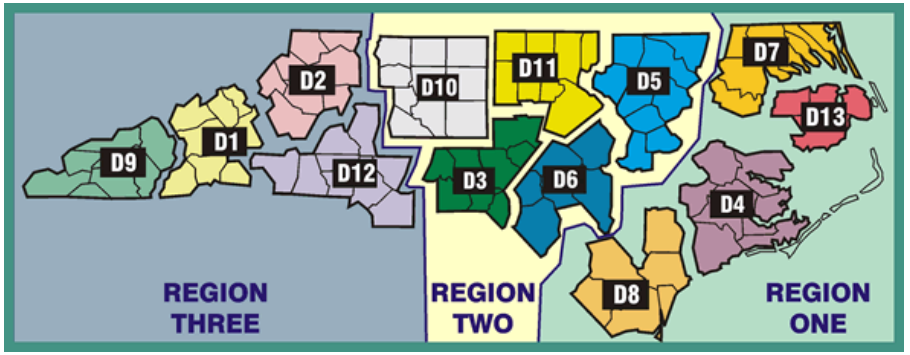
Statewide Seasonal Fire Danger Assessment

– July 2023 Update –



Created by: Jamie Dunbar

Fire Environment Staff Forester

NC Forest Service

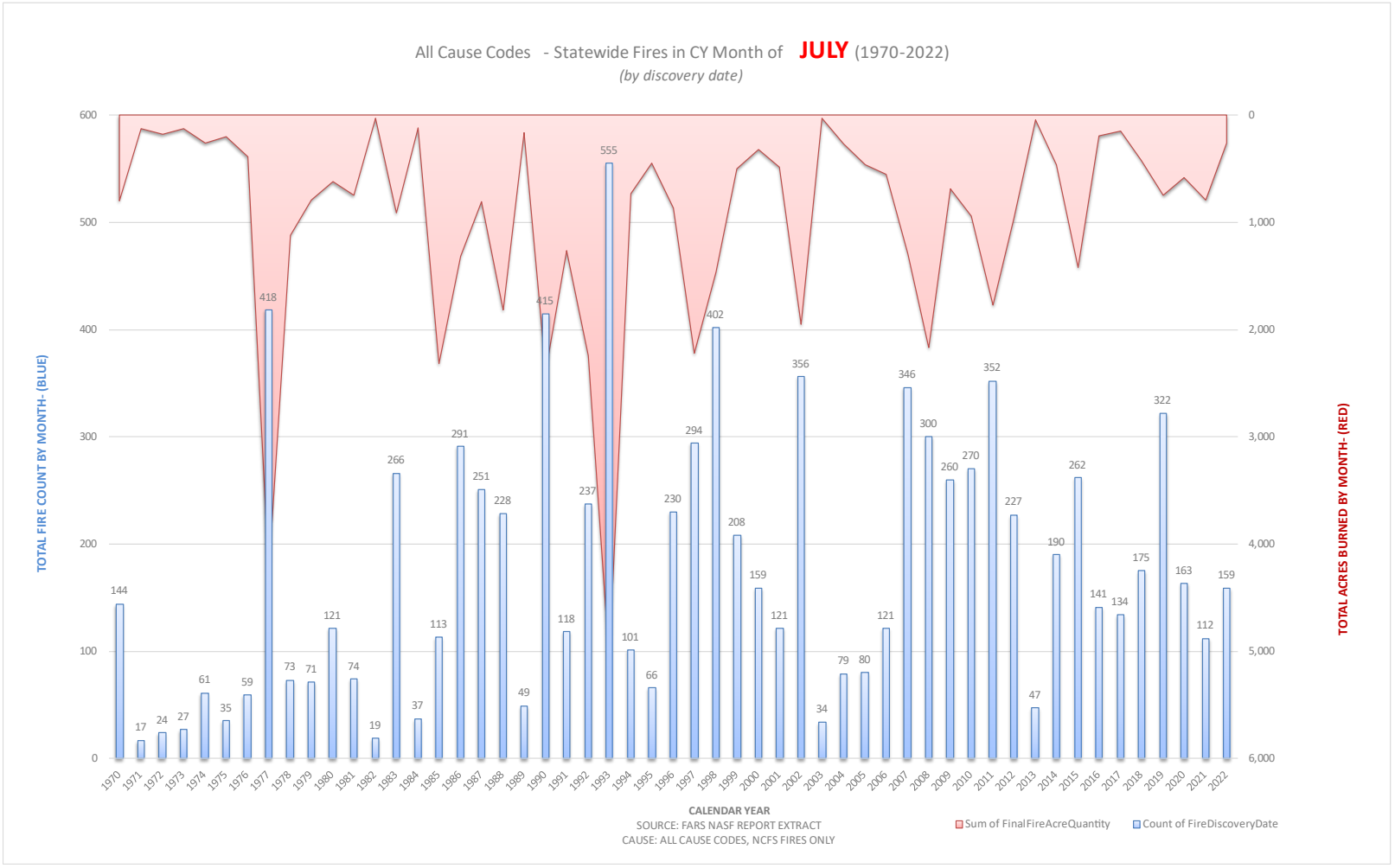
7/11/23

Month to Date Incident Activity

fiResponse Incident Location Map (for general context)
Date Range: 7/1 – 7/9, 2023
Report: Business Intelligence Module, Response Trends Map

NCFS – By Region				
Monthly Fire Activity (Does Not Include Federal Ownerships)				
Data Source:	Signal 14 Regional Activity Summary Report (Signal 14 is a snapshot in time)			
Date Range:	7/1 – 7/9, 2023			
Area	Wildfire Count	Wildfire Acres	RX Count	RX Acres
R1	14	12.4	0	0
R2	25	804.6	0	0
R3	6	7.8	0	0

Distribution of All Fires for month of JULY from 1970 - 2022



Cause: All Cause Codes, Statewide, NCFS Reported Fires Only

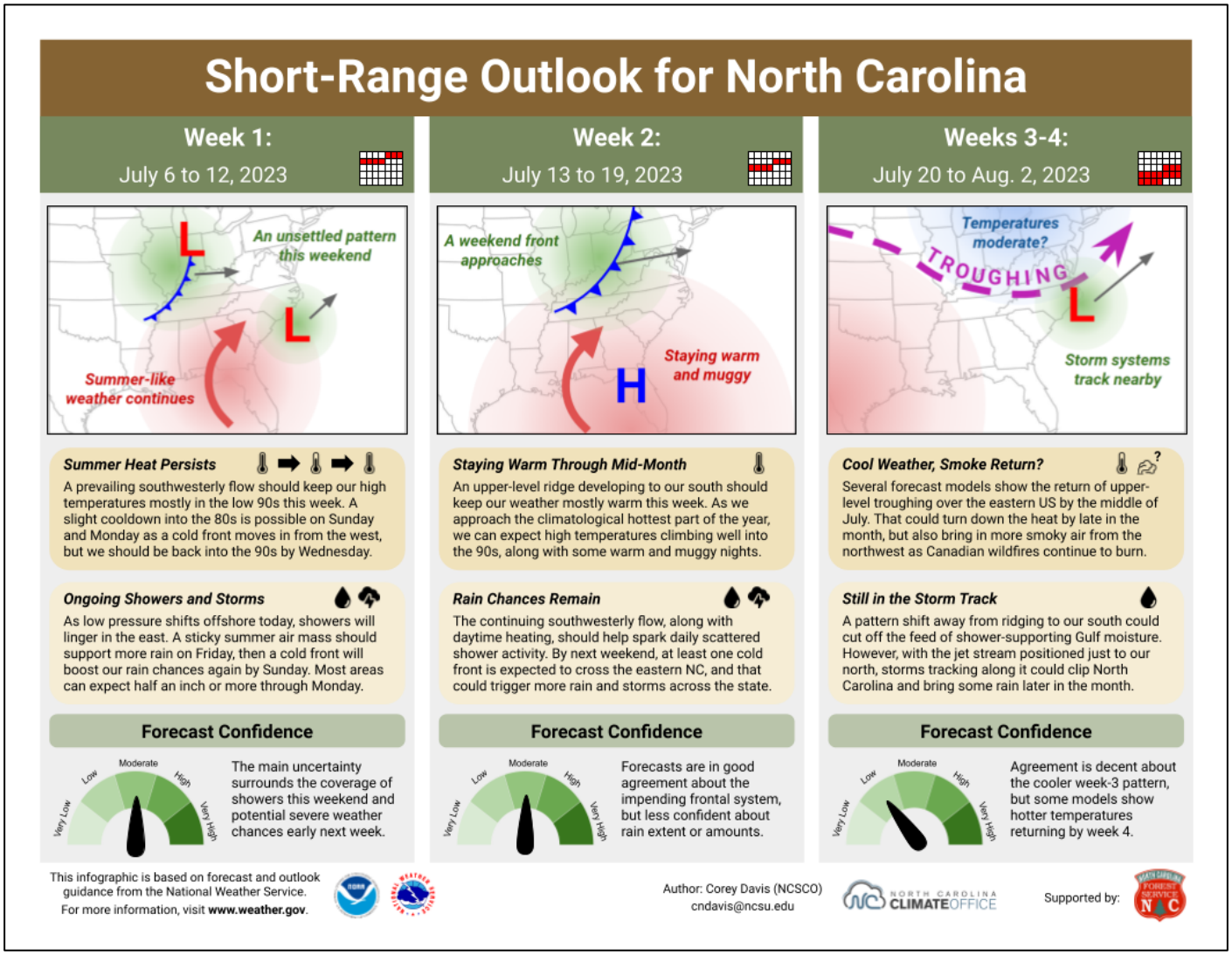
10-Yr. Rolling Average for July: ~ 171 Fires for 506 Acres

Fire Environment Slides

Summary on Last Slide

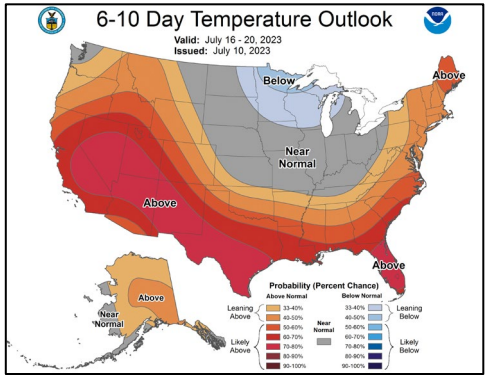
State Climate Office: Short-Range Monthly Outlook for NC

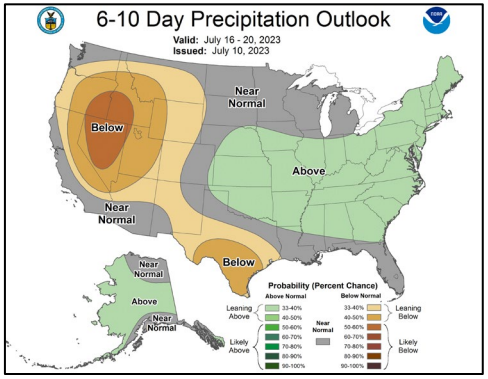
Released 7/6/23 & Location: https://climate.ncsu.edu/fire/outlooks/

