





# **Wildfire Integrated Warning Team**

*Leveraging Science and Technology to  
Develop Rapid Situational Awareness*

**Oklahoma Forestry Services**

***Chris Mask, GIS Manager***

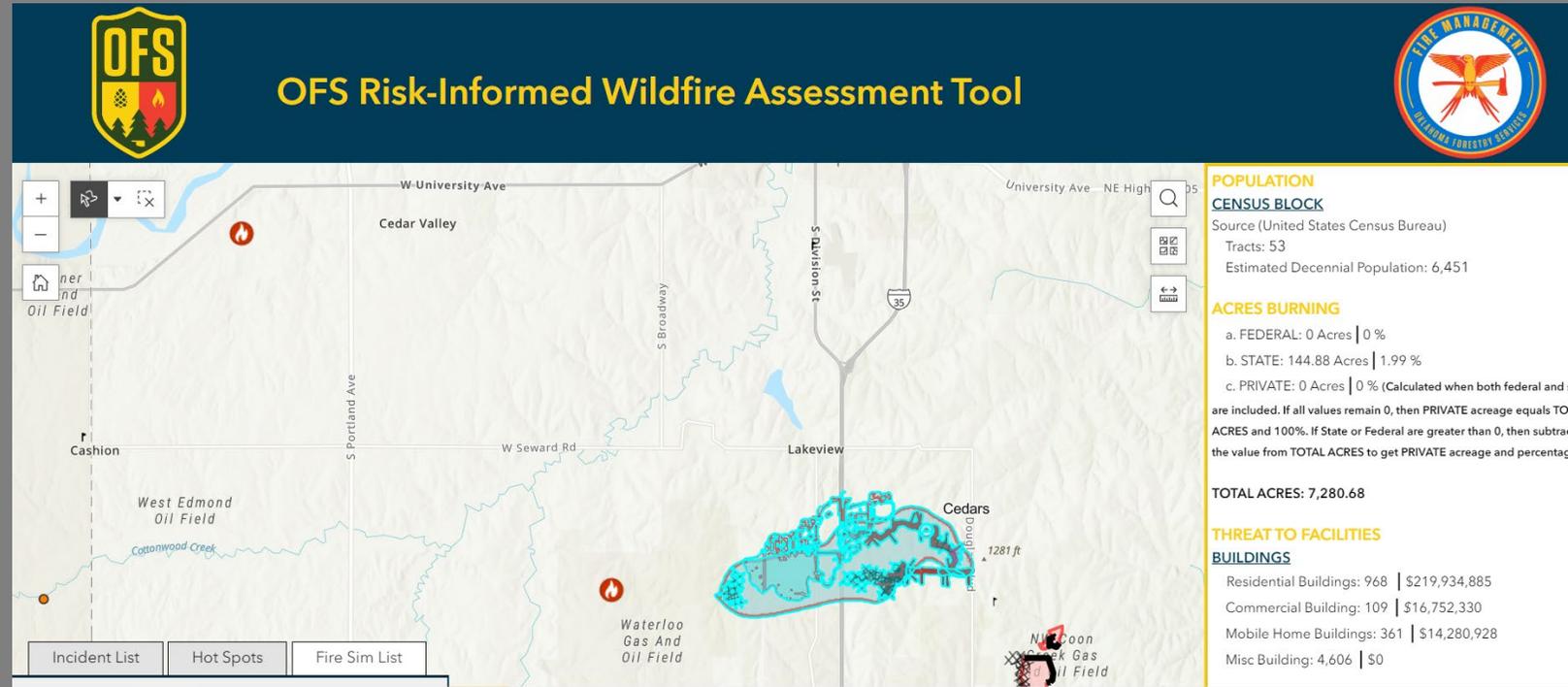
***Drew Daily, Deputy Fire Management Chief***

**National Weather Service - Norman**

***Todd Lindley, Science & Operations Officer***



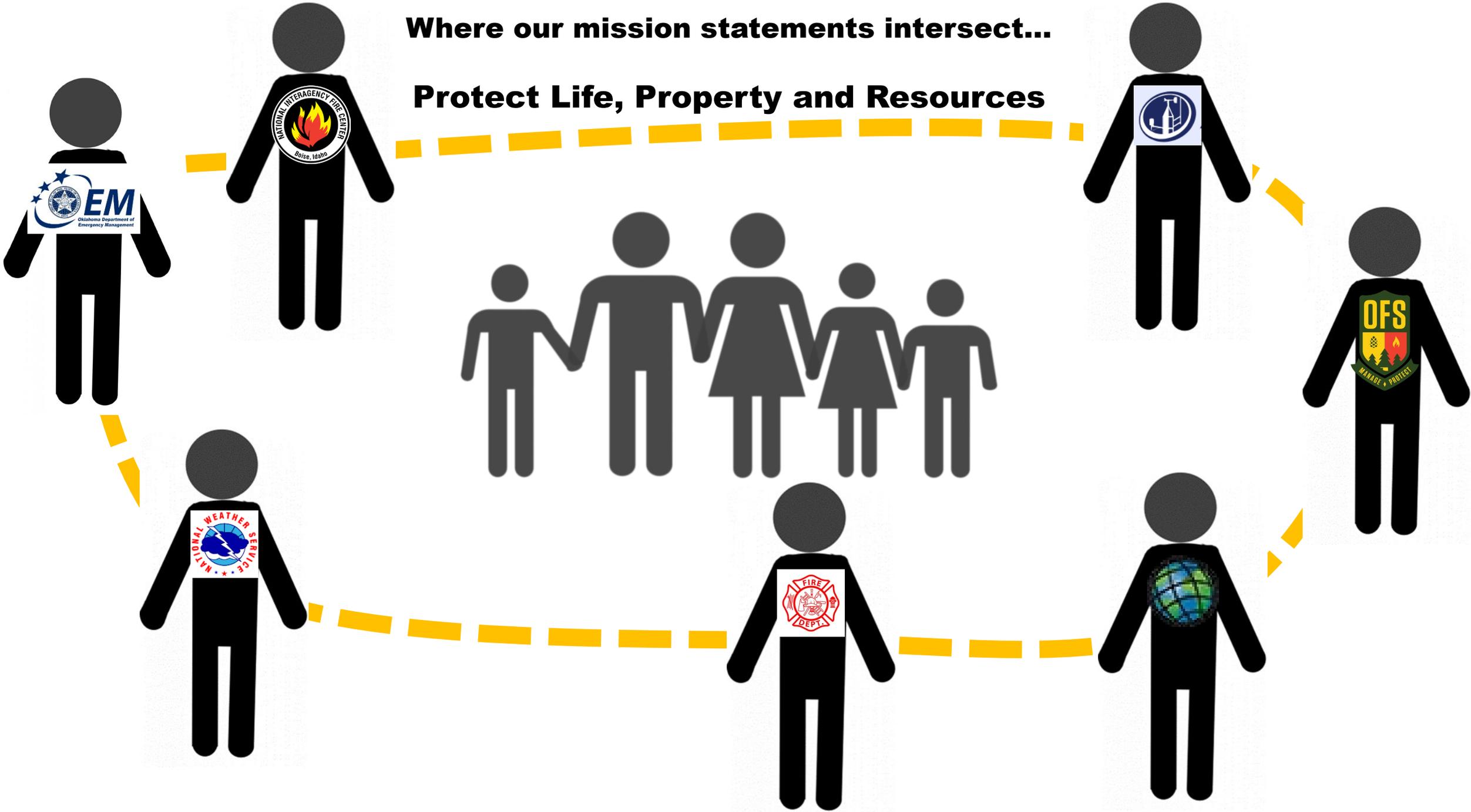
# Geospatial Analysis Informing Strategic Wildfire Response & Timely Transition to Recovery



Access [HERE](#)

