Southern Area Fire Risk Assessment

Winter/Spring 2018

Southern Area Coordination Center
Rapid Assessment Team

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Executive Summary

In response to elevated risk across portions of the Southern Area, a fire risk assessment was conducted to assess the potential and expected fire situation for the late winter and spring fire season. The assessment period extends from February 1 to May 1, 2018 and covers four general geographic areas: Florida, the piedmonts of the Carolinas and Georgia, the southern Appalachian Mountains, and central Texas and Oklahoma. The analysis includes the current weather situation and extended forecast, fuels compared to normal for the time of year, the National Fire Danger Rating System's energy release component for each Southern Area Predictive Service Area, and fire occurrence. Recommendations are provided based on the findings and conclusions of the assessment. Areas not analyzed within this seasonal assessment, at this time, are expected to observe a normal spring fire season. Fire weather over the next few weeks could substantially alter these current conditions. Conditions across the Southern Area are very reminiscent of the same time period in 2017, with both Oklahoma and Texas having emerging and persisting drought conditions, Florida remaining very dry along the western coast of the Gulf, and both the southern Appalachians and piedmont of the eastern coast being fairly moderate after observing a fairly cold and moist winter.

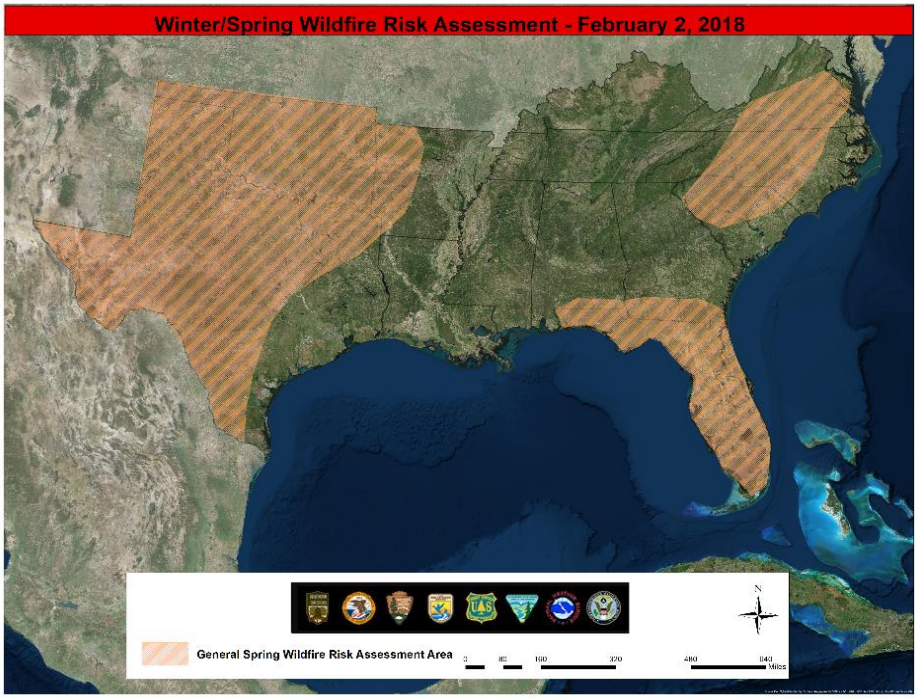

Figure 1. Map of the analysis area

Another factor for most of Florida is the presence of salt killed vegetation from the 2017 hurricane season; there are also areas in southern Florida with significant amounts of downed vegetation and debris fields. Southern Florida has also seen several freezes this winter which will also add to the amount of dead fuel presence in areas that typically have live vegetation year round.

Portions of the region in this analysis are approaching the beginning of their normal fire season. Fire danger has held at an elevated level through the winter in much of Florida, southern Georgia, and southern Alabama. As the days begin to lengthen and become warmer, fire danger will increase as moisture deficits remain in place, as exemplified by current drought levels. During the growing season of 2018 (May- September) above normal rainfall totals have led to an increase in fine fuel loading. In the past 60 to 90 days, the flow of moisture has subsided causing this abundance of fuels to dry out. This dry pattern has led to a slight increase in wildfire activity and severity. In response to the dry conditions and its impact on the fire risk potential within the Southern Area, a fire risk analysis was conducted to:

- Evaluate the possible impacts (i.e., 1000 hour and duff/organic matter outlooks) of long-term drought heading into the spring fire season
- Identify the critical locations in the Southern Area

- Assess the key fire environmental indicators and thresholds which demonstrate above normal fire potential
- Gauge how severe the spring season may be
- Assist state and federal wildfire agencies with severity requests for emergency fire funding
- Inform FEMA of the fire potential in the South to aid obtaining financial assistance

Based on current fuel conditions and forecasted weather conditions, the most likely scenario is an above average level of wildfire activity for February to May. This level of activity will likely cause a slight increase in firefighting resources being mobilized within a state. There is also a high probability the Southern Area will see higher than normal mobilization across state boundaries for this time of the year. La Niña conditions are expected to continue across the tropical Pacific during this outlook period. In this particular pattern, we expect a warmer/drier trend to remain anchored across the US Southwest and southern-central Plains. We still expect disruptions in the stratospheric polar low that will result in significant and longer lasting periods of much colder than average temperatures from February into March.

Analysis Findings and Recommendations

Analysis Findings

The analysis findings indicate the following probabilities for the fall fire season for the assessment area:

Scenario Description for the 2018 Spring Fire Season (February through May)	**Southern Area Probability**
Most Likely Case The spring fire season in Florida, Texas, and Oklahoma is significantly active. High fine dead fuel loading is already supporting large fire growth in Oklahoma and Texas. The piedmont of North Carolina should observe an uptick in wildfire activity with above average initial attack activity. The southern Appalachian Mountains and coastal plains of the eastern coast should observe normal to below normal activity for the analysis period. The season is longer than normal due to the current drought, fuels conditions, and predicted weather pattern. Some additional aviation and ground resources are required due to fire behavior. Mobilization of resources, from across the Southern Area, to these critical areas occurs. Several Type III incidents occur at the same time in the Southern Area. There would be a higher probability of some of these Type III incidents transitioning to either Type II or I. However, no large scale mobilization of out-of-region resources are required due to at least some mitigating weather pattern (i.e., high humidity or periodic rainfall).	70
Best Case With La Niña expected to continue but weaken as we move into spring, a typical ”wetter” pattern would begin to emerge and be more prominent across an area from the Ohio Valley southeast into northern areas of the central Gulf states. This wetter pattern should then recede northeastward towards western Virginia during later April and then May. Rainfall activity occurs at a high enough frequency that fuel dryness is minimized with a resulting lower than average wildfire occurrence. Texas and Oklahoma would observe a normal initial attack load with minimal chance of extended attack events.	20
Worst case Rainfall frequency and amounts are little, and strong dry cold fronts bring significant fire weather. Moderate to severe drought conditions and extreme fire weather events result in numerous large fire incidents and heavy initial attack workload. Large-scale extended attack operations occurring across the Southern Area would require multiple Incident Management Teams as well as out-of-region resources. Lack of rainfall, coupled with this long-term drought and minimal green-up, leads to an extended spring fire season. These areas experience a well above-average spring fire season, including numerous extended attack (Type I and II) fires. Large scale mobilization of out-of-region resources occurs.	10

Table 1. Analysis findings for the Southern Area 2018 spring fire season with probability rating

Recommendations

- This spring assessment has been completed prior to the typical fire season. As we move closer to and enter the spring fire season, managers should maintain situational awareness of current and trending conditions.
- Drought conditions are prevalent throughout the Southern Area. Though moderated across interior portions of the area due to increased moisture, the western states and Florida have observed below normal precipitation over the past couple months. Fire personnel must remain cognizant of these conditions and monitor any voids in normal rainfall frequency.
- Fire managers will need to monitor fuels conditions in these assessment areas. This will become more important as the fire season and prescribed fire season start to blend together.
- Wildfire operations could evolve from normal operations to larger scale and more complex as the spring continues. Do not expect any fire to be routine. Be prepared to utilize indirect tactics with extended mop-up. Utilize aerial supervision to help direct crews and keep them informed on fire behavior. Ensure that LCES is in place before engaging on any fire. Remember to STOP, THINK, and TALK before you ACT… and actively look for ways to minimize risk to firefighters in what is forecast to be a period of very high fire danger.
- Ensure out-of-region resources are briefed on current and past conditions. Utilize pocket cards showing the current situation and the WFAS mobile severe fire weather mapping program to stay current on conditions (http://m.wfas.net/).
- Implementation of prescribed fire operations will need to be monitored as well. Fuel conditions will dictate fire behavior and smoke management procedures.
    - Fire managers will need to continue to monitor prescribed fire parameters. Mindful selection of burn units will be important if drought conditions worsen. Engage in a risk dialogue with field personnel and leadership on ceasing or continuing prescribed fire operations. Daily discussion on resources needs for prescribed fire and suppression operations will be important.
- Fire managers should be prepared to support periods of more frequent fire occurrence and the potential for more complex, longer duration wildfire incidents.
- Maintain capabilities to mobilize Type III teams.
- Augmentation of initial attack resources will likely be required throughout the late winter and spring. This will result from increased fire behavior, fire spread, and longer mop-up times due to drought-stressed fuels and soil. Additional resources, both ground and aviation, may be needed.
- Ensure firefighter pocket cards are up to date and posted on the national website (http://fam.nwcg.gov/fam-web/pocketcards/).
- The increased dead or dormant vegetation load could increase the severity of the fire season, especially in Florida. The presence of salt killed vegetation from the 2017 hurricane season resulted in significant amounts of downed vegetation and debris fields in areas of southern Florida; this area has also seen several freezes this winter, which has added to the amount of dead fuel presence in areas that typically have live vegetation year round.

- Central Florida is seemingly not as critical in the short-term. There are no outstanding moisture deficits for this area; however, this area typically can and will dry out quickly. Long-term forecasts show warmer and drier trends for this area through May; therefore, a reassessment may need to be done for central Florida if rainfall becomes less frequent and moisture deficits begin to build.
- As fuels, water levels, and soil moisture begin to drop over this time period, ignition of prescribed fires will need to be monitored closely as the risk becomes elevated and organic soils will begin to become available for burning. Long-term burning of organic soils has led to numerous escaped prescribed fires over the past decade as much as a month post ignition. Organic soil fires are likely to result in unwanted smoke impacts.
- Conditions for Florida, southern Georgia, and southern Alabama will need to be monitored over the coming weeks as conditions are forecast to become drier and warmer. The potential for an above average spring fire season is present in south Florida (south of Lake Okeechobee) as well as north Florida, south Georgia, and south Alabama. However, at this time, conditions are largely average to slightly above average and are providing ample opportunities for prescribed fire accomplishments.

Introduction and Background

During the growing season of 2017 (May-September) above normal rainfall totals have led to an increase in fine fuel loading across the western portion of the Southern Area. In the past 60 to 90 days, the flow of moisture has subsided causing this abundance of fuels to dry out. Multiple hard freezes have also contributed to this situation. 1000 hour fuels are not showing signs of extreme conditions based on reports of fire managers across the assessment area; however, as the season persists, they will begin to dry out and cause fire control issues and long-term smoke impacts from prescribed fires.

Fire danger has held at an elevated level through the winter in much of Florida, southern Georgia, and southern Alabama. As the days now begin to lengthen and become warmer, fire danger will begin to increase as moisture deficits remain in place, as exemplified by current drought levels.

Significant drought conditions, which led to the historic fall fire season across the Appalachian Mountains in 2016, have generally seen a return to normal rainfall patterns since early December. Long-term drought still remains and can be observed in the U.S. Drought Monitor in Figure 2.

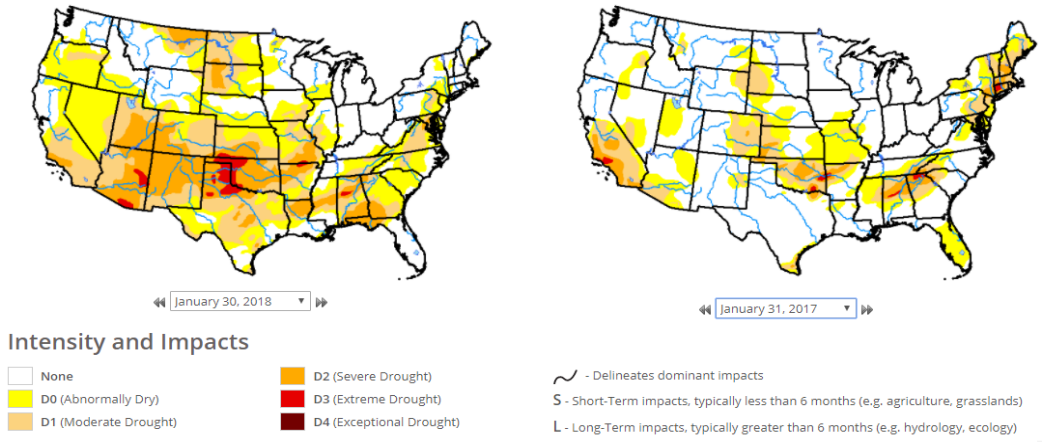

Figure 2. Map of the National Drought Monitor which displays the size and severity of drought conditions across the United States. Source: National Drought Monitor website

Figure 3. Map of current Southern Area large fires as of February 5, 2018.

Risk Analysis

Weather

Short-term drought will continue to build in the Southern Plains as we remain in a La Niña signature during the winter months. Cold air outbreaks will penetrate deep into the Southern Plains, and these outbreaks will provide periodic snows and wintry precipitation. They will be the exception to the overall dry signature that has developed and is expected to continue. Our southern tier of states, while likely to see some precipitation, is another area of drier than average rainfall along with milder temperatures. As the winter brings some cold weather to the I-10 corridor, these influences should mute fire danger. Texas and Oklahoma are expected to feature the most accentuated dry signature, perhaps with western Arkansas as well. Some drying is expected in Florida, and this is a situation that will have to be monitored closely as spring evolves.

The map below displays the 60-day percent of normal precipitation, as of February 1, 2018. Western portions of the Southern Area, specifically the panhandle of Texas and western Oklahoma, are hovering at around 10 percent of normal precipitation for this time of year. The majority of the remaining Southern Area has observed slightly below normal precipitation comparatively.

Recurring periods of moderate to locally high rain activity and the subsequent continuing broad improvement in fuel moistures have minimized fire activity in January in most of the Southern Area except areas of far-western Oklahoma and west Texas. Existing dry/drier/drying conditions in these more western areas of the Southern Area, along with above average fine fuel loadings and anticipated periods of windy weather and dry line induced lower humidity, should produce a fuels environment increasingly receptive to ignition and fire spread. Fire managers should be monitoring any weather pattern changes which could broaden this area eastward.

