Region 8

Ouachita National Forest in Arkansas/Oklahoma

Oklahoma Ranger District

Lennox Wildfire Declaration Forest Review

Lennox RX Unit 6,566 acres

Date of Declaration April 2, 2021

Declared Wildfire 8 acres

Executive Summary:

Lennox RX is a large (6,566 acres) unit of mixed pine/hardwood forest over rocky mountainous ridges in Eastern Oklahoma. On the north boundary of the fire is the Talimena National Scenic Byway that is heavily used. Around the unit there are sporadic private property with some adjacent residences. The district has a long history of burning large RX acres with success, including a Type-One burn weeks before. Lennox burn had 30-35 employees, aircraft, engines, UTV's, and dozers assigned on burn day. The State of Oklahoma contributed to the resources due to private land that was included in the burn under the Community Protection Grant. The district's RX target for the year was 45,000 acres of the Forest's 193,000 acre target. Most of the day, the holding groups reported spots but could be handled by resources on scene but inevitably stretched resources thin. One of the spots was below a resident and wasn't realized until it was well established. Resources responded and extinguished the spot at 8 acres. There was minimal timber damage to the private property but a small utility trailer was damaged. Two engines responded and were able to extinguish the spot before it reached the home.

Review Team composition:

Due to the complexity, acres involved and minimal damage to private property, the Forest decided to do a Forest level review of the wildfire declaration. The team was composed of Troy Heithecker Forest Supervisor, Josh Graham FFMO, Tim Nutley FAFMO and Mike Ward Region 8 Fuels Program Manager. Although a Forest review, the Region assisted at the request of the Forest.

"*learning may be said to have occurred only when individual behaviors change on the ground.*" David Garvin.

Objectives of the review team:

1. Create a learning environment as the team reviews the actions, reactions, and conditions of the Lennox Wildfire declaration in order to learn and minimize repeat occurrences.
2. Through transparency, identify lessons that will improve our ability to implement prescribed fire and react to wildfire in a safe efficient manner in the future.
3. Evaluate the scale of Type-one burns on the Forest and recommend guidelines that can identify potential problems when size, resources or time limitations could contribute to potential problems.

Reference: Quick Reference - USFS Escape Prescribed Fire Response (ver. 4/25/16), FSM 5140, 6732.11, 5142.43, 5142.45, FSM 5142.3, NWCG, PMS 484, FSM 5137.1,

Lennox RX objectives:

From the approved burn plan

ELEMENT 5: GOALS AND OBJECTIVES

A. Goals (See the FLRMP for Project Goals by Management Area):

MA 14- Ouachita Mountains-Habitat Diversity Emphasis. Desired condition:
Vertical structure is 6-14% grass, forb, seedling/ sapling/ shrub and 60-90% in mature Timber with Hardwoods comprising approximately 30% mixed, mainly in stream corridors and North slopes. Visual equity is Park- like with grassy understory and fairly open canopy. Prescribed fire applied every 3-5 years.
MA-19 Indian Nations National Scenic and Wildlife Area (Pine-Hardwood Emphasis). Desired condition:
Scenic Integrity Objectives are High for this area, naturally appearing vegetation; Hardwoods and Pine Hardwood with grass, forbs and occasional openings can be observed. Prescribed fire applied every 3-5 years.

B. Objectives (1st Order Fire Effects, FLRMP and Appendix R Monitoring Data):

Resource Objectives: There are three primary objectives: 1) Reduce fuel accumulation in order to better protect national forest and adjacent ownerships from wildfire: 2) Reintroduce the ecological role of fire in designated areas. 3) Maintain and enhance wildlife/fisheries habitat, specifically for the ABBA (American burying beetle) habitat.
The reduction in the amount of dead and down material through burning will also benefit forest health by stimulating the nutrient cycling process. Burning will also benefit wildlife habitat in general by removing dead/dying material from brush and hardwood
Prescribed Fire Objectives: Responder and public safety; Maintain High SIO, Minimal Overstory Mortality. Fuel reduction goals of available fuels and vegetation are as follows: litter layer by 20%- 90%, <1-inch diameter class by 35%-80%, 1-3-inch diameter class by 0%-40%, and 3-9 inch diameter class 0%-40%. Reduce oak mid-story from pine stands of 3-7' height classes by 10-20%

Lennox Prescription:

From the approved burn plan

ELEMENT 7: PRESCRIPTION

Prescription Narrative: No Previous RX entry, this will be the first entry into this Unit. Expected fire behavior should have mixed severity (low, moderate, high) moderate intensity and severity is most common under the parameters for this project. Occasionally pockets or isolated areas may exhibit higher intensity and severity, for example areas of open unshaded, or unknown storm damage. Both Fuel Model 2 and 9 are represented, flame lengths of <6 feet are expected but most commonly flame lengths of <4 foot are observed. Spread rates will vary but should be < 30 ch/hr. Firebrands and spotting should be expected but are generally <100 foot from control lines. It is possible to experience crown fire this can happen in periods of heightened dryness, topography change, winds and/or discrepancies in firing sequences and techniques and has occurred in similar areas previously (Blackjack South & Simmons Mtn.). By following the parameters in part B, monitoring weather conditions and maintaining situational awareness the objectives can be met.

