Tripp Fire Analysis
February 10th-11th, 2017

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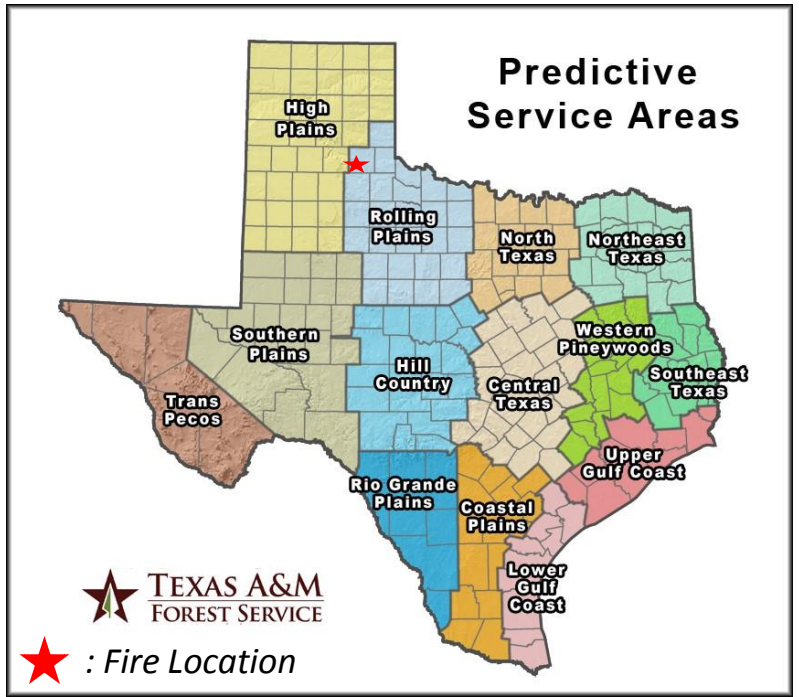
Texas A&M Forest Service

Location

- Hall County, approximately 9 miles Northeast of Turkey, Texas off Highway 82 and between County Roads 8 and 15.
- Hall County is in the northwest extent of the Rolling Plains Predictive Service Area (PSA). Fuel and weather conditions during the Tripp Fire were more representative of the High Plains PSA, therefore fuel and weather threshold values for the High Plains PSA are used for analysis.
- Elevation at the fire location is between 2,200-2,300 feet.



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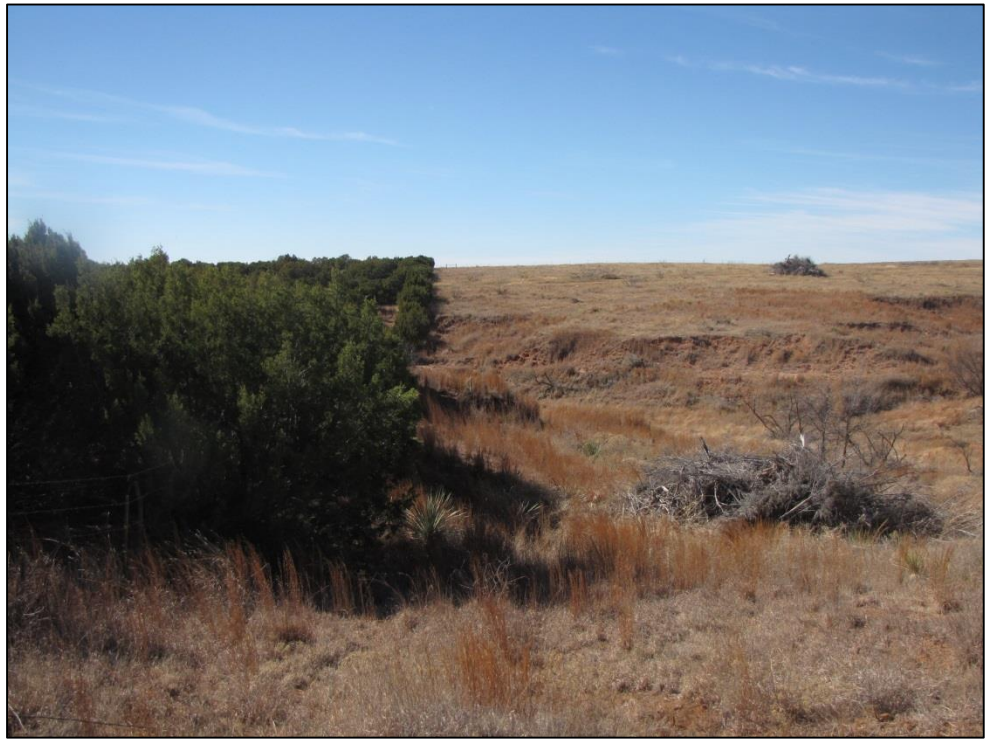
Location Continued

- Soils found in the Tripp Fire location are a mix of coarse sands and tight clays consistent with the Rolling Plains Ecoregion *(Texas Park and Wildlife)*
- Land use was a mix of rangeland for cattle production and Conservation Reserve Program (CRP) rangeland.



A fence line separating ownership depicts the difference in land use/management practices found within the fire perimeter.

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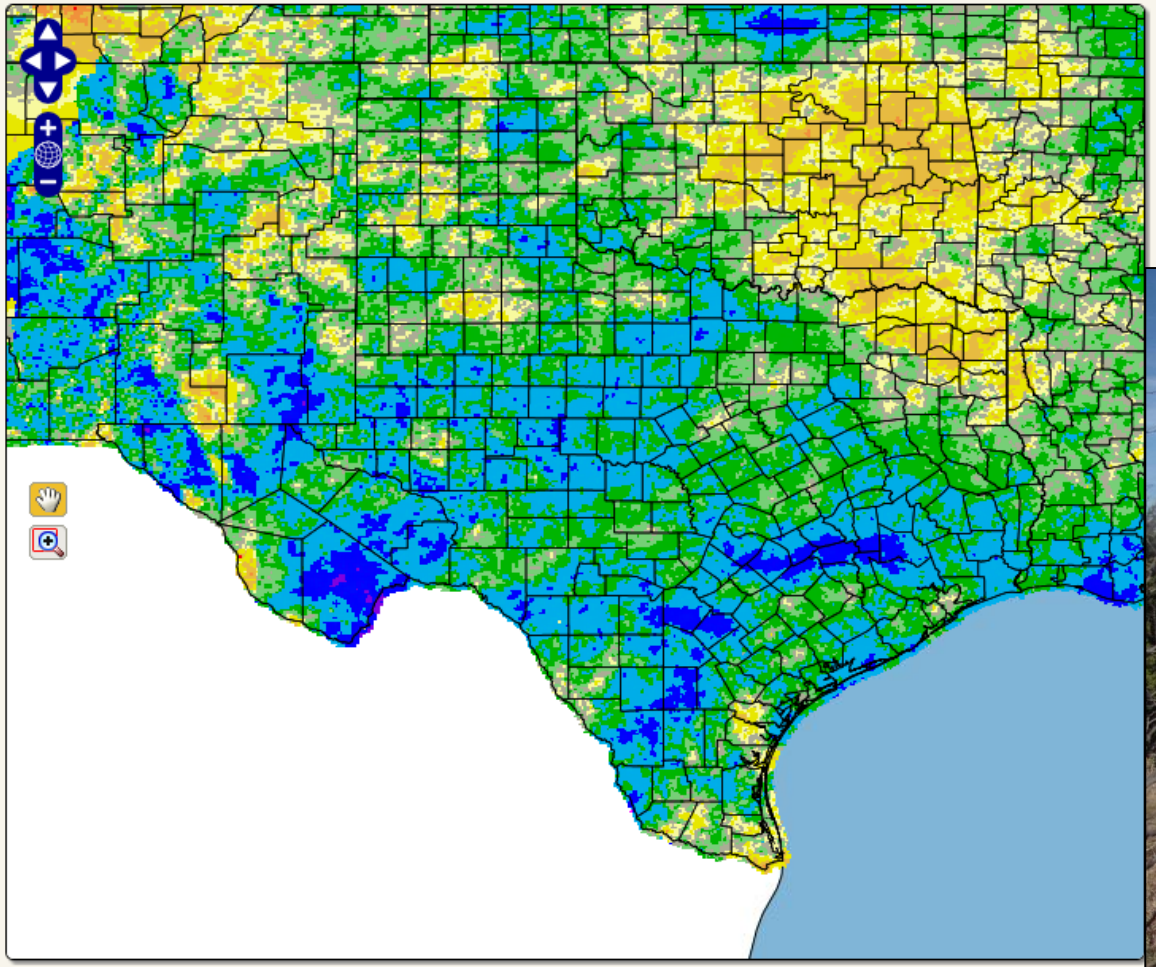
Past Precipitation and Fine Fuel Loading

- Normal to Above Normal Rainfall in the High and Rolling Plains during the spring and summer of 2016 led to the growth of robust grass crop.
- Grass/Fine fuels are dormant and cured due to prior freezing temperatures.