**Where our mission statements intersect...**

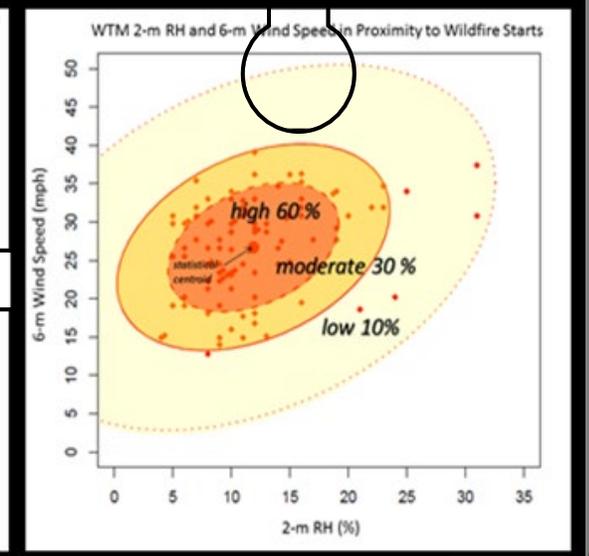
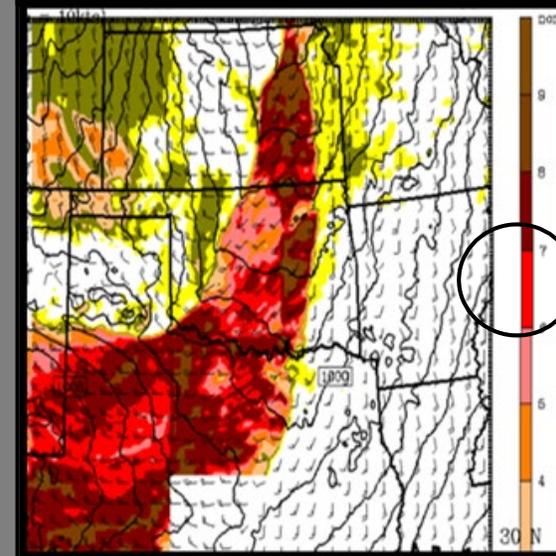
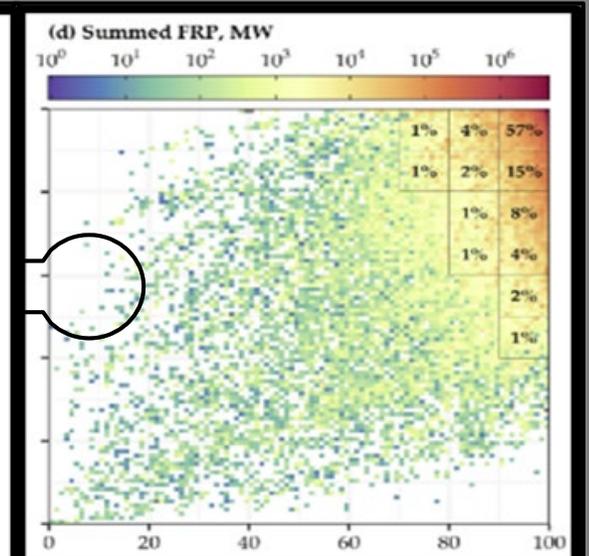
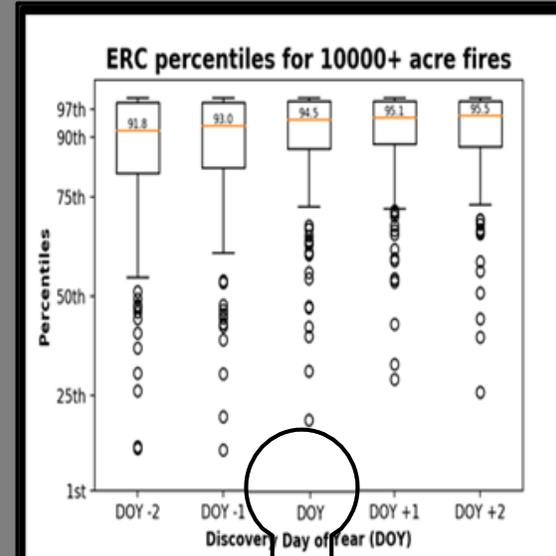
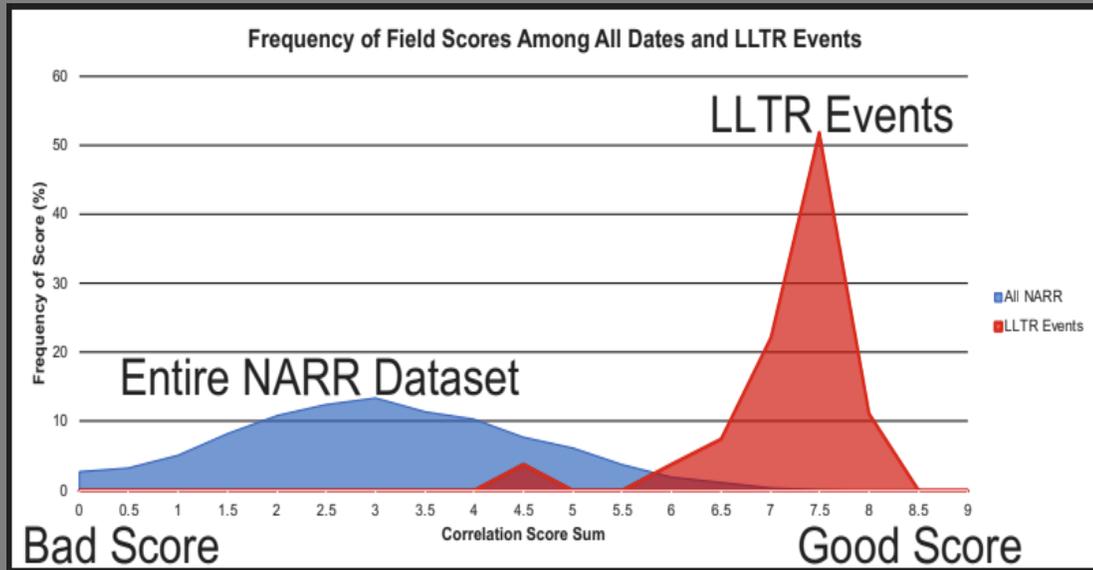
**Protect Life, Property and Resources**





# Pieces of a Probabilistic Puzzle

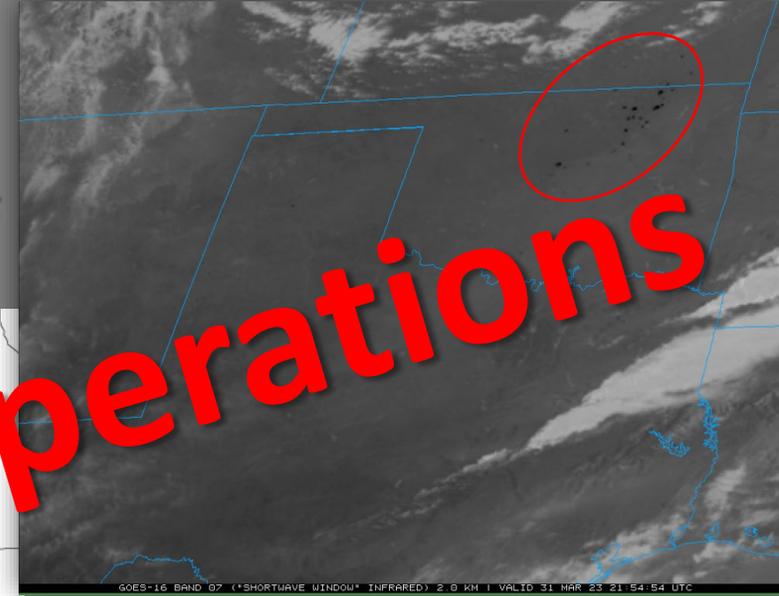
- Energy Release Component
- Red Flag Threat Index
- Burning Index
- CIPS Analog Guidance
- Weather+Fuel Parameter Space



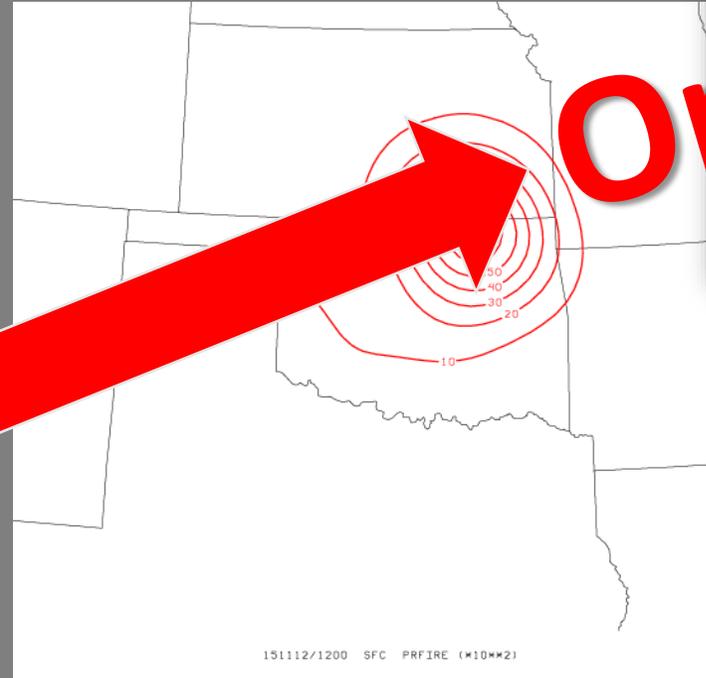
# The Probabilistic Puzzle

- Energy Release Component
- Red Flag Threat Index
- Wildland Fire Assessment System

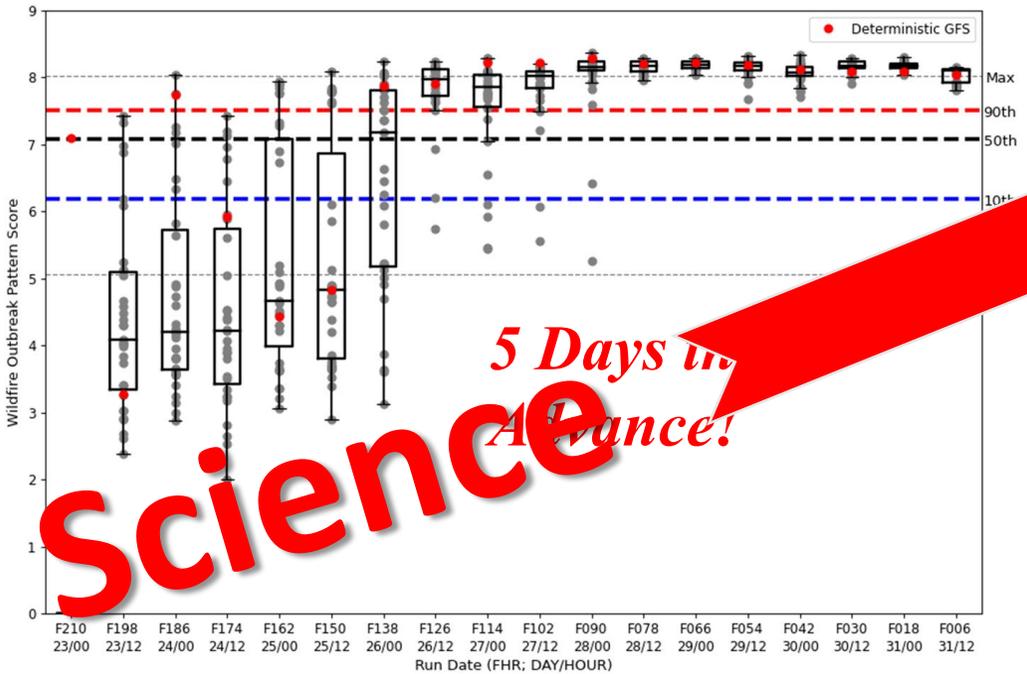
*Prototype probability of  $\geq 5,000$  acre fire 1<sup>st</sup> guess*



**Operations**



Southern Great Plains Wildfire Outbreak Guidance  
GEFS Forecasts All Valid at: 20230331/1800

