A photograph of a forest fire at night. The scene is filled with the intense orange and yellow glow of flames consuming the forest floor and lower branches. Tall, dark tree trunks stand vertically, some partially illuminated by the fire. The ground is covered in a layer of dark, charred debris and glowing embers. A semi-transparent dark blue rectangular box with a thin white border is centered horizontally, containing white text.

IF YOU AIN'T SWEATIN' IT
You Ain't Payin' Attention

F. R. Montes de Oca
Fire Chief (ret)

What We Will Cover Today

- Past and Future
- Know Your Weather
- Planning is Your Pfriend
- Operating Outside the Box

DISCLAIMER

This presentation is not intended to minimize the bravery and efforts of any individual or organization that stands in the trenches to protect their communities and loved ones in time of need.

The intent is to generate discussion to better prepare those who will sacrifice much for mankind.

PAST AND FUTURE

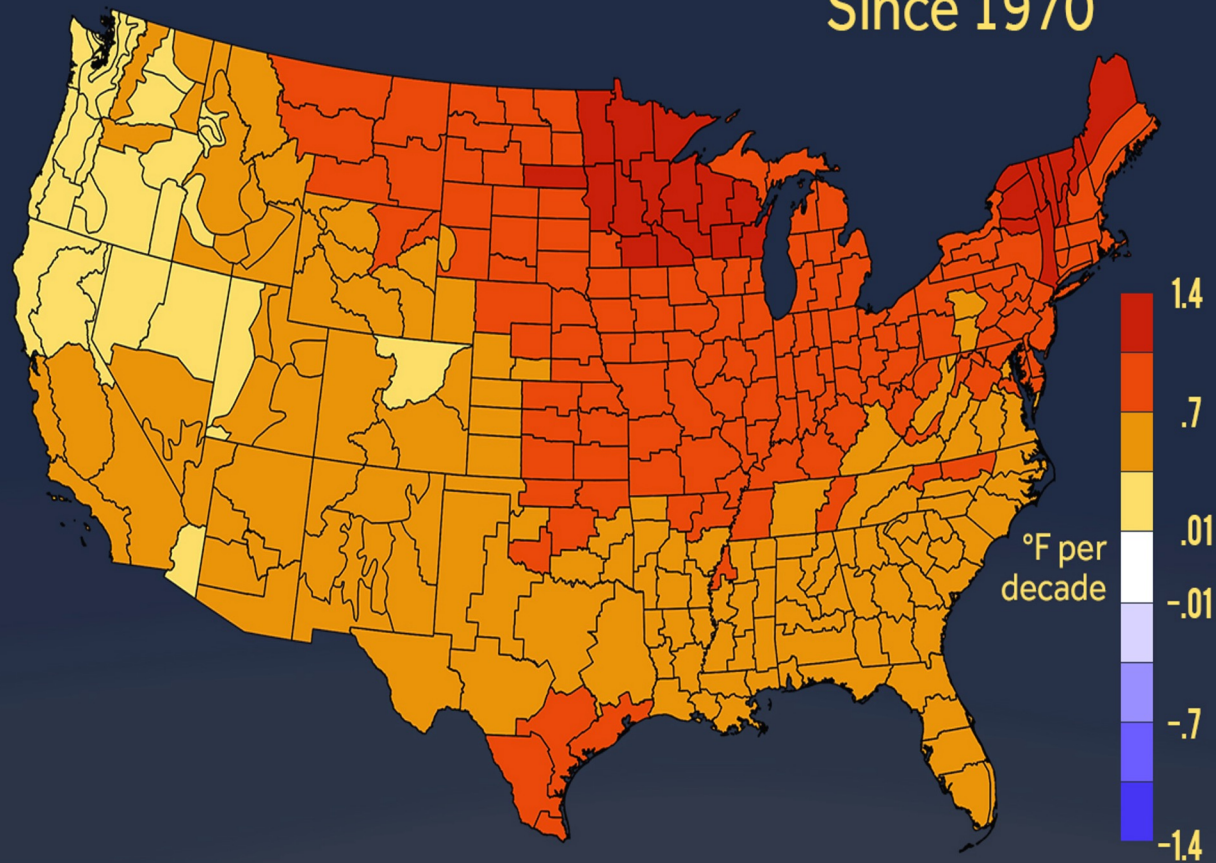


Past and Future

*The number and severity of weather-related incidents
(i.e. wildfires, flooding and extreme heat events) will continue to grow.*

WINTER IS WARMING

Since 1970



Extreme Weather Fueled by Climate Change
1:39

<https://youtu.be/yIkeAH7ETJk>

Past and Future

It's not *if* extreme weather events will occur,
it's *when* they will occur.

