Past, Present, and Future: The Fire Warning Paradigm in AWIPS

Lexy Elizalde-Garcia

OU CIWRO/NWS WDTD Norman, OK

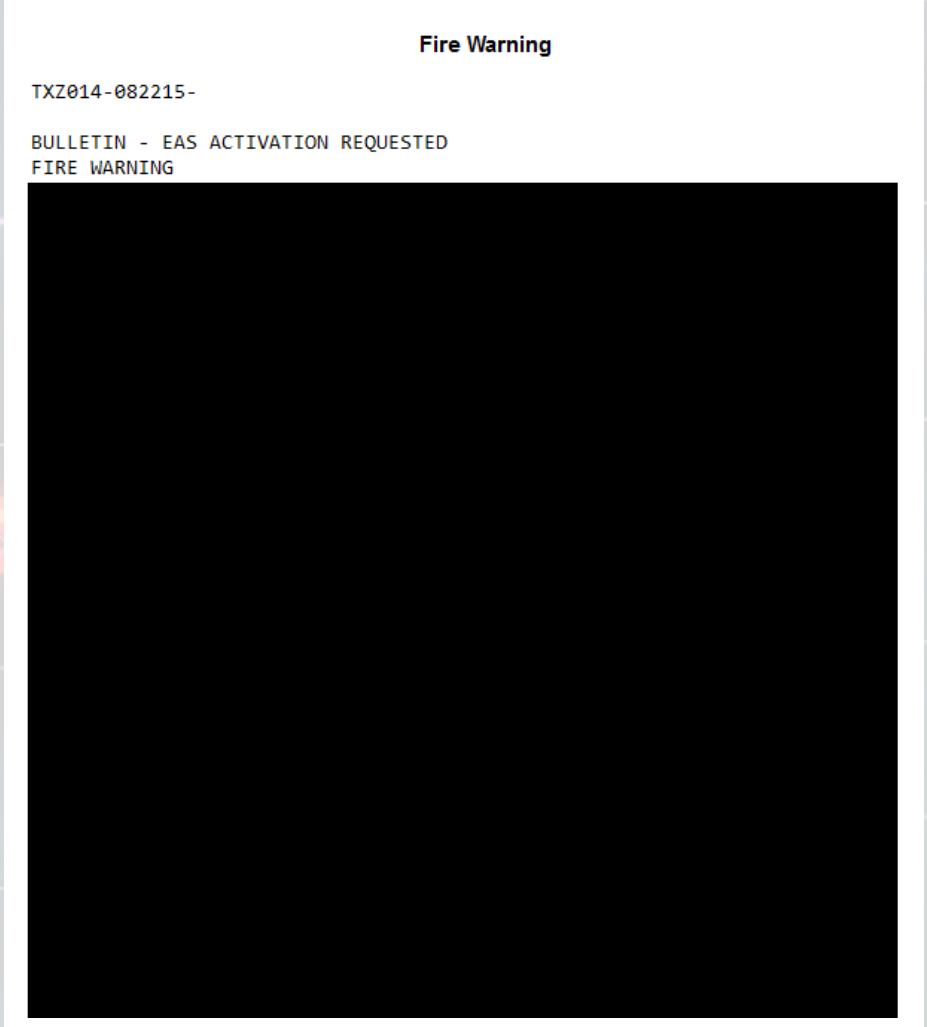
Collaborators: Todd Lindley[1], Aaron Ward[2], Alexander Zwink[3], Zach Tolby[4]

[1]NWS Norman, [2]NWS Amarillo, [3]NWS WDTD, [4]NOAA Fire Weather Testbed

Image By: Kyle Miller, Wyoming Hotshots, USFS (2020)

What is a Fire Warning?

- Directive NWSI 10-518 B.4.11: “A warning of a spreading structural fire or wildfire that threatens a populated area.”
- Technically, a Fire Warning is a Non-Weather Emergency Message, and is considered a “pass-through product”.


Fire Warning

TXZ014-082215-

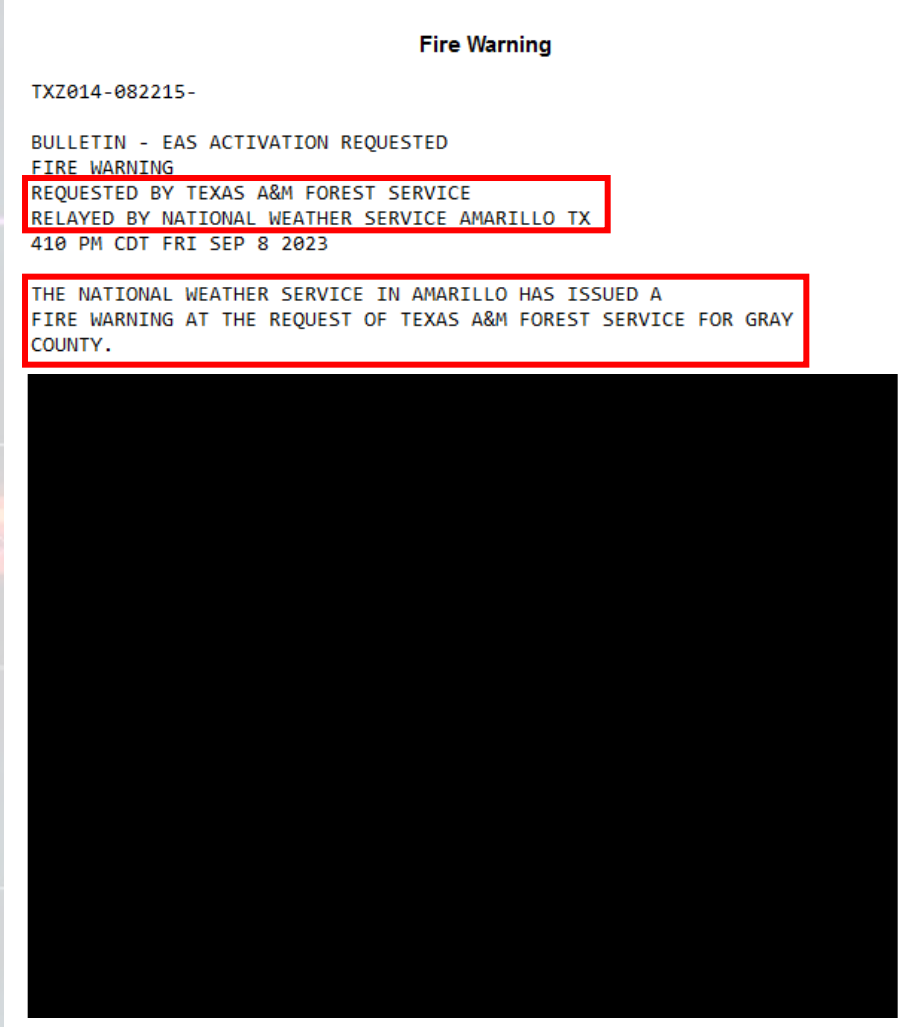
BULLETIN - EAS ACTIVATION REQUESTED
FIRE WARNING

[redacted]

NWSI – National Weather Service Instruction

Who issues a Fire Warning?