B. Prescription Parameters:

Prescribed Fire Parameters and Observations Table																					
Closest NFDRS Weather Station: Kiamichi-346303 & Closest Mesonet Weather Station: Talihina																					
Date(s): *Record times in appropriate columns, i.e. test fire, fire, post*	Regional or Forest Standard	RxBP Prescription 1/	Forecast 2/		Test Fire 3/		Fire 4/		Fire 4/		Post Fire 3/										
Fuel Models (FBPS)	N/A	FM-9, FM-2																			
1-Hour Fuels %	N/A	≥ 6																			
10-Hour Fuels %-/4	≥7open site	≥ 7																			
Temperature (dry bulb)-/ 7	≤95°	≤95																			
Relative Humidity %-/4/6/7/8	≥20 ≤45	≥20 ≤ 45																			
20 ft. Wind (mph)-/6/8	≤ 20	≤ 20																			
20 ft. Wind Direction-/7	N/A	NES																			
Mid-flame Wind Speed (mph)	N/A	2-5																			
Mid-flame Wind Direction	N/A	Same as 20'																			
Transport Wind Speed (mph)/5/8	≥ 9	≥ 9																			
Transport Wind Direction-/7	NESW	NESW																			
Mixing Height (ft), (AGL) /8	≥1968	≥4168																			
NFDRS Parameter-/4	BI	≤ 60																			
Probability of Ignition (%) /4	≤ 70	≤ 70																			
KBDI-/7	≤ 500	≤ 500																			
Days Since Rain	≤ 14	≤ 14																			
Amount (inches)	≤ 0.25	≤ 0.25																			
Firing Technique	N/A	See Element 15																			
Ignition Method	N/A	Aerial Hand																			
Percent Slope (average) (%)	N/A	15-20																			
Effective Wind-speed (mph)	3-18	3-18, 2-4 Night																			
Flame Length (ft.)	N/A	≤ 6'																			
Rate of Spread (chains/hr.)	N/A	3-20																			

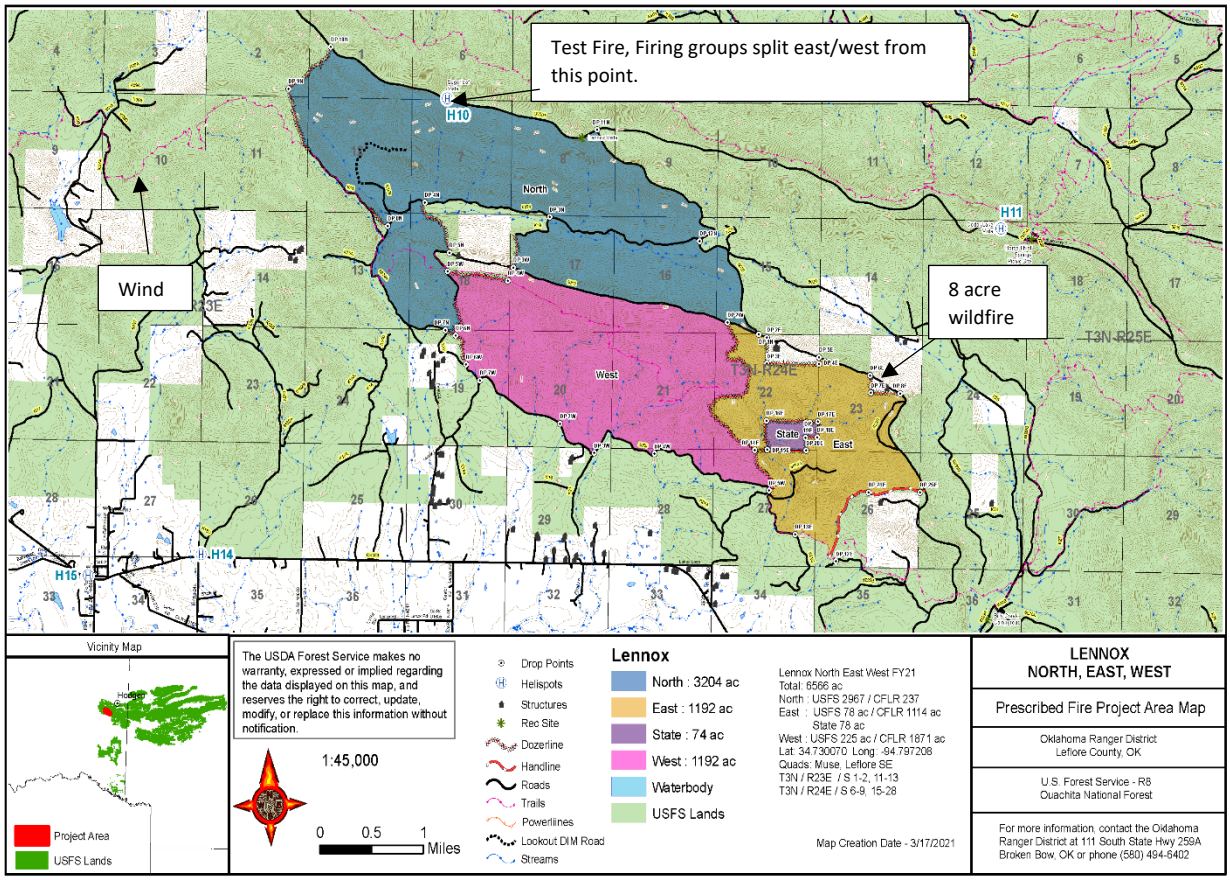
1/ Prescription items to be completed at planning time
2/ General forecast items to be completed on the day of burn. General and spot wx forecasts shall be attached to the Prescribed Fire Plan.
3/ Test Fire and post fire weather parameters shall be taken on-site.
4/ POI>70, BI>60, 10hr fuel moisture limits, and RH predicted between 25-29% require Forest Supervisor FFMO approval. If predicted wx and parameters exceeded, may continue if objectives met and safer.
5/ Sliding scale based on transport wind speed; *see Appendix I Smoke Dispersion Table (Page 36).*
6/ Forest Supervisor &/or Fire Management Staff Officer Change approval *(see 5140.42-Exhibit 01).*
7/ Max. Temp, KBDI>500, Days since rain, and wind direction changes requires Line Officer Approval and documentation on "Change Approval"
8/ RH below 25%, 20ft winds above 20mph, low mixing height, and transport wind speeds <9mph require Regional Approval

