Phenology observations at Sands Ranch, Arizona, 2021

Executive Summary:

From June to October 2021, two volunteers from Borderlands Restoration visited Sands Ranch on an approximately weekly basis to make observations of flowering timing of *Agave palmeri*. This was the third consecutive year where these data were collected at Sands Ranch. This data collection is part of an ongoing effort by the USA National Phenology Network, Flowers for Bats, to provide information about changing flowering timing of nectar sources of the lesser long-nosed bat, *Leptonycteris yerbabuenae*. The observers collected 300 observations on 3 patches of plants and recorded both presence of flower buds and open flowers as well as the peak in flowering timing.

2021 Project Activities:



As part of the post-delisting process for the lesser long-nosed bat (*Leptonycteris yerbabuenae*) the U.S. Fish and Wildlife Service created a postdelisting monitoring plan that proposes two primary components to monitor the status of the lesser long-nosed bat: continued roost occupancy and threats monitoring, and an assessment of forage availability through phenology and distribution monitoring of lesser long-nosed bat forage resources.

The USA National Phenology Network (USA-NPN) is partnering with the USFWS to implement the forage monitoring portion of the lesser long-nosed bat post-delisting monitoring plan. The data collected will help the USFWS track changes in the phenology of important lesser long-nosed bat forage species and evaluate the potential effects of climate change on forage species. For more information about Flowers for Bats, as well as a detailed description of our methods, please view the *Lesser long-nosed bat* (Leptonycteris yerbabuenae) forage phenology monitoring protocol available at fws.usanpn.org/flowersforbats.

A number of organizations across southern Arizona are partnering with the USA-NPN in this effort to collect flowering phenology data, including the organization Borderlands Restoration. In 2021, for the third consecutive year, one Flowers for Bats volunteer observer with Borderlands Restoration, John Hughes, visited Sands Ranch to monitor flowering of *Agave palmeri*. He was accompanied on most trips by Laura Cleveland, who assisted with observations. John noted that in general, the number of flower stalks was less in 2021 in the previous two years, perhaps due to prolonged drought and practically nonexistent 2020-21 winter rains. There were several stalks that aborted flower buds before the flowers opened. John also noted two agave that sent up flower stalks at the end of the season in October.

John and Laura collected 300 observations over the period of June 6th to October 11th using a combination of binoculars and the naked eye. They monitored 3 separate patches of agaves, one in each of the red circled areas on the map below. They estimated that the peak in number of agaves flowering was N = 19 for Patch 1 on August 9th, N = 13 for Patch 2 on June 21st, and N = 21 for Patch 3 on July 5th.



Figure 1, below, displays the days on which an observation was recorded for the various phenophases, or life cycle stages of *A. plameri* at Sands Ranch. Colored lines indicate that the phenophase was observed, gray lines indicate that the phenophase was looked for, but the phenophase was not occurring. Across all patches, flower buds were present as of June 7th, and flowers opened on June 21st. The last date of open flowers was recorded on October 4th.



Figure 2, below, displays the magnitude of the phenological stage by showing the proportion of yes records reported for flowers or flower buds and open flowers across *Agave palmeri* patches at Sands Ranch.



USA National Phenology Network, www.usanpn.org

In addition to phenophase status, the intensity of the phenophase was also recorded as a percent of flowers open. For patches with multiple flower stalks, the percentage was averaged for all plants across the patch. Patch 1 and Patch 2 peaked on September 27th and Patch 3 peaked between August 9th and October 4th.







Photo by John Hughes showing multiple *Agave palmeri* with flower buds.





Photo by John Hughes showing open flowers on Agave palmeri.

Photo by Laura Cleveland showing John Hughes next to a large *Agave palmeri* that did not flower in 2021.





Photo by John Hughes showing a late emerging flower stalk of *Agave palmeri*.



Photos by John Hughes show a diversity of wildflowers and wildlife viewed at Sand Ranch in 2021.