- Fire warnings are not unilaterally issued by the NWS, instead are issued at the request of local, state, or tribal authorities.
- NWS can collaborate with their partner agencies to relay fire weather information, including hot spot notifications (potential new fire starts).



Fire Warning

TXZ014-082215-

BULLETIN - EAS ACTIVATION REQUESTED
FIRE WARNING
REQUESTED BY TEXAS A&M FOREST SERVICE
RELAYED BY NATIONAL WEATHER SERVICE AMARILLO TX
410 PM CDT FRI SEP 8 2023

THE NATIONAL WEATHER SERVICE IN AMARILLO HAS ISSUED A
FIRE WARNING AT THE REQUEST OF TEXAS A&M FOREST SERVICE FOR GRAY
COUNTY.

[redacted]

Why is a Fire Warning issued?

- Traditionally to communicate evacuation information to the public at the request of local officials.
- More recently, to also include actionable language, safety messaging, and calls-to-action.

Fire Warning

TXZ014-082215-

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FIRE WARNING AT THE REQUEST OF TEXAS A&M FOREST SERVICE FOR GRAY
COUNTY.

* AT 406 PM CDT...A DANGEROUS WILDFIRE WAS LOCATED A HALF A MILE
  NORTHEAST OF LEFORS...OR 11 MILES SOUTHEAST OF PAMPA...MOVING
  RAPIDLY TO THE SOUTH AND SOUTHWEST AT 3 TO 5 MPH.

* AREAS IMPACTED... LEFORS AND THE IMMEDIATE SURROUNDING AREAS.

* ADDITIONAL INFORMATION...EVACUATION AREA WILL BE AT THE PAMPA FIRST
  BAPTIST CHURCH IN PAMPA.

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.

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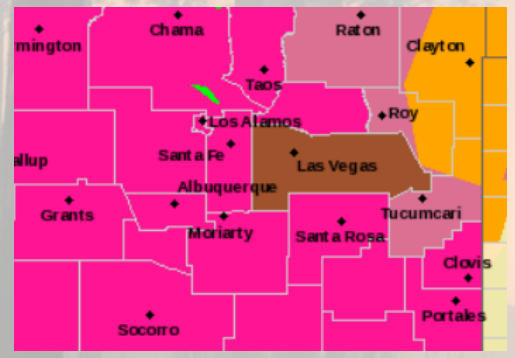
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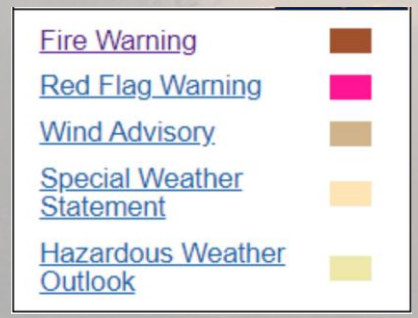
LFM

The Dilemma(s)

- There is currently no *unified* paradigm for fire warning issuance across the NWS. It varies based on geographical location, forecaster experience, and office → partner collaboration.
- County-based fire warnings (GHG/GFE):
  - Could be problematic for a large county with multiple cities and towns
- Polygon-based fire warnings (WarnGen):
  - No real capability to track the fire front
- There is currently no way to cancel and/or update a warning



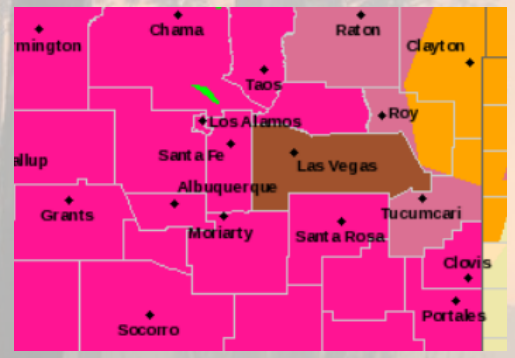




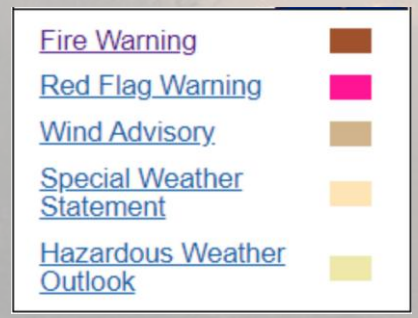
GHG: Graphical Hazard Generator | GFE: Graphical Forecast Editor

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History of Fire Warnings

- 2002- Federal Communication Commission (FCC) amended rules regarding the EAS
  - Addition of new event codes, including the FRW
- 2008- FCC sets rules to establish CMAS, including FRW

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BULLETIN - EAS ACTIVATION REQUESTED
FIRE WARNING
CARTER COUNTY EMERGENCY MANAGEMENT
RELAYED BY NATIONAL WEATHER SERVICE NORMAN OK
800 PM CST THU JAN 12 2006

THE FOLLOWING MESSAGE IS BEING TRANSMITTED AT THE REQUEST OF THE
CARTER COUNTY OFFICE OF EMERGENCY MANAGEMENT.

A LARGE WILDFIRE IS SPREADING RAPIDLY SOUTH TOWARDS THE COMMUNITY OF
GRAHAM. AT 750 PM... OFFICIALS REPORTED THE LEADING EDGE OF THE FIRE
WAS ABOUT TWO MILES NORTH OF GRAHAM... MOVING QUICKLY SOUTH.
EVACUATIONS WERE OCCURRING IN GRAHAM.

PEOPLE IN AND AROUND GRAHAM SHOULD HEED THE ADVICE OF LOCAL
AUTHORITIES. DO NOT ATTEMPT TO FIGHT THE FIRE YOURSELF.

