Actuarial Weather Extremes: October 2020
Western US Wildfires, Hurricane Delta, Hurricane Zeta, Winter Storm Billy

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Overview

This report examines three costly phenomena in October 2020: Wildfires in the Western US states, Hurricanes Delta and Zeta, and Winter Storm Billy which occurred near and about the same time as Hurricane Zeta, leading to a compounding effect.

2020 Wildfires in Western U.S. States

The National Interagency Fire Center (NIFC) reports that in the US, as of November 9 there have been 49,149 wildfires that have burned over 8.7 million acres this year. This is almost double the acreage burned to date in the 2019 season.  

Hurricane Delta

Hurricane Delta made landfall October 9 near Creole, LA. Catastrophe risk modeling firm AIR quantified the insured damage from Hurricane Delta at from $1 billion to $3 billion.

Hurricane Zeta

Hurricane Zeta made landfall on October 28 near Cocodrie, LA, about 150 miles east of Hurricane Delta’s landfall 19 days earlier. Catastrophe risk modeling firm AIR Worldwide estimates onshore insured losses will range between $1.5 billion and $3.5 billion. Hurricane Zeta was the 27th named Atlantic storm of the season tying a record set in 2005.

Winter Storm Billy

On October 27 a rare October ice storm hit portions of Oklahoma and Texas. Combined with the outages from Hurricane Zeta’s landfall in Louisiana (October 28), the two events left nearly 3 million homes without power regionally on October 29.


Wildfires in the Western US

Figure 1

Utilizing data from the National Oceanic and Atmospheric Administration (NOAA) Societal Impacts Wildfire data which provides wildfire counts and acres burned in the US, the size of the US Wildfires in October 2020 is the largest; looking at October US wildfire data back to the year 2000.

WILDFIRE COUNT AND ACRES BURNED IN MONTH OF OCTOBER LAST 21 YEARS IN THE U.S.

The California Department of Forestry and Protection lists information about the 20 largest California wildfires. It’s November 3, 2020 update, shown in Figure 2, indicates that many are 2020 wildfires, and for several of those the amounts of acres burned was still incomplete at the time.

Figure 2
TWO OF THE FOUR LARGEST WILDFIRES IN CALIFORNIA ARE NOT YET FINAL

<table>
<thead>
<tr>
<th>FIRE NAME (CAUSE)</th>
<th>DATE</th>
<th>COUNTY</th>
<th>ACRES</th>
<th>STRUCTURES</th>
<th>DEATHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUGUST COMPLEX</td>
<td>August 2020</td>
<td>Mendocino, Humboldt, Trinity, Tehama, Glenn, Lake, &amp; Colusa, Napa, Lake, Mendocino &amp; Glenn</td>
<td>1,032,619</td>
<td>935</td>
<td>1</td>
</tr>
<tr>
<td>MENDOCINO COMPLEX</td>
<td>July 2018</td>
<td>Stanislaus, Santa Clara, Alameda, Contra Costa, &amp; San Joaquin</td>
<td>459,123</td>
<td>280</td>
<td>1</td>
</tr>
<tr>
<td>SCU LIGHTNING COMPLEX</td>
<td>August 2020</td>
<td>Fresno &amp; Madera</td>
<td>396,824</td>
<td>222</td>
<td>0</td>
</tr>
<tr>
<td>CREEK FIRE (Under Investigation)*</td>
<td>September 2020</td>
<td>Sonoma, Lake, Napa, Yolo &amp; Solano</td>
<td>877,093</td>
<td>853</td>
<td>0</td>
</tr>
<tr>
<td>LSU LIGHTNING COMPLEX (Under Investigation)*</td>
<td>August 2020</td>
<td>Butte, Plumas &amp; Yuba</td>
<td>363,229</td>
<td>1,401</td>
<td>6</td>
</tr>
<tr>
<td>NORTH COMPLEX (Under Investigation)*</td>
<td>August 2020</td>
<td>Shasta County &amp; Trinity</td>
<td>318,030</td>
<td>2,352</td>
<td>15</td>
</tr>
<tr>
<td>THOMAS (Powerline)</td>
<td>December 2017</td>
<td>Ventura &amp; Santa Barbara</td>
<td>281,393</td>
<td>1,063</td>
<td>2</td>
</tr>
<tr>
<td>CEDAR (Human Related)</td>
<td>October 2003</td>
<td>San Diego</td>
<td>273,246</td>
<td>2,920</td>
<td>15</td>
</tr>
<tr>
<td>RUSH (Lightning)</td>
<td>August 2012</td>
<td>Lassen</td>
<td>271,911 CA / 65,668 NY</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>RIM (Human Related)</td>
<td>August 2013</td>
<td>Tulare</td>
<td>257,311</td>
<td>112</td>
<td>0</td>
</tr>
<tr>
<td>ZACA (Human Related)</td>
<td>July 2007</td>
<td>Shasta</td>
<td>240,297</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>CARR (Human Related)</td>
<td>July 2018</td>
<td>Santa Barbara</td>
<td>229,651</td>
<td>1,614</td>
<td>8</td>
</tr>
<tr>
<td>MATILLA (Undetermined)</td>
<td>September 1992</td>
<td>Ventura</td>
<td>220,009</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>WITCH (Powerline)</td>
<td>October 2007</td>
<td>San Diego</td>
<td>197,999</td>
<td>1,659</td>
<td>2</td>
</tr>
<tr>
<td>KLASATH THEATER COMPLEX (Lightning)</td>
<td>June 2008</td>
<td>Siskiyou</td>
<td>192,038</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>MARBLE CONE (Lightning)</td>
<td>July 1977</td>
<td>Monterey</td>
<td>177,866</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>LAGUNA (Powerlines)</td>
<td>September 1970</td>
<td>San Diego</td>
<td>175,425</td>
<td>382</td>
<td>5</td>
</tr>
<tr>
<td>SQF COMPLEX (Lightning)</td>
<td>August 2008</td>
<td>Tulare</td>
<td>170,384</td>
<td>228</td>
<td>0</td>
</tr>
<tr>
<td>BASIN COMPLEX (Lightning)</td>
<td>June 2008</td>
<td>Monterey</td>
<td>162,818</td>
<td>58</td>
<td>0</td>
</tr>
<tr>
<td>DAY FIRE (Human Related)</td>
<td>September 2000</td>
<td>Ventura</td>
<td>162,762</td>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>

