Drought monitor

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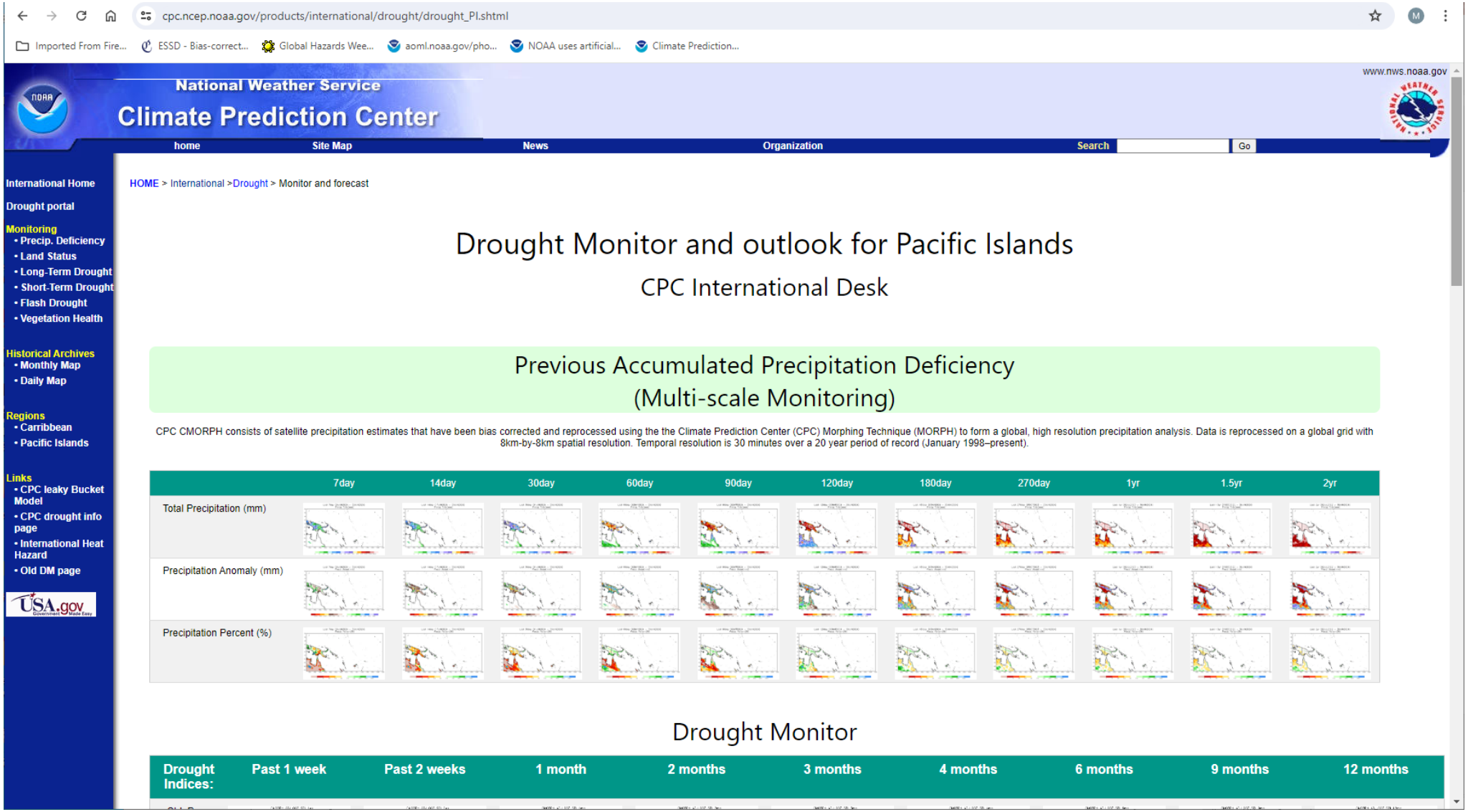
PREPARE Drought and Flood Early Warning for Central Pacific Islands
Nadi, Fiji, 15-20 July 2024