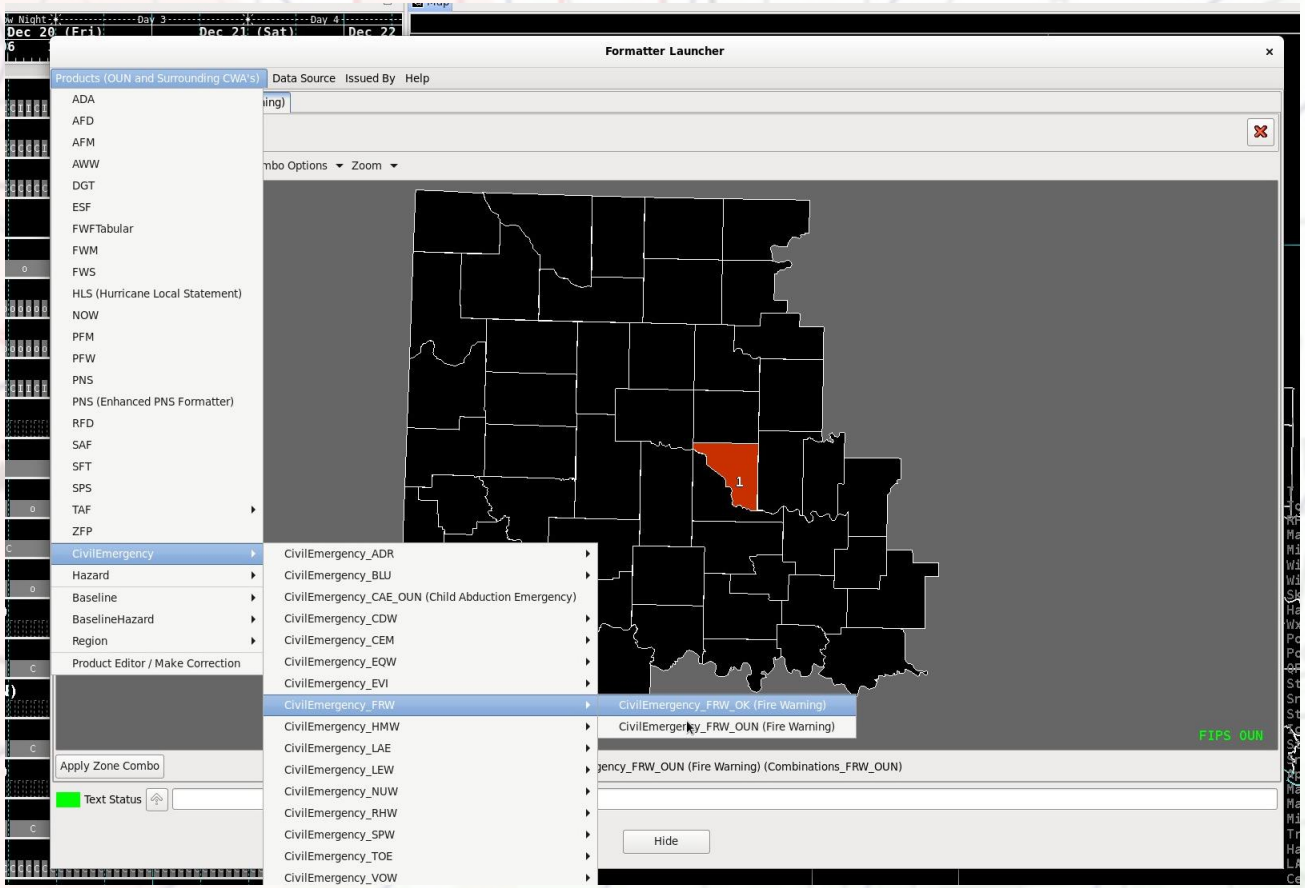
FOR MORE INFORMATION...TUNE TO LOCAL RADIO AND TELEVISION.

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EAS – Emergency Alert System
CMAS – Commercial Mobile Alert System

Current Practice for Fire Warning Issuance in AWIPS – County Based

- Open Formatter Launcher in GFE
- Under the Products dropdown, Civil Emergency FRW is selected for a specific county



Current Practice for Fire Warning Issuance in AWIPS – County Based

- Open Formatter Launcher in GFE
- Under the Products dropdown, Civil Emergency FRW is selected for a specific county
- Text formatter is generated






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WOUS44 KAMA 152001
FRWAMA
OKC139-152215-

BULLETIN - EAS ACTIVATION REQUESTED
FIRE WARNING
TEXAS COUNTY EMERGENCY MANAGEMENT GUYMON OKLAHOMA
RELAYED BY NATIONAL WEATHER SERVICE AMARILLO TX
201 PM CST WED DEC 15 2021

THE FOLLOWING MESSAGE IS TRANSMITTED AT THE REQUEST OF THE TEXAS
COUNTY EMERGENCY MANAGEMENT GUYMON OKLAHOMA.

AN ONGOING WILDFIRE WEST OF GUYMON WILL THREATEN THE WEST EDGE OF
THE TOWN OF GUYMON.

RESIDENTS OF GUYMON WEST OF SUNSET LANE AND COUNTY ROAD 30 ARE
REQUESTED TO EVACUATE TO THE NORTH OR SOUTH OF GUYMON TO AVOID THE
PATH OF THE FIRE.

