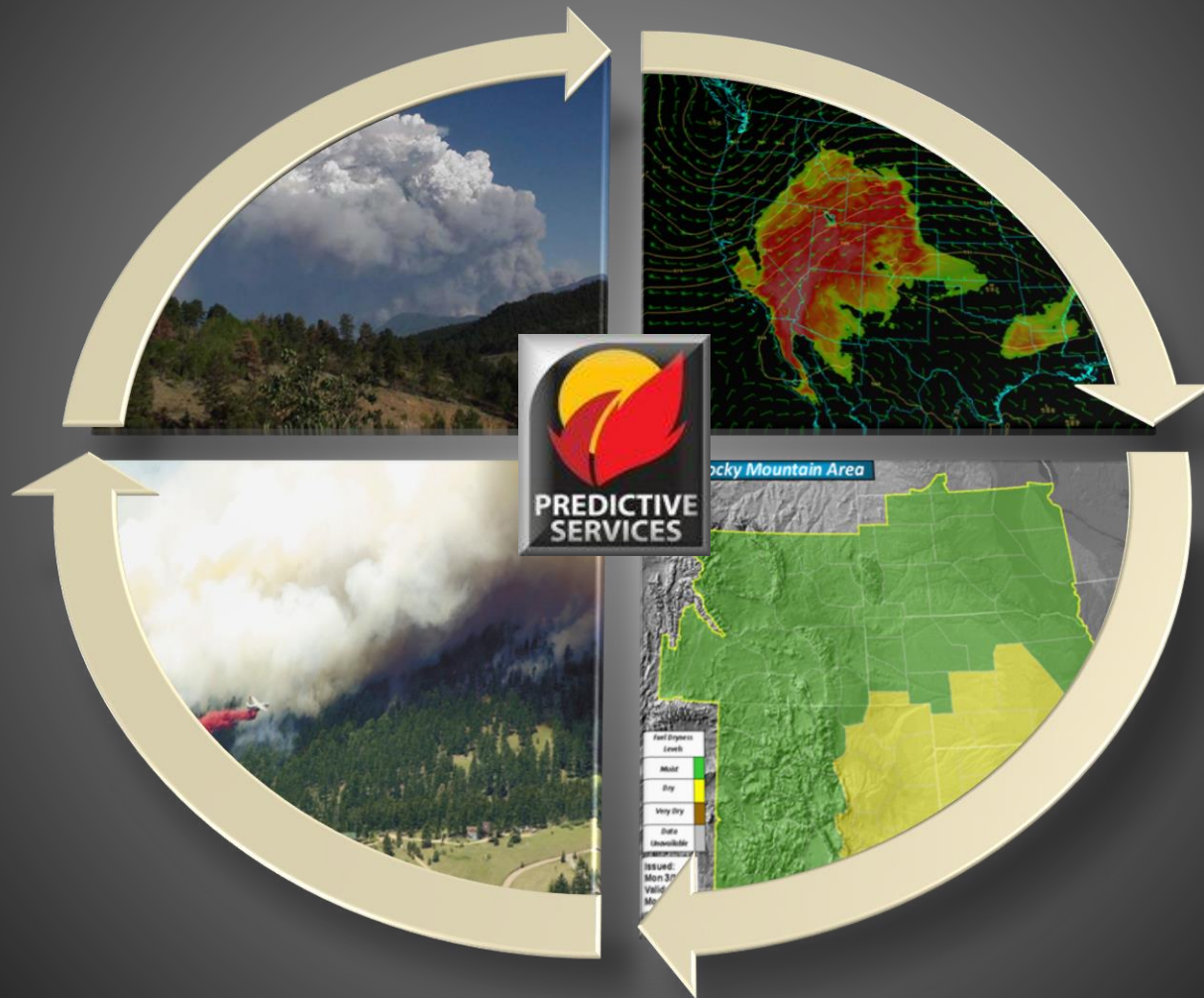




Rocky Mountain Area April-July Large Fire Potential Outlook...Issued 4/2/19



120 Day Fire Potential Outlook Considerations and Discussion

Antecedent Considerations

- ❑ Weather Patterns of Winter-Spring 2019
- ❑ Temperature Anomalies
- ❑ Precipitation and Drought Comparisons
- ❑ Fuel Moisture and Fuel Loading
- ❑ Large Fire History

Prediction Considerations

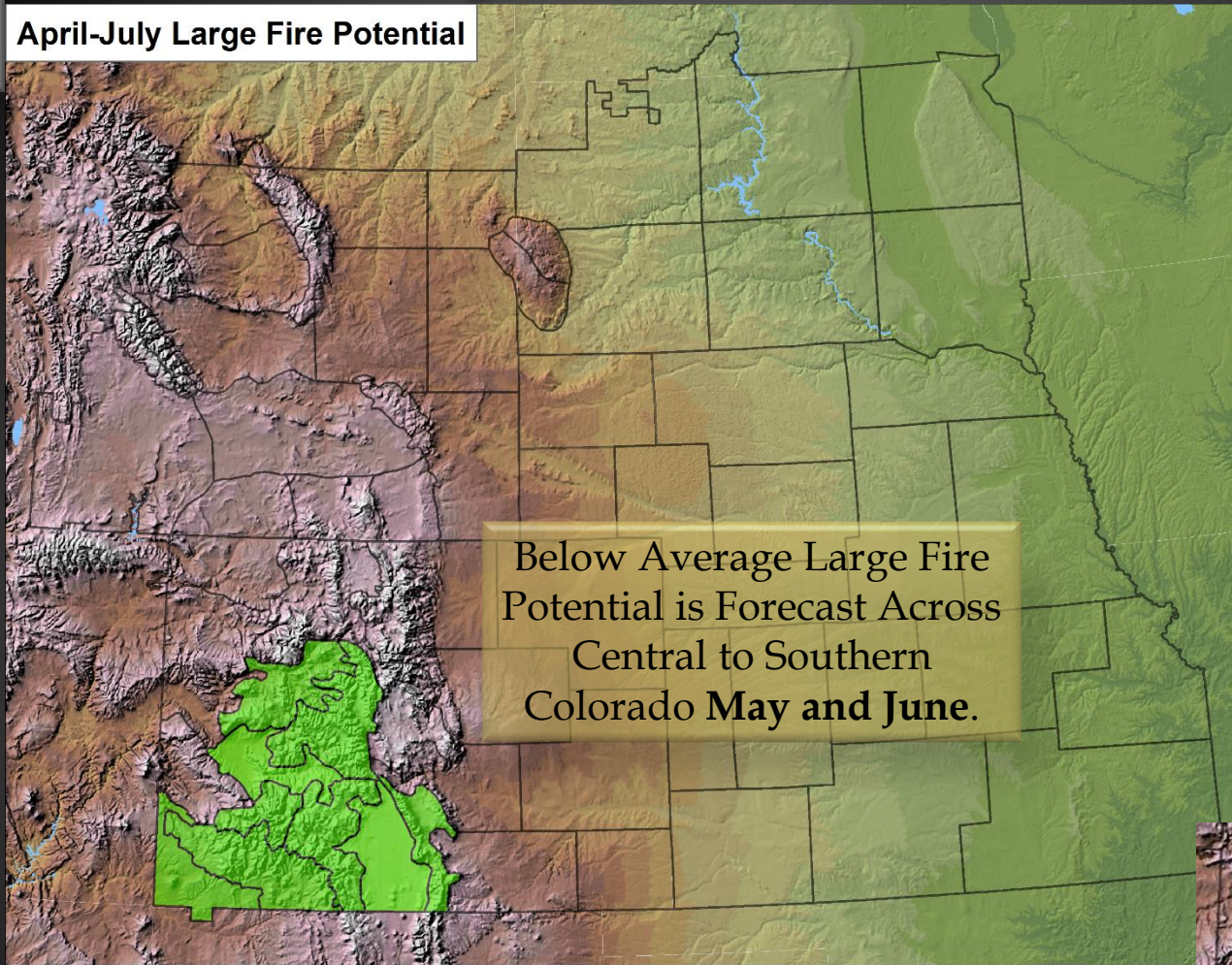
- ❑ Recent Climate Trends
- ❑ Sea Surface Temperature Anomalies and Predictions (El Nino, La Nina)
- ❑ Short Term and Long Term Model Forecast Charts
- ❑ Climate Prediction Center Forecasts and Predictive Services Temperature/Precipitation Anomaly Forecasts
- ❑ Final Thoughts and Considerations for Spring/Summer 2019

April-July 2019 Fire Potential Discussion

The combination of recent cool/wet trends so far in 2019 and average to wetter/cooler than average long range predictions into the first half of summer are in part tilting the odds toward average to below average large fire risk across the RMA April-July. Below average large fire risk is predicted for May-June in central to southern CO, with below average risk in July becoming constrained to the mountains of central to southern CO. In addition to the recent and forecast wet trends, heavy snowpack in the central to southern CO mountains is projected to minimize large fire risk during the spring months, and subsequently help to delay the onset of core fire season. Historically, fire activity from June to July has a tendency to increase across western CO, WY, and western SD/northwest NE; conversely, decreasing trends are often the case in July across the southern CO front range. CO statewide snowpack is at the second highest amount for April 1st since 1992, and above median snowpack in CO on April 1st has always been followed by below average large fire activity (since 1992) in CO from the front range westward during the core fire season (June-August). The current El-Nino sea-surface pattern correlates historically with a below average fire season across CO from the front range westward through WY and the Black Hills of SD, as all but one El-Nino spring since 1992 has been followed by a below average June-August fire season.

Large Fire Potential Forecast

April-July Large Fire Potential



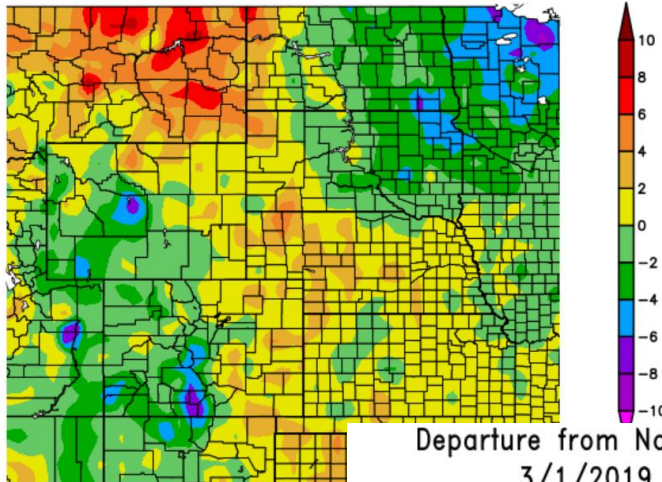
Below Average Large Fire Potential in July is Forecast to Become Constrained to the Mountains of Central to Southern Colorado in **July.**



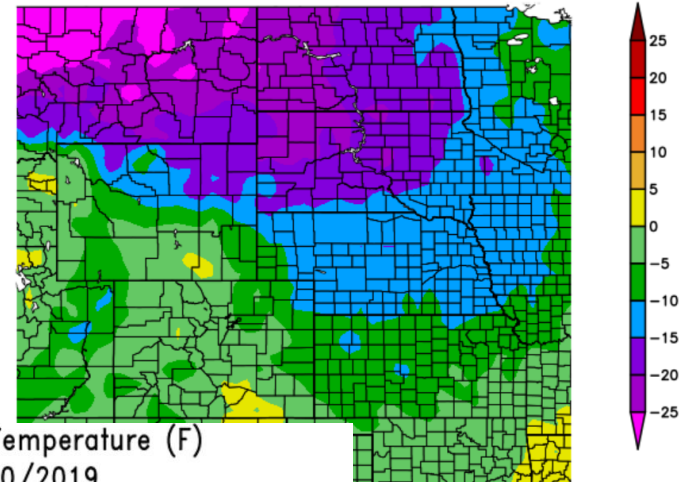
Temperature Anomalies

Temperature trends from late winter into early spring have transitioned from cooler than average in the far west and far east into a more widespread cooler pattern across the RMA, although some warmth occurred in south-central CO.

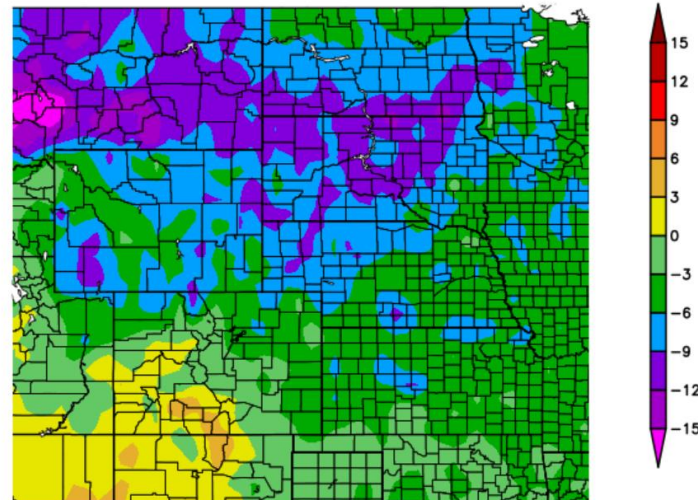
Departure from Normal Temperature (F)
1/1/2019 – 1/31/2019



Departure from Normal Temperature (F)
2/1/2019 – 2/28/2019



Departure from Normal Temperature (F)
3/1/2019 – 3/30/2019



2/20/2019 at HPRCC using provisional data.