There is no doubt that there were fires with significant acreage burned in years prior to 1992, but these records are less reliable, and this list is meant to give an overview of the large fires in more recent times.

*Numbers not final.
Drought and High Temperatures

Figure 3 shows that during the month of October drought conditions worsened in much of the western US, including in those areas that have been impacted by wildfires.

Figure 3
DROUGHT CONDITIONS IN THE CONTINENTAL U.S. EARLY AND LATE OCTOBER


Coincidental with the worsening drought conditions in the Western US states in October, Figure 4 shows many Global Historical Climatology Network (GHCN) stations experienced their highest average daily high temperatures for the month of October in 2020, compared to all October station average values dating back to 1960.

**Figure 4**

STATIONS IN THE US AND CANADA WHERE OCTOBER 2020 AVERAGE DAILY HIGH TEMPERATURE WAS AMONG FIVE HIGHEST (1-5) AND FIVE LOWEST (57-61) DURING OCTOBERS DATING BACK TO 1960.

Source: Global Historical Climatology Network (GHCN) station data (Accessed November 6, 2020).
ftp://ftp.ncdc.noaa.gov/pub/data/ghcn/daily/ghcnd_all.tar.gz
Hurricane Delta

Precipitation

Hurricane Delta made landfall near Creole, LA on October 9, 2020. Figure 5 shows that several GHCN stations had record daily rainfall totals for October vs October daily totals back to 1960. Some stations recorded 10 or more inches of rain within a single day during October 6-13, 2020.

Figure 5
GHCN STATIONS WITH US PRECIPITATION RECORDS IN EXCESS OF 3 INCHES SET ON OCTOBER 6-13, 2020 FOR OCTOBER DAILY PRECIPITATION BACK TO 1960. THE CHART INDICATES INCHES OF DAILY RAINFALL.


Hurricane Zeta

Precipitation

Hurricane Zeta made landfall near Cocodrie, LA on October 28, 2020. As shown in Figure 6, Many GHCN stations had record daily rainfall totals for October vs October daily totals back to 1960. Several stations reported daily rainfall totals of five or more inches of rain during October 28-30, 2020.

Figure 6
US PRECIPITATION RECORDS IN EXCESS OF 4 INCHES SET ON OCTOBER 28-30, 2020 FOR OCTOBER DAILY PRECIPITATION BACK TO 1960. THE CHART INDICATES INCHES OF DAILY RAINFALL.


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Winter Storm Billy

Daily Minimum and Maximum Freezing Temperatures

Winter Storm Billy, an October ice-storm which impacted portions of Texas and Oklahoma on October 27, occurred during the lead-up to Hurricane Zeta. As shown in Figure 7, many stations experienced both high and low temperatures below freezing during October 25-28, 2020.

Figure 7
STATIONS WITH US DAILY HIGH (TMAX) AND DAILY LOW (TMIN) TEMPERATURES BELOW FREEZING ON OCTOBER 25-28, 2020. THE CHART INDICATES DEGREES FAHRENHEIT.


More Than 40,000 Still Without Power 10 Days After Oklahoma Ice Storm. Jan Wesner Childs. November 08, 2020
Compound Assessment

Time Lapse of Temperature and Precipitation

By clicking on the link below Figure 8, you can see the October 2020 hourly time lapse of temperature, precipitation and departure from the 1980-2010 average. The Figure 8 snapshot shows the colder temperatures and precipitation coincidental with Winter Storm Billy. The time lapse will also show the onset of precipitation associated with Hurricanes Delta and Zeta. From this you can see in the late part of October 2020, the compounding impacts of Winter Storm Billy with Tropical Storm Zeta October 27/28.