Prescribed Fire Outcomes

- 2,500 acres of the planned 6,500 acre unit were successfully burned on Forest Service lands that met planned prescribed fire and resource objectives.
- 8 acres unintentionally burned on private lands that are adjacent to the burn unit, outside of the designated project area, resulting in damage to private property.
- Forest level escaped wildfire declaration review conducted.
- Lessons Learned and recommendations developed to be shared with Ouachita NF stakeholders involved with planning and implementing the prescribed fire program.

Narrative and Chronology: See Appendix D

Maps and Photos:



Summary:

On April 2nd the wind was predicted to come from the South with favorable conditions. The test fire was conducted on the north end of the unit along the Talimena National Scenic Byway. Two burn groups split and Alpha went west and Bravo group went east along the drive. During ignition it became apparent that the adjacent fuels were highly receptive. Both firing groups experienced spots but holding resources were able to catch. The Bravo group burned around two areas of private along a dozer line that excluded private land from the burn. After the area cooled down, resources continued along the planned firing line. Later, the helicopter reported that there might be fire across the line on the private land. An engine responded and verified that the fire had jumped the dozer line and was moving up hill in alignment with wind and slope toward a residence. Two engines worked to point protect the home and property. 8 acers of private land was burned with minimal damage to the land due to being a similar fuel loading as the FS adjacent area. During the escape there was a small trailer that received damage but the residence did not. The area was secured and fire spread was stopped along the road. With several spot fires and a wildfire declaration, the Burn boss worked with the areal firing group to find features that they could burn to that could stop the continuation of the burn. Over the next three days resources secured the Lennox burn at 2,500 acres with 8 acres outside the project boundary.

Lessons Learned by the participants:

Knowing that there is private land in and around the unit with residents, the need to remain on scene to ensure success is important. The lack of resources or length of line to hold may be adjusted to secure those values in and around the unit. Identify and assign holding resources on IAP. Assign point protection resources to residences adjacent to the burn unit. Several of the leadership mentioned that getting an earlier start with ignitions could have minimized the "rush" and allowed more time to meet burn objectives for the day. Because of the pace of the hand firing group, the holding group was outpaced when spotting occurred early in the ignition period.

Very high fuel loading present in first entry burn of a 40+year rough, increased sources of ember production, smoke emissions and burn duration. This threat could be mitigated by weeks of preparation, in addition the burn could be divided, to allow for additional patrols in areas that overhead threats are present. Improving fire break and reducing fuels adjacent to fire breaks through blacklining operations in critical holding or pressure areas prior to the burn day could reduce spotting potential.

Reviewing the Kiamichi RAWS stations leading up to April 2, shows poor night time RH recovery. At 0300 RH reading was 23%, at 0500 they were 48%, and at 0900 they were falling to 43%. Normal night time recover exceeds 50% for many hours before dropping back down to daytime lows. Later that day the lowest RH recorded was 24%. There was a Forest Variance approved for 27% RH from the morning spot weather predictions. Overall the fuels didn't recover compared to "normal" recoveries in the area. The PIG was 50% based on RH/Temp/Aspect and time of year. The one hour fuels were said to be at 6%, the ten hours were also at 6%. Due to the fuel moistures being a factor in the issues the burn had, it is recommended that the Forest use fuel sticks to weigh and measure moisture on unit. This will give the decision makers more accurate information when planning and anticipating the day's activities. Energy Release Component (ERC) and Burning Index for this station for burn day was above the 90th percentile indicating increased fire intensity and resistance to containment potential. While KBDI was low but rising from recent precipitation it was not a good indicator of fuel conditions on the ridge tops. Trees and vegetation regaining vigor from dormancy should be considered as another factor that influences surface fuel and soil moistures that KBDI may not respond to quickly enough. No on-site fuel moisture or precipitation monitoring occurred which could have provided decision support information on holding concerns.

Broad Forest Recommendations and Forest Lessons learned:

This report was focused on the team's objectives for the 8 acre wildfire but they didn't want to miss an opportunity to see some of the contributing factors when looking at the larger picture.

Broader lessons:

Difficulty: When conducting a large burn, there is a time factor that every burn boss deals with. Some burns are structured to accomplish large acres with minimal finesse but others have large hand lines adjacent to values or project boundaries that require time. Due to the miles of black line, minimal resources and timing of ignition commencement, there was a sense of urgency. One employee explained that it felt like an emergency situation (wildfire burn out) instead of a planned event. Another added that it would have been nice to have several days to complete. One firing group said that it is tough to burn 7 miles of line but we have been successful at doing this in the past.

Possible recommendation: All resources agreed and accepted the work assignments but in review, identified time as a factor. A couple years ago the district took a look at the complexity of their burns and reevaluated the complexity of each burn. This specific block was adjusted and met type-one complexity. Although there are three burn blocks in the Lennox burn, each one could be looked at independently. This action may not change the complexity of the unit but if executed independent, could expand the time needed to complete. In addition, the Forest has had a long standing restriction on evening/night blackline operations due to potential smoke impacts on roadways. Knowing that there are now smoke models available that can map potential smoke impacts, Forest leadership may adjust their restrictions on a case by case basis to allow operators more tools to successfully implement complicated firing operations.