Future Climate Affecting Wildfire
France-Sky News – 3:07

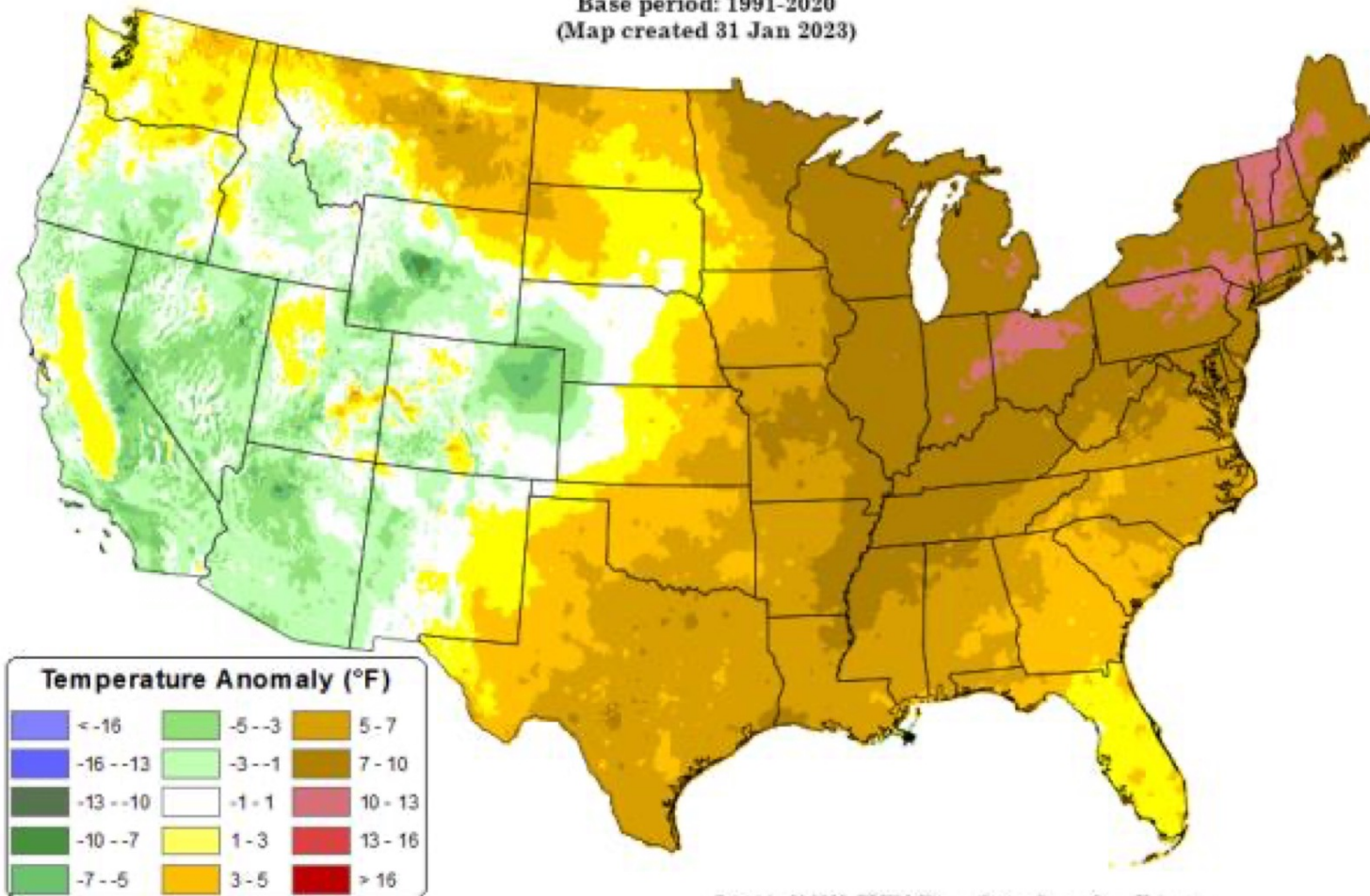
<https://youtu.be/PUYqyPM8SCI>

Daily Mean Temperature Anomaly: 01 Jan 2023 - 30 Jan 2023

Period ending 7 AM EST 30 Jan 2023

Base period: 1991-2020

(Map created 31 Jan 2023)



