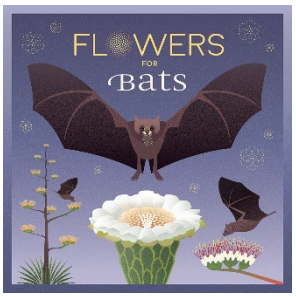
# Phenology observations at Sands Ranch, Arizona, 2024

**Executive Summary**:

From late May to mid-October 2024, one volunteer from Borderlands Restoration visited Sands Ranch on an approximately weekly basis to make observations of flowering timing of *Agave palmeri*. This was the sixth 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 observer collected 321 observations on 3 patches of plants and recorded both presence of flower buds and open flowers as well as the peak in flowering timing.

**2024 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.

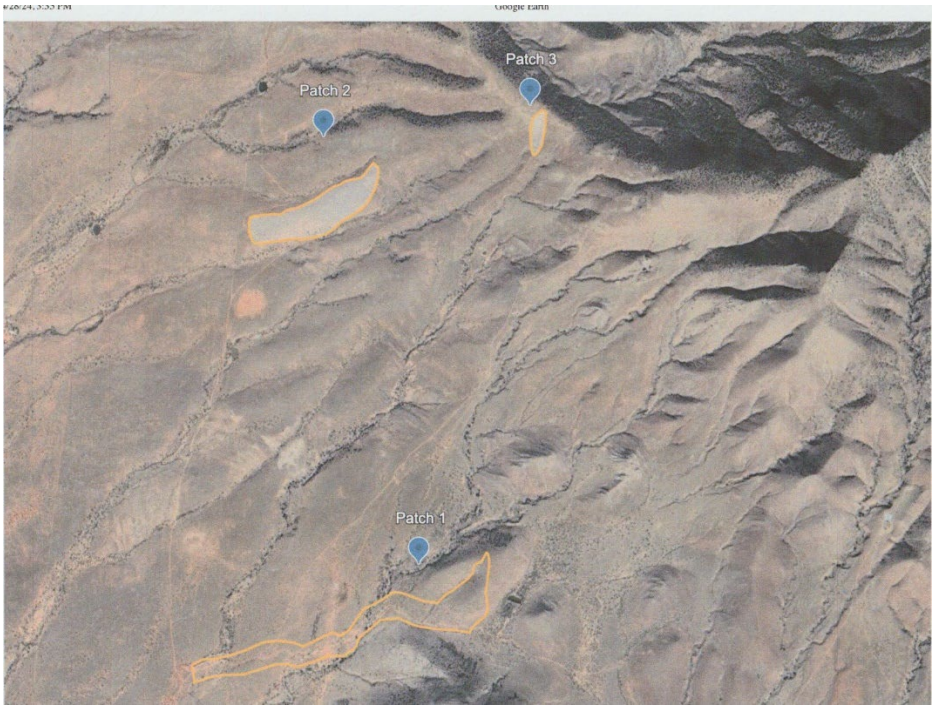
The USA National Phenology Network (USA-NPN) is partnering with the USFWS to implement the forage monitoring portion of the lesser long-nosed bat post-delisting monitoring plan. The data collected will help the USFWS track changes in the phenology of important lesser long-nosed bat forage species and 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 2024, for the sixth consecutive year, one Flowers for Bats volunteer observer with Borderlands Restoration, John Hughes, visited Sands Ranch to monitor flowering of *Agave palmeri*.

John collected 321 observations over the period of May 27th to October 14th using a combination of binoculars and the naked eye. He monitored 3 separate patches of agaves, indicated on the map below.



Report compiled by Erin Posthumus, USA-NPN Partnerships & Projects Manager, May 9th, 2025.




Here is John's account of his field season at Sands Ranch:

The Sands Ranch Conservation Area had high *Agave palmeri* production in 2024. Patch 3 once again had the highest concentration of agave, followed by Patch 2 with Patch 1 having the least number of plants. Late winter, early spring rains may have contributed to the noted abundance. Patch size and location remained unchanged from last year. The winter of 2024-2025 was very dry and it will be interesting to observe whether the agave will flower in the same abundance as the previous two years.