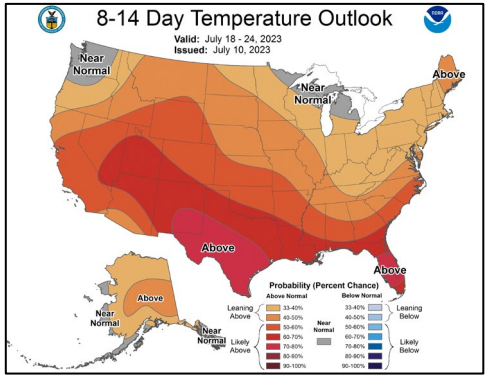


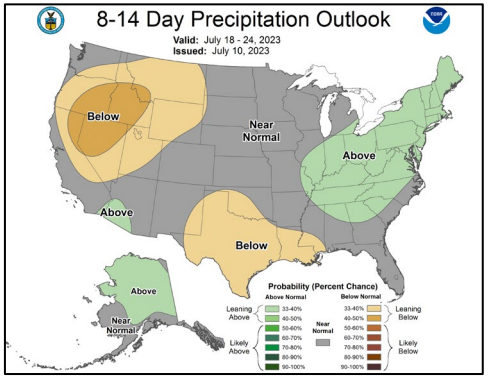
Temp & Precip Outlook

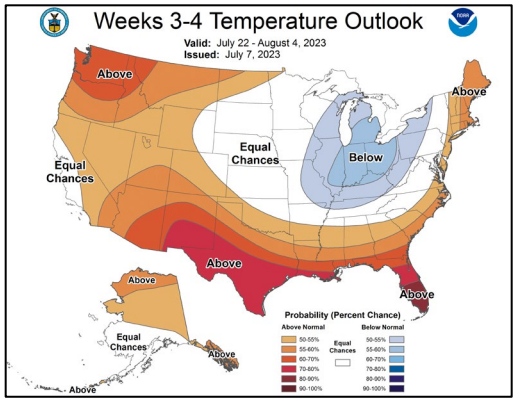
6-10 Day, 8-14 Day & Weeks 3-4

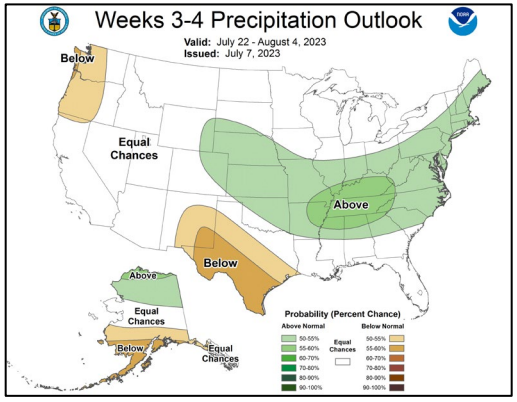






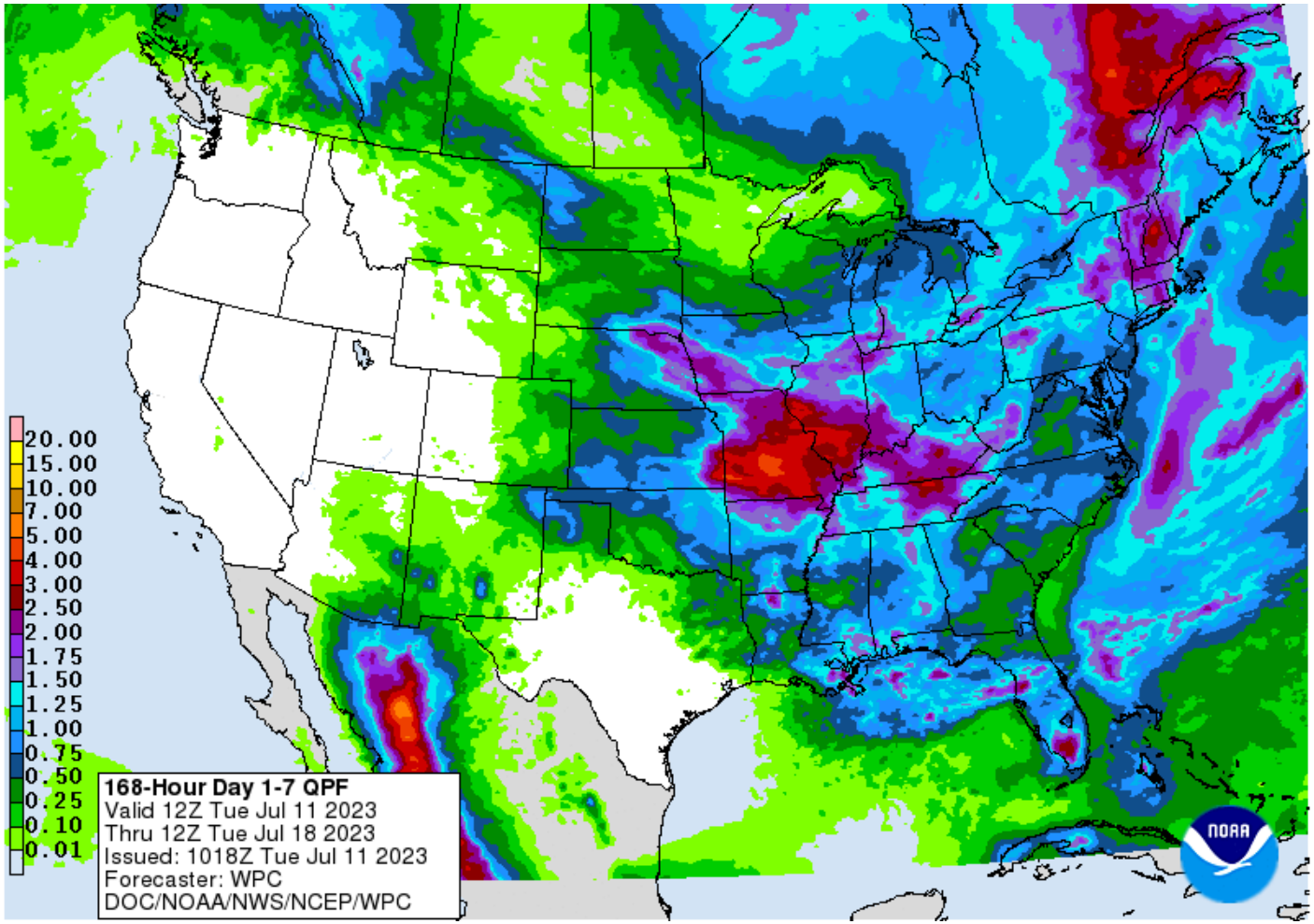






Source: https://www.cpc.ncep.noaa.gov/

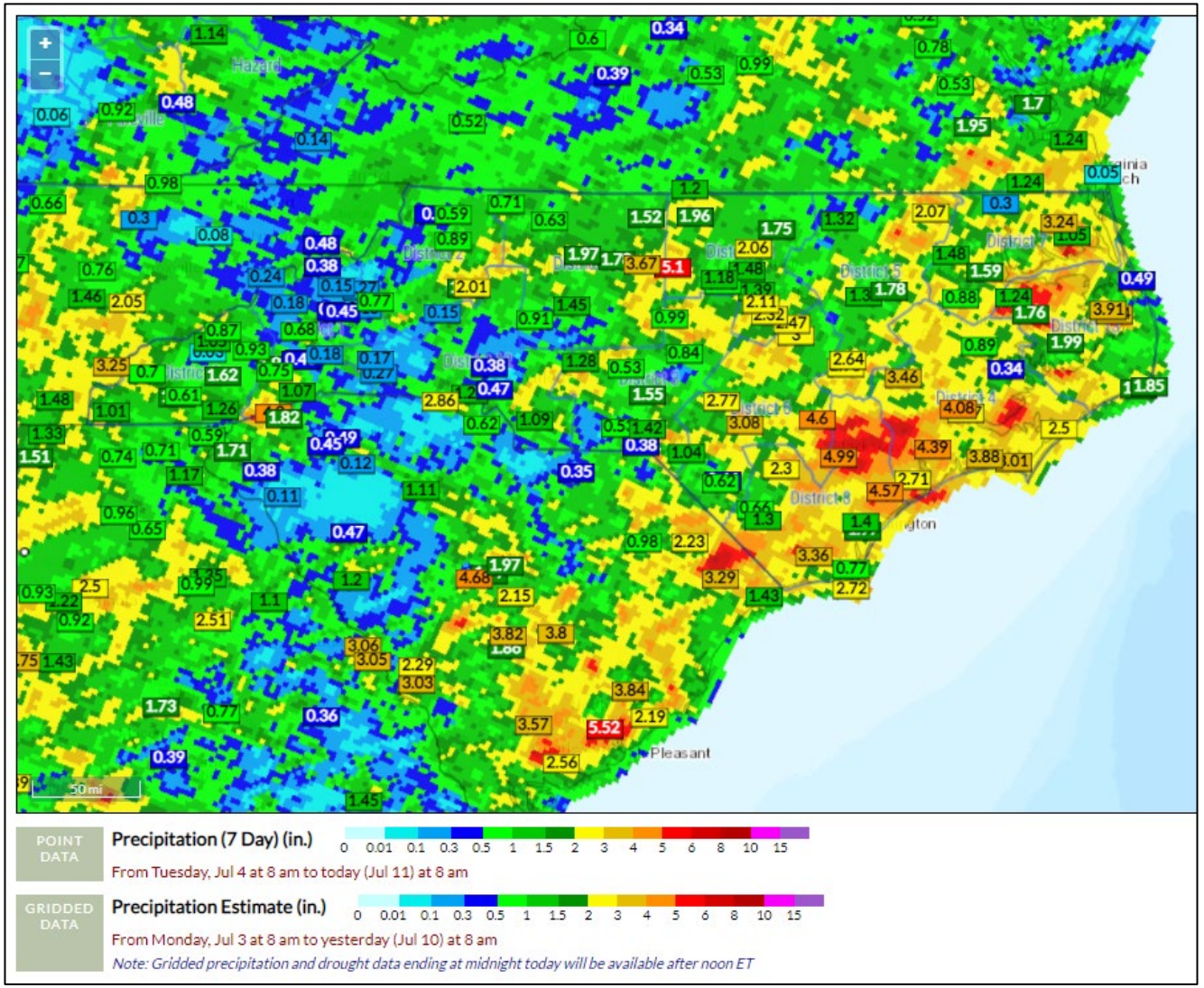
Quantitative Precipitation Forecast, 7-Day