Copyright (c) 2023, PRISM Climate Group, Oregon State University

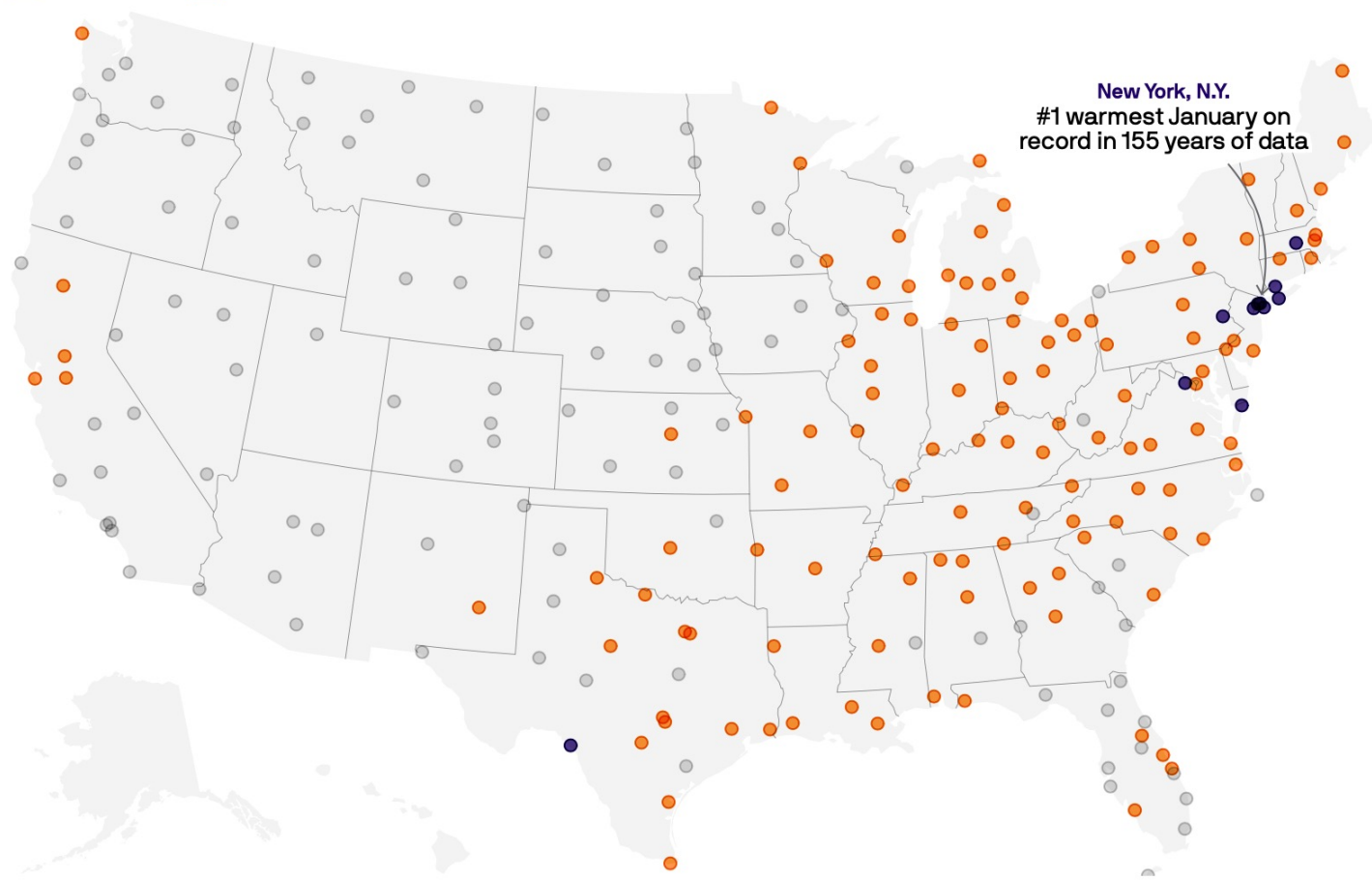
Future Climate Change Threats-PBS 13.29

https://youtu.be/l_Oe6YK0DgE

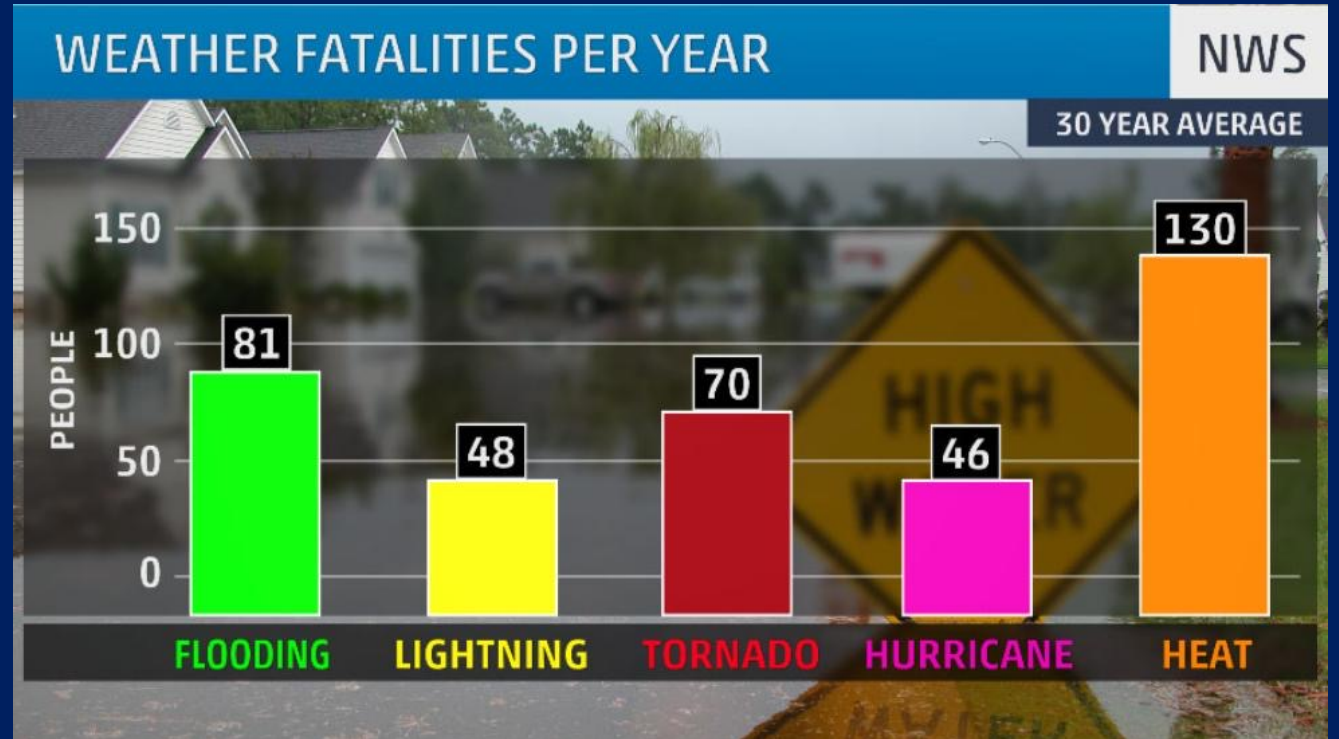
January 2023 temperature rankings

Average January temperatures from regional climate stations in the continental U.S.

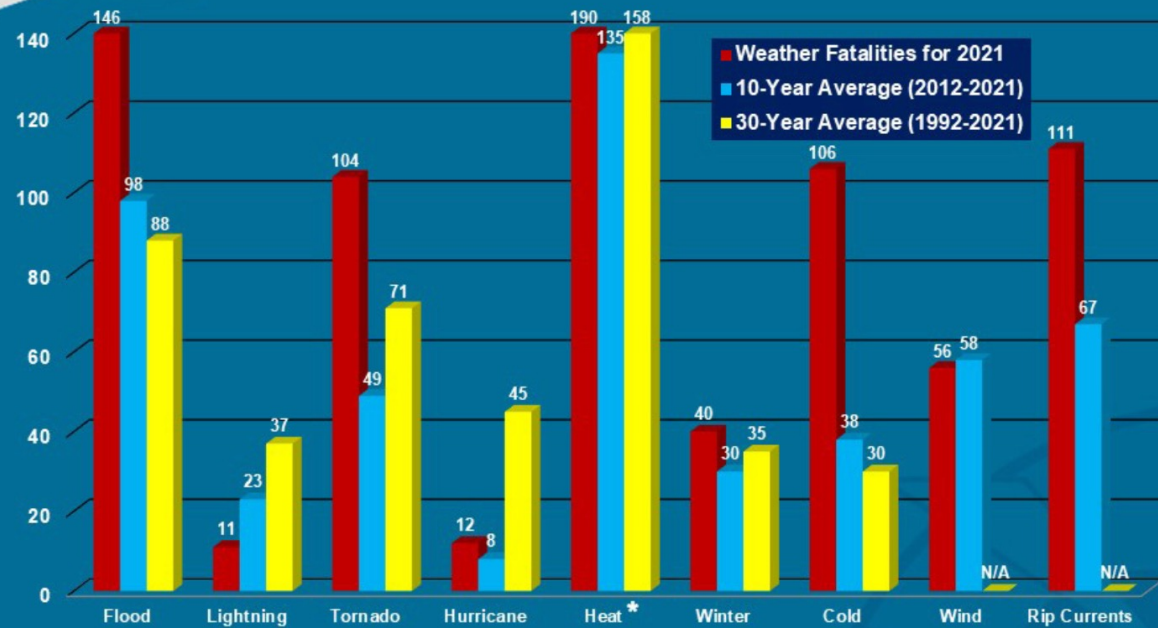
■ New #1 record ■ Top 15 warmest ■ 16th–68th



PAST AND FUTURE



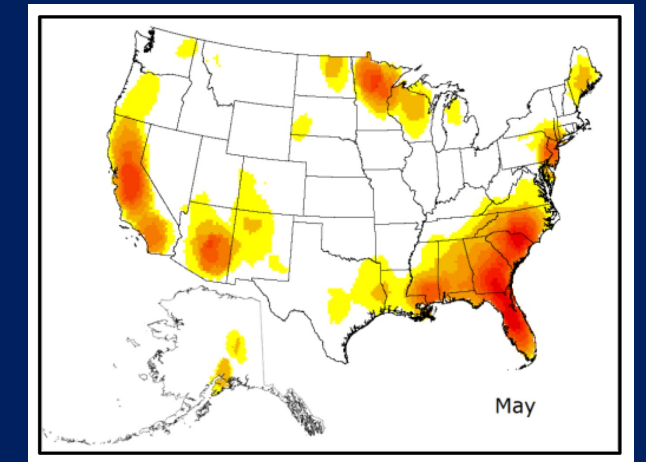
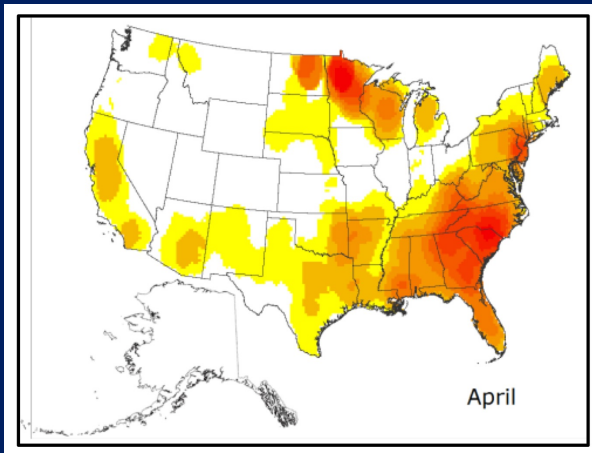
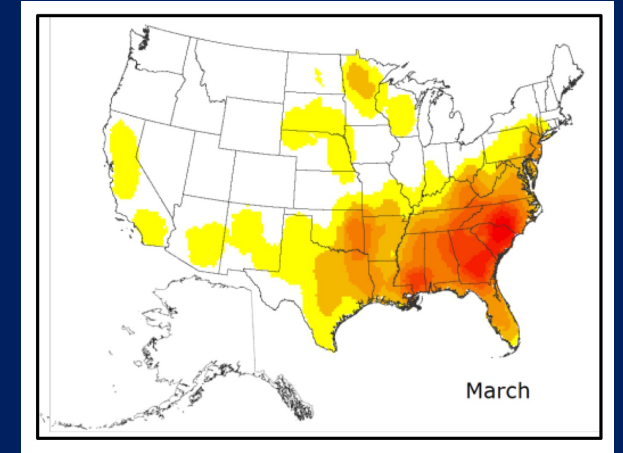
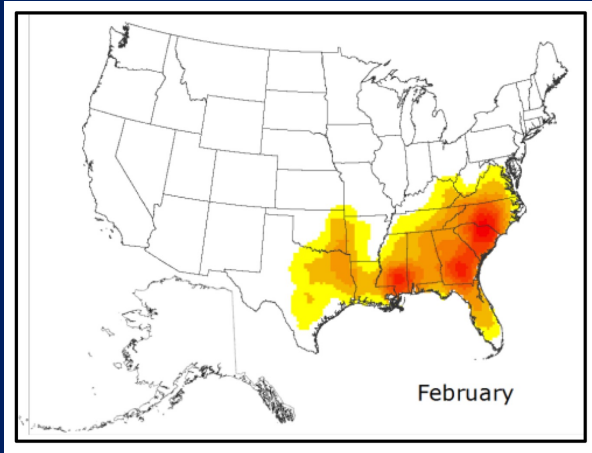
Weather Fatalities 2021