Patch 2 experienced the highest early season predation again. While on site at Patch 2, I observed a large Hereford bull consuming one of the agave stalks. Predation occurs early in the cycle as the primary stalk emerges. Once the stalks reach a certain height the cattle leave them alone. Predation appears opportunistic, as it occurs most where cattle are abundant. Despite their numbers, cattle do not consume all the stalks available. Being on the area early, I was able to note that sample size increased on Patches 1 and 3 between May 27th and June 2nd, while the sample size dropped 17% on Patch 2, due to predation. Notably, Patch 1 and 2 sample sizes stabilized by mid-June, but Patch 2 saw a surge of new starts until the end of June. Predation had slowed by this point. The data from Patch 2's late-season plants were used for the final collection.

Summer rains were rare, and winter/spring rains almost non-existent. Observing their impact on *Agave palmeri* abundance this season will be interesting.

Thank you for allowing me to roam the area observing agave phenology and other plant and animal life in the area.

**Data Summary:**

John estimated that the peak in number of agaves flowering was N = 52 for Patch 1 on June 26$^{th}$, N = 80 for Patch 2 on July 8$^{th}$, and N = 101 for Patch 3 on June 17$^{th}$.

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 already present at the first site visit on May 27th, and flowers opened on June 24th. The last date of open flowers was October 7th.

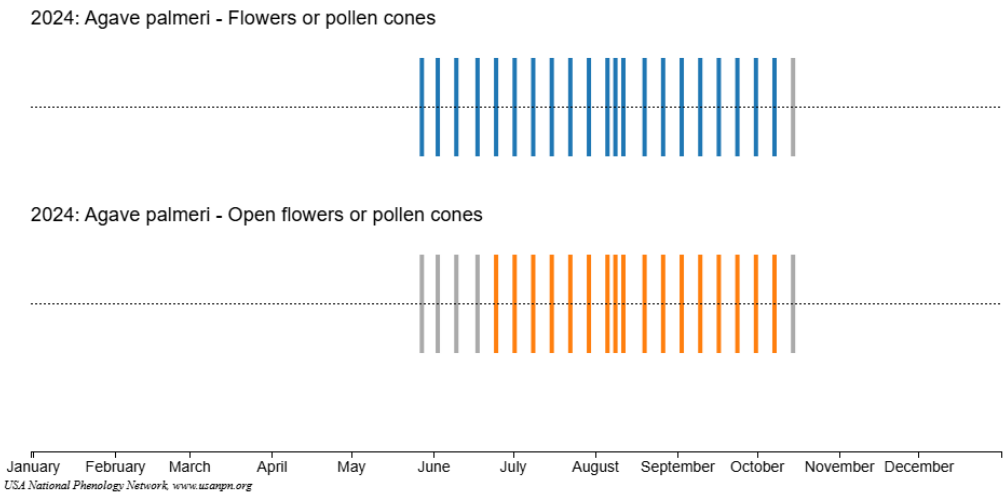
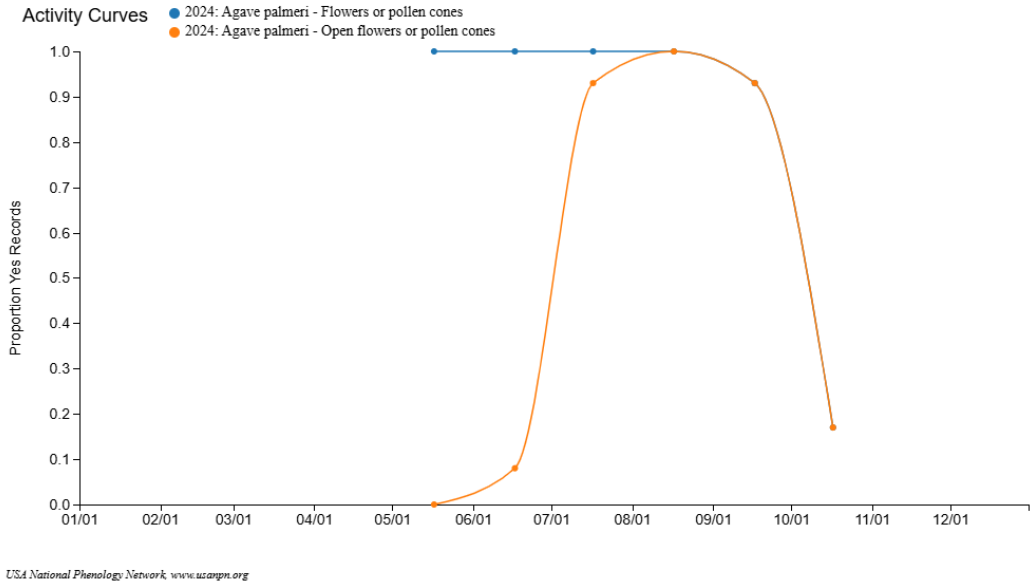
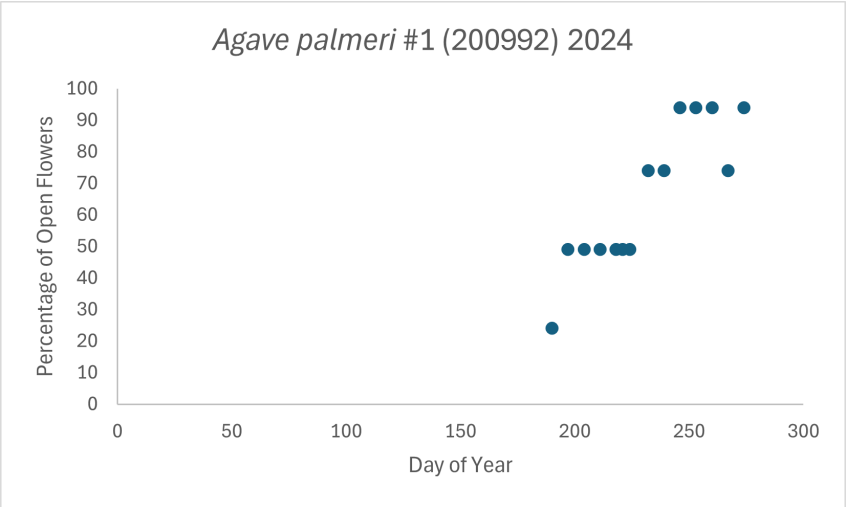