Difficulty: Large wildfire operations have access to multiple sources of information to inform decision makers and to direct operational focus. Often prescribed fire has minimal staffing due to budget, number of resources available and being a planned event. This RX was staffed with 30-35 personnel. If the Lennox RX was a wildfire of 6,566 acres in mixed hardwood/pine with structures threatened, there would be hundreds of resources on the ground just in operations. There would be a small fleet of aircraft and support personnel. In addition there would be dozens of specialist and support personnel mapping and predicting the future of that fire informing decision makers.

Possible Recommendation: There are several resources inside and outside the Forest that can be utilized for this type of complexity to support leaders with better information. There is an FBAN on Forest that could help with modeling fire runs. There are regional staff that can model smoke or look at night smoke dispersal. There are IMET's at the Regional office that could take a specific look at the area of operations to ensure RH/wind/temperatures are consistent and accurate. As the planned events get more complex, it is recommended to reach out and use other tools to ensure leadership has accurate information to make good decision. The Forest

has a Forest Fuels Specialist position in it's existing organization that hasn't been filled in three years. Filling this position should increase capacity in decision support information and planning/preparation.

Difficulty: In Region 8, Forest fire resources are minimal. This causes the Forests around the region to rely on outside resources to accomplish their program of work. Historically, hundreds of resources visit the Ouachita National Forest from January –April. When looking at the composition of resources on that burn, there were Forests from around the country represented there. Although essential to the success of a large burn target, resources are guests and often are given directions and follow.

Possible Recommendation: It is difficult to be a guest on a Forest and give honest feedback or opinions on operations. When you're a guest, you want to be low maintenance and be a strong contributor to the success of the program. It is essential under these circumstances that resources on either a wildfire or prescribed fire understand leader's intent, and agree with the plan, tactics and strategies. If there is a discrepancy in perspective, it is important that the host unit and guests have the ability to discuss the situation and clear up any differences through open dialog. Although not a specific problem highlighted on this burn, it is an important note for all host/guest resources to understand.

Personal Observations from Review Team:

Very well-prepared burn plan and complexity analysis

Thorough communications with line officers and the public prior to, during and after planned ignitions.

Late ignition for test fire seemed to put pressure on burn boss and crew to hurry.

Multiple shortly after ignition began.

Holding resources outpaced by ignition resources.

Holding resources not clearly identified nor clear leadership for them.

Basing expected fire behavior on last couple of weeks burning instead of looking at the indices and collecting on site information.

Needed dedicated resources to manage private property lines through burn period.

Fire Environment not thoroughly assessed. Fuel moistures on site not measured.

Specialists not utilized or consulted for burn day fire environment conditions: Fire behavior analysist, Air Quality Smoke Specialist, IMET, etc. For a type 1 burn that is initial entry large concerns for impacts to private property and public health utilizing the best available analysis of the current and expected conditions is critical.

No Rain gauges or Fuels sticks on site prior to ignition operations.

ERCs were over 90th percentile for fuel models G and P at the reference RAWS weather station – Kiamichi.

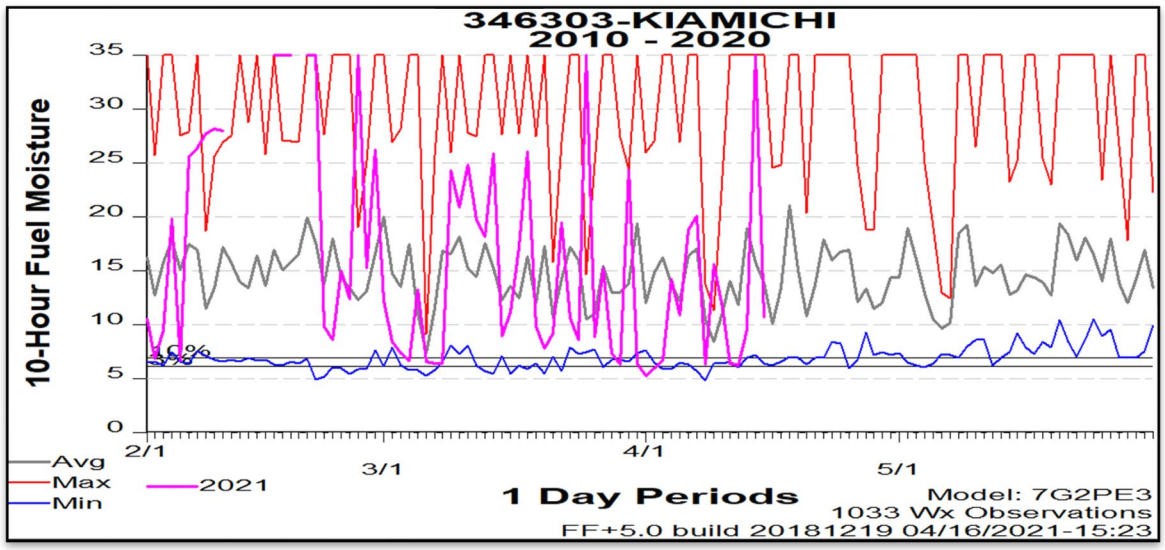
Fire Danger Rating in prescribed fire plan for BI thresholds of ≤60 puts the BI above the 97th percentile.

