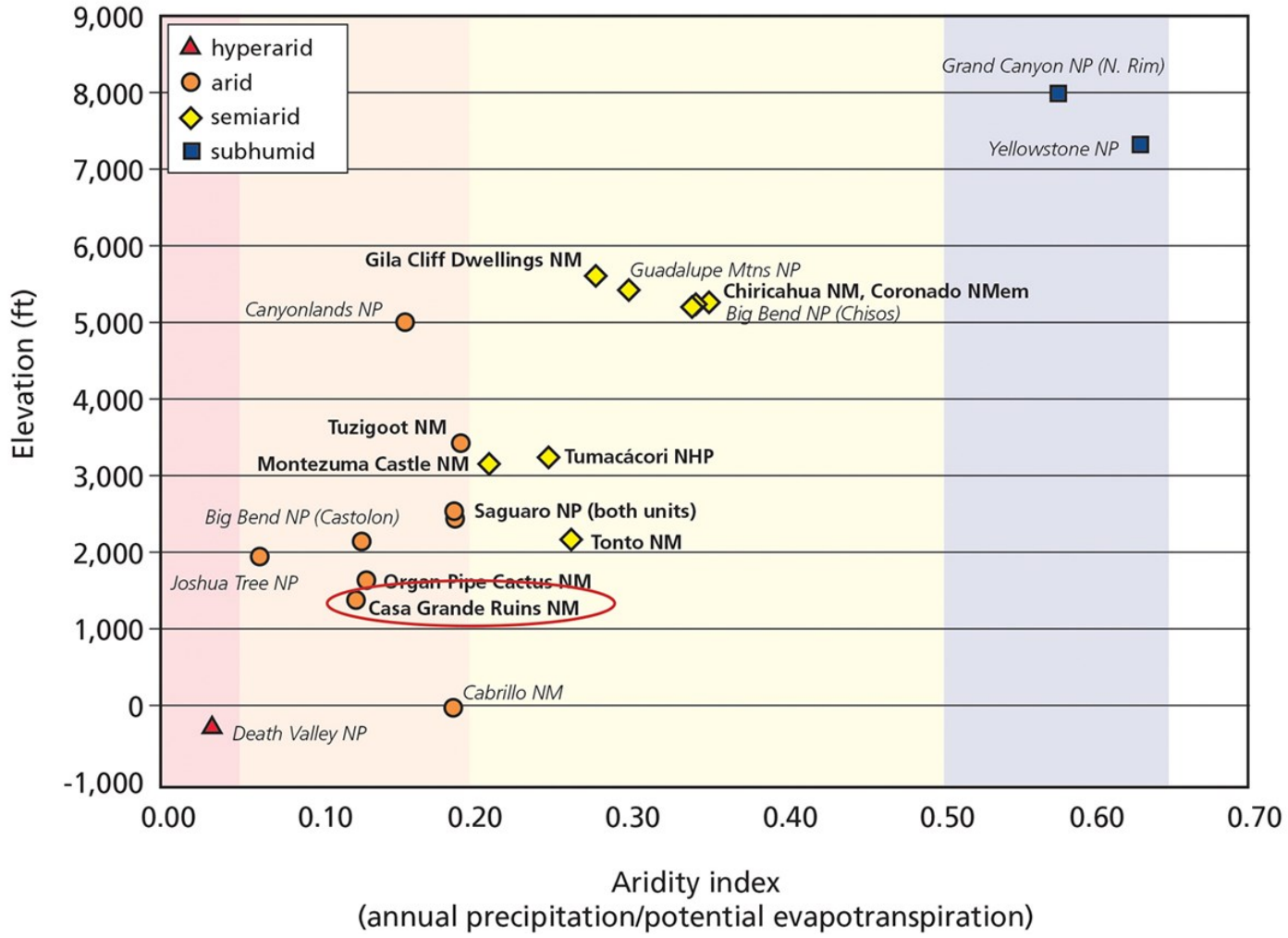
Climate and Groundwater Monitoring at Casa Grande Ruins National Monument, 2018

Casa Grande Ruins National Monument (/cagr/)

Climate and hydrology shape the structure and function of ecosystems. This is particularly true in the **Sonoran Desert (https://www.nps.gov/im/sodn/ecosystems.htm)**, where water is the primary limiting factor in the lives of plants and animals.

At Casa Grande Ruins National Monument, the **Sonoran Desert Network (https://www.nps.gov/im/sodn/index.htm)** monitors **climate (https://www.nps.gov/im/sodn/climate.htm)** and **groundwater (https://www.nps.gov/im/sodn/groundwater.htm)**. Understanding changes in these closely linked environmental factors is key to assessing the condition of park flora and fauna, as well as key cultural resources.

