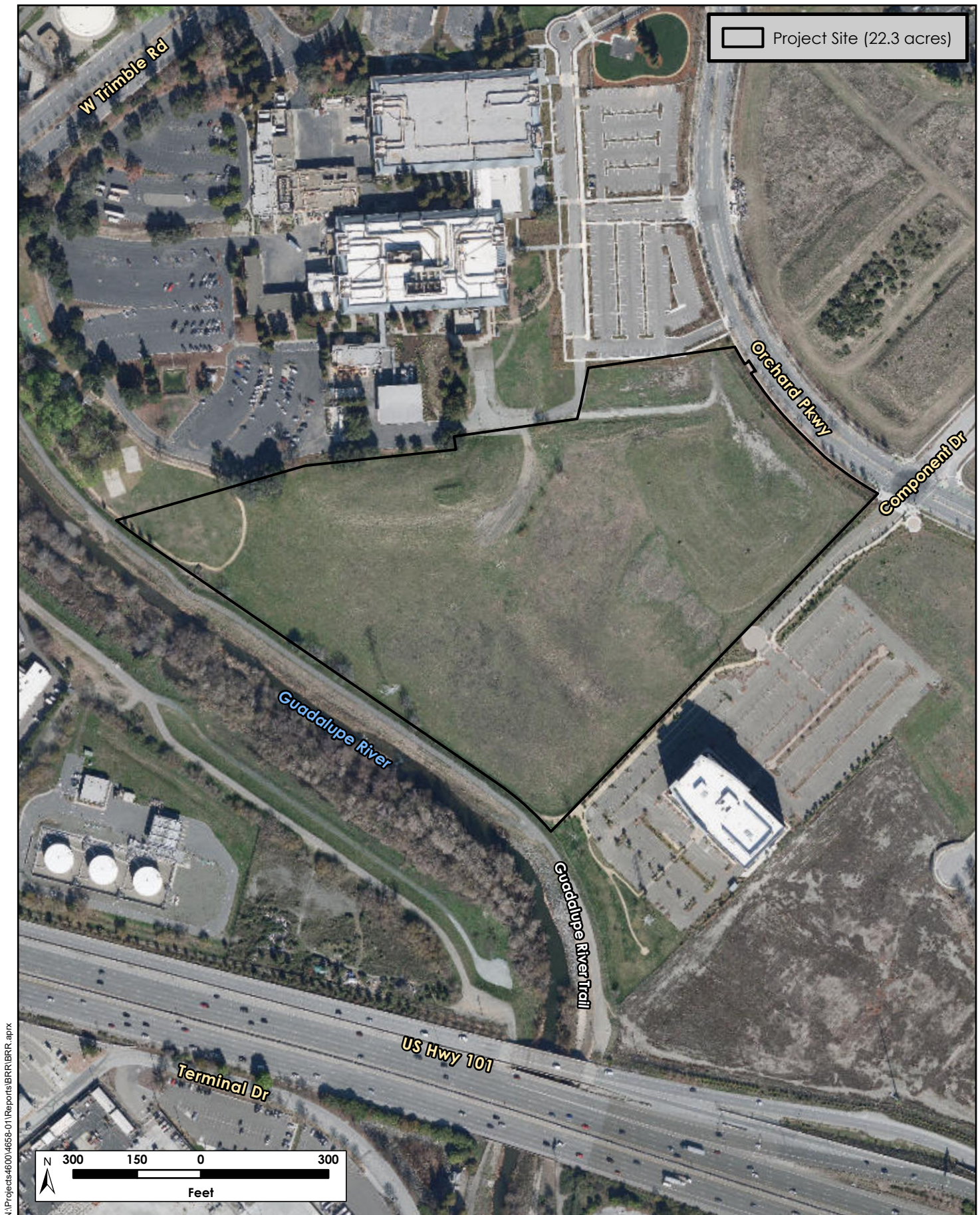


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Figure 1. Vicinity Map

Microsoft San José Data Center SJC04 and SJC06
Crotch's Bumble Bee Survey Report (4658-03)
September 2023



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Figure 2. Project Site

Microsoft San José Data Center SJC04 and SJC06
Crotch's Bumble Bee Survey Report (4658-03)
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Section 2. Methods

On June 6, 2023, the California Department of Fish and Wildlife (CDFW) issued *Survey Considerations for CESA Candidate Bumble Bee Species* (CDFW 2023). Because Crotch's bumble bee is considered a candidate for listing under the California Endangered Species Act (CESA), we incorporated components of these *Survey Considerations* into our assessment and survey methodology as applicable, and this report is organized according to the applicable components of CDFW's *Survey Considerations*.

