



# FIRE WEATHER SUMMARY 2020

## Alaska Interagency Coordination Center

---

Heidi Strader [heidi\\_strader@nps.gov](mailto:heidi_strader@nps.gov)

Eric Stevens [eric\\_stevens@nps.gov](mailto:eric_stevens@nps.gov)

<https://fire.ak.blm.gov/predsvcs/weather.php>

907.356.5691

PO Box 35005

Ft. Wainwright, AK 99703



# TABLE OF CONTENTS

OVERVIEW _____	3
CONDITIONS AT THE START OF THE SEASON _____	6
Spring Snowpack _____	6
The Status of Drought in Alaska upon Breakup _____	8
The Seasonal Forecast _____	8
WEATHER MONTH BY MONTH _____	10
April _____	10
May _____	12
June _____	13
July _____	16
August _____	18
ACKNOWLEDGEMENTS _____	20

# OVERVIEW

Mark Twain has helpfully pointed out that, “Climate is what you expect, but weather is what you get.” While climate may now be changing over distressingly short time scales, weather is even more mercurial. The weather during Alaska’s 2019 wildfire season included enough long bouts of heat and extended dry spells to facilitate the consumption of 2.5 million acres of the landscape and occasional extreme wildfire behavior. The year 2020 was quite a different animal.

Statewide temperatures in June, July, and August were substantially cooler than the temperatures in 2019, per figure 1 below. Interestingly, temperatures in 2020 were quite normal when one considers the entire span of data reaching back to 1925. But for those who have only recently moved to Alaska, the summer of 2020 may have seemed disappointingly cool.

The season’s precipitation (figure 2) was somewhat variable across the state, with much of the Interior being quite wet while much drier conditions predominated over the North Slope, west coast, and Prince William Sound. Thus the areas typically most prone to significant wildfire activity received well above normal amounts of rain.

The combination of moderate temperatures and ample rainfall through the season over the most fire-prone parts of Alaska effectively kept a lid on fire activity, particularly after the

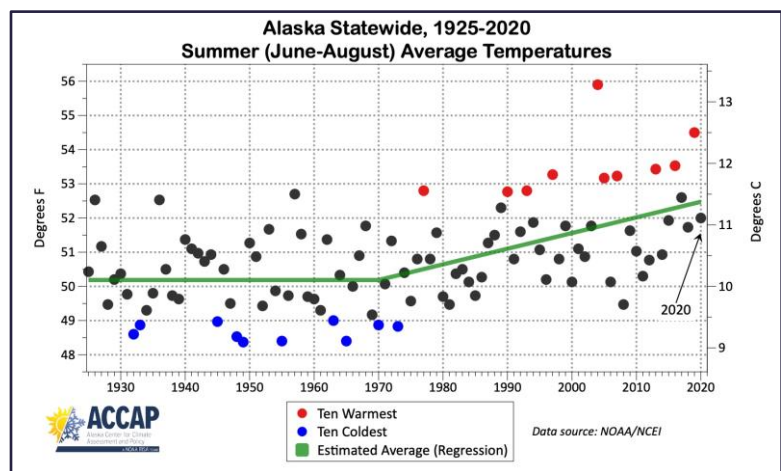


Figure 1 Timeseries of statewide temperatures over the summer months.

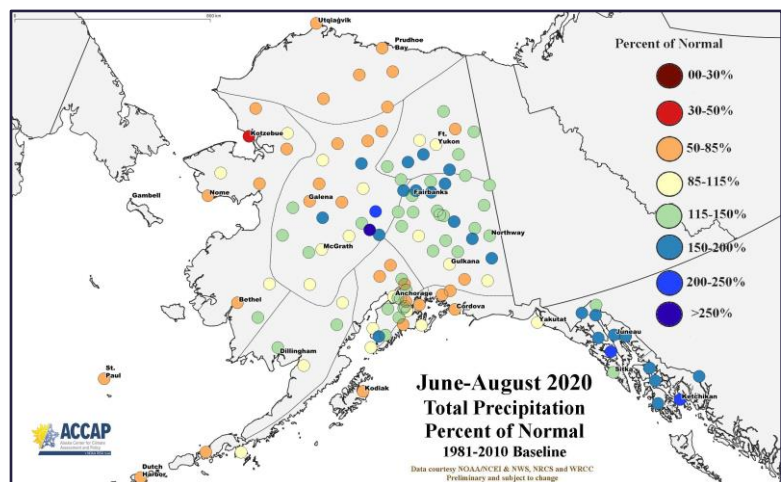


Figure 2 Percent of normal precipitation showing much of the Interior well above normal in 2020.

summer solstice. The meager number of acres burned in 2020 (181,253 acres) illustrates the stranglehold the weather had on wildfire development and behavior for much of the season. That total in itself is noteworthy for its strong departure from the tally in 2019, and also because there was remarkably little growth in acreage in July, a month that typically features some of the season's most active wildfires. Figure 3 depicts the accumulation of acres burned day by day through the season in comparison to the larger seasons since 2004.