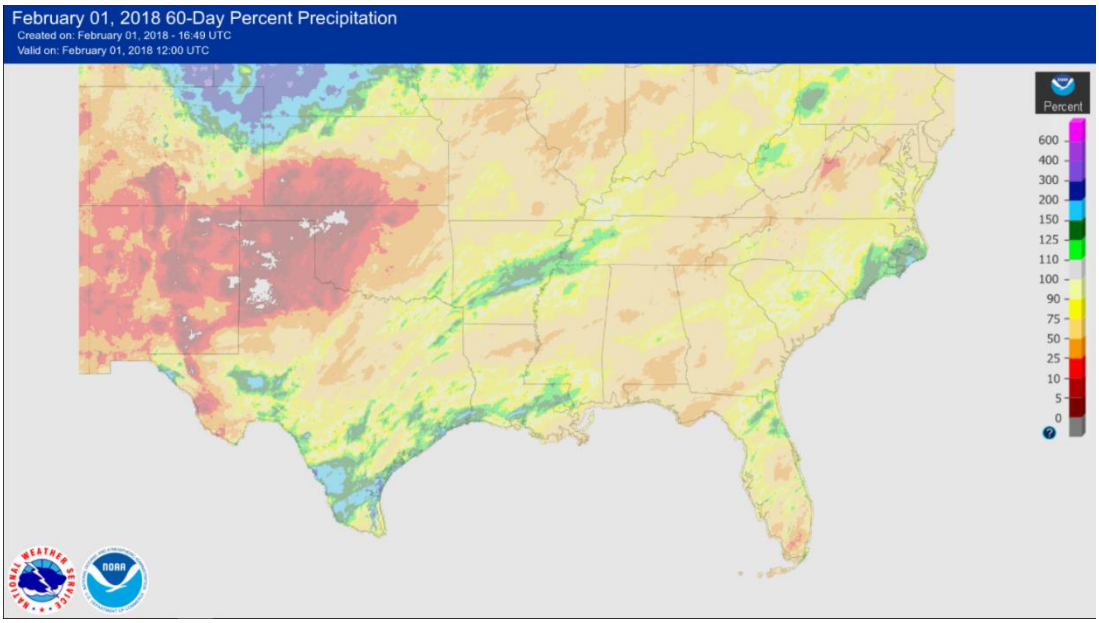

Figure 4. Map of 60 day percent of normal precipitation

PRECIPITATION OUTLOOK

La Niña conditions are expected to continue across the tropical Pacific during this outlook period. In this particular pattern, we expect a warmer and drier trend to remain anchored across the US Southwest and southern-central plains. We still expect disruptions in the stratospheric polar low that will result in significant and longer lasting periods of much colder than average temperatures from February into March. Snow events in this pattern will likely be a risk into March. With La Niña expected to continue but weaken as we begin to move into spring, a typical "wetter" pattern should begin to emerge and be more prominent across an area from the Ohio Valley southeast into northern areas of the central Gulf states. This wetter pattern should then recede northeastward back towards western Virginia during later April and then May.

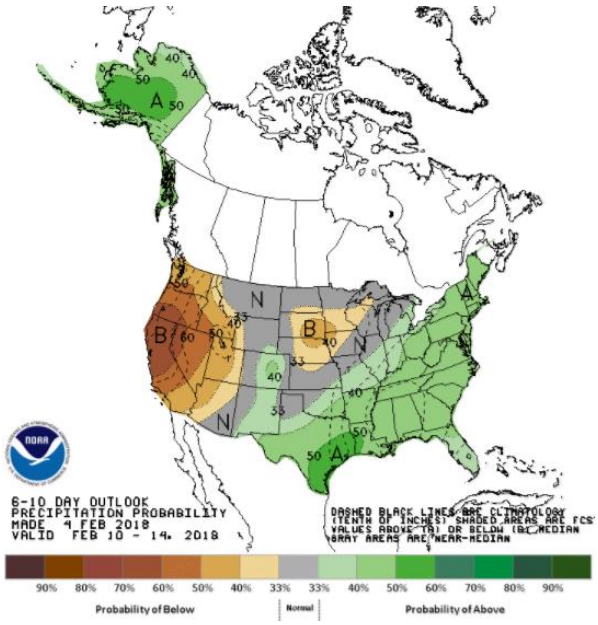

Figure 5. Map of six to ten day precipitation forecast for the United States

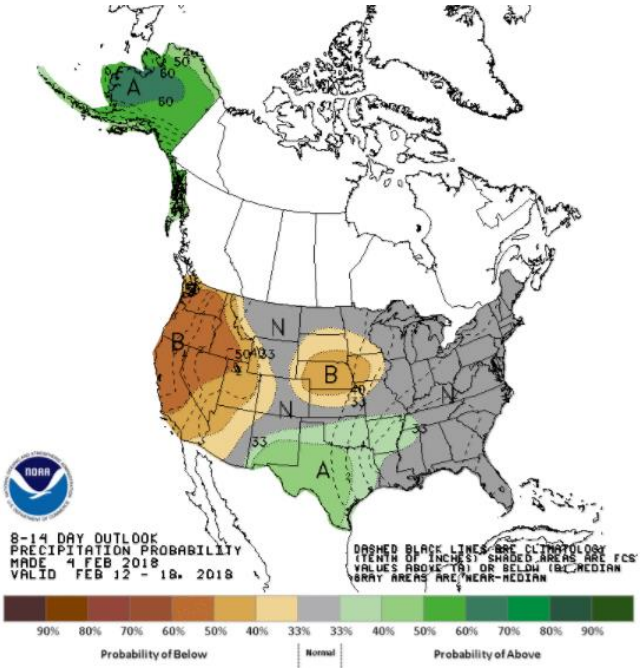

Figure 6. Map of eight to fourteen day precipitation forecast for the United States

February: A persisting, cool El Niño Southern Oscillation (ENSO) episode from 2017 combined with northern hemispheric patterns should produce a resurgence of colder winter weather for most of the month. This will lead to some additional snow and rain events, which will continue to mute wildfire risks for most of the Southern Area. For the western states of the Southern Area, pre- and post-cold frontal lower RH and wind patterns should produce periods of continuing elevated to high fire danger as fuels and loadings are likely to remain overly dry and high with the drought situation worsening. This is due to expected below average precipitation and above average temperatures.

March: March is looking to be the wettest month of the four month outlook period. Because of this, the pattern should see a broadening of rain (yet still some snow) activity resulting in a peaking period of fire danger limiting weather and lower initial attack levels. Oklahoma and Texas should continue to remain in warmer and drier than average weather conditions, which should produce seasonally peaking and above average fire potential in places during March and into April. With the cool phase of this year's ENSO pattern, there could be some emerging dryness in areas of the Gulf Coast, particularly in Florida, which could produce periods of higher initial attack. This will need to be monitored as the pattern evolves.

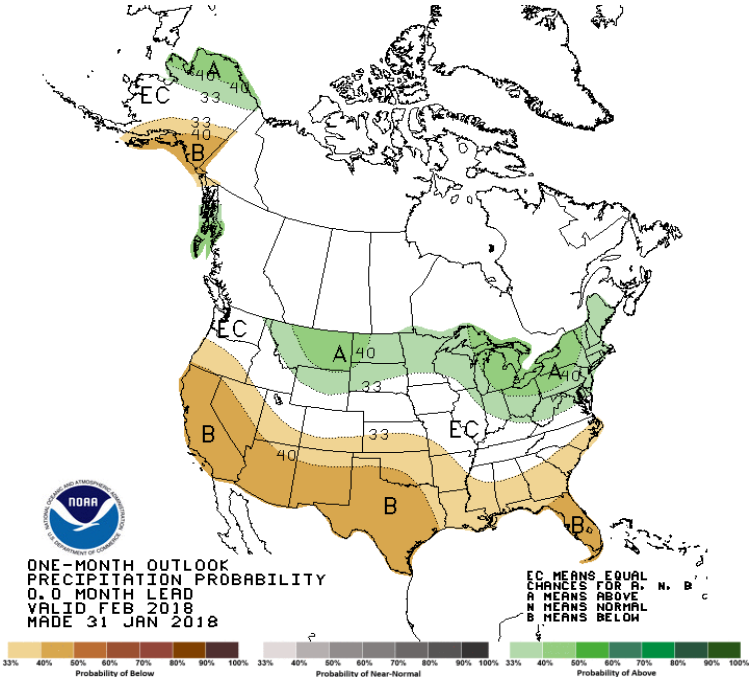

Figure 7. Map of thirty day precipitation forecast for the southern United States

April/May: April and May will likely see a change from the much colder previous winter months where warmer than average temperatures will be more common across the Southern Area. The cool water ENSO episode will likely begin to fade, but it should still allow rain activity east of the Mississippi Valley with above average rain fall centered from the Appalachian Mountains west into eastern Kentucky and Tennessee with this area retreating northeast into Virginia in May. The driest, warmest, and continued highest fire threat should remain anchored in areas of Oklahoma and Tennessee.

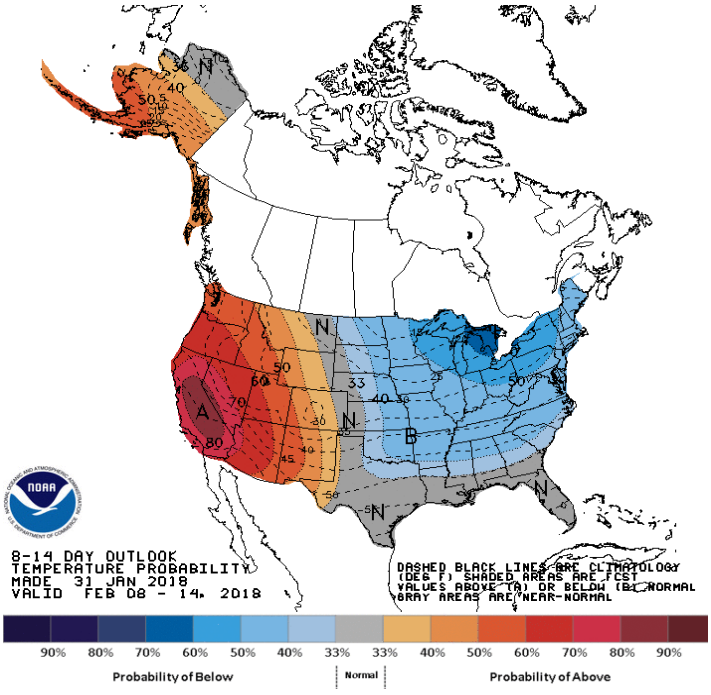

Figure 8. Map of thirty day temperature forecast for the southern United States

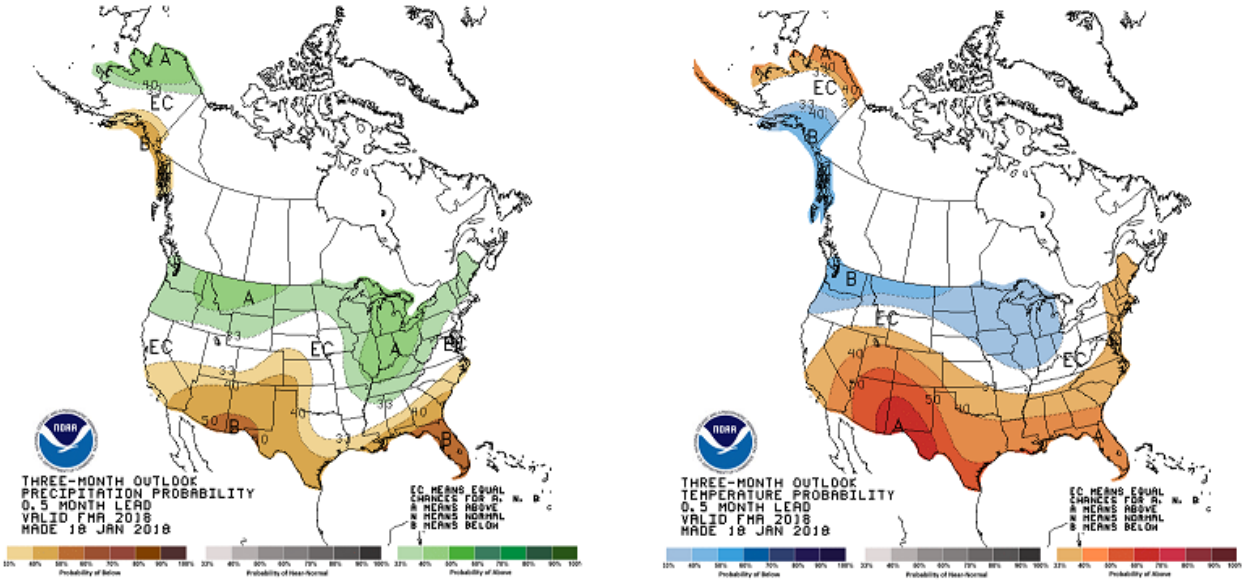

Figure 9. Map of three month precipitation and temperature forecast for the United States

The before-mentioned forecast leads to the drought outlook in Figure 10. Currently, drought persists and even develops across portions of Texas and Oklahoma. Forecast conditions indicate that this ongoing drought is likely to continue and possibly intensify for much of northern Florida, southern Alabama, and the coastal plains into the piedmont of Georgia.

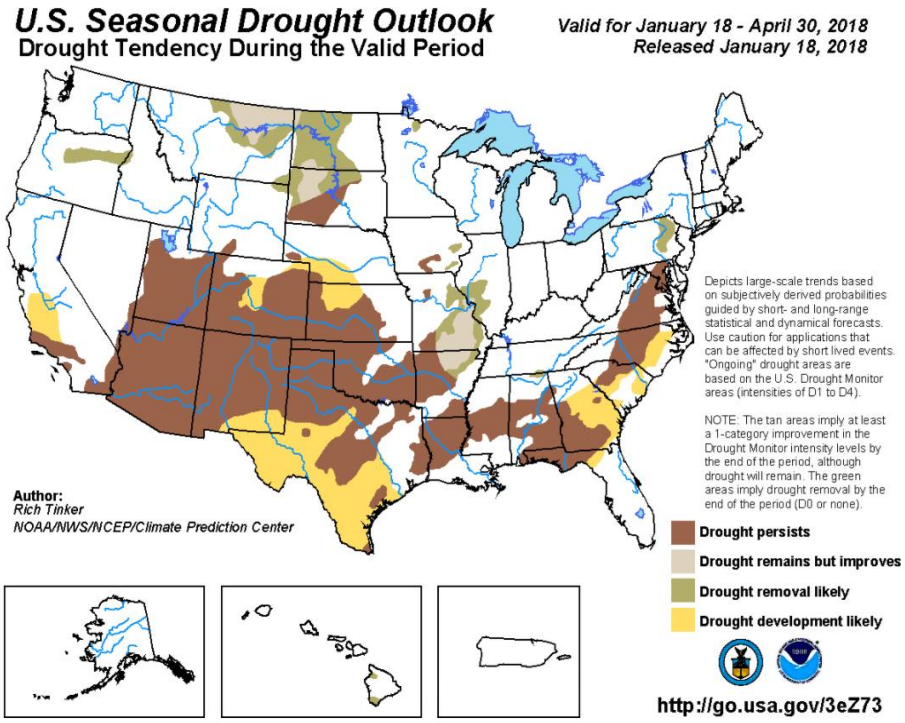

Figure 10. Map of seasonal drought outlook for the continental United States

Fuel and Fire Danger Conditions

In order to isolate fire danger across the broad Southern Area, fuel and fire danger conditions have been separated into three subsections: Florida, southern Georgia, and southern Alabama; central Texas and Oklahoma; the southern Appalachian Mountains and the central piedmont region.

In spite of a higher frequency of stormy weather and snow events so far this winter, short-term drought has expanded across the Southern Area with much of the South now in moderate and severe conditions. More recently, a drier condition has emerged and evolved across our mid-Atlantic and southeastern states. Bitter arctic cold outbreaks have resulted in widespread cured and dormant fuels with live fuels affecting freezing temperatures penetrating down into the central Florida peninsula. Despite this, rain and snow events are generally keeping fuel moistures trending at elevated levels with only short periods of drying weather causing the moisture levels to fall near critical levels. Fuel loadings still remain above average in Texas and Oklahoma, and there will be an added fire risk factor during this outlook period. High dead fuel loadings left behind by last year's hurricanes, Harvey, Irma, and Maria, will continue to pose unique fire danger concerns for coastal Texas, Florida, and Puerto Rico, and this will need to be considered should higher risk fire conditions emerge in these areas.

FUEL AND FIRE DANGER CONDITIONS FOR FLORIDA, SOUTHERN GEORGIA, AND SOUTHERN ALABAMA

Fire danger has held at an elevated level through the winter in much of Florida, southern Georgia, and southern Alabama. As the days now begin to lengthen and become warmer, fire danger will begin to increase as moisture deficits remain in place, as exemplified by current drought levels. As fire danger increases, fire resources will begin to experience extended burning periods, potential for fires to more readily ignite organic soils, and an increase in the difficulty to control wildland fires, especially when wind speeds above 3-5 miles per hour are seen at the ground level.

Minimal precipitation has been observed over the northern Gulf states during early 2018. These areas were already in a deficit, keeping southern Alabama, southern Georgia, and northern Florida in a state of severe drought as seen in Figure 11.