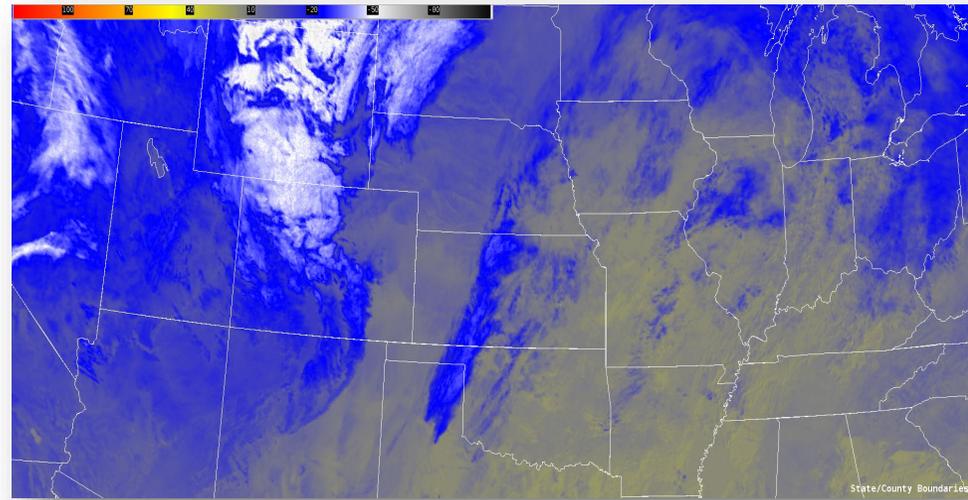
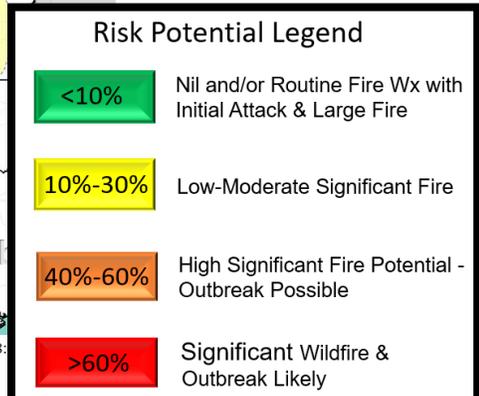
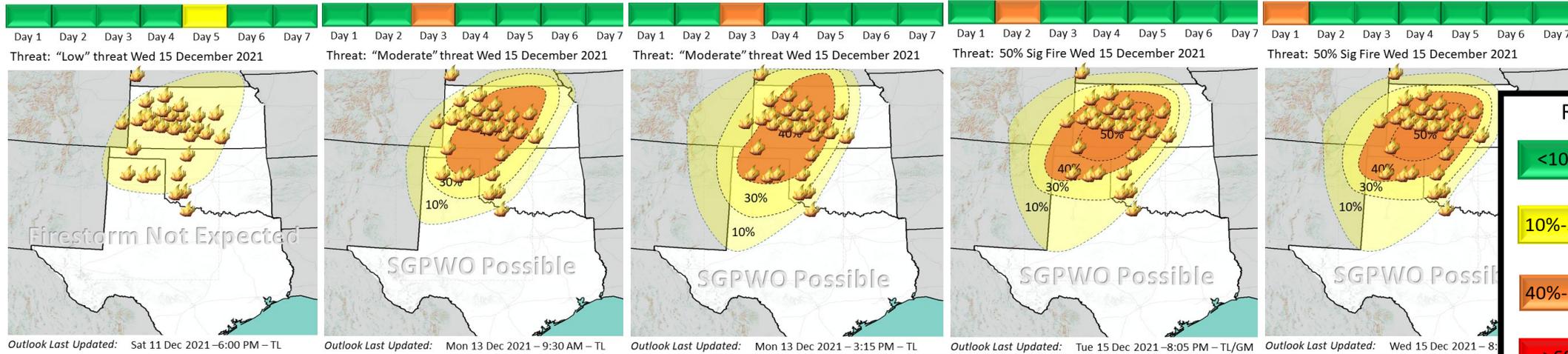


**Science**



# Summary of Probabilistic Outlooks

## Probability of Significant Wildfire Occurrence – 15 December 2021



# Science to Operations

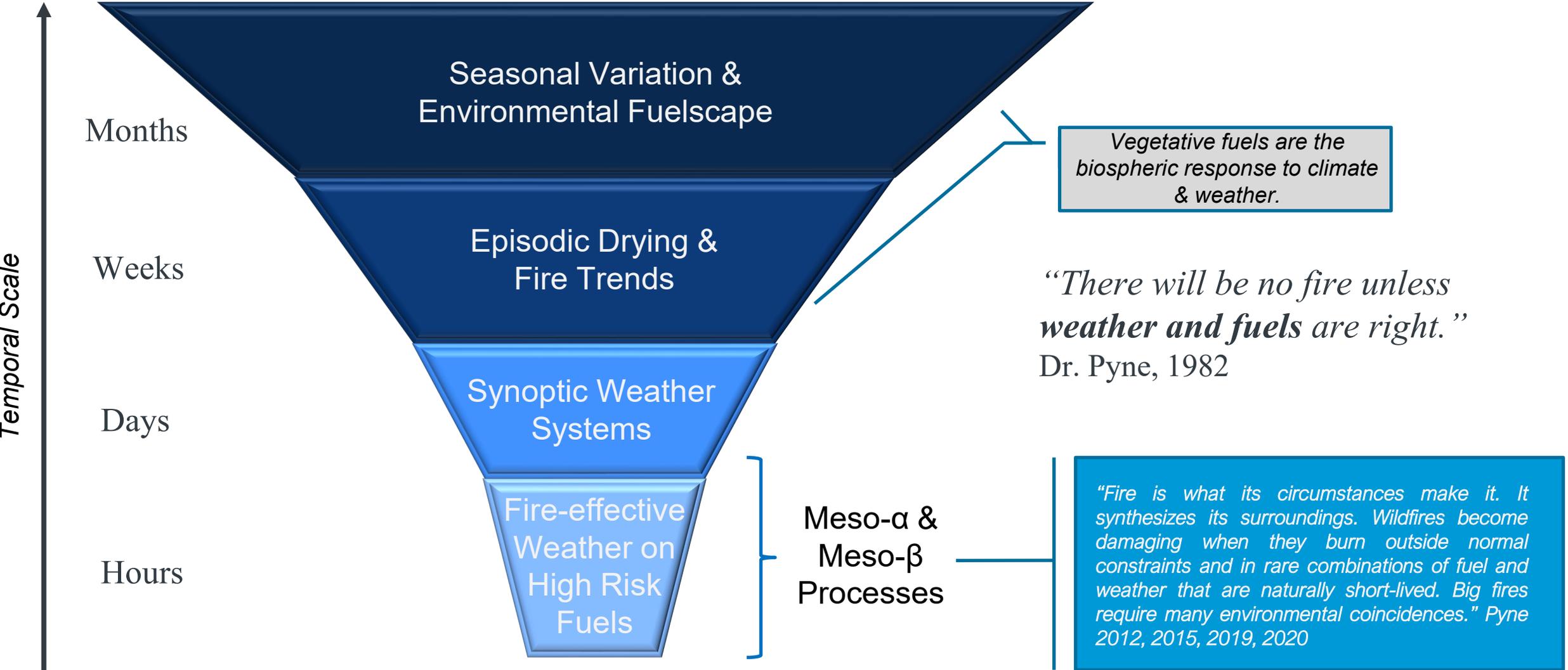
- Cooperation - Collaboration – Partnership
- Direct Connection to Operations
  - To the Incident Responder
  - To the Public

(Fuels) + (Weather) + (Topography) = Fire Behavior  
Values at Risk

- Duty, Respect & Integrity

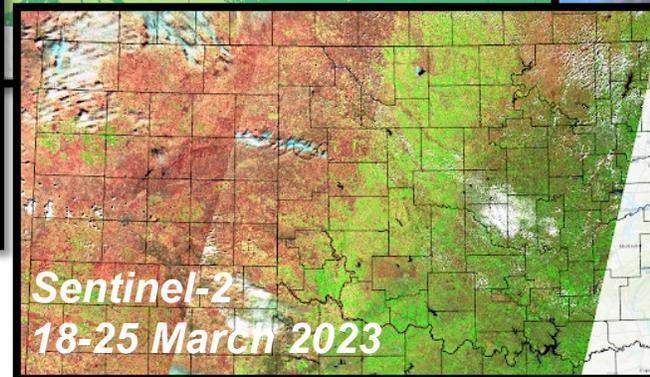
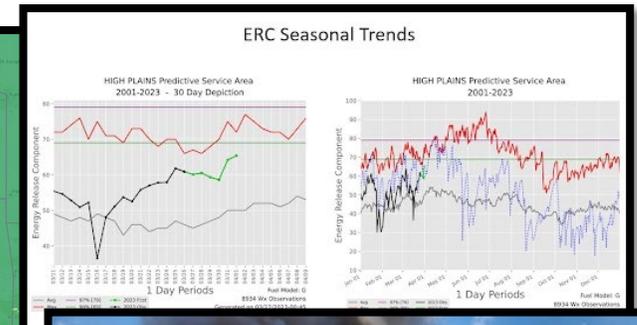
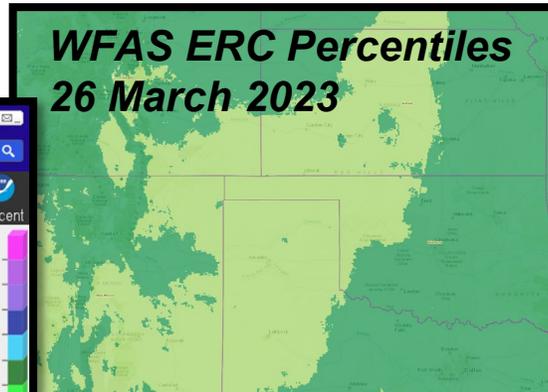
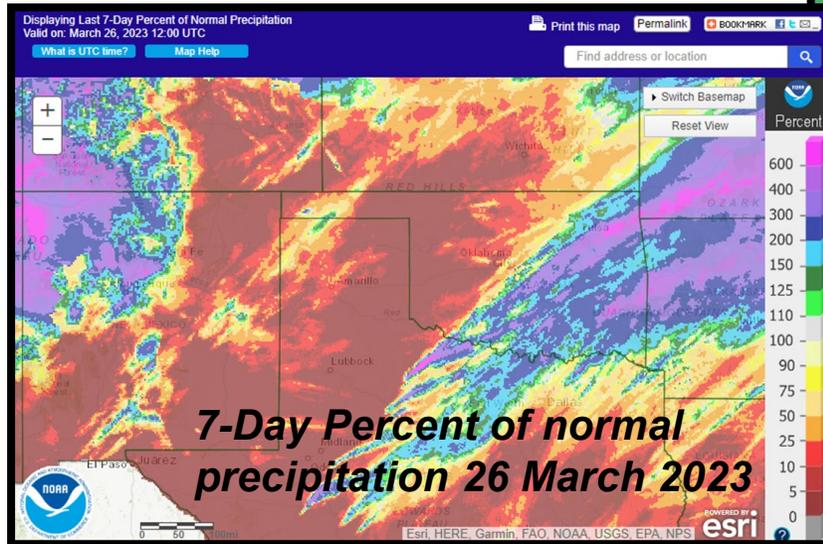


