



Volcanic Impacts on Honey Bees and Guidelines for Beekeepers: Plan “Bee”

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The lower Puna eruption on the Big Island began on May 3, 2018, in Kīlauea's East Rift Zone. To date, over 20 fissures have erupted lava fountains into the Leilani estates subdivision with lava flows affecting many others, destroying hundreds of homes and displacing thousands of residents. The region surrounding this most recent eruption also has high value for agriculture: in addition to producing approximately 90% of the state's papayas, it is critical for beekeepers and honey production. Apiaries in the eastern and southern areas of the Big Island that are outside of the immediate eruption zone yet are still experiencing poor air quality from vog may be impacted as well.

Soils of volcanic origin have high potential for agricultural production, and for successful production these areas have need of pollination services. Despite this, very little research has been conducted investigating the indirect effects of volcanic eruptions on honey bees; instead, nearly all is focused on the direct effects of ash. In laboratory studies, volcanic ash interferes with the waxy components of the honey bees' exoskeleton, leading to dehydration.¹ If you think about the exoskeleton like a suit of plate armor, the plates can get ash particles caught between them, which lacerates their sensitive membranes

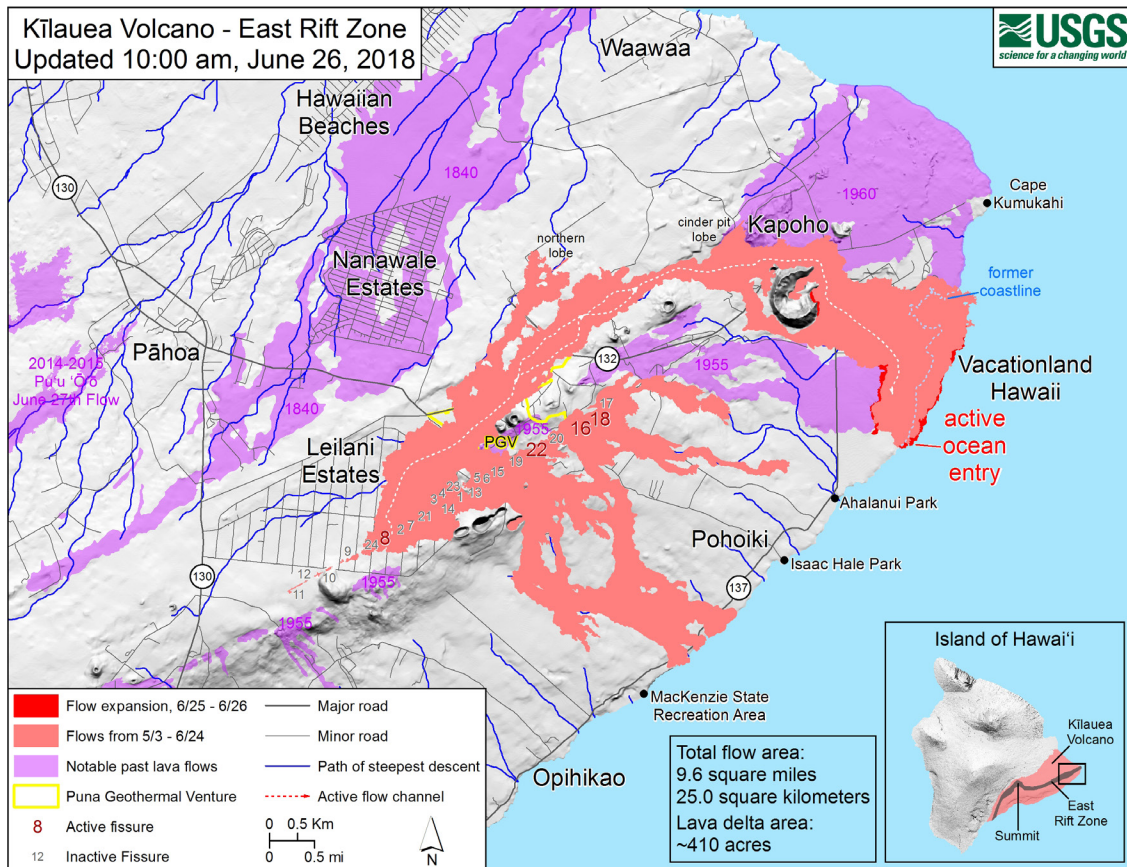


A Big Island apiary experiencing vog and ash fallout from the lower Puna eruption. Photo by Eli Isele.

and impedes the workers' ability to fly.^{1,2} Honey bees do not appear to avoid ash-contaminated food resources,³ and ingestion of ash particles is hypothesized to damage their digestive systems and ultimately reduce survival.⁴ To date, no research has been published evaluating the effects of volcanic gases on honey bees directly, or the effects on honey bee products such as honey, wax, or pollen in terms of human consumption.

Based on the limited information available, recommendations to Big Island beekeepers are focused on mitigating risks associated with ash and potentially hazardous gas exposure. If possible, transporting

colonies to more favorable areas is strongly recommended. If this is not possible, you can discourage foraging on contaminated flowers by reducing or sealing hive entrances and providing supplemental nutrition in the form of sugar water and protein supplements. Offering previously collected local pollen as a patty may also be beneficial. These should not be considered long-term solutions, though, and moving colonies to less impacted areas should be prioritized. Trade winds have mostly kept the vog plume out at sea, but should this change, neighboring islands (Maui and Lana'i) may experience unsafe vog conditions. These will likely be short term,



Lava flow map (USGS).



Fissure 8 erupting, and fissures 16 and 18 emitting ash and sulfur gases over Leilani Estates. Photo by USGS (public domain, <https://www.usgs.gov/news/k-lauea-volcano-erupts>).

and beekeepers on these islands should not need to take further safety precautions.

For further emergency resources, please visit <https://cms.ctahr.hawaii.edu/ER>.

References

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