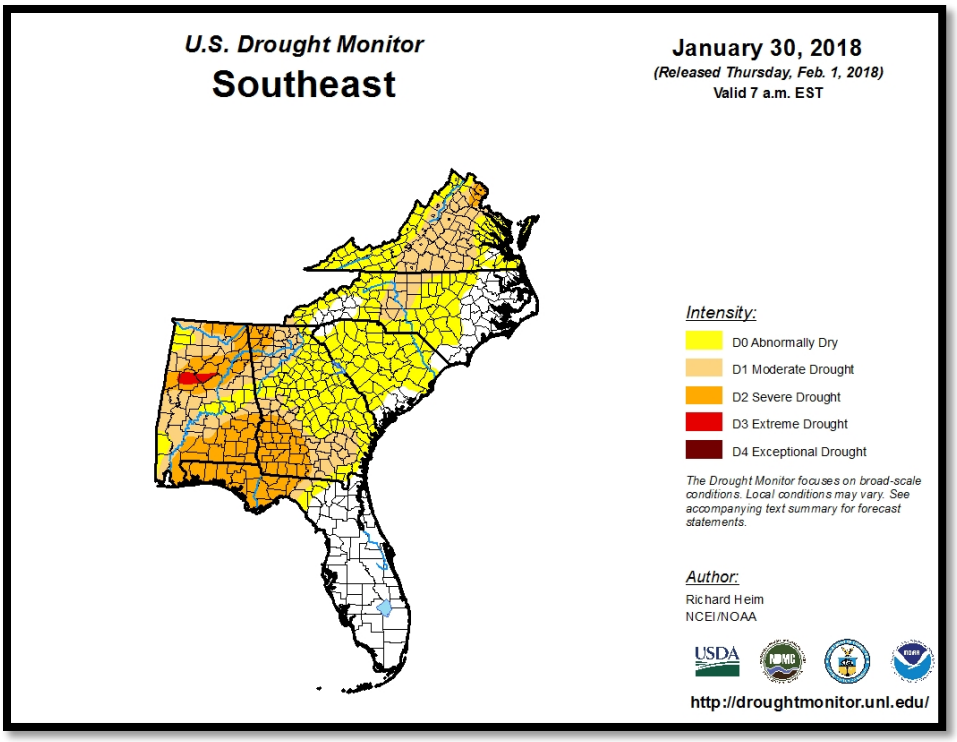

Figure 11. Map of the Drought Monitor for the southeast United States as of January 30, 2018

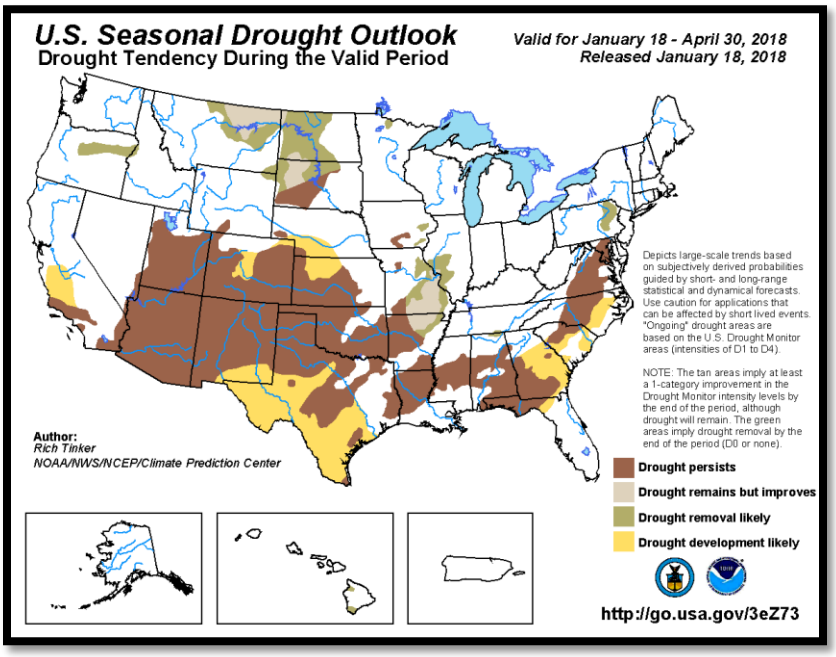

Figure 12. Map of seasonal drought outlook for the United States

Forecast conditions indicate that this ongoing drought is likely to continue and possibly intensify for much of north Florida, south Alabama, and the coastal plain into the piedmont of Georgia as displayed in Figure 12.

Current departure from normal rainfall also highlights the long-term moisture deficit in place. Areas in northern Florida, southern Alabama, and southern Georgia currently have 90 day rainfall deficits of six to twelve inches. The outlook over the next three months exceeds a 50 percent chance for below-normal precipitation for Florida and 40 percent for most of Georgia and southern Alabama (Figure 13).

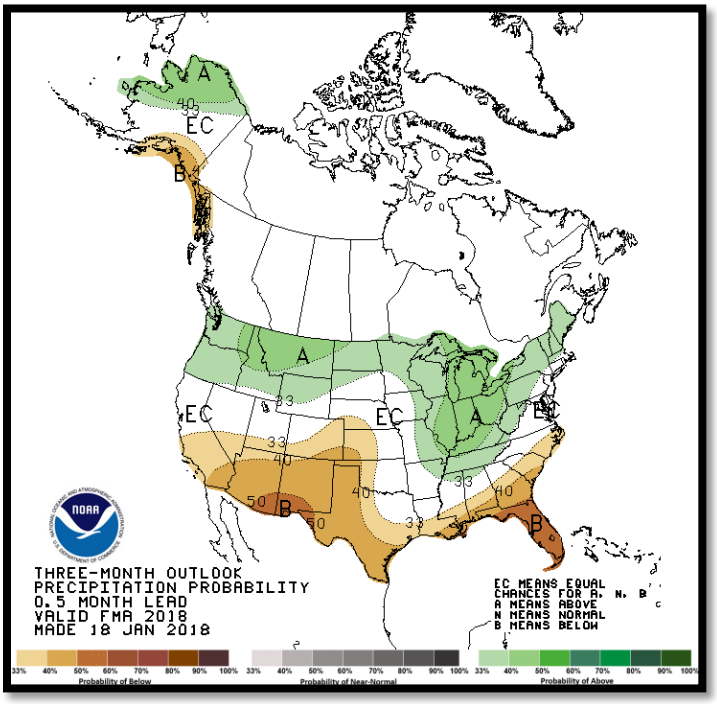

Figure 13. Map of the February-March precipitation forecast for the United States

In south Florida, the normal dry season is drier than normal with rainfall deficits of two to four inches across most of the area south of Lake Okeechobee. As the dry season persists in April and May, continued drying will occur that will set up a higher than normal potential for lightning fires in April and May as the rain and lightning season begins (Figure 14).

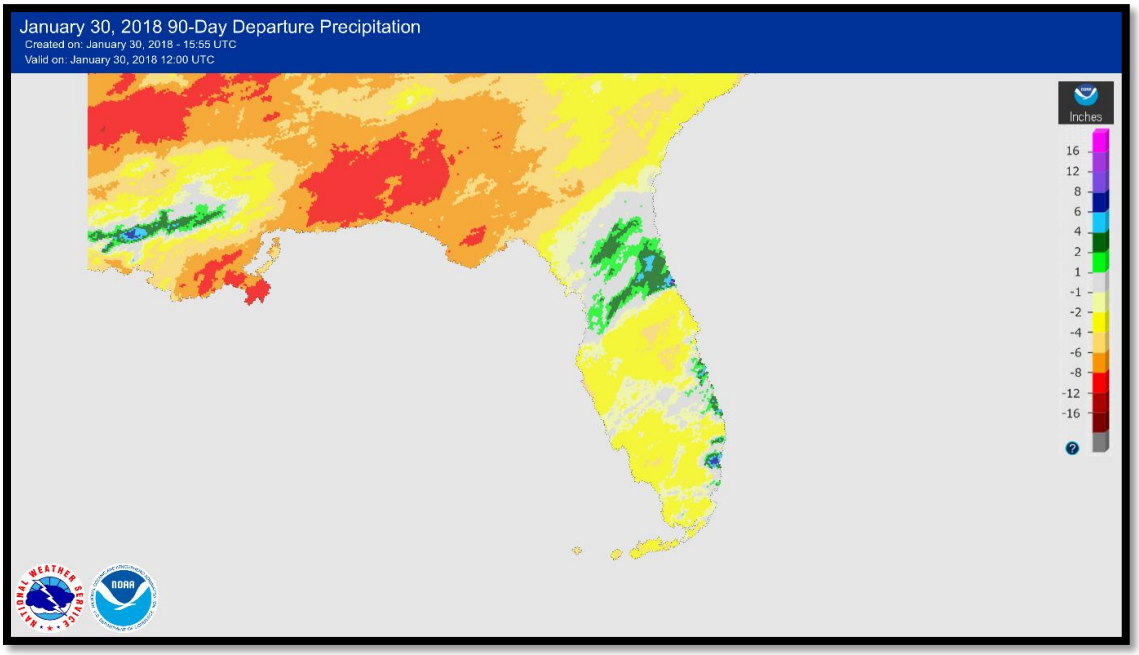

Figure 14. Map of the 90-day departure precipitation for the Gulf Coast states

Stream flow rates vary across the state of Florida as seen in Figure 15. The southern portion of the state has close to normal surface water levels at this time; however, as the drier than normal dry season continues surface water levels will drop leading to above normal fire potential in late spring.

In north Florida, an area from Pensacola to Tallahassee is experiencing stream levels below the 25th percentile. This is a result of the 90 day precipitation deficit. With low surface water levels in place, this area will be more likely than normal to be susceptible to long-term burning into organic soil layers, especially as the surface water levels drop below the 10th percentile.

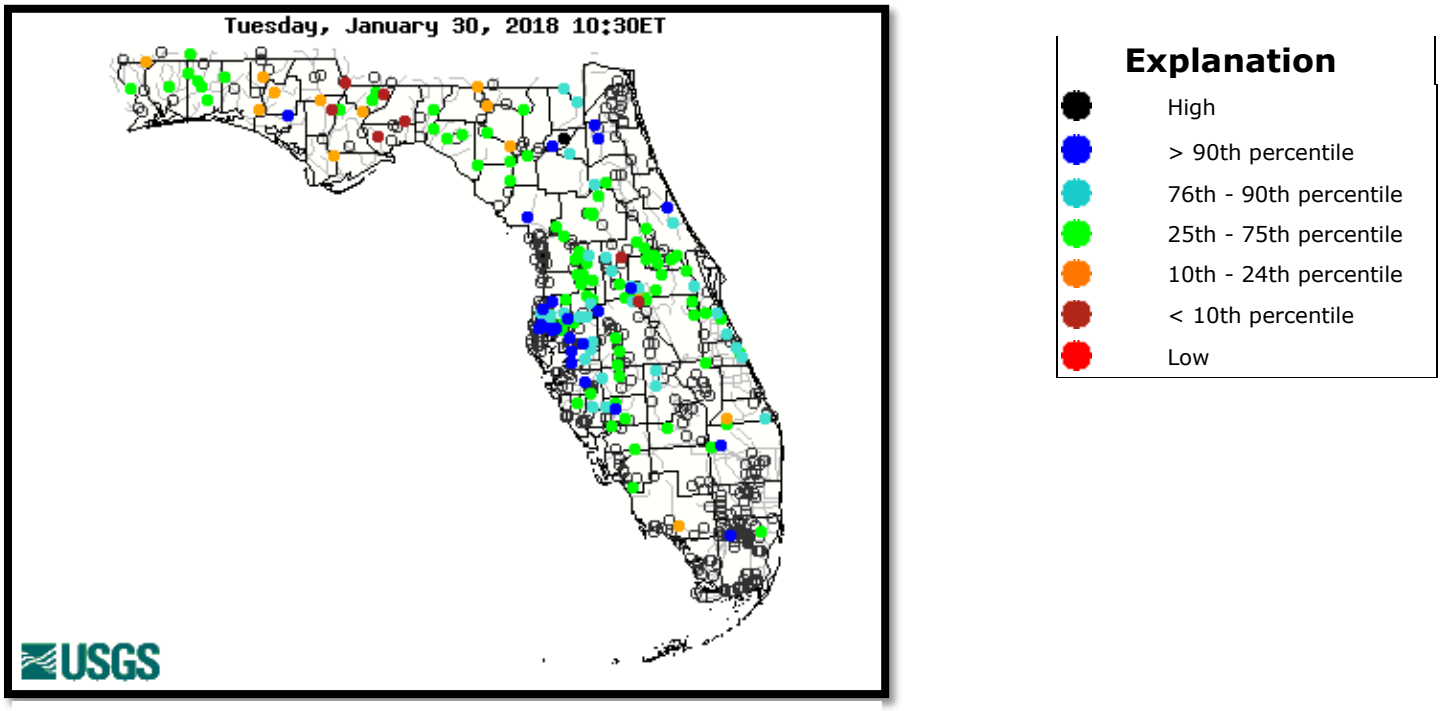

Figure 15. Map of stream flow rates in Florida as of January 30, 2018

The USGS stream gage located at Fargo, GA has been shown to correlate with large fire growth in the Okefenokee National Wildlife Refuge. This refuge was home to significant fires in 2007, 2015, and 2017. In 2007 and 2011, stream discharge dropped to zero cubic feet per second (cfs) at this station. In 2017, it dropped as low as 2 cfs. Large fire growth typically can occur when discharge drops below 75 cfs. Discharge is currently at or slightly below average for this station. As the drought intensifies, this will need to be closely monitored.

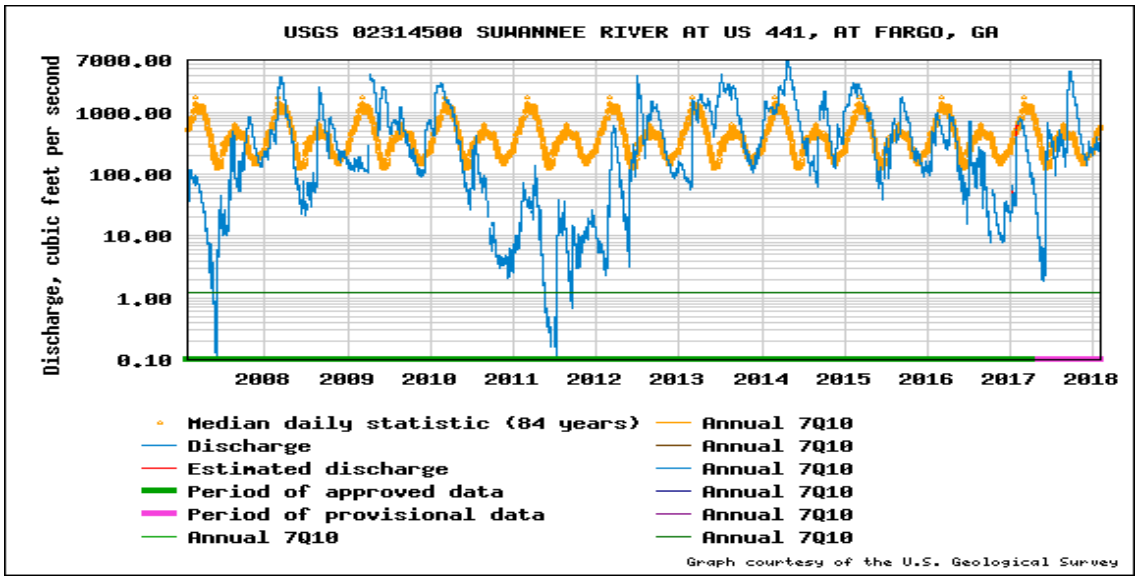

Figure 16. Graph of Suwannee River discharge rates (cubic feet per second) from 2008-2018 at Fargo, GA