# Interdisciplinary Forecast Funnel



# 31 March 2023 – Integrated Forecast

Weeks



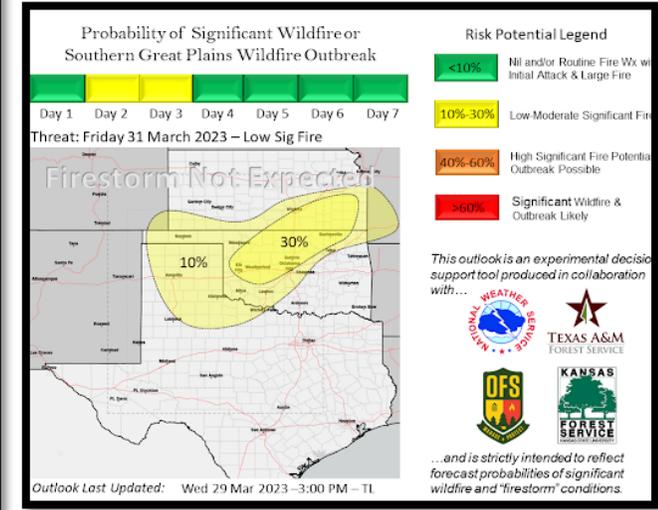
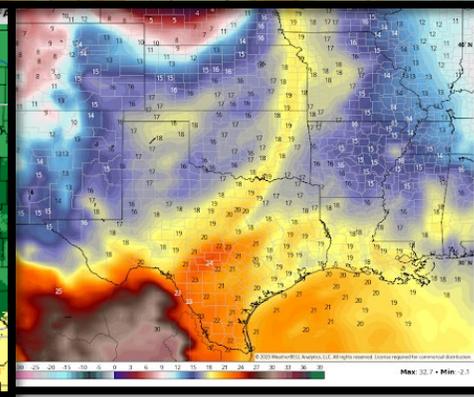
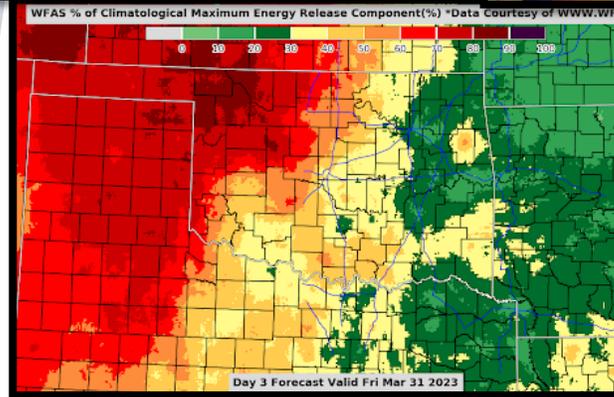
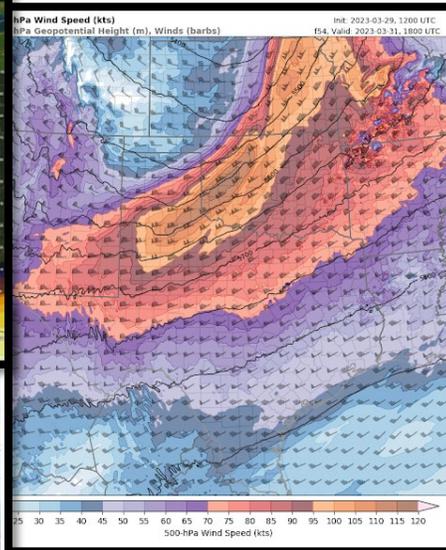
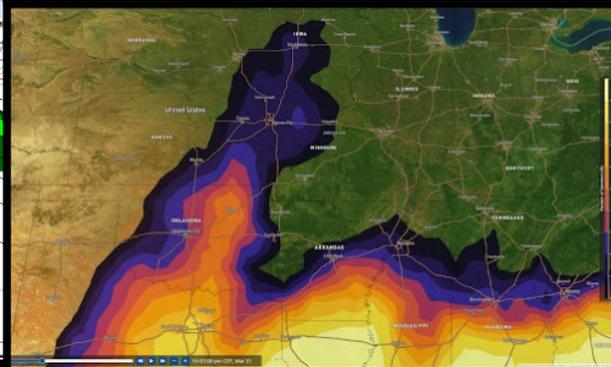
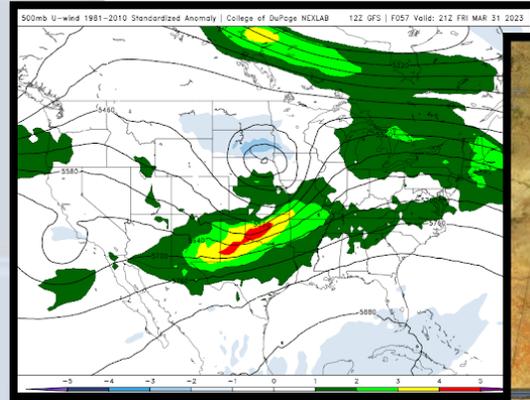
## SGPWO Working Group 25-27 March 2023:

***“Run-to-run continuity with the next major short wave trough to eject across the Plains. The best atmospheric alignment will occur along eastern periphery of recent drying. ERC percentiles increase to around 75<sup>th</sup>ile by Friday”***



# 31 March 2023 – Integrated Forecast

Days

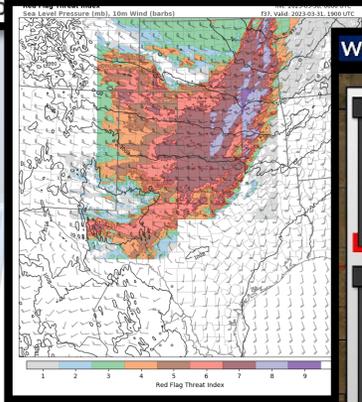
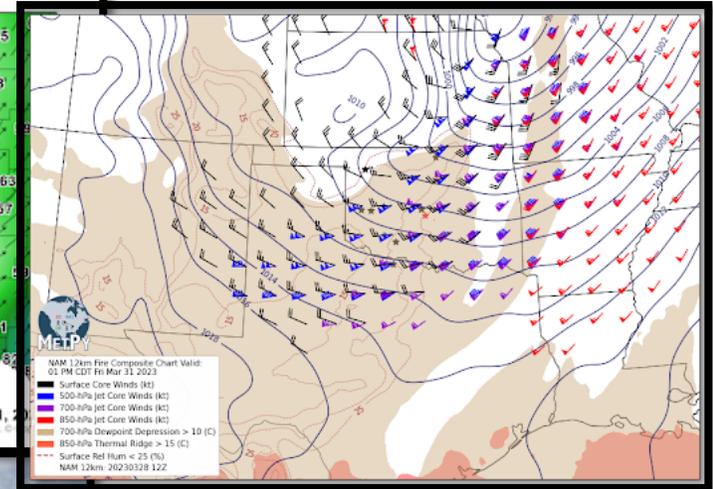
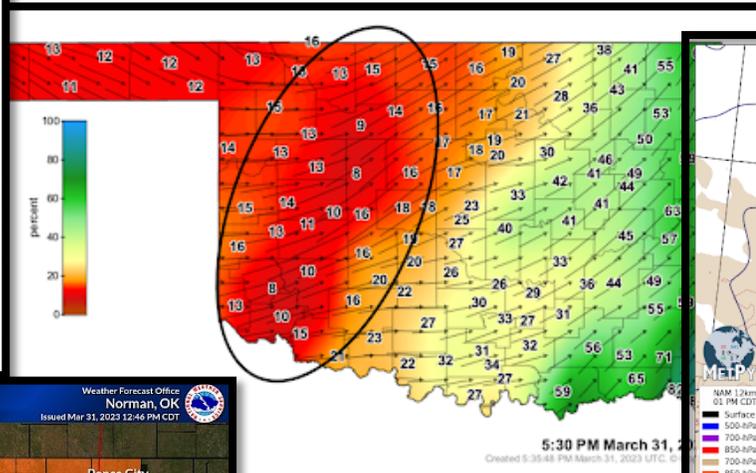
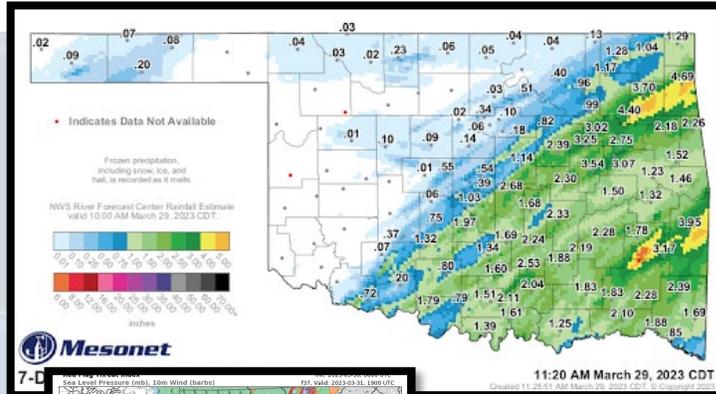


**SGPWO Working Group – 29 March 2023:**

***“Primary concern Friday revolves around severity of fire weather that will impact central OK around midday with opportunity for fire ignition/problematic behavior in proximity to population centers. This will present a notable WUI risk from OKC to Tulsa.”***



# 31 March 2023 – Integrated Forecast



### Wildfire Threat Increasing

Weather Forecast Office  
Norman, OK  
Issued Mar 31, 2023 12:46 PM CDT

**Be Prepared For**

- What: Conditions highly favorable for fire start and spread.
- When: Now through 2 PM.