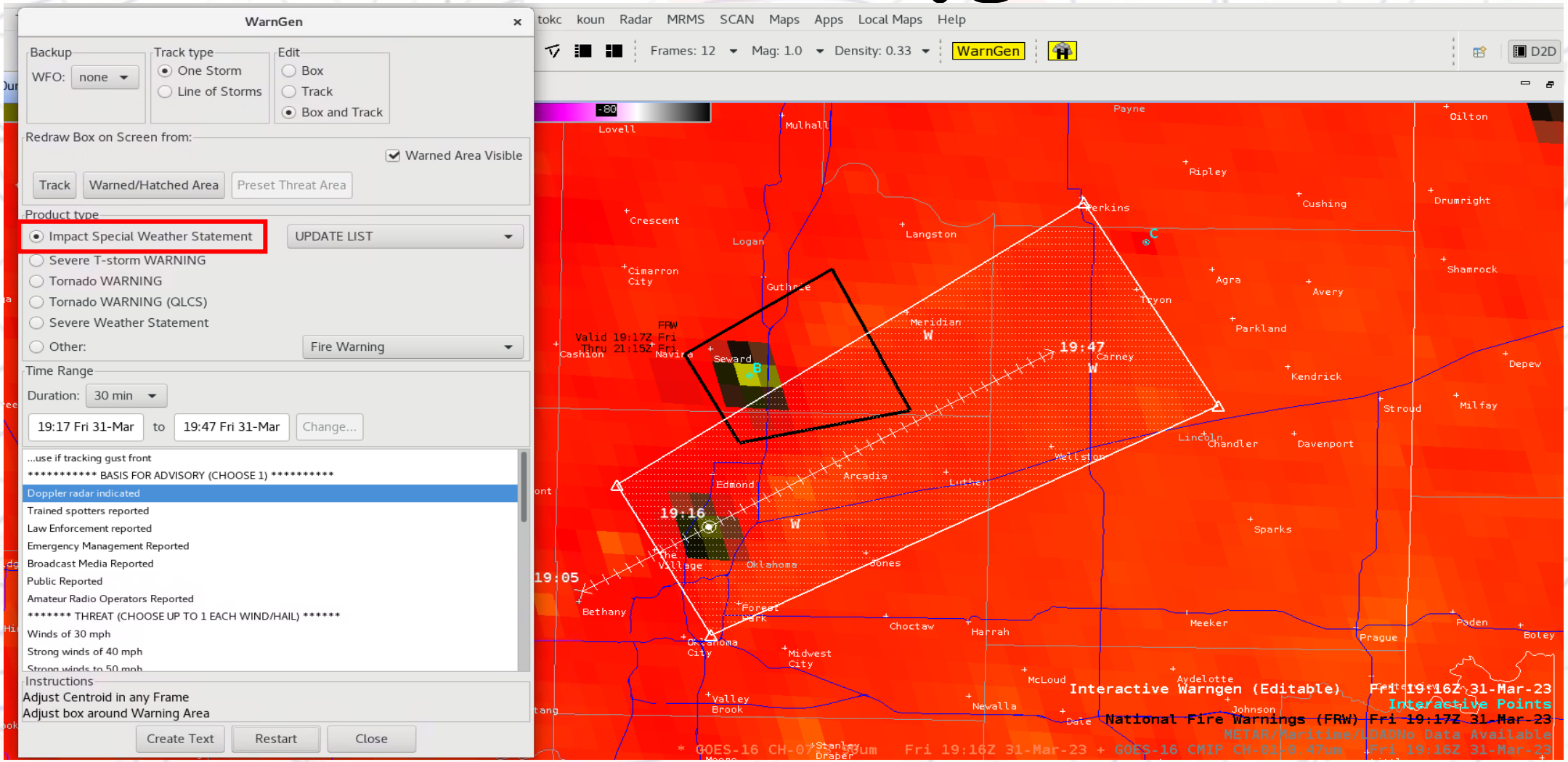
OTHER RESIDENTS OF GUYMON ARE URGED TO BE ALERT FOR AND HEED
EVACUATION INSTRUCTIONS ISSUED BY LAW ENFORCEMENT AND EMERGENCY
RESPONDERS.

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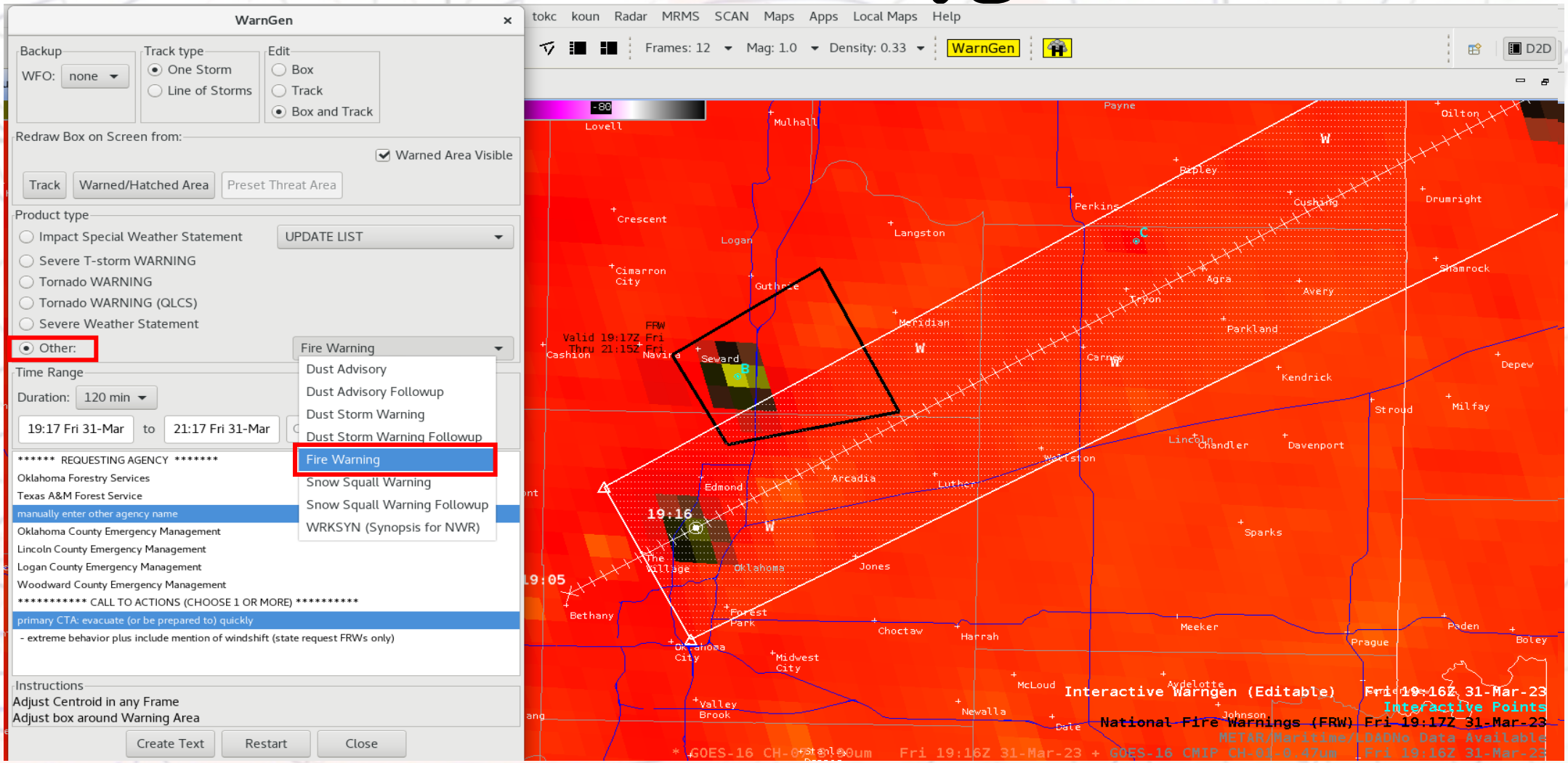
Current Practice for Fire Warning Issuance in AWIPS – Polygon Based