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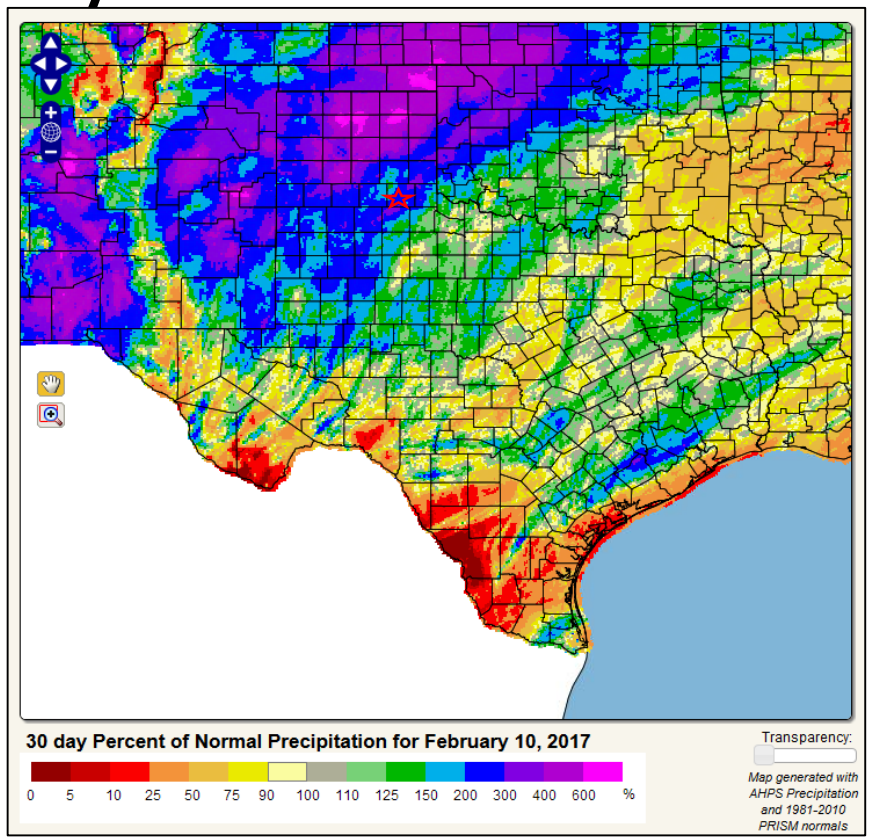
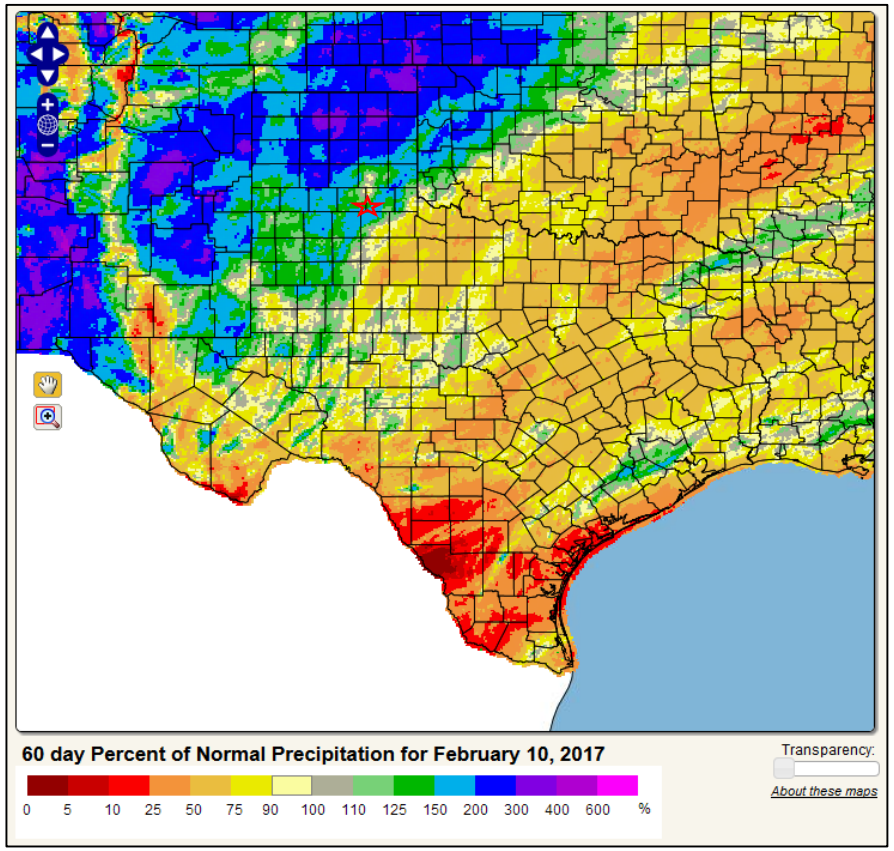
30 Day and 60 Percent of Normal Rainfall





- The High Plains had received 1-2 inches of precipitation during the middle of January.
- No drought conditions were present.
- Below are the nearest RAWS stations and date of last precipitation events.

Caprock RAWS
January 14th-18th:1.36 inches
January 22nd : 0.02 inches
By 2/10/17: 19 days since measurable precipitation

Matador RAWS
January 14th-18th: 0.94 inches
By 2/10/17: 23 days since measurable precipitation

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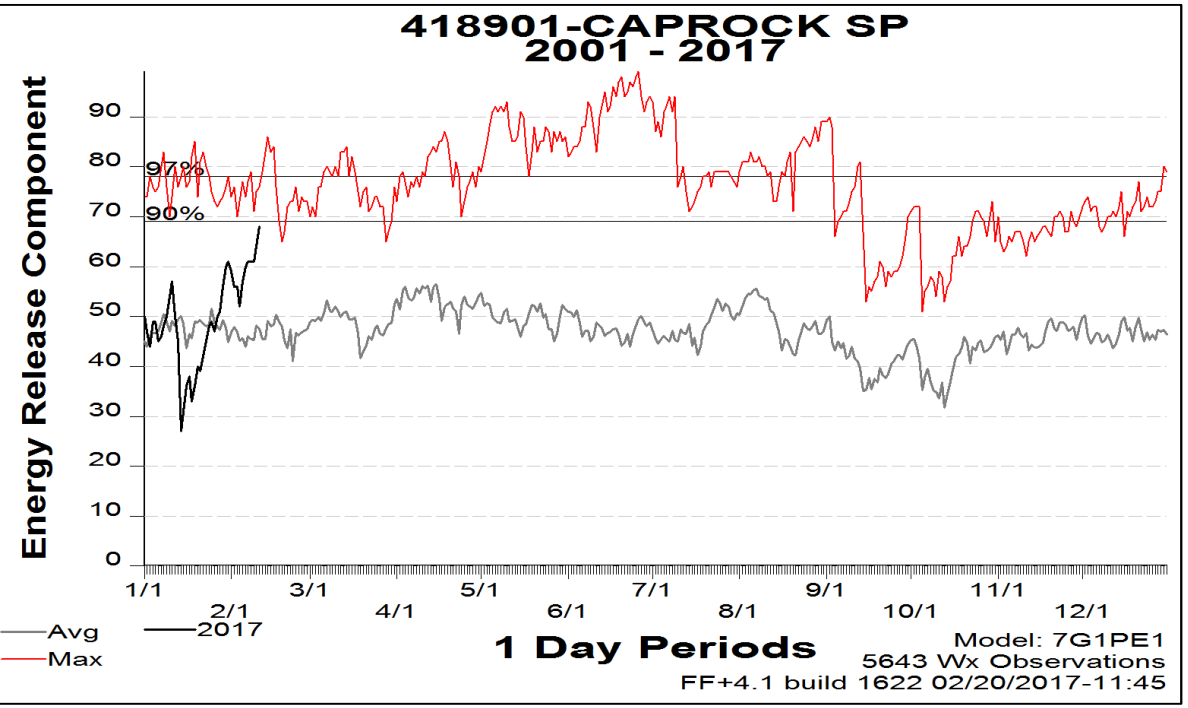
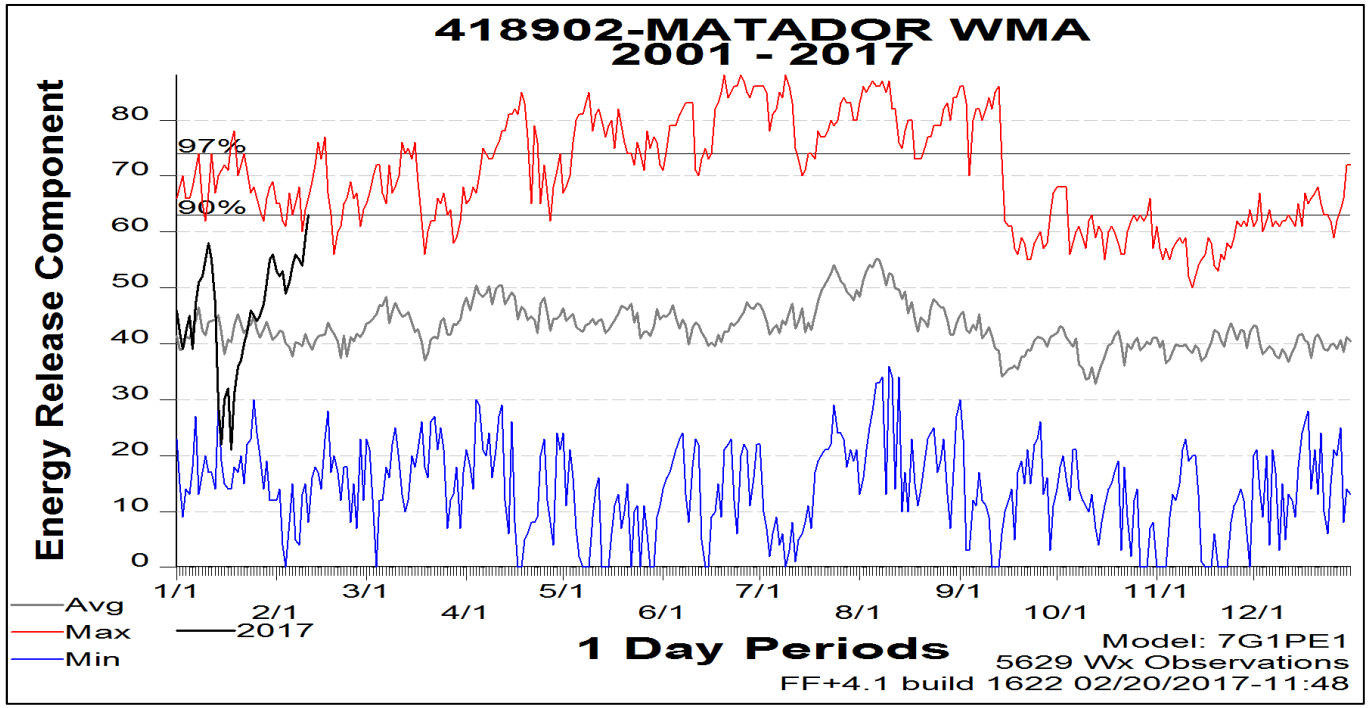
Energy Release Component Trends