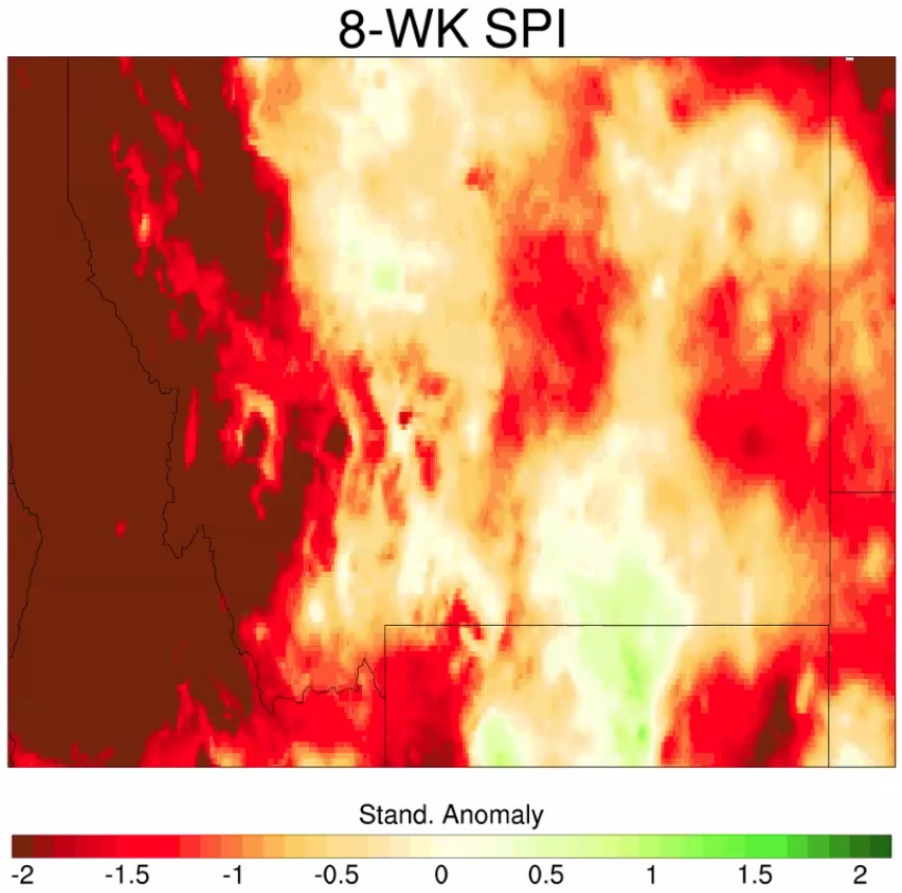


https://www.cpc.ncep.noaa.gov/products/international/drought/drought_PI.shtml

Realtime Geotiff for drought monitor

Dataset	Precipitation	Percent of Normal Precip.	Max Temperature Departure from Normal	SPI	SPEI	EDDI	Coverage and Resolution	Latency
CPC Daily Unified	1-Month, 2M, 3M, 6M, 9M, 12M	1-Month, 2M, 3M, 6M, 9M, 12M	1-Week, 2W, 1-Month, 2M, 3M, 6M, 9M, 12M	1-Month, 2M, 3M, 6M, 9M, 12M	1-Month, 2M, 3M, 6M, 9M, 12M	1-Week, 2W, 1-Month, 2M, 3M, 6M, 9M, 12M	Global 0.5 deg	1-2 days
ERA5 (Global)	1-Month, 2M, 3M, 6M, 9M, 12M	1-Month, 2M, 3M, 6M, 9M, 12M	1-Week, 2W, 1-Month, 2M, 3M, 6M, 9M, 12M	1-Month, 2M, 3M, 6M, 9M, 12M	1-Month, 2M, 3M, 6M, 9M, 12M	1-Week, 2W, 1-Month, 2M, 3M, 6M, 9M, 12M	Global 30km	3-5 days
CMORPH	1-Month, 2M, 3M, 6M, 9M, 12M	1-Month, 2M, 3M, 6M, 9M, 12M	Precip. Only	1-Month, 2M, 3M, 6M, 9M, 12M	Precip. Only	Precip. Only	Global 8km	1-2 days
GPM IMERG	1-Month, 2M, 3M, 6M, 9M, 12M	1-Month, 2M, 3M, 6M, 9M, 12M	Precip. Only	1-Month, 2M, 3M, 6M, 9M, 12M	Precip. Only	Precip. Only	Global 10km	2-4 days