Location: https://www.wpc.ncep.noaa.gov/#

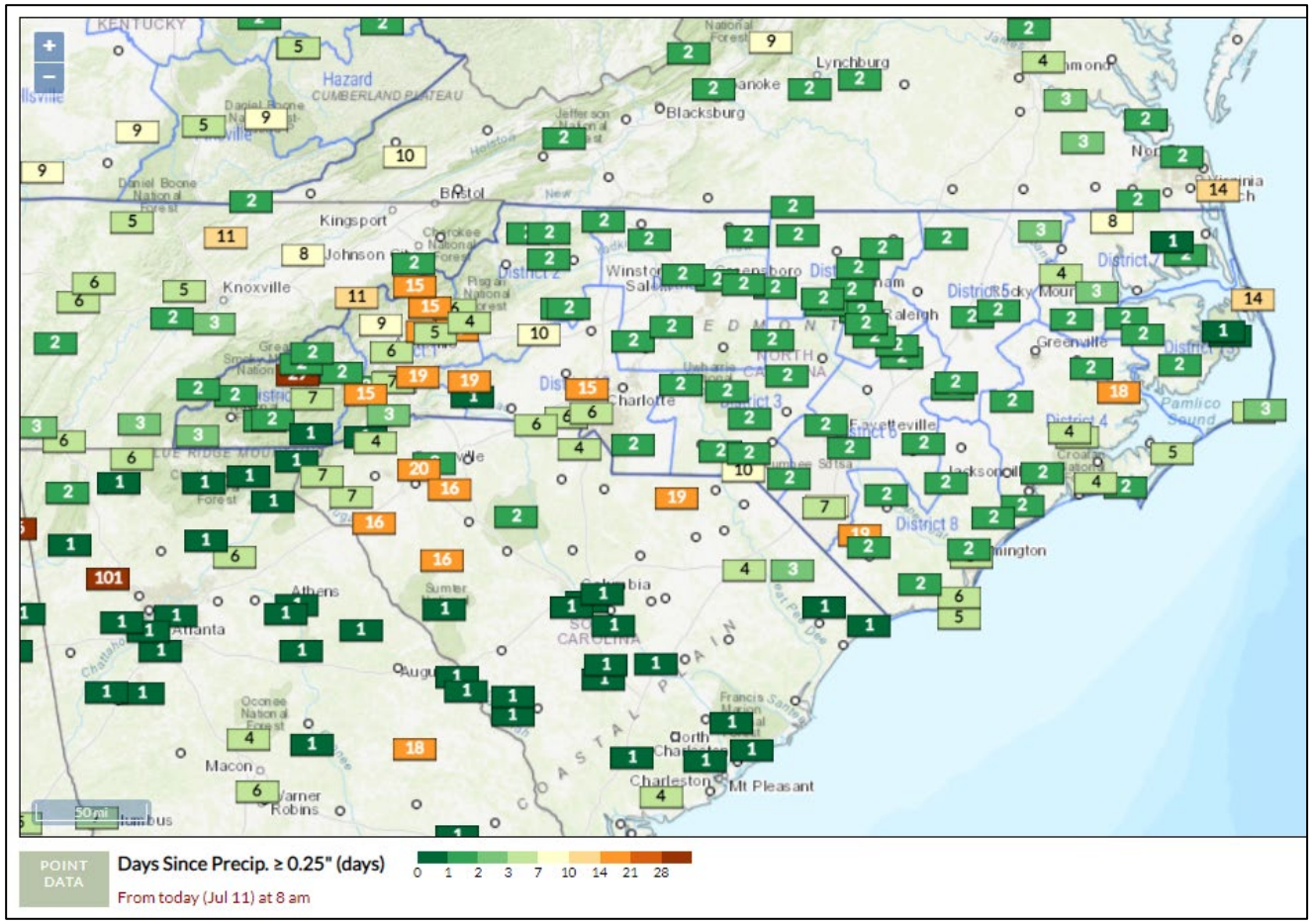
7 Day Precipitation Totals

FWIP *(Point accumulation ending at 0800 on 7/11, Grid ending 0800 7/10)*



Days Since Precip ≥ 0.25”

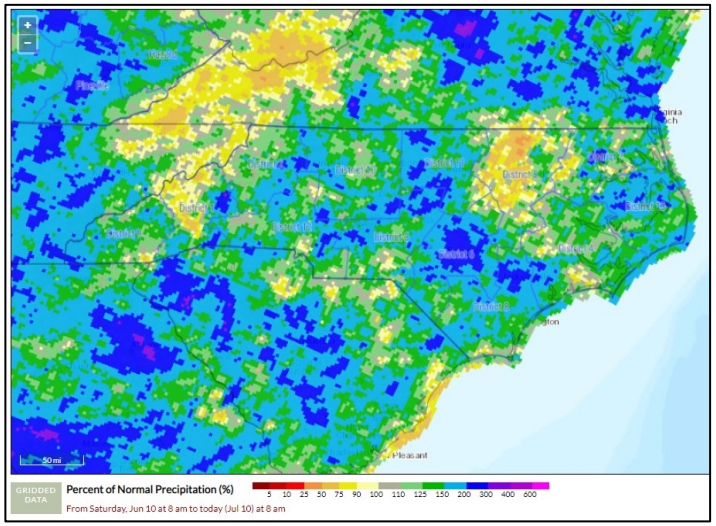
FWIP *(Point calculation ending at 0800 on 7/11)*



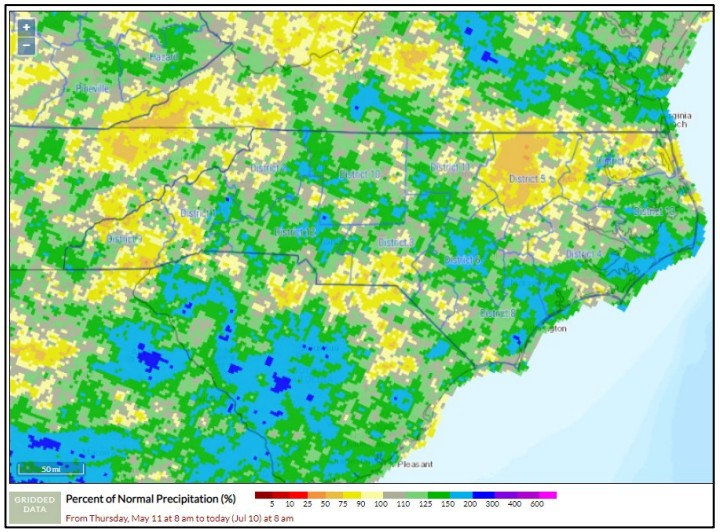
- Cow Mountain RAWS has a known rain gauge issue (BIA).
- Locust Gap & Highlands RAWS are reporting rain again (USFS).

Percent of Normal Precip, *FWIP* *(Ending 0800 7/10)*

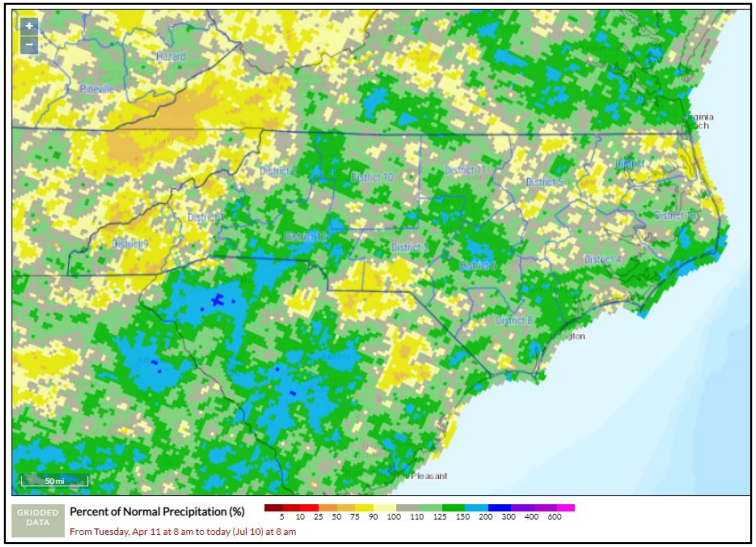
30-Day % of Normal



60-Day % of Normal



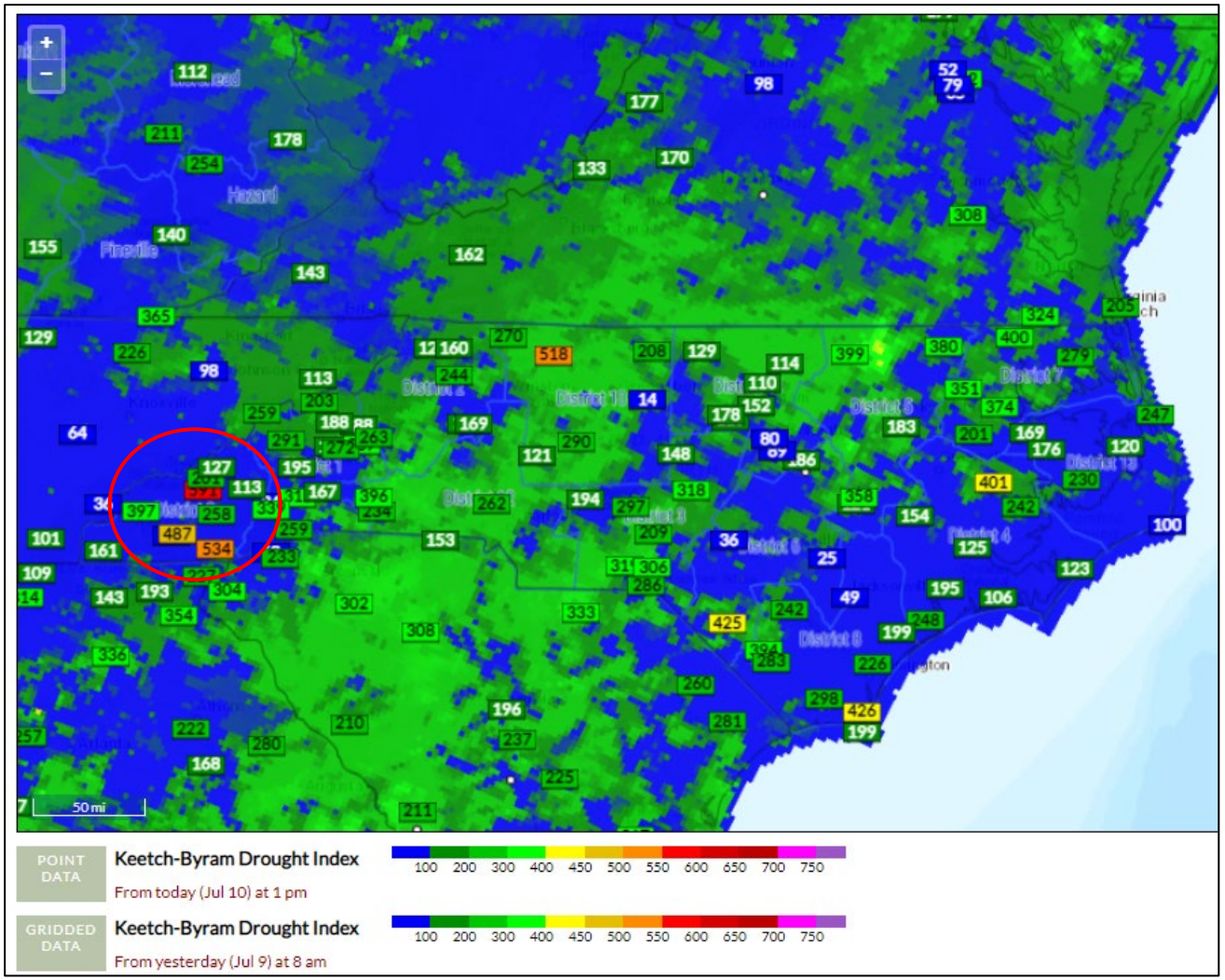
90-Day % of Normal



- Many areas of improvement since last month's update.
- However, pockets of dryness still exist – note 40% of normal in D5 area at the 1-to-2-month time scale as example.