*Due to an inherent delay in the reporting of official heat fatalities in some jurisdictions, this number will likely rise in subsequent updates.

PAST AND FUTURE

1st/2nd Quarter Heat 2023



FIRE AS A WEAPON



FOR YOUR CONSIDERATION

- More than 46M residences (70,000 communities) at risk for WUI fires.
- Peak burning conditions (mid-summer) quickly depletes resources.
- WUI event evacuations are slower than in urbanized areas.
- Protecting critical infrastructures in rural areas are more challenging.
- Vegetation is twice as likely to cause exposure fires.

July 2020

ISIS released an English-language video titled *Incite the Believers* urging supporters to conduct arson attacks in forests, fields, cities and villages..

FIRE AS A WEAPON

Growing Terrorist Tactic

IID* Incidents Increased 2019-2020

- Government Facilities 210%
- Commercial Facilities 113%
- Critical Infrastructure 141%

*Improvised Incendiary Devices

FIRE AS A WEAPON

Growing Terrorist Tactic

IIDs are devices placed or fabricated in an improvised manner incorporating chemical mixtures and flammable liquids that cause fire and are designed to destroy, incapacitate (kill), harass or distract.💀

*Improvised Incendiary Devices
💀 FBI

FIRE AS A WEAPON

Terrorist TTPs to Monitor

- Recruiting fire experts to maximize damage.
- Messaging TTPs for setting wildfires.
- Selecting targets maximizing conflagrations.
- Choosing ignition sources.
- Setting multiple fires to amplify chaos minimizing forces.
- Impersonating public safety personnel.

FIRE AS A WEAPON

Report Indicators

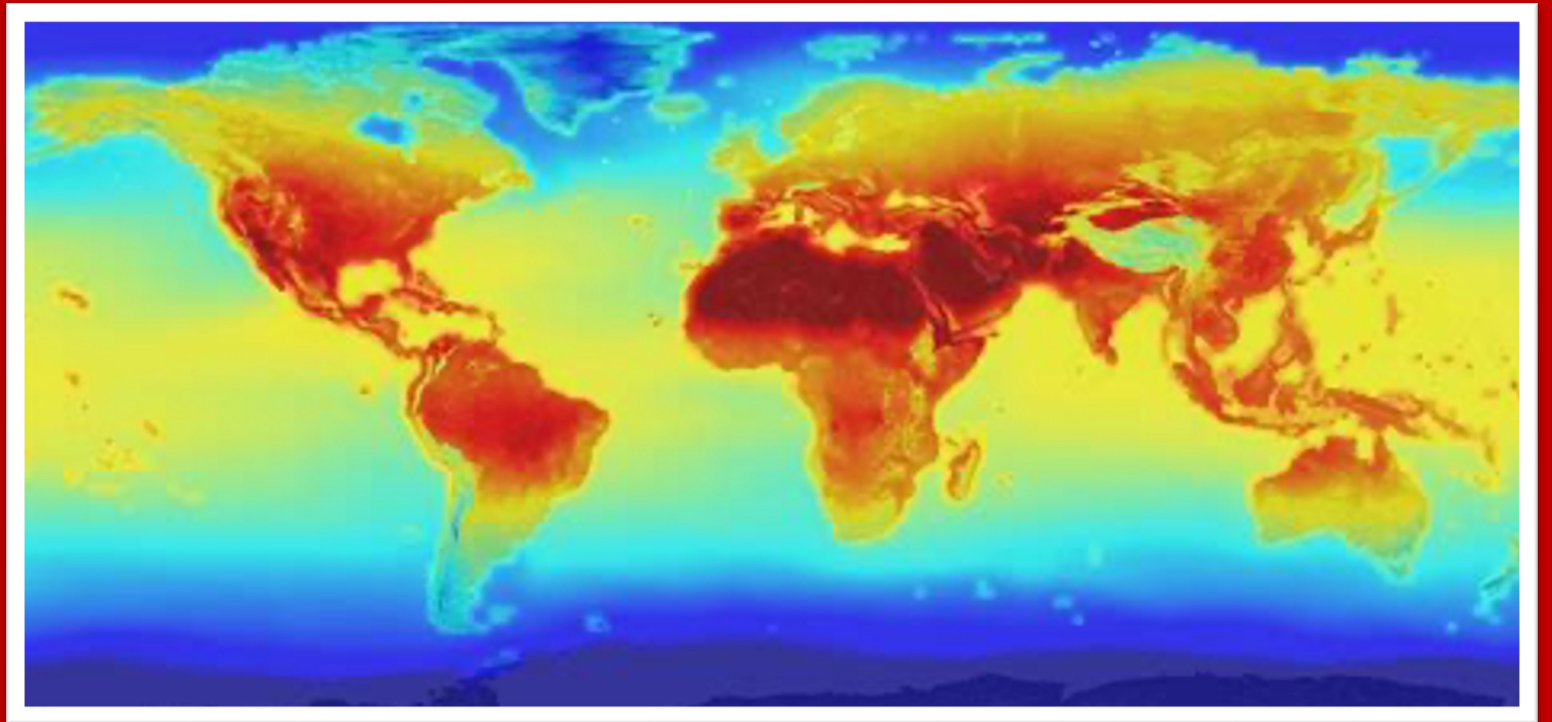
- Damaged or tampered fire protection systems
- Suspicious or unattended items: propane tanks, bags...
- Suspicious questioning of building systems, water supplies...
- Unusual quantities of flammables/combustibles
- Social media messaging promoting use of fire as a weapon