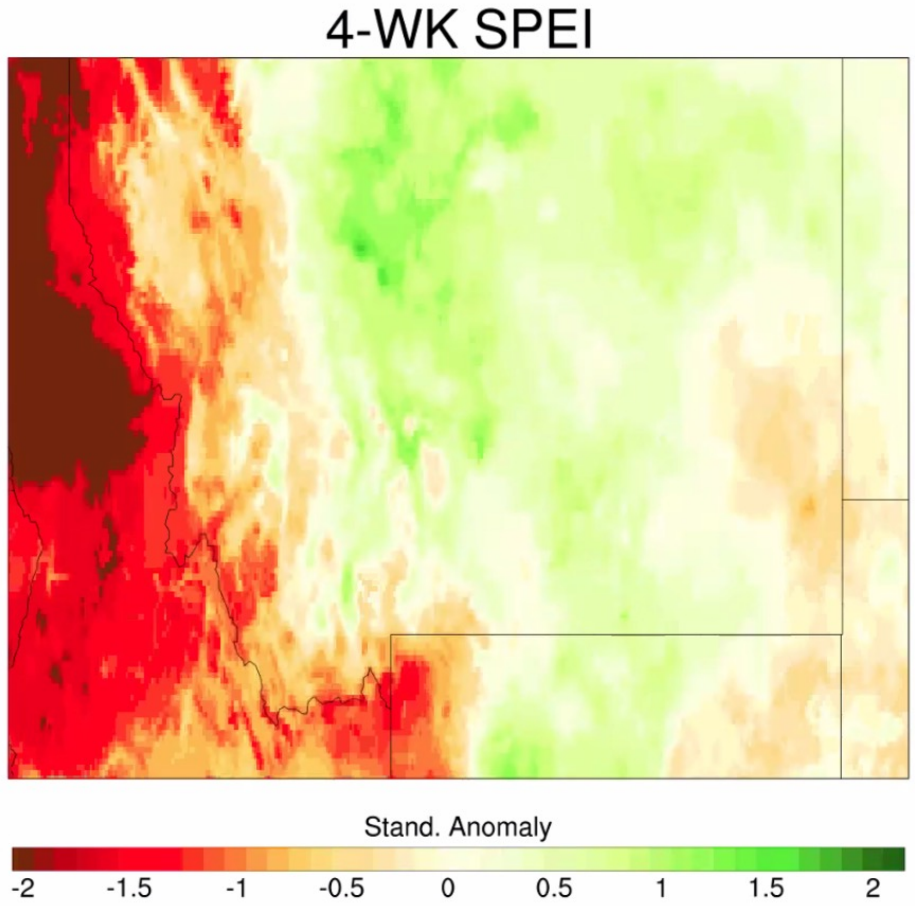
Standardized Precipitation Index (SPI)



Strengths: 1) Precipitation is a major driver of all types of drought, 2) can be computed over a range of time scales (one month to many years), 3) long data record allows for better estimates of precipitation anomalies

Weaknesses: 1) Sparse in situ observations in many regions, 2) radar-derived precipitation estimates can be biased, and there are gaps in radar coverage, 3) it is not a direct indicator of drought impacts and can be misleading depending upon how precip. occurred

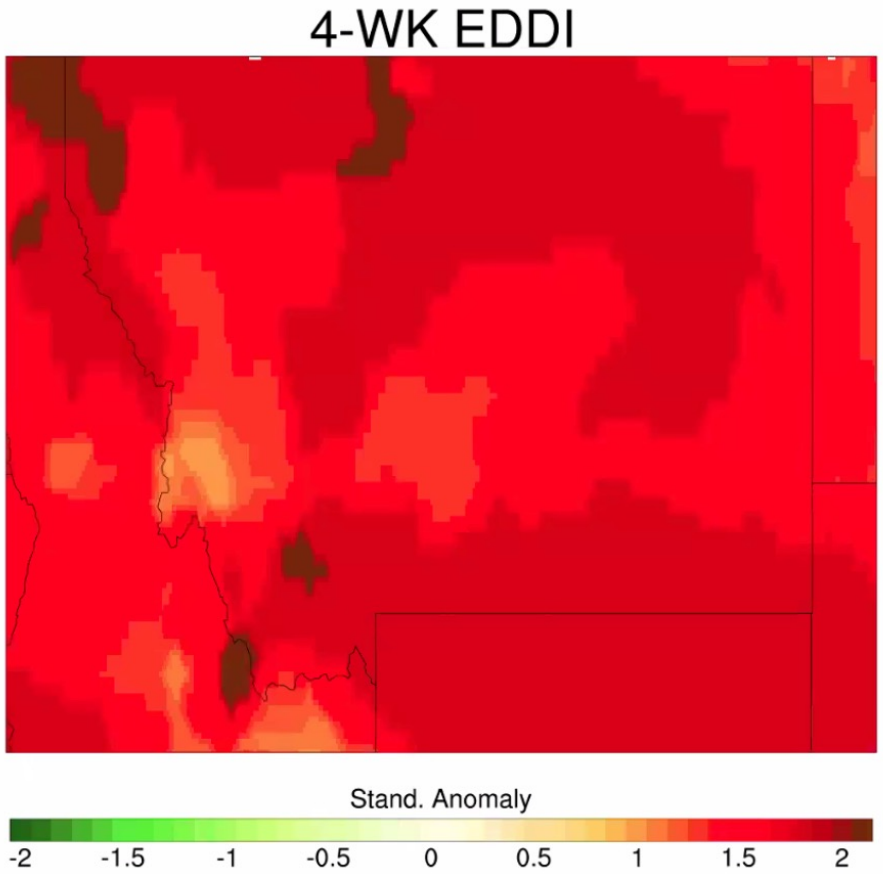
Standardized Precip. Evap. Index (SPEI)



