

Tonto National Forest Climate Report: June 2024

Highlights

- The current average 1-month (June) Standardized Precipitation Index (SPI) for Tonto National Forest is **0.28** (Near Normal).
- Average June precipitation was 0.52 inches, which was **+0.22 inches** different from the long-term average. This value ranks 29th out of 130 years in total precipitation (Rank 1 is the wettest year).
- Average June temperature was 79.7 degrees F, which was **+4.5 degrees F** different from the long-term average. This value ranks 4th out of 130 years in average temperature (Rank 1 is the warmest year).
- The 1-month outlook for July predicts **equal chances of above, below or normal precipitation** and a **60-70% chance of warmer-than-average temperatures**. The 3-month seasonal outlook for July-September predicts a **50-60% chance of drier-than-average precipitation** and a **60-70% chance of warmer-than-average temperatures**. (More information at NOAA Climate Prediction Center, <https://www.cpc.ncep.noaa.gov/>)

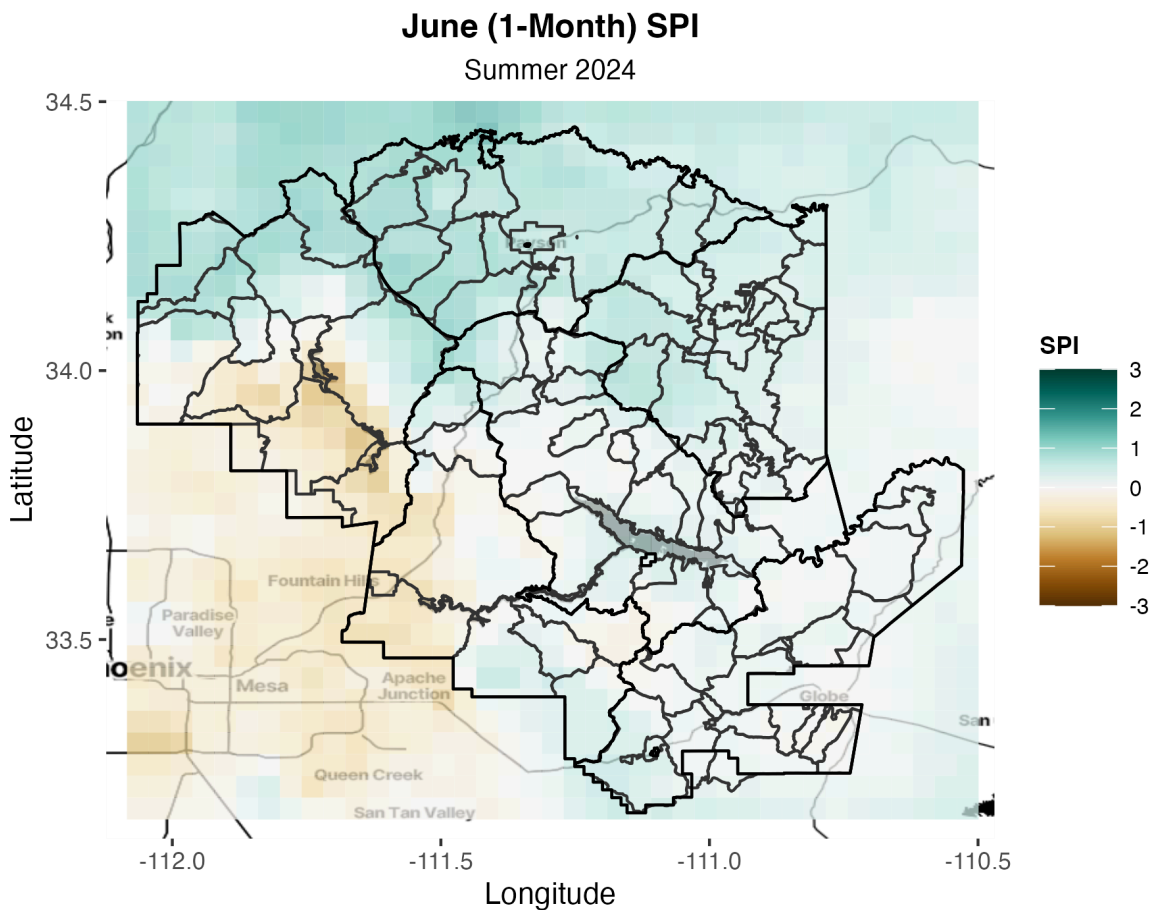


Figure 1: Tonto National Forest drought status for Summer 2024 (June 2024 1-Mo. SPI)