- Short term drying coupled with periodic episodes of above normal temperatures and dry air mass intrusion, allowed Energy Release Component (ERC) values to increase steadily across the region.
- By 2/10/17, both the the Caprock Canyons State Park (SP) and Matador Wildlife Management Area (WMA) RAWS ERC values were approaching the 90th percentile.

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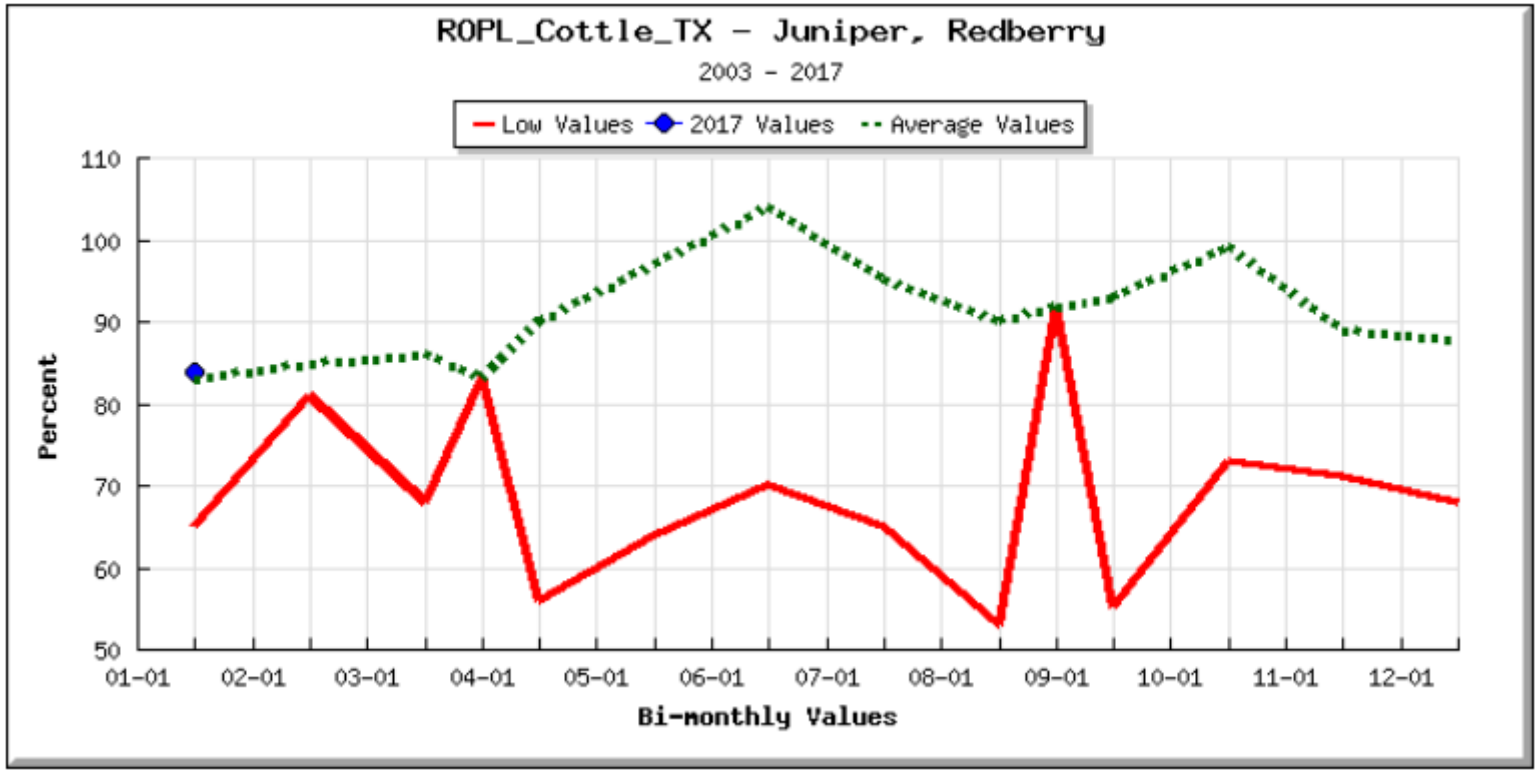
Live Fuel Moisture

- The closest live fuel sampling site is in Cottle County, adjacent to Hall County.
- The January 15th Red Berry Juniper sample indicates live fuel moistures were average.
- Redberry Juniper live fuel moistures are normally lower from December-March as growth slows with cooler temperatures and less precipitation.



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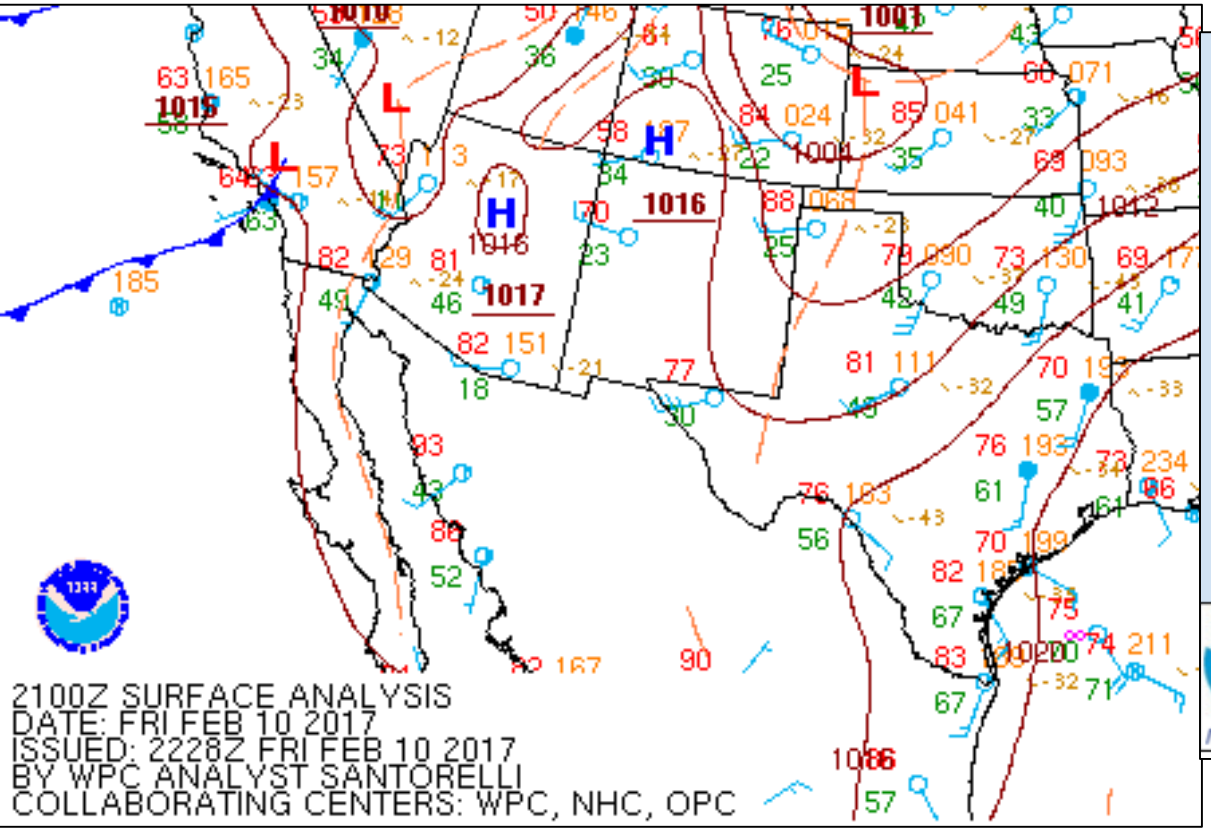
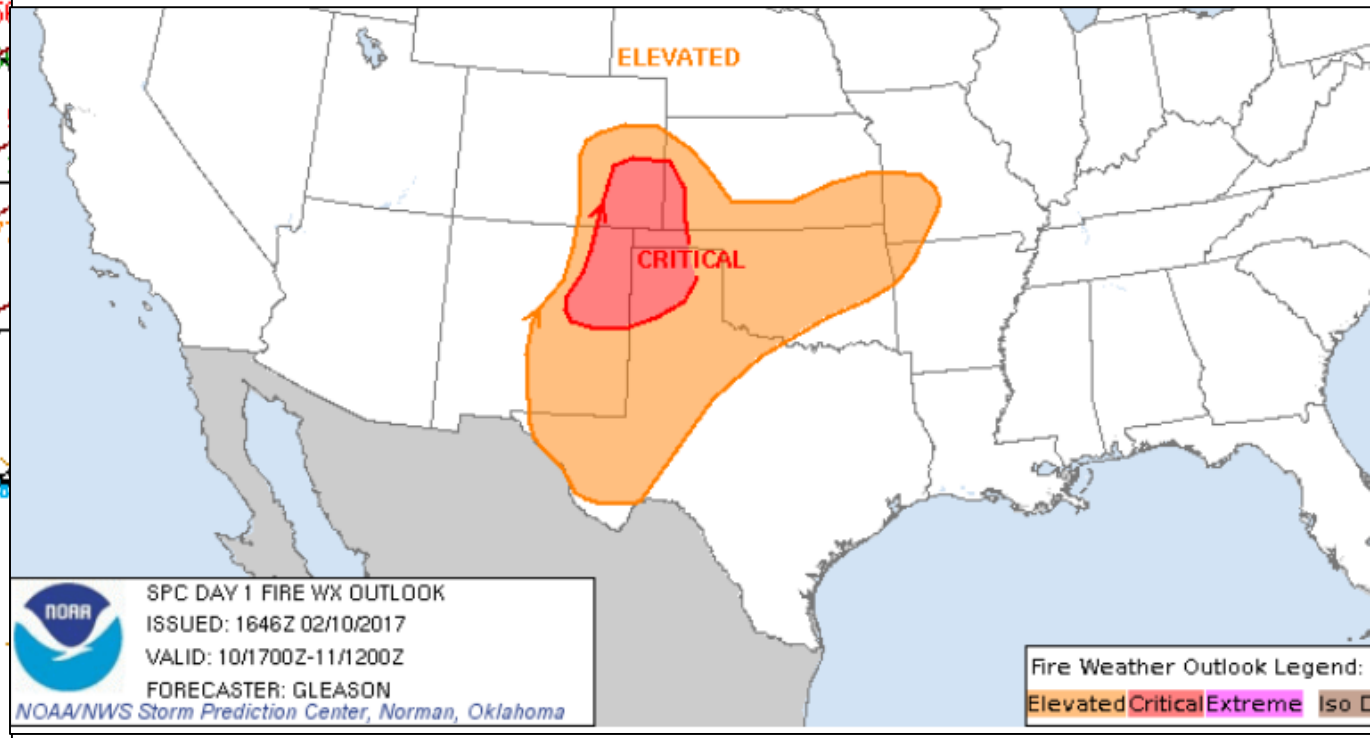
2/10/17 Surface Analysis and Critical Fire Weather Forecast