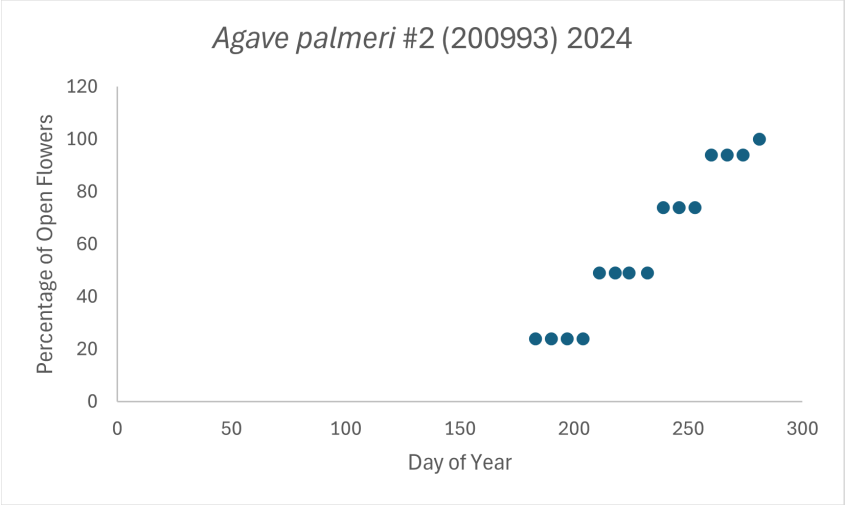

Figure 2, below, displays the magnitude of the phenological stage by showing the proportion of yes records reported for flowers or flower buds and open flowers across *Agave palmeri* patches at Sands Ranch.

