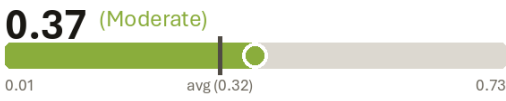




Little Colorado River Plateau Groundwater Basin Profile

Basin Summary Statistics

Size¹: 26,520 square miles
Elevation²: Range: 3,048-12,341 ft; Median: 5,976 ft
Top 3 land cover types by area³: Shrub/Scrub (81%), Evergreen Forest (14%), Grassland Herbaceous (2.9%)
Major surface watershed(s)⁴: Little Colorado River (LCR), Chinle Wash, Moenkopi Wash, Dinnebito Wash, Oraibi Wash, Polacca Wash, Jadito Wash, Cottonwood Wash, among other LCR tributaries
Groundwater subbasins¹: None
Groundwater-derived streamflow fraction⁵:



Mean Annual Hydrologic Cycle Components (1980-2020)
LITTLE COLORADO RIVER PLATEAU

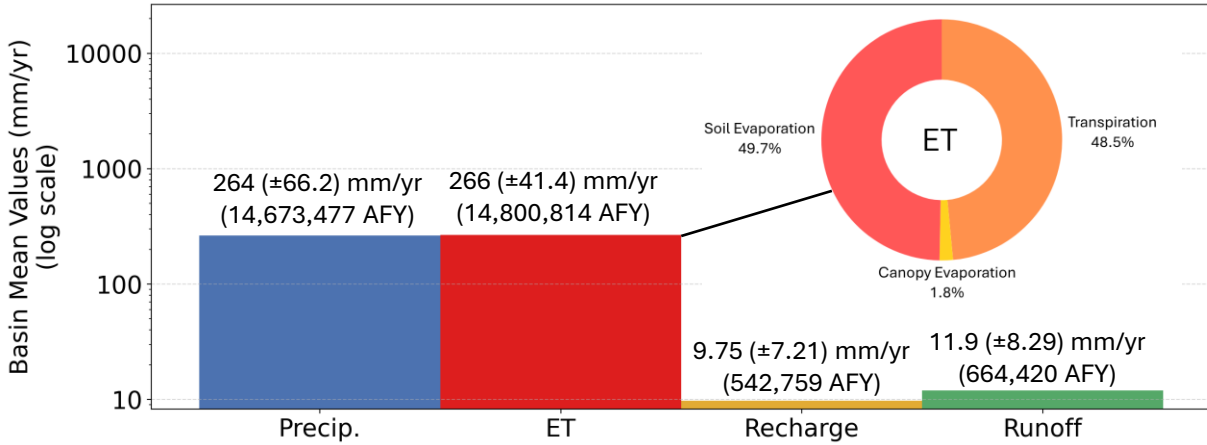


Figure 1 (above). Bar chart showing Noah-MP modeling results of the historical mean annual hydrologic cycle components (precipitation [P], evapotranspiration [ET], natural recharge, and runoff) in the basin from 1980-2020.⁶ ET is partitioned into soil evaporation, canopy evaporation, and transpiration. It is possible for ET to be greater than P when there are other sources such as groundwater, surface water, or water in storage.

The Little Colorado River Plateau (LCRP) is the largest groundwater basin in the state, covering 26,520 square miles. On average, annual evapotranspiration (ET) is approximately equal to annual precipitation (P) across the basin, resulting in relatively low basin-wide annual averages for natural recharge (9.75 mm) and runoff (11.9 mm). Soil evaporation makes up 49.7% of total ET in the basin, while transpiration comprises 48.5% and canopy evaporation accounts for the remainder (1.8%). Seasonally, the LCRP is affected by the North American Monsoon during the summer months. ET exceeds P from March through September while P exceeds ET in the winter months. Natural recharge and runoff peak in April as a result of springtime snowmelt.