- Surface low pressure over the Central Plains produced a tight pressure gradient allowing dry, southwest winds to invade the Southern US Plains.
- The southwest flow at the surface allowed temperatures to increase well above normal.
- The Storm Prediction Center (SPC) painted the High Plains and Rolling Plains under Critical and Elevated Fire Weather conditions.

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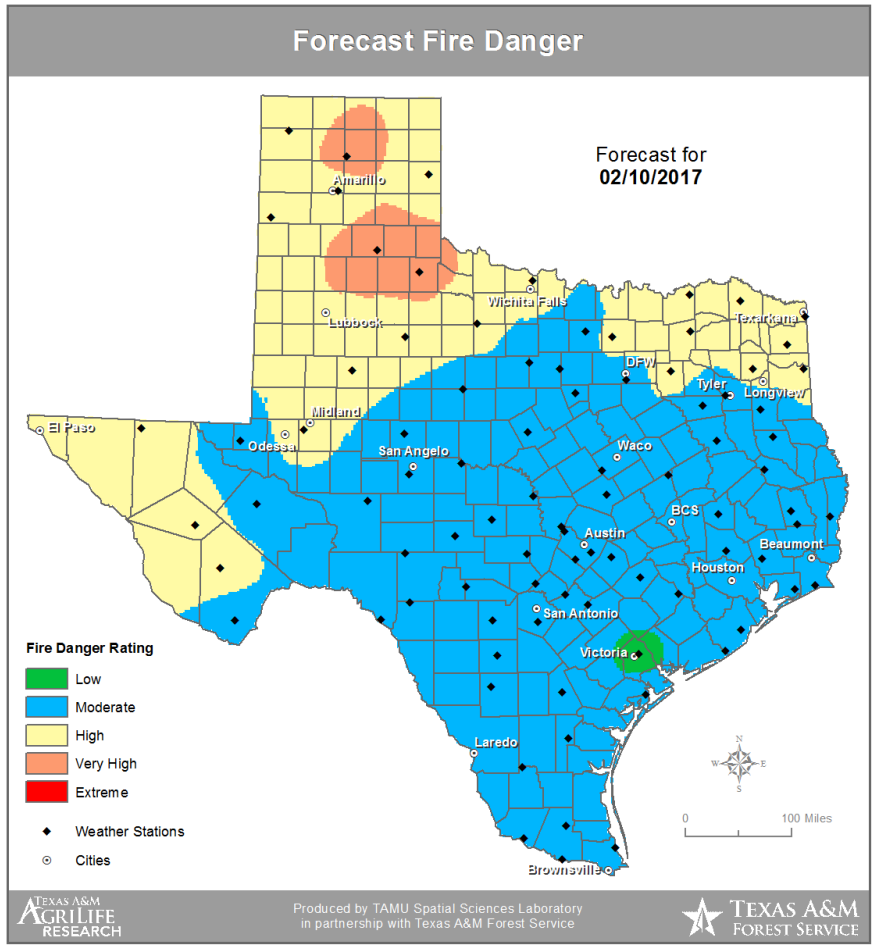
Forecast Products



National Fire Danger Rating System indices painted the High and portions of the Rolling Plains under Very High to High Fire Danger.

Significant Fire Potential Matrix

Caprock RAWS 2014		Preparedness Level Energy Release Component G (ERC)			
		1 0-52	2 53-70	3 71-81	4 82+
Dispatch Level Burning Index G (BI)	1 0-69	Low	Low	Moderate	Moderate
	2 70-96	Low	Moderate ★	Moderate	Moderate
	3 97-109	Moderate	Moderate	High	High
	4 110+	Moderate	Moderate	High	Very High

Forecast: ERC-62, BI - 95

The significant fire potential at the Caprock Canyon State Park RAWS forecasted a firm moderate potential.

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2/10/17 Caprock Canyon State Park RAWS Weather Observations

*Approximately 15 miles from Tripp Fire

High Plains Critical Fire Wx
Relative Humidity: **15% or less**
20’ Windspeed: **25 mph**
Temperature: **10% above average (~60°F is average for mid-February)**

Tabular Listing of 25 Observations from 02/09/2017 22:07 CST to 02/10/2017 22:07 CST:

Time (CST)	2.0m Temperature °F	2.0m Dew Point °F	2.0m Wet bulb temperature °F	2.0m Relative Humidity %	6.1m Wind Speed mph	6.1m Wind Gust mph	6.1m Wind Direction	Solar Radiation W/m*m	Fuel Temperature °F	Fuel Moisture gm	Precipitation accumulated in	Battery voltage volt	Quality Control
22:07	64.0	24.4	45.8	22	8.0	12.0	SSW	0.0	58.0	5	1.76	13.00	OK
21:07	65.0	26.3	46.7	23	9.0	12.0	SW	0.0	60.0	5	1.76	13.10	OK
20:07	63.0	32.7	47.8	32	8.0	9.0	SSW	0.0	56.0	5	1.76	13.10	OK
19:07	70.0	33.5	51.0	26	7.0	11.0	SSW	9.0	61.0	5	1.76	13.10	OK
18:07	82.0	26.3	53.8	13	8.0	22.0	SSW	193.0	80.0	4	1.76	13.20	OK
17:07	89.0	27.7	56.7	11	13.0	25.0	SW	443.0	94.0	4	1.76	13.20	OK
16:07	89.0	27.7	56.7	11	17.0	28.0	WSW	662.0	95.0	5	1.76	13.20	OK
15:07	90.0	30.6	57.8	12	16.0	31.0	WSW	821.0	98.0	5	1.76	13.20	OK
14:07	88.0	32.8	57.7	14	20.0	29.0	WSW	909.0	96.0	5	1.76	13.20	OK
13:07	86.0	34.6	57.5	16	19.0	28.0	WSW	917.0	94.0	6	1.76	13.50	OK
12:07	81.0	33.5	55.3	18	20.0	28.0	WSW	839.0	89.0	6	1.76	13.40	OK
11:07	75.0	33.6	53.0	22	14.0	26.0	WSW	687.0	84.0	7	1.76	13.60	OK
10:07	70.0	33.5	51.0	26	17.0	25.0	WSW	489.0	77.0	7	1.76	13.50	OK
9:07	61.0	31.7	46.6	33	16.0	25.0	WSW	230.0	67.0	7	1.76	13.80	OK
8:07	55.0	30.5	43.4	39	16.0	27.0	WSW	22.0	56.0	7	1.76	13.30	OK
7:07	55.0	29.9	43.2	38	18.0	27.0	WSW	0.0	53.0	7	1.76	12.90	OK
6:07	55.0	29.9	43.2	38	18.0	29.0	WSW	0.0	53.0	7	1.76	12.90	OK
5:07	55.0	27.2	42.3	34	17.0	27.0	SW	0.0	53.0	6	1.76	12.90	OK
4:07	56.0	28.0	43.1	34	15.0	22.0	SW	0.0	53.0	6	1.76	13.00	OK
3:07	55.0	26.4	42.1	33	12.0	27.0	SSW	0.0	51.0	6	1.76	13.00	OK
2:07	58.0	25.9	43.4	29	18.0	28.0	SW	0.0	56.0	6	1.76	13.00	OK
1:07	58.0	25.9	43.4	29	17.0	29.0	SW	0.0	56.0	6	1.76	13.00	OK
0:07	59.0	27.6	44.4	30	14.0	20.0	SSW	0.0	55.0	6	1.76	13.00	OK
23:07	56.0	28.0	43.1	34	13.0	19.0	S	0.0	52.0	6	1.76	13.10	OK
22:07	51.0	28.1	40.7	41	9.0	12.0	S	0.0	47.0	6	1.76	13.10	OK