2.1 Evaluation of Potential for Occurrence

CDFW's *Survey Considerations* recommend a review of existing occurrence information to determine the potential for occurrence of CESA candidate bumble bees in the vicinity of a project, listing the California Natural Diversity Database (CNDDDB), iNaturalist, and Bumble Bee Watch as appropriate sources of information. Prior to conducting the habitat assessment and survey on the Microsoft San José Data Center 04 and 06 project, and again prior to the preparation of this report (to obtain updated information), H. T. Harvey reviewed those databases for occurrences of Crotch's bumble bee and other CESA candidate bumble bees in the project site vicinity.

2.2 Habitat Assessment

CDFW's *Survey Considerations* recommend assessing habitat within and adjacent to a project area to determine the potential for occurrence of CESA candidate bumble bees. On July 24 and August 7, 2023, H. T. Harvey & Associates senior wildlife ecologist Steve Rottenborn, Ph.D. visited the project site to assess habitat suitability and survey for bumble bees. He walked transects throughout the entire project site and viewed adjacent areas within 100 feet of the site, looking for evidence of suitable foraging, nesting, and overwintering habitat for Crotch's bumble bee. He identified and recorded all flowering plants, including plants that were flowering and plants that had already senesced (i.e., died or dried up) for the season. He estimated the percent cover of the site occupied by flowering plants. Steve also assessed the distribution and abundance of potential nest sites, such as California ground squirrel (*Otospermophilus beecheyi*) and valley pocket gopher (*Thomomys bottae*) burrows, bunchgrasses, thatched grasses, tree cavities, old bird nests, and debris piles, and he assessed whether suitable habitat for overwintering queens was present.

2.3 Bumble Bee Surveys

Surveys for individual Crotch's bumble bees and their nests were conducted on July 24 and August 7, 2023. In accordance with CDFW's *Survey Considerations*, surveys were spaced at least 2 weeks apart, during the "Colony Active Period" of April-August, the period of highest detection probability for Crotch's bumble bee. At other Santa Clara County locations, Steve observed four Crotch's bumble bees in July 2023 and more than 30 individuals between August 5 and August 13, 2023, demonstrating that the surveys of the San José Data Center

04 and 06 project site were conducted during appropriate times for detecting Crotch's bumble bee if the species was using the site at the time.

Per CDFW's *Survey Considerations*, surveys did not start until at least one hour after sunrise and ended more than two hours before sunset, and surveys were conducted under warm (65-90°F), sunny, dry conditions when sustained winds were less than 8 miles per hour. Although CDFW's *Survey Considerations* recommend that surveys should ideally be conducted between 9:00 a.m. and 1:00 p.m., survey data from Santa Clara County indicate that Crotch's bumble bees are regularly detectable later in the afternoon. Weather conditions (temperature, sunlight, and wind) appear to be more important in determining suitable flight conditions for Crotch's bumble bee. Nevertheless, these surveys were conducted between 9:00 a.m. and 1:00 p.m. CDFW's *Survey Considerations* recommend that at least one person-hour of searching be conducted for each 3 acres of suitable habitat. Although the Microsoft San José Data Center 04 and 06 project site is approximately 22.3 acres in size, most floral resources suitable for use by Crotch's bumble bee had senesced by July, so floral resources were not abundant during the survey. As a result, it was determined that each survey would last at least 3 hours, or as long as was necessary to ensure that all floral resources within the survey area were thoroughly examined, whichever was greater.

Survey times and weather during the two surveys were as follows:

- July 24 – surveyed 09:00-12:25. At start, 65° F, mostly clear and sunny, wind 2-3 mph from north-northwest. At end, 83° F, mostly clear and sunny, wind 4-6 mph from northwest.
- August 7 – surveyed 09:35-12:35. At start, 75° F, clear and sunny, no wind. At end, 82° F, clear and sunny, no wind.