Mean Monthly Hydrologic Cycle Components (1980-2020)
LITTLE COLORADO RIVER PLATEAU

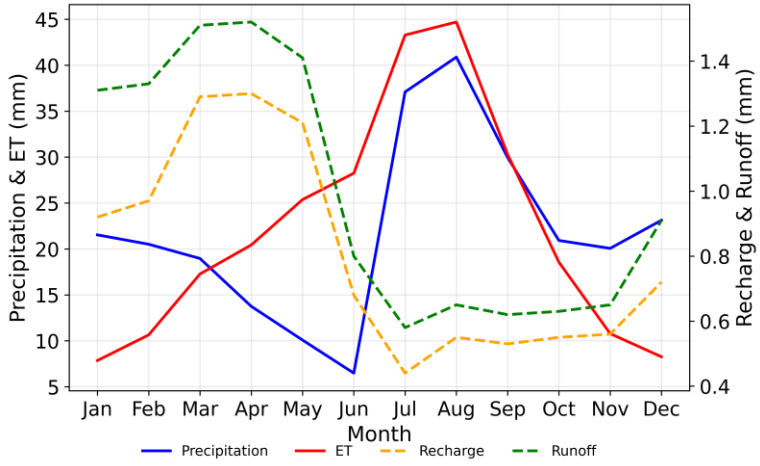


Figure 2. Graph showing monthly mean precipitation, ET, recharge, and runoff for the groundwater basin (1980-2020) from Noah-MP modeling results.⁶

Little Colorado River Plateau