NOAA Regional Climate Centers

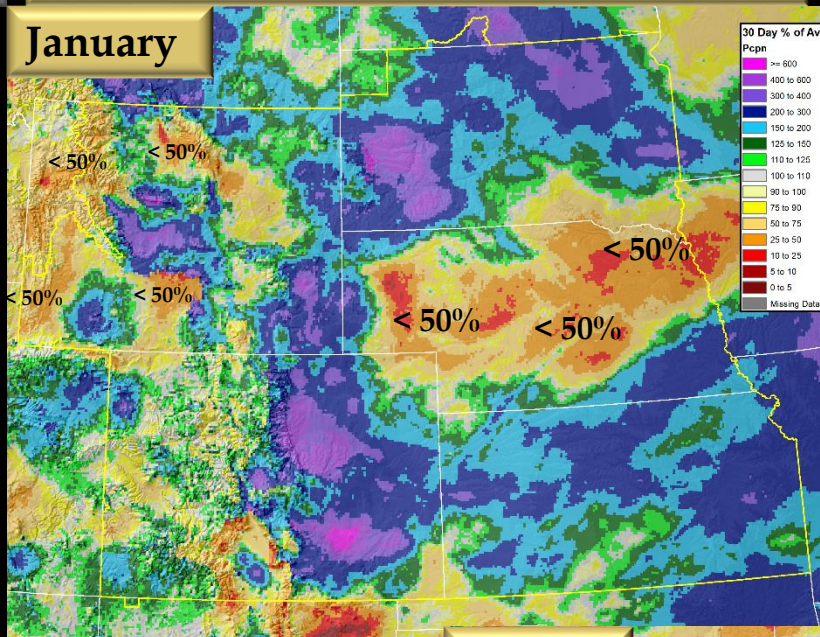
3/31/2019 at HPRCC using provisional data.

NOAA Regional Climate Centers

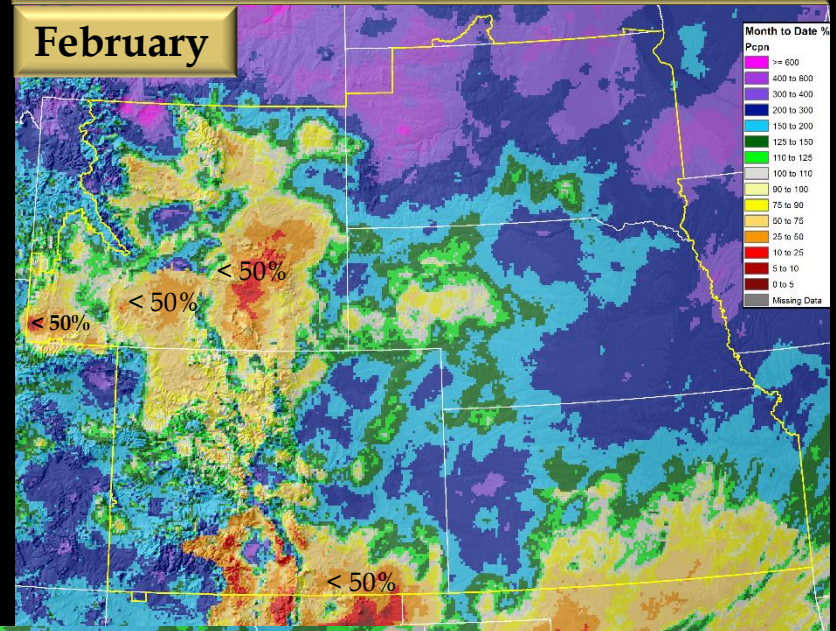


Percent of Average Precipitation

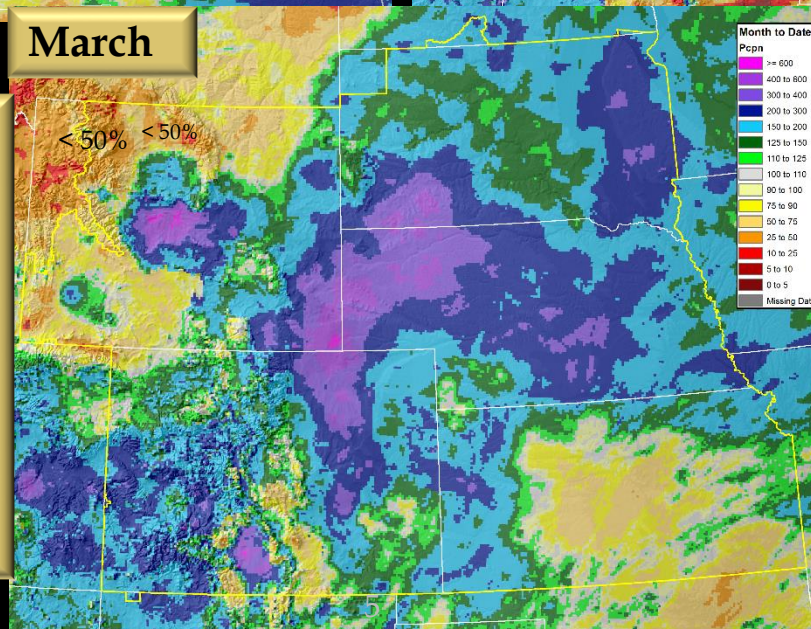
January precipitation deficits were somewhat evident across portions of western Wyoming, but mainly over a large portion of Nebraska.



February precipitation was above average across a large portion of the geographic area, but areas of significant deficits occurred over portions of southern WY and far southeast CO.



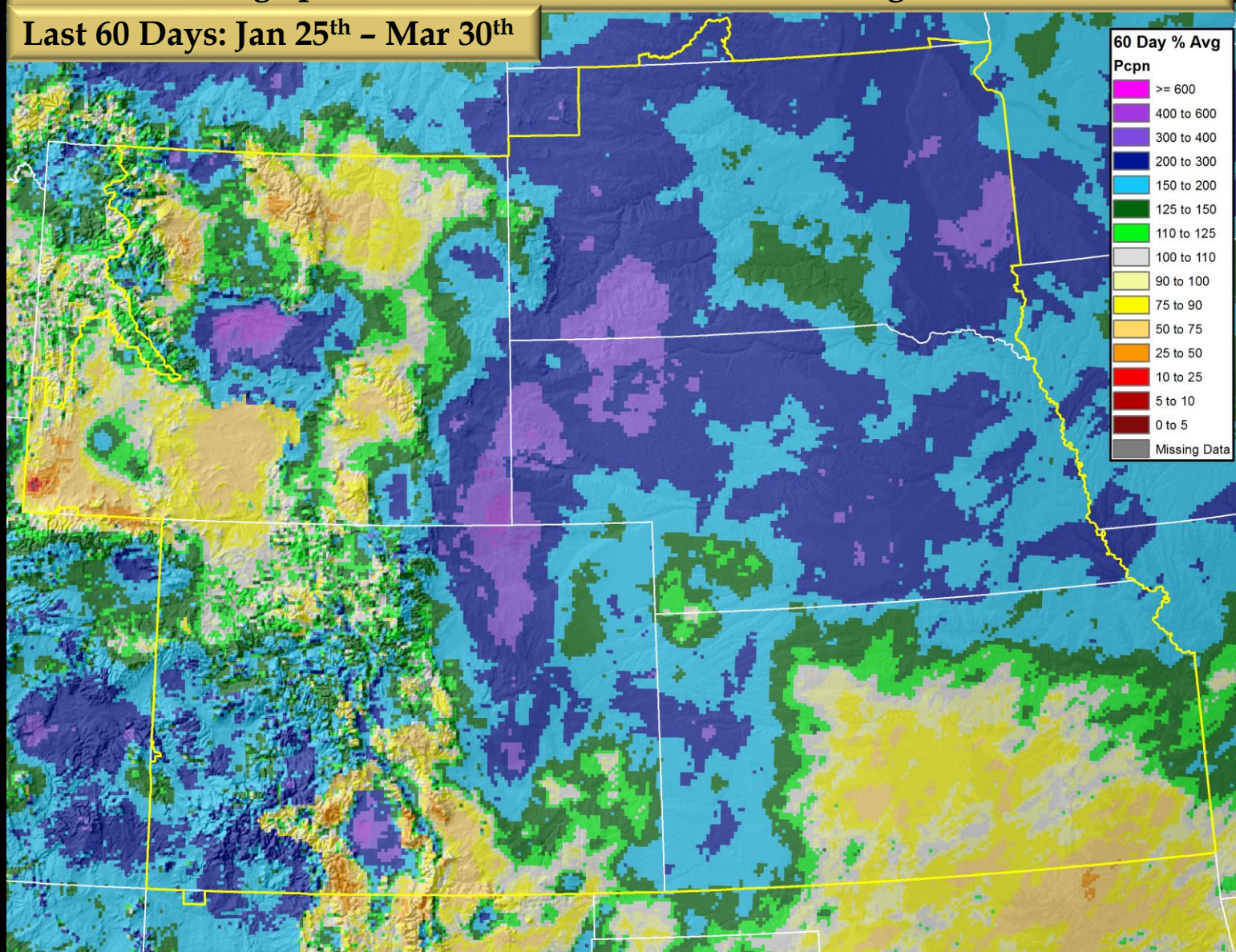
March precipitation thus far continued above average across a large portion of the geographic area, but areas of significant deficits have begun to emerge over northwest Wyoming.



Percent of Average Precipitation for the Last 60 Days

Precipitation deficits for the last 60 days were relatively minor across the geographic area over portions of WY, KS, and the southern CO front range; otherwise a large portion of the area shows above average amounts.