**Actions To Take**

- Avoid activities that cause sparks or open flames.
- Don't park cars on grass.
- Don't throw cigarettes out the window.

Map of Oklahoma showing wildfire threat areas. Cities labeled include Woodward, Enid, Ponca City, Stillwater, Clinton, Oklahoma City, Ada, Altus, Lawton, Ardmore, Durant, Wichita Falls, and Seymour.

NWSNorman weather.gov/norman



**SGPWO Working Group -  
31 March 2023 @ 1:00 pm  
and 1:53 pm:**

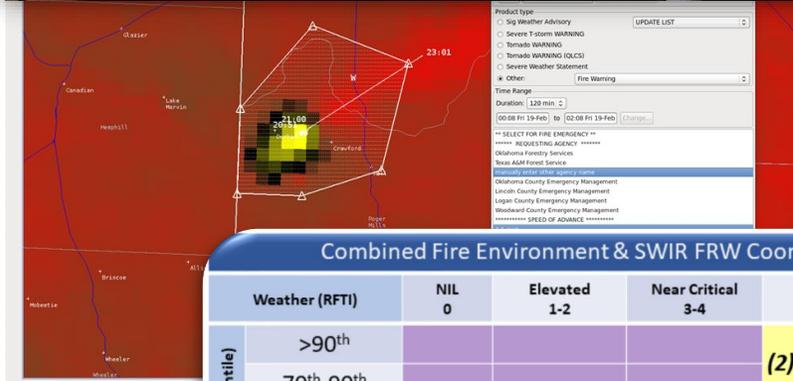
***“Conditions will rapidly degrade through 3 pm yielding increasing risk of problematic wildfires. The potential exists for new fire starts to outpace local jurisdiction resources and for evolution of damaging/dangerous wildfires.”***

# Science-based Operational Guidance

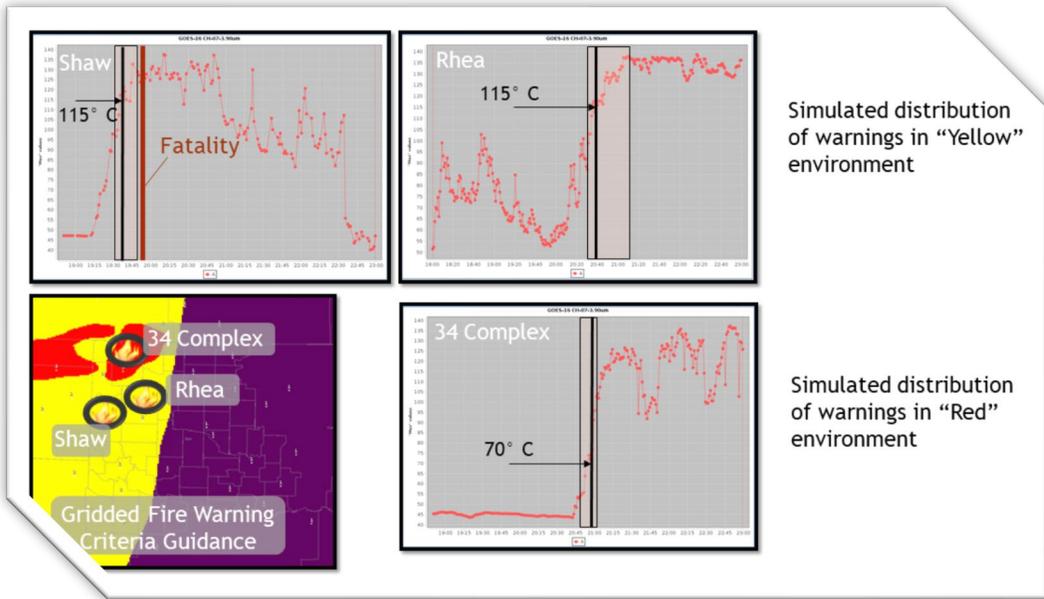


The scientific guidance for Fire Warnings was co-developed between meteorologists and fire analysts through simulations & analyses, and includes:

- ❑ Gridded environmental information (ERC percentiles & Red Flag Threat Index).
- ❑ Remote sensing (GOES-16/17) signals related to past extreme fire behavior in various fire environments.

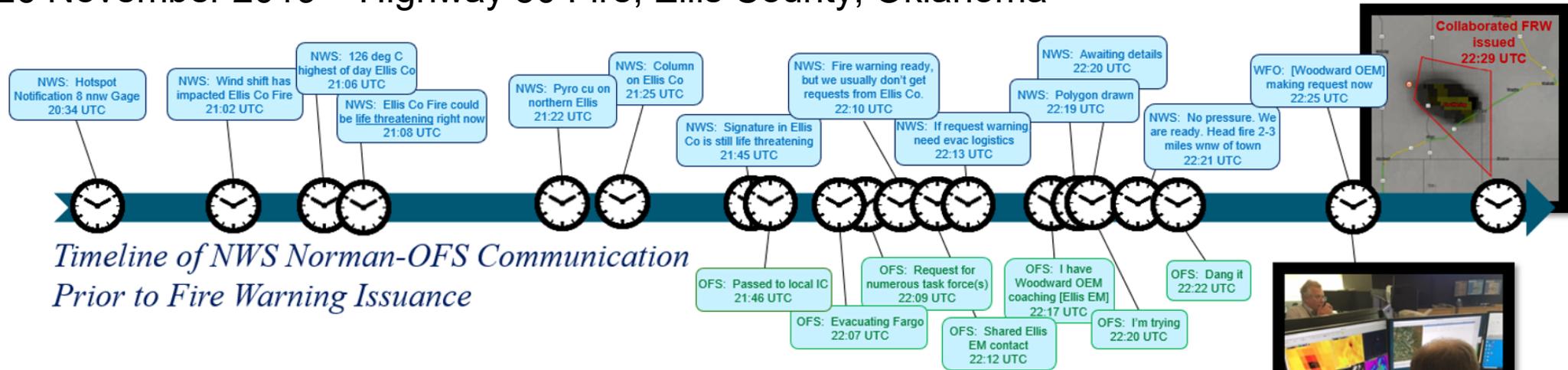


Combined Fire Environment & SWIR FRW Coordination Decisional Guidance						
Weather (RFTI)	NIL 0	Elevated 1-2	Near Critical 3-4	Critical 5-6	Extreme 7-8	Historic 9-10
>90 <sup>th</sup>				(2)	(3) $BT_{min}=55^{\circ}C$	
70 <sup>th</sup> -90 <sup>th</sup>				$BT_{min}=95^{\circ}C$	$BT_{med}=70^{\circ}C$	
50 <sup>th</sup> -70 <sup>th</sup>				$BT_{med}=115^{\circ}C$		
25 <sup>th</sup> -50 <sup>th</sup>	<b>(1) Local EM Request Only</b>					
<25 <sup>th</sup>						



# Legacy FRW Practices

26 November 2019 – Highway 50 Fire, Ellis County, Oklahoma

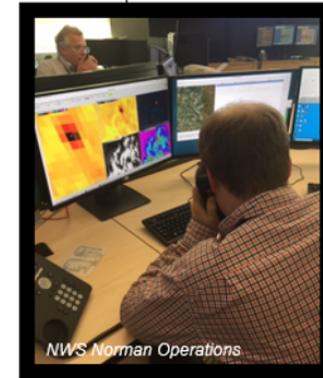


*Timeline of NWS Norman-OFS Communication Prior to Fire Warning Issuance*

- NWSI 10-518 permits Fire Warning issuance at request of state/local/tribal officials.
- In practice, only issued upon request of local EM during evacuations.
- Adherence to this practice **delayed warning issuance 82 minutes** after “life threatening” fire identified per TAMFS/OFS/OUN science-based Fire Warning simulations.
- **More timely Fire Warnings issued at request of state forestry agencies and collaborated between meteorologists/fire analysts are possible**