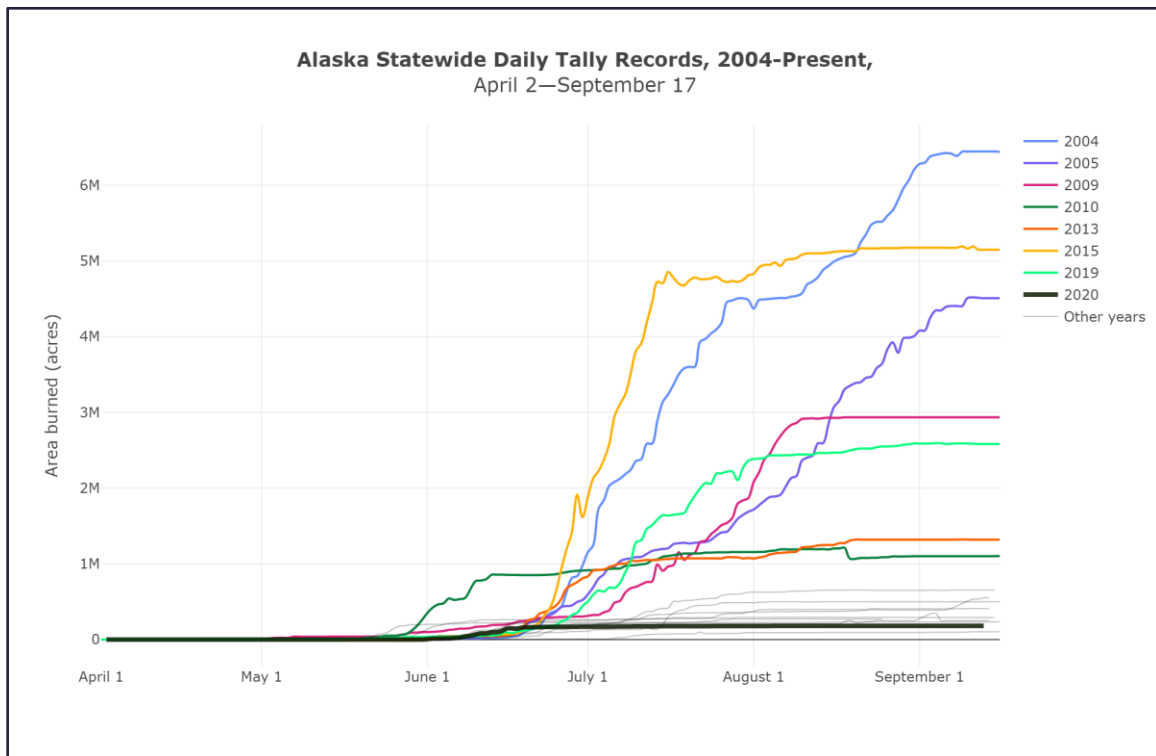


Figure 3 The accumulation of burned acres through the season.

Another metric expressing the tame nature of the summer is the number of days in which wildfire smoke reduced visibility at Fairbanks International Airport to six miles or less. The grand tally for such days this year was exactly zero, a shut-out that hasn't occurred since 1996.

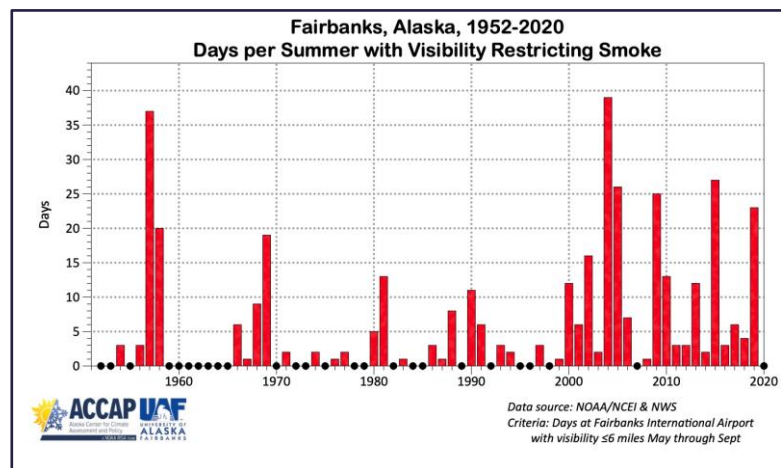


Figure 4 Number of days each summer with smoke reducing visibility at Fairbanks International Airport.