Figure 3 (below). Gridded depiction of mean annual water fluxes across the groundwater basin from Noah-MP modeling (1980-2020): (a) precipitation, (b) evapotranspiration, (c) recharge, (d) runoff.⁶ Major cities/towns⁷ and Native American Reservation boundaries⁸ are shown (as applicable) to help orient the reader.

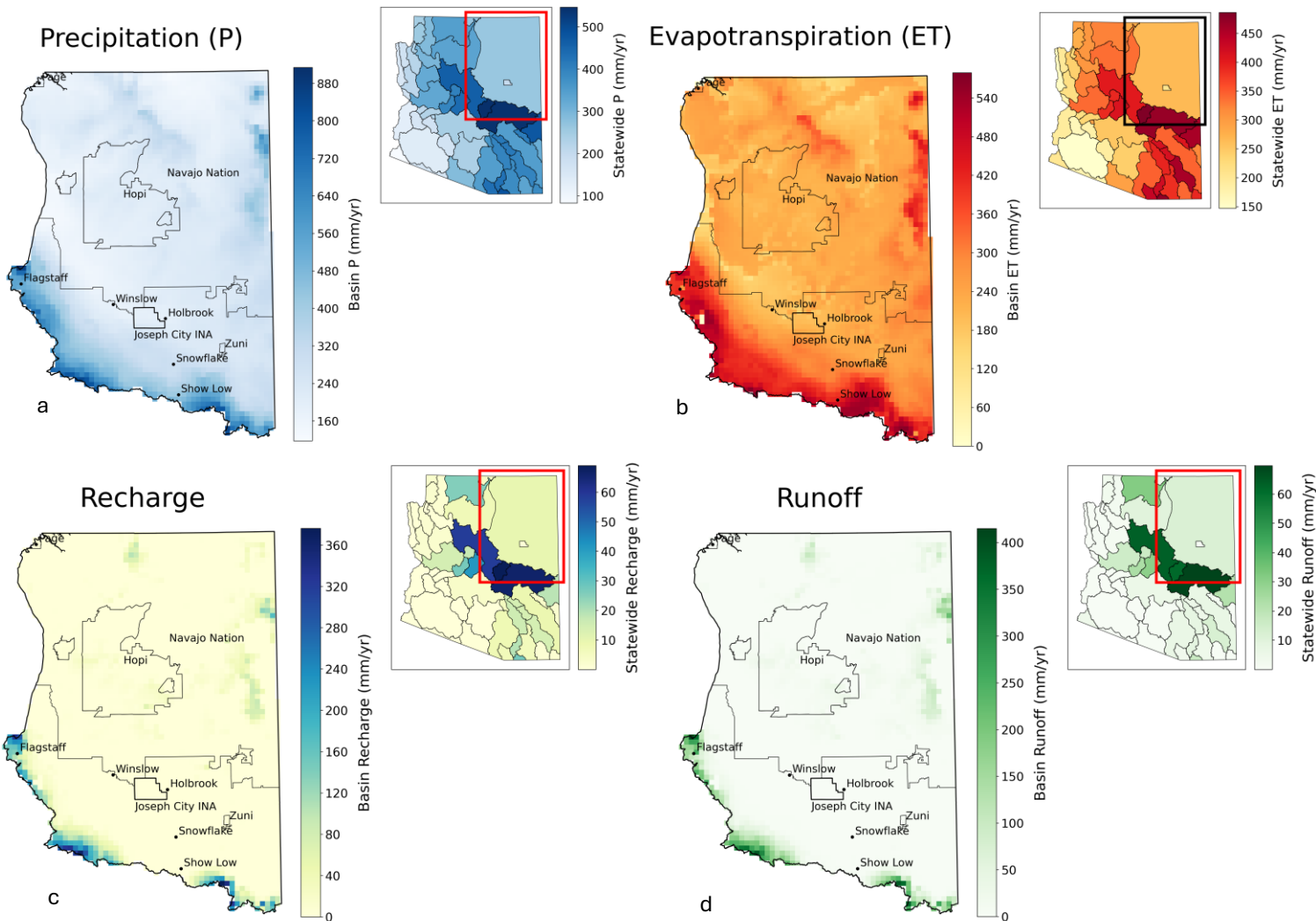
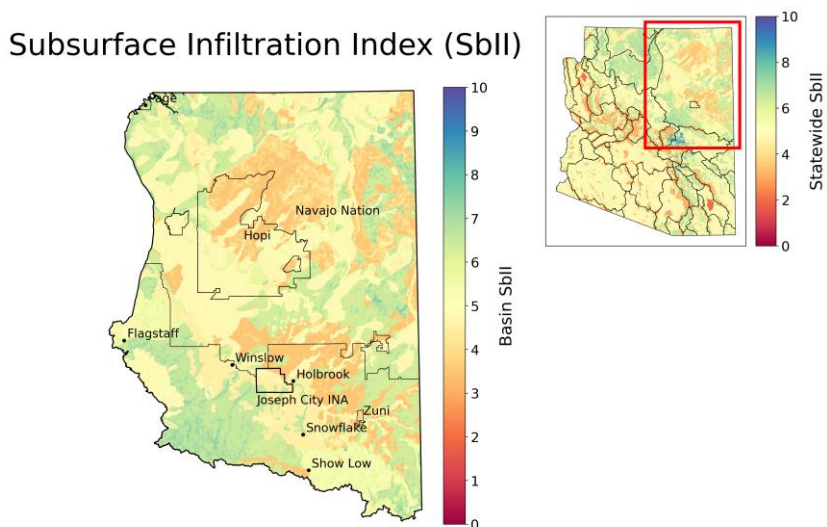