**82 min Lapse**



# Integrated Fire Warning Procedure

## Interdisciplinary Process for Collaborated Warnings

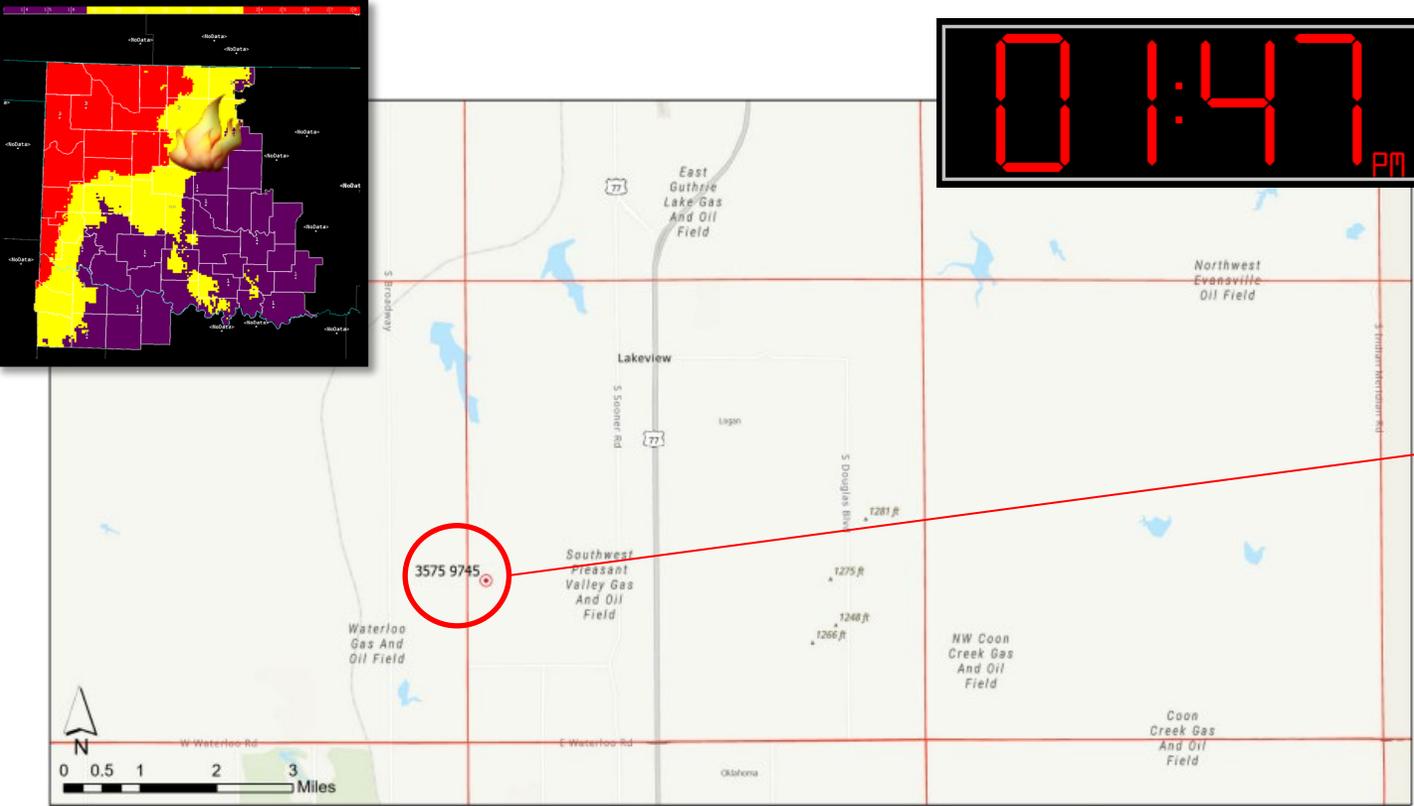


# Integrated Fire Warning Procedure

## 1. Hot Spot Notification

01:47 PM

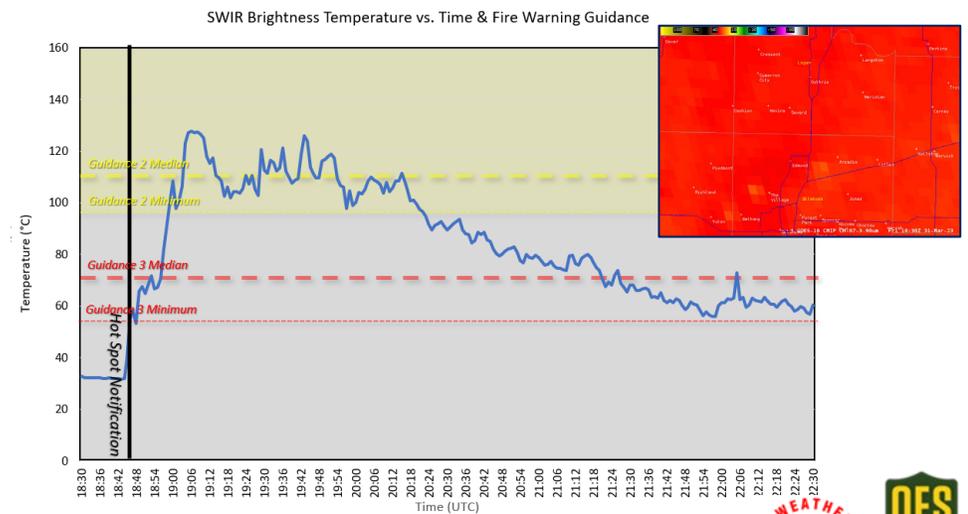
Fri Mar 31 2023 13:47 CDT  
 Hot Spot  
 35.750/ 35 45.027N  
 -97.451/ 97 27.066W  
 4 miles SSE of Seward,OK.  
 Logan,OK  
 -Fire Wx Level: Critical  
 -Method: Satellite - 1Min  
 -Ob:GUTH T:77 DpT:22  
 RH:13 WDIR:242 WSPD:32  
 WGST:49 7.0 miles NNW of POI.



Simpson Road Fire  
 Approximately 3,392 Acres  
 Logan County, OK



31 March 2023

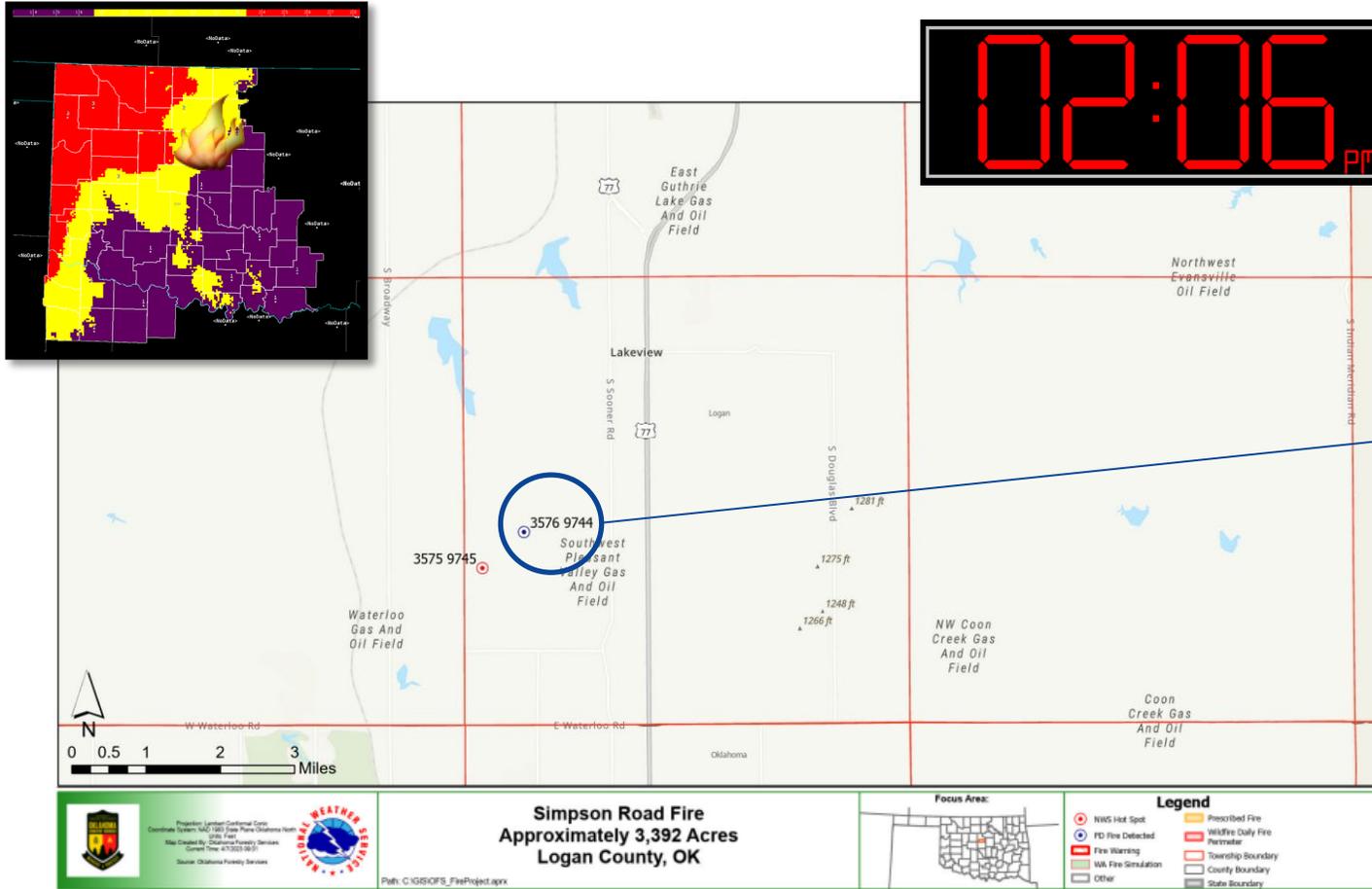


# Integrated Fire Warning Procedure

1. Hot Spot Notification
2. 'Potentially Dangerous Fire Detected'

02:06 PM

Fri Mar 31 2023 14:06 CDT  
 Potentially Dangerous Fire Detected  
 35.763/ 35 45.776N  
 -97.446/ 97 26.745W  
 3 miles SE of Seward,OK.  
 Logan,OK  
 -Fire Wx Level: Extreme  
 -Method: Satellite - 1Min  
 -Ob:KGOK T:75 DpT:10 RH:N/  
 A WDIR:270 WSPD:44  
 WGST:61 6.2 miles NNE of POI.  
 Fire 3 se of Seward is now at 123 deg C and sustaining at greater than 100 deg c. To request Fire Warning contact WFO Norman.