The approach used to survey for and identify bumble bees differed from CDFW's *Survey Considerations*, which focus on the capture and chilling of bumble bees for photography to survey for CESA candidates. However, the *Survey Considerations* also state, "Photos of bees on vegetation are also acceptable, but identification may be impaired by photo quality or inability to show identifying characteristics in sufficient detail." In H. T. Harvey's experience, capturing bumble bees for photography, as recommended by CDFW's *Survey Considerations*, is useful when trying to document all the bees occurring in a given area (e.g., per the California Bumble Bee Atlas project's protocol), in cases in which bumble bee surveyors lack experience with identification of all the potentially occurring bumble bee species in an area, or if the CESA candidate species in question is difficult to distinguish visually from other potentially occurring species. However, in our experience, visual/photo surveys are preferable for presence/absence assessments and would provide superior results compared to capture methods for the Microsoft San José Data Center 04 and 06 project, for the following reasons:

- Surveys of the Microsoft San José Data Center 04 and 06 project were conducted by Dr. Steve Rottenborn. On August 7, H. T. Harvey & Associates wildlife ecologist Dani Christensen was also present to look for bumble bees, although all bumble bees observed by Dani were then scrutinized and identified by Steve. Steve has spent several hundred hours surveying for and photographing bumble

bees in the south San Francisco Bay area with the intent of understanding and documenting identification, distribution, and abundance of bumble bees. In particular, he has focused on documenting Crotch's bumble bee, and to date he was observed and photographed more than 60 individuals at 11 locations in Santa Clara County since July 2022. He is proficient in identifying both Crotch's bumble bee and the few other bumble bee species that regularly occur in the County (*B. vosnesenskii*, *B. melanopygus*, and *B. fervidus*), as well as bumble bees that occur very infrequently in the County (*B. caliginosus*, *B. rufocinctus*, and *B. vandykei*).

- Of all bumble bee species that occur in Santa Clara County, Crotch's is the most easily identifiable species. All other species are at least superficially (or in some cases, extremely) similar to other species, but the color patterns of Crotch's bumble bee are, among potentially occurring species in Santa Clara County, unique to that species. When detecting Crotch's bumble bees elsewhere in the County over the past year, Steve has been able to identify this species even in flight, and prior to obtaining photos.
- Steve has become proficient in obtaining photos of foraging bumble bees. He has observed that most Crotch's bumble bees are more easily photographed than other Santa Clara County bumble bee species, as Crotch's bumble bees tend to spend more time on each individual flower, investigate more flowers on a given plant or in a patch of plants, and fly more slowly among flowers when foraging than other bees.
- As a participant in the California Bumble Bee Atlas project, a joint project of the Xerces Society and CDFW, Steve has attended several workshops on bumble bee biology, identification, and survey techniques given by the Xerces Society. He has conducted 12 bumble bee "point surveys" per Atlas protocols, capturing bumble bees and chilling them for photodocumentation. In the process, he has come to the conclusion that, while capturing bumble bees is useful in the identification of other species occurring in the region, Crotch's bumble bee may actually be more easily surveyed using visual methods, with less harassment of individuals. Any Crotch's bumble bee that is close enough to the observer to be captured with a net should be identifiable (to an experienced observer) as *B. crotchii*, whereas some Crotch's bumble bees may be beyond the reach of the surveyor (e.g., up or down a slope, or through a patch of dense vegetation) or may fly away before the surveyor can get close enough to capture it. However, such individuals may be photographed even from a distance.
- The time necessary to place captured bumble bees in vials and then in a cooler is time that could be spent looking for bumble bees. Logistically, a project site can be covered more thoroughly and efficiently if the surveyor is spending time looking for, and then briefly photographing, bees than if the surveyor has to capture and process the bees.
- As stated in the *Survey Considerations*, bees should not be kept in a cooler for more than 120 minutes. Therefore, surveys that necessitate capturing bees involve having the surveyor spend more time processing and photographing chilled bees, as opposed to continuing to move around the project site looking for bees.