FIRE AS A WEAPON

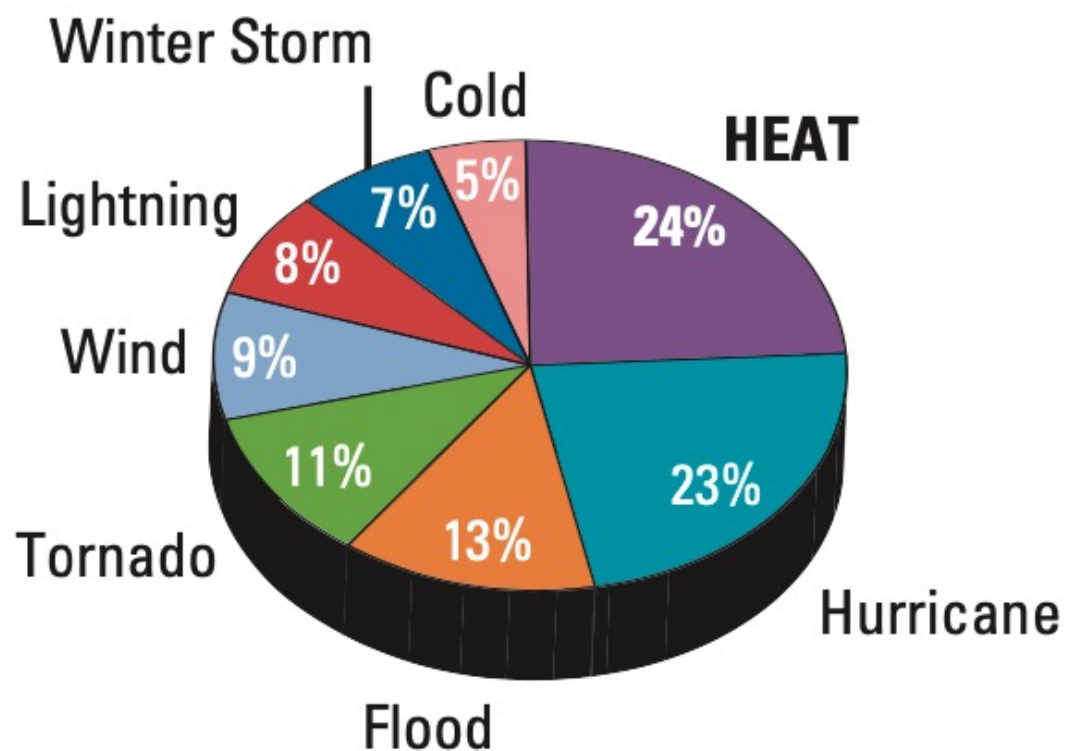
Discussion

List community facilities vulnerable
to WUI targeting.

KNOW YOUR WEATHER



DEATHS IN THE UNITED STATES ATTRIBUTED TO WEATHER CONDITIONS, 2000–2009 ⁶



Understanding Extreme Heat Events

What Is an Extreme Heat Event?

While there is no single agreed upon definition of an extreme heat event, most definitions refer to an extended period of time (several days or more) with unusually hot weather conditions that potentially can harm human health.⁵



The U.S. Environmental Protection Agency defines extreme heat events as “periods of summertime weather that are substantially hotter and/or more humid than typical for a given location at that time of year.”⁴



HEAT INDEX 101

- The heat index* is what the temperature feels like to the human body when **relative humidity is combined with the air temperature**.
- If the **perspiration is not able to evaporate**, the **body cannot regulate** its temperature.
- Evaporation is a cooling process. When perspiration is evaporated off the body, it **effectively reduces** the body's temperature.
- When the atmospheric moisture content (relative humidity) is high, the rate of evaporation from the body decreases.

