Phenology observations at Sands Ranch, Arizona, 2020

Executive Summary:

From June to September 2020, two volunteers from Borderlands Restoration visited Sands Ranch on an approximately weekly basis to make observations of flowering timing of *Agave palmeri*. 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 271 observations on 3 patches of plants and recorded both presence of flower buds and open flowers as well as the peak in flowering timing.

2020 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 post-delisting 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 2020, 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 and Laura collected 95 observations over the period of June 3rd to September 28th 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 on August 19th was N = 87 for Patch 1, N = 233 for Patch 2, and N = 98 for Patch 3.
Figure 1, below, displays the days on which an observation was recorded for the various phenophases, or life cycle stages of *A. palmeri* 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 3rd, and flowers opened on June 22nd. The last date of open flowers was recorded on September 28th.

![Figure 1: Days of Observation for Various Phenophases](image1)

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.

![Figure 2: Proportion of Yes Records](image2)
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 peaked on September 7th and again on September 28th, Patch 2 first peaked on September 7th and Patch 3 peaked on August 24th.
Photo by John Hughes showing an *Agave palmeri* with flower buds.
Photo by John Hughes showing a close-up of *Agave palmeri* flower buds.
Photo by John Hughes showing Laura Cleveland next to an *Agave palmeri* with flower buds and open flowers.
Photo by John Hughes showing a hummingbird on top of *Agave palmeri* seed pods.
Photo by John Hughes showing an antelope jackrabbit at Sands Ranch.