- When bees are captured and chilled, the pollen they have collected in the corbiculum (the “pollen basket”) often rubs or falls off entirely during handling in the net or collection vial, thus reducing that bee’s foraging efficiency for the day.
- As stated in the *Survey Considerations*, a CESA 2081(a) Memorandum of Understanding (MOU) between the surveyor and CDFW is necessary to capture CESA candidate species, and a Scientific Collecting Permit (SCP) may be required in certain circumstances. Although California Bumble Bee Atlas project surveyors (including Steve) are listed on MOU and SCP issued by CDFW to the Xerces Society specifically for Atlas field work, those MOU/SCP authorizations do not authorize biologists to capture bees for development projects such as the Microsoft San José Data Center 04 and 06 project. Thus, relatively few individuals possess the permits necessary to capture bees in accordance with the protocol recommended by the *Survey Considerations*.

During the survey, Steve walked transects throughout the entire project site and viewed adjacent areas within 100 feet of the site, looking for bumble bees and bumble bee nests. Although most effort looking for bumble bees was spent near floral resources, transects were walked throughout the entire site to look for potential nest sites and for bumble bees flying in and out of nests. Concentrations of flowers were visited at least twice during each survey. Whenever a bumble bee was observed, every effort was made to identify and photograph the bee (to confirm the field identification and document the species involved) using a Canon digital single-lens reflex camera with a Canon 180mm macro lens.

Section 3. Findings

3.1 Potential for Occurrence

Of the four CESA candidate bumble bee species, only Crotch's bumble bee and western bumble bee (*Bombus occidentalis*) historically occurred in the south San Francisco Bay area (Williams et al. 2014, Xerces Society for Invertebrate Conservation et al. 2018). Whereas recent survey efforts have documented Crotch's bumble bees in a number of locations, as discussed below, those same efforts have not recently detected western bumble bees anywhere in the greater Bay area. Rather, the western bumble bee appears to have been extirpated from much of its former range in California, and all recent records have been from areas well north or northeast of the Bay area according to photo-documented CNDDDB (2023), iNaturalist (2023), and Bumble Bee Watch (2023) records. Therefore, no other CESA candidate bumble bee species are known or expected to currently occur in the project vicinity, and the bumble bee habitat assessment and survey for the Microsoft San José Data Center 04 and 06 project focused only on Crotch's bumble bee.

The CNDDDB (2023) contains seven occurrences of Crotch's bumble bee in Santa Clara County since 1909, though only two records are recent (since 1994) – one from Santa Teresa County Park in 2019 and another in urban San Jose in 2020. As of September 6, 2023, iNaturalist (2023) contains 10 recent occurrences (2019-2023) of Crotch's bumble bee within Santa Clara County, including the two recent CNDDDB records; three of these are from urban areas in San José. As of September 6, Bumble Bee Watch (2023) contains 18 records (some of multiple individuals) from 10 locations in Santa Clara County. Several of the records reported to CNDDDB, iNaturalist, and Bumble Bee Watch represent the same occurrences. Data from 2023 California Bumble Bee Atlas surveys, as well as incidental observations from 2023 by H. T. Harvey & Associates senior wildlife ecologist Steve Rottenborn, Ph.D., and Santa Clara Valley Water District (Valley Water) biologists, all of which will soon be submitted to Bumble Bee Watch and CNDDDB, document records of approximately 40-50 additional individual Crotch's bumble bees in Santa Clara County. Relative to the project site, the closest record to date was located approximately 3 miles from the site. Collectively, these occurrences (nearly all of which are documented by photos) indicate that Crotch's bumble bee is fairly widespread (albeit fairly scarce) in Santa Clara County, occurring in grassland and scrub habitats on either side of the Santa Clara Valley, in some urban locations, and even adjacent to the San Francisco Bay.

3.2 Habitat Assessment

The Microsoft San José Data Center 04 and 06 project site is dominated by California annual grassland. Although the site is typically mown at least once each spring or summer for fire prevention purposes (and has been managed in that manner for decades), the site had not been mown in 2023 prior to our surveys, to ensure that habitat conditions for Crotch's bumble bee could be adequately assessed. During our surveys, vegetation in the California annual grassland was 10–40 inches tall, with some patches of milk thistle (*Silybum marianum*) and bull thistle (*Cirsium vulgare*) up to 60 or more inches tall. This vegetation had a very thick thatch layer from