KBDI - Gridded & Station Points

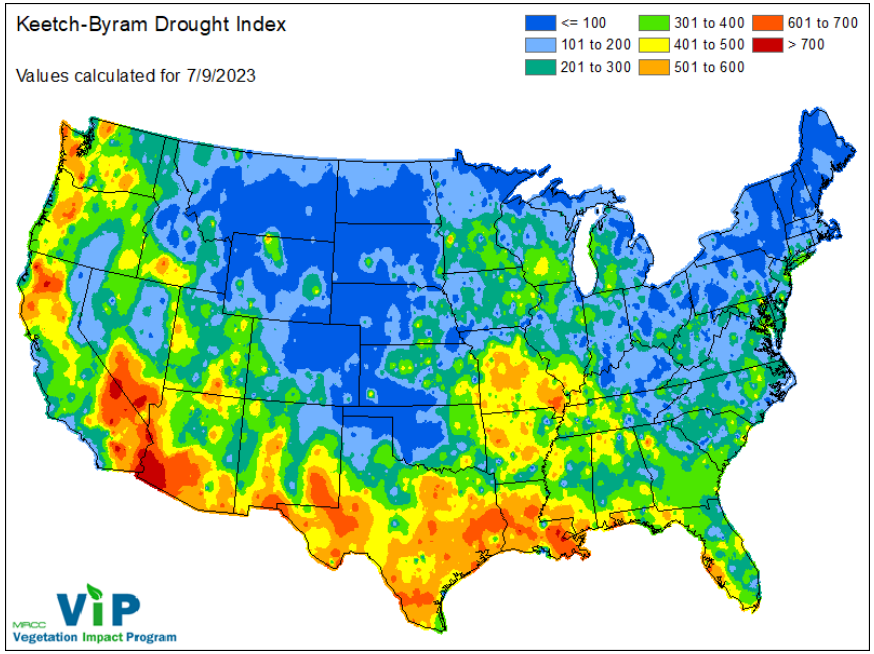
FWIP (Point calculation from 1300 on 7/10, Grid ending 0800 7/9)

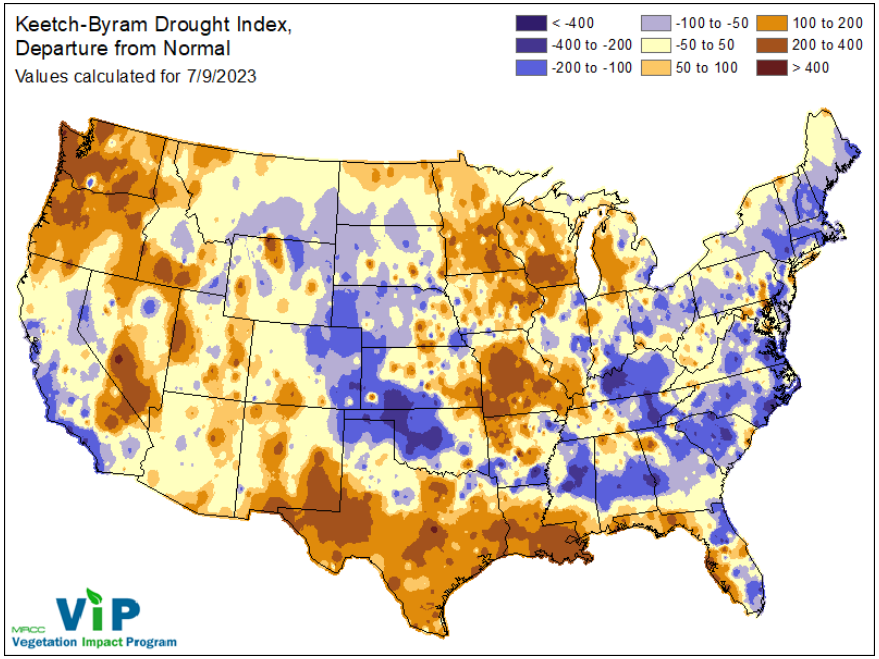


- *Red Circle Area: High KBDI values reflect known issues with rain gauge at Cow Mtn RAWS and recently repaired Locust Gap & Highlands RAWS.*

KBDI – Calculated Values & Estimated Departures from Normal

- *This product is created by the Midwestern Regional Climate Center. See FAQ.*

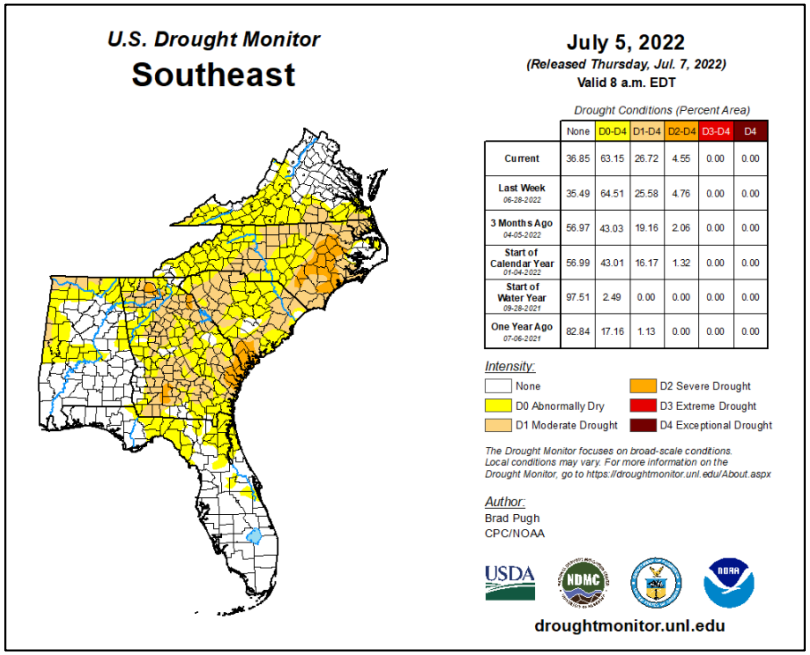




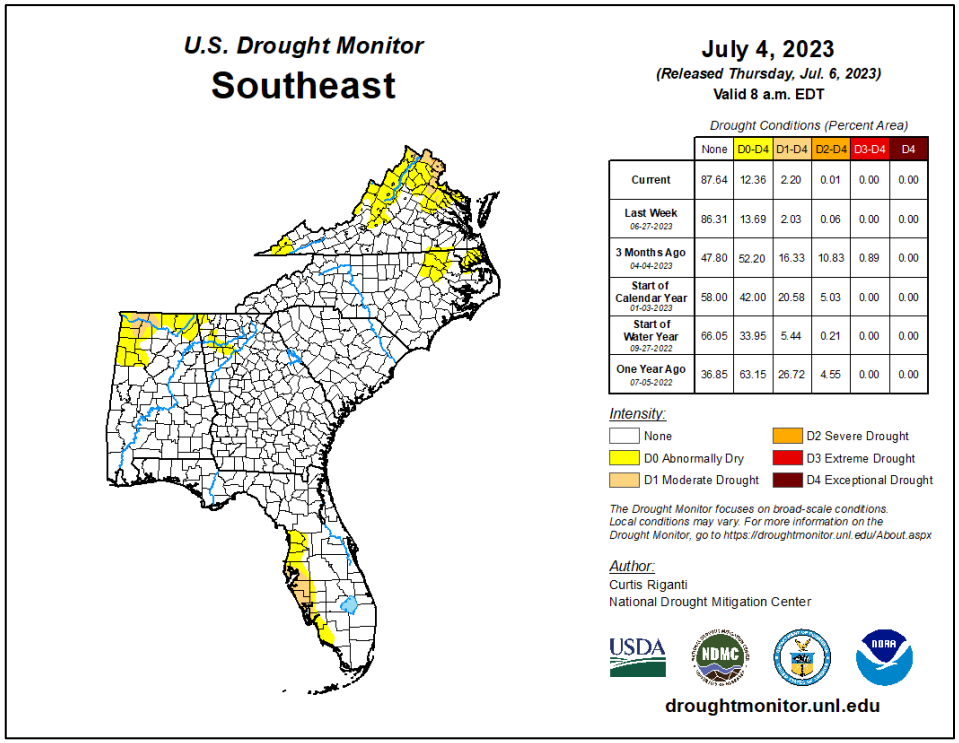
Drought Monitor (USDM)

- "D0" Abnormally Dry Designation now for ~8% of State
- *The USDM map is released every Thursday morning, with data valid through Tuesday at 7am Eastern.*

One Year Ago:



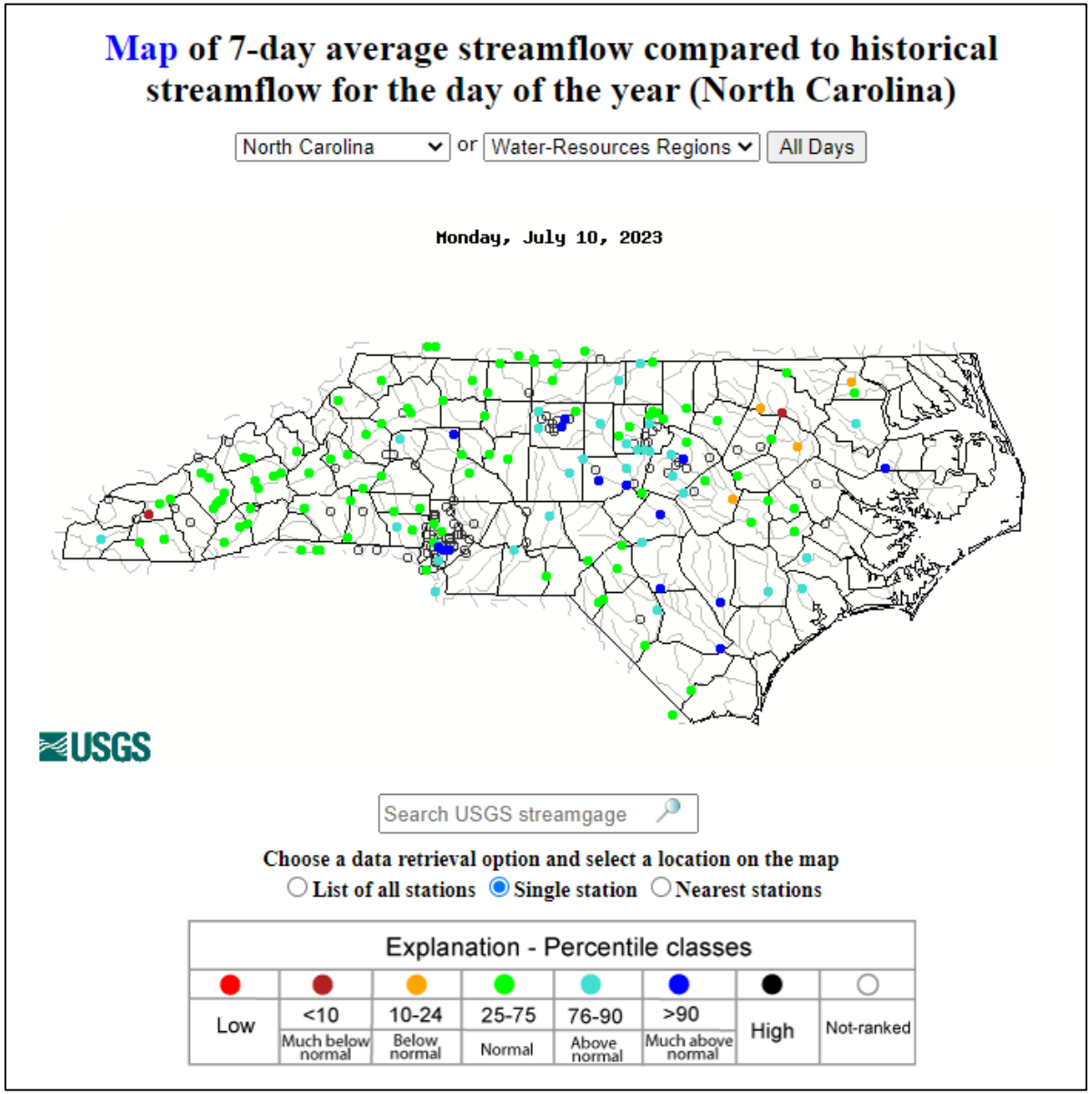
Current Week:



Sources: https://www.ncdrought.org/map-archives

Streamflow:

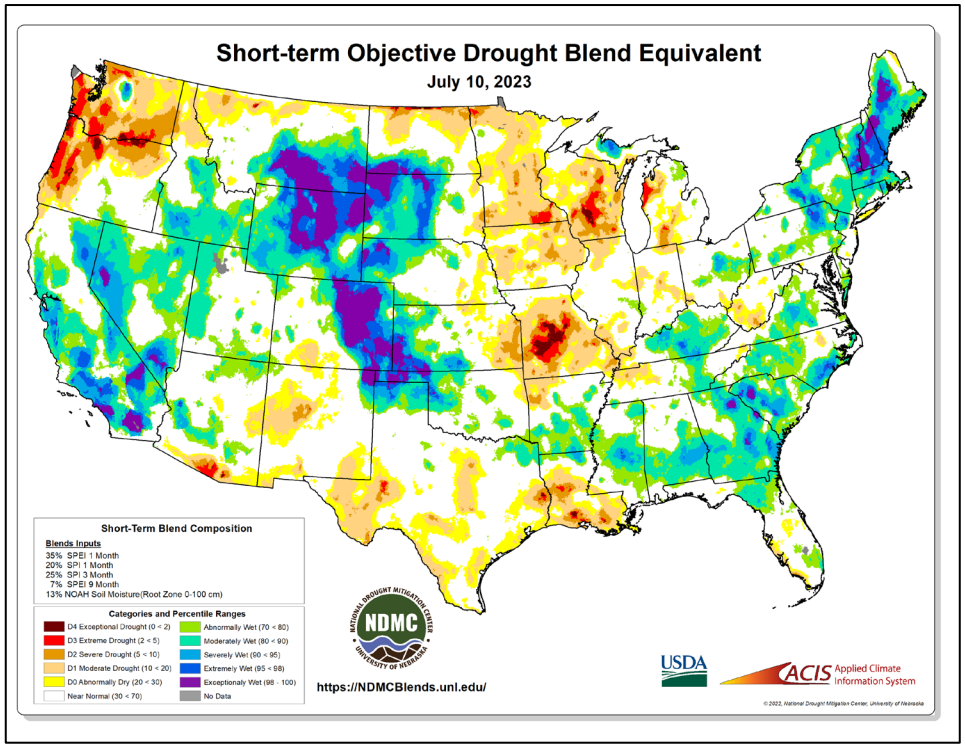
- Improvement in 7-Day Average Stream Flows in much of NC as compared to last month's map.



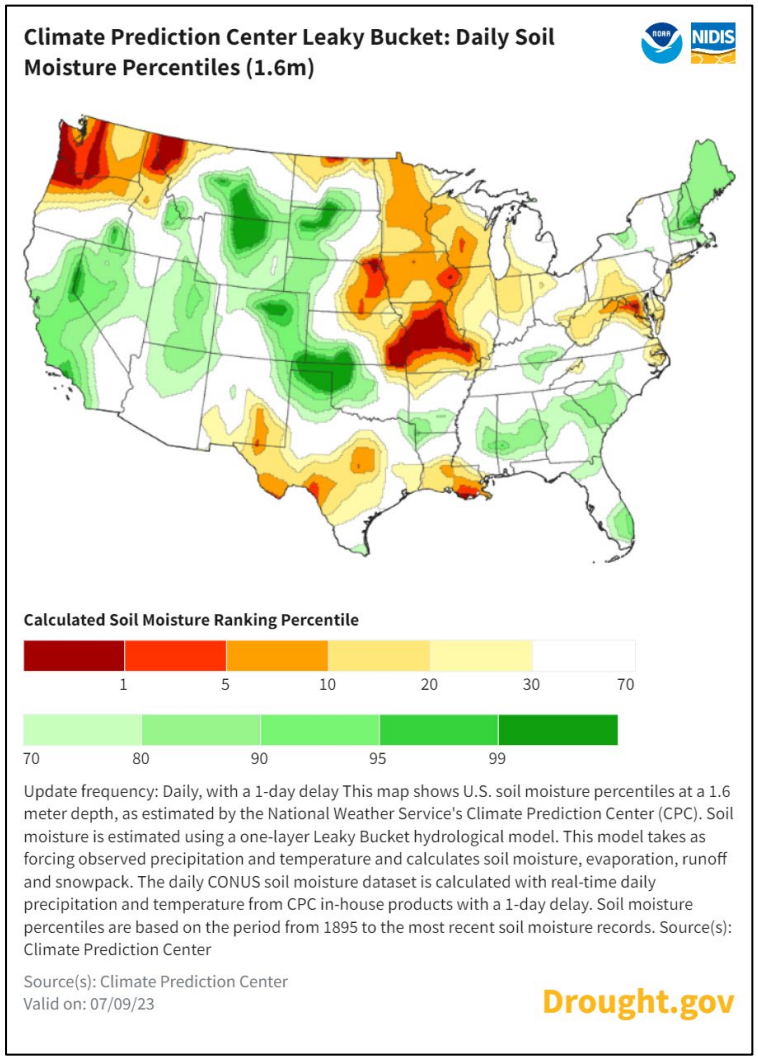
Source: https://waterwatch.usgs.gov/index.php?m=pa07d&r=nc&w=map

Modeled Relative Soil Dryness

NDMC Short-term Drought Blend (7/10/23)



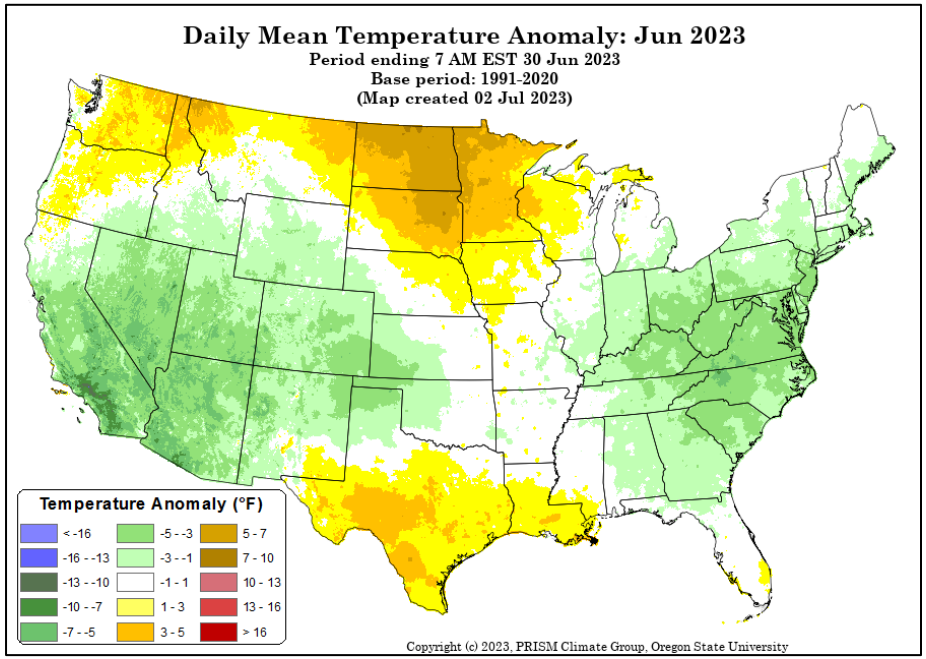
National CPC Product: 7/9/23

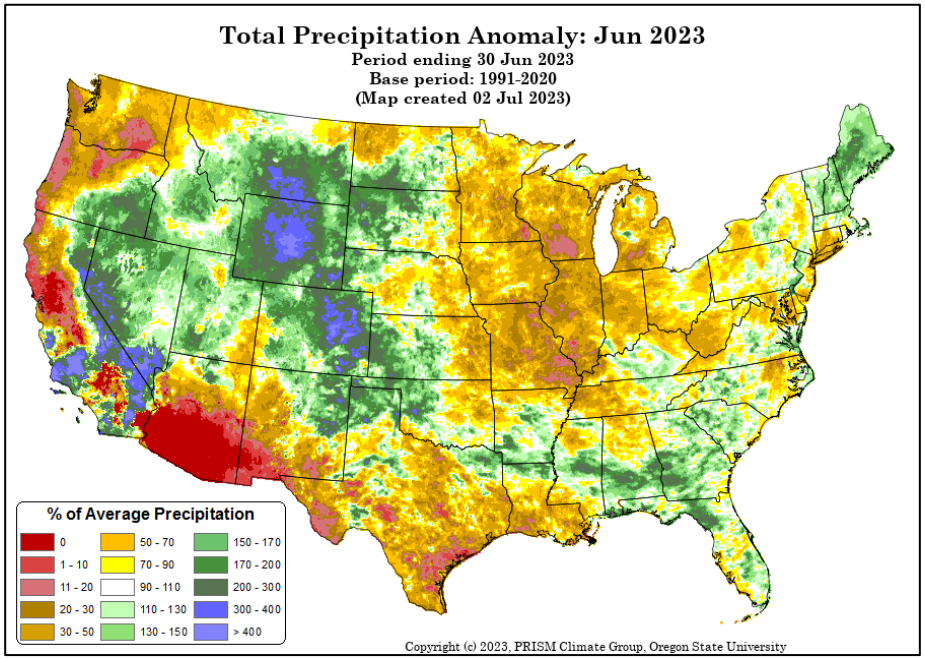


- SPoRT products are still down due to disk failure.
- General improvements noted in the Blend and CPC Maps.