- Open WarnGen
- Forecaster process can go several different ways:
  1. Product type: Impact Special Weather Statement
  2. Product type: Other: Fire Warning

Current Practice for Fire Warning Issuance in AWIPS – Polygon Based

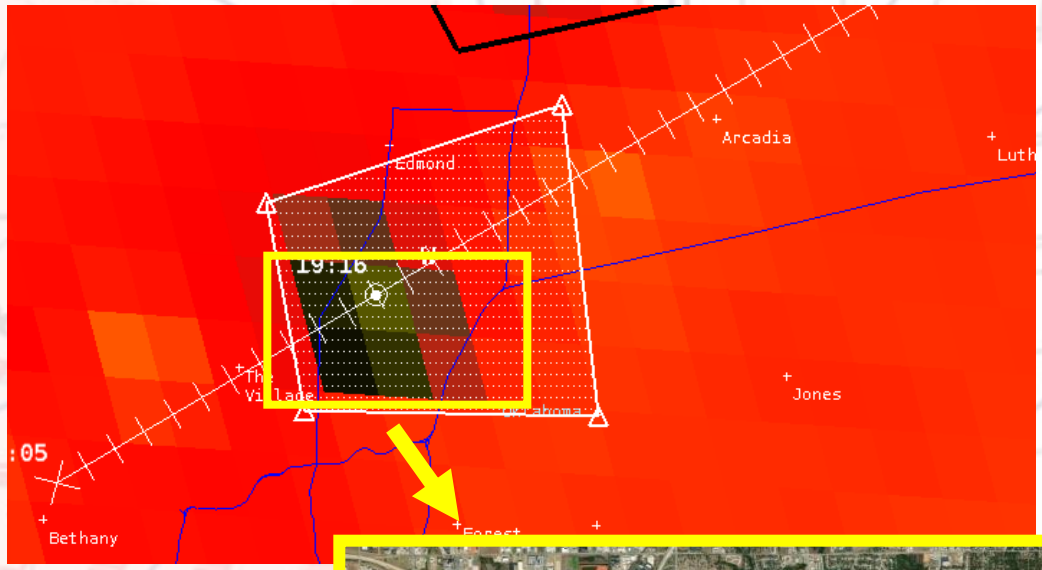


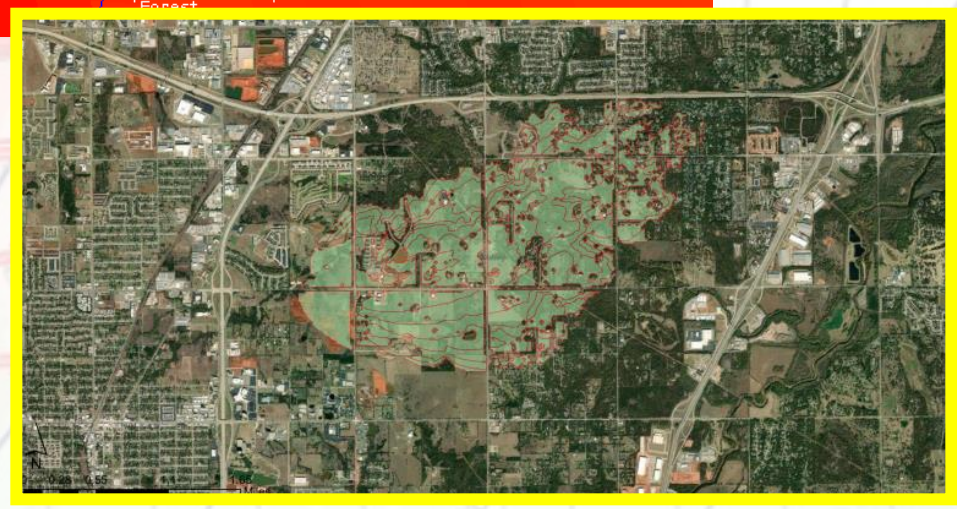
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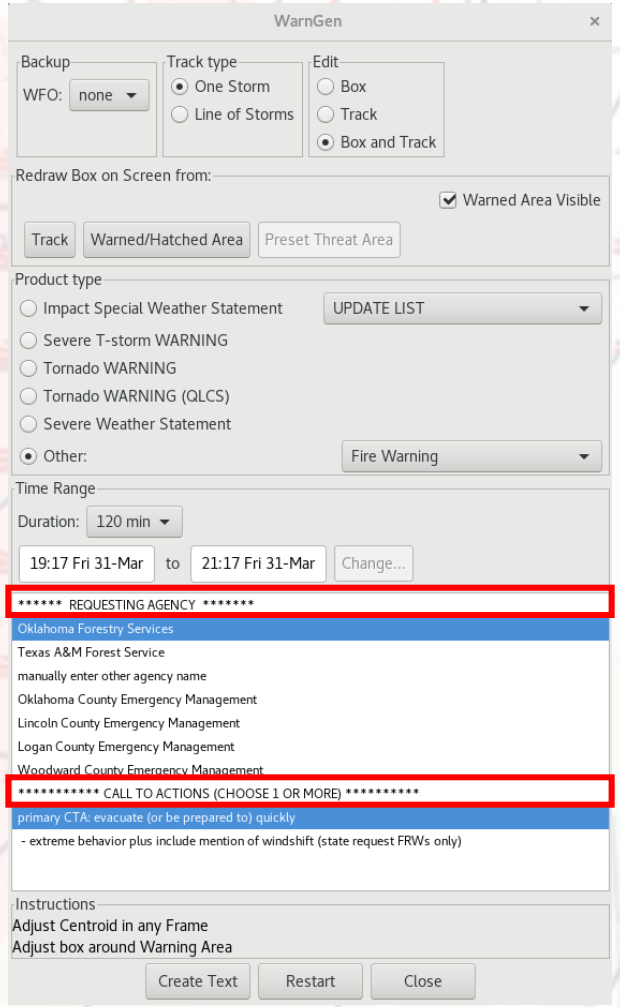
- Open WarnGen
- Forecaster process can go several different ways:
  1. Product type: Impact Special Weather Statement
  2. Product type: Other: Fire Warning
- <u>Adjust warning polygon</u>