Figure 8
TEMPERATURE AND PRECIPICATION OCTOBER 2020 TIME LAPSE ANIMATION USING DATA FROM THE IOWA STATE UNIVERSITY AUTOMATED SURFACE OBSERVING SYSTEM (ASOS)


Click this Link for Time-Lapse Animation

https://drive.google.com/file/d/1qOXx1QUvlKa5X-gKH3ACPJk_Kz6S7YsQ/view?usp=sharing

Source: IA State: https://mesonet.agron.iastate.edu/request/download.phtml
Rough Assessment of the Losses Caused by Recent Extreme Weather

Economic and insured losses are often difficult to estimate in the immediate aftermath of an extreme weather event. With the passage of time, the extent of the losses gradually becomes clearer.

September 2020 Wildfires in Western U.S. States

The National Interagency Fire Center (NIFC) reports that in the US, as of November 9 there have been 49,149 wildfires that have burned over 8.7 million acres this year. This is almost double the acreage burned to date in the 2019 season. 8

October 9, 2020 Hurricane Delta

Hurricane Delta made landfall October 9 near Creole, LA. Catastrophe risk modeling firm AIR quantified the insured damage from Hurricane Delta at from $1 billion to $3 billion. Since Hurricane Delta made landfall only about six weeks and 12 miles from Hurricane Laura’s landfall (August 27, Cameron, LA), some areas affected by Delta could have been affected already by Laura. AIR assumes independence between these hurricanes in their modeling approach, and this reflected in the loss range. AIR’s estimates are for losses to onshore properties, automobiles, contents and time element coverages. 9

October 28, 2020 Hurricane Zeta

Hurricane Zeta made landfall on October 28 near Cocodrie, LA, about 150 miles east of Hurricane Delta’s landfall 19 days earlier. Catastrophe risk modeling firm AIR Worldwide estimates onshore insured losses will range between $1.5 billion and $3.5 billion. Hurricane Zeta was the 27th named Atlantic storm of the season tying a record set in 2005. The insured damage estimates include onshore property, automobile, contents and time element coverage. 10

September 16, 2020 Winter Storm Billy

On October 27 an unusually early Winter Storm Billy ice storm hit portions of Oklahoma and Texas. In Oklahoma, more than 400,000 homes and businesses were without power at the peak of the outages and more than 40,000 homes in and around Oklahoma City were still without power November 7.

Combined with the outages from Hurricane Zeta’s landfall in Louisiana, the two events left nearly 3 million homes without power regionally on October 29. 12

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Data

**Temperature and precipitation data** used in this report was obtained from the **Global Historical Climatology Network** (“GHCN”) weather database, which provides daily weather observations from over 100,000 weather stations worldwide, covering over 180 countries. The database is publicly available through the National Oceanic and Atmospheric Administration (NOAA) via the following FTP site:

Filename: ghcnd_all.tar.gz

Wildfire data


Source: California Department of Forestry and Fire Protection  As of November 3, 2020
[https://www.fire.ca.gov/media/11416/top20_acres.pdf](https://www.fire.ca.gov/media/11416/top20_acres.pdf)

Automated Surface Observing System (ASOS) temperature and precipitation data

The steps below show how to get the hourly temperature and precipitation at the STL Airport, as an example, from the Iowa State University Automated Surface Observing System (ASOS):

IA State: [https://mesonet.agron.iastate.edu/request/download.phtml](https://mesonet.agron.iastate.edu/request/download.phtml)

1) Select “Missouri ASOS” as the network and click “Switch to Network”

2) In the list of available stations, select the “[STL] ST. LOUIS” station, and click “Add Selected”

3) In the “Select From Available Data” section, choose the “Air Temperature [F]” and “1 hour Precipitation [inch]” options.

4) Set the date range to 2020-October-1 and 2020-October-31 (or whatever range is desired)

5) Select “Yes” for “Include Latitude + Longitude”

6) Click “Get Data” at the bottom

These steps would give you the results from the URL below.

[https://mesonet.agron.iastate.edu/cgi-bin/request/asos.py?station=STL&data=tmpf&data=p01i&year1=2020&month1=10&day1=1&year2=2020&month2=10&day2=31&tz=Etc%2FUTC&format=onlycomma&latlon=yes&elev=no&missing=M&trace=T&direct=no&report_type=1&report_type=2](https://mesonet.agron.iastate.edu/cgi-bin/request/asos.py?station=STL&data=tmpf&data=p01i&year1=2020&month1=10&day1=1&year2=2020&month2=10&day2=31&tz=Etc%2FUTC&format=onlycomma&latlon=yes&elev=no&missing=M&trace=T&direct=no&report_type=1&report_type=2)
Acknowledgments

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