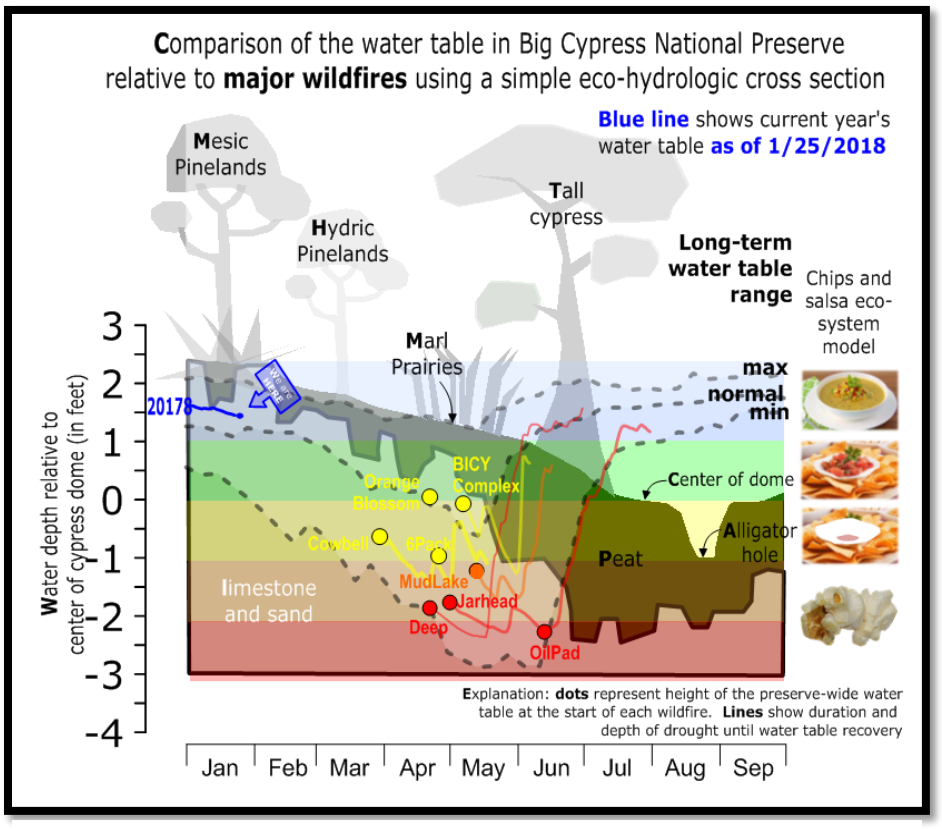

Figure 17. Current water table levels at the Big Cypress National Preserve relative to water levels that existed during major wildfire events

As seen in Figure 17, current water table levels at the Big Cypress National Preserve are slightly above average. Over the next several months, this will drop with the lowest water levels of the year coinciding with the start of lightning season in April and May.

As seen in Figure 18, heavy dead fuel moisture values for the panhandle of Florida indicate that even with recent rainfall fuels are still drier than they were during the noteworthy 2007 fire season. As days lengthen and become warmer over the next two months, expect these fuel moisture values to continue to drop given the current forecast.

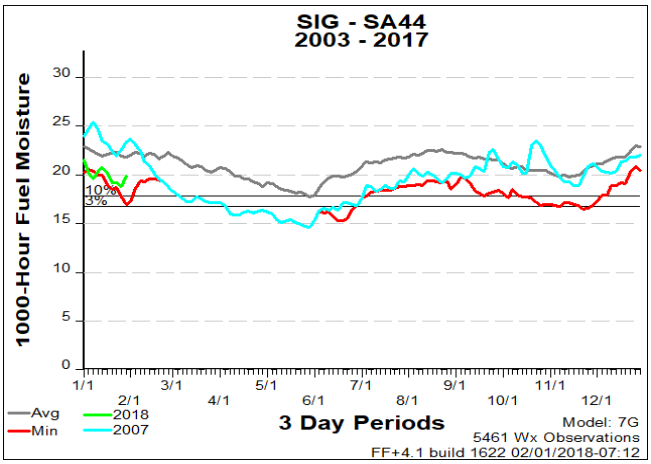

Figure 18. Graph of 1000-hour fuel moisture for northern Florida

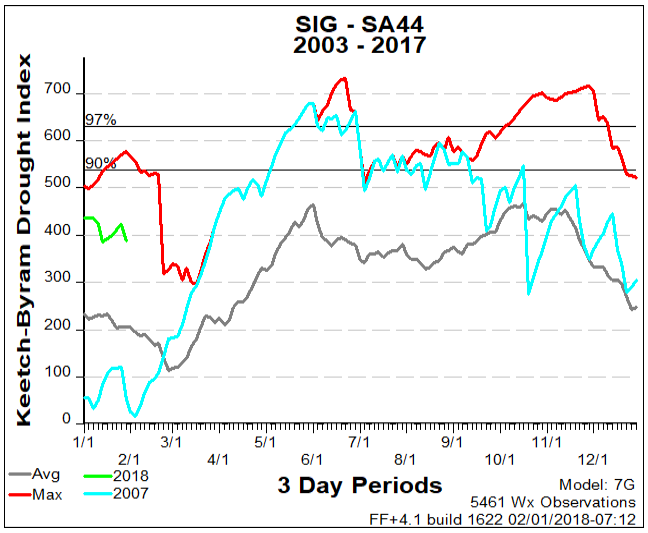

Figure 19. Graph of KBDI values for northern Florida

Keetch-Byram Drought Index **(**KBDI) values in the panhandle of Florida started out higher this year than in 2007, and they have remained high due to the lack of moisture over the last 90 days (Figure 19).

Energy Release Component (ERC) values were near record levels prior to recent rainfall. This indicator of dryness on the overall fuel bed is likely to climb over the coming weeks and closely mimic the seasonal trend set in 2007 (Figure 20).

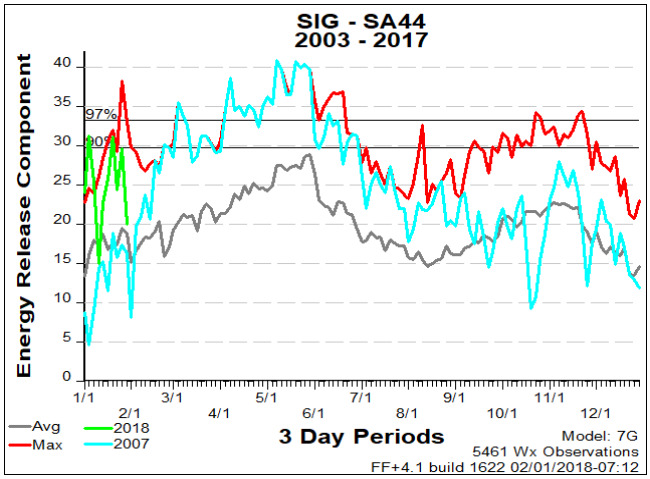

Figure 20. Graph of energy release component values for northern Florida

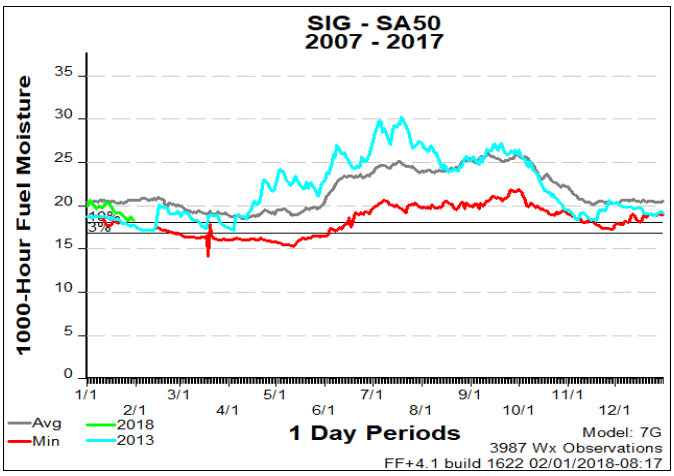

Figure 21. Graph of 1000-hour fuel moisture for south Florida

Heavy dead fuel moisture values are similar to where they have been during previous large fire years in south Florida. Dryness in 1000- hour fuels is indicative of long term drying, which is also typically reflected in low surface water measurements (Figure 21). In south Florida, fires will get large quickly during periods with low surface water.

Keetch-Byram Drought Index (KBDI) values are slightly lower than in 2013, but they are still above average and will continue to rise as the traditional dry season continues through April and into May (Figure 22).

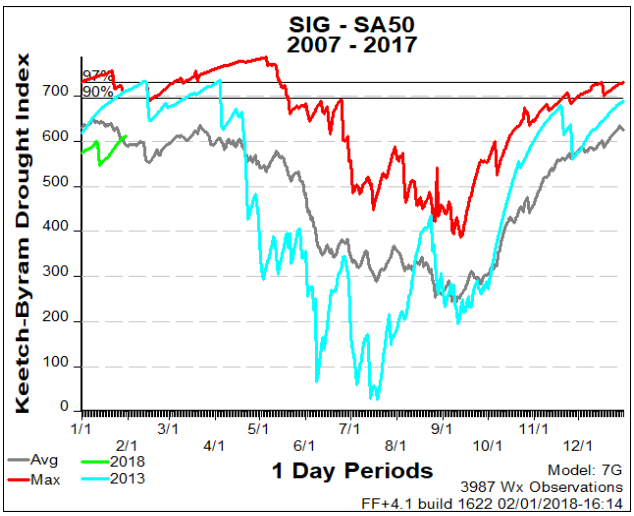

Figure 22. Graph of Keetch-Byram Drought Index values for south Florida

ERC values are almost identical to the 2013 fire year as seen in Figure 23. These values are currently near record levels for south Florida and this upward trend in overall fuel bed dryness is likely to continue through April and into May.

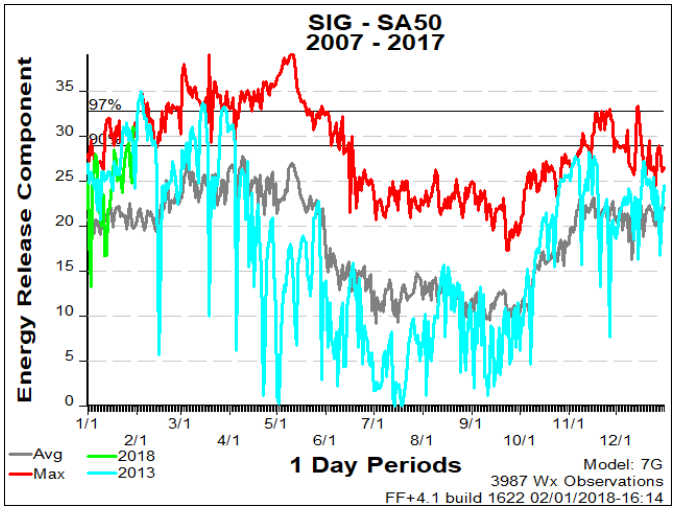

Figure 23. Graph of energy release component values for south Florida

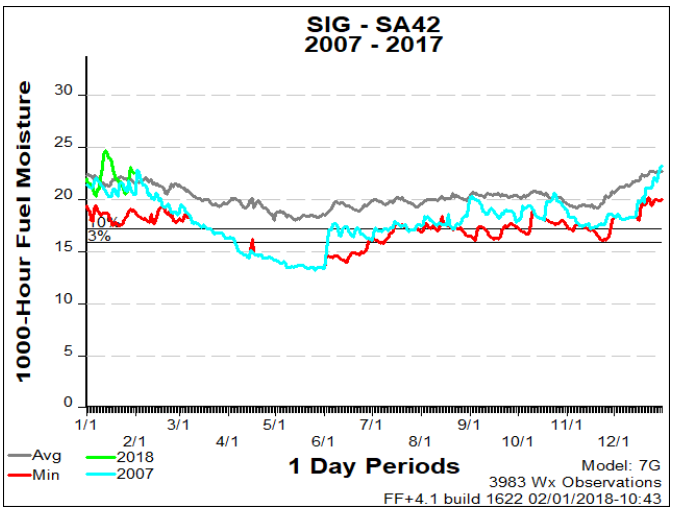

Figure 24. Graph of 1000-hour fuel moisture for south Georgia

Heavy dead fuel moisture values are very similar to where it was at this time in 2007 (Figure 24). With the given forecast a downward trend should be expected to continue.

KBDI values are currently higher than during this time period in 2007 as displayed in Figure 25.

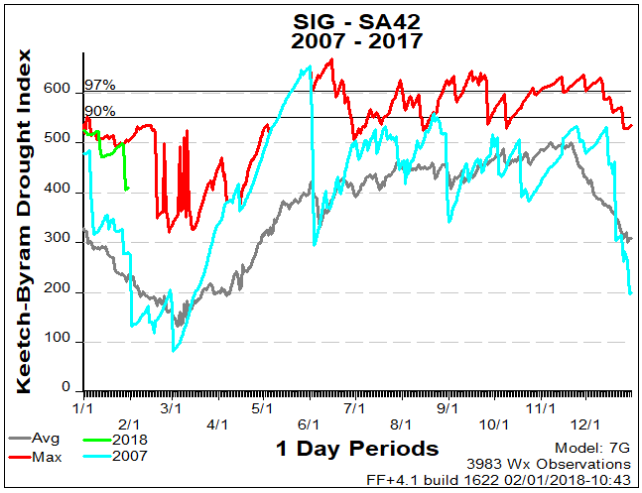

Figure 25. Graph of Keetch-Byram Drought Index values for south Georgia

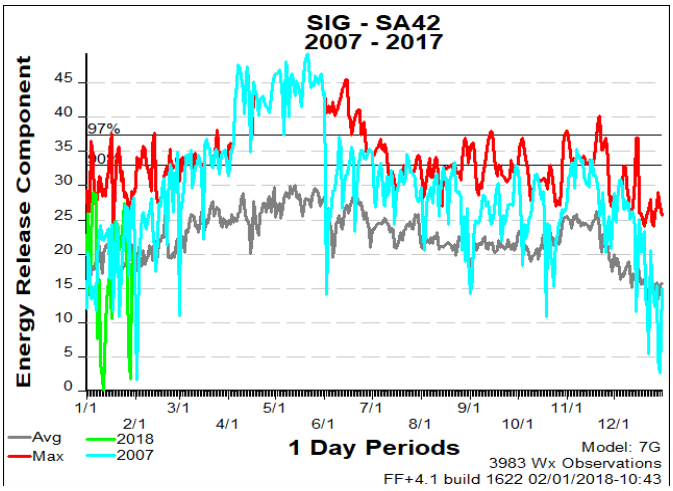

Figure 26. Graph of energy release component values for south Georgia

ERC values in South Georgia are currently average but are expected to trend upwards in a similar fashion to 2007 given the current forecast (Figure 26).

The increased dead or dormant vegetation load could increase the severity of the fire season, especially in Florida. The presence of salt killed vegetation from the 2017 hurricane season resulted in significant amounts of downed vegetation and debris fields in areas of south Florida. Southern Florida has also seen several freezes this winter, which will also add to the amount of dead fuel presence in areas that typically have live vegetation year round.

Central Florida is seemingly not as critical in the short-term. There are no outstanding moisture deficits for this area; however, this area typically can and will dry out quickly. Long-term forecasts show warmer and drier trends for this area through May, so a reassessment may need to be done for central Florida if rainfall becomes less frequent and moisture deficits begin to build.

As fuels, water levels, and soil moisture begin to drop over this time period, ignition of prescribed fires will need to be monitored closely as the risk becomes elevated and organic soils will begin to become available for burning. Long-term burning of organic soils has led to numerous escaped prescribed fires over the past decade as much as a month post-ignition. Organic soil fires are likely to result in unwanted smoke impacts.

Conditions for this entire area will need to be monitored over the coming weeks as conditions are forecast to become drier and warmer. The potential for an above average spring fire season is present in south Florida, south of Lake Okeechobee, as well as north Florida, south Georgia, and south Alabama. However, at this time, conditions are largely average to slightly above average and are providing ample opportunities for prescribed fire accomplishments.