SWIR Brightness Temperature vs. Time & Fire Warning Guidance



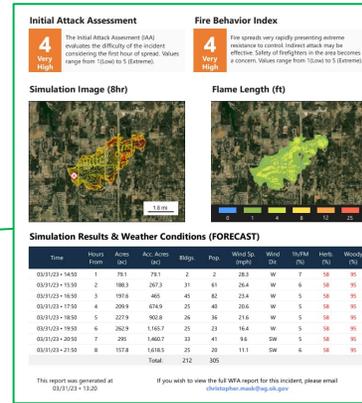
31 March 2023



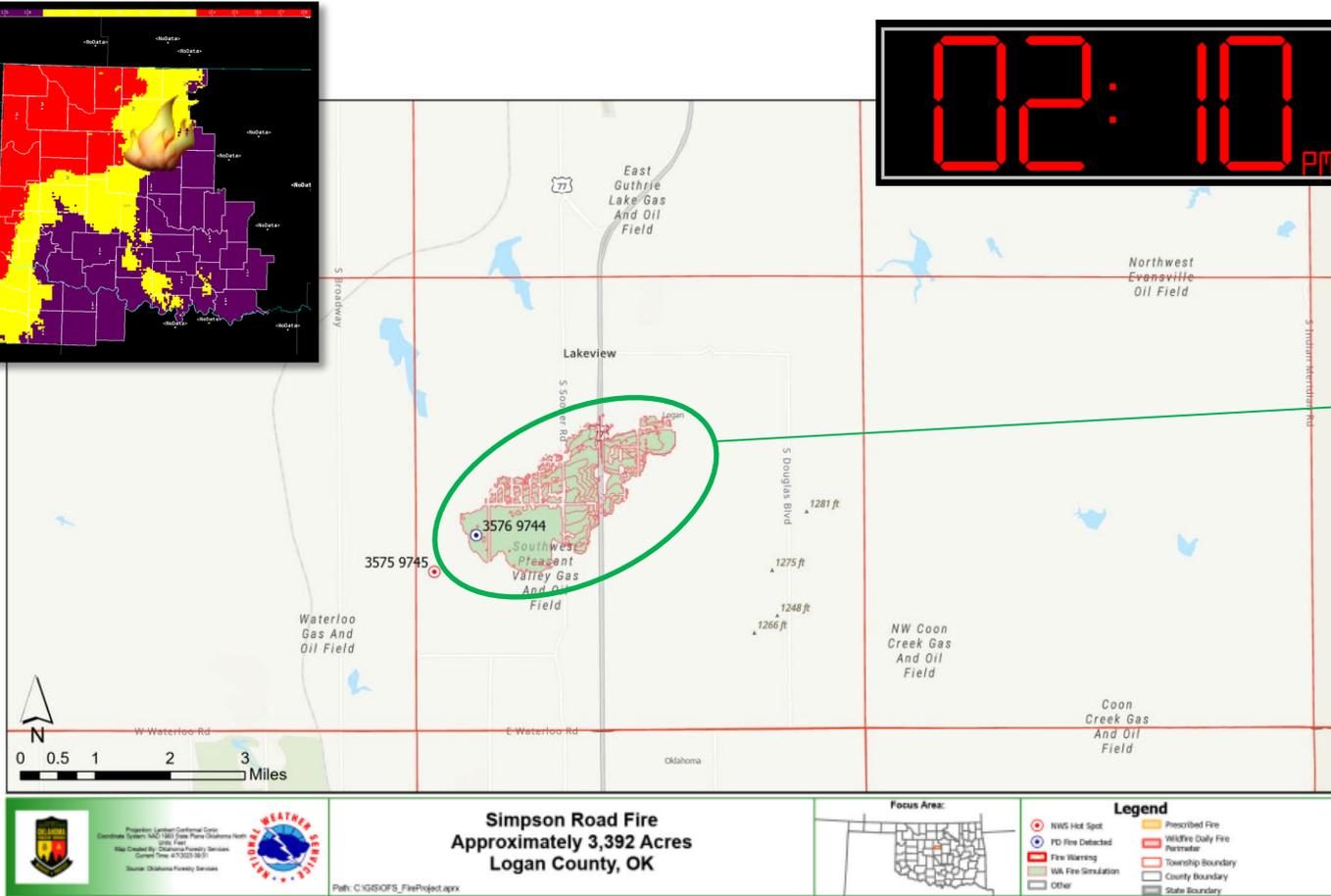
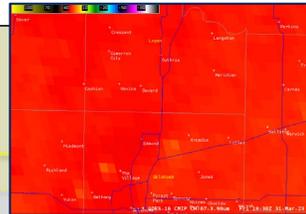
# Integrated Fire Warning Procedure

1. Hot Spot Notification
2. 'Potentially Dangerous Fire Detected'
3. OFS-WFA Spread Model – Affirmative Warning Decision

02:10 PM



SWIR Brightness Temperature vs. Time & Fire Warning Guidance



31 March 2023



# Integrated Fire Warning Procedure

1. Hot Spot Notification
2. 'Potentially Dangerous Fire Detected'
3. OFS-WFA Spread Model – Affirmative Warning Decision
4. FRW Issued

02:11 PM

BULLETIN - EAS ACTIVATION REQUESTED  
 Fire Warning  
 REQUESTED BY OKLAHOMA FORESTRY SERVICES  
 Relayed by National Weather Service Norman OK  
 211 PM CDT Fri Mar 31 2023

The National Weather Service in Norman has issued a Fire Warning at the request of Oklahoma Forestry Services for southern Logan County.

\* AT 209 PM CDT, a dangerous wildfire was located 6 miles north of Edmond, or 3 miles southeast of Seward, moving rapidly east at 3 to 5 mph.

\* Areas Impacted...Interstate 35 between Edmond and Guthrie.

\* Additional Information... Smoke and fire will present a threat to life and property on Interstate 35 and for residents of the surrounding area of south-central Logan County.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

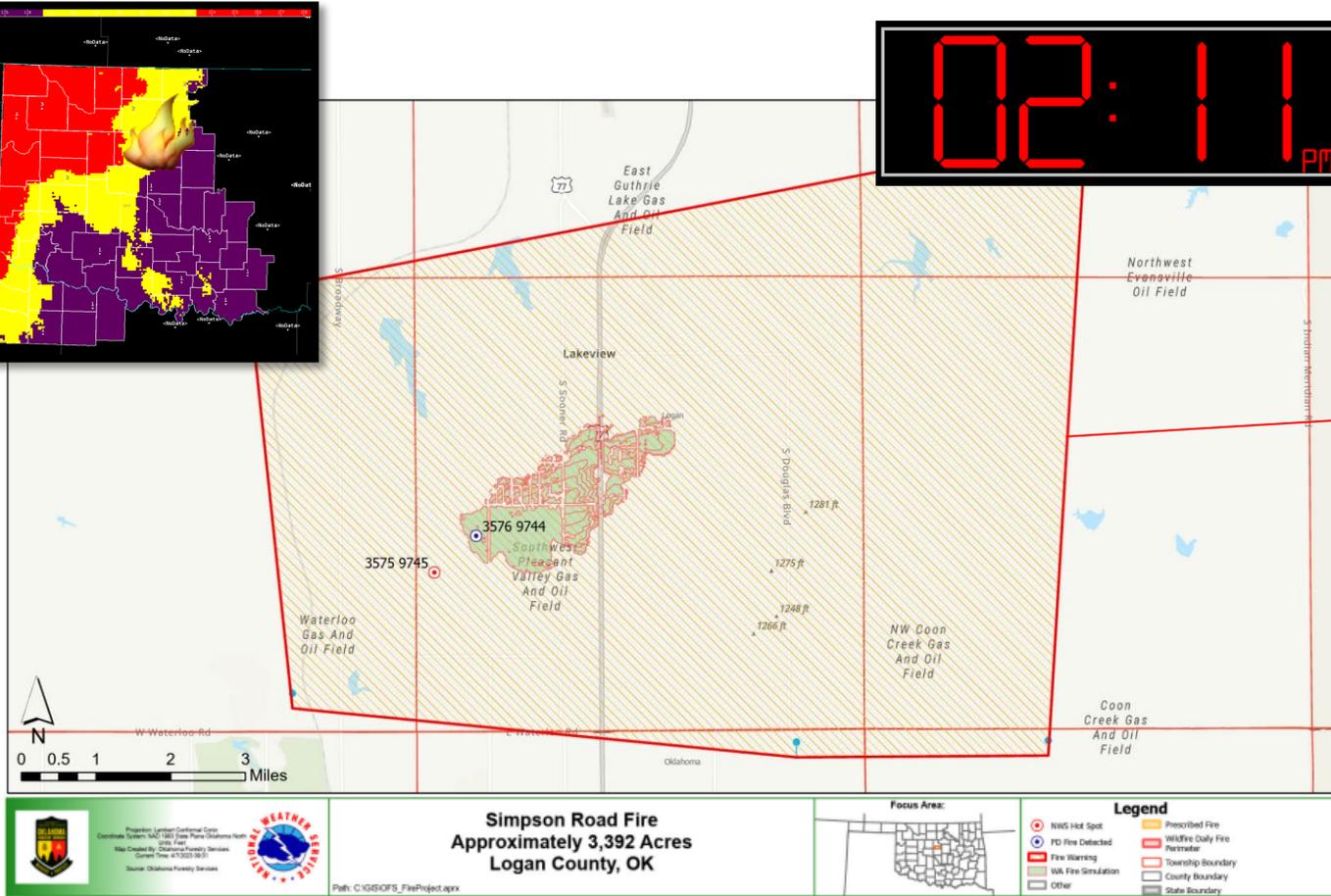
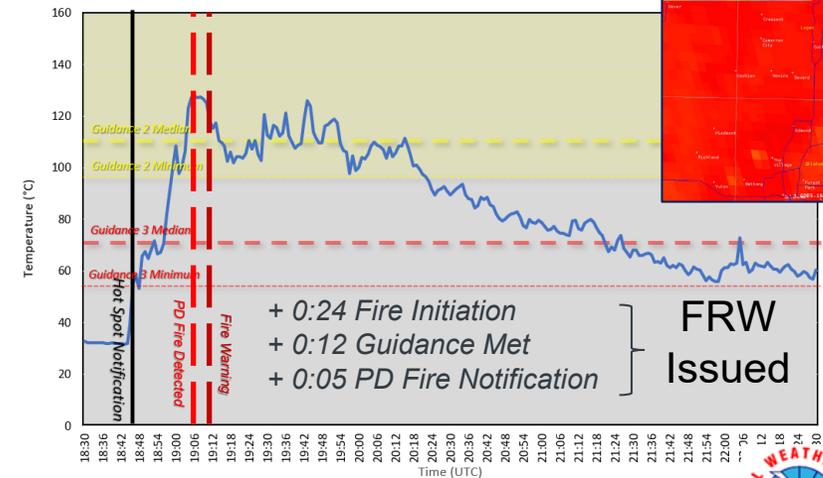
Be prepared to evacuate quickly if requested and follow all safety instructions from local emergency management officials. Do not drive into smoke.

Firefighters and incident responders should anticipate extreme fire behavior including a wind-driven and torching fire.

