Northside Post-Fire Report 755 Acres Walker County, TX October, 19th 2015





Northside Fire Environment

The Northside Fire occurred on October 19th, 2015 seven miles north of Huntsville, TX in Walker County. The fire was 755 acres with no reported injuries. Over 100 homes were threatened with 3 unoccupied residences lost.

Walker County is located in the Western Pineywoods Predictive Service Area (PSA). Topography at the Northside Fire is generally flat with the elevation ranging from 200-250 feet above sea level. Deep, sandy, porous soils are present which causes precipitation to percolate quickly past the root zone of existing plants and trees. The rapid downward motion of water in the soil limits the amount of water available for herbaceous and woody vegetation root systems to absorb and retain water



Fuel types found at the Northside Fire are pine plantations, mixed pine/hardwood timber, slash (cutover), yaupon, upland post oak timber, native and improved grasslands, and mixed grass and juniper. Timber fuels are considered a high risk fuel, both in pine and hardwood leaf litter. Adding yaupon as a fuel into the fire environment raises the risk due to combustibility and potential to carry fire from the understory into the timber canopy. Complexity of the fire increased with the wildland urban interface present.

Critical fire weather thresholds listed below with actual observed weather conditions highlight that the relative humidity met the critical threshold with winds nearly meeting critical values.

Critical Weather Thresholds	Observed			
Relative Humidity: 30% or less	15%			
20' Wind speed: 15 mph +	3.5-7 mph, gusts to 13 mph			
Temperature: 10% above normal (Normal 78.9°F)	2.7% above normal (81°F)			

After record spring rainfall around the state, including the Western Pineywoods, there was an abundance of herbaceous growth of grasses that caused above normal fine fuel loading. Starting in July, a high pressure system became entrenched over Texas bringing above normal temperatures, and little to no precipitation leading to a "Flash Drought".

The Flash Drought was then compounded by the passage of several moisture starved cold fronts through Texas. Unusually dry air was ushered into the Western Pineywoods causing consecutive days of accelerated drying of already dry fuels. The fire environment became primed for a significant fire to occur, all that was needed was an ignition source.

Past Precipitation

Record amounts of precipitation were recorded during the winter and spring of 2015 all across Texas. Below is the Huntsville Remote Automated Weather Station (RAWS) observed precipitation totals from January 1st-June 28th and from June 28th until October 19th. Limited rainfall occurred after June 29th as indicated in the amounts recorded after this date leading up to October 19th.

January 1st-June 28th: **42.59 inches** June 29th-October 19th: **3.04 inches**

The 60-day Percent of Normal rainfall map (left) indicates much of the county receiving 25-50% of normal rainfall with less than 25% amounts appearing in the west and northwest part of the county. Where the Northside Fire occurred (black star), it is located near the edge of the of less than 25% area of observed rainfall over the 30 day period (right).



Weather Conditions

A dry cold front passed through the state over the weekend of the 17th ushering very dry air and seasonable temperatures. Surface high pressure that was located in the Central Plains shifted eastward by Monday.

Clockwise rotation around the high pressure center allowed for East-Southeasterly winds to prevail with drier air remaining in place with low Dew Point temperatures and Relative Humidity.



Relative Humidity values were forecasted to drop into the teens by afternoon throughout North and East Texas. In Walker County, winds were forecasted to be out of the Southeast at 6-9 mph with gusts up to 12 mph.

Although forecasted winds were not going to reach critical fire weather thresholds, the wind speeds would still be able to spread fire due to the high risk timber fuel and the existing fuels dryness.





Graphic created-Oct 19 8:52AM EDT

Fuel Dryness, a combination of 100-hour fuels and Energy Release Component (ERC) values, were already observed as "Dry" in Walker County the week prior to the Northside Fire (October 13th). Above normal temperatures and below normal observed precipitation were factors to the fuels dryness. A noticeable change is present on October 16th as more "Critically Dry" fuels begins to encompass North and East Texas with even "Extremely Dry fuel conditions being observed.

12z issuance

By October 19th, Extremely Dry Fuels began were widespread throughout East Texas, including Walker County. Parts of Central and North Texas also observed extremely dry fuels. This rapid change, or accelerated drying can be attributed to dry air mass that moved into Texas.



Accelerated Drying

Dry air that surged into East Texas on October 12th, caused Dew Point temperatures to fall into the 30's and 40's with actual air temperatures in the 80's and 90's. The wide range in Dew Point and Air temperatures caused low minimum relative humidity values in the lower to middle teens. Overnight relative humidity recoveries were poor only reaching the low 60%'s starting on the 17th.



The 10-hour fuel moisture percentile map depicts the low moisture values as most of East Texas, including Walker County are in the 3rd percentile of dryness.