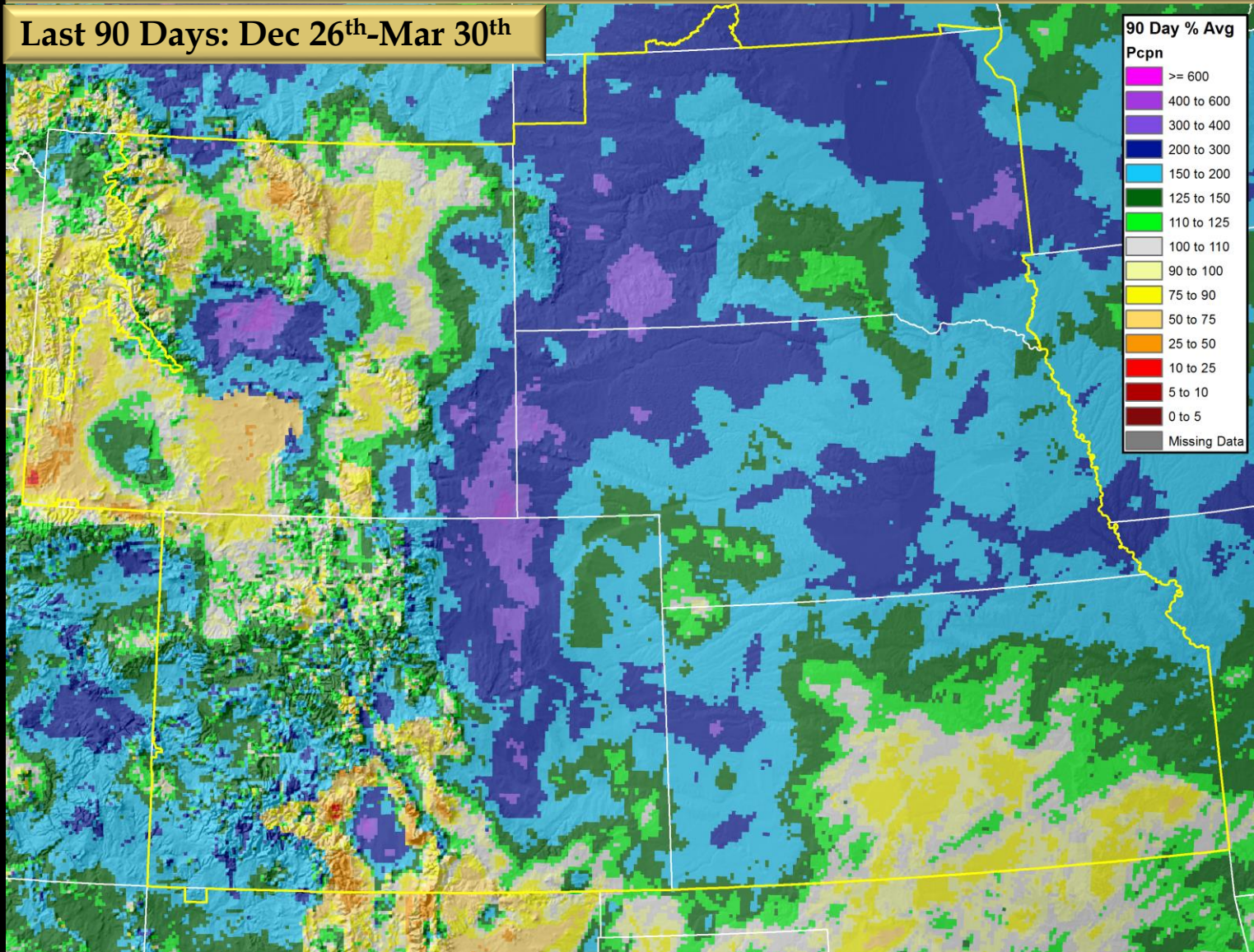
Last 60 Days: Jan 25th – Mar 30th



Long Term Percent of Average Precipitation

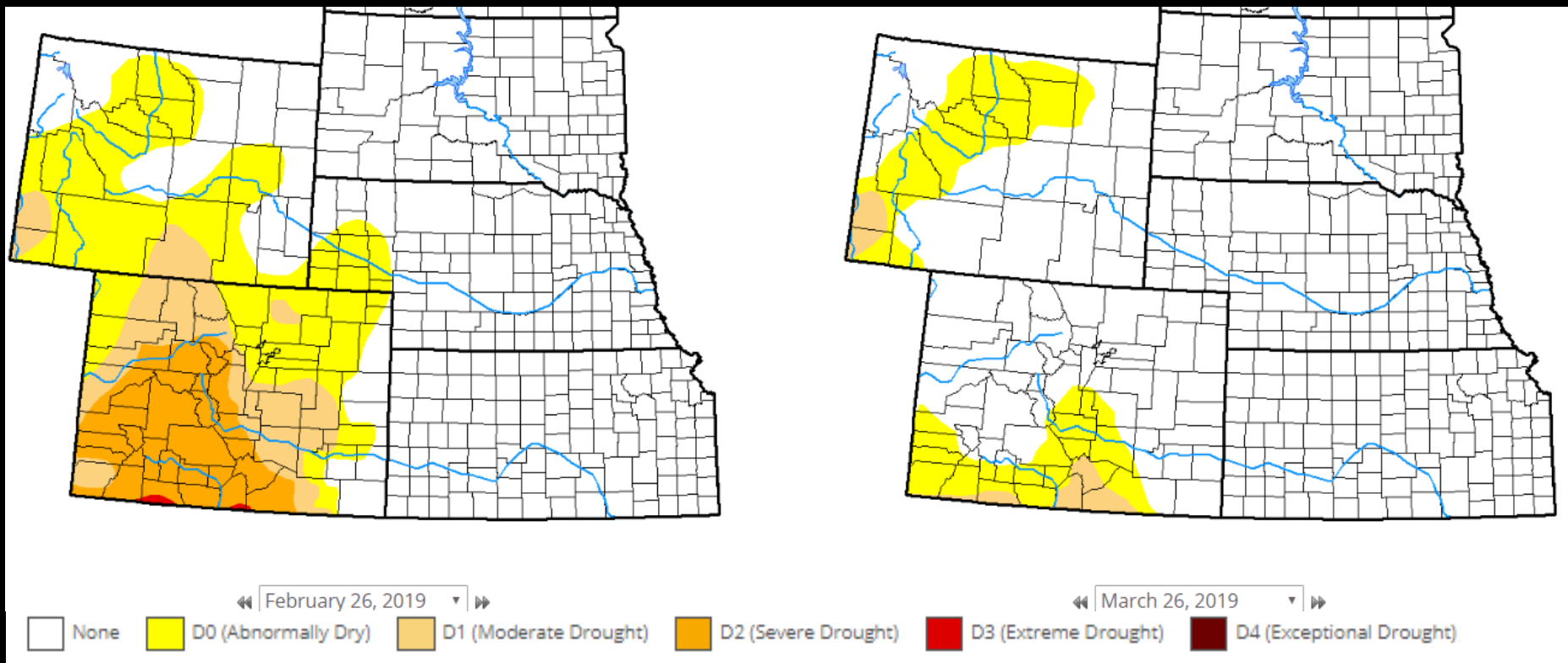
Precipitation deficits for the last 90 days were relatively minor across the geographic area over portions of WY, KS, and the southern CO front range; otherwise a large portion of the area shows above average amounts.

Last 90 Days: Dec 26th-Mar 30th



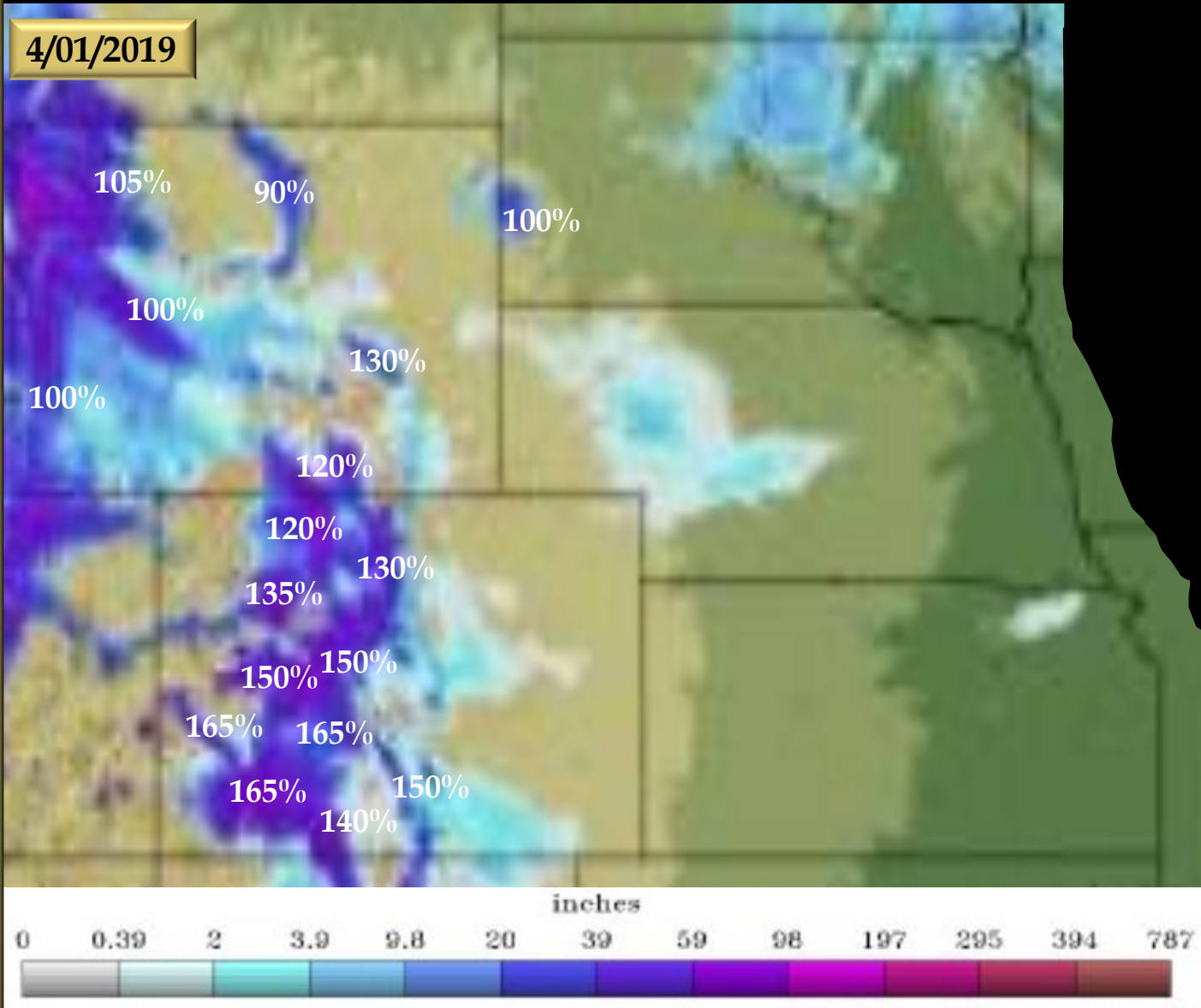
Long Term Drought Analysis from the National Drought Mitigation Center

Long range drought trends portray ongoing improvement across the geographic area compared to last few months. "Severe" drought ratings have been removed from CO, with "Moderate" ratings in the far south, and also the southwest corner of Wyoming.



Snow Depth and Snow Water Equivalent (SWE) Percent of Median

Snow depth analysis (NOAA, Office of Water Prediction). **Snowpack amounts in central to southern CO are in the top 5 for many measuring sites, and in the top 1 or 2 for a few sites (NRCS period of record). CO statewide snowpack for April 1st is tied for 2nd greatest on that date (1992-2017). Otherwise snow depths of 40"-100" (90%-105% of SWE median) are shown across western WY, 20"-60" (100%-130% of SWE median) eastern WY into the Black Hills, and 40"-100+" (120%-165% of SWE median). CO into south-central WY.**

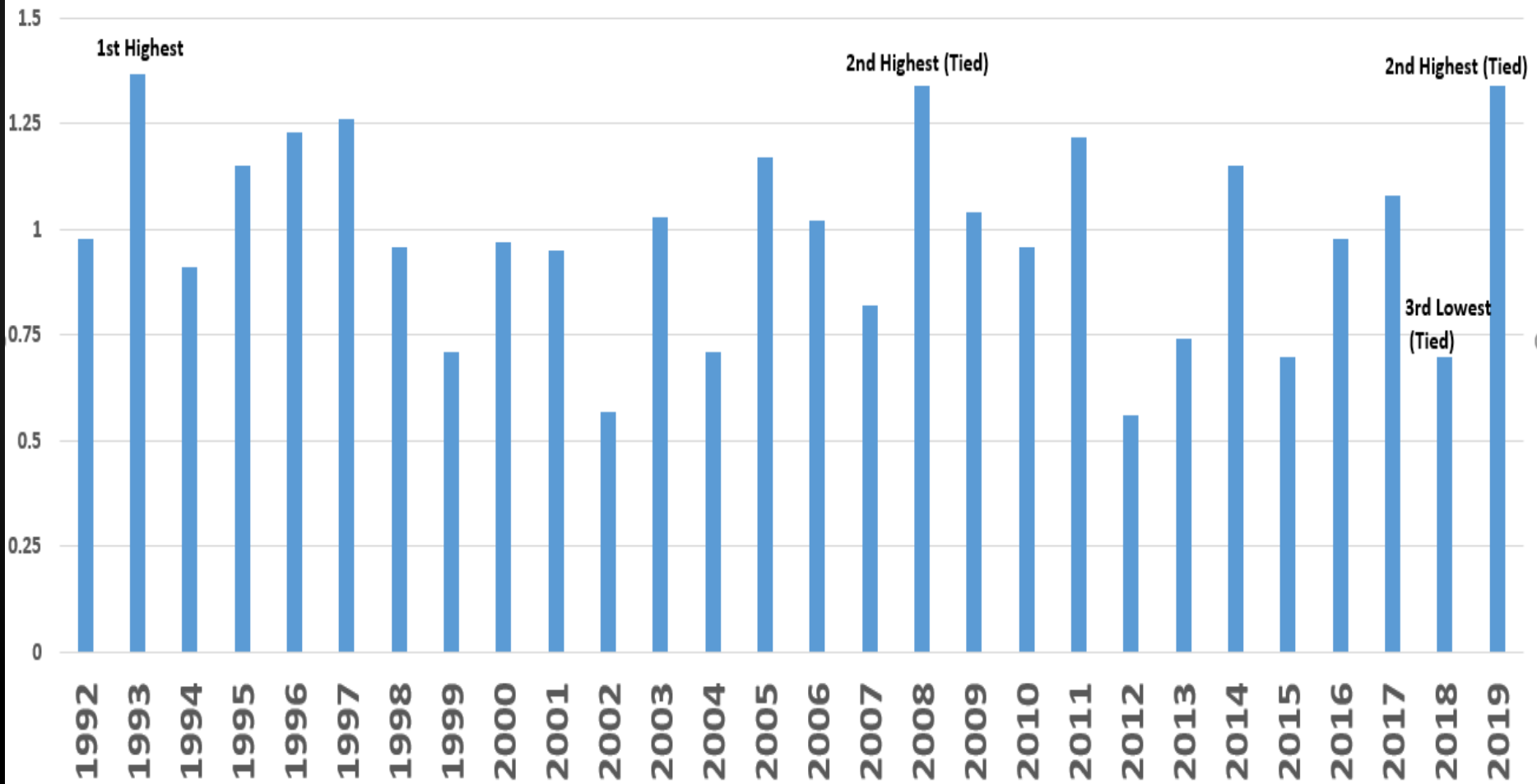




April 1st Snow Water Equivalent Percent of Median History

CO Snowpack is currently at its' second highest reading for this time of year going back to 1992. Conversely, last year at this time we were at the 3rd lowest.