Strengths: 1) Combines anomalies in precipitation and evaporative demand into a single indicator, 2) can be computed over a range of time scales, 3) long data record

Weaknesses: 1) It is a not a direct indicator of drought impacts

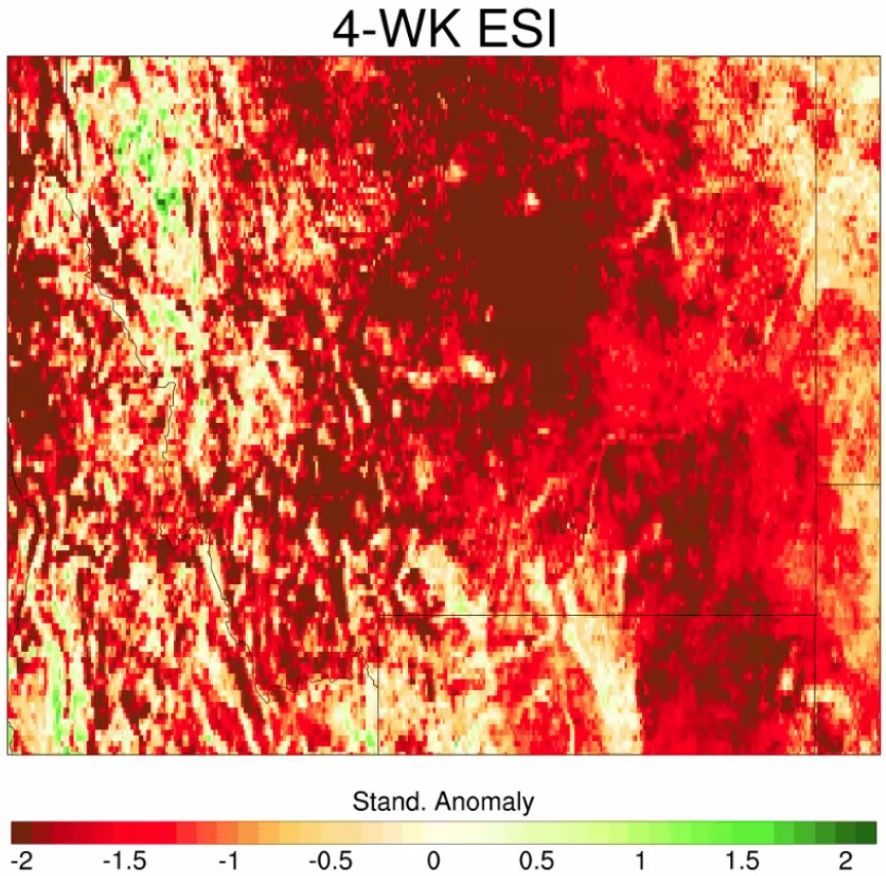
Evaporative Demand Drought Index (EDDI)



Strengths: 1) Evaporative demand is a key driver of flash drought onset and intensification, 2) can be computed over a range of time scales (one week to months), 3) long data record allows for better estimates of evaporative demand anomalies

Weaknesses: 1) Relatively coarse resolution, 2) it is not a direct indicator of drought impacts, 3) can lead to false alarms because high temperatures by themselves may not lead to drought if precipitation is adequate