accumulated vegetation debris in some areas. The grassland was dominated by nonnative grasses such as wild oat (*Avena fatua*) and ripgut brome (*Bromus diandrus*), as well as weedy forbs such as milk thistle, bull thistle, Italian thistle (*Carduus pycnocephalus*), Russian thistle (*Salsola tragus*), wild radish (*Raphanus sativus*), broadleaved pepperweed (*Lepidium latifolium*), and salsify (*Tragopogon porrifolius*). Large stands of coyote brush (*Baccharis pilularis*) individuals were present in some areas. A row of red willow (*Salix laevigata*), black walnut (*Juglans hindsii*), and Fremont cottonwood (*Populus fremontii*) were present along a dirt road that extends partway from the northern project boundary southwest toward the Guadalupe River Trail. A few scattered, small individuals of other trees, including eucalyptus (*Eucalyptus* sp.), western redbud (*Cercis occidentalis*), pear (*Pyrus* sp.), and acacia (*Acacia* sp.), were present along the eastern/northeastern edge of the project site. Photos 1-4 depict site conditions during the July 24 survey (conditions were similar during the August 7 survey).



Photo 1. Looking south from the center of the project site. This photo shows the extensive grasses and more limited nature of flowering plants dominating much of the site.



Photo 2. Looking northwest from the central part of the project site. The dark brown vegetation is a dense stand of senesced milk and bull thistle.



Photo 3. Looking east-northeast from the north-central part of the project site.



Photo 4. Looking southeast at the central part of the project site.

Plants that were flowering on or within 100 feet of the project site during the two surveys included a number of species that are regularly visited by at least some South Bay bumble bee species, including hairy vetch (*Vicia villosa*), Italian thistle, bull thistle, bristly oxtongue (*Helminthotheca echioides*; Photo 5), field mustard (*Brassica rapa*), wild radish, fennel (*Foeniculum vulgare*), yellow star-thistle (*Centaurea solstitialis*; Photo 6), panicked willowherb (*Epilobium brachycarpum*), and ornamental rose (*Rosa* sp.), as well as plants that are not frequently used by foraging bumble bees, including cheeseweed (*Malva parviflora*), prickly lettuce (*Lactuca serriola*), field bindweed (*Convolvulus arvensis*), salsify, broadleaved pepperweed, red yucca (*Hesperaloe parviflora*), and white yarrow (*Achillea millefolium*). Of the plants observed on the project site during these surveys, Steve Rottenborn has seen only bull thistle and yellow star-thistle used by Crotch's bumble bees in the South Bay (based on observations of more than 60 individual Crotch's bumble bees). The majority of plants flowering during our field surveys were concentrated in the northeastern corner of the site, with a strip along the southern border and scattered plants elsewhere. Some senescence of flowering plants occurred between the July 24 and August 7 surveys, so that floral resources were of lower quality on the latter date.

Large stands of milk thistle and bull thistle, nearly all of which had senesced by the time of our surveys, were present on portions of the site. Including plants that were flowering at the time of our surveys and plants that had already senesced, we estimated that approximately 15-20% of the project site was dominated by flowers potentially useful to Crotch's bumble bees during some portion of the 2023 flight season.



Photo 5. Bristly ox-tongue in the northeast corner of the project site.



Photo 6. Yellow star-thistle in the northeast corner of the project site.

The site provides potential Crotch's bumble bee nesting sites in the form of thatched grasses and dense bases of plants, scattered pocket gopher burrows (not abundant or dense, but present in a number of areas throughout the site), two old California ground squirrel burrows (Photo 7), and soil cracks along the southern fenceline of the site. Ornamental bunchgrasses along the driveway entrance to an adjacent building at 2509 Component Parkway also provided potentially suitable nesting sites. Wintering queens take refuge in loose soil or leaf litter, and such habitat components were observed in scattered locations on the project site.



Photo 7. An inactive California ground squirrel burrow in the east-central part of the project site.

Based on the presence of suitable floral resources and habitat conditions, the project site provides potential foraging, nesting, and wintering habitat for Crotch's bumble bee. Earlier in the year, when dense, extensive milk thistle and bull thistle were flowering, the project site would have provided more floral resources than it did during the July and August surveys. During our surveys, however, foraging habitat quality was limited, as very few bull thistle plants were still in flower, and the remaining plant species that were flowering at the time are not species regularly used by Crotch's bumble bee. Rather, most Crotch's bumble bees observed by Steve Rottenborn in other South Bay locations in July and August 2023 were on narrow-leaved milkweed (*Asclepias fascicularis*), which was entirely absent from the project site. Therefore, at the time of our July and August survey, the site provided relatively low-quality foraging habitat for Crotch's bumble bees.