2

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- Poor overnight recoveries helped accelerate the drying of fuels.
- 10-hour fuels were available earlier and the burn period was longer.

2

- Critical Fire Weather Thresholds for Temperature and Relative Humidity were exceeded.
- Although wind speeds did not meet critical thresholds, the above normal grass loading allowed fire intensities and rates of spread to be moderate to high.
- Above Normal (Record)temperatures likely helped lead to instability due to surface heating.
- Full solar radiation was observed with minimal cloud cover present.

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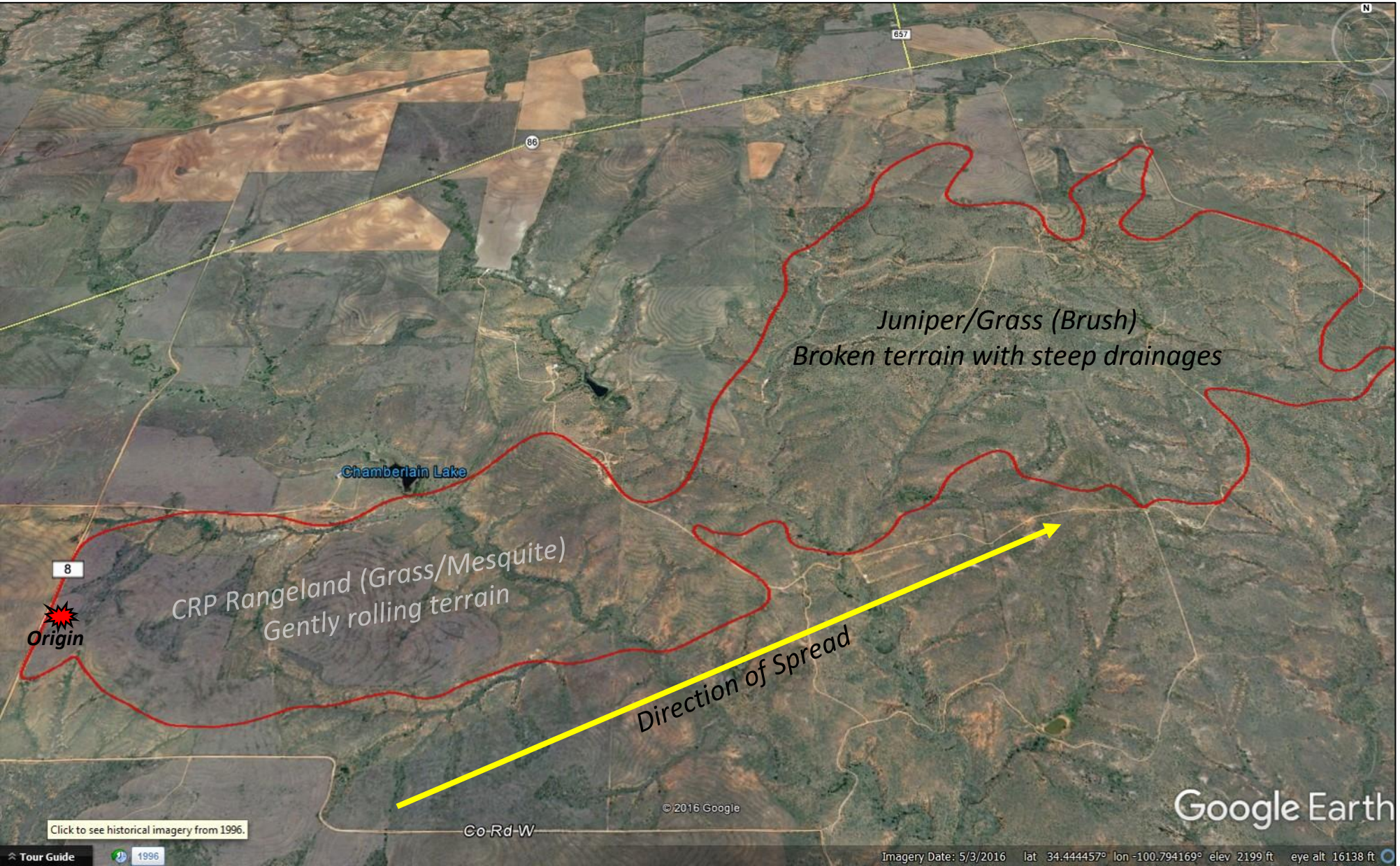
Fire Perimeter Overview



- Cause: Equipment use (Grinding on pipe/welding)
- Local Fire Department Response: Approximately 13:00
- Total Length of Fire: 4.25 miles

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Normal to Above Normal Grass Loading

Evidence of grazing was present, primarily next to ranch roads. Loading can be considered normal with moderate fire intensities even with a backing fire.

Further from the ranch roads, less grazing was observed and grass fuel loading is above normal. Also, cattle do not graze as intensively under mesquite where higher fuel loads reside and produce pockets of higher fire intensities.

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Short Wind Driven Runs

- On the right flank, fire intensities would “pulse” with short wind driven runs. The photos above indicate the change from moderate to high intensities and increased and rates of spread.
- The above normal grass loading in these CRP grasses also attributed to increase fire intensities.
- Short runs and higher intensities added resistance to control efforts.

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Fuel Continuity

- Continuous above normal grass fuel loading in the interior of the CRP land was observed.
- The combination of lower fuels dryness and above normal loading allowed the fire to spread with wind speeds less than critical thresholds
- County motor graders and local fire departments could access and suppress the fire in this fuel and terrain.

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Transition from Grass to Brush/Grass

- The fire moved Northwest from the CRP rangeland into the Juniper/Grass mix.
- Based on the angle of smoke lean and direction of spread, the fire is wind driven.
- Normal to above normal grass loading also contributed to this spread.

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Juniper/Grass Mix (Brush/Grass)

- The open canopy Juniper/Grass mix can be characterized as a Brush/Grass fuel model.
- A open canopy promotes fine fuel growth as ample sunlight and precipitation can reach the surface and support grass growth.
- Normal to above normal grass loading can generate enough surface heating and allow juniper canopies to torch.
- Terrain was more broken with steep drainages.

Brush/Grass fuels

- Normal to above normal grass loading in areas with some grazing
- Moderate to High Fire intensities and rates of spread

Grazing impacts on fire intensity in Brush/Grass fuels

Areas closer to road are more heavily grazed with below normal grass loading. Fire hit this fuel load and intensities lowered.

Short wind driven run in Brush/Grass fuels (Left Flank)