&&

LAT...LON 3584 9730 3572 9731 3572 9737 3573 9749 3581 9750

SWIR Brightness Temperature vs. Time & Fire Warning Guidance



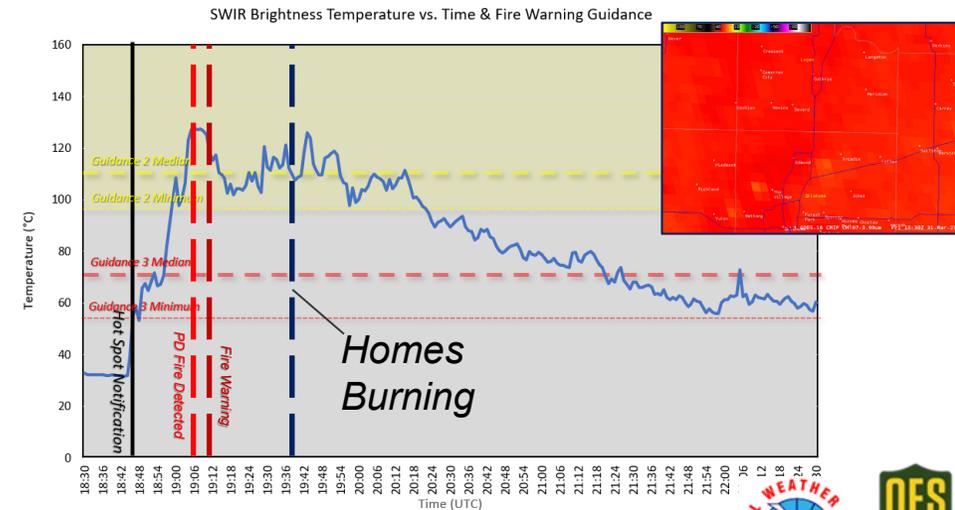
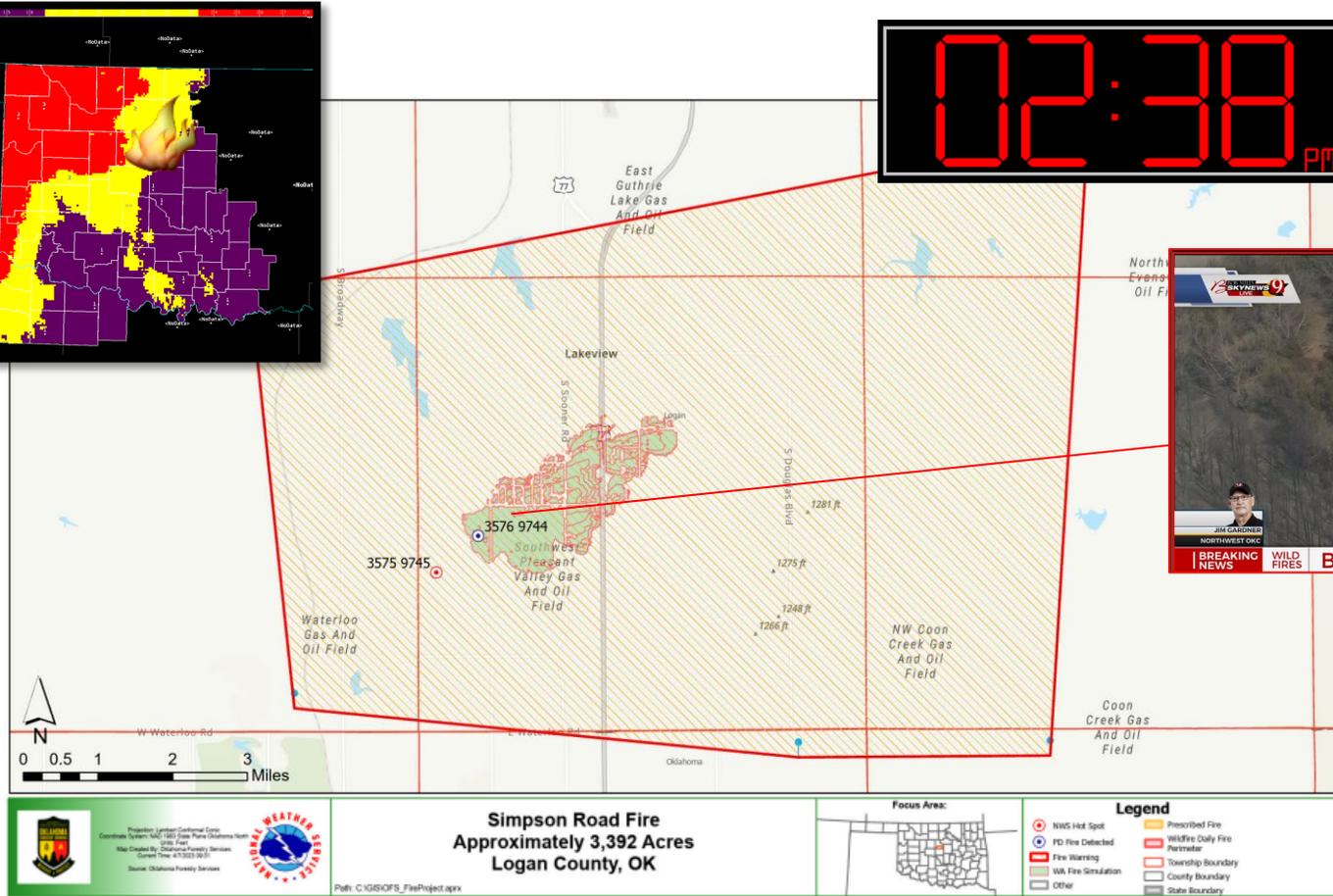
31 March 2023



# Integrated Fire Warning Procedure

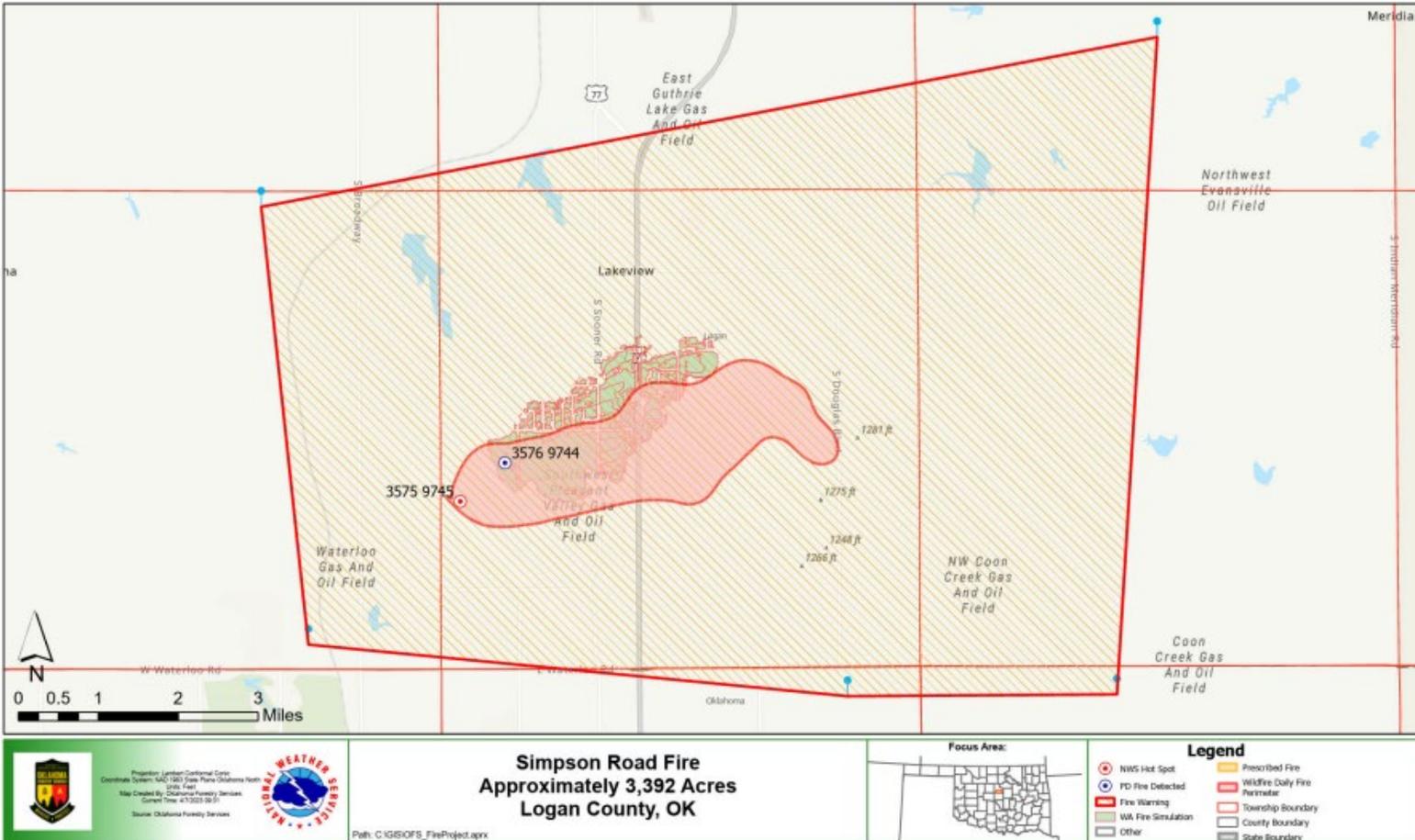
1. Hot Spot Notification
2. 'Potentially Dangerous Fire Detected'
3. OFS-WFA Spread Model – Affirmative Warning Decision
4. FRW Issued

02:30 PM



31 March 2023

# Integrated Fire Warning Procedure



**55 Homes/156  
Outbuildings  
Destroyed**

**NO FATALITIES**

**31 March 2023**



# Text of Actual FRW

BULLETIN - EAS ACTIVATION REQUESTED  
Fire Warning  
REQUESTED BY OKLAHOMA FORESTRY SERVICES  
Relayed by National Weather Service Norman OK  
211 PM CDT Fri Mar 31 2023

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&&

LAT...LON 3584 9730 3572 9731 3572 9737 3573 9749  
3581 9750

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**NATIONAL WEATHER SERVICE**



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**...Fire is not listening to our whining, rhetorical windiness, and data presentations. It speaks a language of wind, fuel, drought, and terrain, and it will ignore anything that does not translate its conceptions into such media.**

**Dr. Stephen J. Pyne – Pyromancy (2004)**

**Next Steps?**