Source: https://ndmcblends.unl.edu/Home.aspx , https://www.drought.gov/testing/soil-moisture-indicators

June Precip and Temp Anomalies – US Context





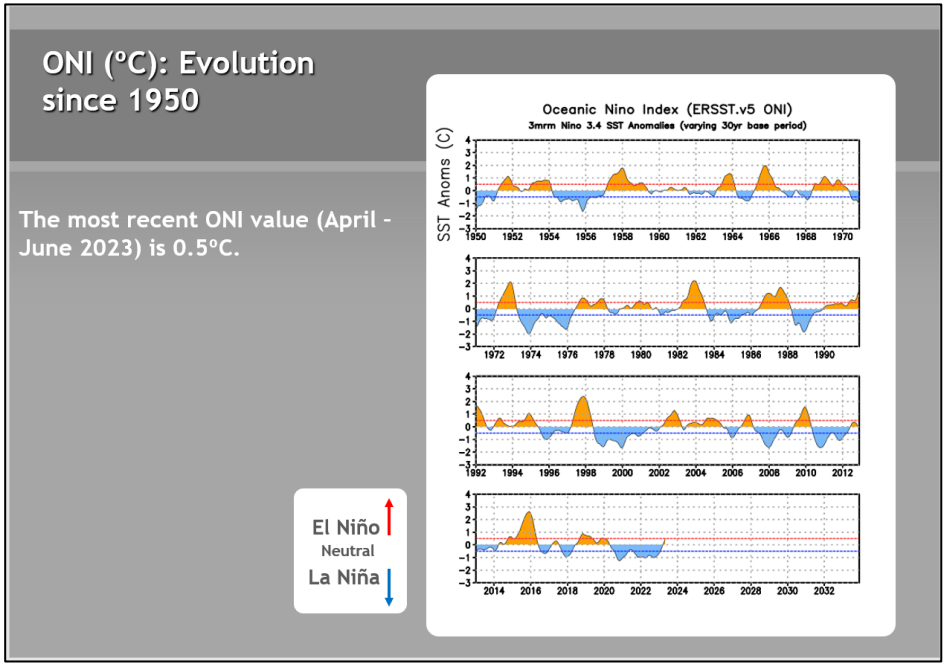
Source: https://prism.oregonstate.edu/mtd/

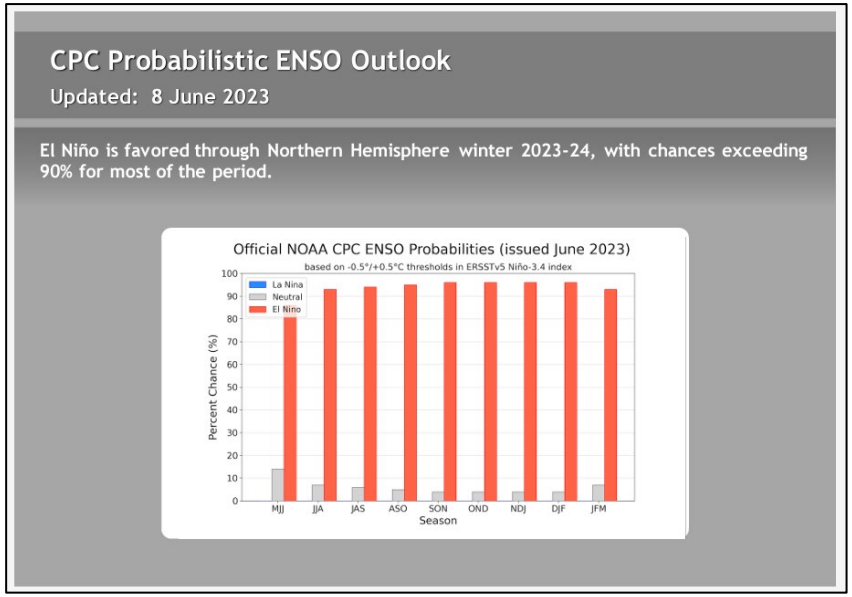
ENSO Notes from the CPC (7/10/23 Update)

ENSO Alert System Status: **El Niño Advisory**

El Niño conditions are present and are expected to gradually strengthen into the Northern Hemisphere winter 2023-24.
Is forecast to continue through the winter with a 56% Chance of a strong El Niño developing this fall.

ENSO, or El Nino Southern Oscillation, is a fluctuation in the sea surface temperature (SST) in the equatorial Pacific Ocean. Research has shown that even slight changes in the SST, particularly in area 3.4, can influence weather in North America. Generally, when SSTs are lower than normal, known as La Nina, NC has drier than normal conditions and can have more fire occurrence. However, La Nina also can lead to more tropical activity. El Nino, on the other hand, usually means wetter weather for NC, but less opportunity for tropical landfalls due to increased wind shear. In order to declare a La Nina, the departure from average SST must be at least -0.5° C (line shown in green) for 3 consecutive months. For El Nino, the departure must be at least 0.5° C above average for 3 consecutive months.

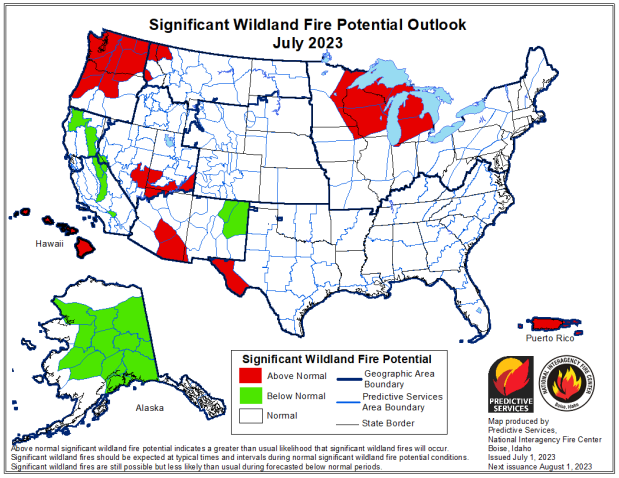


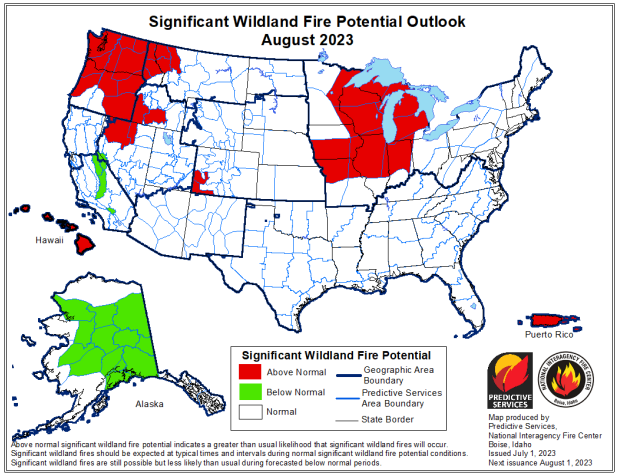


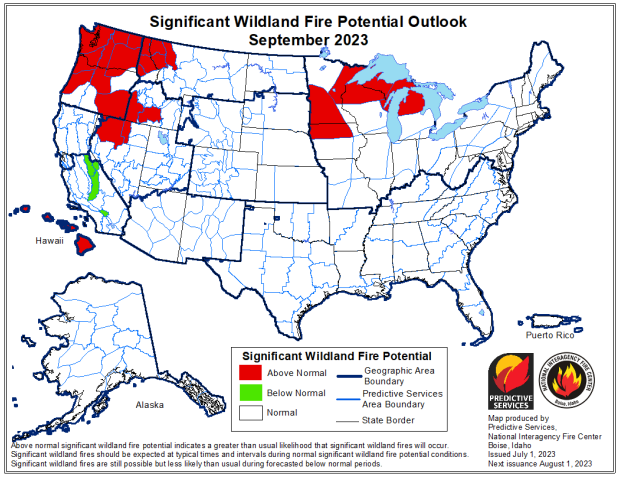
Slide Source: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.ppt

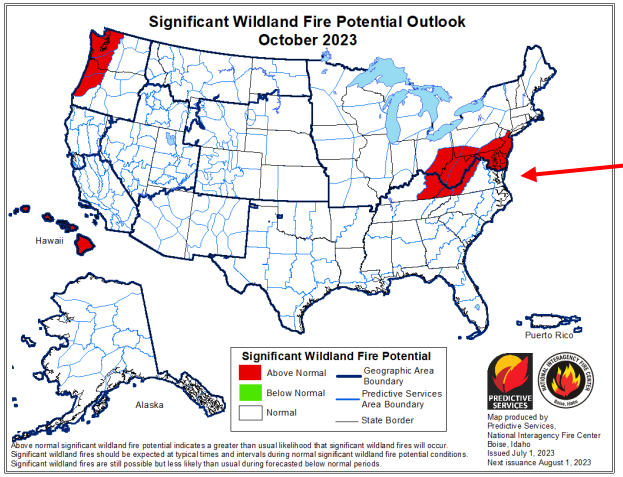
Significant Wildland Fire Potential Outlook:

Updated 7/1/23 – Next Update on 8/1/23









A significant fire is one that requires resources from outside the district (other than aviation). IA potential is based more on shorter term weather factors. Just a few days of dry weather can increase IA activity considerably as we have seen this year.

Useful Daily Self-Briefing & Situational Awareness Links

Not an exhaustive list.