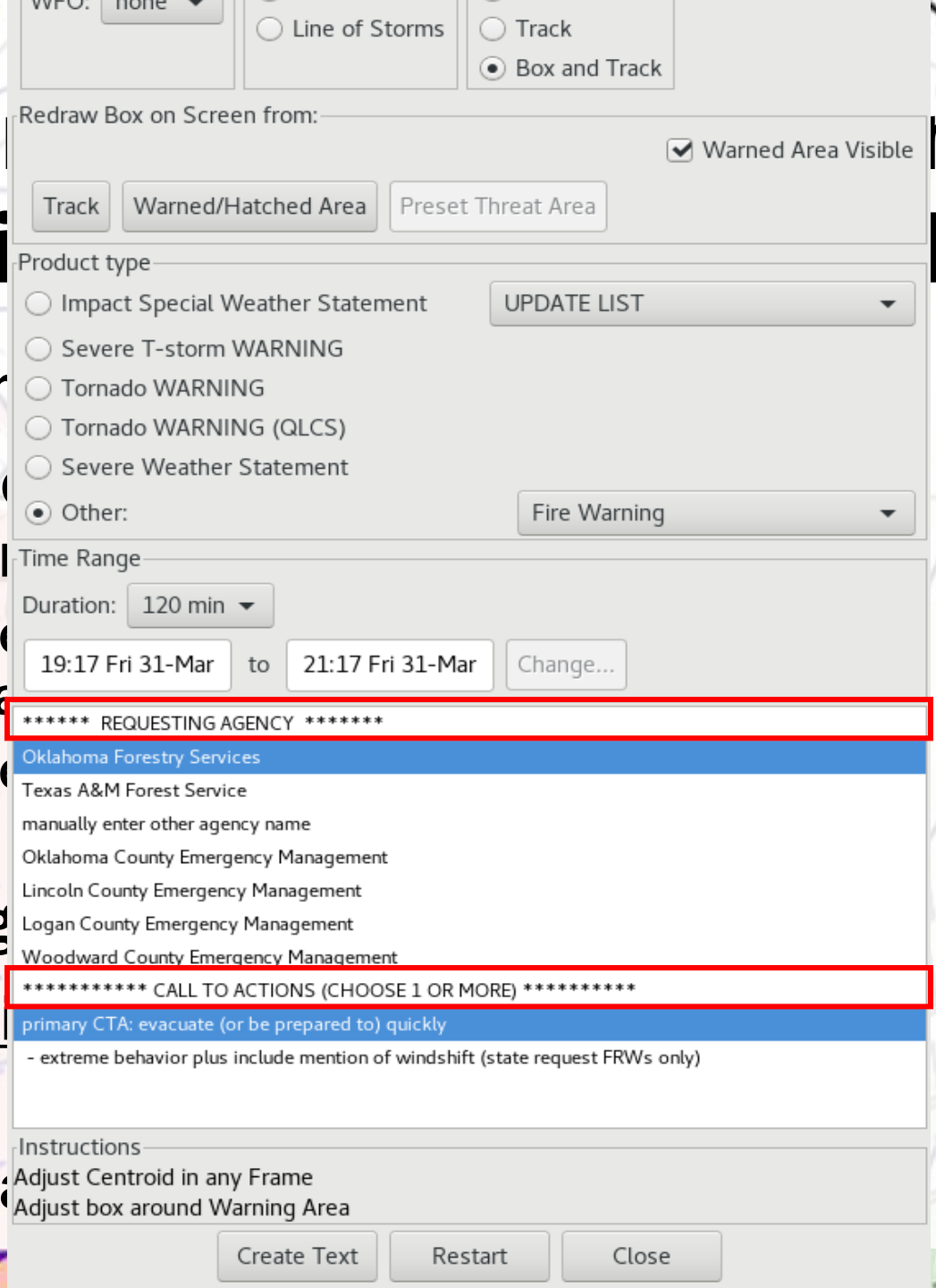
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- Open WarnGen
- Forecaster process can go several different ways:
  1. Product type: Impact Special Weather Statement
  2. Product type: Other: Fire Warning
- Adjust warning polygon
- <u>Select requesting agency & CTAs</u>
- Fill in appropriate text



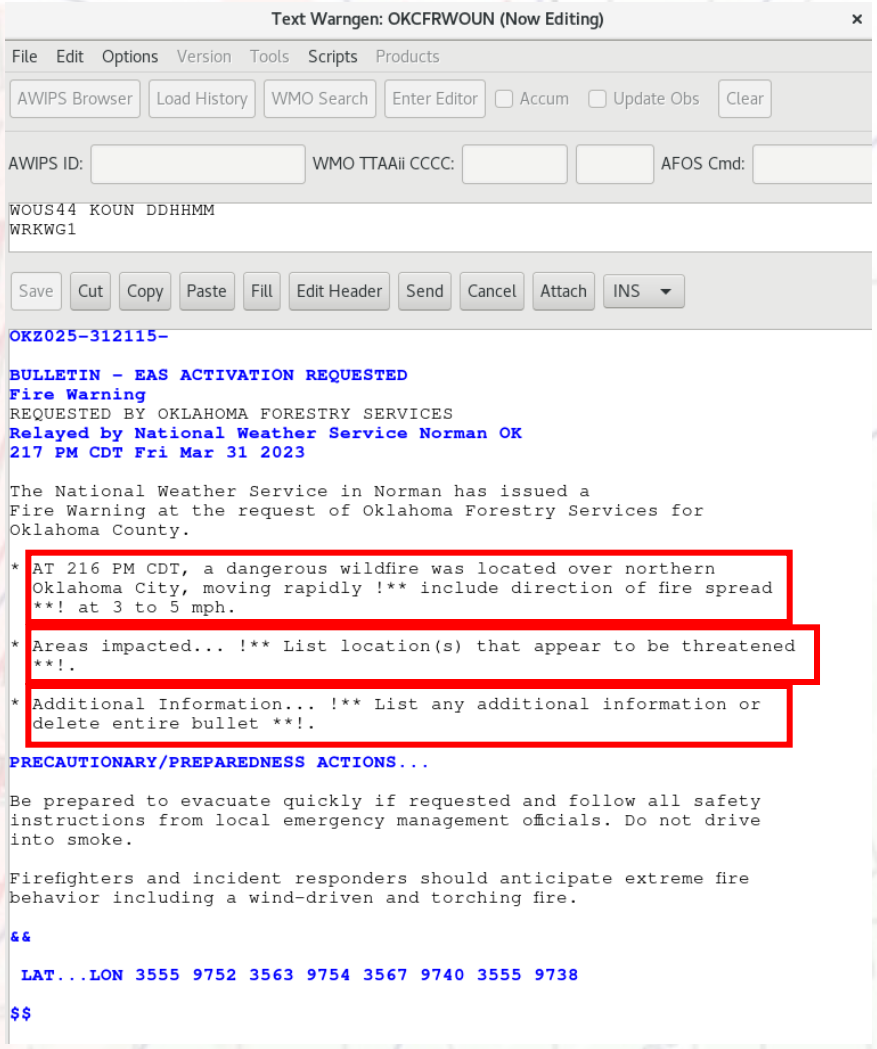
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  2. Product type… Warning
- Adjust warning…
- Select request… CTAs
- Fill in appropri…