Evaporative Stress Drought Indicators

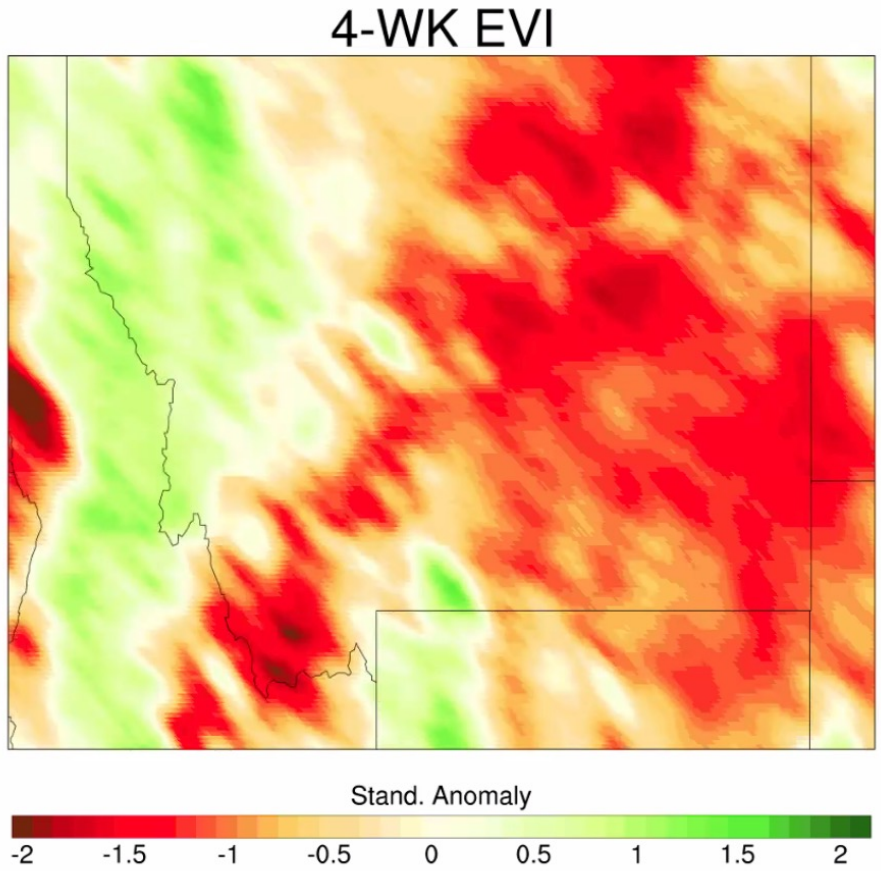


Examples: Evaporative Stress Index (ESI), Stand. Evaporative Stress Ratio (SESR)

Strengths: 1) Direct indicator of moisture stress on vegetation health, 2) satellite-based tools have high resolution, 3) can be computed over a range of time scales (one week to several months)

Weaknesses: 1) Satellite-derived ET can only be retrieved when skies are clear, 2) short data record for satellite-based tools (generally starting in 2000), 3) not useful indicator outside of the growing season

Vegetation Conditions

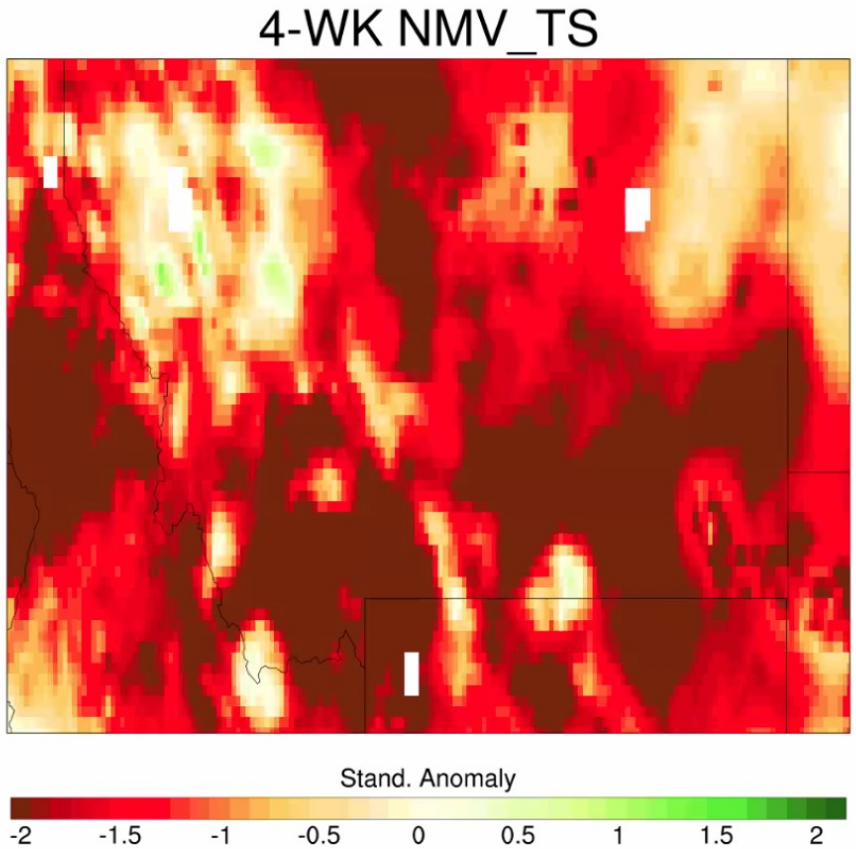


Examples: Enhanced Vegetation Index (EVI), Solar Induced Fluorescence (SIF)

Strengths: 1) Direct indicator of impacts of moisture stress on vegetation health and functioning, 2) EVI has high spatial resolution

Weaknesses: 1) Can only be retrieved when skies are clear, 2) irregular updates, 3) short data record (~20 years or less), 4) SIF has coarse resolution

Soil Moisture



Ex: NLDAS, SPoRT LIS, in situ obs., SMAP

Strengths: 1) Important indicator of potential moisture stress, 2) can be computed over different time scales, 3) available over a long time period (1979-present) from model reanalyses

Weaknesses: 1) Coarse spatial resolution and potentially large model biases, 2) in situ obs may not be representative, 3) coarse resolution limits utility of model analyses, and 4) need to use appropriate soil layers (not topsoil layer)