As mentioned above, the site was not mown in spring or summer of 2023 to better allow habitat conditions for Crotch's bumble bee to be assessed. In a typical year, when the site is mown once or more during the growing

season, floral resources for bumble bees would likely be less extensive and of even lower quality than they were in 2023.

3.3 Bumble Bee Surveys

No Crotch's bumble bees, nor any bumble bees that could potentially have been of this species, were observed during our surveys.

During the July 24 survey, 21 bumble bees of two species were observed, as follows:

- Nine yellow-faced bumblebees were observed on bristly oxtongue and one was observed on fennel (Appendix A, Photos A-1/A-2, A-3/A-4, A-7, A-9/A-10, A-11/A-12, A-15, and A-17/A-18). These individuals were likely *Bombus vosnesenskii*, which is by far the most abundant and widespread bumble bee species in the South Bay (and throughout the state of California as a whole). However, the obscure or fogbelt bumble bee (*Bombus caliginosus*) looks nearly identical to *vosnesenskii* in the field – study of the underside of the abdomen is necessary to distinguish females of the two species, and microscopic characters need to be evaluated to distinguish males. None of these features could be evaluated under the field conditions during this survey. Because *caliginosus* is much scarcer than *vosnesenskii*, with only two documented occurrences in Santa Clara County (Bumble Bee Watch 2023), and because *caliginosus* is thought to occur primarily in more mesic, fog-influenced locations, it is likely that all the yellow-faced bumble bees on the project site are *vosnesenskii*. More relevant to the purpose of this survey, all 10 of these individuals were easily distinguishable from Crotch's bumble bee, as they all had abdomens that were completely black except for a narrow band on the fourth tergite (abdominal segment), whereas Crotch's bumble bee has a broad pale band on the second tergite and usually even more extensive pale hairs on other abdominal segments. Crotch's bumble bee also averages noticeably larger than yellow-faced bumble bee.
- Seven yellow bumble bees (*Bombus fervidus*) were observed on bristly oxtongue, with one of those also using yellow star-thistle and one also using both yellow star-thistle and wild radish; an additional yellow bumble bee was observed only using yellow star-thistle. These bees, shown in Appendix A (Photos A-5/A-6, A-8, A-13/A-14, A-16, A-19/A-20, A-21/A-22, A-23/A-24, and A-25/A-26), were distinguished from yellow-faced bumble bee by the dark, rather than pale yellow, hairs on the face. Otherwise, they were similar to yellow-faced bumble bees, differing from Crotch's bumble bees by virtue of the entirely black abdomen aside from a yellow band on the fourth tergite.
- Three bumble bees were seen only in flight and could only be identified as being either *vosnesenskii* or *fervidus*. These were small bumble bees with yellow on the front of the thorax, black at the rear of the thorax, and black throughout the entire abdomen except for a narrow subterminal yellow stripe on the fourth tergite. Although seeing the faces of these bees would have been necessary to distinguish between *vosnesenskii* and *fervidus*, these individuals were easily distinguished from Crotch's bumble bee by virtue of the pattern of the abdomen.

During the August 7 survey, only two yellow-faced bumble bees (likely *vosnesenskii* rather than *caliginosus*, as described above) were observed – one on bristly oxtongue (Appendix A, Photos A-27/A-28) and one seen well in flight.

Of the 23 bumble bees observed during the survey, 16 were photographed. Photos of these bumble bees are provided for documentation in Appendix A.

No bumble bee nests were detected, and no bumble bees that were thought to be potentially nesting (e.g., seen flying into or out of areas that provided potential nest sites) were observed during the survey.

Section 4. Conclusions

The San José Data Center 04 and 06 project site provides potential foraging, nesting, and overwintering habitat for Crotch's bumble bee. There are three recent (2020-2021) records of Crotch's bumble bees from urban areas elsewhere in San José, one of which was located only 3 miles from the project site (iNaturalist 2023), and recent surveys in the South Bay have demonstrated that this species occurs more widely than was thought when the species was petitioned for listing under CESA in 2018. Therefore, there is some potential for the species to occur on the project site.