FUEL AND FIRE DANGER CONDITIONS FOR CENTRAL TEXAS AND OKLAHOMA

During the growing season of 2017 (May-September) above normal rainfall totals have led to an increase in fine fuel loading. In the past 60 to 90 days, the flow of moisture has subsided causing this abundance of fuels to dry out. Multiple hard freezes have also contributed to this situation. 1000-hour fuels are not showing signs of extreme conditions based on reports of fire managers across the assessment area; however, as the season persists, they will begin to dry out and cause fire control issues and long-term smoke impacts from prescribed fires. Currently, ERC indices are around the 90th percentile across the area. This will result in control issues, rapid rates of spread, frequent spotting into receptive fuel beds, and complete consumption of fuels down to the mineral soil.

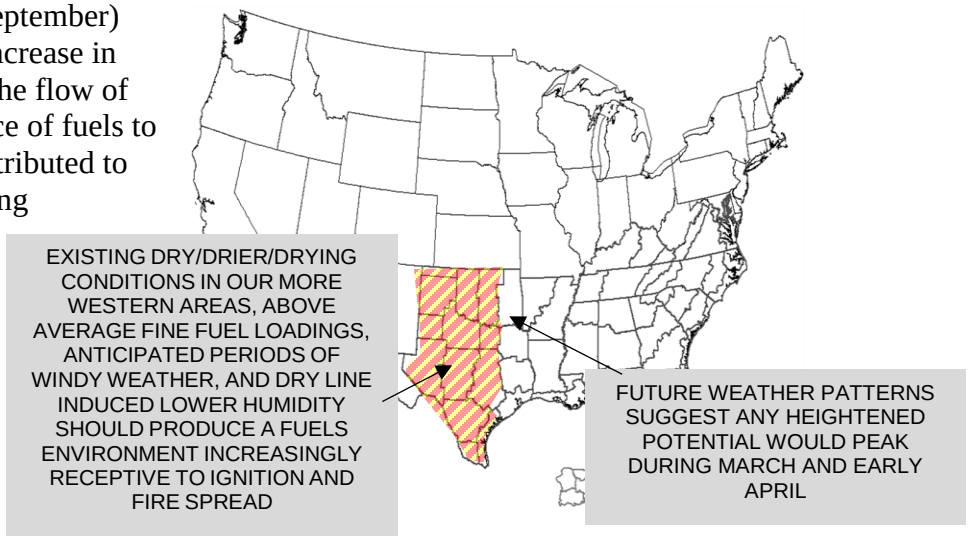

Figure 27. Map displaying areas of drying across Texas and Oklahoma

In very general terms, extreme fire behavior can exist when two conditions are present. One of those conditions is the long-term drying of fuels. The second condition results from daily fire weather (e.g., low humidity, high temperatures, and high winds), which when aligned can lead to large fire growth.

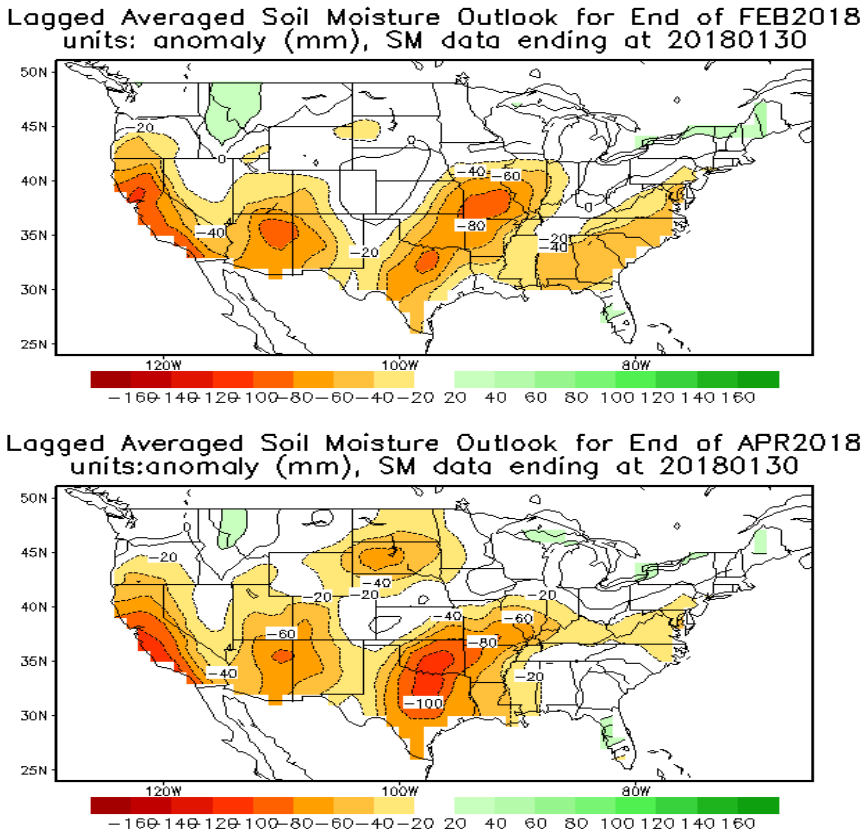

Figure 28. Map of soil moisture outlook for the United States from February to April

The short-term moisture outlook in soils over the assessment area can be observed in Figure 28. Currently soil moisture for the assessment area is of low concern; however, with the projected lack of moisture over the coming months, this will contribute to a higher wildfire risk potential. The outlook products show a range between 40-100% average deficits in soil moistures. Figure 24 correlates directly to the soil moisture deficit in Figure 28. Although there has been infrequent rain across the assessment area, the drought is still persisting in western Oklahoma and northern Texas as the ENSO cycle beings to change.

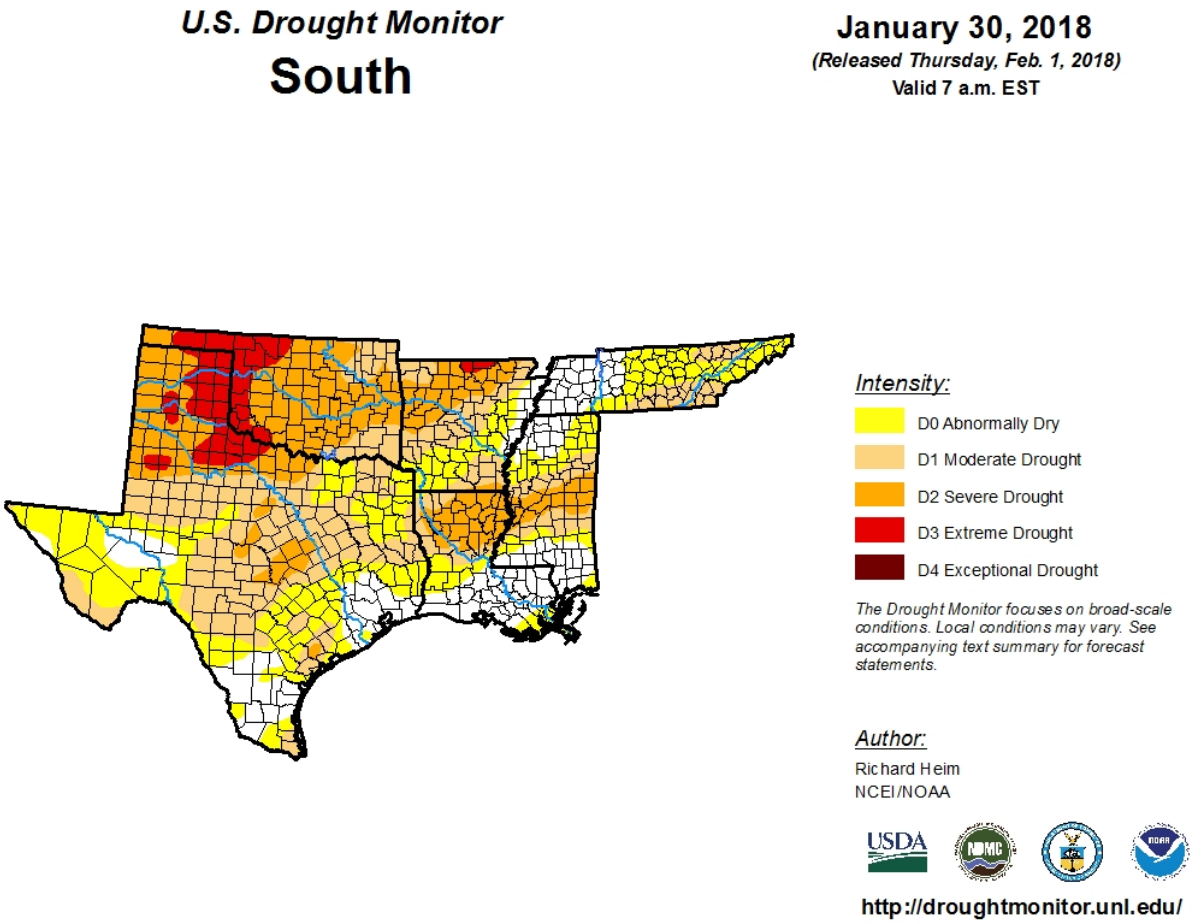

Figure 29. Map of the Drought Monitor for the southcentral United States as of January 30, 2018

Figures 30-32 provide fire danger readings from some of the most critical areas in Oklahoma and Texas using ERC. The graphs have the current year ERC value displayed in green and an additional analog year overlaid for context displayed in black. 2011 was a significant year in terms of wildfire occurrence and acres burned for both Texas and Oklahoma.

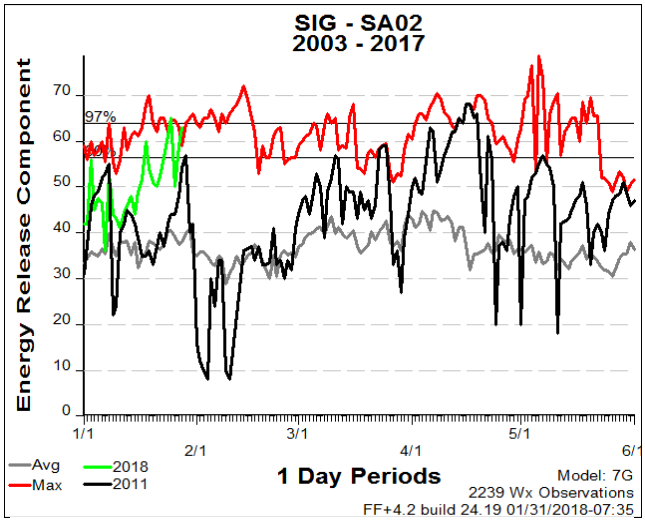

Figure 30. Graph of ERC values for 2011 and 2018 in western Oklahoma

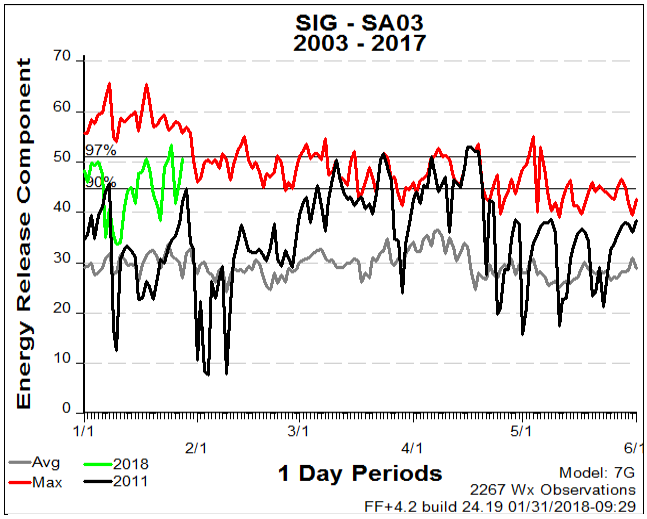

Figure 31. Graph of ERC values for 2011 and 2018 in central Oklahoma

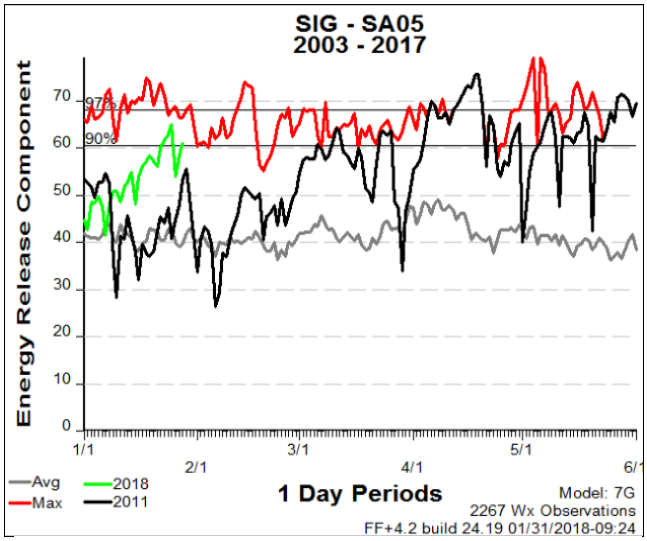

Figure 32. Graph of ERC values for 2011 and 2018 in central and northwest Texas

Figure 33 shows the current soil moisture deficits. Current analysis shows that the majority of the Southern Area has a soil moisture deficit. The forecast outlook shows the deficit improving in the deep southeastern states, but it moves west and worsens in Oklahoma and Texas. In 2017, 1000-hour fuels across the assessment area held around normal to slightly above normal for the entire year until late December. In late December and the first weeks of January, most 1000-hour fuels were either above average or at maximum levels. Cold, wet weather has mitigated these low 1000-hour fuel levels with the exception of the Tennessee Mountains and Tennessee central piedmont region.

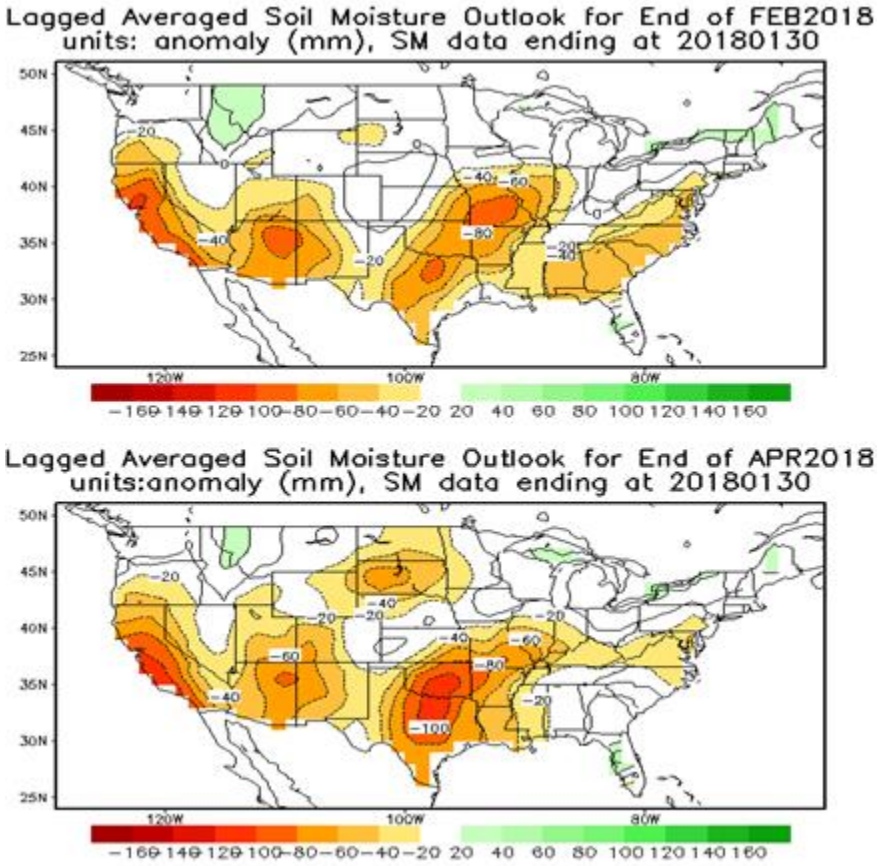

Figure 33. Map of soil moisture outlook for February and March-April for the continental United States

The piedmont assessment area was between 4-16 inches below annual historical average precipitation. Fall and winter rains help to moderate the conditions; however, there was not enough rain to remove the area from drought conditions (Figure 34).