Turkey Airport
1645 Wx Obs

Temperature: 88°F
RH: 12%
Wind: SW 18mph
Gust 22 mph

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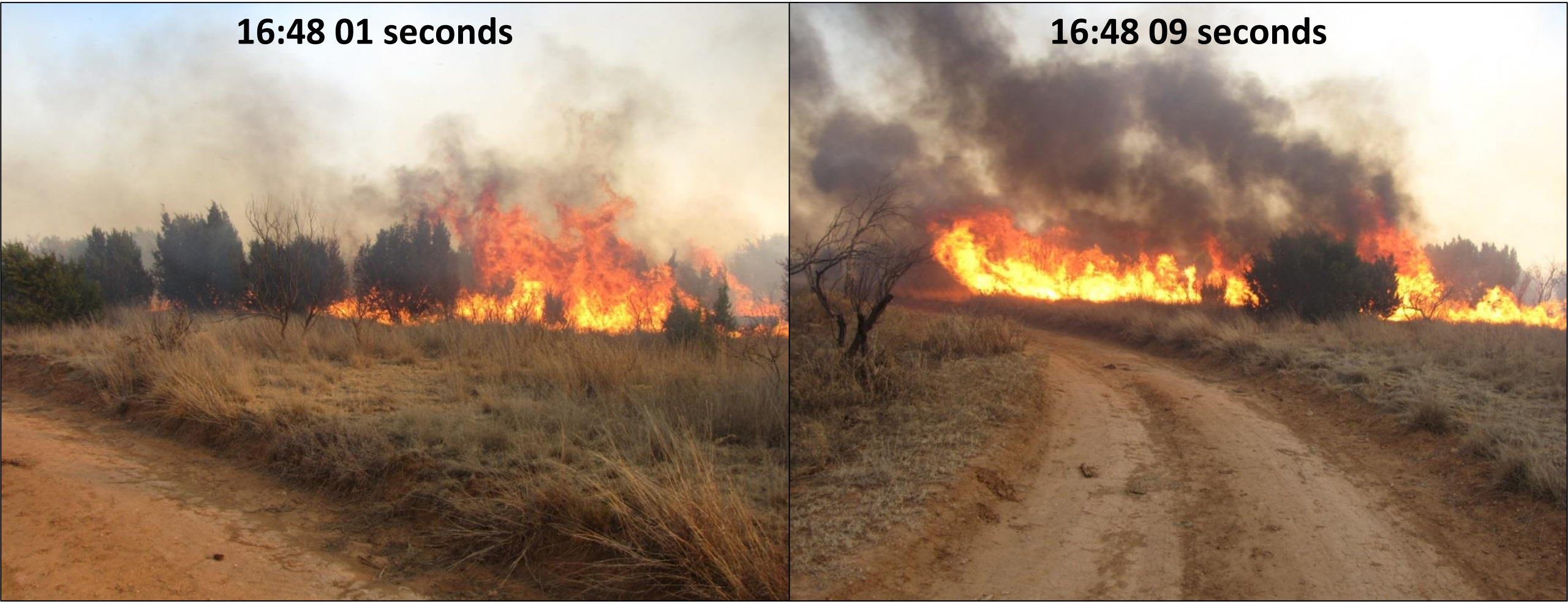
Short wind driven run in Brush/Grass fuels (Left Flank)



- A quick transition of moderate fire behavior to high behavior occurred even with wind speeds under critical thresholds.
- Above normal grass loading contributed to the short runs with winds under critical thresholds.

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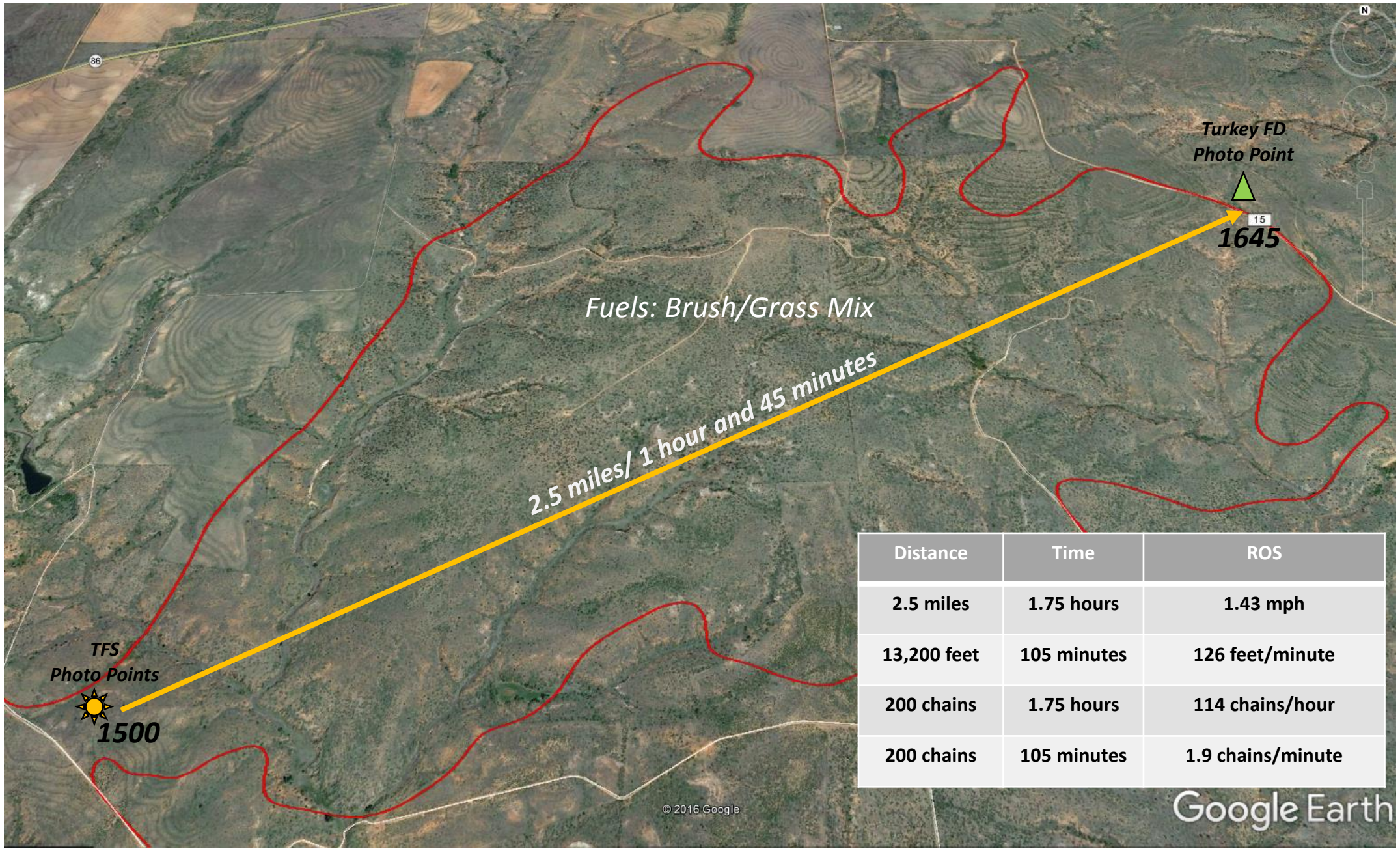
Short wind driven run in Brush/Grass fuels (Left Flank)

- Flames lengths and rates of spread increased rapidly within 23 seconds.
- These short wind driven runs may be more resistant to control efforts at the ground.

Forward Progression

The fire reached County Rd 15 at approximately 16:45. The fire was checked up at the road with improvement of the road on the left side. Special thanks to Tori Minick of the *Caprock Courier*/ Turkey Fire Department for providing the photo.

Estimated Rate of Spread (ROS)



Distance	Time	ROS
2.5 miles	1.75 hours	1.43 mph
13,200 feet	105 minutes	126 feet/minute
200 chains	1.75 hours	114 chains/hour
200 chains	105 minutes	1.9 chains/minute

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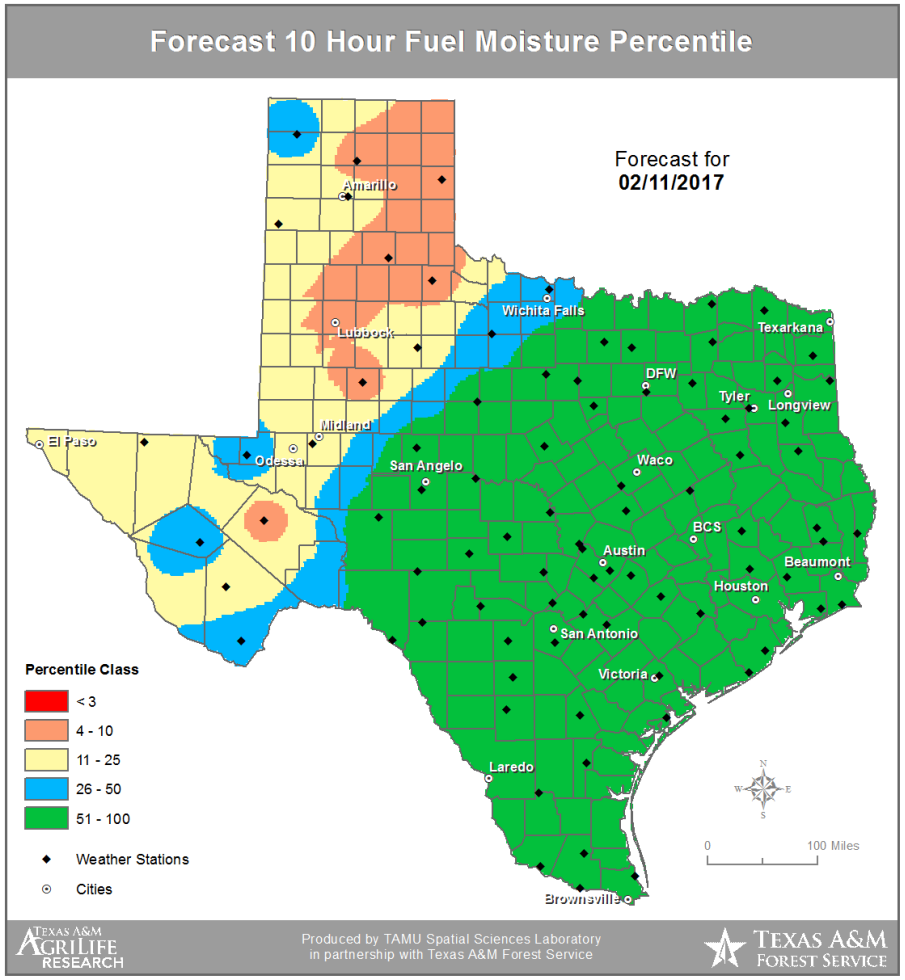
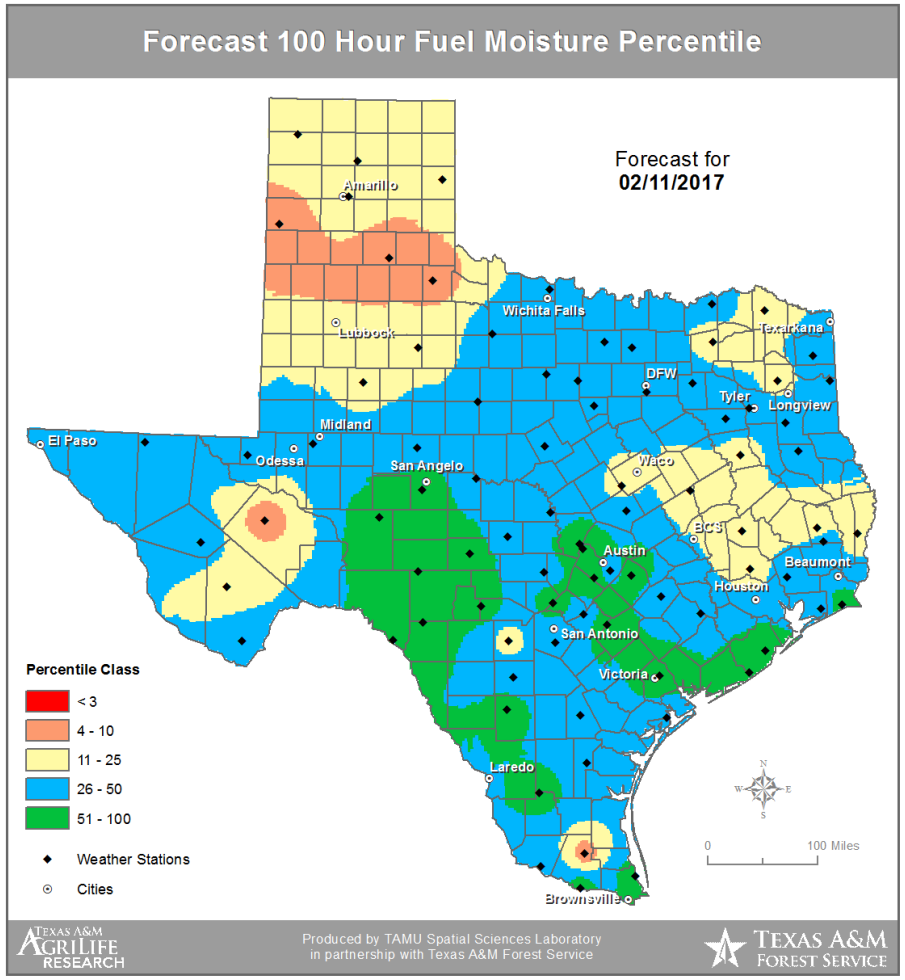
Active burning into the evening