Located in the **desert biome (https://nps.gov/im/sodn/ecosystems.htm#desert)**, the climate of Casa Grande Ruins National Monument is classified as “arid.” This characterization is based on an aridity index. Used globally to classify climate zones, an aridity index considers long-term average annual precipitation relative to average annual potential evapotranspiration (the amount of water that would evaporate or be used by plants if water was unlimited).



On a scale of hyperarid to subhumid, Casa Grande Ruins National Monument is classified as arid.

2018 Findings

Findings are reported by water year (WY), which begins in October and ends the following September. Climate data are available at **The Climate Analyzer**



Weather stations at Casa Grande Ruins National Monument.

(http://www.climateanalyzer.org/sonoran_desert/map_html).

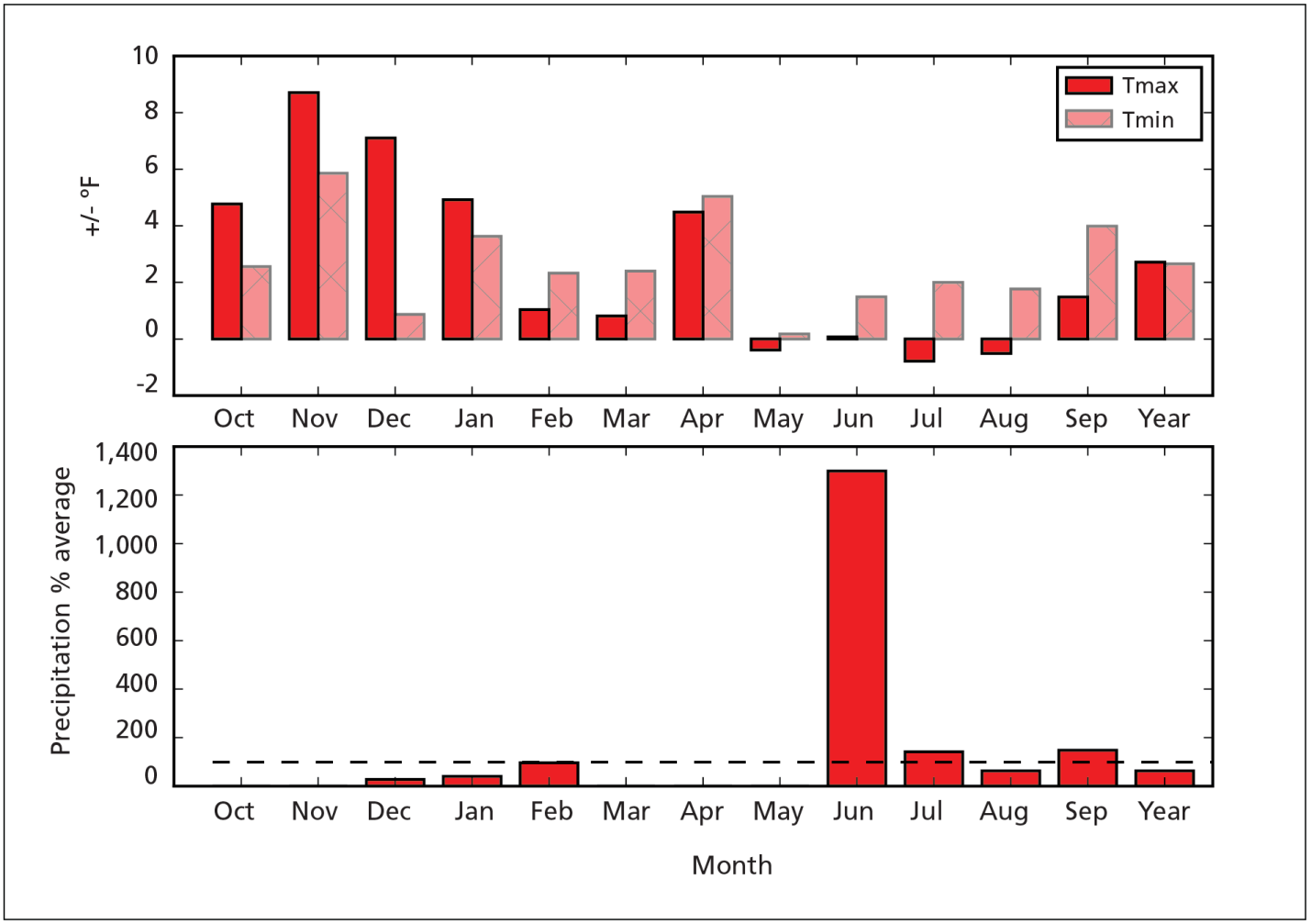
Climate

Temperature. In WY2018, air temperatures at Casa Grande Ruins NM were generally warmer than normal compared to normalized climate data for 1981–2010. Mean monthly maximum and minimum temperatures were warmer than normal (+1–9°F) in each month of the cool season (October–March). In May–September, mean maximum temperatures were generally near normal. April was about 4°F warmer than normal. Mean minimum temperatures were greater than normal (+1–5°F) for all warm-season months.