*Apparent Temperature

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution

Extreme Caution

Danger

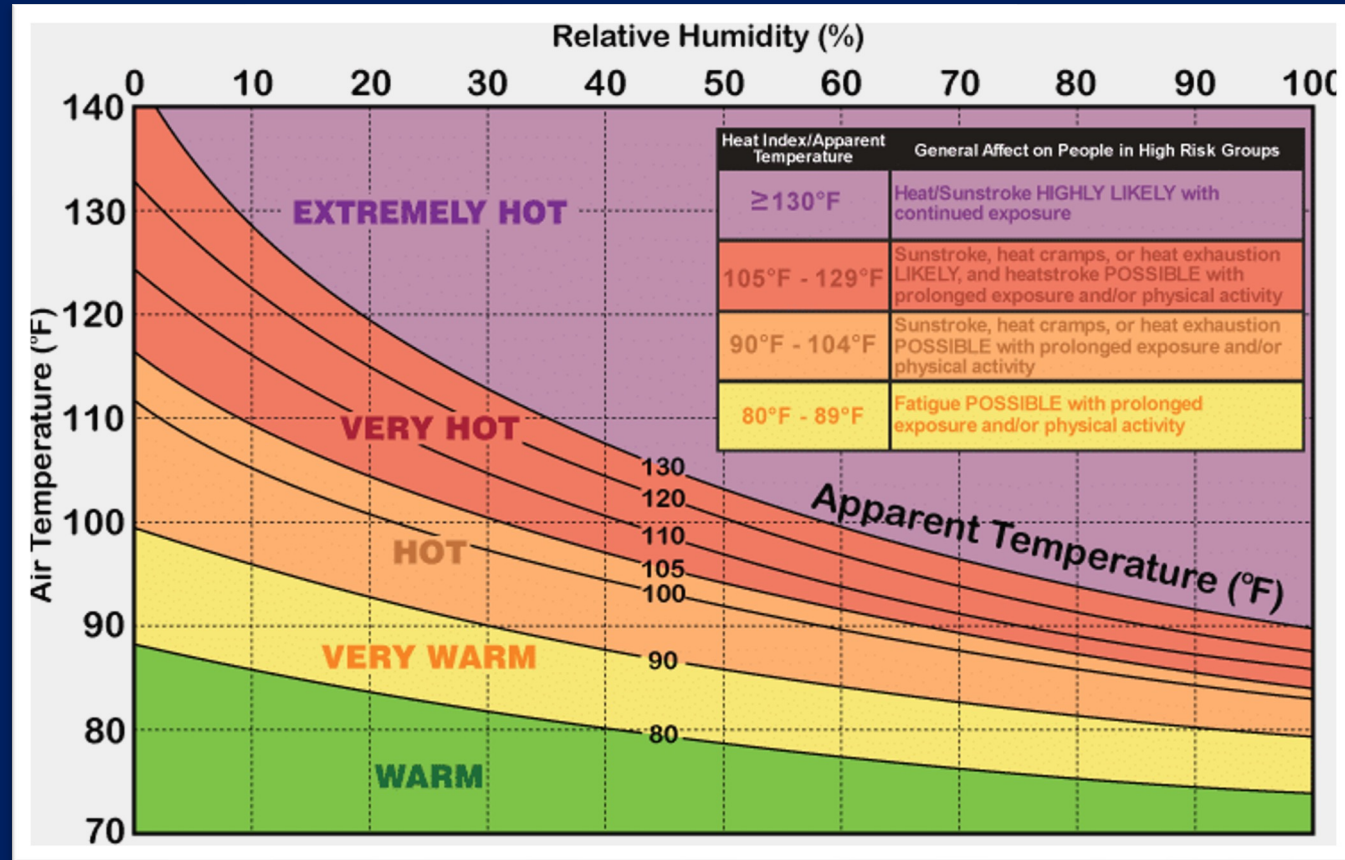
Extreme Danger

WET BULB GLOBE TEMPERATURE















- The Wet Bulb Globe Temperature (WBGT) measures the heat stress in **direct sunlight**, which takes into account: temperature, humidity, wind speed, sun angle and cloud cover (solar radiation) that affects humans.
- WBGT differs from heat index measurement, which takes into consideration temperature and humidity and is calculated for **shady** areas. **If you work or exercise in direct sunlight, this is a good element to monitor.**
- Military agencies, OSHA and many nations use the WBGT as a guide to managing workload in direct sunlight.



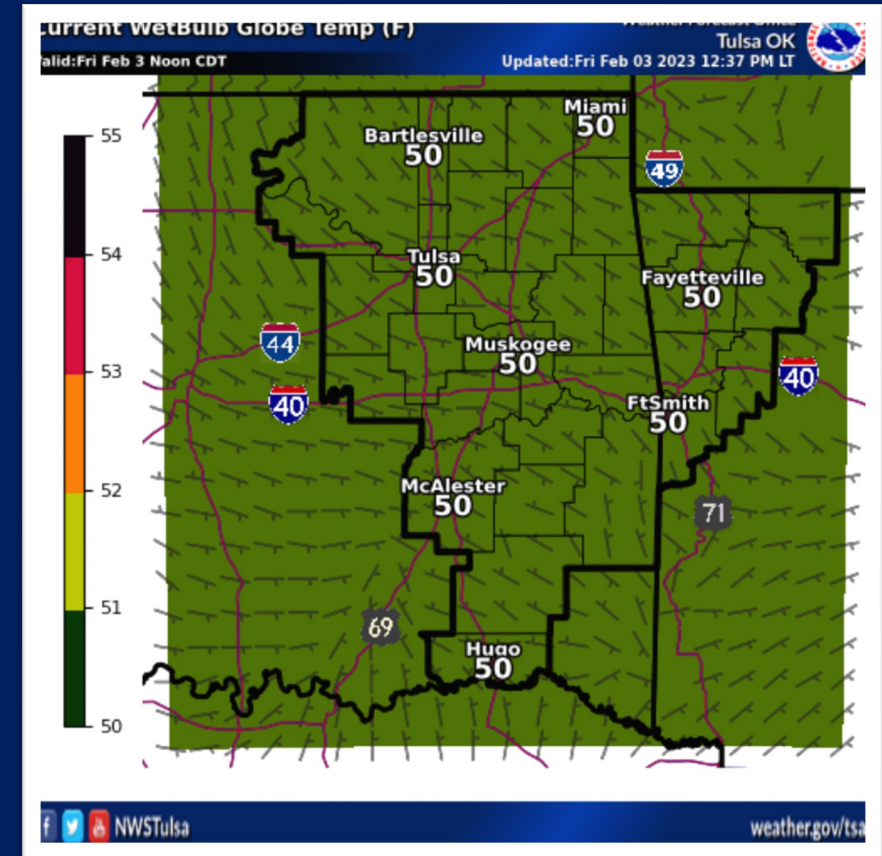
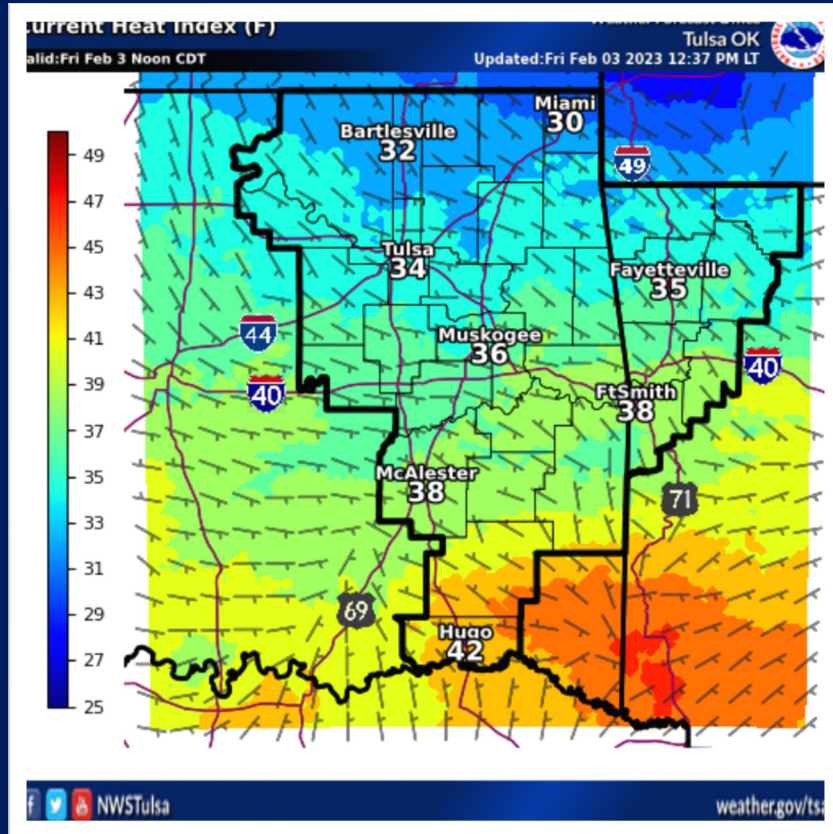
Just the facts, ma'am.



Just the facts, ma'am.

Comparison with Heat Index		
	WBGT	Heat Index
Measured in the sun		
Measured in the shade		
Uses Temperature		
Uses RH		
Uses Wind		
Uses Cloud Cover		
Uses Sun Angle		

HEAT INDEX VERSUS WBGT



Work/Rest Times and Fluid Replacement Guide

Heat Category	WBGT Index (°F)	Easy Work Walking on hard surface, 2.5 mph, <30 lb. load; weapon maintenance, marksmanship training.		Moderate Work Patrolling, walking in sand, 2.5 mph, no load; calisthenics.		Hard Work Walking in sand, 2.5 mph, with load; field assaults.	
		Work/Rest (minutes)	Fluid Intake (quarts/hour)	Work/Rest (minutes)	Fluid Intake (quarts/hour)	Work/Rest (minutes)	Fluid Intake (quarts/hour)
1	78° - 81.9°	NL	½	NL	¾	40/20 (70)*	¾ (1)*
2 (GREEN)	82° - 84.9°	NL	½	50/10 (150)*	¾ (1)*	30/30 (65)*	1 (1¼)*
3 (YELLOW)	85° - 87.9°	NL	¾	40/20 (100)*	¾ (1)*	30/30 (55)*	1 (1¼)*
4 (RED)	88° - 89.9°	NL	¾	30/30 (80)*	¾ (1¼)*	20/40 (50)*	1 (1¼)*
5 (BLACK)	> 90°	50/10 (180)*	1	20/40 (70)*	1 (1¼)*	10/50 (45)*	1 (1¼)*
NL = No limit to work time per hour.				*Use the amounts in parentheses for continuous work when rest breaks are not possible. Leaders should ensure several hours of rest and rehydration time after continuous work.			