Appendix

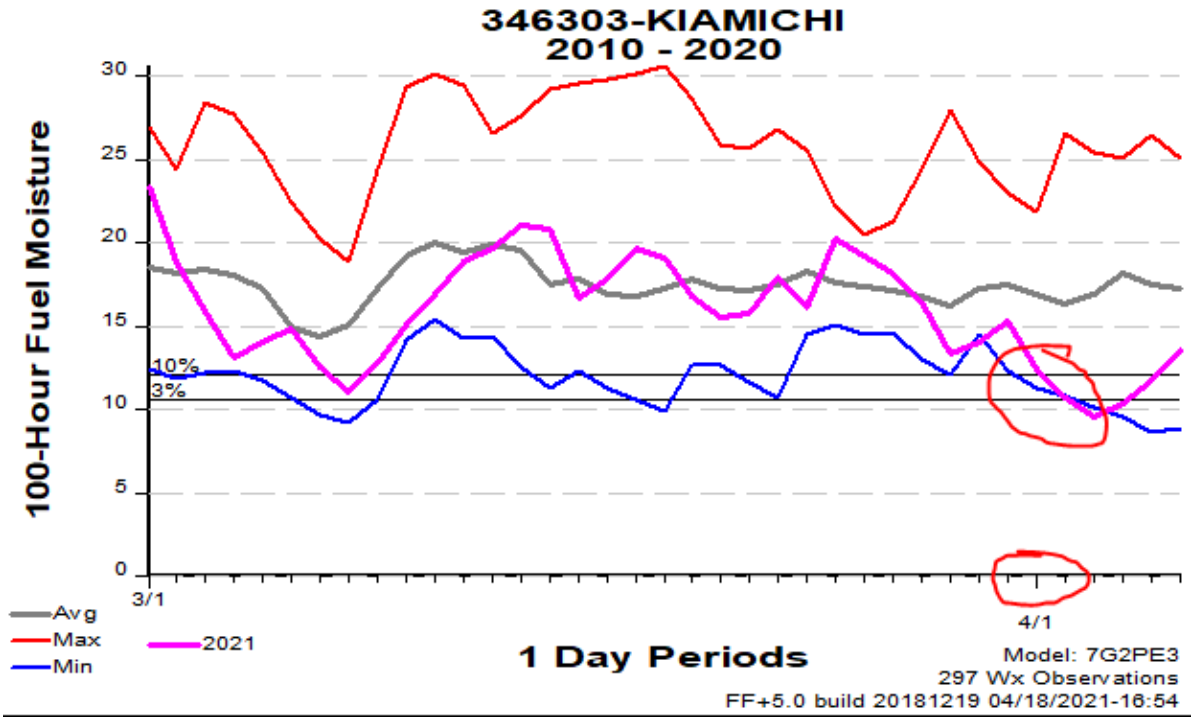
(See Lennox Folder for Appendix)

A. Lennox IAP
B. Burn Plan
C. Lennox NFDRS Graphs
D. 214 time line
E. Spot Weather
F. Variance Request
G. Lennox Complexity Analysis
H. Lennox RX USFS escape data sheet

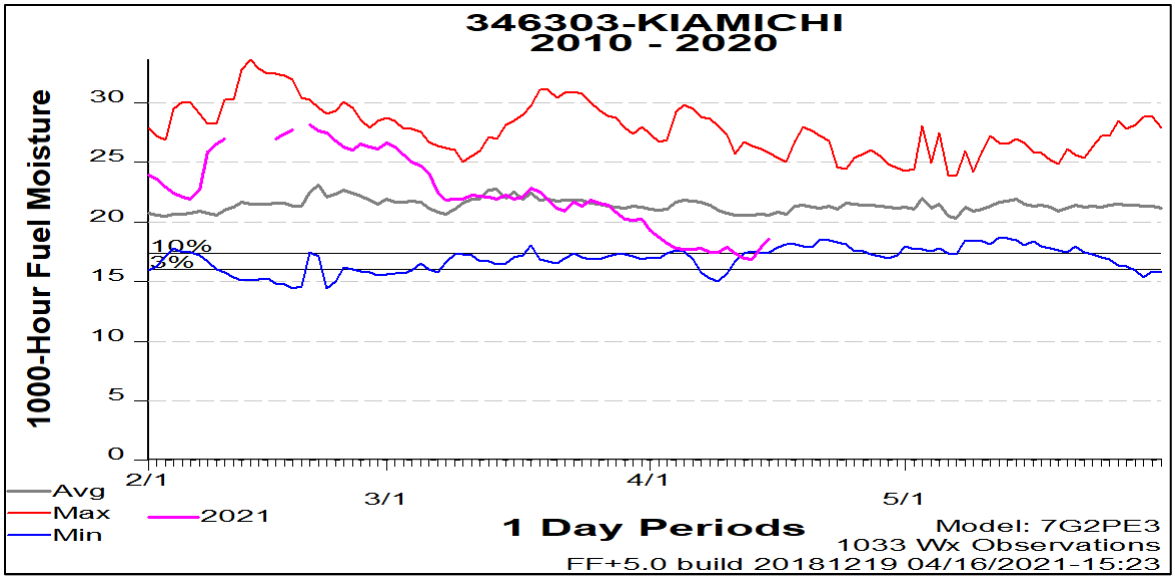
The Tables below illustrate the fire danger and trends for April 2, 2021.
Table 1. 10 Hours 6%
Table 2. 100 Hours 6%
Table 3. 1000 Hours 16%
Table 4. BI G model 97%
Table 5. BI P Model above 90% at 34.
Table 6. BI 16Y above 90%
Table 7. ERC G above 90%
Table 9. ERC 16Y under 90%
Table 10. KDBI 50