Precipitation. Annual precipitation at Casa Grande Ruins NM was only 63% of normal (5.81" vs. 9.18") in WY2018. Monsoon rainfall was greater than normal, but the rest of the year was substantially drier. No rain fell in October–November and March–May (see figure below). In June, a single, 0.65" storm event dropped 1,300% of that month's normal rainfall. The regional drought that began in 2000 continued.

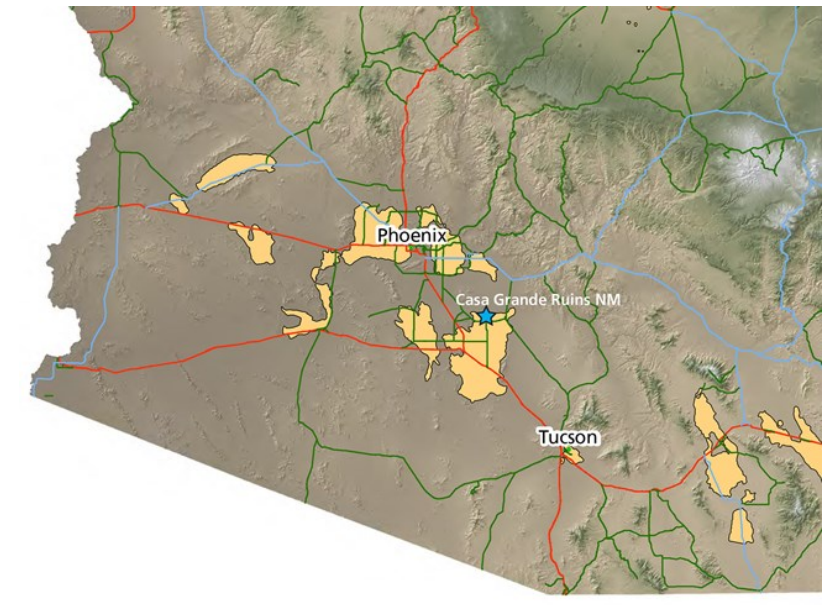
Extreme weather events. Extreme weather events, such as air-temperature extremes and unusually intense precipitation events, may be as important to understanding ecological patterns as long-term climate averages are. Sustained low temperatures can damage keystone plants, such as columnar cacti (e.g., saguaro cactus) and native trees (e.g., velvet mesquite). Extreme precipitation events can cause localized flooding and erosion, spur or inhibit plant productivity, and modify animal behavior. Localized erosion and exposure of critical archeological resources by extreme precipitation events is of particular concern at Casa Grande Ruins NM.

There were substantially fewer extremely cold days than normal in WY2018 (4 days vs. 16.8 ± 0.9 days). There was one extreme precipitation event (>1"), compared to an average of 2.3 ± 0.6 events per year for 1981–2010. The single extreme (1.05") event occurred on September 20.



Departures from 30-year (1981–2010) normal minimum and maximum temperature and precipitation, Casa Grande Ruins National Monument, water year 2018.

Graphics generated by www.climateanalyzer.org.



Areas experiencing active land subsidence in southern Arizona.

Groundwater

Groundwater conditions have important implications for Casa Grande Ruins National Monument and the surrounding area. The monument is located in the north-central section of the Eloy groundwater subbasin. Since the early 20th century, the Eloy subbasin has been in groundwater deficit. More water has been pumped out of the aquifer than has been naturally replenished. This has resulted in substantial changes to the natural flow regime, declining water levels, and land subsidence (gradual collapse, fissuring or slumping in areas where

Arizona Department of Water Resources

deep basins filled with alluvial sediments are de-watered. In the monument and the adjacent city of Coolidge, groundwater is the potable water source. Groundwater loss has the potential to affect the water supply as well as the stability of structures at the monument.

Groundwater levels near Casa Grande Ruins in WY2018 increased 12.3 feet from WY2017, a deviation from the general downward trend since 1995. Land subsidence at Casa Grande Ruins NM between March 2017 and March 2018 was 0–1 centimeters in most of the park, and up to 2 centimeters in the park's northwest corner. Only a few minor fissures are known in the Coolidge area. Online viewing of natural hazards around the state, including earth fissures, is available from the **Arizona Geological Survey (http://data.azgs.az.gov/hazard-viewer/)**.

Information on this webpage was summarized from *K. Raymond. 2019.* ***Status of climate and water resources at Casa Grande Ruins National Monument: Water year 2018. (https://irma.nps.gov/DataStore/Reference/Profile/2263562)***

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