CO Statewide Snowpack Percent of Median 1992-2019

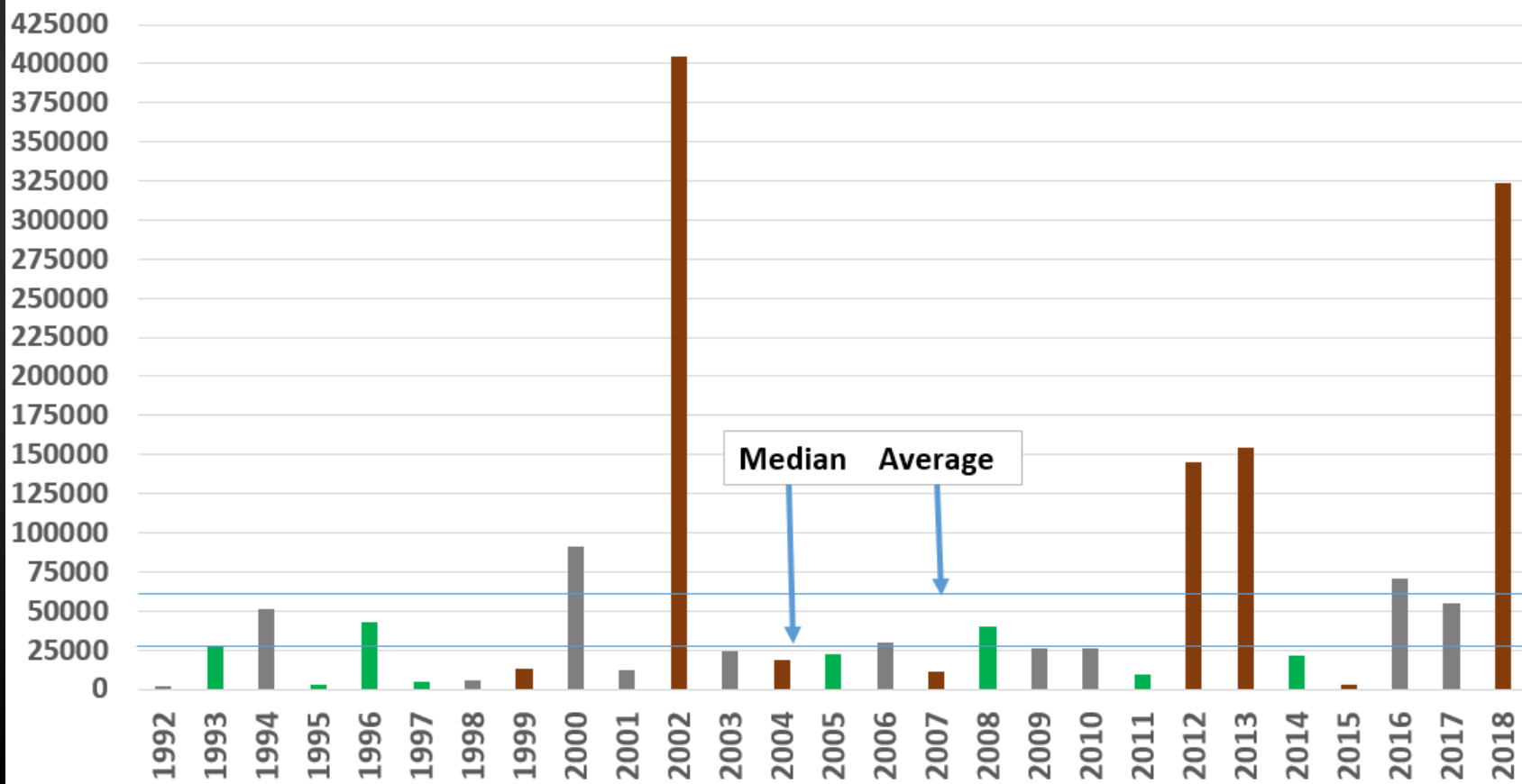




April 1st Snow Water Equivalent Percent of Median Vs. June-August Large Fire History

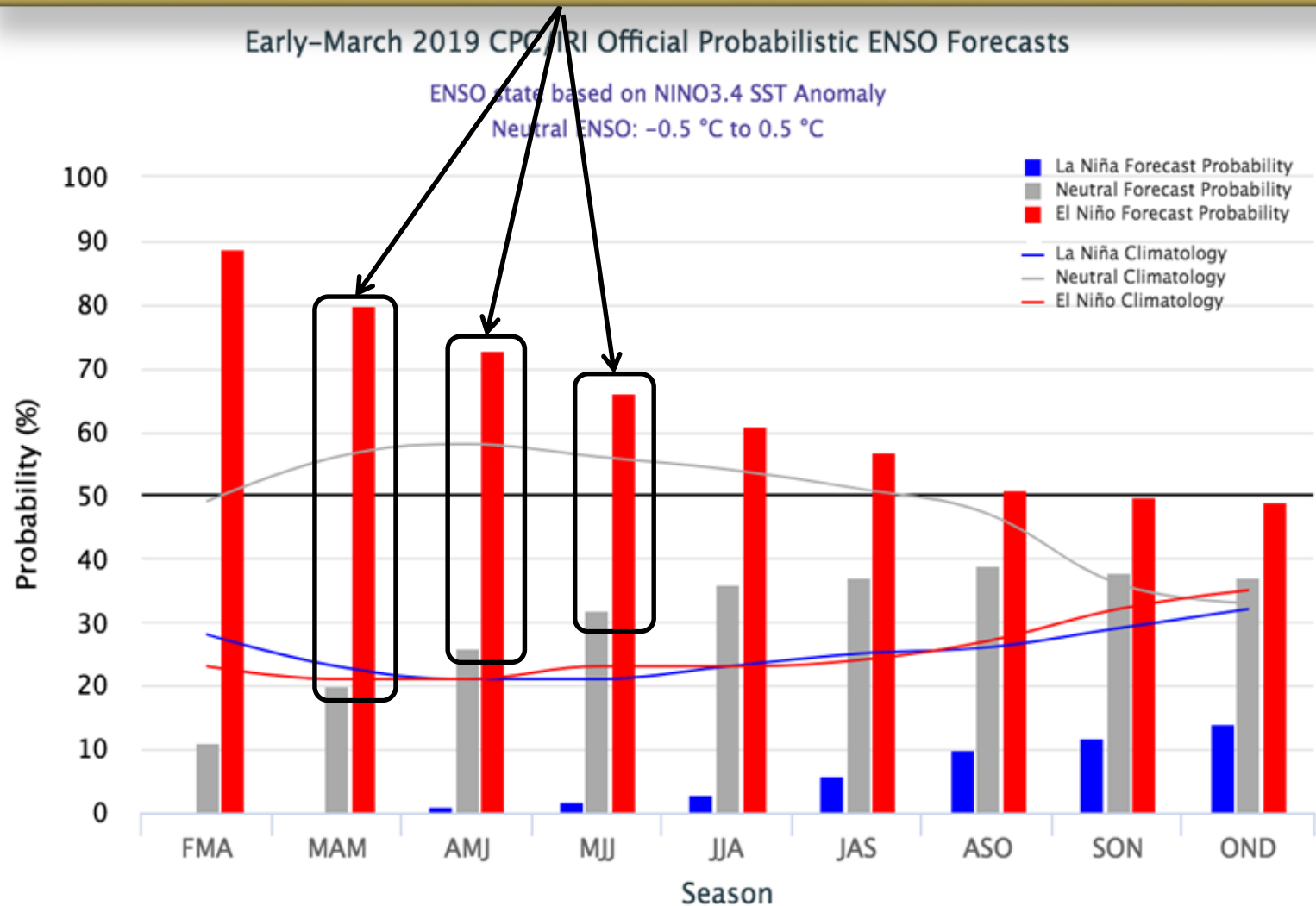
For years that had above median snowpack on April 1st (green), all had well below average acres burned for June-August in the CO front range westward, with many below median for acres burned. The bigger CO fire years all had April 1st snowpack below median values (brown).

Colorado June-August Acres Burned 1992-2018 (Front Range Westward) Years with snowpack April 1st Above Median (Green), Below Median (Brown), Near Median (Gray)



El-Nino/La-Nina Forecast (El-Nino Southern Oscillation (ENSO))

CPC/IRI forecasts predict a continued weak El-Nino phase during the spring and summer (68%-80% El-Nino vs. <20%-32% Neutral).



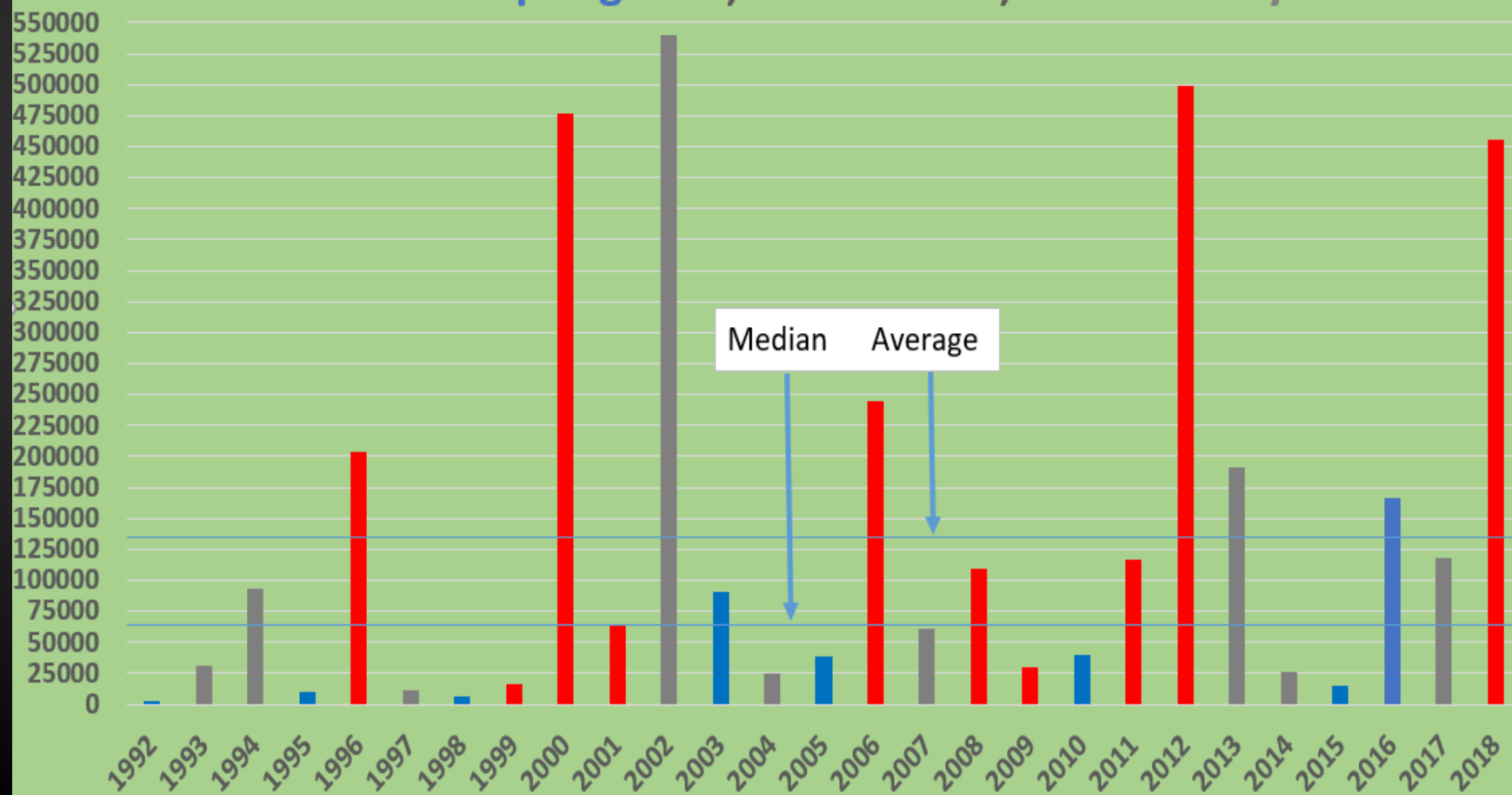
El-Nino/La-Nina Vs. Large Fire History

All El-Nino springs (Blue) had below average acres burned in June-August (except 2016), and most had below median acres burned. Most of the La-Nina springs (Red) had an above median amount of acres if not well above average during June-August.

June-August 1992-2018 Large Fire Acres Burned in CO

(Front Range Westward), WY, and SD Black Hills.

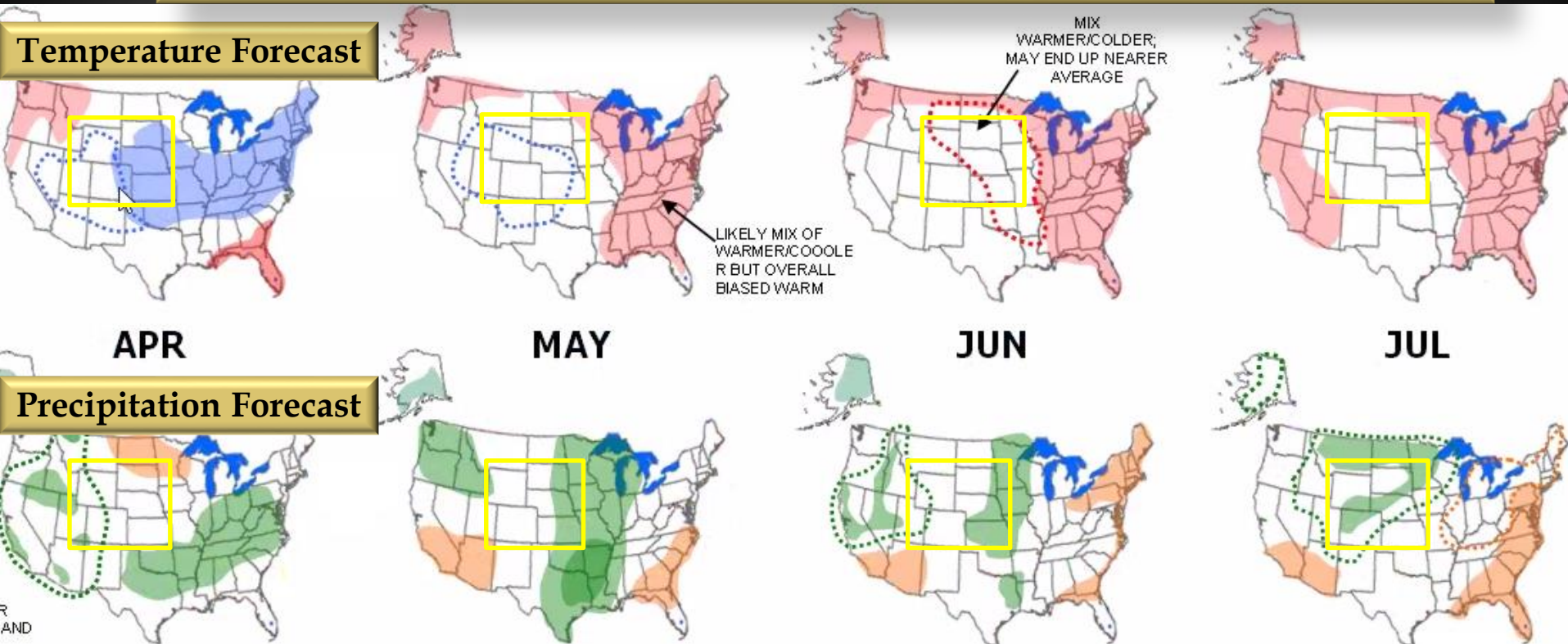
El-Nino Spring Blue, La-Nina Red, Neutral Gray