This guidance will sustain performance and hydration for at least 4 hours of work in the specified heat category. Fluid needs can vary based on individual differences (± ¼ qt/hr) and exposure to full sun or full shade (± ¼ qt/hr).

Rest means minimal physical activity (sitting or standing) in the shade if possible.

Body Armor - Add 5°F to WBGT index in humid climates.

NBC (MOPP 4) - Add 10°F (Easy Work) or 20°F (Moderate or Hard Work) to WBGT Index.

CAUTION: Hourly fluid intake should not exceed 1½ qts. Daily fluid intake should not exceed 12 qts.



Approved for public release,
distribution unlimited.

CP-033-0415

Suggested Actions and Impact Prevention

WBGT(F)	Effects	Precautionary Actions
< 80		
80-85	Working or exercising in direct sunlight will stress your body after 45 minutes.	Take at least 15 minutes of breaks each hour if working or exercising in direct sunlight
85-88	Working or exercising in direct sunlight will stress your body after 30 minutes.	Take at least 30 minutes of breaks each hour if working or exercising in direct sunlight
88-90	Working or exercising in direct sunlight will stress your body after 20 minutes.	Take at least 40 minutes of breaks each hour if working or exercising in direct sunlight
>90	Working or exercising in direct sunlight will stress your body after 15 minutes.	Take at least 45 minutes of breaks each hour if working or exercising in direct sunlight

HYDRATION AND COOLING

OSHA recommends workers replace a cup of fluids every 20 minutes, which coincides with firefighting rotation periods.

HYDRATION AND COOLING

Fluid Replacement Guidelines

- Less than 90°: Intake PRN
- 90°-94°: 12-24 ounces hourly
- 95°-99°: 24-36 ounces hourly
- 100°-104°: 36-48 ounces hourly
- 105°-109°: 36-48 ounces hourly

BODY COOLING BOTTOM LINE

- When temperatures rise, the body attempts to lower heat by pumping blood closer to the skin.
- High heat and humidity complicates the attempt.
- Internal body temperatures above (104°F) vital organs begin to fail.

EXTREME HEAT ACTIVITY

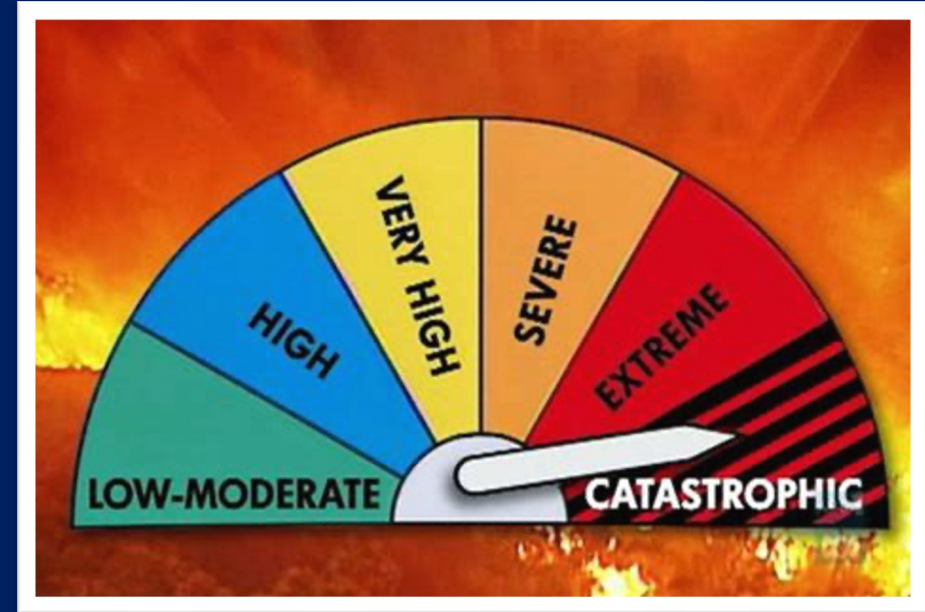
Precautionary Guideline Discussions

Describe Department/Community
Extreme Heat Guidelines

- Who is affected?
- Who authored it?
- When was it updated?
- Specific extreme heat training guidelines?