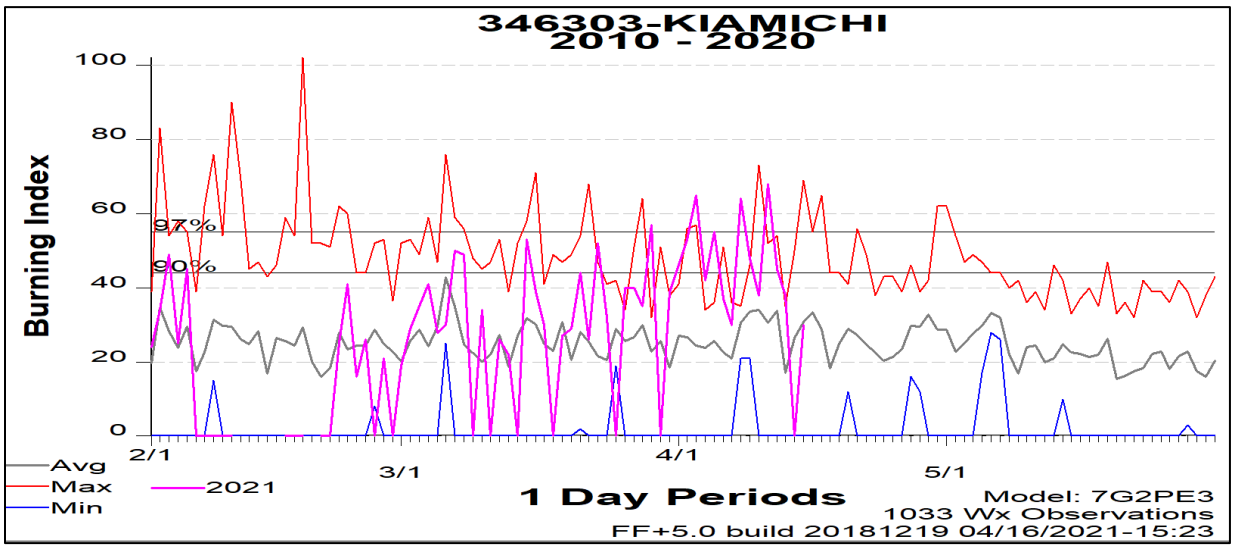
1. Ten Hour Fuel Moisture trends, broke 10 low observed for this station on 4/2/21.



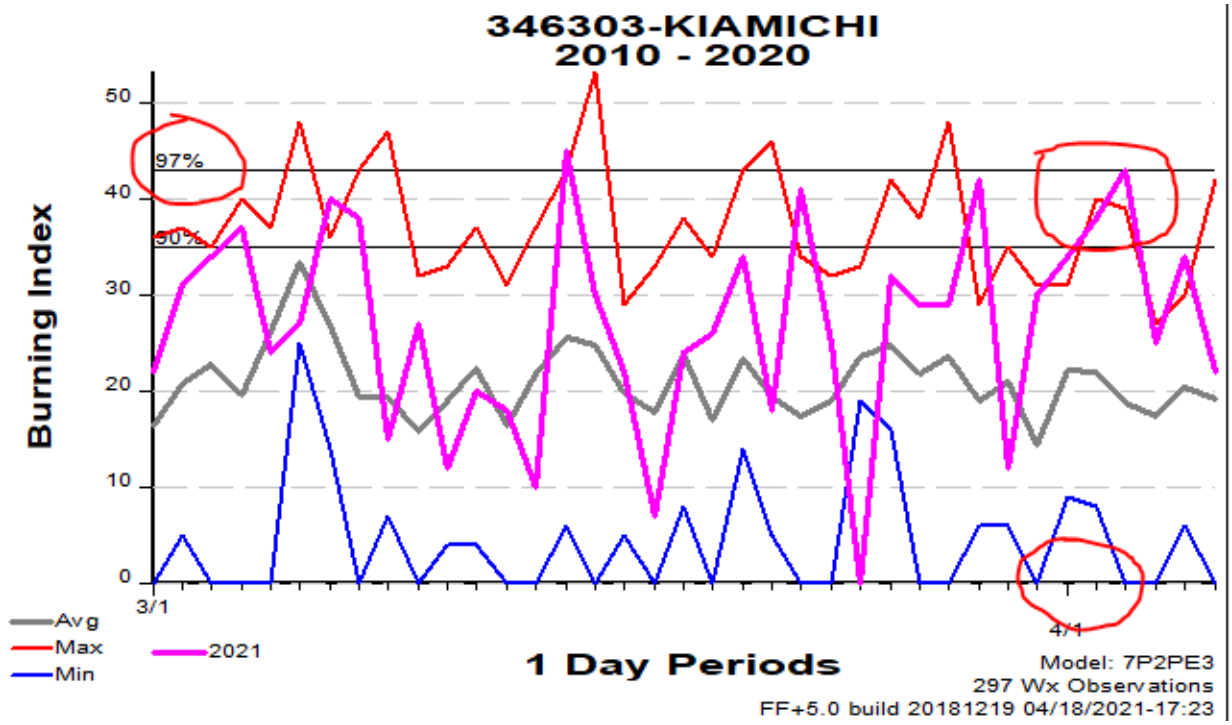
2. 100 hour Fuel Moisture drying trend and 10 year low on burnday.