The Huntsville RAWS ERC graph also provides representation on the accelerated drying that occurred. ERC values were near the 90th percentile, but sharply increased above the 97th percentile.

This rapid build up indicates the overall dryness of both live and dead fuel and amount of energy that could be produced at the head of the fire.



The low minimum relative humidity values and overnight recoveries led to accelerated drying of the fuels, especially the 10-hr fuels. This is observed in the fuel moisture of the Huntsville RAWS station. Fuel moistures stayed lower longer for a longer period of time.





Northside Fire Weather Observations

Below is the Huntsville RAWS and Huntsville Municipal Airport weather observations for October 19th, 2015, the day the Northside Fire occurred.

Huntsville RAWS

Tabular I	Labular Listing of 25 Observations from 10/19/2015 6:06 CD1 to 10/20/2015 6:06 CD1:												
(CDT)	2.0m Temperature	2.0m Dew Point	2.0m Wet bulb temperature	2.0m Relative Humidity	6.1m Wind Speed	6.1m Wind Gust	6.1m Wind Direction	Radiation	Fuel Temperature	Fuel Moisture	Precipitation accumulated	voltage	Quality Control
	•¥	• 8	• F		mph	mph		W/m*m	• F	gm	in	volt	
6:06	56.0	51.9	53.6	86	2.0	3.0	NNW	0.0	54.0	15	45.63	12.70	OK
5:06	56.0	50.9	53.1	83	3.0	5.0	N	0.0	55.0	13	45.63	12.70	OK
4:06	56.0	50.3	52.8	81	3.0	4.0	NNW	0.0	54.0	11	45.63	12.70	OK
3:06	57.0	51.6	53.9	82	0.0	2.0		0.0	53.0	9	45.63	12.70	OK
2:06	60.0	52.8	55.7	77	0.0	0.0		0.0	57.0	8	45.63	12.80	OK
1:06	61.0	51.5	55.5	71	0.0	3.0		0.0	57.0	7	45.63	12.80	OK
0:06	62.0	49.3	54.7	63	0.0	2.0		0.0	59.0	6	45.63	12.80	OK
23:06	64.0	44.5	53.2	49	0.0	2.0		0.0	62.0	6	45.63	12.80	OK
22:06	68.0	41.4	53.6	38	1.0	13.0	SSE	0.0	65.0	6	45.63	12.80	OK
21:06	69.0	35.4	51.8	29	5.0	11.0	SE	0.0	67.0	6	45.63	12.90	OK
20:06	71.0	33.4	52.0	25	2.0	8.0	SE	0.0	67.0	6	45.63	13.00	OK
19:06	72.0	33.2	52.4	24	5.0	8.0	ESE	9.0	69.0	5	45.63	13.20	OK
18:06	78.0	32.4	54.6	19	5.0	10.0	ENE	72.0	76.0	6	45.63	13.40	OK
17:06	80.0	31.3	55.0	17	6.0	13.0	E	51.0	79.0	6	45.63	13.50	OK
16:06	81.0	30.6	55.3	16	6.0	13.0	E	44.0	80.0	6	45.63	13.60	OK
15:06	80.0	28.2	54.3	15	2.0	13.0	SSE	49.0	79.0	6	45.63	13.60	OK
14:06	79.0	27.4	53.7	15	2.0	10.0	SE	72.0	78.0	6	45.63	13.60	OK
13:06	77.0	25.8	52.5	15	1.0	9.0	SSE	98.0	78.0	6	45.63	13.70	OK
12:06	76.0	29.4	52.9	18	4.0	12.0	ESE	578.0	86.0	7	45.63	13.40	OK
11:06	72.0	29.9	51.4	21	9.0	13.0	ESE	547.0	80.0	8	45.63	13.80	OK
10:06	68.0	32.8	50.5	27	8.0	12.0	ESE	386.0	75.0	9	45.63	13.50	OK
9:06	63.0	31.9	48.0	31	7.0	13.0	E	171.0	68.0	9	45.63	14.30	OK
8:06	57.0	36.4	46.9	46	3.0	5.0	E	13.0	57.0	9	45.63	12.80	OK
7:06	51.0	38.9	45.0	63	0.0	4.0		0.0	47.0	8	45.63	12.70	OK
6:06	55.0	36.7	46.0	50	1.0	7.0	NW	0.0	51.0	8	45.63	12.70	OK

The Huntsville RAWS recorded very poor relative humidity (RH) recoveries the morning of the 19th with an RH of only 63%. During the afternoon, the minimum RH bottomed out 15% from 1300-1500 and slowly recovered into the 20% range in the evening.