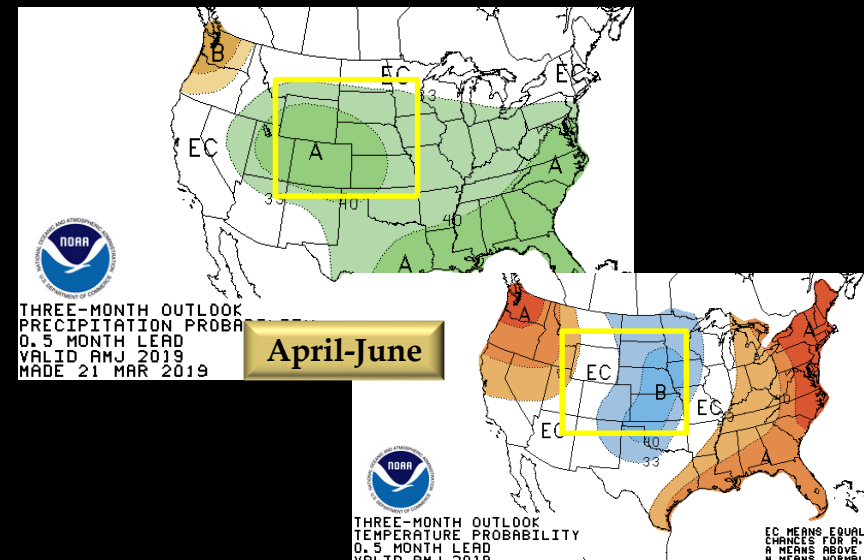
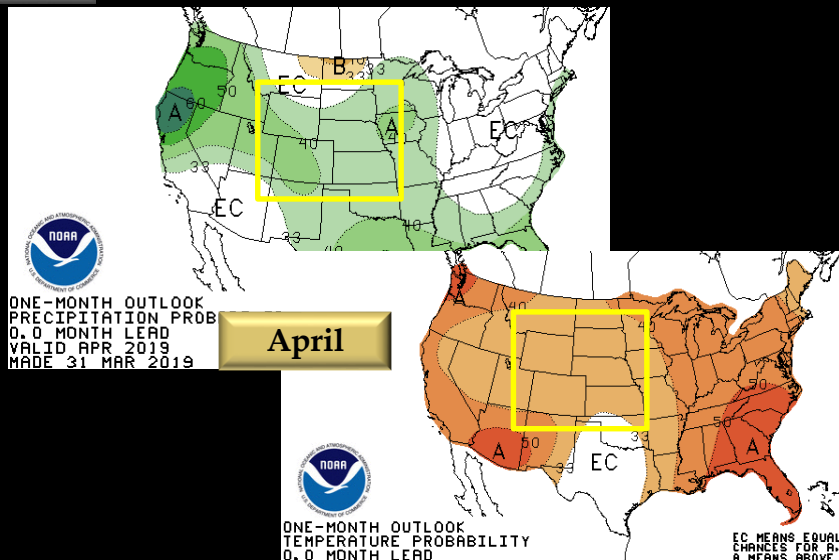


Predictive Services Unofficial Long Range National Weather Forecasts

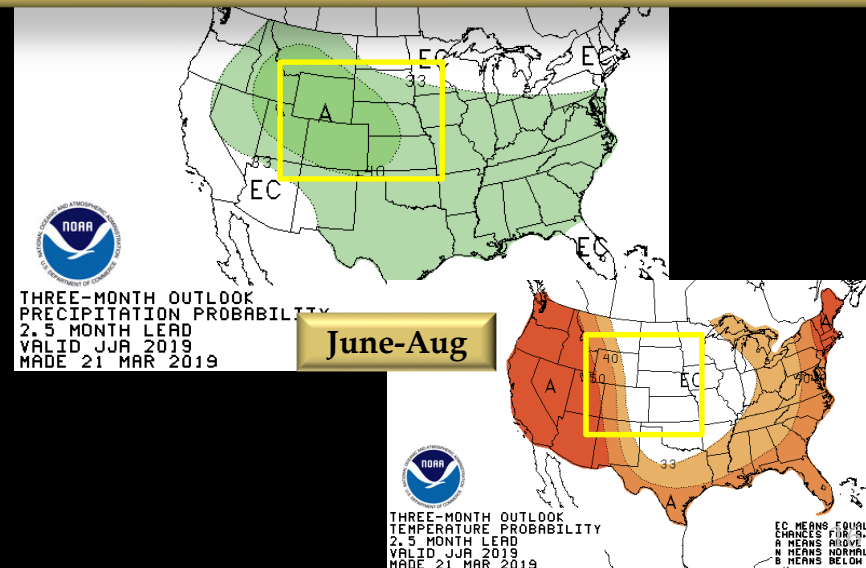
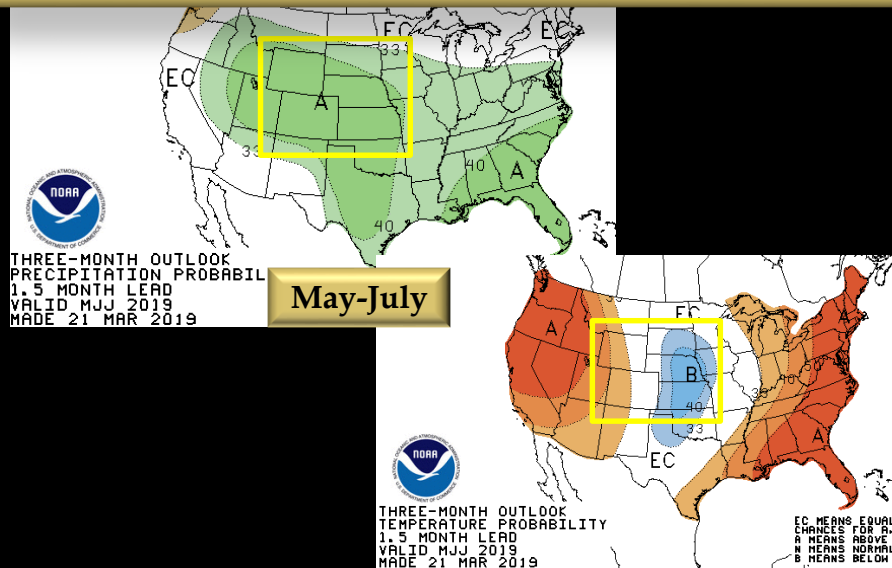
Overall precipitation forecasts April-July are average to above average, with average temperatures except cooler than average in the east during April.



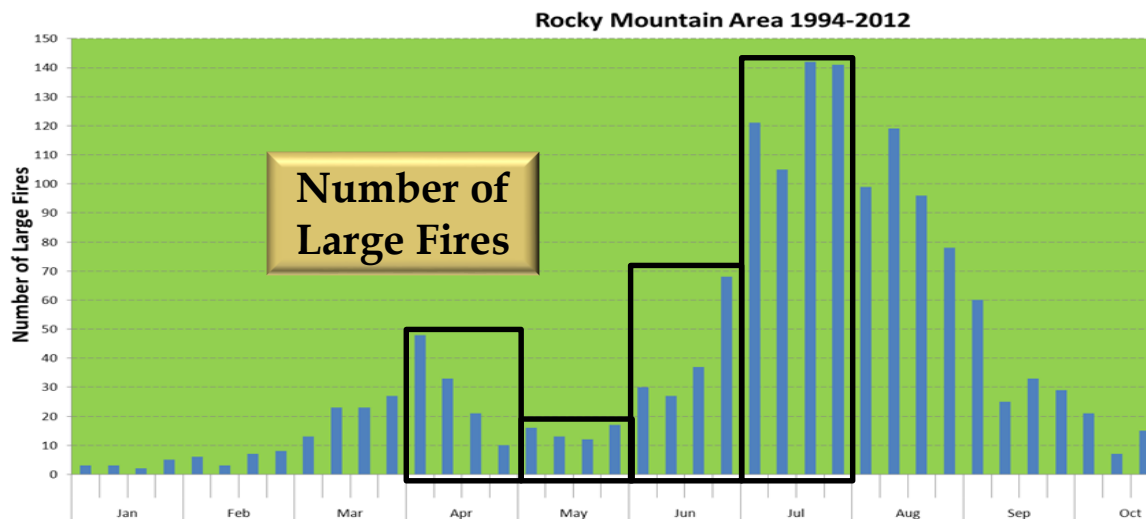
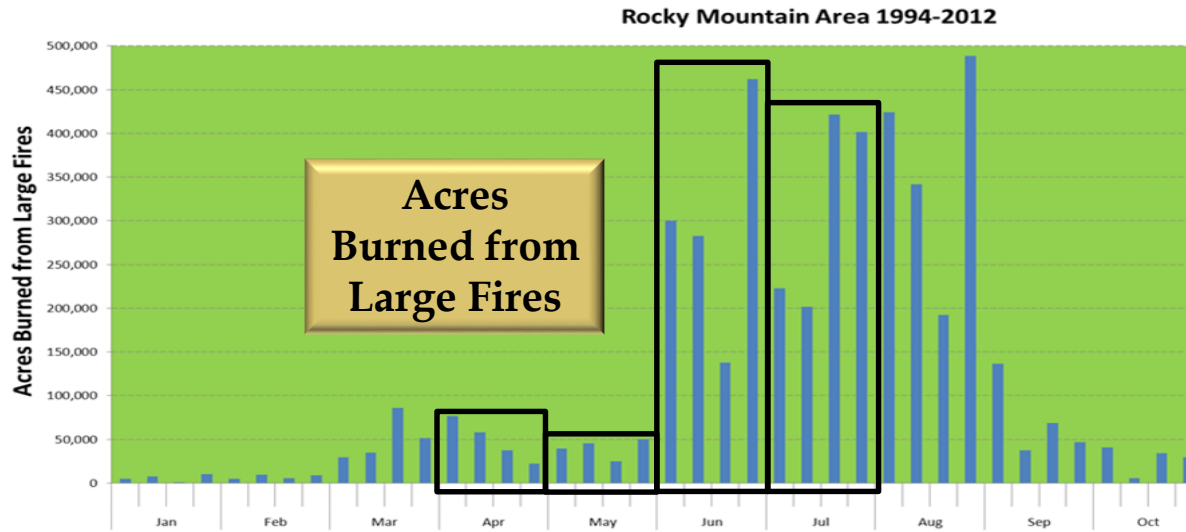
Climate Prediction Center Temperature and Precipitation Anomaly Forecasts



The Climate Prediction Center shows a wetter than average April-July. Temperatures vary from warmer in April, cooler in the east in May, and warmer than average in the far west June-July.