With regard to fuels, the wet weather combined with the absence

of extended heat waves over Alaska's Interior prevented the duff layers from drying to a state that would support a more active fire season. Figure 5 compares the average values of the buildup index (BUI) observed in Alaska's Interior during the very active wildfire seasons in 2015 and 2019 against the much quieter season in 2020. The values of BUI observed during these three seasons remained fairly similar from the start of the season through mid June, but then diverged from that point. The contrast between the 2019 and 2020 seasons is striking, as heavy rains soaked much of Alaska's Interior in June and July of 2020, typically the heart of the season when wildfire behavior can be most extreme. The average BUI never recovered to values around 50 again for the remainder of the season after reaching that peak in mid June. In contrast, no such rains occurred in 2019 when the duff layers dried to the point that ash pits were a significant hazard on the McKinley Fire at the end of the season. For the purposes of this analysis, predictive service areas AK01E, AK01W, AK02, AK03N,

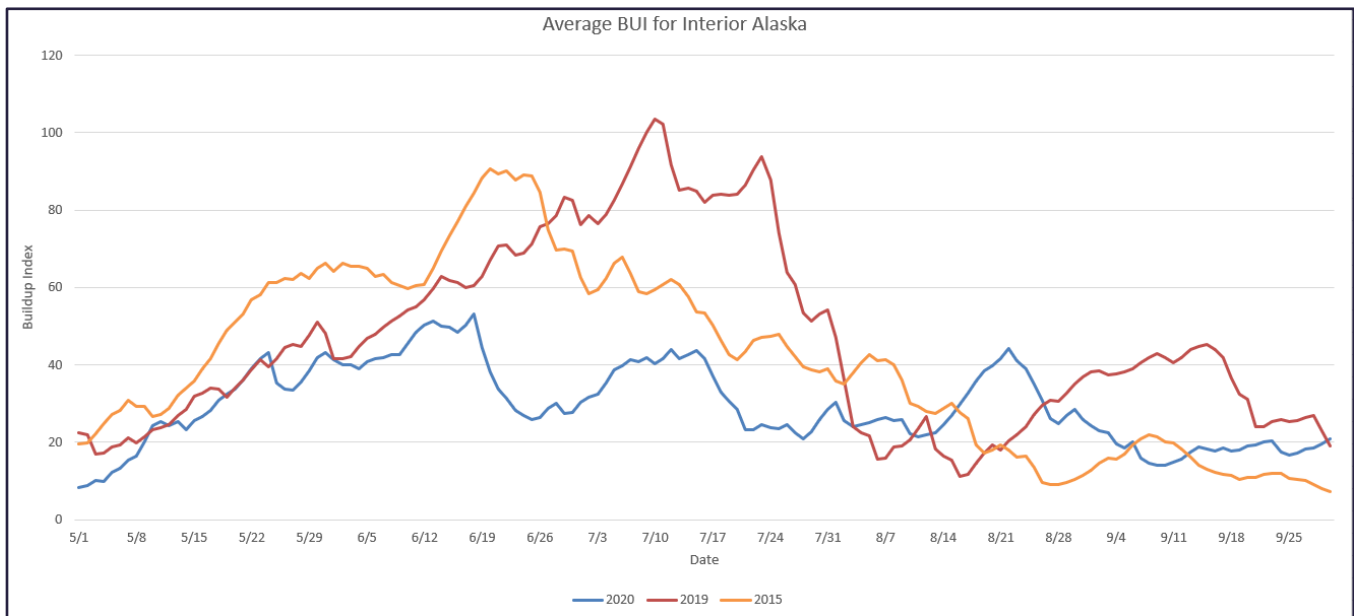


Figure 5 Buildup Index for Alaska's Interior

AK03S, AK04, AK05, AK07, and AK09 are defined as Alaska's Interior.

# CONDITIONS AT THE START OF THE SEASON

## Spring Snowpack

The winter of 2019-2020 featured ample snowfall over Alaska's Interior, leaving some of the most fire-prone regions of the state with a snowpack containing as much as 200% of the normal amount of water on April 1<sup>st</sup>. In contrast, the snowpack over South Central Alaska was below normal on that date.