The poor RH recovery the morning of the19th and from several days prior, resulted in very low 10-hour fuel moistures. 10-hour fuel moistures recovered only to 9 grams at 0800 and went down to under 5.5 grams by 1800. Winds at the Huntsville RAWS during the time of active burning of the Northside Fire 1300-1900 ranged from 1-6 mph with gusts of 9-13 mph from the Southeast.



The Huntsville Municipal airport recorded Southeast winds from 3.5-7 mph during the same time. These winds speeds are likely more representative based on the rate of spread and fire behavior for the Northside Fire. Wind gust observations are not recorded at this location so the Huntsville RAWS wind gust data will be used.



Significant Fire Potential Matrix

The forecasted and observed National Fire Danger Rating System (NFDRS) values for the ERC and Burn Index (BI) on the 19th at the Huntsville RAWS were:

Forecast: ERC- 56 BI-40

Observed: ERC-59 BI-39

The observed ERC and BI were on the edge of Moderate to High Preparedness level for a significant fire to occur.

*Burn Index– Number related to contribution of fire behavior to the effort of containing a fire. Based on flame length and fireline intensity from a combination of the Spread Component (Wind) and ERC (fuel moisture).

Huntsville RAWS		Preparedness Level Energy Release Component G (ERC)								
2014		1 0-30	2 31-43	3 44-54	4 55+					
	1 0-25	Low	Low	Moderate	Moderate					
h Level dex G (BI)	2 26-39	Low	Moderate	Moderate	Moderate					
Dispatc Burning Inc	3 40-49	Moderate	Moderate	High	High					
	4 50+	Moderate	Moderate	High	Very High					



The NFDRS Forecast Fire Danger for the 19th at the Huntsville RAWS produced an adjective rating of High Fire Danger day.

A High Fire Danger is described as "All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and shortdistance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small." (Wildland Fire Assessment System)

Heel and Points of Origin:

FM 980 from Northside Baptist Church to County Rd 2628

The Northside Fire was caused by a trailer hauling round bales south on FM 980 that had caught fire. Pieces of burning material landed in receptive surface fuels for ignition to occur. Texas A&M Forest Service was requested for assistance at 1324. RH values were recorded at 15-18% with winds out of the East-Southeast 3.5 mph with gusts to 9 mph.





The grasses opposite of where the fire ignited, represents the surface fuels and fine fuel loading that was likely present. There was little greenness present in these grasses. Fine fuel loading was continuous and above normal.

An open canopy environment was present in the fine fuels. Multiple ignitions coupled with winds likely allowed for a large grass fire with a large head that moved rapidly into the post-oak timber surface fuels in the distance.



<u>Right Flank</u>

Fire grassy fuels and S/SE winds pushed the fire W/NW throughout a post-oak savannah.

Complete combustion of fine, 1-hour surface fuels occurred here.





Fine, grassy fuels on the opposite site the containment line represent the surface fuels that allowed the fire to spread. Some greenness is present, but fuels are continuous and can be described at above normal fine fuel loading.



Right Flank-Transition

The fire pushed into a semi-closed canopy environment of predominant post-oak. Fire remained at the surface consuming grasses and leaf litter fuels. This is evident by the present leafs on the lower limbs. Leaf litter fuels and 10-hour fuels were readily available for combustion due to the prior fuels dryness and poor RH recoveries over the past few days.





The semi-open canopy environment allowed for sunlight to reach the surface and grasses to grow during the spring. Above normal fine surface fuel loading allowed for the fire to continue through this type of environment.

As the fire progressed, the post-oak timber fuels transitioned into a mix of post-oak and pine timber fuels. By 1500, Southeast winds were observed at approximately 5 mph with gusts to 13mph. Relative humidity was observed at 15%.





Cutover from past timber harvesting created a mix of open and closed canopy timber fuels. Sunlight reaching the surface provided an opportunity for grass and brush to grow over 100 and 1000 hour fuels on the surface. This mix of herbaceous growth (1-hr and 10-hr fuels) provided enough heat energy for combustion of these large down surface fuels.

The above photo is adjacent to the photo to the right. The surface and understory fuels saw complete combustion. Fire intensities were likely had high flame lengths based on the amount of fuel loading present and complete combustion at the surface. This type of fire behavior would create resistance to control issues for suppression resources.





Convection from the high fire intensity froze pine needles in the upper canopy of the pine trees in this photo. The needles are frozen pointing in toward the W/NW indicating the direction the head of the fire progressed.



Representation of herbaceous growth in cutover. High fuel load at the surface in this mix of open and closed canopy environment.

Fire only burned at the surface at this location. Ladder fuels were not available and or fire intensity was not as high for fire to cause single tree torching





Continuous fine fuel loading from summer cured grasses in the mixed canopy environment provided for high rates of spread.