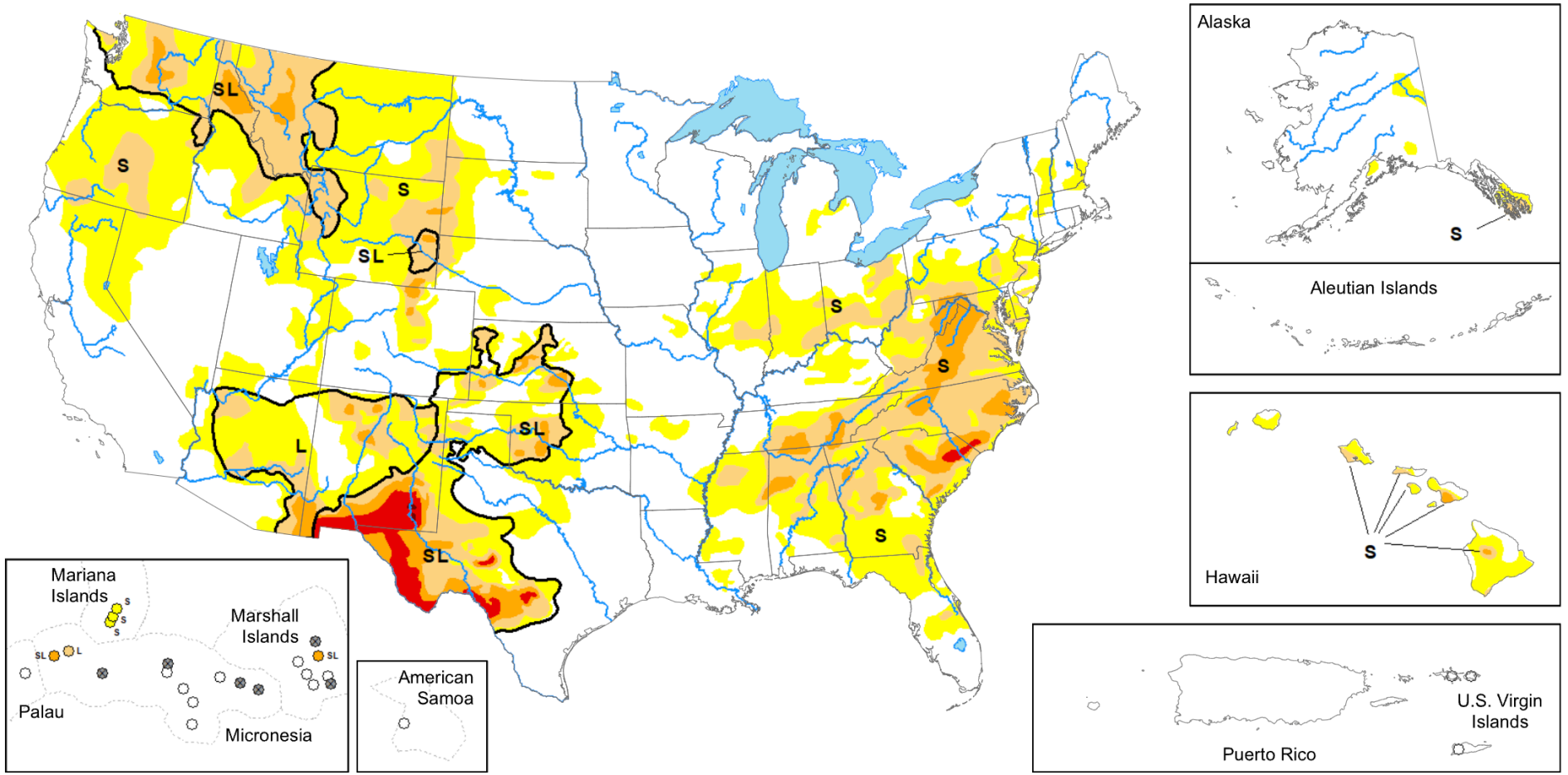
QGIS practical

- Vector layer: QGIS/WMO_Basemap_EPSG_3832.zip
- Raster layer: tiff/
- CMORPH prcp monitor
  - Pmean : CMORPH_Pmean_90day.tif
  - Panom : CMORPH_Panom_1yr.tif
  - PanomPct: CMORPH_PanomPct_180day.tif
- CPC unified data:
  - SPI: GLOBAL-NOAA_CPC_DAILY_GLOBAL-spi-12mo.tif
  - SPEI: GLOBAL-NOAA_CPC_DAILY_GLOBAL-speih-6mo.tif
- ERA5 EDDI: GLOBAL-ERA5-eddih-1mo.tif
- GPM IMERG: GLOBAL-GPM_DAILY-spi-2mo.tif
- SMP: smp_glb.tif, smp_glb_monthly.tif, smp_glb_weekly.tif
- SRI: sri1_glb.tif, sri3_glb.tif
- ESI: esi_glb.tif
- VHI (1km): GVH1kmInitialVH_VHI_geotiff_v2r01_j01_s202407010000000_e202407072359590_c202407080341410.tif