Useful Daily Links:

Daily WIMS Observations and NFDRS Estimates

Averaged by FDRA SIG Group
This is available on the FWIP at: https://products.climate.ncsu.edu/fwip/nfdrs.php?data=ob&state=NC

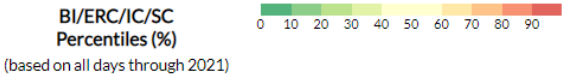
- The averaged values are derived from the SIG Station Outputs for a particular FDRA
  (SIG station names shown in bold on the live link above)

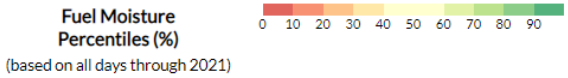
- You can toggle the percentiles on/off, displaying below the actual calculated values
  these percentiles are based on analysis of "All Days" for entire calendar year range through 2021 for these stations

Daily Observations for 7/10/23

Averages by FDRA

FDRA	STATION_COUNT	NFDR_DATE	BI	ERC	IC	SC	KBDI	1HR	10HR	100HR	1000HR	HRB	WOODY	TEMP	RH	WIND	PRECIP	DUR
Southern Highlands	3	2023-07-10	23.17 30.6%	11.30 31.3%	1.93 38.7%	7.93 45.1%	394.00	15.52 63.0%	22.48 73.8%	19.20 46.0%	21.81 76.3%	207.67	171.67	77.7°F	64.3%	ESE 3.0 mph	0.16 in.	4.7
Central Mountains	3	2023-07-10	14.63 20.4%	7.67 22.1%	1.20 26.3%	4.23 21.8%	315.00	17.11 67.5%	23.87 82.8%	18.84 49.8%	21.49 68.1%	250.00	200.00	81.7°F	55.3%	SSW 3.3 mph	0.12 in.	4.3
Northern Highlands	2	2023-07-10	19.95 33.6%	8.60 31.6%	1.55 47.0%	7.15 45.0%	216.00	15.93 59.3%	22.72 77.0%	18.44 35.9%	21.75 80.1%	250.00	200.00	77.0°F	48.0%	E 5.0 mph	0.03 in.	2.5
Blue Ridge Escarpment	3	2023-07-10	28.87 39.5%	15.27 35.6%	2.80 38.3%	9.53 49.3%	301.00	14.34 61.1%	21.46 70.1%	20.24 58.2%	19.67 50.8%	189.07	158.00	82.0°F	55.0%	WSW 2.0 mph	0.05 in.	2.3
Western Piedmont	3	2023-07-10	21.37 20.2%	13.23 22.3%	1.77 25.0%	5.33 22.2%	243.33	15.16 73.2%	21.37 78.2%	18.33 49.4%	19.64 64.0%	128.40	117.67	83.3°F	58.7%	SW 3.0 mph	0.17 in.	1.0
Sandhills	3	2023-07-10	10.47 11.6%	8.87 11.4%	0.77 15.7%	2.17 13.4%	183.67	22.95 88.4%	25.99 90.2%	20.24 68.3%	20.17 64.0%	91.53	97.67	77.0°F	79.0%	E 1.0 mph	0.42 in.	3.0
Eastern Piedmont	4	2023-07-10	17.30 11.2%	9.20 13.9%	0.98 15.8%	4.93 8.9%	143.00	17.05 78.3%	23.66 86.8%	20.96 78.5%	19.96 62.9%	112.30	113.25	79.5°F	76.0%	SE 2.0 mph	0.52 in.	2.5
Southern Coastal	7	2023-07-10	7.41 6.6%	5.97 10.9%	0.50 16.0%	1.29 4.1%	290.00	19.48 81.8%	23.89 86.1%	20.91 71.9%	21.46 64.1%	246.09	194.57	82.0°F	77.1%	SW 1.1 mph	0.34 in.	2.4
Northern Coastal	4	2023-07-10	14.18 12.3%	13.93 21.0%	1.18 18.1%	2.13 8.1%	264.75	15.05 69.0%	20.55 77.4%	19.00 52.8%	20.01 55.0%	147.60	130.25	84.8°F	68.8%	WSW 1.3 mph	0.74 in.	2.3





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Daily Forecast for 7/11/23 (issued on 7/10)

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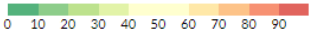
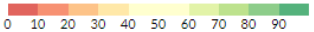
Southern Highlands	3	2023-07-11	27.87 44.9%	15.73 48.7%	3.13 51.9%	8.07 45.1%	394.00	13.42 42.1%	20.07 63.9%	19.39 46.0%	21.79 76.3%	202.87	168.00	79.0°F	52.0%	WSW 3.3 mph	0.3	0.0
Central Mountains	3	2023-07-11	21.60 34.6%	14.47 38.7%	2.93 51.9%	5.13 31.7%	315.00	12.66 46.9%	20.19 65.7%	19.38 49.8%	21.36 68.1%	250.00	200.00	80.7°F	46.7%	SW 3.0 mph	0.0	0.0
Northern Highlands	2	2023-07-11	23.25 40.4%	14.80 50.0%	3.15 58.1%	5.75 38.6%	216.00	12.55 37.9%	18.53 56.7%	18.95 50.6%	21.61 80.1%	250.00	200.00	76.0°F	46.5%	SW 2.5 mph	0.0	0.0
Blue Ridge Escarpment	3	2023-07-11	40.80 57.7%	26.53 64.6%	5.37 54.4%	11.87 54.4%	301.00	11.45 37.1%	16.35 38.9%	19.10 45.9%	19.97 50.8%	182.30	154.33	82.7°F	42.3%	S 2.0 mph	0.0	0.0
Western Piedmont	3	2023-07-11	42.27 53.4%	24.40 50.0%	5.30 49.6%	13.23 52.8%	243.33	12.43 55.3%	20.69 78.2%	18.14 49.4%	19.60 64.0%	120.07	110.00	88.3°F	42.0%	WNW 3.0 mph	0.0	0.0
Sandhills	3	2023-07-11	27.20 27.8%	25.53 26.1%	5.03 33.6%	5.40 47.6%	183.67	13.03 64.7%	22.00 81.1%	20.17 68.3%	20.16 64.0%	89.33	95.67	91.0°F	39.3%	NW 2.7 mph	0.0	0.0
Eastern Piedmont	4	2023-07-11	25.65 15.1%	18.18 22.1%	2.83 25.6%	5.90 10.0%	143.00	13.51 66.7%	21.05 77.1%	20.52 78.5%	20.23 62.9%	114.50	112.75	89.8°F	46.3%	NW 1.3 mph	0.0	0.0
Southern Coastal	7	2023-07-11	15.83 11.3%	11.11 16.0%	1.74 22.3%	3.40 7.2%	290.00	14.47 63.2%	22.01 80.1%	21.78 80.7%	21.49 64.1%	247.01	196.86	88.4°F	55.0%	NW 3.0 mph	1.3	0.0
Northern Coastal	4	2023-07-11	26.23 18.7%	17.15 24.2%	2.68 29.2%	6.50 15.5%	264.75	13.98 64.4%	19.31 68.8%	18.81 52.8%	19.81 55.0%	149.38	132.25	88.0°F	53.3%	SSW 4.3 mph	0.0	0.0

BI/ERC/IC/SC Percentiles (%)
(based on all days through 2021)



Fuel Moisture Percentiles (%)
(based on all days through 2021)



Useful Daily Links:

Weekly Outlook - FDRA General Fire Danger Forecast Matrix:

- Available on the FWIP within the "Resources for NCFS" page.
- The operation link is: https://products.climate.ncsu.edu/fwip/outlook.php
- The matrix updates daily - please review the tool notes below for more details.
- For the 9 FDRAs in North Carolina

Southern Coastal FDRA - General Fire Danger Forecast

For planning purposes only; forecast is subject to change

Four or more RED blocks in a day signals the potential for a **Critical Fire Day**

DAY	MON 10-Jul	TUE 11-Jul	WED 12-Jul	THU 13-Jul	FRI 14-Jul	SAT 15-Jul	SUN 16-Jul
Avg. Max. Temp. (°F)	85	91	93	93	94	96	95
Avg. Min. Humidity (%)	70	50	47	52	59	56	57
Avg. 20' Wind Speed (mph)	3	3	4	7	8	9	8
Avg. Wind Direction*	SW	SW	SSW	SSW	SSW	SW	SW
Avg. Probability of Precip. (%)	49	12	6	19	29	32	38
Days Since a Wetting Rain**	1.1	1.9	2.9				
Forecast ERC (Fuel Model X)	11.6	14.1	15.8	15.9	15.4	14.4	14.8
Forecast BI (Fuel Model X)	17.5	17.9	20.3	27.2	27.3	26.4	25.2
Forecast IC (Fuel Model X)	1.5	2.1	3.0	4.1	3.9	3.4	3.4
Forecast 100-Hr. FMC	20.3	19.4	18.7	18.3	18.2	18.3	18.4
Forecast 1000-Hr. FMC	21.4	21.4	21.2	20.9	20.6	20.4	20.2
KBDI	298.6						

Data Source:

- Weather forecasts come from the National Weather Service's Digital Forecast Database. The wind speed and direction, and probability of precipitation, are calculated as averages of the 1 am, 7 am, 1 pm, and 7 pm forecasts. The 20-foot wind speed is estimated from the 10-meter forecast using the log wind profile method.
- Days since a wetting rain is calculated using a combination of historical data (to determine the most recent wetting rain event) and forecasted precipitation amounts. These forecasted amounts are only available for the first three days of the forecast period.
- Fire danger forecasts for the next 7 days are issued by National Weather Service through WIMS. KBDI is only available on the first forecast day since the NFDRS Forecast product does not include precipitation amounts, which are used to adjust KBDI from day to day.

Values in the table above are averages from 7 stations in this FDRA:

- **Finch's Station** (317501)
- **Beaufort** (317801)
- **New Bern** (319004)
- **Turnbull Creek** (319302)
- **Hofmann Forest** (319507)
- **Whiteville** (319701)
- **Sunny Point** (319803)

KEY	Low to Moderate Burning Conditions	Burning Conditions Can be High CAUTION	Burning Conditions Can be Critical WATCH OUT!
Avg. Max. Temp.	Less than 50°F	Between 50°F and 65°F	Greater than 65°F
Avg. Min. Humidity	Greater than 40%	Between 35% and 40%	Less than 35%
Avg. 20' Wind Speed	Less than 5 mph	Between 5 mph and 10 mph	Greater than 10 mph
Avg. Wind Direction*	Criticality of wind direction is highly dependent on burn operations and/or structures threatened.		
Days Since a Wetting Rain**	A wetting rain is defined as 0.10" or greater. This is an average of the FDRA stations noted above.		
Energy Release Comp.	Less than 36.4	Between 36.4 and 47.2	Greater than 47.2
Burning Index	Less than 68.3	Between 68.3 and 89.5	Greater than 89.5
Ignition Component	Less than 7.9	Between 7.9 and 12	Greater than 12
100-Hour Fuel Moisture	Greater than 18.2%	Between 17.3% and 18.2%	Less than 17.3%
1000-Hour Fuel Moisture	Greater than 19%	Between 18% and 19%	Less than 18%
KBDI	Less than 385	Between 385 and 486	Greater than 486

Other factors to consider when determining fire danger: **sky conditions, precipitation amount, number of days since rain,** and **season**

South Coast: 7/10/23 Run

Tool Summary:

The forecast matrix was created using **standard NFDRS and weather forecast data:**

- Weather conditions and NFDRS outputs are forecasted over the next 7 days by NWS for SIG stations in each FDRA.
- Weather variable ranges and breakpoints were defined by FDRA stakeholders and relate to Pocket Card notes.
- Maximum temperatures in the Critical range are color-coded with shades of red to help visually distinguish daily variations. The brightest red color corresponds to temperatures of 100°F or greater.