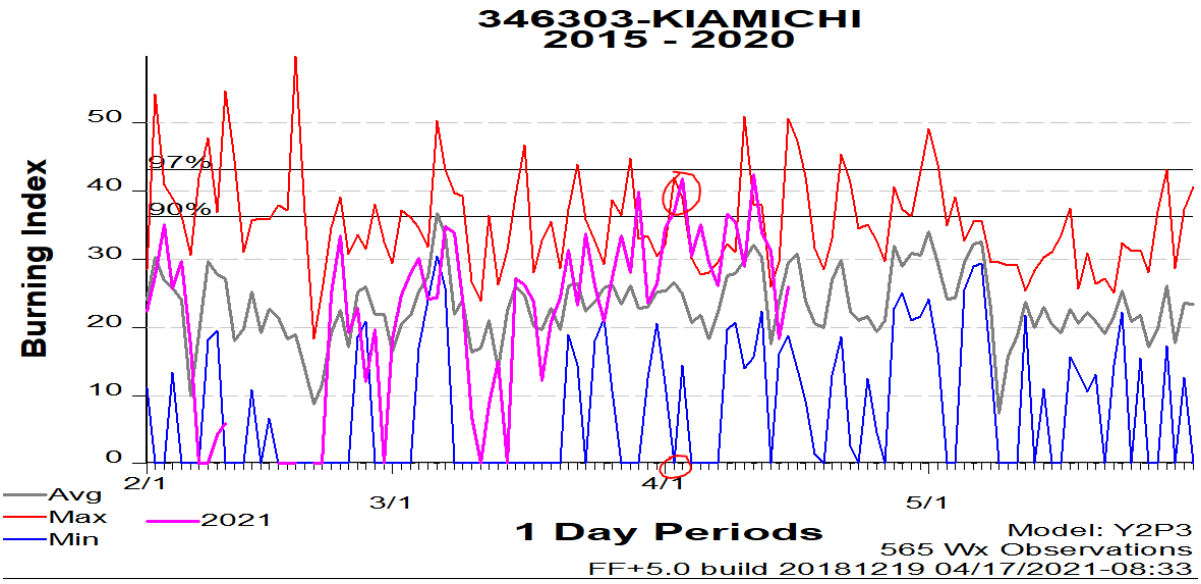
3. 1000 Hour Fuel Moistures Trending downward since last precipitation event. On 4/2/2021 near average levels.



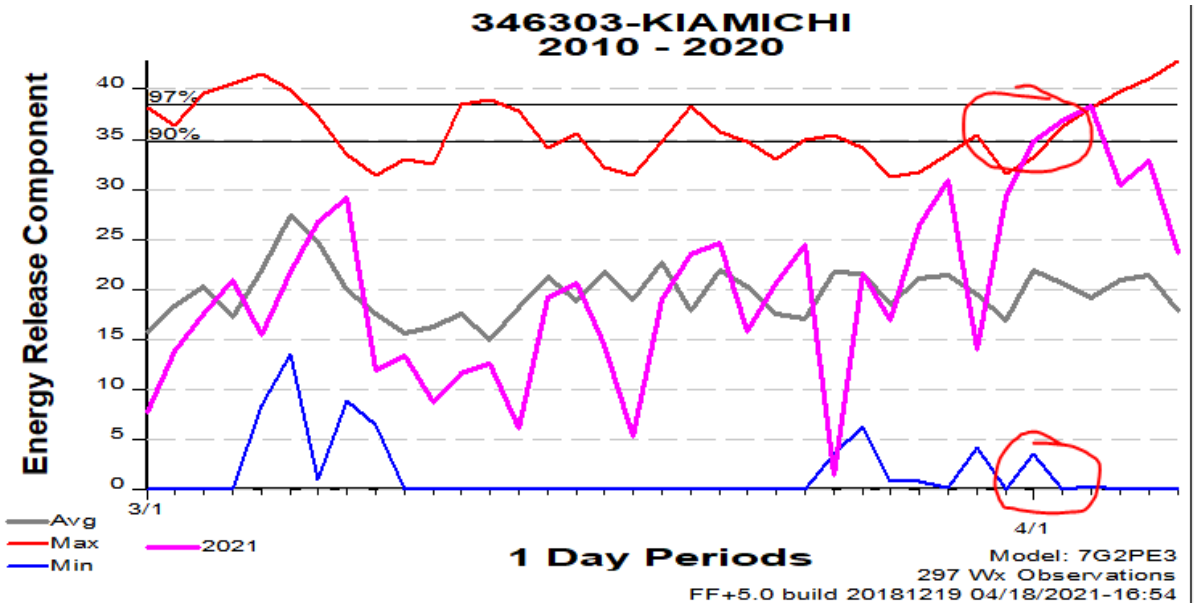
4. Burning Index using Fuel model G, notice on 4/2/21 Bi was at the



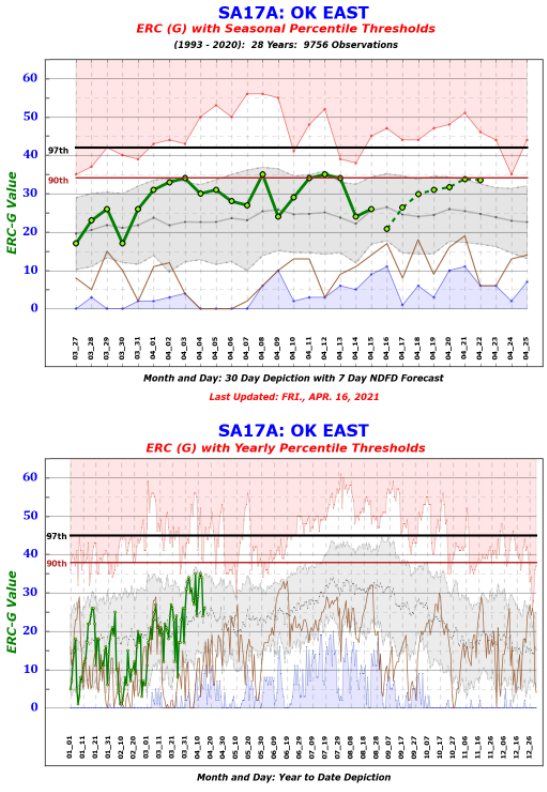
5. BI using Fuel Model P that this station is set for. Notice that on 4/2/21 it was at the 90th percentile at 34 and the 97th percentile is 42, yet the burn plan parameter allows up to BI of 60.