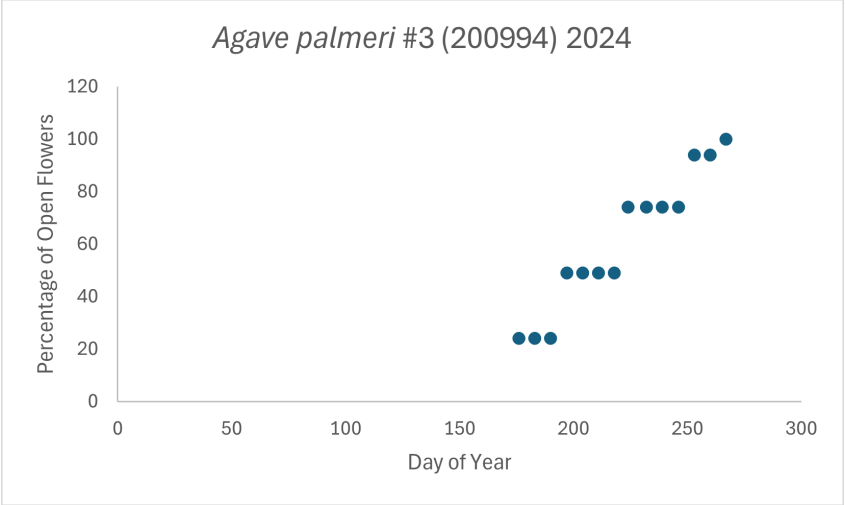



In addition to phenophase status, the intensity of the phenophase was also recorded as a percent of flowers open. For patches with multiple flower stalks, the percentage was averaged for all plants across

the patch. Figures 3, 4, and 5 below show Patch 1 peaked on September 3rd and Patch 2 peaked on October 8th and Patch 3 peaked on September 24th.

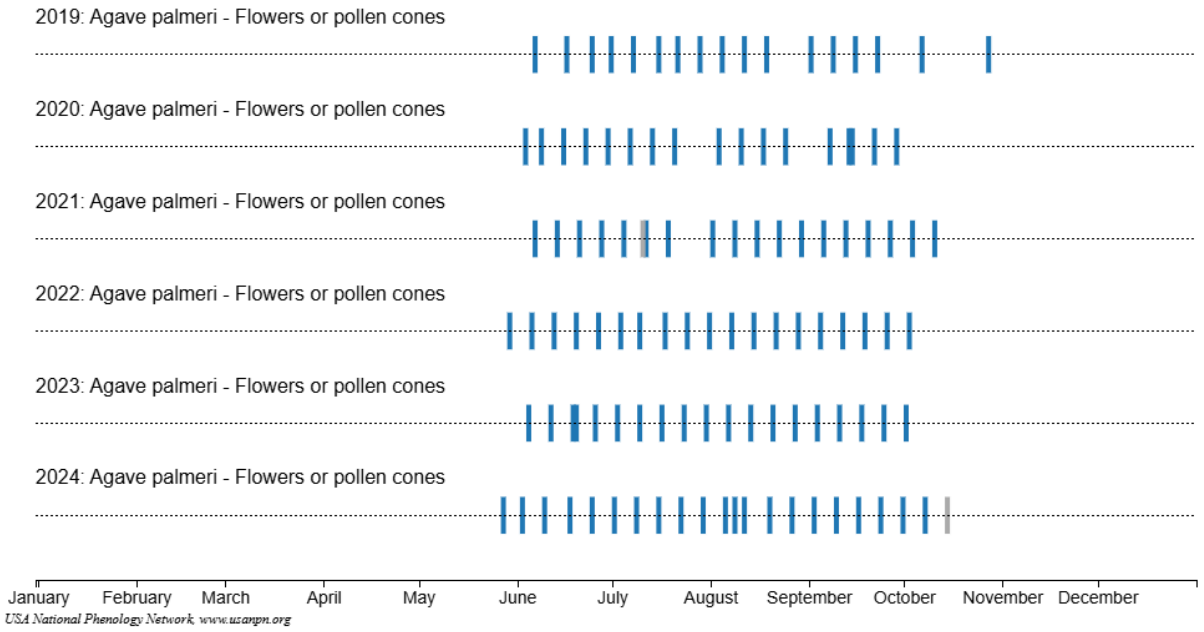



As we have six years of data collection, we can start to look at patterns in the data over these years. Figures 6 and 7 below shows that over the past six years, flower buds were present in either the last

week of May or first week of June, while open flowers started in mid to late June. Flowering has lasted through mid to late October in all six years.



