

Incident Summary Page for the 100 Fires Project

Incident Name: Chimney Tops 2 Fire Sometimes referred to as 2016 Great Smoky Mountains Wildfires; Gatlinburg Wildfires; or Sevier County Firestorm	Incident Date & Time: 11/23/2016 @ 18:00
Incident Location: Great Smoky Mountains National Park and Sevier County, Tennessee	Incident Size: 17,000 acres
Types of resources involved: Federal, tribal, state and local fire departments and resources	# of Fatalities/injuries: 14 civilian fatalities / 190 civilian injuries
Reason this fire was selected for the 100 Fires list: ➤ Civilian mass casualty event	
Conditions leading up to the event:	
<p>At the time the Chimney Tops 2 Fire started in November of 2016 the risk of wildland fire was significant in eastern Tennessee. Deepening drought had been expanding throughout the state since the summer. The Remote Automated Weather System (RAWS) stations in Great Smoky Mountains National Park had measured below average rainfall, and the frequency of rainfall events was below average as well. Fire danger indices which are calculated from RAWS weather observations, such as the Keetch-Byram Drought Index (KBDI) and the Energy Release Component (ERC), were at record levels. By late November, 60 percent of the state of Tennessee, including Sevier County where the Chimney Tops 2 Fire occurred, was classified as being in “Extreme Drought” or worse. Local remote weather stations measured record low humidity in the days immediately preceding the fire.</p> <p>The impact of the drought was substantial. The drought resulted in lower moisture contents of not only dead fuels such as leaves, sticks, logs, and duff, but live vegetation as well. In drought-free years, duff, large logs, and live vegetation such as understory shrubs are much less flammable. The addition of these fuels to a wildland fire increases its intensity and makes it more difficult to control. In addition to the drought-stricken fuels, the normal autumn leaf fall was underway in the widespread deciduous forest. With below average rainfall amount and frequency, this litter layer—normally somewhat compacted by moisture—remained uncompressed and subject to movement by winds. The fall fire season is also commonly characterized by the passage of cold fronts that are accompanied by low relative humidity and preceded by high winds. The combination of low relative humidity, strong winds, and hardwood leaf litter increases the likelihood of fires becoming larger and more difficult to control. In addition to cold fronts, extreme wind events called “Mountain Waves” frequently occur from November through March in the western foothills of the southern Appalachian Mountains. Mountain Waves typically occur two to four times per year.</p>	
Brief description of the event:	
<p>On November 23, 2016 a human-caused wildland fire started in the rugged Chimney Tops area of Great Smoky Mountains National Park in Tennessee. The <i>Chimney Tops 2 Fire Investigation Report</i> describes two phases. Phase One, from discovery on November 23 until mid-day on November 27, the fire grew slowly, from 1.5 acres to about 10 acres. Phase Two of the Chimney Tops 2 Fire began at mid-day on November 27 and continued through November 28 when—due to extreme fire behavior, exacerbated by drought conditions and extreme winds—the fire left the park.</p> <p>During the afternoon of November 27, the fire size was aerially mapped at 35 acres. At 20:15 hours, all resources were released from the fire because the fire appeared to be quiet. At 07:00 on the morning of November 28, a park employee reported the fire had moved a considerable distance during the night and fire size was estimated to be 250-500 acres. A spot fire approximately one to one and half miles northwest of the main fire’s edge was detected around 0800. At 11:15 hours, another fire was detected in the Twin Creeks area on the western boundary of the park.</p> <p>After the fire started on November 23 the fire would slowly grow as firefighters made plans to box it in using indirect attack. Under extreme weather conditions the fire left the park on November 28. High winds and dry fuels would push the fire from the park and merge with other wildland fires caused by downed powerlines outside the park. As these fires merged they were referenced as the “Sevier County Fires,” with the ultimate loss of 14 lives and 2,545 structures.</p>	
Fire behavior factors that were present during the event:	
<p>Fuels in the area of the fire consist mostly of hardwood litter accompanied by moderate to deep duff layers. Deciduous leaf fall was underway to various degrees at different locations of the eventual fire footprint, and most locations still had some dried foliage in tree canopies. In normal years, much of the leaf fall is compressed by precipitation and moisture as it lies on the forest floor. At the time of the fire in late November 2016, however, due to the drought and infrequency of rain, much of the hardwood litter could be described as “fluffy”—loose, not compacted, and easily moved by wind. Wind measured at several weather stations near the fire area show wind gusts began to increase around midnight on November 27 from 20 mph to more than 80 mph by 16:00 hours the next day. Sustained</p>	