Figure 4 (below). Subsurface infiltration index (SbII) showing infiltration potential of the subsurface across the groundwater basin on a scale of 1-10 based on geologic features.⁹



Most of the rain and snowfall in the Little Colorado River Plateau basin occurs along the Mogollon Rim in the southern portion of the basin where average annual precipitation can exceed 800 mm/year. Evapotranspiration, runoff, and natural recharge in the basin are also generally highest along the Rim due to greater water availability in that region. Much of the basin has moderately high subsurface infiltration potential due to presence of karst-type geology.

Little Colorado River Plateau



Climate Change Projections: Changes in Temperature, Precipitation, ET, Recharge, and Runoff (2060-2099 vs. 1981-2020)

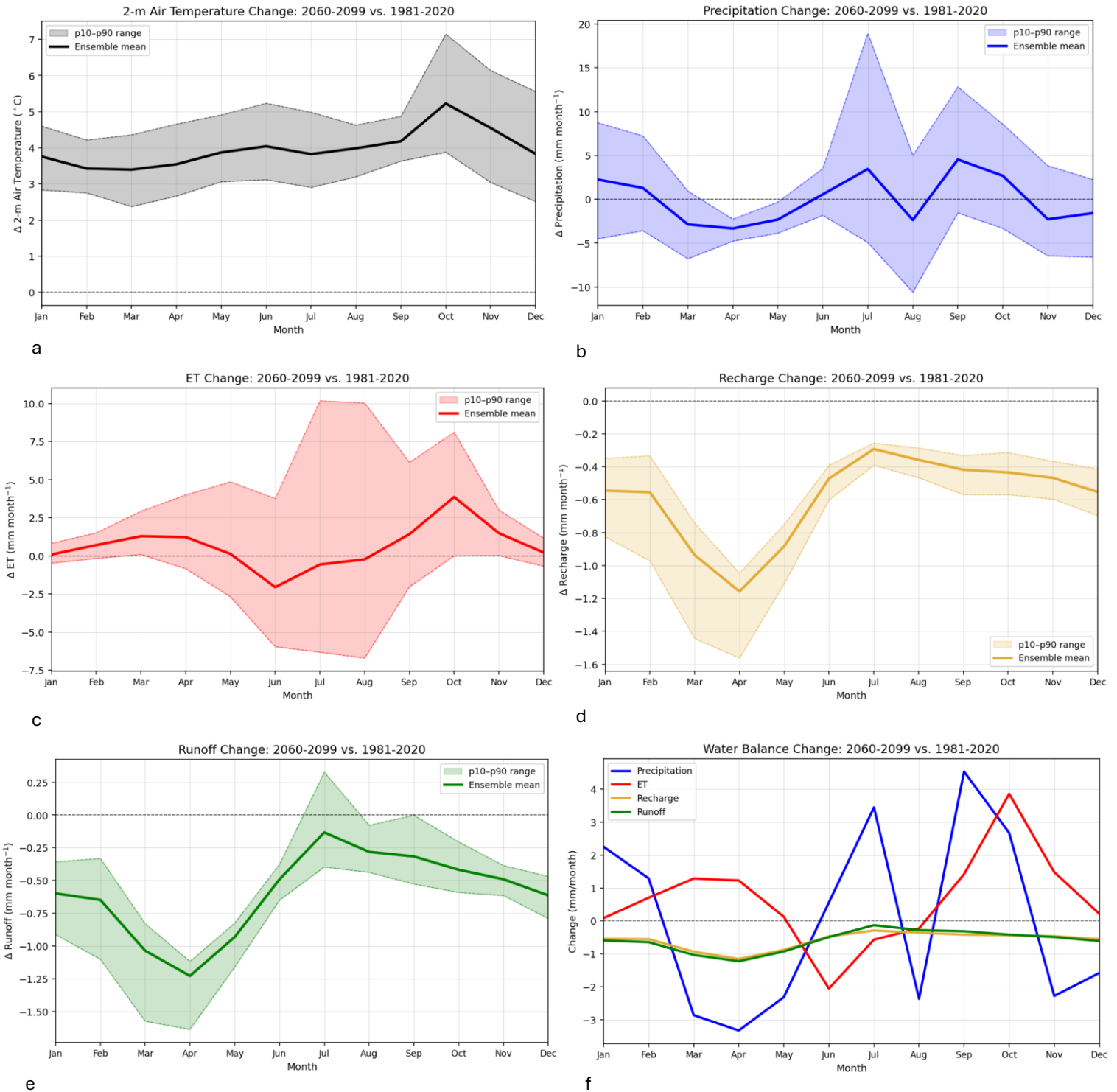


Figure 5. Plots (a)-(e) show projected changes in (a) temperature, (b) precipitation, (c) evapotranspiration (ET), (d) natural recharge, and (e) runoff statewide, comparing end of the 21st century to the historical record from 1981-2020 under the IPCC Scenario SSP3-7.0.¹⁰ Plot (f) shows the change in the water balance components (P, ET, recharge, and runoff) on a single graph for direct comparison. The analysis uses 14 dynamically downscaled global climate models (GCM) at 9-km resolution and the Noah-MP land surface model. The ensemble mean of the 14 GCMs is shown in bold for each component of the hydrologic cycle, with the 10-90th percentile shaded to show model projection uncertainty.



Climate change projections across the LCRP show drier springs (14-27% drier March through May), and a drier August (5%), November (12%) and December (6%). January-February (7-11%), June-July (9-10%), and September-October (13-15%) are projected to be wetter on average by the end of the century. The increase in precipitation in September-October (2.8-4.4 mm/month) is consistent with a projected increase in extreme events associated with hurricane and tropical cyclone activity. Declines in natural recharge are projected for all months of the year, with projections in the highest recharge months (February-May) showing declines of 57-76% (-0.57 to -1.2 mm/month). Similarly, runoff is expected to decline in all months of the year, with declines of 55-72% (-0.66 to -1.2 mm/month) from February to May by the end of the century. Projected increases in temperature range from approximately 3.4 °C in March to 5.3 °C in October. Higher temperatures and greater water availability from precipitation lead to a 23% (3.9 mm) projected increase in evapotranspiration (ET) in October compared to the baseline period.

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