- Between 1807 and 1907, relative humidity values increased from 13%->26% and winds speeds ranged from 8-7 mph with gust from 22-11 mph
- Temperature decreased from 82° to 70° F
- The fire remained active burning additional fingers. This activity can be attributed to the above normal grass fuel loading
- Fire activity had laid down based at 0200 on TFS resources observations.

2/11/17 Forecast Products





- Both the 10-hr and 100-hr dead fuel moisture forecast maps for 2/11/17 indicated the accelerated drying in both fuels classes in the High Plains and portions of the Rolling Plains

2/11/17 Caprock Canyon State Park RAWS Weather Observations

*Approximately 15 miles from Tripp Fire

Tabular Listing of 25 Observations from 02/10/2017 22:07 CST to 02/11/2017 22:07 CST:

Time (CST)	2.0m Temperature °F	2.0m Dew Point °F	2.0m Wet bulb temperature °F	2.0m Relative Humidity %	6.1m Wind Speed mph	6.1m Wind Gust mph	6.1m Wind Direction	Solar Radiation W/m*m	Fuel Temperature °F	Fuel Moisture gm	Precipitation accumulated in	Battery voltage volt	Quality Control
22:07	74.0	25.0	50.2	16	11.0	17.0	W	0.0	70.0	4	1.76	13.00	OK
21:07	69.0	26.3	48.5	20	6.0	12.0	WNW	0.0	64.0	4	1.76	13.00	OK
20:07	65.0	28.3	47.3	25	8.0	14.0	SSW	0.0	59.0	4	1.76	13.10	OK
19:07	74.0	25.0	50.2	16	4.0	9.0	WNW	8.0	56.0	4	1.76	13.10	OK
18:07	85.0	24.6	54.5	11	5.0	14.0	W	192.0	82.0	4	1.76	13.30	OK
17:07	90.0	23.6	56.2	9	12.0	22.0	WSW	449.0	95.0	4	1.76	13.10	OK
16:07	91.0	24.3	56.7	9	15.0	25.0	WSW	665.0	97.0	4	1.76	13.20	OK
15:07	92.0	22.3	56.7	8	14.0	26.0	W	831.0	99.0	4	1.76	13.10	OK
14:07	92.0	25.1	57.2	9	15.0	25.0	W	916.0	99.0	4	1.76	13.20	OK
13:07	89.0	27.7	56.7	11	14.0	28.0	W	922.0	98.0	4	1.76	13.20	OK
12:07	87.0	30.2	56.6	13	17.0	30.0	W	825.0	95.0	5	1.76	13.20	OK
11:07	85.0	28.6	55.5	13	17.0	30.0	WNW	654.0	93.0	5	1.76	13.30	Caution
10:07	81.0	27.3	53.6	14	18.0	31.0	WNW	480.0	88.0	5	1.76	13.30	Caution
9:07	73.0	29.6	51.0	20	18.0	31.0	W	231.0	79.0	5	1.76	13.40	Caution
8:07	69.0	29.7	49.4	23	18.0	30.0	WNW	20.0	70.0	5	1.76	13.40	Caution
7:07	69.0	30.7	49.7	24	16.0	26.0	WNW	0.0	66.0	5	1.76	12.90	OK
6:07	69.0	29.7	49.4	23	14.0	28.0	WNW	0.0	66.0	5	1.76	12.90	OK
5:07	69.0	29.7	49.4	23	17.0	29.0	W	0.0	66.0	5	1.76	12.90	OK
4:07	70.0	28.3	49.4	21	19.0	29.0	W	0.0	68.0	5	1.76	12.90	OK
3:07	68.0	28.8	48.7	23	11.0	20.0	WNW	0.0	65.0	5	1.76	12.90	OK
2:07	68.0	27.7	48.4	22	13.0	22.0	WNW	0.0	65.0	5	1.76	12.90	OK
1:07	61.0	29.3	45.8	30	5.0	9.0	S	0.0	54.0	5	1.76	13.00	OK
0:07	63.0	27.6	46.2	26	4.0	14.0	SE	0.0	55.0	5	1.76	13.00	OK
23:07	62.0	26.7	45.5	26	5.0	12.0	SSE	0.0	56.0	5	1.76	13.00	OK
22:07	64.0	24.4	45.8	22	8.0	12.0	SSW	0.0	58.0	5	1.76	13.00	OK

- Extremely poor relative humidity (RH) recoveries were observed overnight with a max of 30%.
- RH values decreased at 0207 and winds shifted from the S to the NNW. Winds speeds also increased.
- The RH decrease and wind shift were associated with the passage of a boundary.
- By 1007, critical weather thresholds for temperature and RH were exceeded.
- Winds speeds remained below critical weather thresholds, although winds gusts did exceed 30 mph.
- Full solar radiation was observed.