No Crotch's bumble bees were detected during surveys conducted during the peak of the species' flight season, at a time when the species was being observed at other South Bay locations, whereas 23 individuals of other bumble bee species were observed on the project site. Although the majority of higher-quality floral resources (thistles) had senesced by the time of our surveys, there were still flowers on the project site that could have been used by Crotch's bumble bees. If the species were present on the site during our surveys, it likely would have been detected using those flowers. Habitat quality for Crotch's bumble bees on the site was likely higher earlier in spring/summer, when extensive bull and milk thistles were flowering, and if Crotch's bumble bees were present in 2023 in the project vicinity, they might have used floral resources on the project site. However, in a typical year when the site is mowed once or more during spring or summer, floral resources would be less extensive and of lower quality than they were in 2023. Nothing about the floral resources, burrow density (which was fairly low), or other habitat characteristics suggested that the project site provides high-quality habitat for Crotch's bumble bee. Furthermore, the largely urban nature of the project site's surroundings suggests that Crotch's bumble bee populations in the project vicinity are likely low, if the species is present there at all. A few urban records of the species are among the recent documented occurrences in the South Bay, but the vast majority of Crotch's bumble bee records are from areas with much more extensive natural grassland and scrub (Bumble Bee Watch 2023, iNaturalist 2023).

In conclusion, although occurrence of Crotch's bumble bee on the project site cannot be ruled out, there is no evidence that the project site supports the species, or high-quality habitat for the species.

Section 5. References

Bumble Bee Watch. 2023. <https://www.bumblebeewatch.org/>

[CDFW] California Department of Fish and Wildlife. 2023. Survey Considerations for CESA Candidate Bumble Bee Species. June 6.

[CNDDB] California Natural Diversity Database. 2023. Rarefind 5. California Department of Fish and Wildlife. <https://apps.wildlife.ca.gov/rarefind/view/RareFind.aspx>

iNaturalist. 2023. https://www.inaturalist.org/observations?place_id=any&subview=map&taxon_id=271451

Williams, P.H., R.W. Thorp, L.L. Richardson, and S.R. Colla. 2014. Bumble bees of North America. Princeton University Press.

Xerces Society for Invertebrate Conservation, Defenders of Wildlife, and Center for Food Safety. 2018. A petition to the State of California Fish and Game Commission to list the Crotch bumble bee (*Bombus crotchii*), Franklin's bumble bee (*Bombus franklini*), Suckley cuckoo bumble bee (*Bombus suckleyi*), and western bumble bee (*Bombus occidentalis occidentalis*) as endangered under the California Endangered Species Act.

Appendix A. Bumble Bee Photos Taken During Project Site Surveys



Photo A-1. Female yellow-faced bumble bee on bristly oxtongue. July 24, 2023



Photo A-2. Female yellow-faced bumble bee on bristly oxtongue (same individual as in A-1). July 24, 2023



Photo A-3. Female yellow-faced bumble bee on bristly oxtongue. July 24, 2023



Photo A-4. Female yellow-faced bumble bee on bristly oxtongue (same individual as in A-3). July 24, 2023

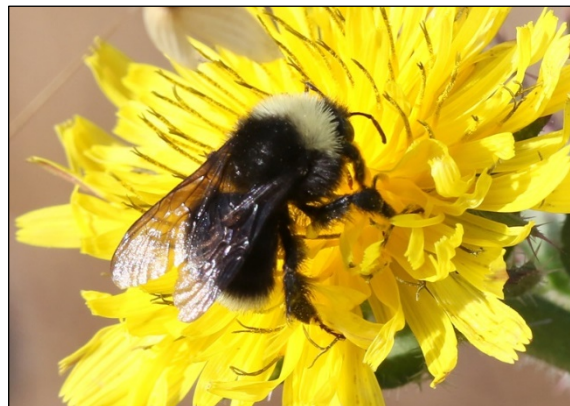


Photo A-5. Female yellow bumble bee on bristly oxtongue. July 24, 2023



Photo A-6. Female yellow bumble bee on bristly oxtongue (same individual as A-6). The dark, rather than pale, hairs on the face distinguish this species from yellow-faced bumble bee. July 24, 2023