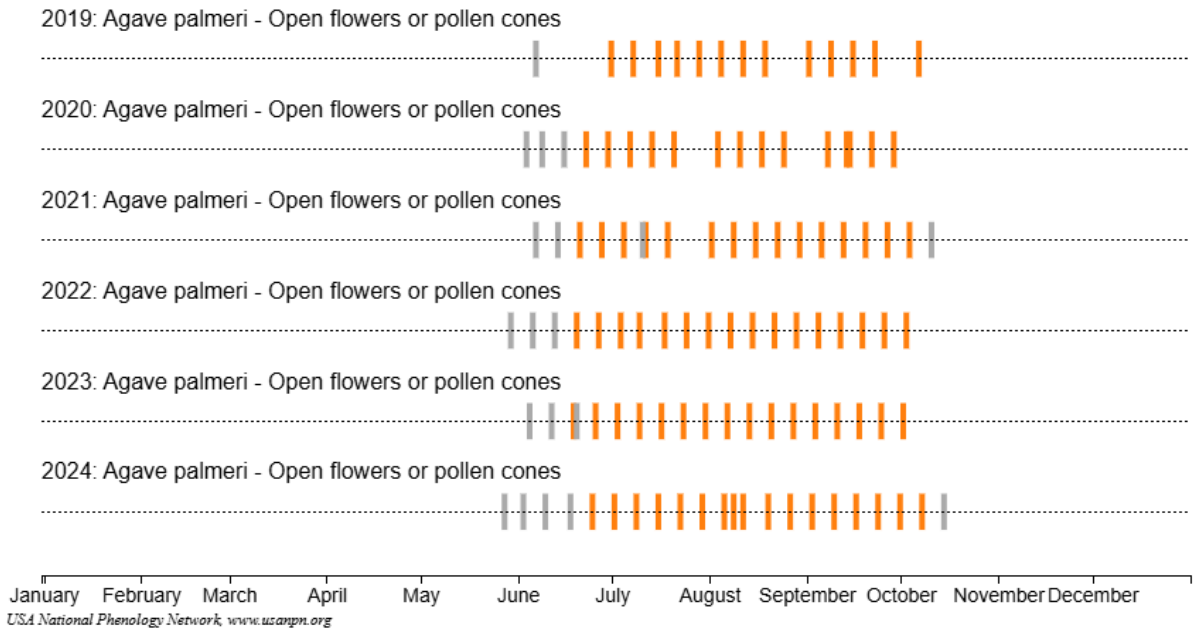




Figure 7 below shows the proportion of yes records for open flowers peaked at a similar time in mid-June in 2020, 2022, and 2023, but several weeks later in 2019, 2021, and 2024.