Table 1: Current Drought Conditions

District	Minimum SPI	Mean SPI	Maximum SPI	Total Precip [in.]	Anomaly [in.]
Mesa	-0.86	-0.09	1.09	0.29	0.08
Cave Creek	-1.37	0.1	1.18	0.45	0.22
Payson	0.23	0.84	1.49	0.90	0.52
Pleasant Valley	0.07	0.5	0.89	0.71	0.30
Globe	-0.19	0.14	0.62	0.42	0.09
Tonto Basin	-0.25	0.22	0.95	0.40	0.13

Note:

Tonto National Forest SPI and climate statistics for Summer 2024 (June). Statistics are calculated based on the average of all PRISM grid cells lying within a District boundary.

Seasonal Drought Progression

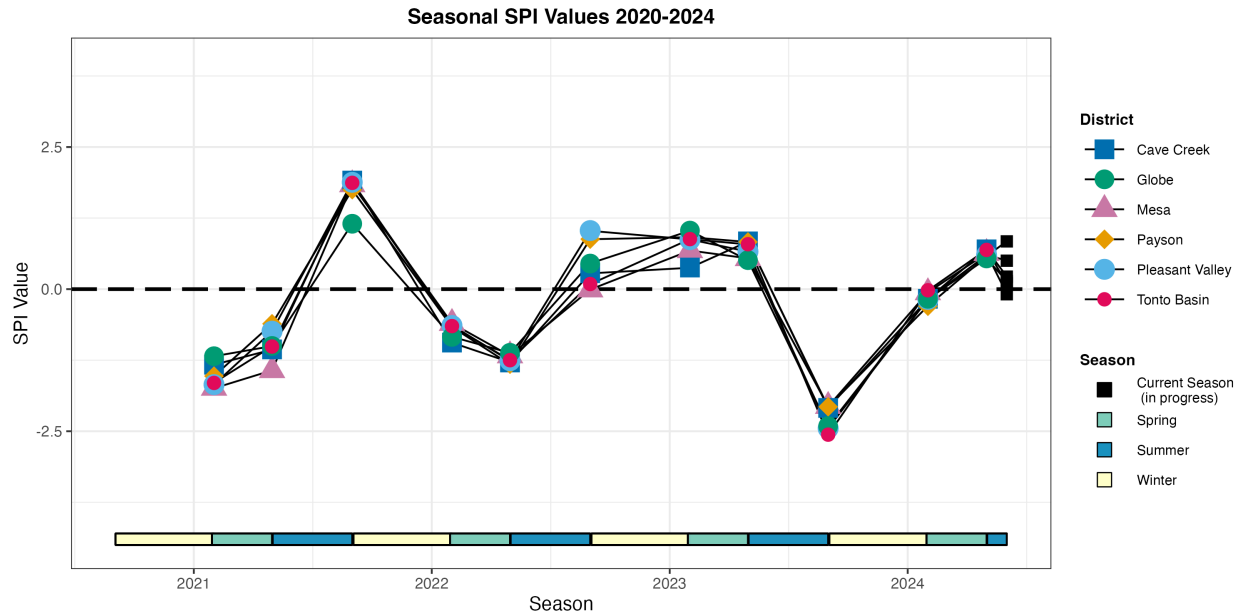


Figure 2: Tonto National Forest seasonal SPI values (2021-2024). Seasonal monthly definitions are as follows: Winter (Oct-Feb); Spring (Mar-May); Summer (Jun-Sep); Fall (-). The displayed SPI value represents the final month within each season at a timescale of the number of months within that season. Current seasonal SPI values (black dots) are not final since the season is still in progress.

Table 2: District-level Seasonal SPI and Climate Statistics

District	2024 Summer SPI*	2024 Spring SPI	2023 Winter SPI	12mo. SPI	2024 Summer Precip [in.]*	2024 Spring Precip [in.]	2023 Winter Precip [in.]	12mo. Precip [in.]	12mo. Precip Anom [in.]
Mesa	-0.09	0.63	-0.06	-0.46	0.29	4.07	7.52	14.02	-3.53
Cave Creek	0.1	0.70	-0.17	-0.51	0.45	4.05	6.79	13.58	-3.29
Payson	0.84	0.58	-0.30	-0.64	0.9	5.39	8.91	19.45	-4.76
Pleasant Valley	0.5	0.60	-0.18	-0.66	0.71	5.29	9.41	19.28	-4.81
Globe	0.14	0.54	-0.17	-0.72	0.42	3.88	7.92	15.10	-4.74
Tonto Basin	0.22	0.69	-0.02	-0.52	0.4	4.13	7.98	14.70	-3.51

Note:

Tonto National Forest seasonal SPI and climate statistics by District. Asterisk (*) signifies season in progress - currently partial Summer (Jun-Jun). Values are calculated based on the average of all PRISM grid cells lying within a District boundary.