Map released: July 11, 2024

Data valid: July 9, 2024

View grayscale version of the map



Intensity and Impacts

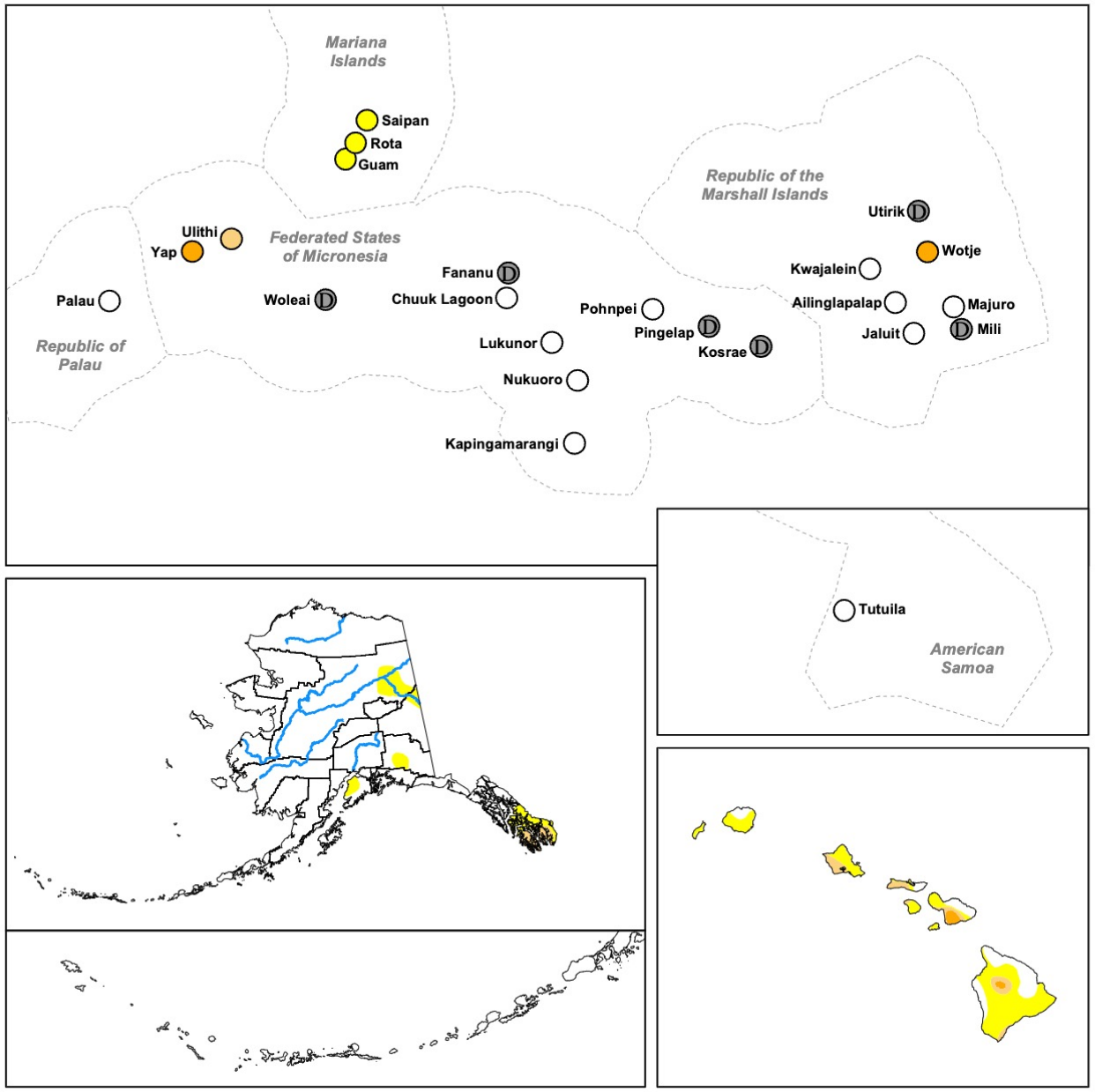
- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

~ - Delineates dominant impacts

S - Short-term impacts, typically less than 6 months (agriculture, grasslands)

L - Long-term impacts, typically greater than 6 months (hydrology, ecology)