American Model



Australian Model

PLANNING IS YOUR PFRIEND

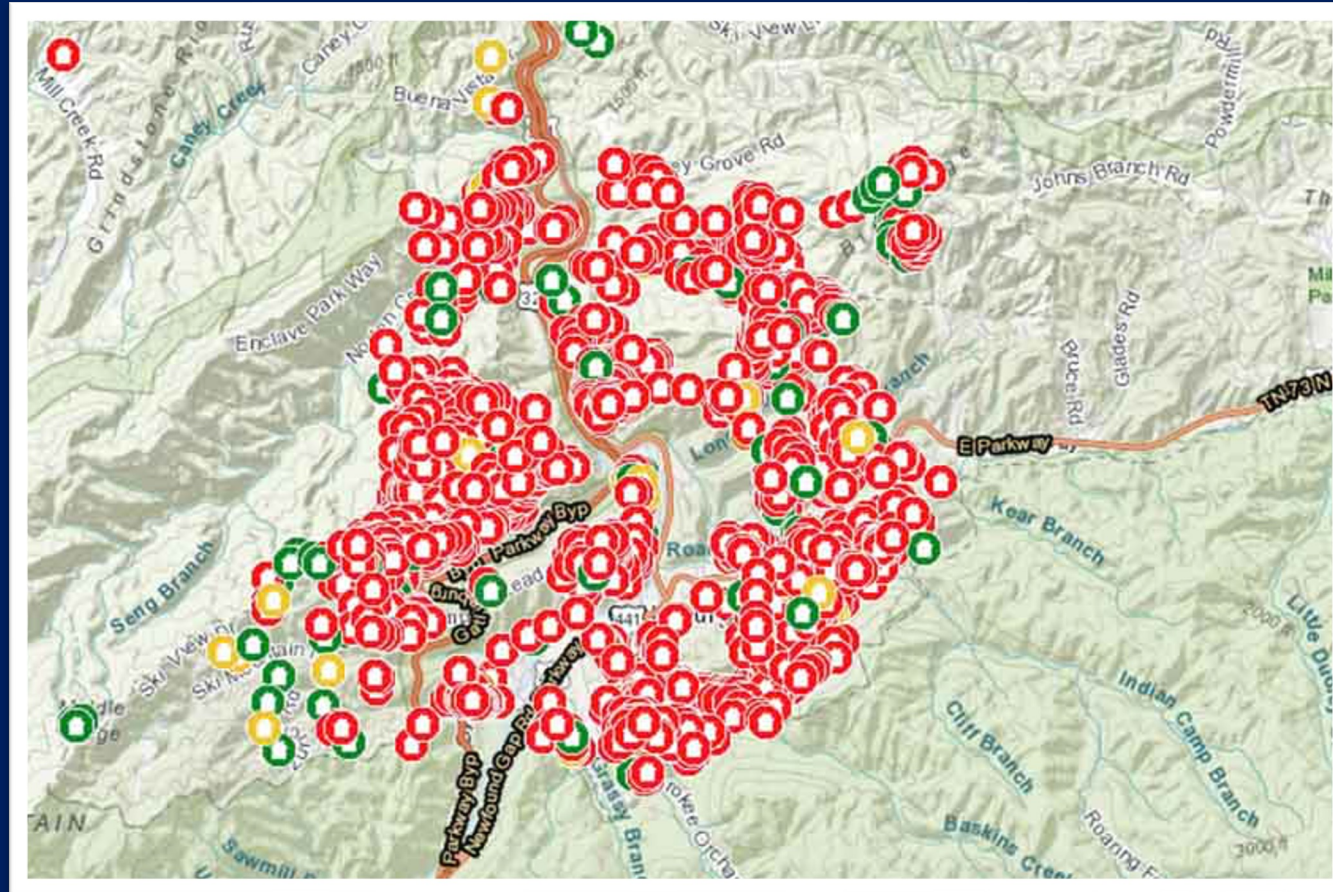


PLANNING PFRIENDS

- FEMA
- Local EMA*
- State EMA
- Colleges/Universities
- Army Corp of Engineers
- Water and Public Works
- Private Funding “Partners”

*LEPC

Gatlinburg Fire 2016



THE GATLINBURG FIRE

- Began at the Chimney Tops Fire a few days before Gatlinburg event.
- Great Smokey Mountain Park crew set a 400-acre containment area.
- East Tennessee (2016) exceptionally dry- exceptional drought.
- Reports of significant wind in area.
- Efforts to fight fire expanded.
- Winds gusted to 87 mph carried embers creating hotspots throughout area.
- Fire progression models (Pigeon Forge FD) estimated fire arrival in 19 hours.
- Fire Reached Gatlinburg in 2 hours.
- Request for Mutual Aid and EOC standup.

THE GATLINBURG FIRE

- Communication Issues ensued:
 - Radio comms overloaded Sevier County radio system.
 - Lack of radio interoperability between departments.
 - Lack of radio frequency availability.
 - Poor comms between Gatlinburg EOC and TEMA delayed evacuation.
 - Lack of comm interoperability: City, State, County, Federal.
 - Lack of early notice by NPS to Gatlinburg FD.
 - Poor PIO resulted in poor (slow) information to community.
 - Power outages due to firestorm.
 - Fire Comms received slow, poor inaccurate information.

PLANNING IS YOUR PFRIEND

Cooling and Relocation Stations

- Elderly (Meds and Family)
- Homeless (Mental Health)
- Mobility Challenged
- CAMET
- Visitor/Tourists
- Advanced Responder Rehabs

PLANNING IS YOUR PFRIEND

Response Facility Upgrades

- Extended Power/Infrastructure Failures
- Explore military vehicle/equipment surplus.
- Do you have a seat in the EOC?
- Weather Stations at All Facilities (Safe Room?)
- Invest in Satellite Comm Capability

PLANNING IS YOUR PFRIEND

Operational Enhancements

- Update training curricula: include volunteer cadres.
- Enable responders to act with minimal oversight?
- Develop task force response matrices.
- Improve Rehab SOPs – volunteer staffing?
- Enhance weather sitrep capabilities.
- Develop/Enhance UAV program(s).

PLANNING IS YOUR PFRIEND

Operational Enhancements

Update Training Curricula

NWCG S190

- First, foundational wildland fire behavioral course.
- Prerequisite to S130
- Describe basic terminology used in wildland firefighting.
- Identify and discuss fire triangle.
- Identify characteristics of wildland components: fuels, weather and topography.
- Identify critical weather factors that may result in extreme fire behavior.

PLANNING IS YOUR PFRIEND

Operational Enhancements

Update Training Curricula

NWCG S130

- Describe Standard Firefighting Orders and Watch Out Situations.
- Describe Lookouts, Communications, Escape Routes and Safety Zones.
- Describe Standard Tools.
- Describe various methods of extinguishing fires.

PROTECTING OUR OWN



- Proactive EOC participation?
- WUI gear for all frontline staff?
- Shake and Bakes for all?
- Proactive logistical support?
- Ops transition for WUI threat?

OPERATING OUTSIDE THE BOX



OPERATING OUTSIDE THE BOX

- BACKUP COMMS
 - Verizon is not your friend
 - Field troops carry personal comms
- REDUCE RESPONDER OVERSIGHT
 - Minimal Medical Direction
 - Consider cross-jurisdictional legalities
 - Rapid (Emergency) Evac w/o Consequences
- DEVELOP/ENHANCE UAV PROGRAM(S)
 - Volunteer Operated/Contracted
 - FAA/FCC Qualified Members

OPERATING OUTSIDE THE BOX

- BAYOU NAVY MODEL
 - 4X4/ATV Access
 - Training, Liability, Control and Medical Coverage
- TASK FORCE RESPONSE MATRICES
 - (Unified) Incident Command System
 - Essential Support versus Important Support
- REHAB OPS
 - Community Staffing?
 - Multiple Location Logistics
 - Multiple Security Points/Access
 - Command Staff Required

OPERATING OUTSIDE THE BOX

- ENHANCE WEATHER SITREP CAPABILITIES
 - Information is Critical
 - Meteorologist Onsite
 - Storm Chaser Team Development and Use
- SAFETY OPS
 - Experienced ISOs versus *Seasoned* ISOs
 - Multiple ALSO's
- PUBLIC INFORMATION
 - In-tune with Community and Leadership
 - Timely and Accurate

OPERATING OUTSIDE THE BOX


A Few Last Thoughts

- Ensure Current Practices: Utilize NFPA Guidelines
- Overestimate Support Units (Rehab, Transport)
- Consider Utilizing Private Supply Support
- Train LCES (Lookout, Comm, Escape, Safety)
- Add Transit Units for Extreme Heat Events

OPERATING OUTSIDE THE BOX

A Few Last Thoughts

- Consider Rehab Support for ALL Responders
- Mandatory Rehab Guidelines (Include Command)
- Train Rehab Team for Mass Extreme Heat Events
- Utilize Transit Busses for Cool-down/Heat Units



IF YOU AIN'T SWEATIN' IT
You Ain't Payin' Attention

Thank you!

F. R. Montes de Oca
Fire Chief (ret)

frm1@me.com
www.responder1.org