

BASELINE PHENOLOGICAL PATTERNS OF:

AGAVES & OCOTILLOS

VEGETATION RESPONSE TO RAIN EVENTS

THE PLANTS:



Palmer's Agave, *Agave palmeri*

Agave

- A critical source of nectar for migrating Lesser-Long Nosed Bats
- A succulent that grows 1.5–3.5 ft in height, with leaves 14–32 inches long and 2–5 inches wide. The leaves have teeth on the edges.
- Produces one flowering stock in entire lifetime, reaches up to 20 ft tall.

Ocotillo

- A critical source of nectar for migrating Hummingbirds
- A spiny shrub that grows 20 ft in height, with many long, unbranched arms coming from the base. These arms produce leaves after rain events.
- Tight cluster of red flowers at the tip of each branch.



Ocotillo, *Fouquieria splendens*

THE PROJECT:

Who: The University of Arizona, the USA-National Phenology Network (USA-NPN), and the National Park Service (NPS)

What: A study to determine if forage resource availability is significantly effected by environmental change. A significant effect would mean that bat occupancy periods are out of sync with forage plant flowering phenology.



Ocotillo flower buds, one open flower

Where:

Coronado National Memorial, Chiricahua National Monument, and the Fort Bowie Historic Site (SE Arizona)

When:

August 2018 – April 2021



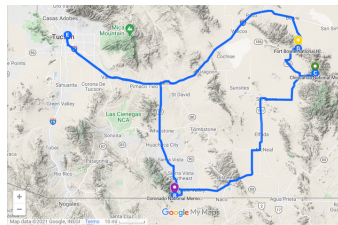
Lesser Long-Nosed Bat pollinating an Agave blossom

Why: Ocotillos and agaves both bloom at the exact time as the migration of their respective pollinators, hummingbirds and the Lesser Long-Nosed Bat. However, climate change is causing changes in rain event frequency, timing, and intensity. A baseline of vegetation response data will inform future research into the nature of these changing relationships.

THE DATA:

Data Collection Process:

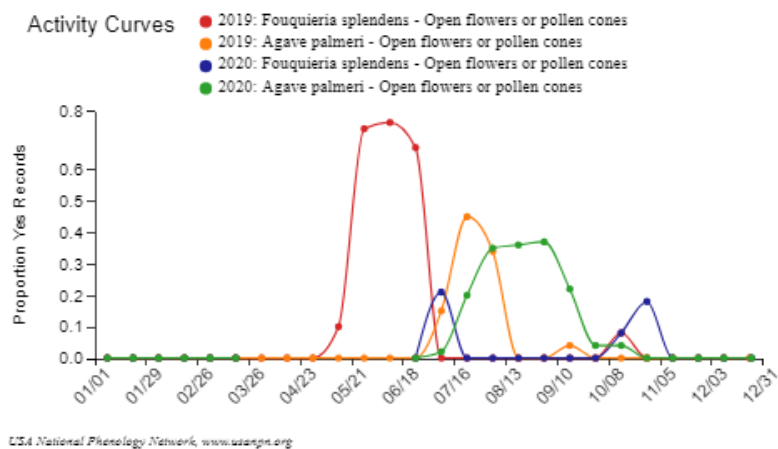
- Phenology data was collected every week for nearly 3 years.
 - Flowers (buds visible growing or open flowers) and Fruits (seeds, ripe, recently fallen)
 - Laves (Ocotillo only)
 - Volumetric Water Content (VWC) of the soil
 - Repeat photography of each individual plant
- Using the USA-NPN's Nature's Notebook app, phenological traits were recorded and stored in a database.



Weekly route taken by field technicians to collect data

Reviewing the Data:

- Phenology: the study of periodic events in biological life cycles and how these events change in response to climate events
- Preliminary Results:
 - The data from 2019 and 2020 shows variation in *F. splendens* and *A. palmeri* bloom time and magnitude.
 - 2019 and 2020 *F. splendens* blooms were very low in the fall, since the summer monsoons were very minimal.
 - 2020 *A. palmeri* bloomed all summer, but in lower proportions than in 2019 due to drought.



THE FUTURE:

The data collected in this study will be used by the U.S. Fish and Wildlife Service to inform future management decisions for the conservation and protection of the Lesser Long-Nosed Bat. However, now that the data set exists, it can be used for any number of environmental studies, from plants to animals and beyond!



Want to Help?

You can collect similar data for plants all around you! USA-NPN's *Nature's Notebook* app allows individual observers to track seasonal changes in plants and animals that you see every day! The data you collect could help scientists maintain complex ecological relationships, like the one between agaves and the Lesser Long-Nosed Bat!



THIS PROJECT WAS MADE POSSIBLE THROUGH THE COOPERATION OF:

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