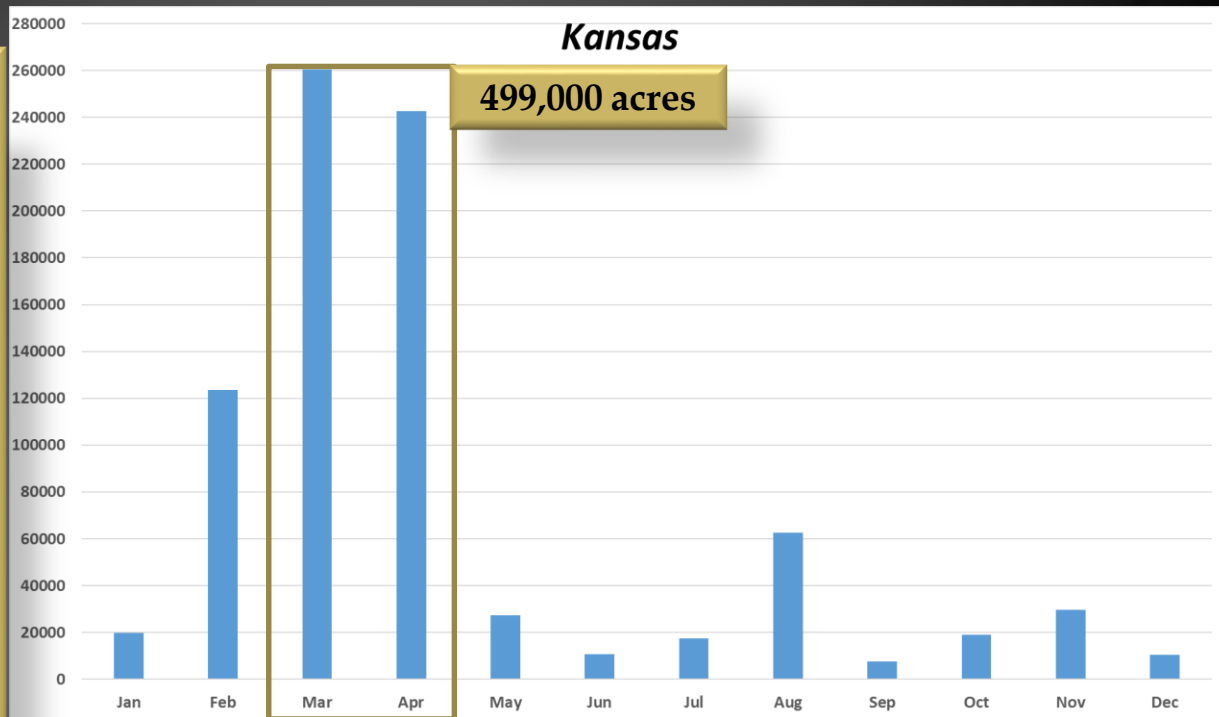
Rocky Mountain Area Fire History



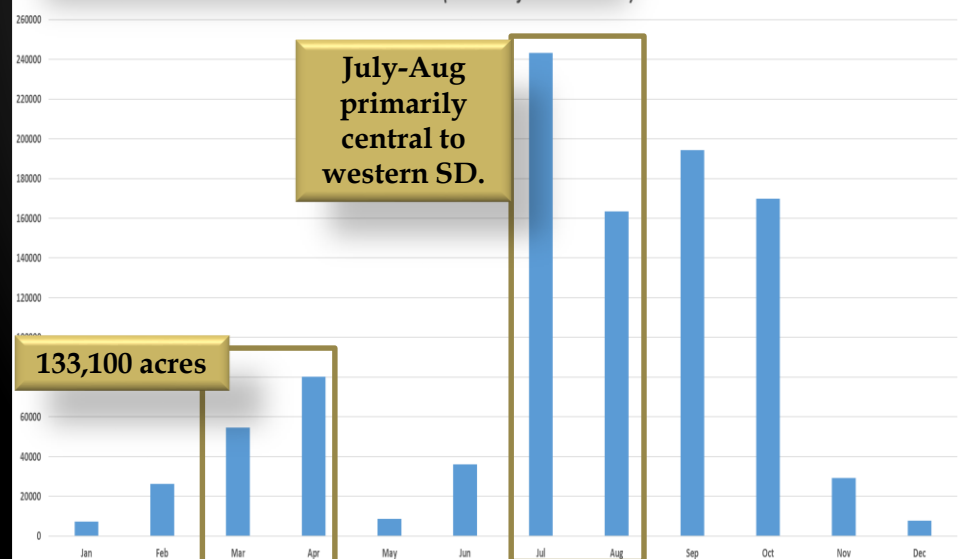
Acres burned by large fires shows a continued increase into the first half of April. Fires during the first half of April tend to be associated with pre-green conditions allowing for short duration wind driven fires mainly east of the continental divide across dead grass and brush fuel regimes. After a lull in fires in May due to green-up and one of our wetter months, the core fire season is apparent with increased large fire activity in June (attributed largely to CO and to a lesser extent northeast WY and the Black Hills). The number of large fires increases from June to July; however, acres burned from these large fires does not increase from June to July.

Rocky Mountain Area Fire History

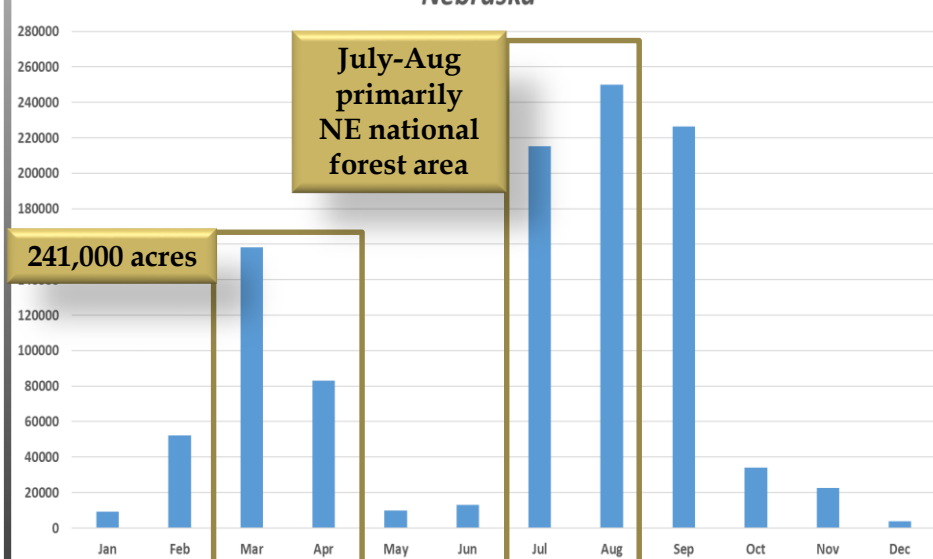
For the pre-green period of March-April (1992-2012 database), the most acres burned across the RMA has been across the plains of SD, NE, and especially KS. Otherwise, an increase in activity during July-August in SD (not Black Hills) is primarily across central to western SD, and in NE in and around the national forest of northwest NE.



South Dakota (Outside of the Black Hills)



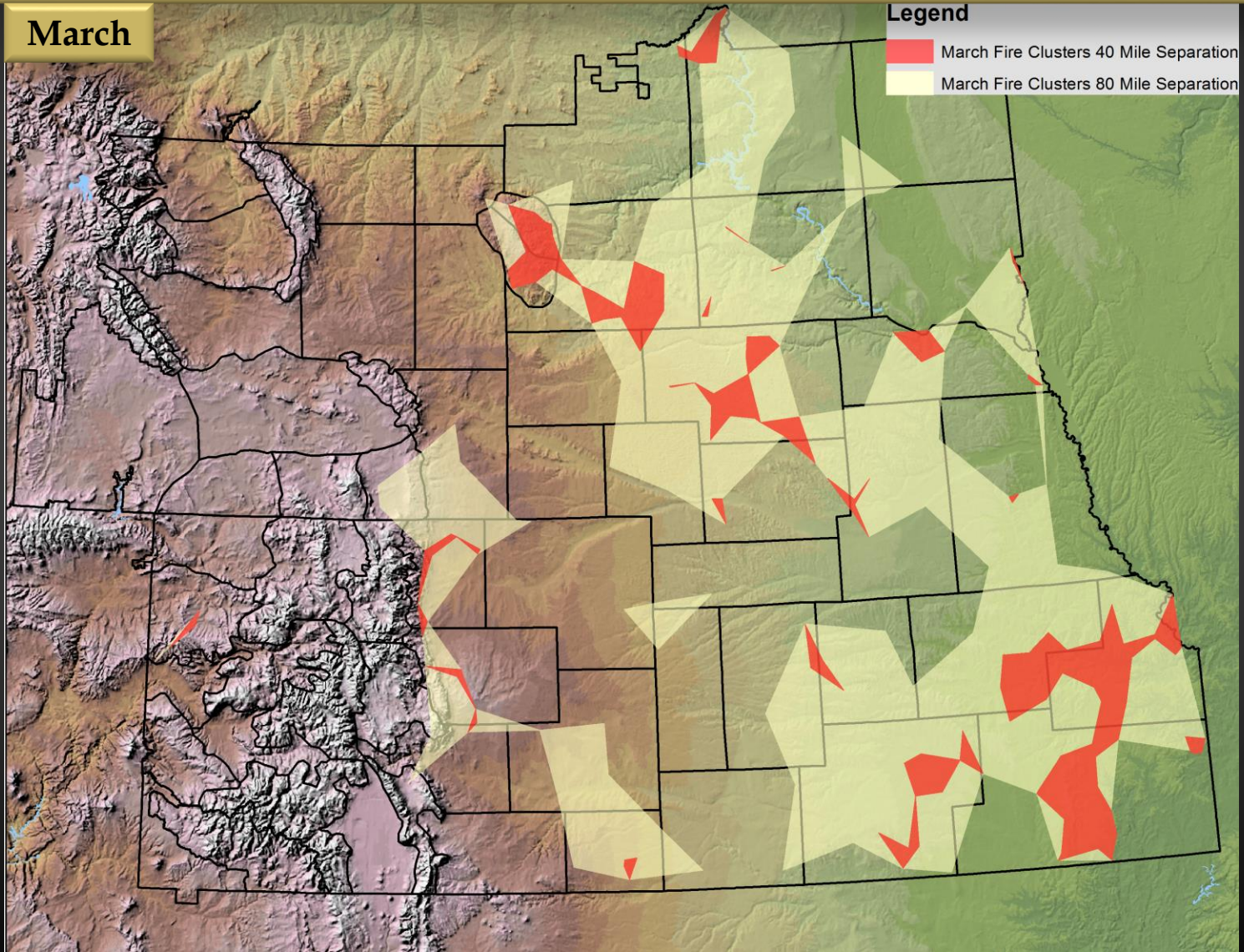
Nebraska



Rocky Mountain Area Fire History

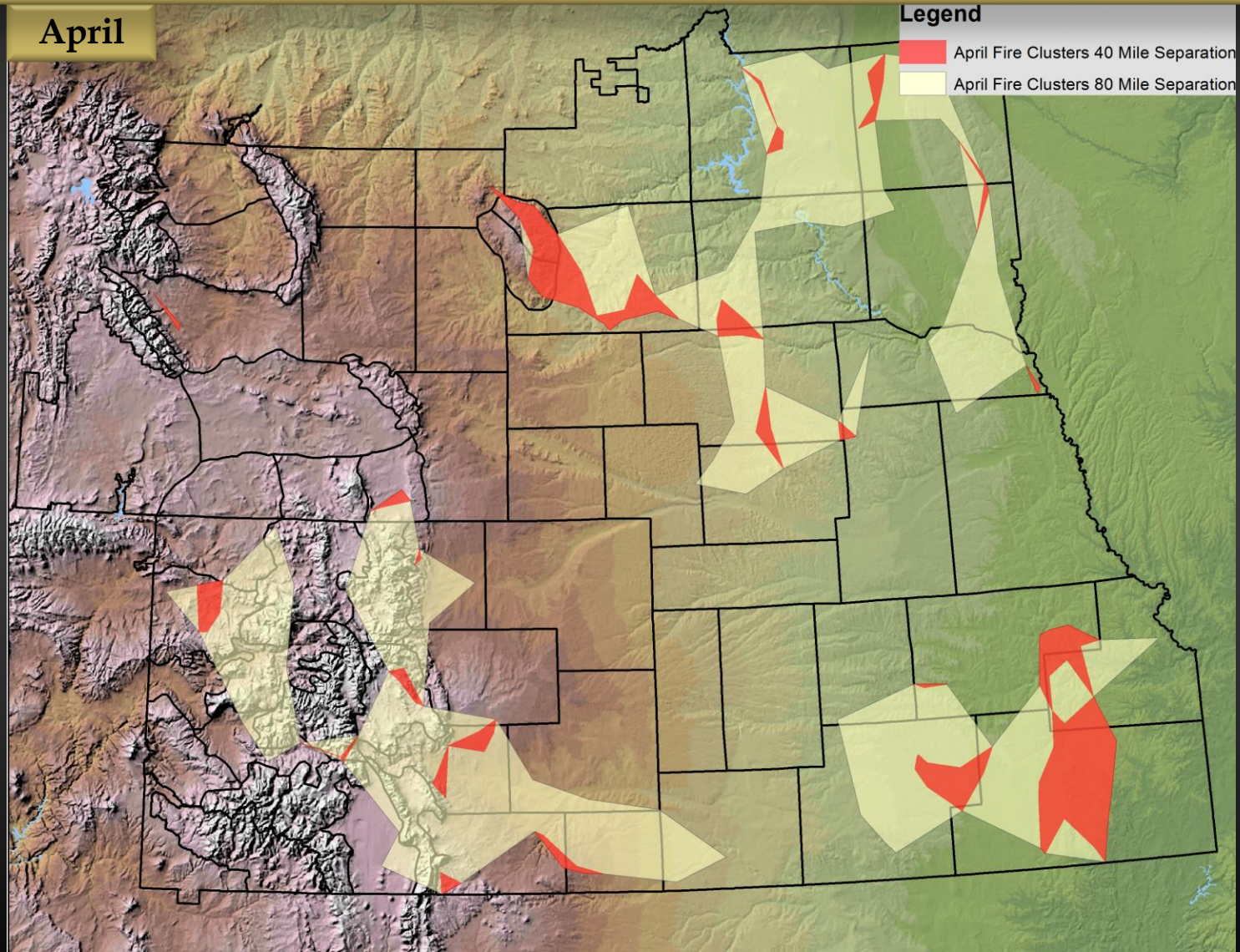
Historical fire data 1992-2015 shows clusters of large fires in March mainly across portions of the eastern plains and the Black Hills (in red). *Yellow encompasses where the majority of large fires have occurred historically, while red shows the highest concentration of large fires.