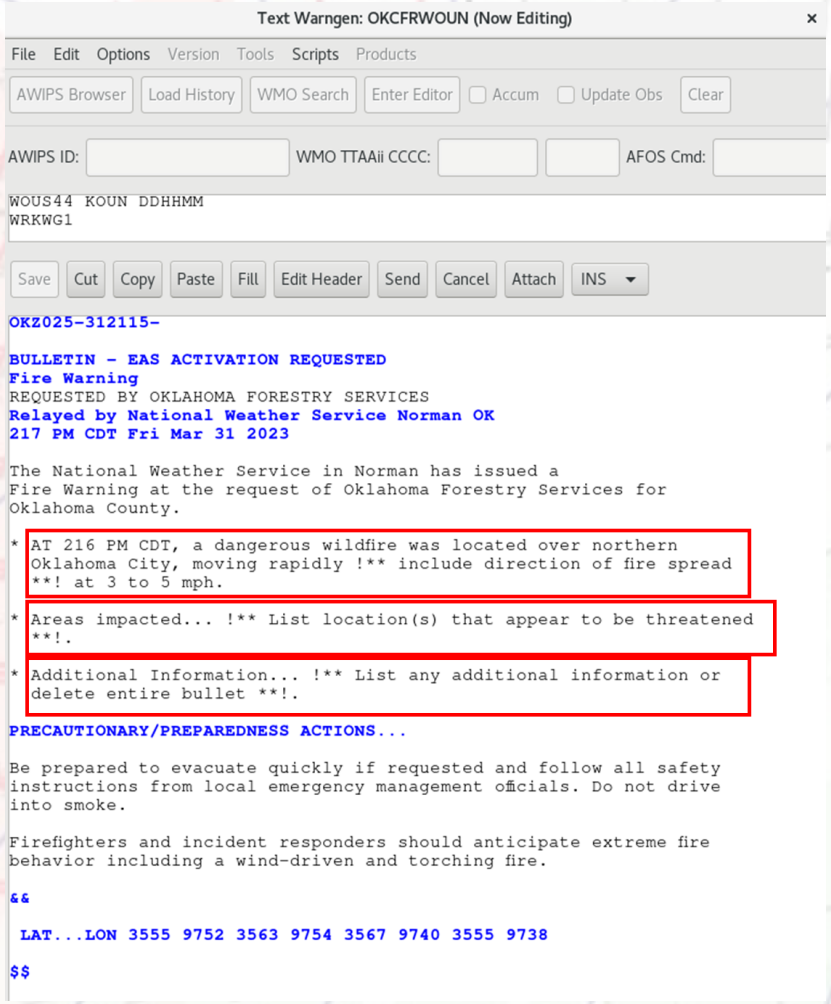
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- Forecaster several dif
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OKZ025-312115-

BULLETIN - EAS ACTIVATION REQUESTED
Fire Warning
REQUESTED BY OKLAHOMA FORESTRY SERVICES
Relayed by National Weather Service Norman OK
217 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
Oklahoma County.

* AT 216 PM CDT, a dangerous wildfire was located over northern Oklahoma City, moving rapidly !** include direction of fire spread **! at 3 to 5 mph.

* Areas impacted... !** List location(s) that appear to be threatened **!.

* Additional Information... !** List any additional information or delete entire bullet **!.

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 3555 9752 3563 9754 3567 9740 3555 9738

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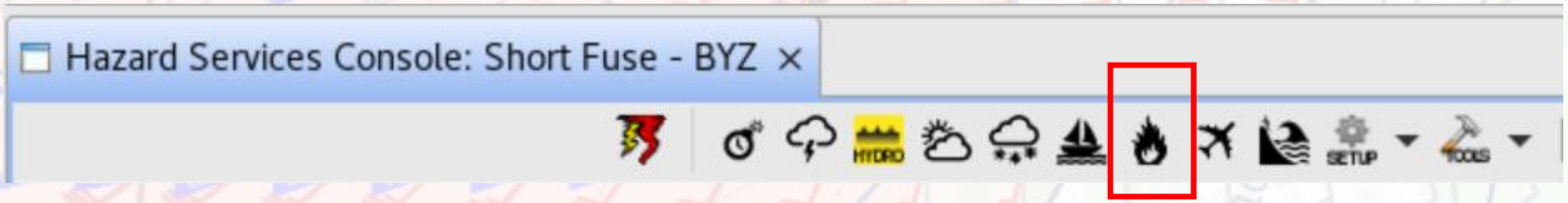
Additional Limitations – County & Polygon Fire Warnings

- County-based fire warnings (GHG/GFE):
  - Could be problematic for a large county with multiple cities and towns
- Polygon-based fire warnings (WarnGen):
  - No real capability to track the fire front
- There is currently no way to cancel and/or update a warning
- **WEA can only be activated by certain officials (in coordination with partners) for a Fire Warning**
  - **Only EAS can be automatically activated for Fire Warnings**
  - **<u>The problem</u>: EAS does <u>NOT</u> alert mobile devices. WEA does, and that level of coordination could take time.**