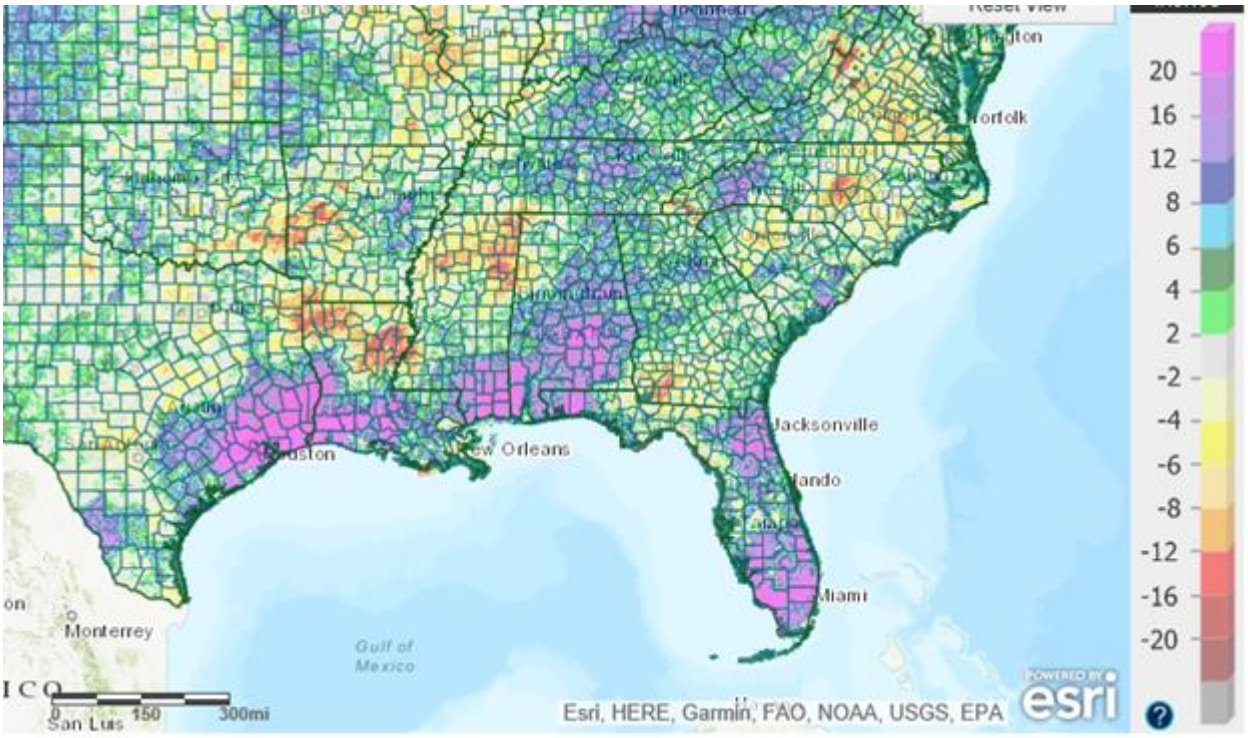

Figure 34. Map of 2016 rainfall departure from normal for the South.

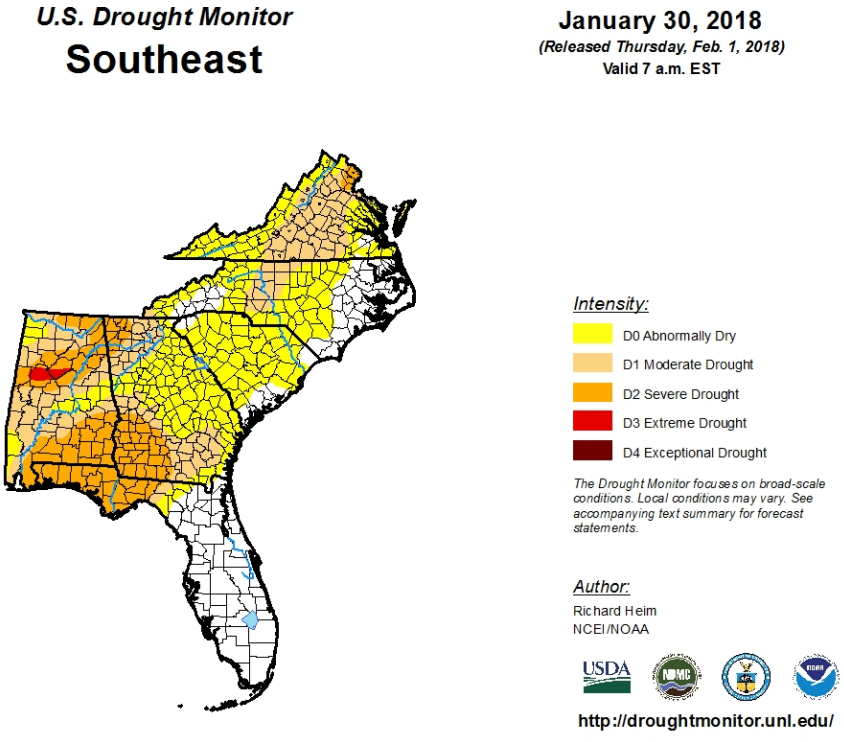

Figure 35. Map of the Drought Monitor for the southeastern United States as of January 30 2018

Figures 36-45 provide fire danger readings from some of the most critical areas across the Southern Area using energy release component. The ERC graphs in figures 36-45 have the current year ERC value and an additional analog year overlaid for context. These analog years provide some perspective on current conditions in relation to years identified as historically significant (in terms of wildfire occurrence and/or acres burned).

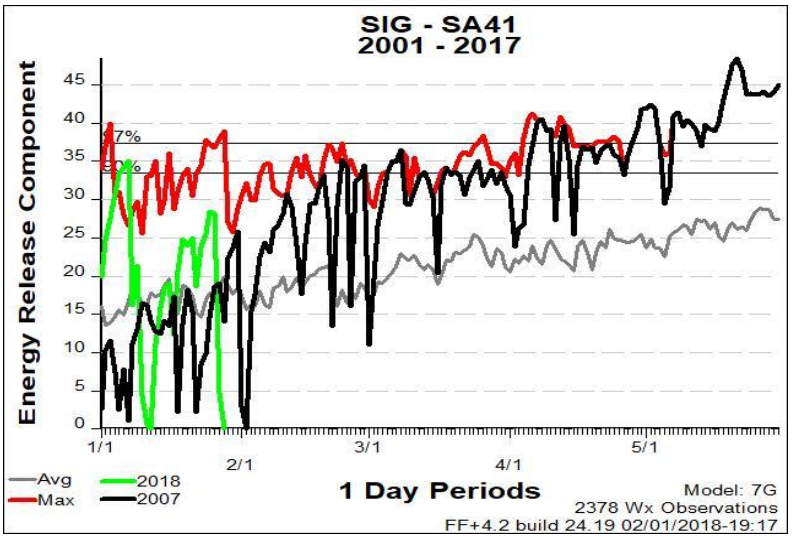

Figure 36. Graph of ERC values for 2007 and 2018 in central Georgia

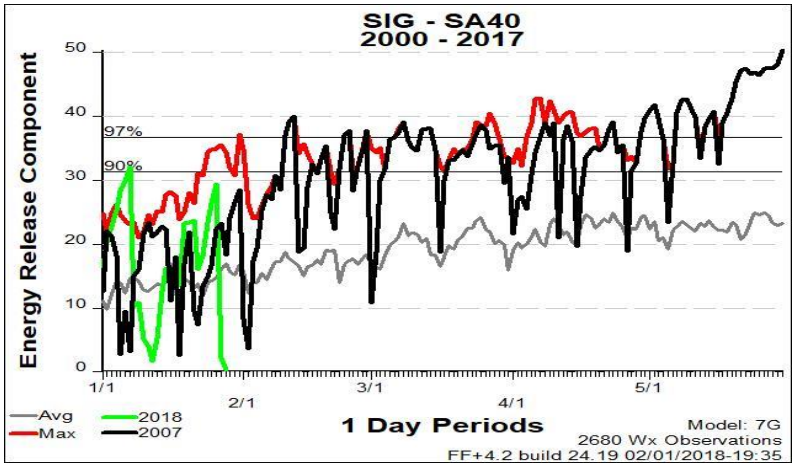

Figure 37. Graph of ERC values for 2007 and 2018 across the northwestern Georgia mountains

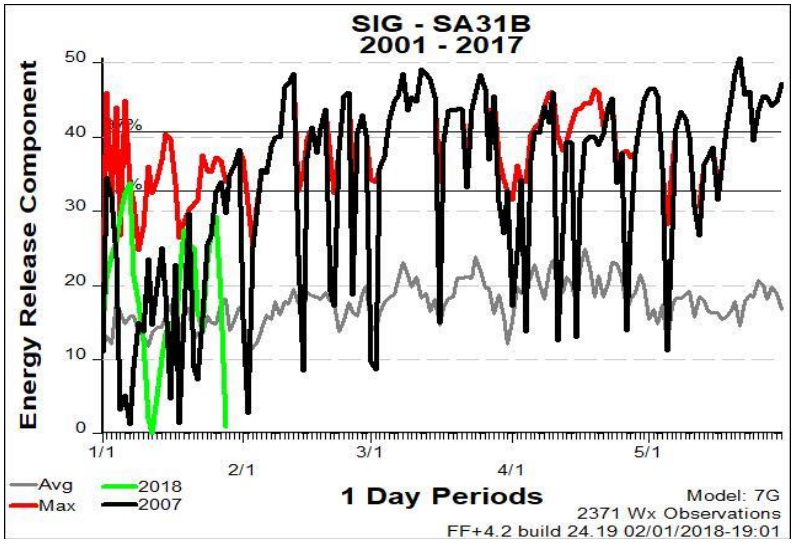

Figure 38. Graph of ERC values for 2007 and 2018 across the north Georgia mountains

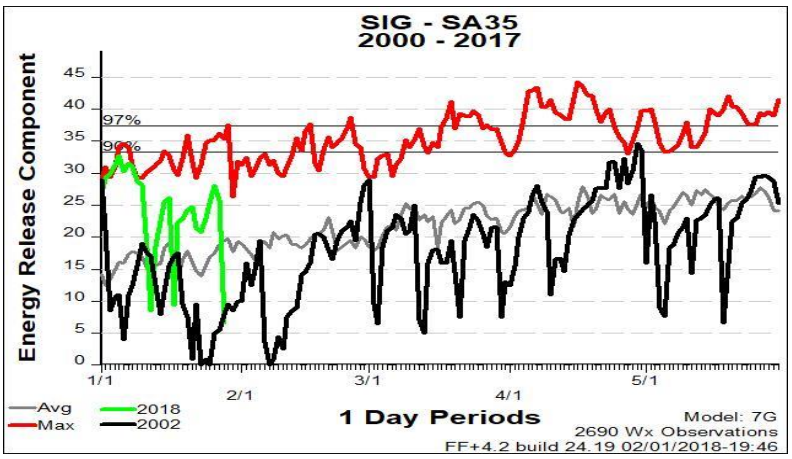

Figure 39. Graph of ERC values for 2002 and 2018 across the central South Carolina piedmont

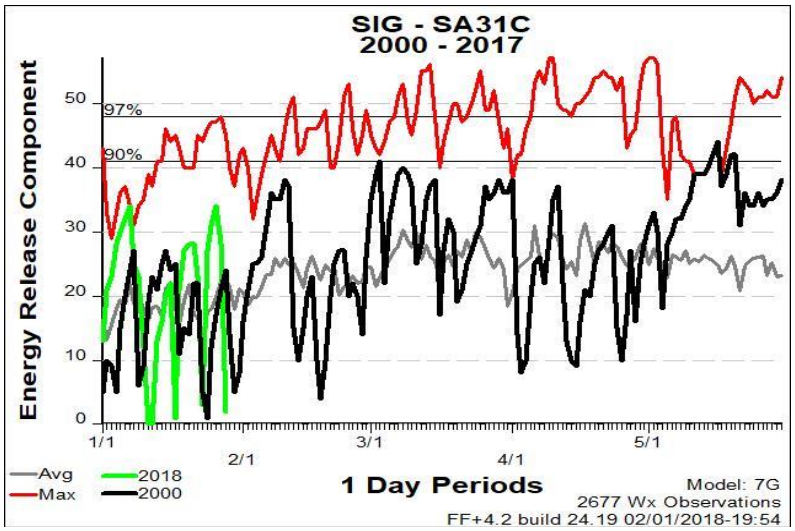

Figure 40. Graph of ERC values for 2000 and 2018 across the South Carolina mountains

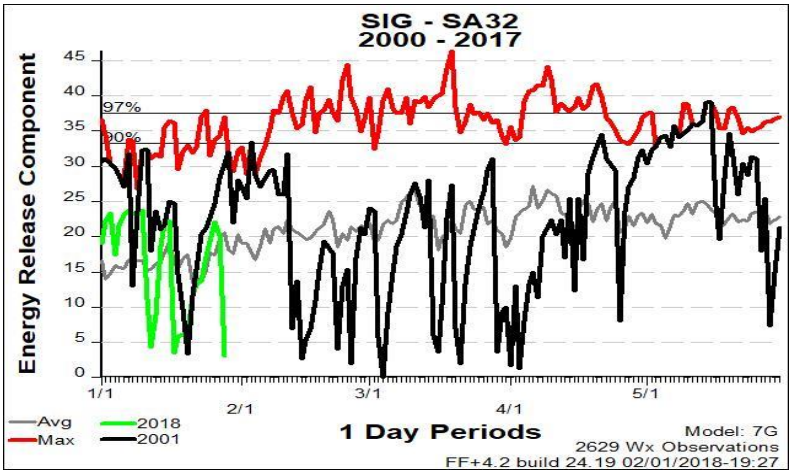

Figure 41. Graph of ERC values for 2001 and 2018 across the North Carolina piedmont

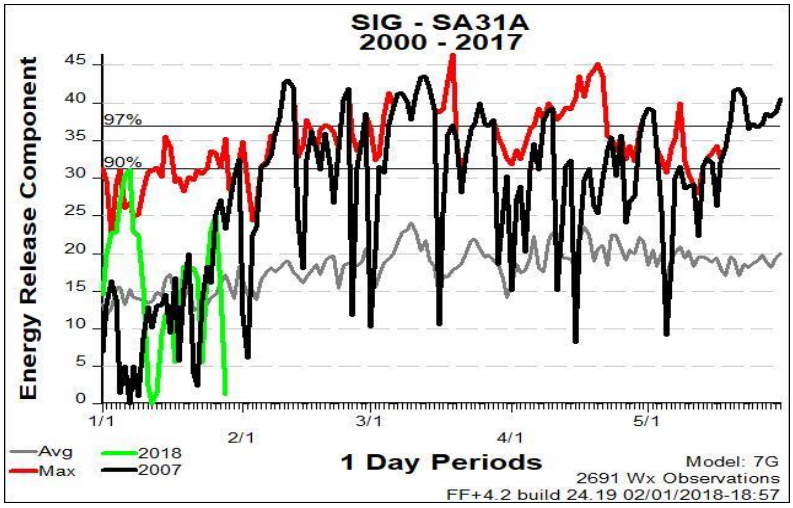

Figure 42. Graph of ERC values for 2007 and 2018 across the North Carolina mountains