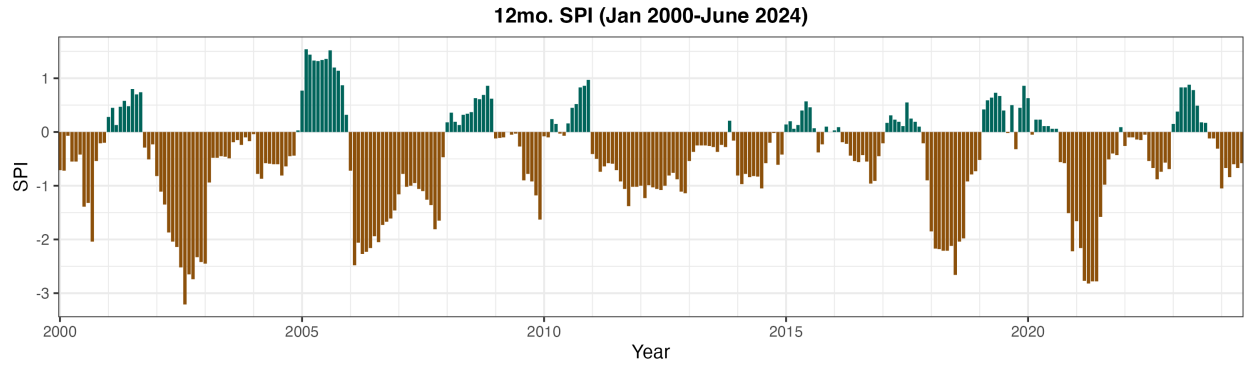


Figure 3: 12mo. SPI for Tonto National Forest (2000-2024)

Station Climate Summaries

Summaries from climate stations with relatively long periods of record, minimal missing data (<10% of days), and within the area boundary are presented in the following tables (5 and 6) as reference locations. These stations are a select subset of stations that contribute to the gridded climate maps. Red circles on map indicate locations of NOAA Global Historical Climate Network stations.

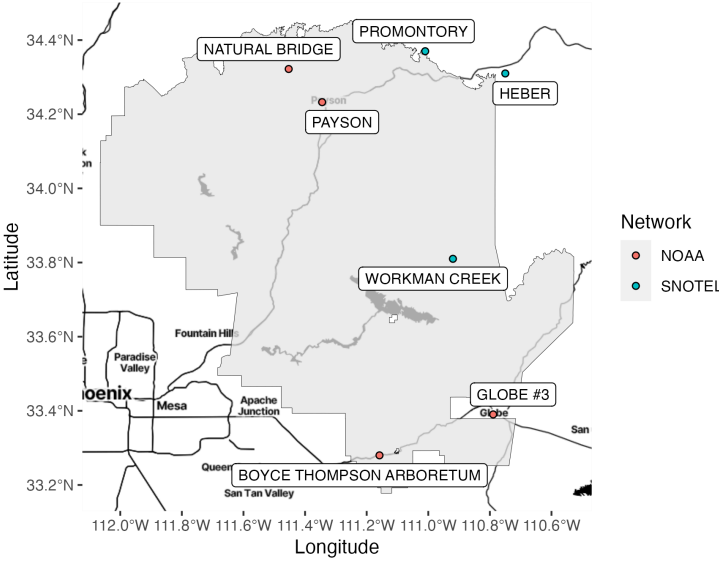


Figure 4: NOAA station(s) located within the report area boundary.