SL - Short- and long-term impacts



Map released: Thurs. July 11, 2024

Data valid: July 9, 2024 at 8 a.m. EDT

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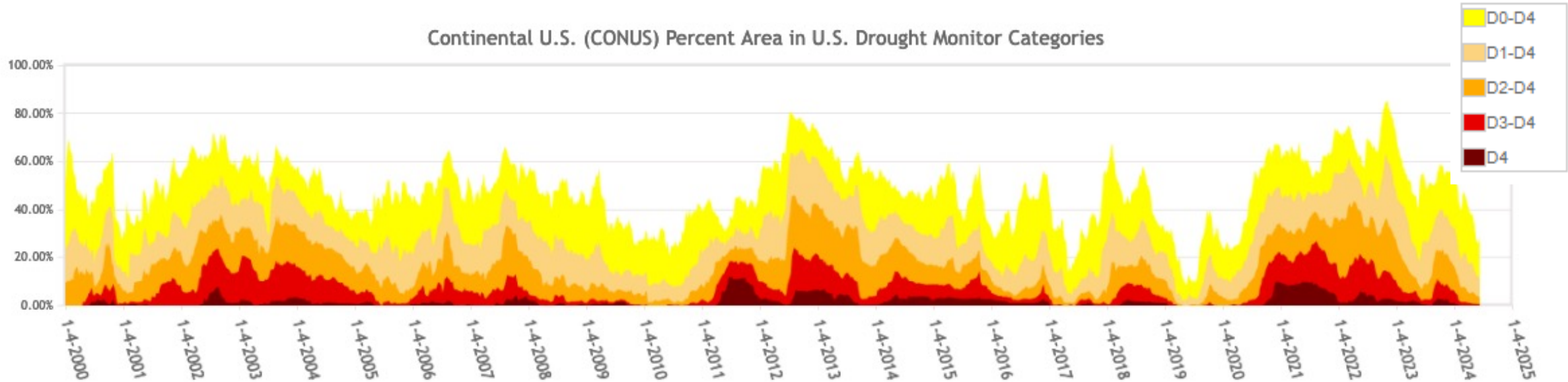

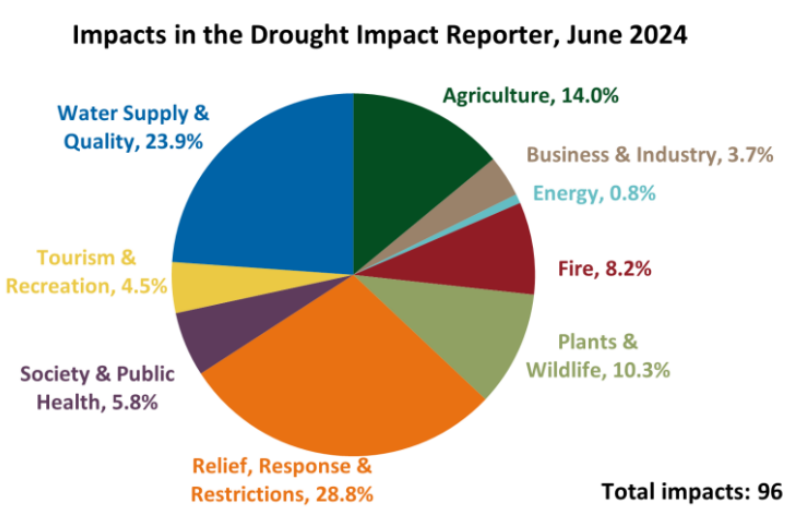

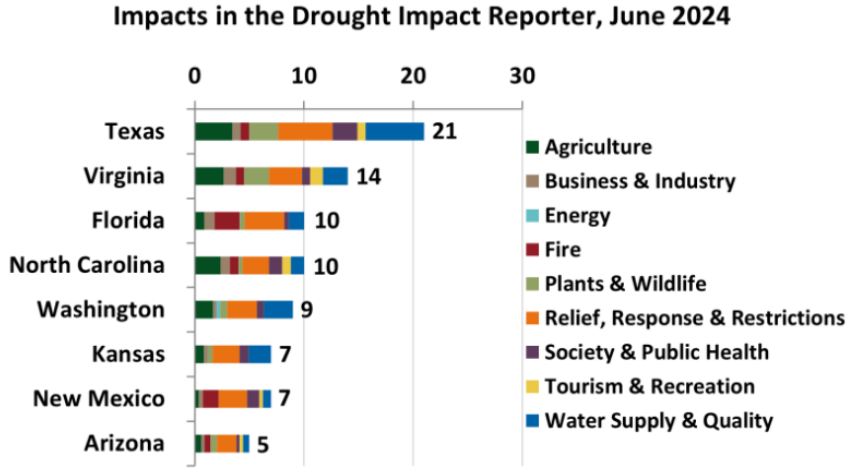

June 2024 impact summaries by category (left) and top states (right).

Operational USDM schedule

- Monday: collect obs. data and review figures
- Tuesday: draft drought monitor map and sent to the local stakeholder for feedback
- Wednesday: revise and improve map based on feedback
- Thursday: release offical USDM
- Friday: drought impact and early warning