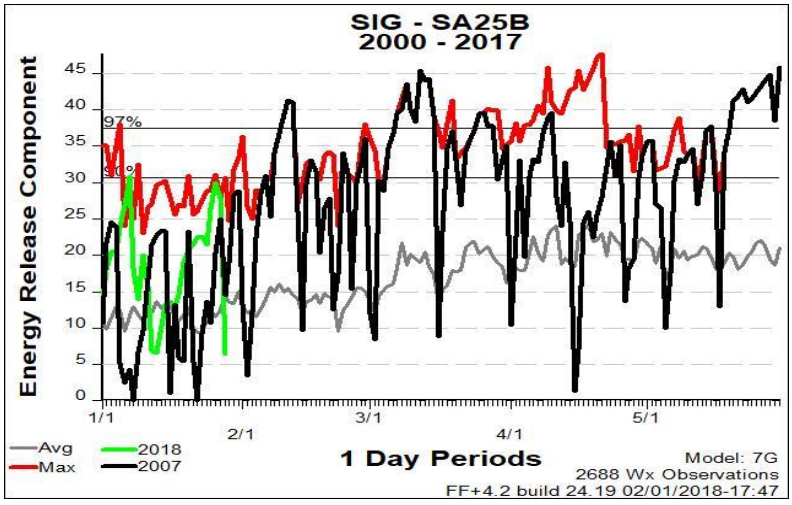

Figure 43. Graph of ERC values for 2007 and 2018 across the Tennessee mountains

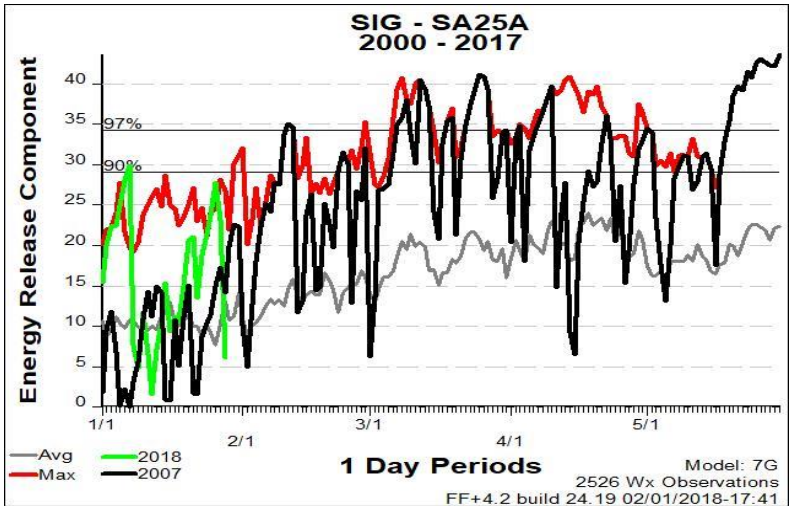

Figure 44. Graph of ERC values for 2007 and 2018 across central Tennessee

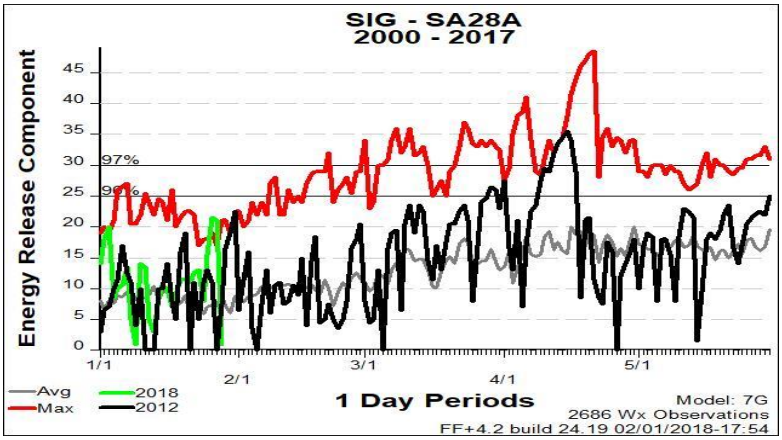

Figure 45. Graph of ERC values for 2012 and 2018 across the southwestern mountains of Virginia

FIRE BEHAVIOR FOR CENTRAL TEXAS AND OKLAHOMA

Fuel loadings still remain above average in Texas and Oklahoma, and it will be an added fire risk factor during this outlook period. High dead fuel loadings left behind by last year's hurricanes, Harvey, Irma, and Maria, will continue to pose unique fire danger concerns for coastal Texas

Fire behavior fuel models GR7, (high load dry climate grass), GR4 (moderate load dry climate grass), and GS4 (high load dry climate grass-shrub) were chosen as representative primary fire carrier fuel types for western Texas and Oklahoma.

Behave Plus runs for this area assumed zero percent slopes and 1 hour dead fuel moistures of 5%. Surface level wind speeds and live herbaceous fuel moisture percentages greatly influence the rate of fire spread and fire intensity in these fuel types, so these variables were assessed to predict likely resulting fire behavior under various scenarios.

For GR7, the primary fire carrier is tall grass fuel with a 3 feet fuel bed depth. Wind driven fires are capable of very fast rates of spread and high intensity and flame lengths (Figures 46-49).

Figure 46. Example of Fire Behavior in Fuel Model GR7

Figure 47. High Load Dry Climate Grass Fuel Model

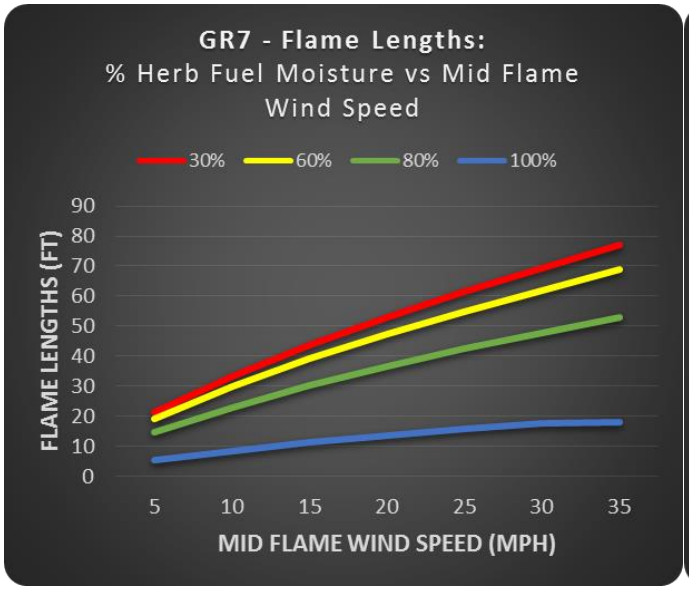

Figure 48. Fuel Model GR7 Modeled Flame Length

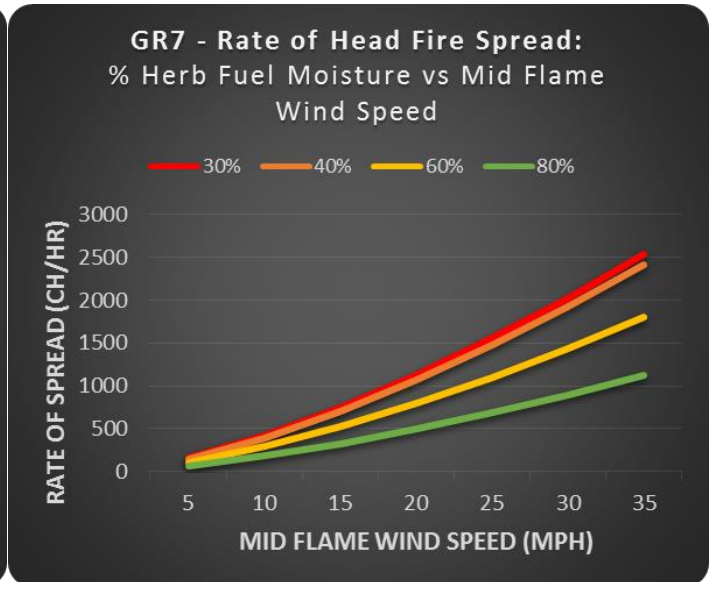

Figure 49. Fuel Model GR7 Modeled Rate of Spread

Below normal rainfall accumulation and below average stream flow rates in this area coupled with several significant freeze events and tropical storm disturbances in 2017 have increased the accumulation of dead and down fuels. The primary fire carrier fuels in this area are shrub/grass understories with mixed pine over stories. Fire behavior fuel models SH4 (low humid climate timber shrub), SH8 (high load humid climate shrub), TU3 (moderate load humid climate timber-grass shrub), and TL8 (long-needle litter).

Figure 50. Low Load Humid Climate Timber-Shrub Fuel Model

Woody shrub dominated forests tend to be capable of producing very high fire intensity levels when live woody plants have low fuel moisture content. High fire intensity levels present significant resistance to control issues and often limit response capabilities. Fire behavior modeling graphs for these fuels in this area of interest include potential fire intensity, flame lengths, and rate of spread.

Figure 51. Example Fire Behavior in SH4

The primary carriers of fire in SH4 are woody shrubs and shrub litter with a low to moderate shrub depth of about 3 feet. Spread rate is high and flame length is moderate in this model (Figures 50-53).

Figure 52. Fuel Model SH4 Flame Length Calculations

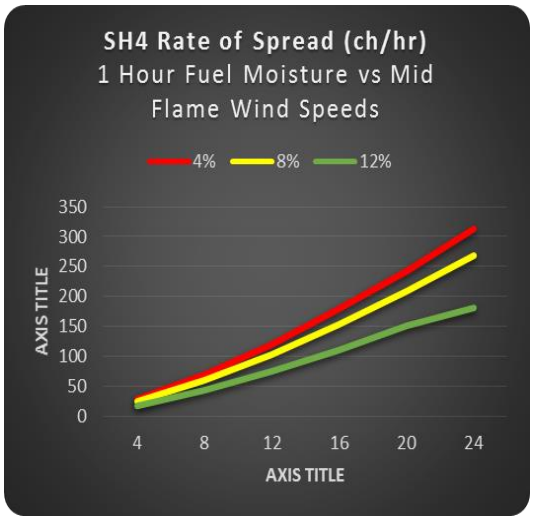

Figure 53. Fuel Model SH4 Rate of Spread Calculations

The primary carriers of fire in SH8 are woody shrubs and shrub litter with little or no herbaceous fuel and a fuel bed depth of about three feet. Spread rate and flame length is high in this model (Figures 54-58).

Figure 54. Example Fire Behavior in Fuel Model SH8

Figure 55. High Load Humid Climate Shrub Fuel Model

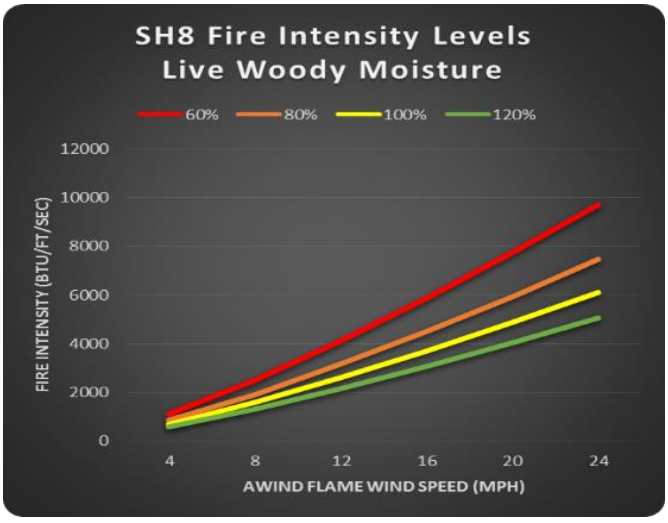

Figure 56. Fuel Model SH8 Fire Intensity Levels for Live Woody Moisture

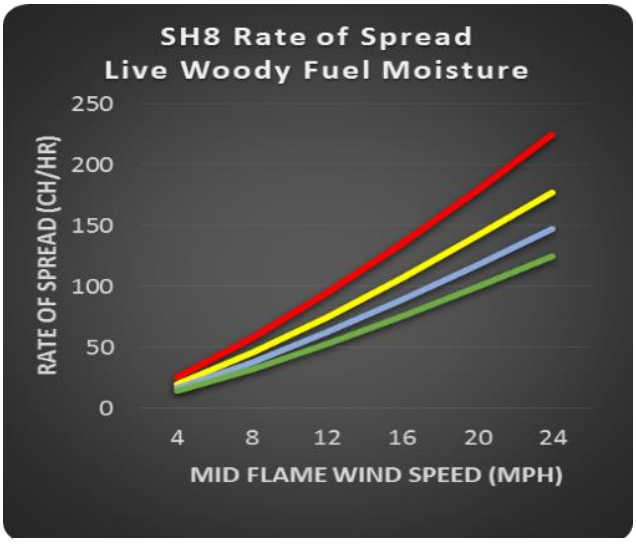

Figure 57. Fuel Model SH8 Rate of Spread for Live Woody Fuel Moisture

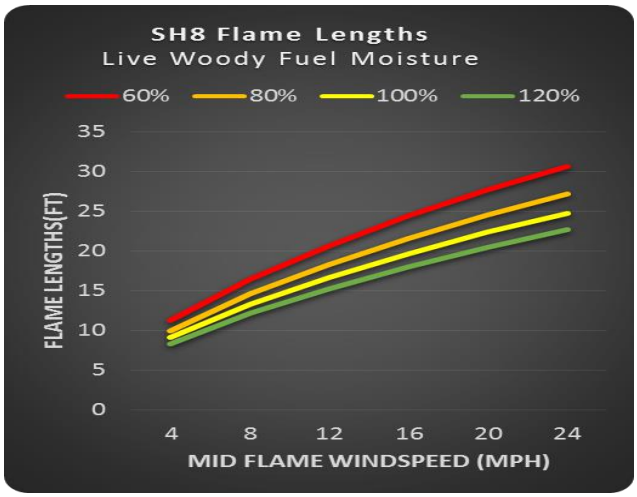

Figure 58. Fuel Model SH8 Flame Length Calculations for Live Woody Fuel Moisture

FIRE BEHAVIOR FOR SOUTHERN APPALACHIAN MOUNTAINS AND CENTRAL PIEDMONT REGIONS

Portions of the central piedmont area have experienced significant disturbance from wind and drought stress over the past twelve months contributing to increases in dead and down fuel loading. Coming into this spring, some areas are expected to experience dryer than normal conditions that can increase wildfire ignition potential and result in higher than average fire intensities. Fire behavior runs for fuel models TU2 (moderate load humid climate timber-shrub), TL2 (low load broadleaf litter), and TL6 (moderate broad leaf litter) were completed to compare 1-hour fuel moistures levels against mid-flame wind speeds.

The primary carrier of fire in TL6 is moderate load broadleaf litter, and it is less compact than TL2. Spread rate is moderate and the flame length is low in this model (Figures 59-62).

Figure 59. Example Fire Behavior in Fuel Model TL6

Figure 60. Moderate Broadleaf Litter Fuel Model

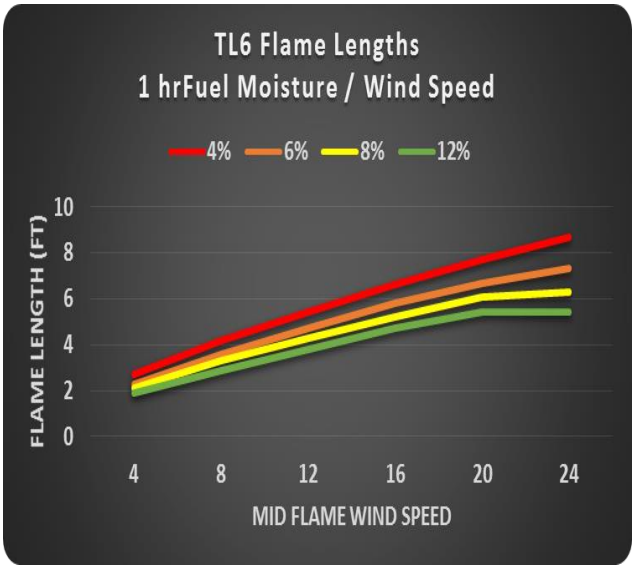

Figure 61. Fuel model TL6 flame length (feet)

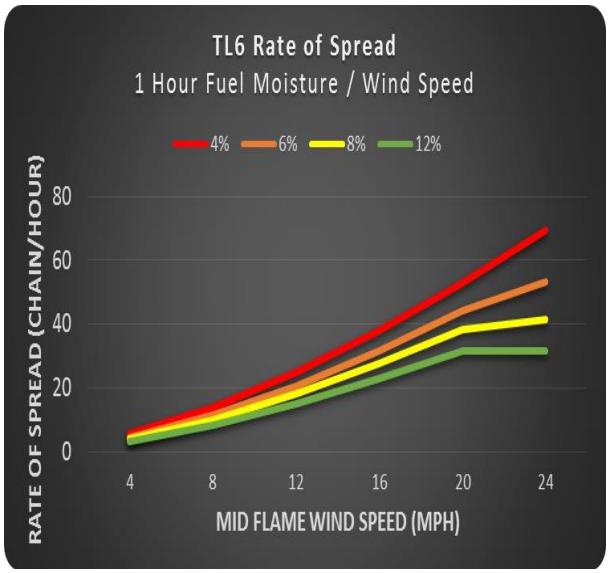

Figure 62. Fuel model TL6 rate of spread (chain/hour)

Fire Occurrence

The Southern Plains in Texas, Oklahoma, and western Arkansas continue to experience short term drought conditions during the core winter fire season. The state of Florida continues to be monitored due to the building dryness. These areas will likely emerge from winter and transition into spring with a drier than average rainfall. Figures 63-66 highlight a ten year fire occurrence trend during late winter and spring months from 2007-2017.