March



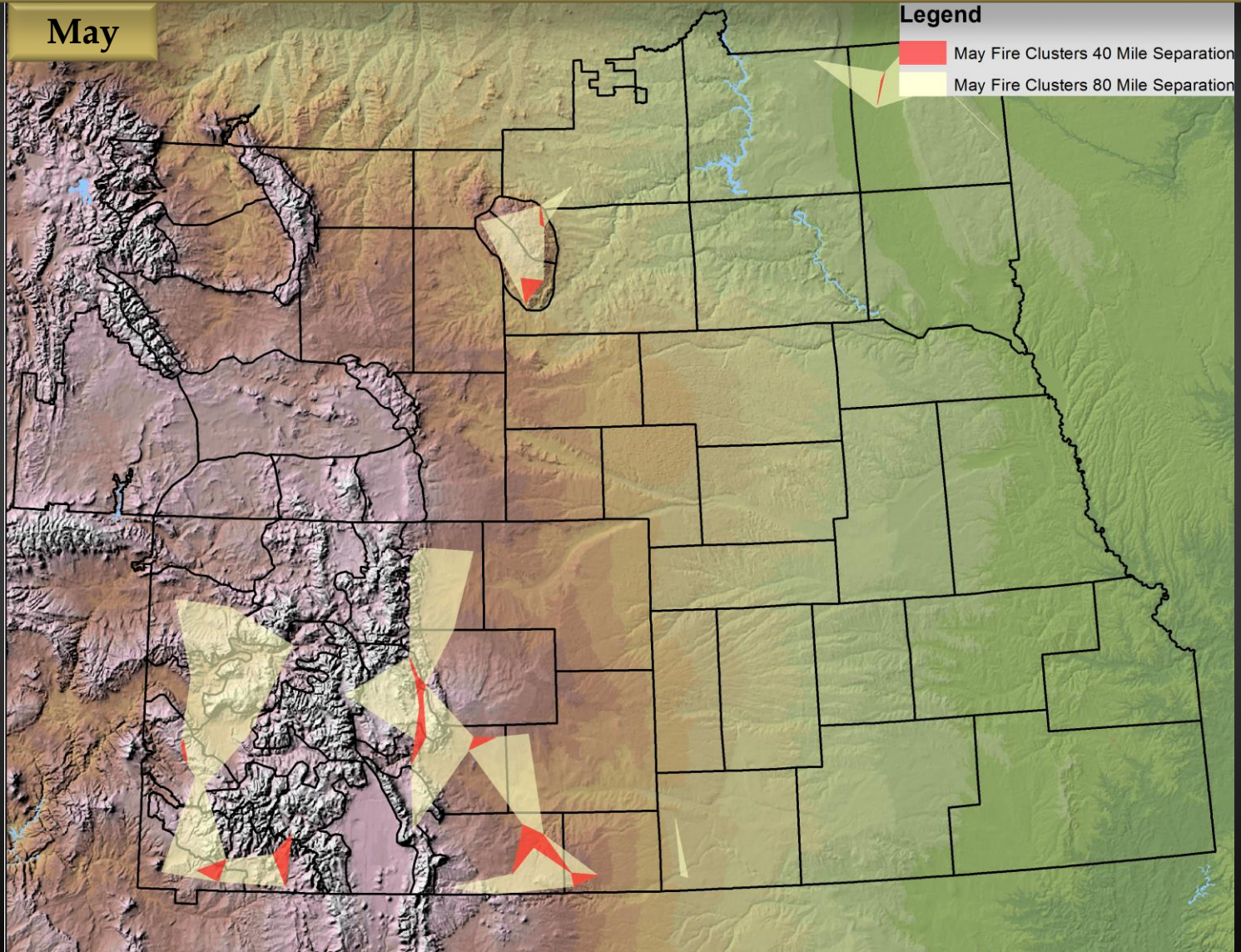
Rocky Mountain Area Fire History

Historical fire data 1992-2015 shows clusters of large fires in April mainly across portions of the eastern plains and the Black Hills (in red), albeit slightly less than March. Also, a slight increase in large fires is seen across CO compared to March. *Yellow encompasses where the majority of large fires have occurred historically, while red shows the highest concentration of large fires.



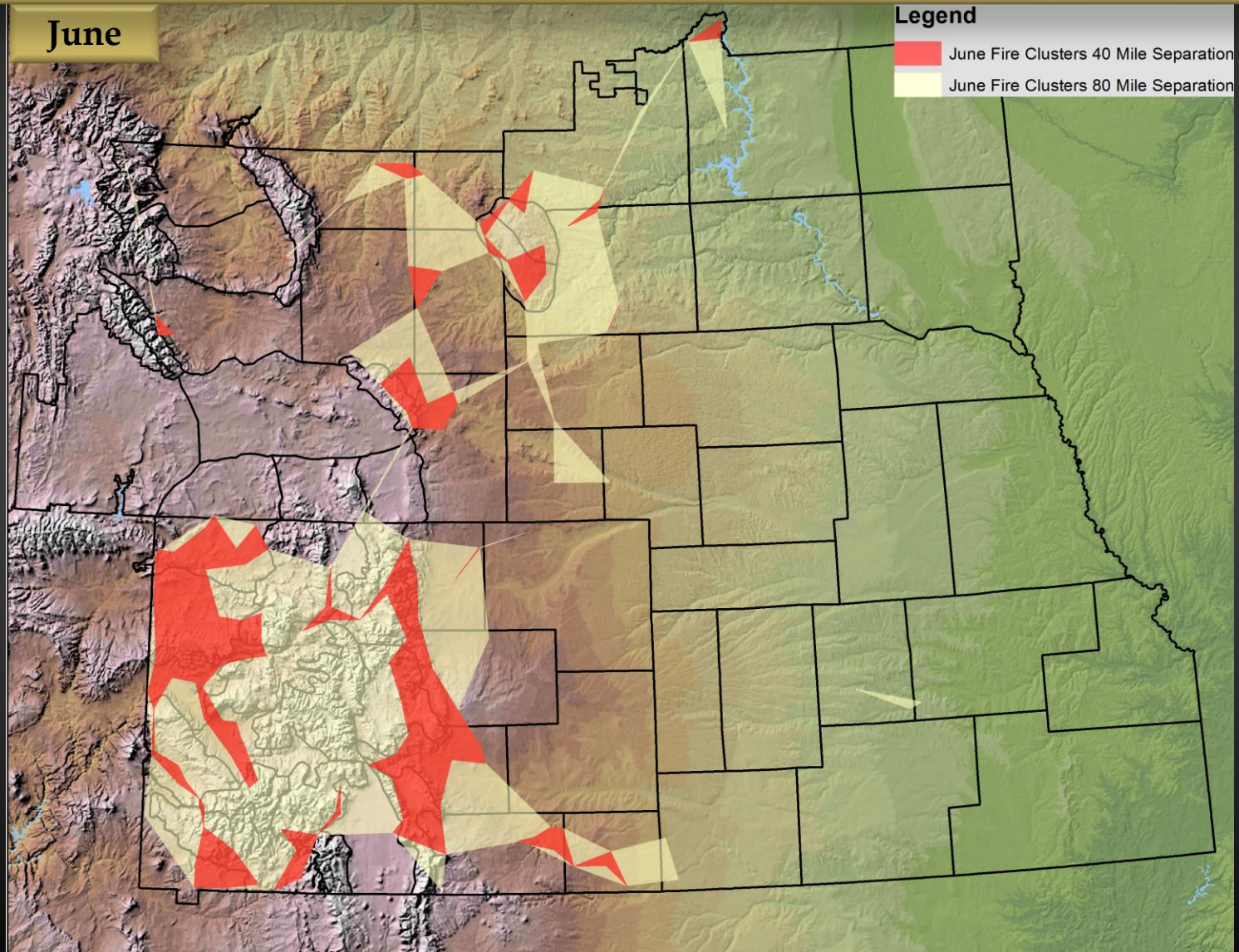
Rocky Mountain Area Fire History

Historical fire data 1992-2015 shows clusters of large fires in May decreasing substantially compared to March-April, especially across the eastern plains and Black Hills. *Yellow encompasses where the majority of large fires have occurred historically, while red shows the highest concentration of large fires.



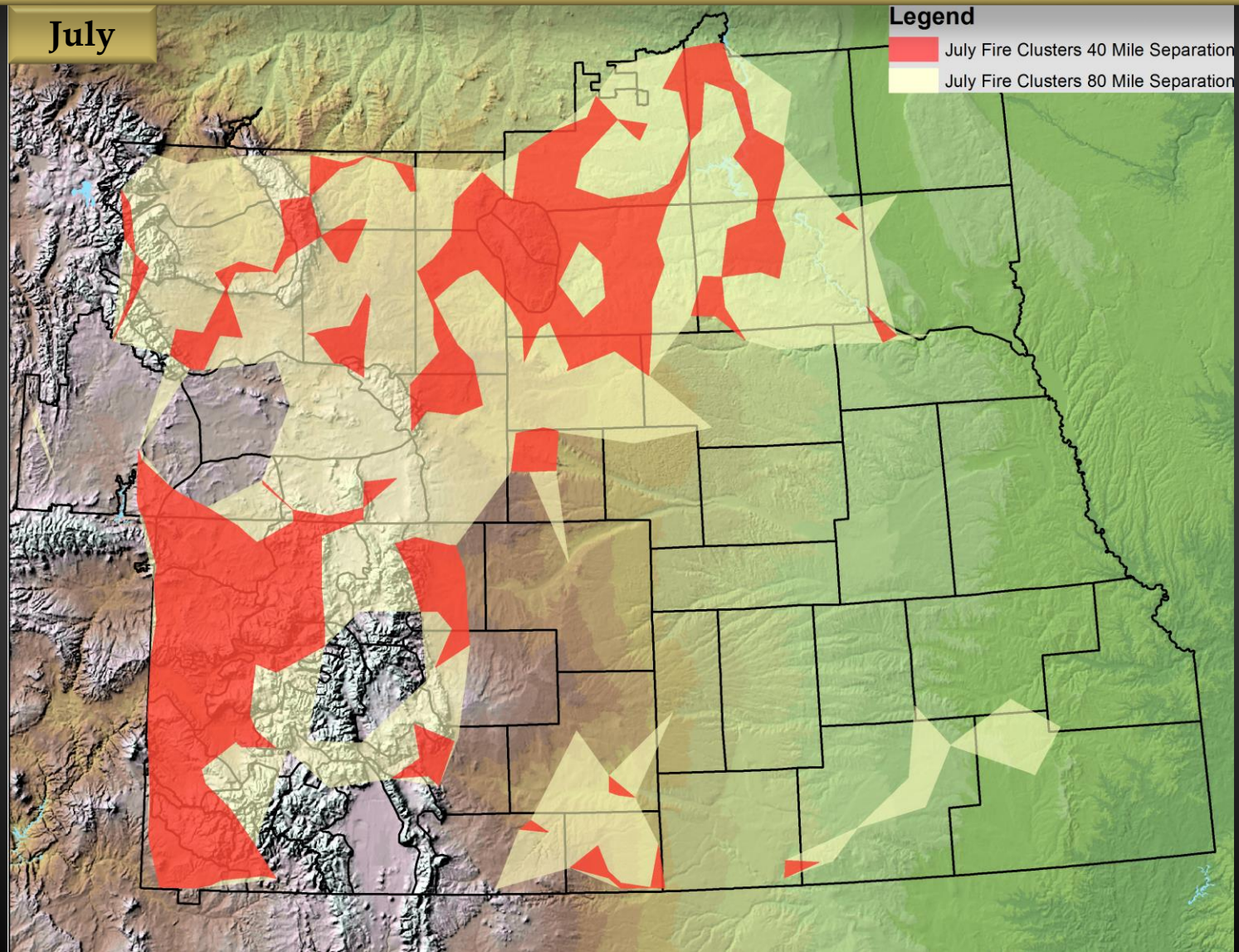
Rocky Mountain Area Fire History

Historical fire data 1992-2015 shows clusters of large fires in June increasing considerably compared to March-May across CO and to a lesser extent northeast WY and the Black Hills. *Yellow encompasses where the majority of large fires have occurred historically, while red shows the highest concentration of large fires.