EAS – Emergency Alert System
WEA – Wireless Emergency Alerts

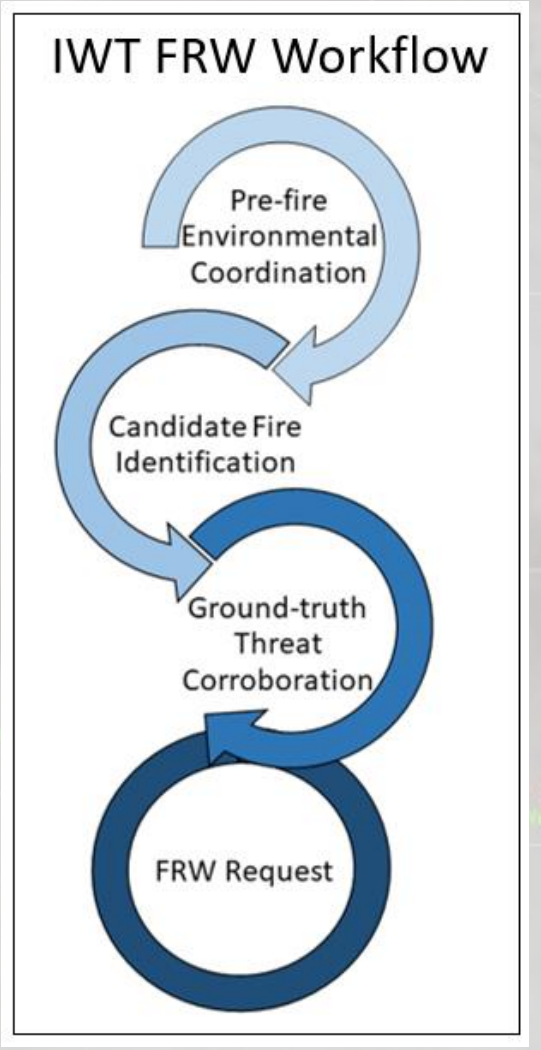
Potential Future of Fire Warning Issuance in AWIPS – Hazard Services

- Hazard Services Fire: Phase 4 deployment with Non-Weather Emergency Messages, Tropical & Long-Fused Marine Hazards
  - Additionally, fully integrate National Centers hazard generation into Hazard Services
  - Currently no build schedule, but in early stages of development by GSL
- Could include new features, but is highly dependent on directive



IWT Framework: A New Unified Paradigm

- IWT: Integrated Warning Team
- The facilitation of partner engagement (EMs, media, local/state/federal officials) to influence public safety
- Collaborative analysis between NWS and partners to disseminate fire information *quickly* and *efficiently*

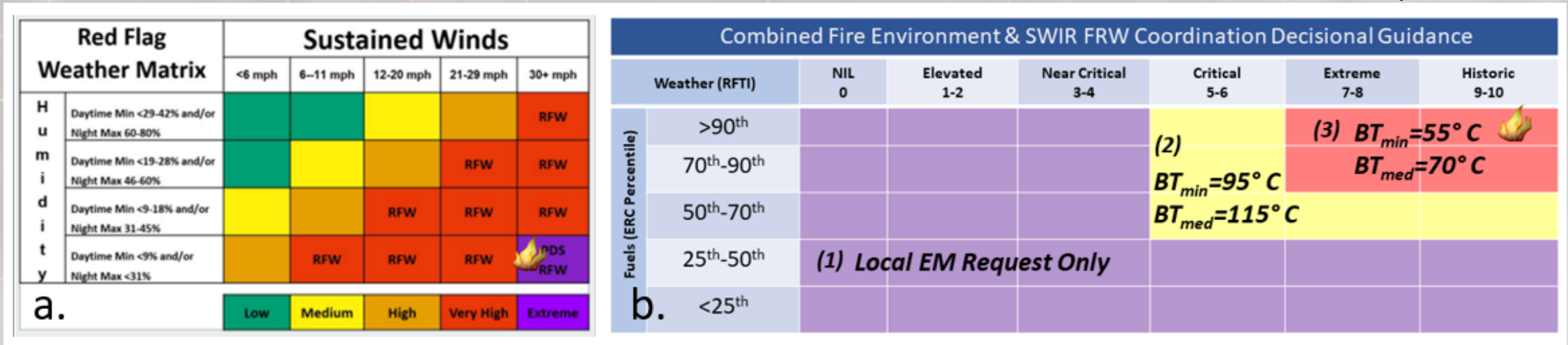


Lindley et al. 2024

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- Collaborative analysis between NWS and partners to disseminate fire information *quickly* and *efficiently*

Lindley et al. 2024



Red Flag Weather Matrix		Sustained Winds				
		<6 mph	6--11 mph	12-20 mph	21-29 mph	30+ mph
Humidity	Daytime Min <29-42% and/or Night Max 60-80%					RFW
	Daytime Min <19-28% and/or Night Max 46-60%				RFW	RFW
	Daytime Min <9-18% and/or Night Max 31-45%			RFW	RFW	RFW
	Daytime Min <9% and/or Night Max <31%		RFW	RFW	RFW	PDS RFW
a.		Low	Medium	High	Very High	Extreme

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
Fuels (ERC Percentile)	>90th				(2) BT_{min}=95° C BT_{med}=115° C	(3) BT_{min}=55° C BT_{med}=70° C	
	70th-90th						
	50th-70th						
	25th-50th	(1) Local EM Request Only					
b.	<25th						

IWT Framework: A New Unified Paradigm

12.1 - Life-saving Collaborative Fire Warnings and Wind-shift Forecasts During the Disastrous Texas Panhandle and Oklahoma Wildfires of February 2024

Wednesday, January 15, 2025

4:30 PM - 4:45 PM

202 (New Orleans Ernest N. Morial Convention Center)

Questions?

Key Points:

1. No current unified paradigm across the NWS for Fire Warnings
2. County Fire Warnings could cause confusion among the public over exact fire location
3. Polygon Fire Warnings are a step in the right direction, but not possible to track the fire front
4. There is currently no way to cancel and/or update a Fire Warning
5. WEA can only be activated by certain officials (in coordination with partners) for a Fire Warning
6. IWT Framework could become the new unified paradigm as an efficient way of issuing Fire Warnings

Contact: Lexy.Elizalde-Garcia@noaa.gov

References

- Lindley, T., and Coauthors, 2024: Retrospective Demonstrations of an Integrated Team Approach to Fire Warnings for Western United States Wildfire Disasters. *J. of Operational Meteor.,* **12**, no. 5, http://nwafiles.nwas.org/jom/articles/2024/2024-JOM5/2024-JOM5.pdf.
- Lindley, T., and Coauthors, 2019: Proposed implementation of warn-on-detection fire warnings for public and firefighter safety. In 47th Conference broadcast meteorology/5th conference on weather warnings and communications. American Meteorological Society Annual Meeting (pp. 1-10), https://ams.confex.com/ams/47BC5WxComm/webprogram/Manuscript/Paper358595/Lindley_et al_2019.pdf
- Federal Communications Commission, accessed December 2024: The Emergency Alert System (EAS), Archives (2002 Report & Order (New Codes, e.g., Amber Alert) (pdf)), https://www.fcc.gov/emergency-alert-system.
- Kyle Miller : HUGE thank you to Kyle for allowing some of his images to be used in this presentation. Check out his photography here! https://www.kylemillerphotography.com/

Hazard Services Roadmap

