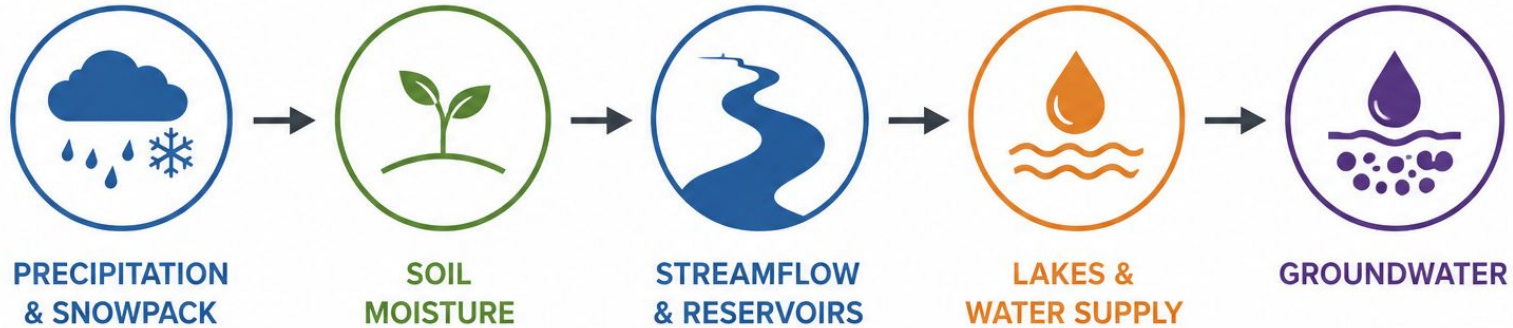


The Drought Cascade



Dr. Zachary H. Hoylman

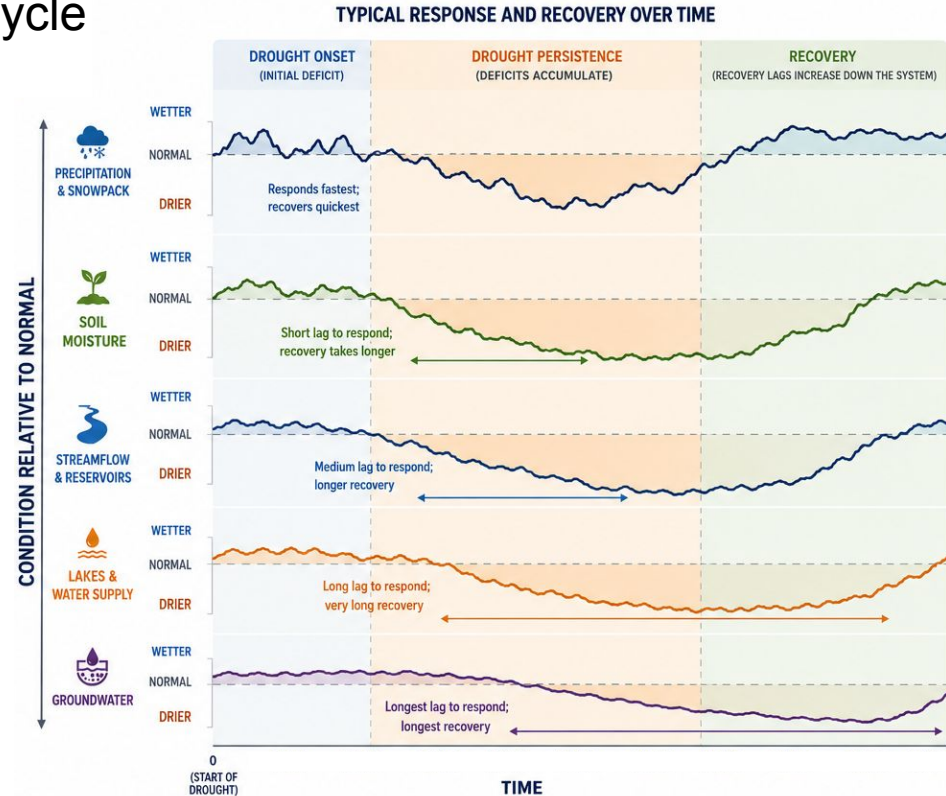


The Drought Cascade

Drought Propagation Through the Water Cycle

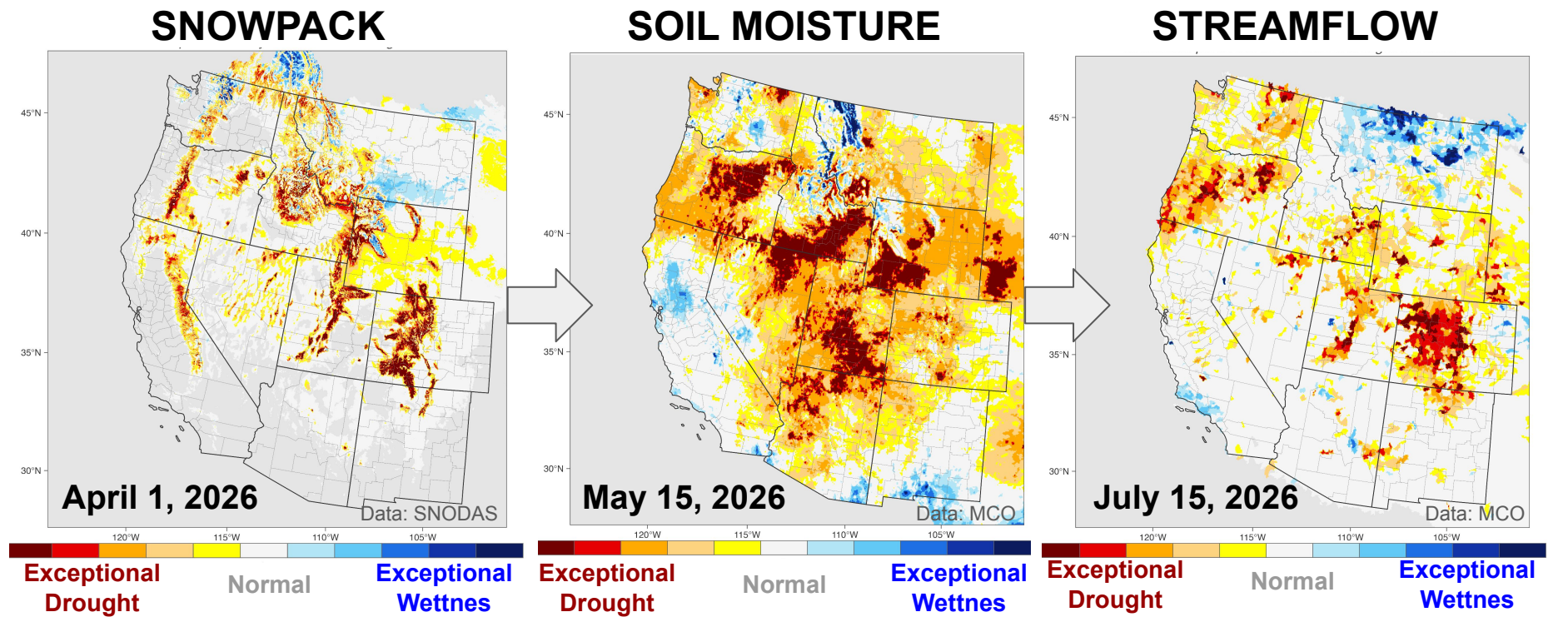
- Precipitation and snowpack provide the initial drought signal.
- Soil moisture and streamflow respond later and integrate conditions over longer periods.
- Groundwater responds most slowly and can remain depleted long after surface conditions improve.

Drought is not a single condition. It propagates through the water cycle at different timescales.



The Drought Cascade Across the West

Snowpack to Soil Moisture to Streamflow in 2026



The West's Big Challenge

Looking ahead

- The West is in drought right now
- Climate change is expected to make these droughts far more common.
- The Colorado River is at elevated risk.



