Post-Hurricane Fuels and Suppression Considerations Bulletin

Background

Hurricane Helene made landfall in the Big Bend region of Florida on Thursday, September 26, 2024, as a Category 4 storm, moving inland. The storm impacted areas as far north as Virginia and Kentucky. Helene retained hurricane status (winds greater than 74 mph) well into the state of Georgia and was still a strong tropical storm as it entered the western Carolinas, east Tennessee, and southern Virginia. Historic precipitation rates resulted in severe flooding and hillslope failures in the mountainous terrain of the Southern Appalachians. Helene left a nearly 500-mile swath of damage along her path through the southeast including widespread downed timber and catastrophic flooding in several states. The impacts from Helene have also altered the fuels and fire environment. A significant increase in fuel loading and a notable change in fuel arrangement, coupled with more open canopy conditions in affected areas, will likely have an impact on fire suppression activities during the upcoming fall fire season, as well as into the spring season of 2025. This bulletin highlights key considerations to ensure the safety and effectiveness of suppression efforts, and the unique challenges and hazards associated with hurricane impacted areas.

Post-storm Suppression Considerations

Fire suppression operations will be impacted by new hazards and complexities. Firefighters should expect the following:

- Access to fires blocked by fallen trees or debris. Landslides may have washed away or destabilized roads and bridges making travel to fires more difficult and dangerous resulting in slower response times to certain areas.
- Hit-by and gravity hazards such as landslides and loose debris from undermined slopes and aerial hazards such as broken tree limbs and snags pose a serious safety risk. Tree roots and soils may be unstable posing a risk to heavy equipment operating on slopes.
- Powerlines mixed in with debris along with conductive materials could be electrified or re-electrified during clean up. Utility wires and cabling can become bound in heavy equipment.
- Hazards to saw operations such as spring poles, root-sprung trees, and broken tops. Standing trees that appear sound and intact may be compromised and could fall without warning.
- Options for direct attack may be limited in areas with significant blowdown or landslide hazards.
- Smoke impacts in affected areas, due to smoldering of heavy fuels, which may require a plan to mitigate or message to the public.
- Longer duration monitoring and patrol of fires in areas of blowdown due to increased loading and prolonged smoldering of heavy fuels.
- Hazardous materials mixed in with wildland fuels including plastics, chemicals, and petroleum products could give off noxious fumes or be unsafe to handle.
- Features on the landscape that usually hold fire to be altered and unreliable. For example, streams that typically held fire in the past may now be compromised due to fallen trees and organic debris within riparian areas.
- Reduced availability of safe and adequate helispot locations to support aerial resources and medical evacuation.
- Reduced logistical capacity due to shortages of water, fuel, food, lodging, medical care, etc.

Changes to Fuel Conditions & Fire Environment

Fuel conditions have been altered along the path of the Hurricane, especially in coastal areas and the Southern Appalachians. Firefighters should be aware of the following key changes to the fire environment.

- Early leaf-drop and blowdown due to high winds resulting in, a) an immediate increase in fine dead surface fuel loading, b) more open stand conditions which allows for increased in-stand wind speeds, and c) more rapid drying of surface fuels due to increased sunlight exposure. These factors combine to increase rates of spread, flame length, and fire intensity.
- Storm debris and chip piles can smolder for prolonged periods (months), increasing spotting potential requiring extensive mop-up and/or long-term monitoring.
- In coastal areas subjected to storm surge or wind-blown sea water, salt-killed or stressed vegetation can become cured and available to burn soon after the storm passes.
- In the Southern Appalachians, expect rapid drying of surface fuels earlier than usual in the Fall due to early leaf-drop in areas impacted by high winds. Responders should not expect forest canopy to moderate the effects of precipitation patterns, evaporative demand, winds and slope aspect on fuel drying rates and resulting fire behavior.
- In affected areas, expect wholesale changes to previous fuel models across the landscape which will in turn affect predicted fire behavior. For example, mixed pine/hardwood stands best represented by Anderson Fuel Model 9 or Scott and Burgan TL8 in the recent past may now be best represented by slash blowdown models such as Fuel Model 12 or SB4. Adjust fuel models in fire behavior analyses to account for these changes, and update firefighters on the predicted changes to fire behavior in briefings and IAPs.
- Features on the Southern Apps landscape that held fire reliably in the past may be altered. Examples include riparian areas with jack-strawed timber that will now allow fire to cross due to continuous fuels and roads and trails which can no longer be counted on as holding features due to fallen trees and strewn debris.
- Alternatively, creeks and drainages that were scoured out by flooding rains may be good options for containment lines. In many cases channels have been widened out and burnable fuels were swept away from the edges of the channel.
- Heavy fuels such as limbs and tree boles which fell during the storm should not be available and significantly contribute to fire intensity during fall of 2024 but will gradually cure out this fall and become more available moving into spring of 2025. Blowdown, limbs, branches, and needle cast may act as ladder fuels allowing surface fires to become more intense and climb into the canopy.
- Expect a noticeable increase in fire intensity where leaves/treetops are suspended above the ground in a needle drape arrangement. This fuel arrangement may act as ladder fuels allowing surface fires to become more intense and climb into the canopy. Flame lengths will be significantly higher and more volatile under those circumstances.
- Widespread debris burning associated with storm clean-up and recovery in the Southern Apps will likely result in new ignitions and increased initial attack when conditions are dry.

Mitigation Strategies

Consider the following mitigation strategies to improve safety and effectiveness during suppression efforts.

- Using real time map updates with mapping apps, such as Field Maps, to continuously update and identify compromised roads, bridges, hazards, and potential containment lines provides critical information for crew safety and effective response to wildland fires and other emergencies.

- Indirect suppression may be a safer tactic than direct attack on wildfires in areas with heavy blowdown. Be prepared to draw a larger containment box and rely more on aerial resources for reconnaissance and suppression (water delivery and burnout operations).
- Implement prescribed burning soon after storm damage especially in areas with heavy fuels. This will help to consume fine fuels before larger fuels become available to burn, reducing the risk of high-intensity wildfires.
- Update medical and safety plans frequently to account for changing conditions. Ensure that extraction routes are established, and medical facilities are available.
- Establish clear communication plans, including protocols for lost communications, as outages may occur during an emergency response. Having backup systems such as satellite phones, Satellite Internet and prearranged check-in times can help maintain contact with resources.
- Coordinate with local agencies and landowners to coordinate resource sharing and access.
- When possible and available, use enclosed cabs for heavy equipment operations.
- Consider specialized equipment to clear debris such as feller bunchers and skidders.
- Conduct safety briefings at the beginning of each shift, reviewing current conditions, anticipated fire behavior, safety hazards, and emergency procedures.
- Order or increase UAS operations for scouting and improved situational awareness to reduce the need for ground crew, helicopter, and fixed-wing missions and associated risk exposure.
- Increase vigilance with wildfire prevention and early detection efforts as local pile burning activity increases for storm debris removal.