The grasses do not have much greenness and are laid over indicating high the fine fuel load weight This is an indication of above normal to exceptional fine fuel loading.

Head of the Fire

At Approximately 1700, the fire pushed into a closed canopy pine stand. This pine stand was bisected by Wallace Road south of the Water Treatment Plant.

Pine Timber fuels are a high risk fuel with pine needle litter at the surface. Additional, Yaupon was intermixed with the understory providing ladder fuels for fire to carry to the crown where group torching occurred.





Observed winds were Southeast 6-7 mph with gusts of 13 mph. RH was at 17%. Spotting of 200 feet was observed.

The right of way created by the road way also could funnel wind and create small eddy's that lead to single or group tree torching at the edge.

Near complete consumption of surface and understory pine timber fuels was present.



Pine timber and yaupon understory at head of the fire. Fire retardant is visible from drops made my aerial resources.





This is located at the end of the forward fire progression. Aerial resources were used heavily with water and retardant drops.

Effective use of drops occured in this high risk fuel of pine timber and yaupon. L. Kanclerz was close by when drops were made.



Spotting from fire. Surface fuels of cured grasses (left) and timber litter (right) were receptive to ignition. Spotting distance of approximately 300 feet occurred here.

Fire intensity was high to extreme as complete combustion of surface, understory, and canopy fuels is observed. Canopy fuel are completely consumed. The dozer line was placed after the primary fire activity.





Spotting occurred from the extreme fire behavior. Spotting in pasture land approximately 4 acres on west side of Wallace Rd.

Spotting distances of 300+ feet observed

Large head fire exhibiting extreme fire behavior moving west toward Wallace Rd. Torching is visible at the edge of the timber fuels. Fire departments providing structure protection. Photo at approximately 1615.



<u>Left Flank</u>

The left flank was mixture of open grass pastureland, post-oak, and pine timber surface fuels. Backfiring and burnout operation were completed in this area. (L Kanclerz was part of those operations)





Continuous fine fuel loading of grass surface fuels consistent around the fire. Little greenness and above normal/exceptional fine fuel loading

Timber litter fuels carried the fire at the surface in this high risk fuel of pine with yaupon understory. Winds were S/SE so the fire likely backed at the surface with lower flame lenghts to the containment line.



Closed canopy pine stand with near complete understory and surface fuel consumption. Scorch marks on trees indicate fire intensity and flame length although there is little to no tree torching present.





Moving east toward the heel of the fire, the transition back to the post-oak dominated landscape is observed.

Fire intensities were likely moderate to high with due to the open canopy with herbaceous grasses mixed with some timber litter. Isolated single tree torching occurred here. Smaller trees and shrubs are completely consumed.

Estimated Rates of Spread

Rates of spread (ROS) likely varied based on wind speed and fuel types at the fire progresses. Finer surface fuels in the open canopy likely exhibited higher ROS and slower ROS in closed canopy timber fuels. Winds observed winds of 6-7mph with gusts of 13 mph from 1500-1800 likely increase ROS during this 3 hour time period.

Primary Fire Activity: 1300-1900 (6 hours)

Straight Line Distance from Heel to Forward Progression: 9,500 feet (144 chains)

Rate of Spread: 0.3 mph (24 chains per/hour)

Conclusions

- Record Spring precipitation led to abundant growth of fine, grassy fuels across the state, including Walker County
- Above normal Summer temperatures and below normal precipitation caused Walker County, and the site of the Northside Fire to observe less than 50% of normal rainfall over a 60-day period.
- Surface High Pressure in the Central Plains then shifting east caused easterly winds and a very dry air mass to impact much of Texas, including Walker County.
- Very low dew point temperatures and above normal temperatures caused relative humidity to reach the teens and also led to poor overnight recoveries over consecutive days.
- Poor overnight RH recoveries caused 10-hr fuel moistures to remain low and not recover overnight. This Led to a longer burn period and more available surface fuel for combustion and opportunity to spread.
- Fuels dryness (100-hr and ERC) went from dry to extremely dry in a 7-day period.
- Multiple ignitions in continuous, cured, fine grassy fuels created a large head fire quickly
- Minimum Relative Humidity of 15% and SE winds of 6-7 mph with gust of 13 mph during peak burn period (1500-1800).
- Transition from grass dominated fuel to timber leaf litter of pine and post-oak in mix of closed and open canopy environment.
- Fire behavior intensified with higher flames lengths, single and group torching, and spotting of 200-300 feet in the timber fuels.
- Northside Fire was a fuel (above to exceptional surface fuel loading) and wind driven (observed winds just below critical thresholds)