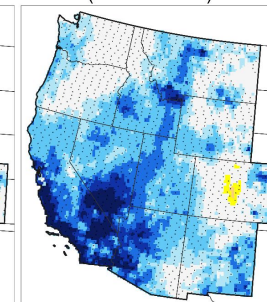
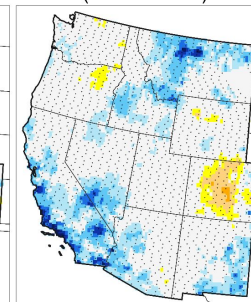
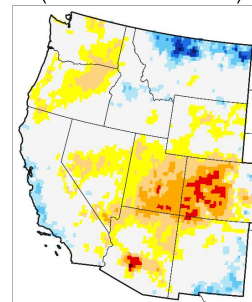
Climate change is reshaping drought across the western United States, altering the timing and availability of water throughout the hydrologic cycle. Understanding how drought propagates through that system is becoming increasingly important for effective drought monitoring and water management.

30-day SPEI over June 1–30, 2026 — EC-Earth3 SSP3-7.0 — Western CONUS

Contemporary Drought Conditions
(1997–2026 reference)

Projected
(2050 climate)

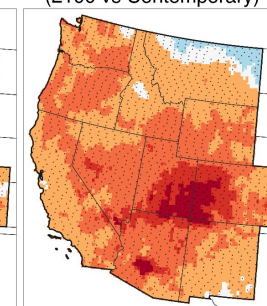
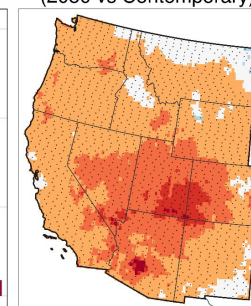
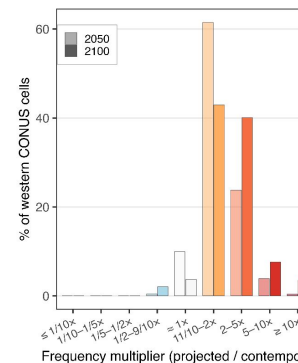
Projected
(2100 climate)



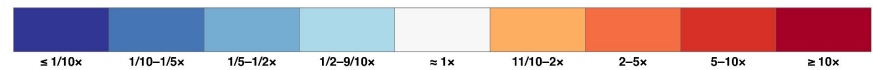
Distribution of Frequency Multipliers

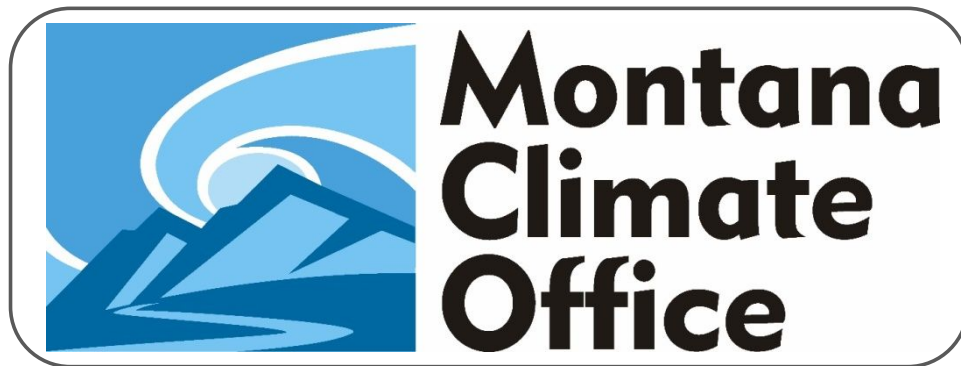
Times more likely
(2050 vs Contemporary)

Times more likely
(2100 vs Contemporary)



Frequency multiplier (projected / contemporary)





zachary.hoylman@umontana.edu

MCO Web Page: <https://climate.umt.edu/>

D³ - Data Drought Dashboard: <https://d3drought.org/>

Montana **Mesonet**: <https://climate.umt.edu/mesonet/>