Incident Summary Page for the 100 Fires Project

winds at the stations ranged from 10 to 30 mph. These winds also caused down powerlines which ignited other fires in Sevier County, including Gatlinburg.

All of the fire behavior factors—fuels, weather and topography—combined to create a violent fire environment, with short-range and long-range spotting, as well as rapid fire spread. At the firestorm peak, between about 18:00 and about 23:00 on November 28, these windblown fires were igniting over 2,000 acres per hour.

Operational lessons available for learning from this incident:

Unprecedented: because park rangers had never seen a fire on such a scale and amid such conditions, they failed to anticipate how quickly the flames could spread and how soon the blaze could erupt out of control. The largest fire in the park’s history occurred in 2001 and was 7000 acres.

Staffing: the fire started on the eve of the Thanksgiving holiday, and most of the fire staff was on leave. One person filled the roles of Fire Management Officer, overall Incident Commander and on-scene Duty Officer, which is contrary to policy.

Decision Support: full utilization of the Wildland Fire Decision Support System and other decision support services as well as documentation of strategy and tactics did not occur on the incident.

Communications: the park radio system was incompatible with the Gatlinburg Fire Department's radio system. Park and city fire crews couldn't talk to each other on their radios.

Weather Forecast: the weather forecast issued two days before the fire struck Gatlinburg, called for high winds but also predicted rain. No Red Flag Warning was issued. Personnel on the fire looked to the promised rain to help quench the blaze. The rain did come on the morning of November 29, after the fires had swept through Gatlinburg.

Topography: due to steep inaccessible terrain, fire personnel working the fire had planned and began an indirect strategy to contain the fire within a 400 acre box, but strong winds the morning of November 28 pushed the fire beyond the box.

Aircraft: the high winds prevented aircraft from flying to support the firefighting efforts on November 28.

Evacuations: downed powerlines, trees falling across roads, loss of cell and landline phone service all hampered evacuation communications and egress. Do not hesitate to begin evacuations early. If it turns out there was no evacuation needed, it is an inconvenience. If evacuation occurs too late, it could be a tragedy.

Gatlinburg experiences a high number of visitors from out of the area. Many of the visitors are unfamiliar with roads and evacuation routes. One of the outcomes of this incident was a recommendation to create printed disaster preparedness information to be distributed to all city and county residents and visitors through all media outlets, explaining specific actions to be followed if evacuations are directed by the public safety officials (e.g., directional maps with all egress routes clearly marked). While some communities have already adopted such measures, this is a worthwhile recommendation to consider for all communities adjacent to flammable vegetation.

Notable impact or historical significance for the wildland fire service from this incident:

Not applicable

Links to more information on this incident:

- <https://wildfiretoday.com/documents/ChimneyTops2Report.pdf>
- <https://wildfiretoday.com/tag/chimney-2-fire/page/2/>
- <https://www.nps.gov/orgs/1319/national-park-service-releases-review-of-chimney-tops-2-fire.htm>
- <https://www.nist.gov/publications/evacuation-decision-making-2016-chimney-tops-2-fire-results-household-survey>

The Wildland Fire Lessons Learned Center offers an excellent site which provides information on many wildland incidents.
[Wildland Fire Lessons Learned Center’s Incident Review Database \(IRDB\) \(wildfire.gov\)](https://www.wildfire.gov/)

This summary page was proudly provided by:
Dan Buckley, former Superintendent Arrowhead Hotshots

