# Impacts of Precipitation on Density & Diversity of Wildflowers in the Sonoran Desert

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## Introduction:

- Variation in environmental aspects usually explains heterogeneity in abundance and species richness (Pickett & Cadenasso, 1995).
- Spatial variation, for example, in the amount of rainfall that is received around Phoenix might lead to heterogeneity of wildflower communities around the city.
- This study will focus on revealing whether the amount of rainfall received influences the types of wildflowers that are most prevalent in the Sonoran Desert.

## Goal:

- In this study, we explored how the quantity of precipitation relates to the density and diversity of wildflowers in the Sonoran Desert.

## Methods:

- Three belt transects at three different sites were created. The sites we surveyed were: ASU West campus, Lake Pleasant, and Dreamy Draw park. These locations were chosen based on their differences in precipitation.
- ASU West had 8.00 cm of rain, Dreamy Draw had 6.40 cm of rain, and Lake Pleasant had 10.59 cm of rain over the period of December 31st, 2018 to March 1st, 2019, the season of wildflower growth.
- Each transect was 50 meters long and 2 meters wide. Data were recorded from 25 individual plots on the transect. Each plot was 2 meters by 2 meters.
- The frequency of each wildflower species was recorded for each individual plot.

## Map of sites surveyed:

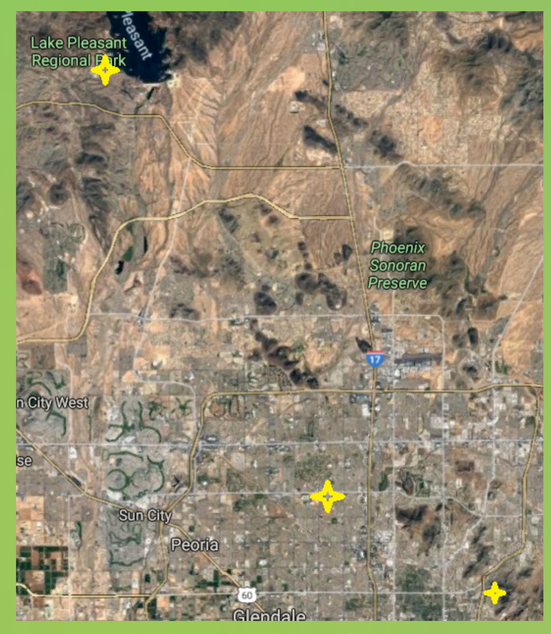


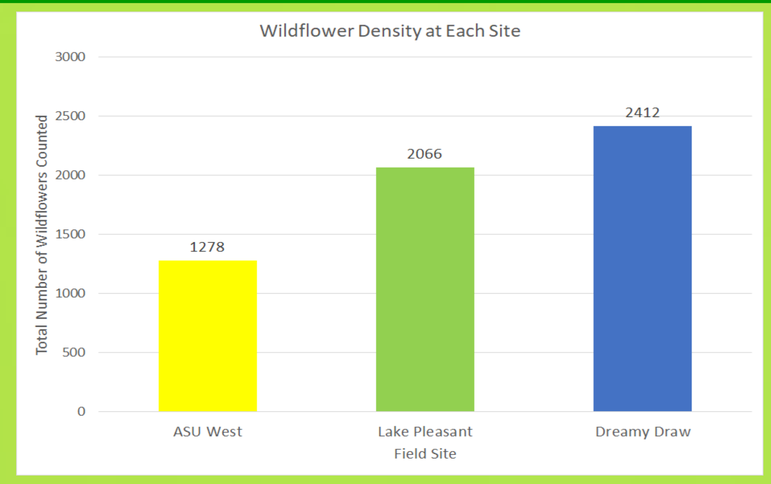

Photo credited to Google Earth

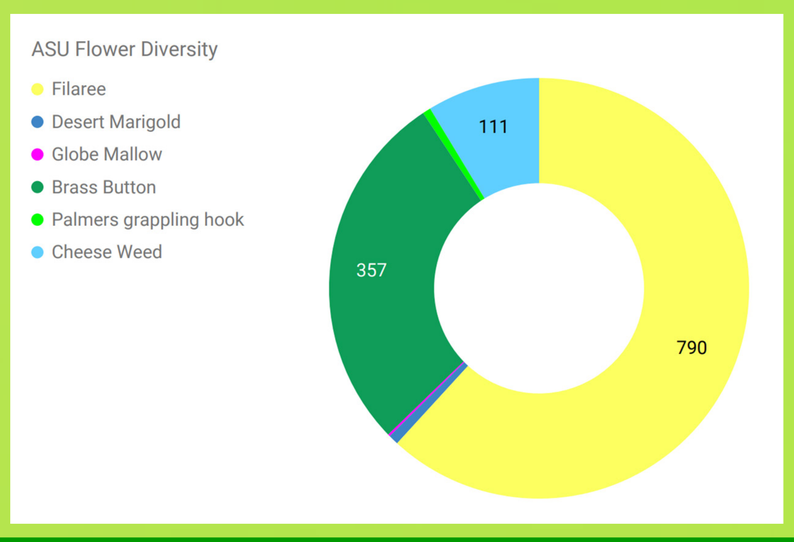
## Research Questions and Hypotheses:

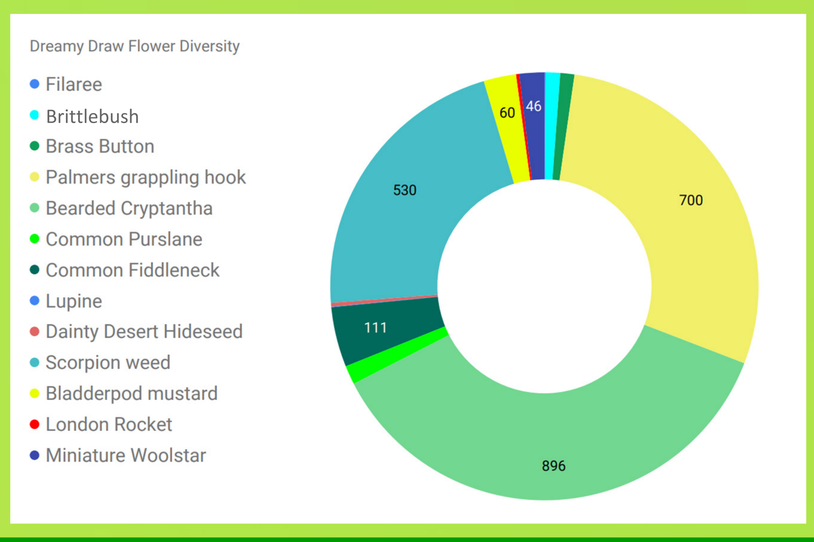
This study aims to address one question: How does wildflower density and diversity in the Sonoran Desert respond to different quantities of rain? The hypothesis that this study will focus on is: If there is more precipitation, then there will be a greater density and diversity of wildflowers.

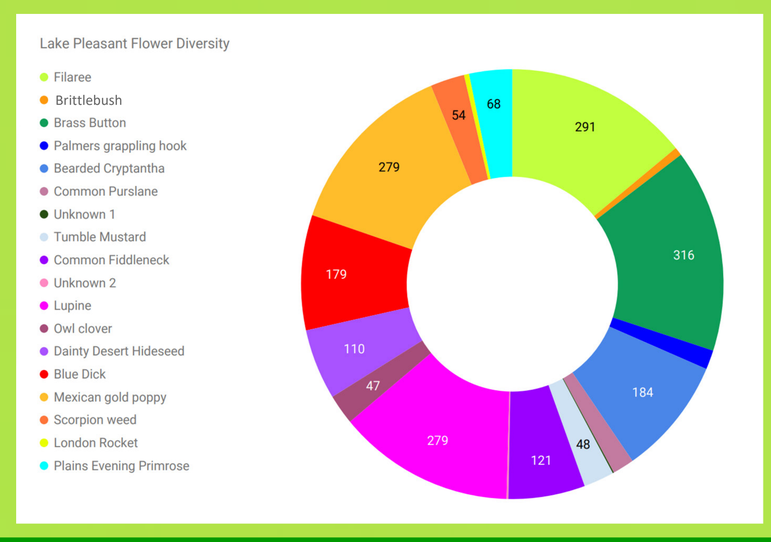
## Results:

Dreamy Draw had received the least amount of precipitation among the three sites, 6.40 cm, but it had the greatest density of wildflowers. The location with the least density of wildflowers was Arizona State University West campus which had received 8.00 cm of precipitation. The site that received the largest amount of precipitation was Lake Pleasant, and this location had an intermediate wildflower density. At Arizona State University, the most common wildflower species were Filaree and Brass Buttons. For Dreamy Draw, the most prevalent species were Bearded Cryptantha, Palmers Grappling Hook, and Scorpion Weed. At Lake Pleasant, the four most prevalent species were Filaree, Brass Button, Lupine, and Mexican Gold Poppy. In terms of diversity, Lake Pleasant had the highest number of individual species. The site with the least number of individual species was Arizona State University West campus.




## Discussion:

We were unable to support our hypothesis stating that areas with less precipitation would yield lower wildflower density; as evidenced by Dreamy Draw, the driest site, having the greatest volume of flowers yet the lowest precipitation value. Interestingly enough, the diversity of the wildflowers at that site seemed to be in the middle. The ASU campus, the intermediate precipitation site, had the lowest diversity but it did not have the least amount of rainfall; this observation did not support our hypothesis either. Possible reasons for which our hypotheses were not fully supported could be differences in location. For example, the field site at Lake Pleasant was within close proximity to a lake. Furthermore, Dreamy Draw was also in close proximity to a dam. These two sites were close to water, had a similar topography (uneven terrain; mountainous), and both had a relatively high species richness. The field site at Arizona State University West campus was relatively flat and had no nearby bodies of water. Therefore, during rainfall events, this site has the most potential for water runoff. These characteristics could explain why this field site had the lowest wildflower density and diversity. Another significant difference with Arizona State University West campus is that this location has been subjected to a substantial amount of human disturbance, this is likely to reflect the low diversity. Precipitation has a large impact on an environment but it is clear that human disturbances also play an important role in shaping wildflower communities. An in depth analysis of the state factors —topography, climate, parent material, potential biota, human activities, and time— at each field site could further reveal why our hypotheses were not fully supported. The analysis could reveal why the location that had received the least rainfall had the greatest wildflower density or why the site that had received the median amount of rainfall had the lowest number of individual species.

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**Reference:** Pickett, S., and M. Cadenasso. "Landscape Ecology: Spatial Heterogeneity in Ecological Systems." Science (Washington) 269.5222 (1995): 331. Web.