Table 3: NOAA Climate Station Observations (2024-06-01 to 2024-06-30)

Station	Elev (ft)	POR	Total Precip (in)	Precip Anom (in)	Days with Precip	Total Snow (in)	Avg Temp (F)	Temp Anom (F)	Freeze Days
GLOBE #3	3660	2013-2024	1.38	1.03	3	NA	82.9	1.08	0
BOYCE THOMPSON ARBORETUM	2436	2023-2024	0.46	0.23	3	0	87.3	3.93	0
NATURAL BRIDGE	4608	1989-2024	1.23	1.04	4	0	76.6	2.7	0
PAYSON	4850	1965-2024	0.19	-0.11	3	0	73.7	3.72	0

Note:
 Tonto National Forest summary statistics of select NOAA stations within the Forest boundary for June 2024

Table 4: USDA NRCS SNOTEL Station Observations (2024-06-01 to 2024-06-30)

Station	Elev (ft)	POR	Max SWE (in)	Max SWE Anom (in)	Total Precip (in)	Precip Anom (in)
WORKMAN CREEK	7031	1938-2024	0	0	2.20	1.84
PROMONTORY	7943	1979-2024	0	0	0.89	0.6
HEBER	7654	1953-2024	0	0	0.00	-0.39

Note:

Tonto National Forest summary statistics of select USDA NRCS Snow Telemetry (SNOTEL) stations within the Forest boundary for June 2024