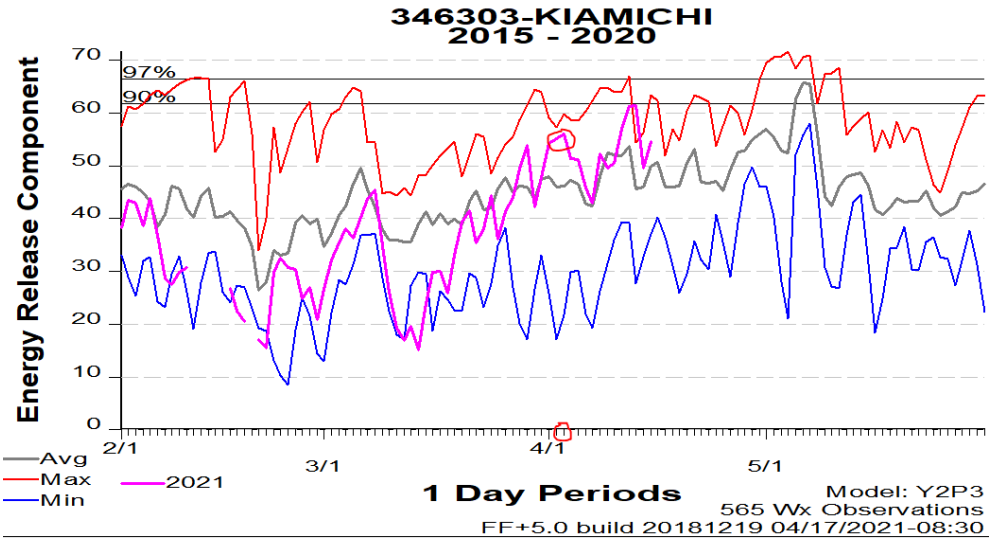
6Burning Index using NFDRS 16 Fuel Model Y



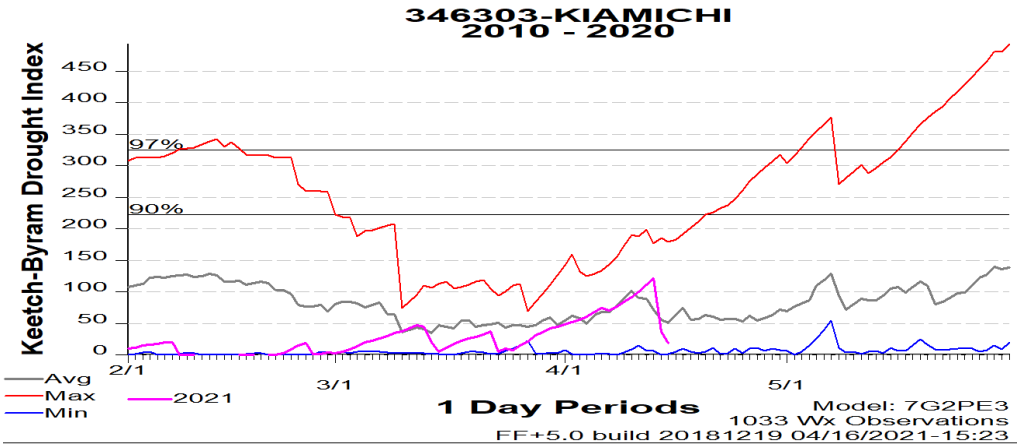
7. Energy Release Component using FM G, highest for this day in 10 years, over 90th percentile.



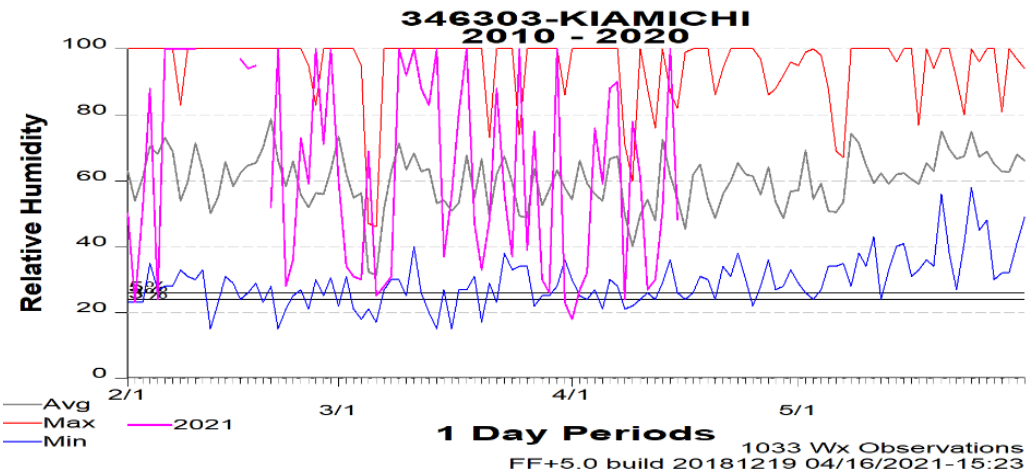
8. Oklahoma Fire Danger Seasonal Percentile for ERC



9. ERC using NFDRS 2016 fuel model Y over 5 year average.



10. KBDI near average, doesn't indicate significant fire danger potential.



11. Observed RH broke 10 year average low on 4/2/21