Photo A-7. Female yellow-faced bumble bee at bristly oxtongue. July 24, 2023



Photo A-8. Female yellow bumble bee on bristly oxtongue. July 24, 2023



Photo A-9. Female yellow-faced bumble bee on bristly oxtongue. July 24, 2023

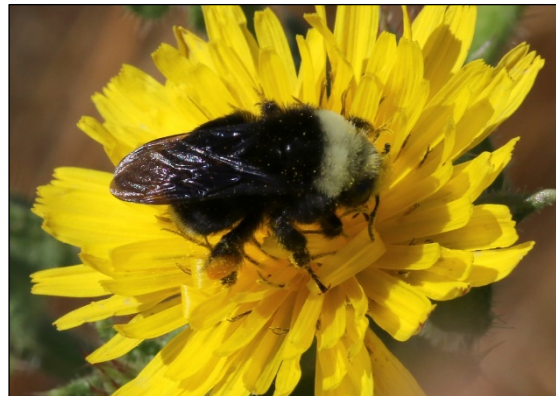


Photo A-10. Female yellow-faced bumble bee on bristly oxtongue (same individual as in A-9). July 24, 2023



Photo A-11. Female yellow-faced bumble bee on bristly oxtongue. July 24, 2023



Photo A-12. Female yellow-faced bumble bee on bristly oxtongue (same individual as in A-11). July 24, 2023



Photo A-13. Male yellow-bellied nectar bee on bristly ox-tongue. July 24, 2023



Photo A-14. Male yellow-bellied nectar bee on bristly ox-tongue (same individual as in A-13). July 24, 2023

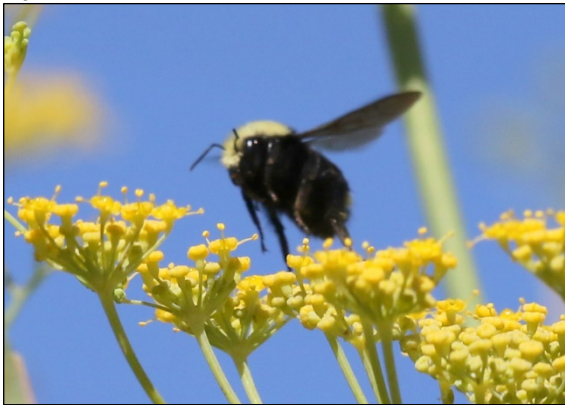


Photo A-15. Yellow-faced bumble bee on fennel. July 24, 2023



Photo A-16. Female yellow-bellied nectar bee on bristly ox-tongue. July 24, 2023



Photo A-17. Female yellow-faced bumble bee on bristly ox-tongue. July 24, 2023



Photo A-18. Female yellow-faced bumble bee on bristly ox-tongue (same individual as in A-17). July 24, 2023



Photo A-19. Female yellow bumble bee on bristly oxtongue. July 24, 2023

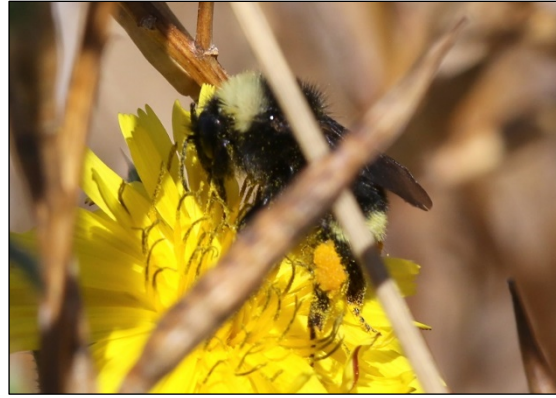


Photo A-20. Female yellow bumble bee on bristly oxtongue (same individual as in A-19). July 24, 2023



Photo A-21. Female yellow bumble bee on yellow star-thistle. July 24, 2023



Photo A-22. Female yellow bumble bee on yellow star-thistle (same individual as in A-21). July 24, 2023



Photo A-23. Female yellow bumble bee on yellow star-thistle. July 24, 2023



Photo A-24. Female yellow bumble bee on yellow star-thistle (same individual as in A-23). July 24, 2023



Photo A-25. Female yellow bumble bee on bristly oxtongue. July 24, 2023



Photo A-26. Female yellow bumble bee bristly oxtongue (same individual as in A-23). July 24, 2023



Photo A-27. Male yellow-faced bumble bee on bristly oxtongue. August 7, 2023



Photo A-28. Male yellow-faced bumble bee on bristly oxtongue (same individual as in A-27). August 7, 2023