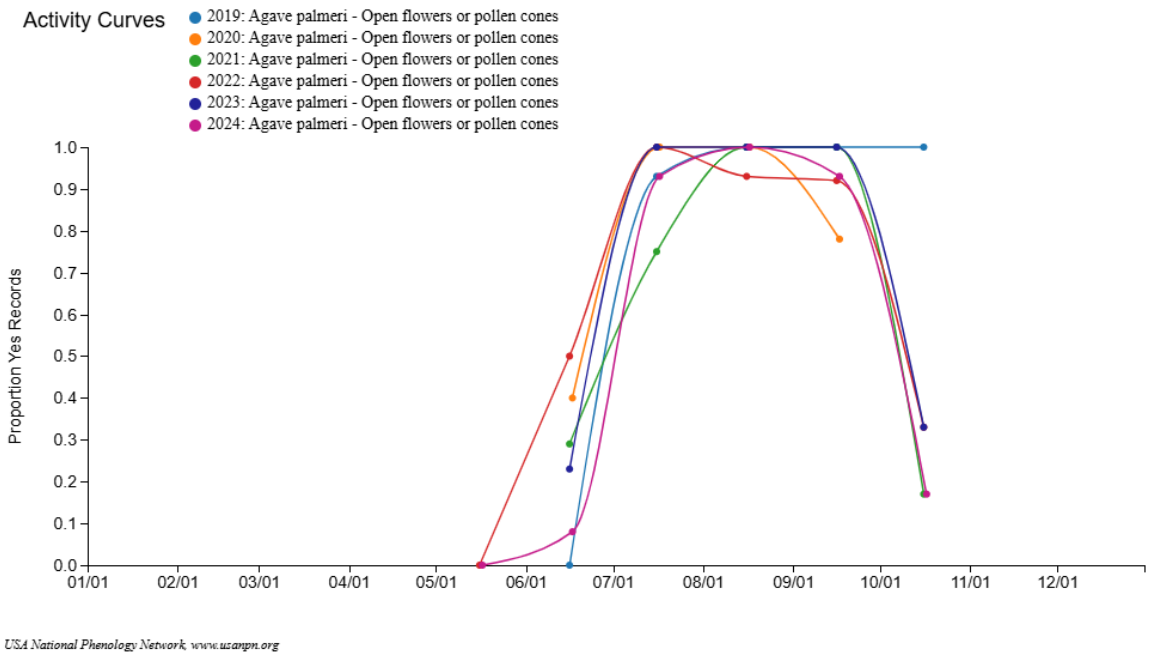



Photo by John Hughes showing a close-up of *Agave palmeri* flower buds just starting to open.

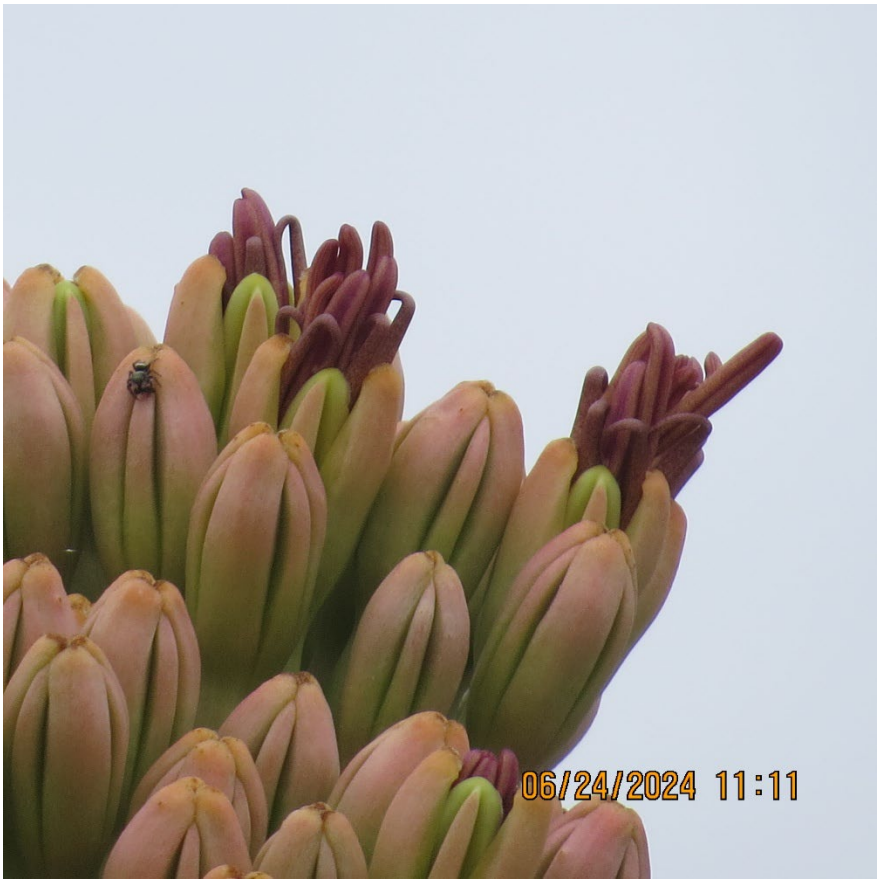


Photo by John Hughes showing a cow eating an emerging *Agave palmeri* flower stalk.


Photos by John Hughes showing several bird species using *Agave palmeri* as perches. From top to bottom: Scott's Oriole, Ash-throated Flycatcher, Ladder-backed Woodpecker, Cassin's Kingbird, Red-tailed Hawk, and Cactus Wren.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