September 2023

Incident Summary Page for the 100 Fires Project

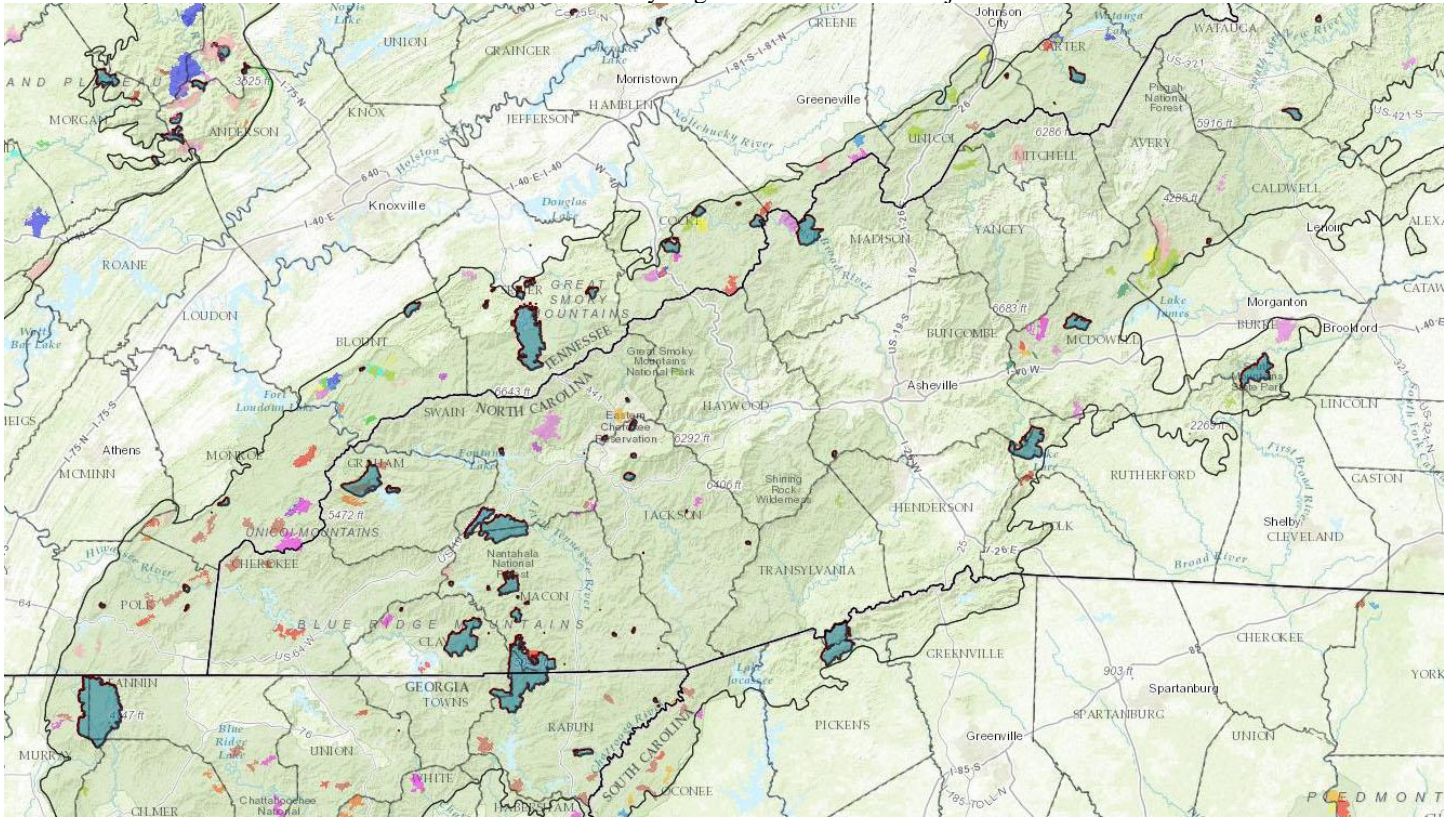


Figure 14 – The fires of 2016 occurring in the area surrounding Great Smoky Mountains National Park. Fires shown in blue were burning at the same time when the Chimney Tops 2 Fire started. Fires indicated in other colors are historical past fires. (from page 51, Chimney Tops 2 Fire Review Individual Fire Review Report)