Fire danger forecast indices and component values are grouped into three categories based on historical percentiles, assessed using the FF+ All Days filter through 2021:

- Low to Moderate (0 to 74th percentile); shown in blue-green
- High (75th to 89th percentile); shown in yellow
- Very High to Extreme (90th+ percentile); shown in red and labeled as Critical

Dead fuel moisture forecast values are grouped into three categories based on historical percentiles, assessed using the FF+ All Days filter through 2021:

- Low to Moderate (26th to 100th percentile); shown in blue-green
- High (11th to 25th percentile); shown in yellow
- Very High to Extreme (0 to 10th percentile); shown in red and labeled as Critical

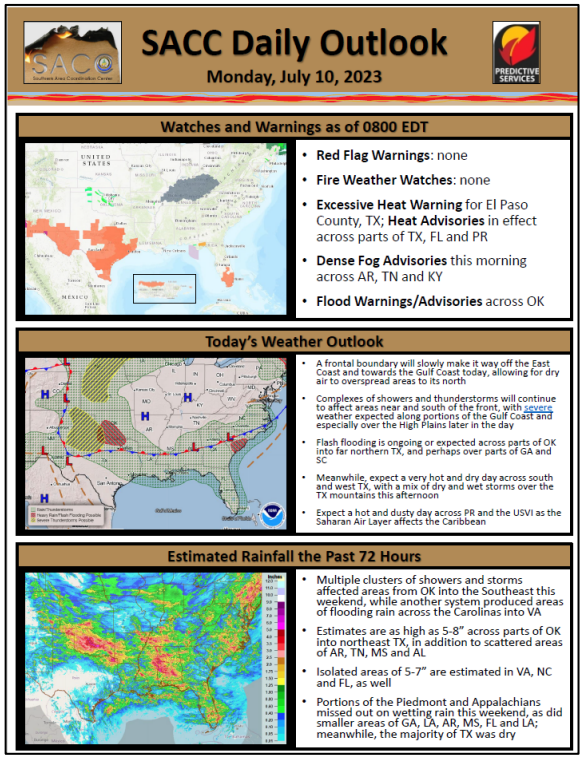
Other Notes:

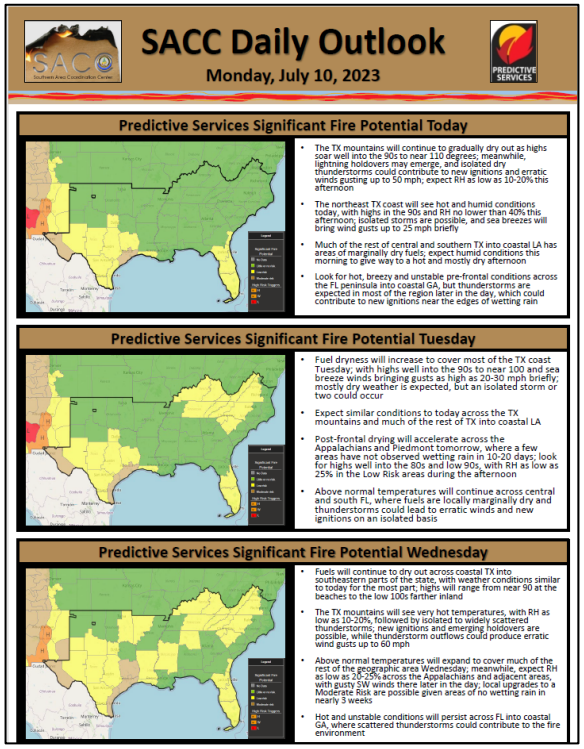
- Read the key and notes for each FDRA, included on the outlook matrix page.
- Forecasts are variable and can change significantly over a forecast cycle and across the landscape.
- This is another tool for gaining better situational awareness, and should be used for general planning purposes only.
- The outlook matrix is refreshed when an FDRA is selected, using the most recent forecast data available at that time. The 7th day may drop off or display partial data prior to the afternoon/evening forecast update.
- Daily updates to NFDRS forecasts occur around **1530** daily, while general weather forecasts are updated around **1730** daily.

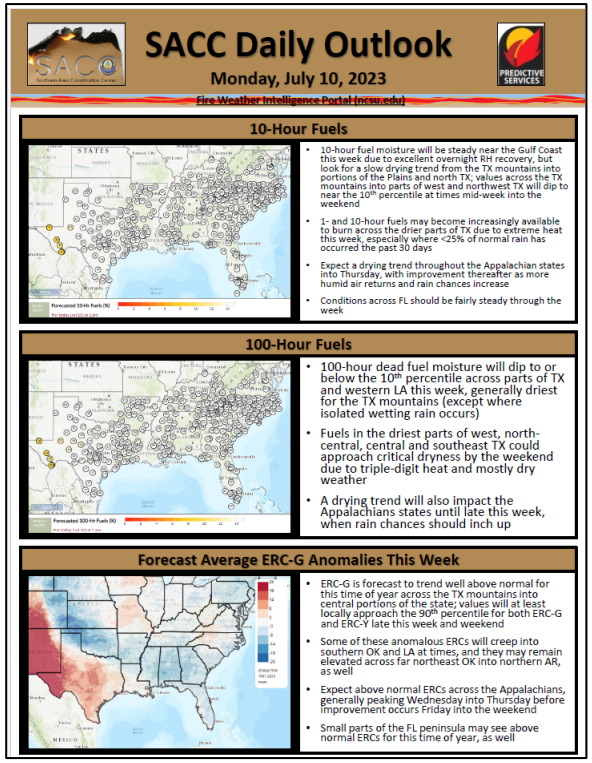
Useful Daily Links:

Southern Area Daily Outlook Page:

https://gacc.nifc.gov/sacc/resources/predictive/sacc-daily-outlook.pdf







Product is generally updated weekdays (three example images from 7/10 Outlook shown)

NC DAQ Air Quality Forecast - *Next Three Days*

The North Carolina Division of Air Quality issues forecasts for fine particulate matter year-round and ozone from March through October. Forecasts and discussions are updated each afternoon for the next three days, and are sometimes updated in the morning to reflect the latest ambient conditions.

View: ◉ The latest forecast discussion ○ The afternoon forecast discussion from Jul 9, 2023 Display

This forecast was issued on **Monday, July 10, 2023** at **2:38 pm**. This forecast is currently valid.

Today's Air Quality Conditions

Both fine particulate and ozone concentrations are in the Code Green range statewide today.

For a display of the most recent Air Quality Index (AQI) conditions throughout the day, visit the Ambient Information Reporter (AIR) tool.

General Forecast Discussion

With the upper-level trough offshore and the weak surface front exiting the Coastal Plain on Tuesday, the day will generally be sunny, warm and dry statewide with light winds developing out of the northwest. A clean air mass upwind indicates 24-hour average fine particulate values will remain in the Code Green range statewide. Abundant sunshine and increasing subsidence as an upper-level ridge builds in from the west may allow ozone values to reach into the low Code Yellow range in the major metro areas within the Piedmont and Sandhills.

Outlook

Wednesday's weather will also be sunny, warm and generally dry. Fine particulate values may slightly increase into the upper Code Green range. Ozone values will again likely reach the Code Yellow range in and around the metro areas in the interior of the state. Thursday could start to see a shift towards a more unsettled weather pattern for the weekend; for now have forecasted upper Code Green fine particulate and ozone concentrations statewide.

Author: *Kreuser- NC Division of Air Quality*

Extended Air Quality Outlook

The forecast Air Quality Index value for each pollutant represents the highest value expected within each county, so some areas and monitors may see lower values. We use the best information and techniques available to ensure the quality and accuracy of the forecasts we provide to the public. Note that ranges do *not* include the nine-county Triad region, which is covered by the Forsyth County Office of Environmental Assistance and Protection.

Forecast Day	AQI Range	Category Range	Download KML
Monday (Jul 10)	45	Green	download
Tuesday (Jul 11)	45 to 74	Green to Yellow	download
Wednesday (Jul 12)	50 to 77	Green to Yellow	download
Thursday (Jul 13)	45 to 50	Green	download

From: ***https://airquality.climate.ncsu.edu/discussion/?view=latest***
DAQ Air Quality Portal: ***https://airquality.climate.ncsu.edu/***

Statewide Summary Notes

Fire Activity Discussion:

- Pulp Road Fire (R1/D8/Brunswick County)
  - 100% contained at 15,642 acres on 6/29/23
  - 3.36" Precip recorded over past seven days at the Nature Conservancy RAWS Station (in area of fire), ending on 7/11
- Summer 2023 has continued to see normal overall activity (in statewide occurrence context)
- Four Month Outlook - Normal Activity continues to be favored **statewide** (see Significant WF Potential Outlook Slide)

However, there is an "Above Normal" Outlook Potential for Appalachians in VA and KY for October – relates to forecast uncertainty for temp, precip, any existing dryness, and threat of early freezes sometimes seen in El Niño transition years. This could also impact areas of NC depending upon alignment of fuel and weather conditions. It is something to watch going into the Fall of 2023.

Climate/Weather Discussion:

- The Climate Prediction Center forecasts a greater than 95% chance of El Niño conditions continuing into winter, with a 56% chance of a strong El Niño developing this fall
- We are in the typical summer thunderstorm pattern (generally scattered distribution of rains with lightning)
- Hurricane Season began on June 1st – with three tropical storms having formed in June
  - Wind shear across the Atlantic Basin in El Niño years can often suppress tropical storm formation
  - On the other hand, sea surface temperatures have already risen to very warm levels for this point in the season
- Above normal air temperatures are favored in the July – Sept time period
- Equal chances for above or below precipitation is also noted for July – Sept time period
  - If tropical systems/rains are suppressed related to El Niño in late summer/early fall - this could lead to drier conditions
  - Much uncertainty this far out in time
  - See NC State Climate Office Blog Post for more discussion on El Niño

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Fuels/Drought Discussion:

- Green conditions & recent rains keeping most of state in normal seasonal pattern of fire activity
- Experiencing seasonal higher daily minimum relative humidity & good night-time recovery
- Fuels and Indices continue to trend at/near seasonal averages statewide (see FWIP)
- "Lightning Season" ignition risk continues, especially on areas of drying organic soils or deep organic duff
  - 6 Lightning Fires for 0.6 Acres so far for July, as noted in Signal 14 Database.
- ~8% of State in "D0" Abnormally Dry Conditions as of last USDM update.
- The US Monthly Drought Outlook released on June 30th for July continues to favor larger-scale drought free conditions for NC and much of the Southeast.
  - However, if drought conditions were to significantly expand/intensify in combination with high plant evaporative demand, overall initial attack activity and mop-up demands would be expected to increase for those areas (especially as more live fuel would potentially become available due to curing).