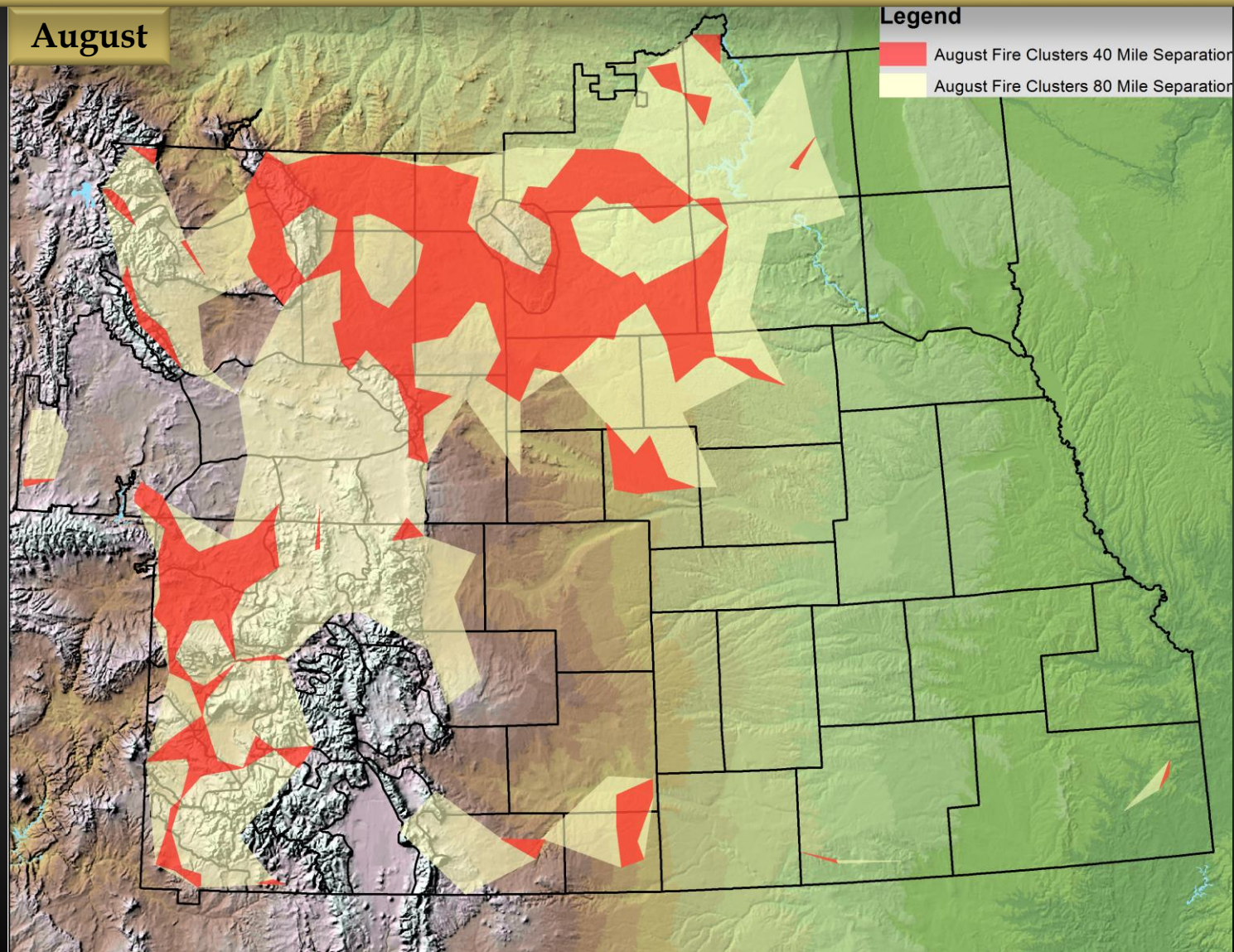
Rocky Mountain Area Fire History

Historical fire data 1992-2015 shows clusters of large fires in July increasing compared to June across western CO, WY, and western SD/northwest NE; conversely decreasing trends are depicted across the southern CO front range. *Yellow encompasses where the majority of large fires have occurred historically, while red shows the highest concentration of large fires.



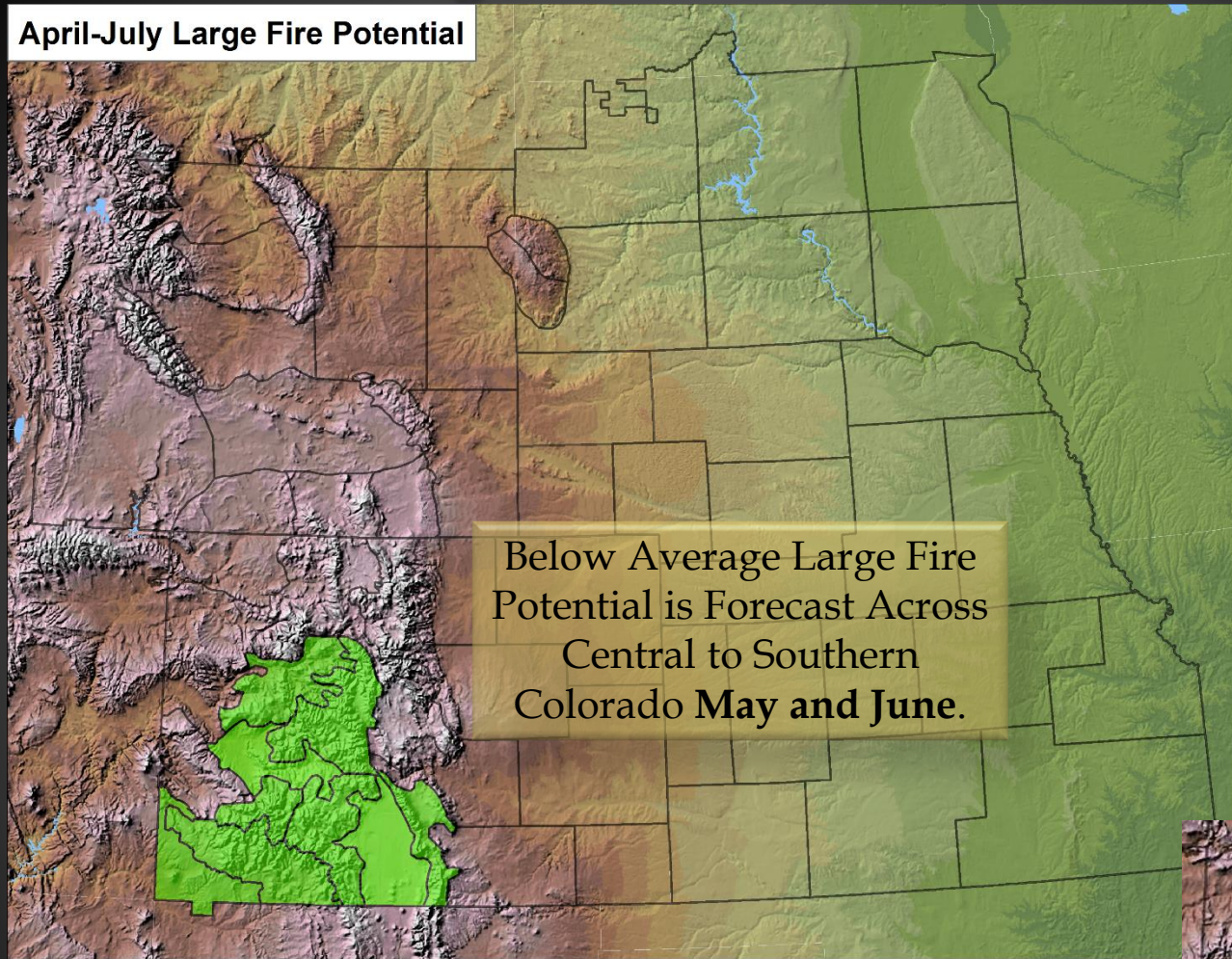
Rocky Mountain Area Fire History

Historical fire data 1992-2015 shows clusters of large fires in August trending downward compared to July in CO, while persisting across WY and western SD/northwest NE. *Yellow encompasses where the majority of large fires have occurred historically, while red shows the highest concentration of large fires.



Large Fire Potential Forecast

April-July Large Fire Potential



Below Average Large Fire Potential in July is Forecast to Become Constrained to the Mountains of Central to Southern Colorado in **July.**

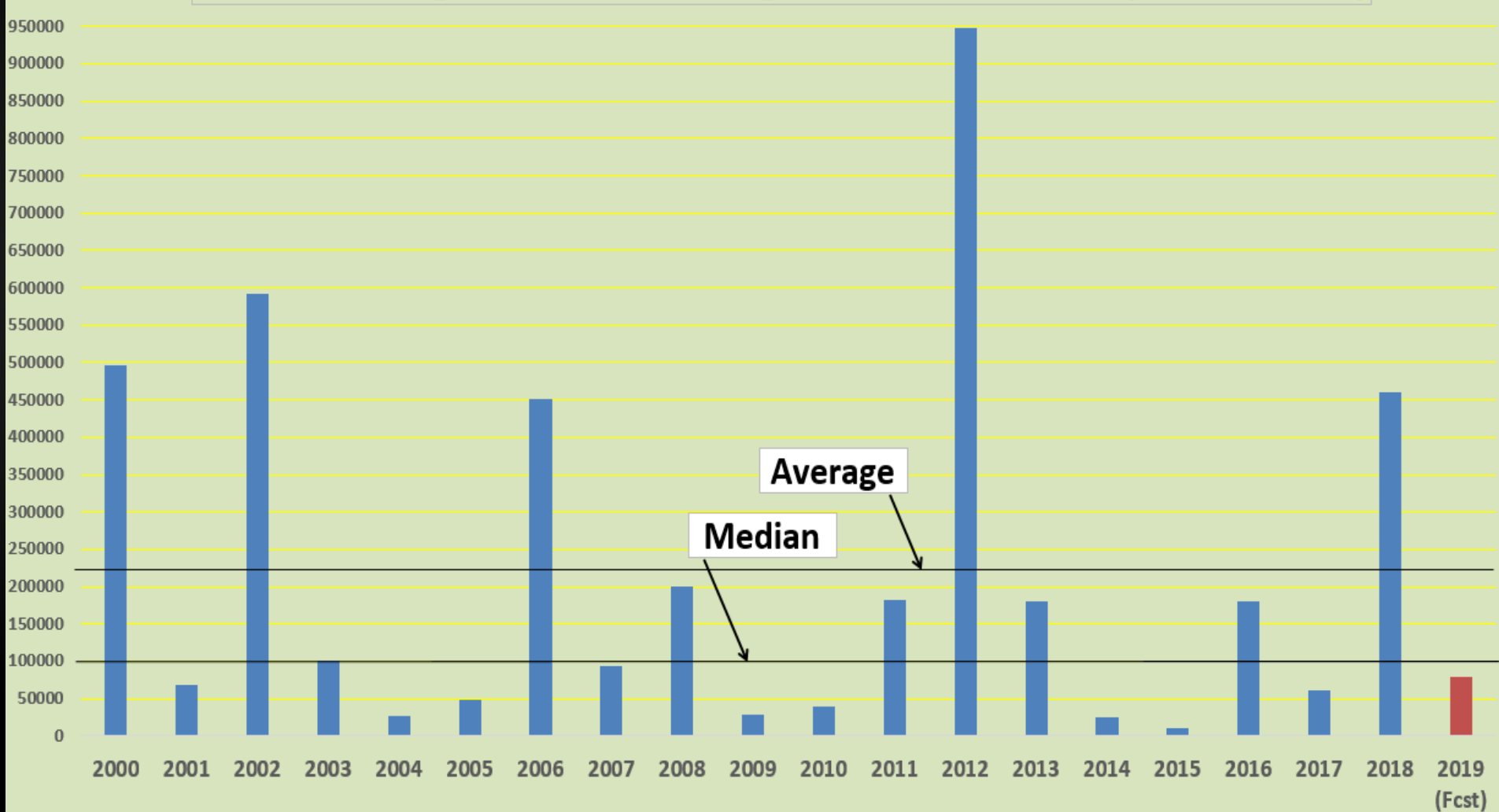




Large Fire Potential Forecast

The 2019 large fire forecast (red bar) for acres burned during June-August across the RMA is below the median value of the 2000-2018 RMACC dataset.

RMA June-August 2000-2018 Large Fire Acres Burned (RMACC Data)



120 Day Fire Potential Outlook Summary

Current Climatology

No persistent warm/dry episodes have occurred during the latter portion of this winter into early spring across the RMA, although portions of WY show some short term and long term precipitation deficits in portions of central to western WY. The Drought Mitigation Center depicts “Moderate” drought ratings in portions of far southern CO and also the southwest corner of WY, as trends continue to show diminishing drought severity the last several months. Mountain snowpack as of April 1st is near average across western and northern WY into the Black Hills of SD. Otherwise, there was above average snowpack across southern WY through CO, especially in the central to southwest portion of the state where amounts were in the top 5 on April 1st for the period of record, with a few reporting sites at their 1st or 2nd highest values for the period of record. Statewide amounts were tied for the 2nd highest since 1992.

Fuels

Snow cover and/or frozen precipitation this time of year limits the utility of ERC readings from RAWs sites across the geographic area, and snowpack as of April 1st was average to above average across the RMA, with heavy snowpack well above average from central to southern CO. Areas of heavy fuel loading across the eastern plains has shown substantial reduction due to compaction from snowfall during the latter portion of winter into early spring.

Weather Predictions

Short term model forecast precipitation during the first half of April indicates average to above average amounts across the geographic area in an average to cooler than average regime. The consensus of long range weather forecasts indicate an average to wetter than average tendency during April through July, with average temperatures overall except cooler than average in April and May across the eastern plains.

Considerations and April-July Fire Potential Outlook

The combination of recent cool/wet trends so far in 2019 and average to wetter/cooler than average long range predictions into the first half of summer are in part tilting the odds toward average to below average large fire risk across the RMA April-July. Below average large fire risk is predicted for May-June in central to southern CO, with below average risk in July becoming constrained to the mountains of central to southern CO. In addition to the recent and forecast wet trends, heavy snowpack in the central to southern CO mountains is projected to minimize large fire risk during the spring months, and subsequently help to delay the onset of core fire season. Historically, fire activity from June to July has a tendency to increase across western CO, WY, and western SD/northwest NE; conversely, decreasing trends are often the case in July across the southern CO front range. CO statewide snowpack is at the second highest amount for April 1st since 1992, and above median snowpack in CO on April 1st has always been followed by below average large fire activity (since 1992) in CO from the front range westward during the core fire season (June-August). The current El-Nino sea-surface pattern correlates historically with a below average fire season across CO from the front range westward through WY and the Black Hills of SD, as all but one El-Nino spring since 1992 has been followed by a below average June-August fire season.