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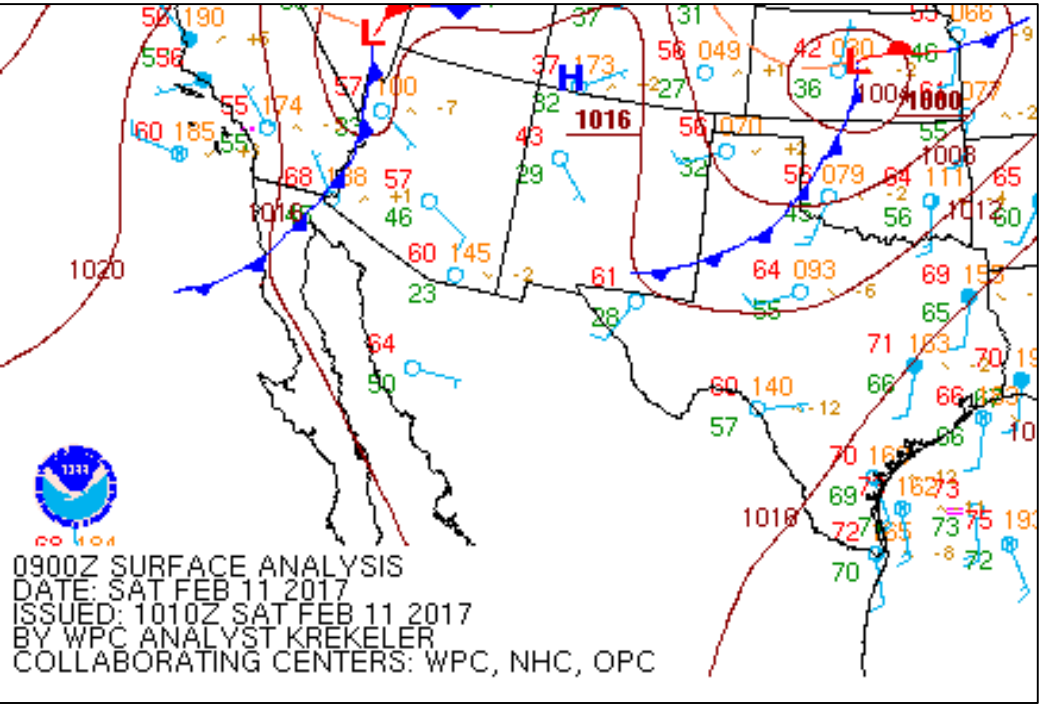
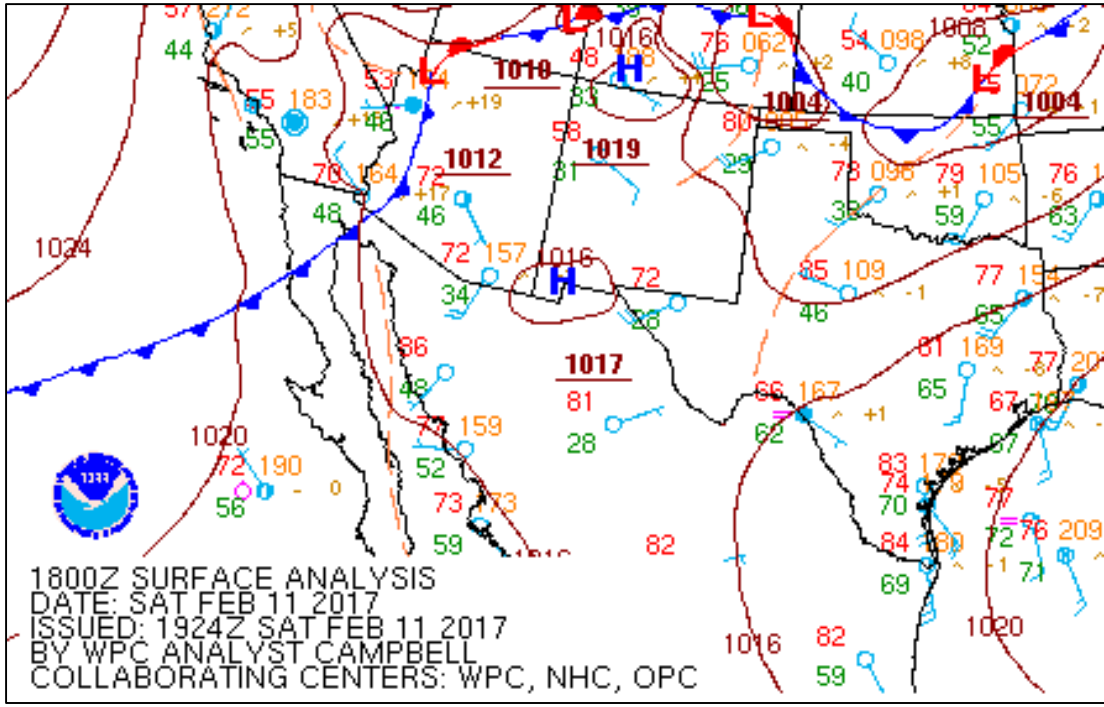
2/11/17 Surface Analysis



Surface Analysis Maps are in Zulu (Z) Time which is 6 hour head of Central Time (CST) during Daylight Savings Time

Ex: 1200Z=0600CST



- A dry cold frontal passage caused the wind shift and decrease in RH around 0200. The Weather Prediction Center (WPC) surface analysis map depicts the passage.
- Although shown as a cold front, this acted more as a boundary since temperatures did not decrease.

- Surface Analysis depicts pre-frontal conditions at 1200 CST local time as cold front over Kanas and Oklahoma was moving south.

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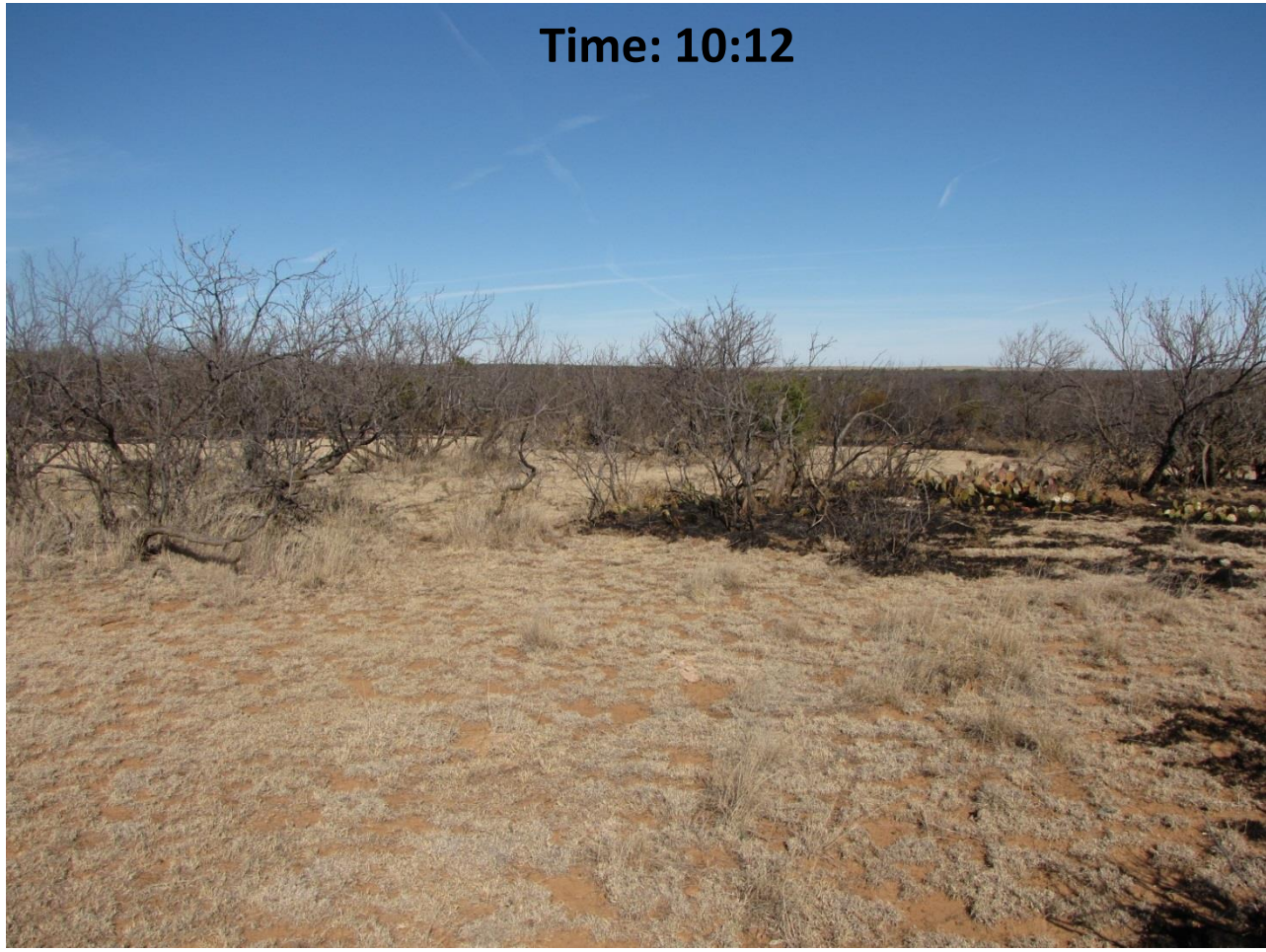
2/11/17-Extended Attack

Time: 10:00

- Above normal grass loading on the right flank near the head in rough terrain due to drainages.
- Minimal fire activity with some interior smoldering

Time: 10:12



- Where terrain was level on the right flank near the head, more grass and mesquite was present. Grazing had occurred and fuel loading was below normal.
- Local Fire department wet lines had been used.

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2/11/17-Extended Attack

- A slopover on the occurred on the left flank in the brush/grass mix.
- Fire intensities were high with group torching of the junipers with moderate rates of spread
- Critical fire weather thresholds were occurring by 1107 (Temperature: 85°F, RH: 13%)
- Wind was below critical values, WNW at 17 mph, Gusts at 30 mph
- Fire activity moderated in shorter, grazed grasses.

2/11/17-Extended Attack

- Even in grazed areas, short continuous fuels allow for the spread of fire at lower intensities
- The fire was checked up at a interior ranch road and containment line.

Tripp Fire Highlights

- Spring and Summer 2016 normal to above normal rainfall promoted abundant grass growth and herbaceous fuel loading across the High and Rolling Plains.
- Short term drying (3 weeks) with periodic episodes of above normal temperatures and dry air mass intrusion allowed ERC values to increase near the 90th percentile.
- Poor overnight relative humidity values led to accelerated drying of fuels and created a longer burning period.
- Critical Fire Weather Threshold values for Temperature and Relative Humidity were exceeded.
- Winds speeds remained below critical thresholds, but normal to above normal grass loading compensated for the lower wind speed to promote spread.
- Brush/Grass in rough, broken terrain presented access issues with higher fire intensities.
- Juniper live fuel moistures are normal, but lower during winter months and more susceptible to torching with higher surface grass loading.

References

- https://tpwd.texas.gov/education/hunter-education/online-course/wildlife-conservation/texas-ecoregions
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