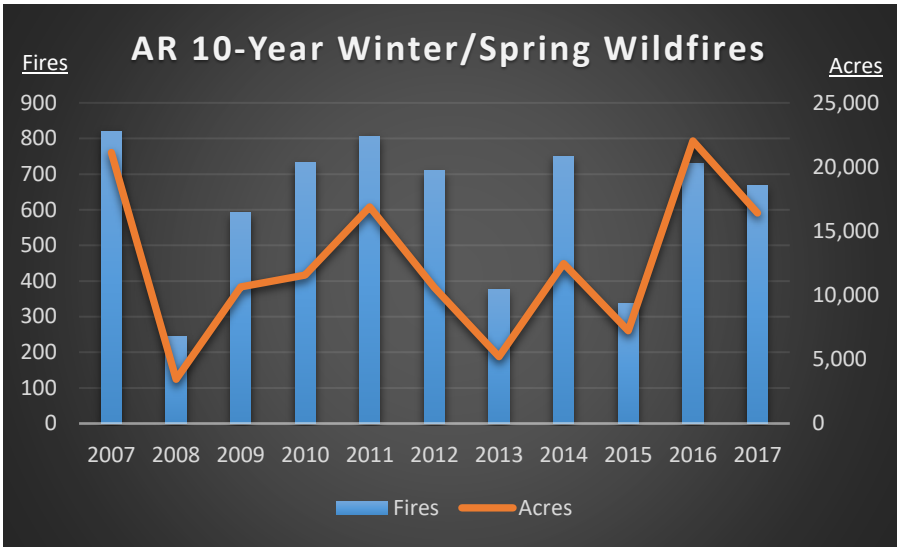

Figure 63. Graph of the number of fires per year from 2007-2017 reported in Arkansas.

Figure 63 shows 2007 was a significant year, in terms of ignitions and acres burned. Numerous fires emerged in Arkansas throughout February and March.

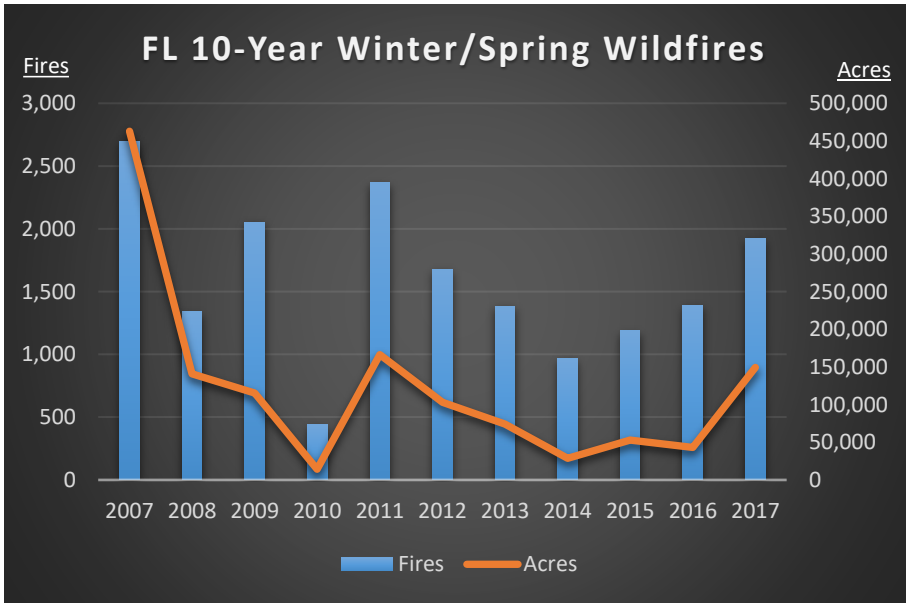

Figure 64. Graph of the number of fires per year from 2007-2017, as reported in Florida.

As observed in Figure 64, 2007 shows the highest fire occurrence, in terms of acres burned, in the past ten years. The largest fire for Florida during the spring season was the Florida Bugaboo fire that was suppressed at 123,014 acres.

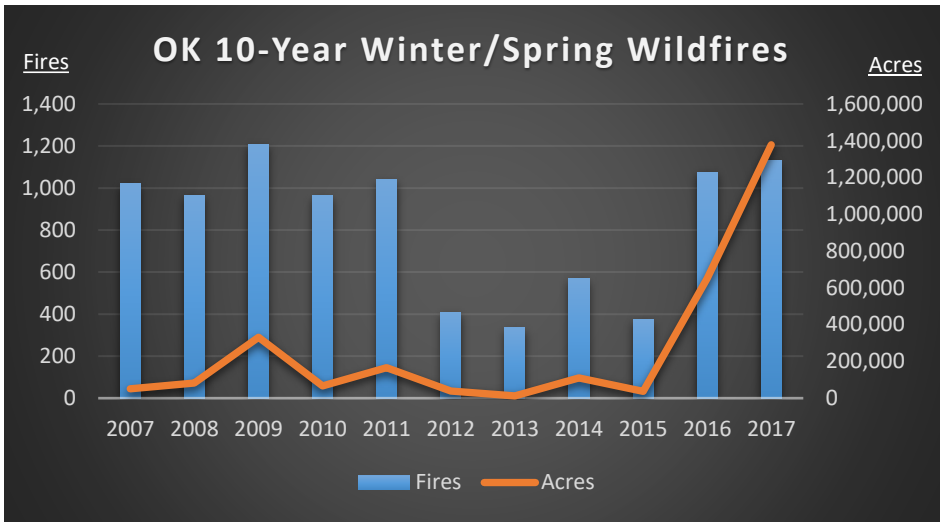

Figure 65. Graph of the number of fires per year from 2007-2017 reported in Oklahoma

Figure 65 highlights 2009 as being a historically significant spring in Oklahoma for fires reported. However, 2017 was historically significant with 1,377,863 acres burned. The largest fire for Oklahoma during the spring fire season was the NW Oklahoma Complex that burned over 779,292 acres.

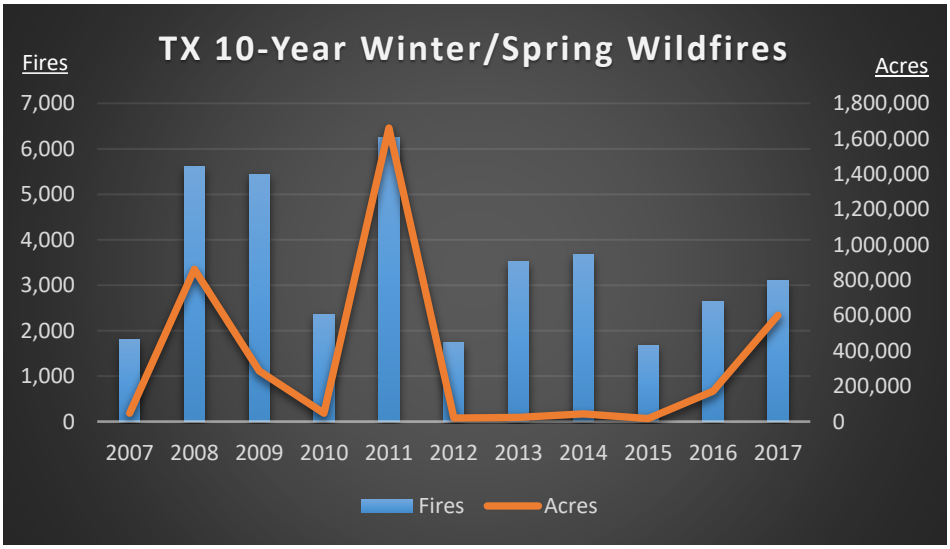

Figure 66. Graph of the number of fires per year from 2007-2017 reported in Texas

Figure 66 highlights the spring of 2011 as being an extremely significant spring season in Texas. Precipitation deficits and above normal temperatures contributed to an above normal fire season. High temperatures quickly transitioned fuels across Texas through green-up and into a cured state.

Summary

- The 2016 fall fire season was unprecedented and those drought conditions, although improved, are amplified with lack of normal rainfall.
- Central Florida, including the panhandle, and southeastern Georgia, have not been receiving their normal precipitation amounts. Florida and southeastern Georgia could experience a significant spring fire season. Fire danger indices are currently trending with values experienced in 2007, which was a significant season.
- Complete curing of the vigorous herbaceous growth from the growing season has resulted in an above normal fine fuel loading. Expansion and intensification of drought has produced very dry large fuels. The weak La Niña effects of warmer and drier than normal conditions punctuated by brief cold snaps combined with poor soil moisture have intensified dormancy of cool-season grasses and forbs and increased their availability to contribute to fire spread. In early February, Oklahoma released a statewide fuels and fire behavior advisory.
- The southern Appalachians and piedmont of the Atlantic coast are still experiencing the effects of drought. The current La Niña event is weak and will probably transition to a neutral phase in the coming months, and this transition coupled with current drought conditions make forecasting fire danger difficult. The US Drought Monitor shows drought improvement or removal likely for the Appalachians and piedmont through the end of April.
- Actual fire occurrence, in terms of number of fire ignitions, is average for the time of year. Oklahoma, thus far, is experiencing a surge in activity.
- As green-up begins to occur, additional moisture will be removed from the soil. Monitoring of rainfall frequency and departure from normal precipitation will be vital to track drought conditions.
- Fire behavior across the Southern Area will vary greatly, depending on fuel types, fuel conditions, and changing weather conditions; fire behavior will cover the gamut from creeping and smoldering to possible sustained crown runs. Increased fire behavior will be strongly correlated with an unstable atmosphere, low relative humidity values, and winds greater than 10 mph. Single and group tree torching may produce short- and long-range spotting, which will factor into fire spread especially when fine fuels are receptive to spotting. Managers and firefighters should closely monitor their fuel conditions this season and remain cognizant of changes in the weather, particularly the winds associated with frontal passages and relative humidity values.
- The frequency of precipitation events is critical to staying out of an extended fire season. These events need to take place on a five to seven day cycle.

Conclusions

Most Likely Case Probability – 70%
The spring fire season in Florida, Texas, and Oklahoma is significantly active. High fine dead fuel loading is already supporting large fire growth in Oklahoma and Texas. The piedmont of North Carolina should observe an uptick in wildfire activity with above average initial attack activity. The southern Appalachian Mountains and coastal plains of the eastern coast should observe normal to below normal activity for the analysis period. The season is longer than normal due to the current drought, fuels conditions, and predicted weather pattern. Some additional aviation and ground resources are required due to fire behavior. Mobilization of resources to these critical areas, from across the Southern Area, occurs. Several Type III incidents occur at the same time in the Southern Area. There would be a higher probability of some of these Type III incidents transitioning to either Type II or I. However, no large scale mobilization of out-of-region resources are required due to at least some mitigating weather pattern (i.e., high humidity or periodic rainfall).

Best Case Probability – 20%
With La Niña expected to continue but weaken as we begin to move into spring, a typical ”wetter” pattern would begin to emerge and be more prominent across an area from the Ohio Valley southeast into northern areas of the central gulf states. This wetter pattern should then recede northeastward back towards western Virginia during later April and then May. Rainfall activity occurs at a high enough frequency that fuel dryness is minimized with a resulting lower than average wildfire occurrence. Texas and Oklahoma would observe a normal initial attack load with minimal chance of extended attack events.

Worst Case Probability – 10%
Rainfall frequency and amounts are little and strong dry cold fronts bring significant fire weather. Moderate to severe drought conditions and extreme fire weather events result in numerous large fire incidents and heavy initial attack workload. Large-scale extended attack operations occurring across the Southern Area would require multiple Incident Management Teams, as well as out-of-region resources. Lack of rainfall, coupled with this long-term drought and minimal green-up, leads to an extended spring fire season. These areas experience a well above-average spring fire season, including numerous extended attack (Type I and II) fires. Large scale mobilization of out-of-region resources occurs.

Recommendations

This spring assessment has been completed prior to the typical fire season. As we move closer to and enter the spring fire season, managers should maintain situational awareness of current and trending conditions.

- Drought conditions are prevalent throughout the Geographic Area. Though moderated across interior portions of the area due to increased moisture, the western states and Florida have observed below normal precipitation over the past couple months. Fire personnel must remain cognizant of these conditions and monitor any voids in normal rainfall frequency.
- Fire managers will need to monitor fuels conditions in these assessment areas. This will become more important as the fire season and prescribed fire season start to blend together.
- Wildfire operations could evolve from normal operations to larger scale and more complex as the spring continues. Do not expect any fire to be routine. Be prepared to utilize indirect tactics with extended mop-up. Utilize aerial supervision to help direct crews and keep them informed on fire behavior. Ensure that LCES is in place before engaging on any fire. Remember to STOP, THINK, and TALK

before you ACT… and actively look for ways to minimize risk to firefighters in what is forecast to be a period of very high fire danger.

- Ensure out-of-region resources are briefed on current and past conditions. Utilize pocket cards showing the current situation and the WFAS mobile severe fire weather mapping program to stay current on conditions (http://m.wfas.net/).
- Implementation of prescribed fire operations will need to be monitored. Fuel conditions will dictate fire behavior and smoke management procedures. Fire managers will need to continue to monitor prescribed fire parameters. Mindful selection of burn units will be important if drought conditions worsen. Engage in a risk dialogue with field personnel and leadership on ceasing or continuing prescribed fire operations. Daily discussion on resources needs for prescribed fire and suppression operations will be important.
    - Fire managers should be prepared to support periods of more frequent fire occurrence and the potential for more complex, longer duration wildfire incidents.
- Maintain capabilities to mobilize Type III teams.
- Augmentation of initial attack resources will likely be required throughout the late winter and spring. This will result from increased fire behavior, fire spread, and longer mop-up times due to drought-stressed fuels and soil. Additional resources, both ground and aviation, may be needed.
- Ensure firefighter pocket cards are up to date and posted on the national website (http://fam.nwcg.gov/fam-web/pocketcards/).
- The increased dead or dormant vegetation load could increase the severity of the fire season, especially in Florida. The presence of salt killed vegetation from the 2017 hurricane season resulted in significant amounts of downed vegetation and debris fields in areas of south Florida. South Florida has also seen several freezes this winter, which will also add to the amount of dead fuel presence in areas that typically have live vegetation year-round.
- Central Florida is seemingly not as critical in the short-term. There are no outstanding moisture deficits for this area; however, this area typically can and will dry out quickly. Long-term forecasts show warmer and drier trends for this area through May, so a reassessment may need to be done for central Florida if rainfall becomes less frequent and moisture deficits begin to build.
- As fuels, water levels, and soil moisture begin to drop over this time period, ignition of prescribed fires will need to be monitored closely as the risk becomes elevated and organic soils will begin to become available for burning. Long-term burning of organic soils has led to numerous escaped prescribed fires over the past decade as much as a month post-ignition. Organic soil fires are likely to result in unwanted smoke impacts.
- Conditions for Florida, southern Georgia, and southern Alabama will need to be monitored over the coming weeks as conditions are forecast to become drier and warmer. The potential for an above average spring fire season is present in south Florida, south of Lake Okeechobee, as well as north Florida, south Georgia, and south Alabama. However, at this time, conditions are largely average to slightly above average and are providing ample opportunities for prescribed fire accomplishments.

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