NASA SPoRT Soil Moisture Estimates

Relative Soil Moisture Percentile
(0-2m depth): 07-05-2024

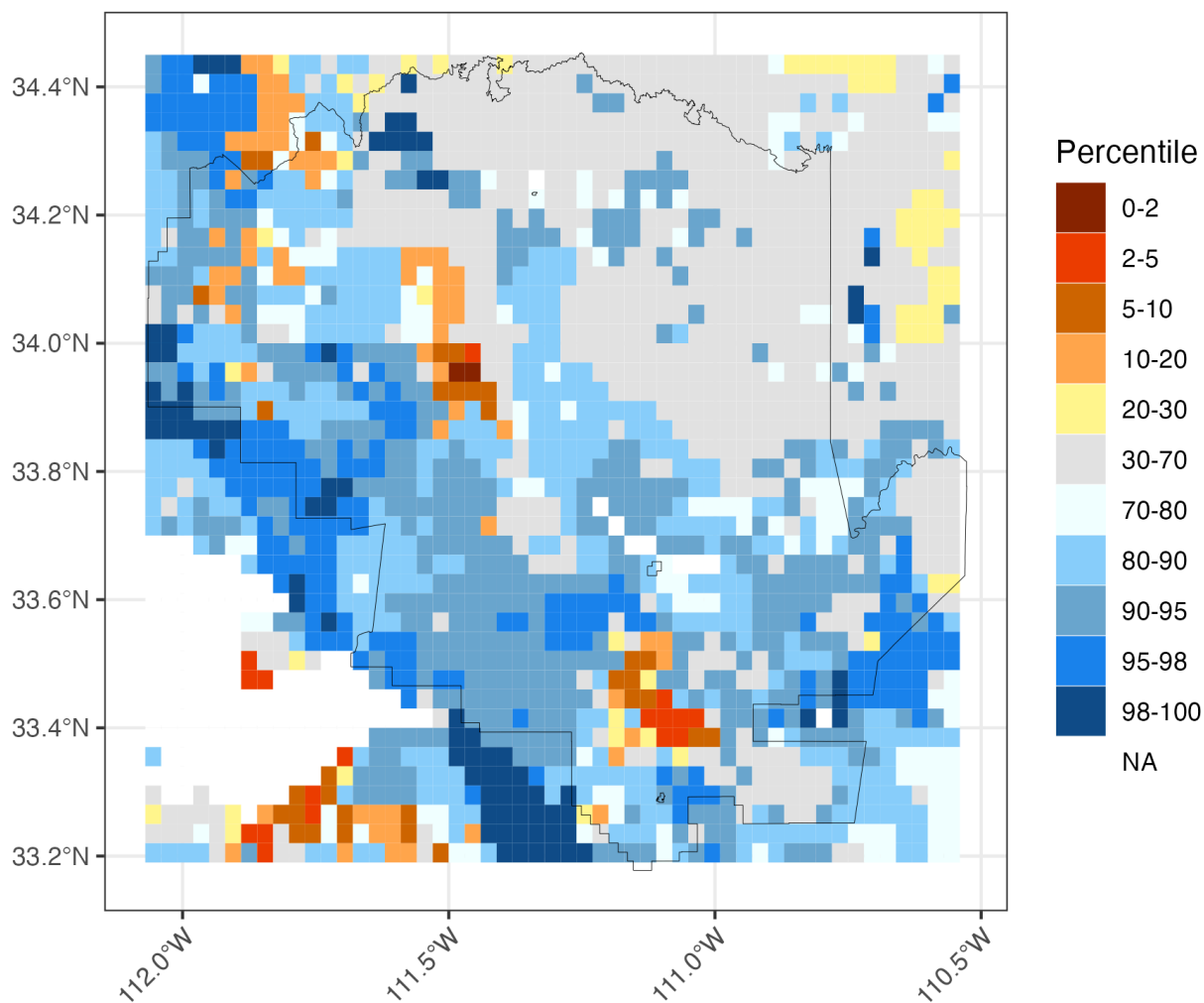


Figure 5: Integrated surface to 2 meter deep relative soil moisture estimate

Modeled soil moisture estimates are provided by the NASA Short-term Prediction Research and Transition Center. This program uses a land surface model to integrate surface weather conditions (e.g. precipitation, temperature, wind...) with surface and soil properties like vegetation cover, soil depth and type to track and make near real-time estimates of soil moisture on a 3km by 3km grid. This map displays how unusually wet or dry the relative soil moisture (based on local soil properties) is for the integrated amount from the surface to 2 meters deep. (more information at <https://weather.ndc.nasa.gov/sport/modeling/lis.html>)

Mechanics Behind the Standardized Precipitation Index (SPI)

The SPI is a meteorological drought index which use monthly precipitation sums to calculate a time series of z-score values. The SPI uses z-score values to represent the number of standard deviations a monthly precipitation total is from the long-term mean. The sign (positive or negative) of a z-score value represents if the monthly total precipitation is above (+, water surplus) or below (-, water deficit) the long-term mean for *all other instances of that month on record*. Furthermore, the size of the z-score value represents the frequency of drought conditions (Table . Smaller SPI values (i.e. falling near zero) represent more frequent drought events while larger SPI values (positive or negative) are less frequent drought events.

Table 5: SPI Drought Categories

SPI Value	SPI Category
≥ 2	Extremely Wet
1.5 to 1.99	Very Wet
1 to 1.49	Moderately Wet
-0.99 to 0.99	Near Average
-1 to -1.49	Moderately Dry
-1.5 to -1.99	Very Dry
≤ -2	Extremely Dry

Note:

Table adapted from <https://drought.unl.edu/Monitoring/SPI/MapInterpretation.aspx>

An important feature of the SPI is the ability to be calculated at a variety of monthly timescales. This flexibility allows the SPI to evaluate drought conditions for different time periods. For example, a 3-month SPI calculation compares total precipitation from the 3 months with all other instances of those same 3 months on record. Land managers can assess SPI values of different timescales to interpret short and long-term drought conditions on their land.

About the data used in this report

- PRISM Climate: The gridded used in mapping and forest and district level climate summaries is provided by the PRISM (Parameter elevation Regression on Independent Slopes Model) statistical mapping system. This system uses a weighted regression scheme to interpolate station data while accounting complexities like topography and rain shadows. The PRISM mapping system relies on a high density of stations to account for small variations in temperature and precipitation. Use caution in interpreting fine-scale patterns (or lack thereof) in regions with low station density. More information on PRISM can be found at <https://prism.oregonstate.edu/> and <https://climatedataguide.ucar.edu/climate-data/prism-high-resolution-spatial-climate-data-united-states-maxmin-temp-dewpoint>.
- Climate Stations: Station-level data used in this report consist of [NOAA Global Historical Climatology Network](#)(NOAA-GHCN) stations and USDA NRCS Snow Telemetry sites which include Cooperative Observer sites, Airports, and CoCoRAHS volunteer observations and also [USDA NRCS Snow Telemetry](#)(SNOTEL) sites. NOAA-GHCN stations consist of Cooperative Observer sites, Airports, and CoCoRAHS volunteer precipitation observations. SNOTEL sites are automated stations located in key snow monitoring locations, often in forested locations. NOAA-GHCN data were accessed

through the [Regional Climate Center-Applied Climate Information System](#) (RCC-ACIS) and SNOTEL data were downloaded using the '[snotelr](#)' package.

Contact information

Direct any questions, comments, or suggestions to:

- Mike Crimmins, Professor and Extension Specialist (crimmins@arizona.edu)
- Trevor McKellar, Research Scientist (tmckella@arizona.edu)

<https://cals.arizona.edu/climate>