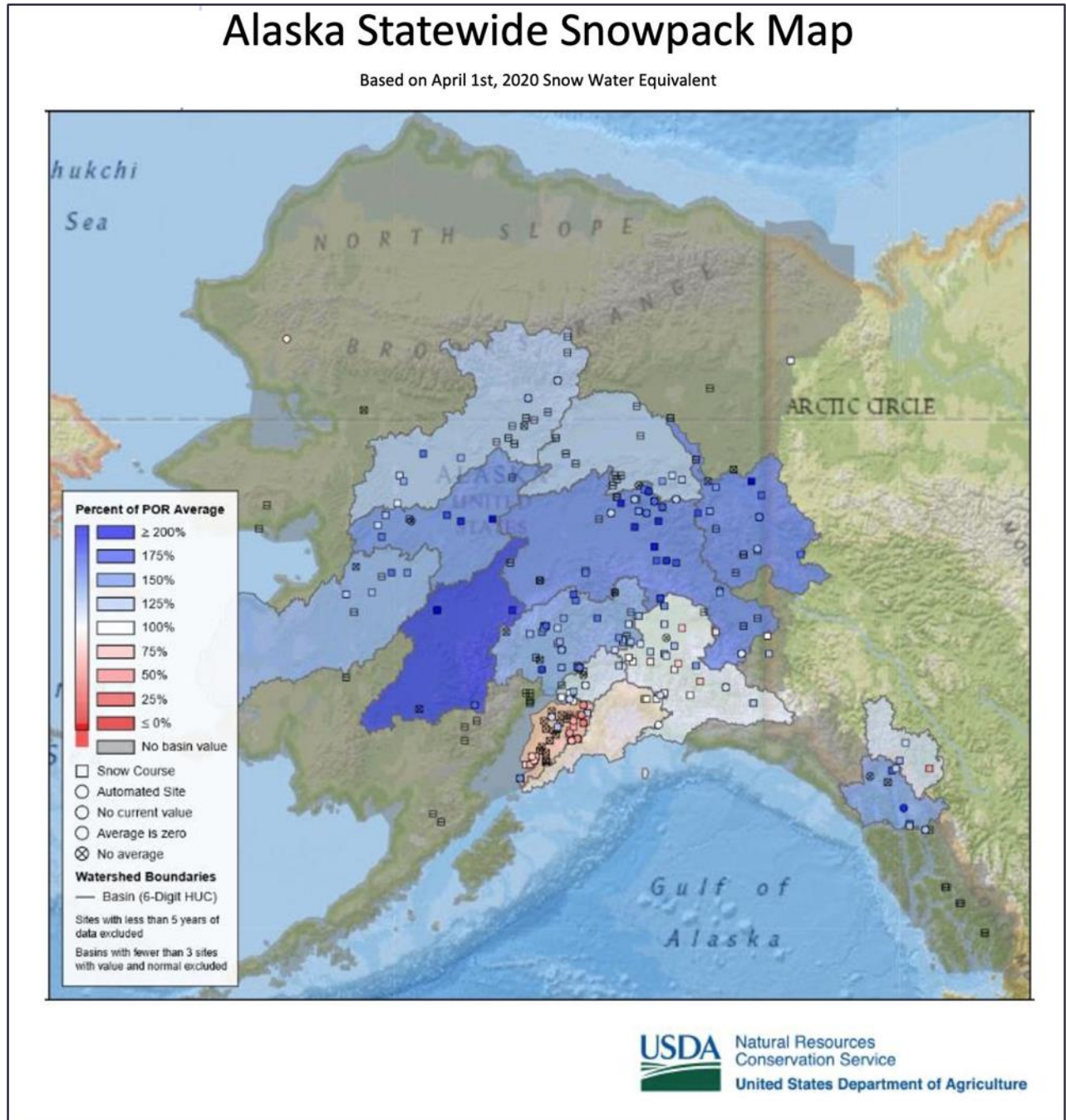


Figure 6 Snow water equivalent expressed as a percent of normal for portions of Alaska's Interior and South-Central Alaska, based on data from April 1<sup>st</sup>, 2020.

A closer look at one specific site, in this case Fielding Lake in the eastern Alaska Range, reveals that the winter of 2019-2020 left at least portions of the Interior with the highest values of both snow depth and snow water equivalent yet recorded.

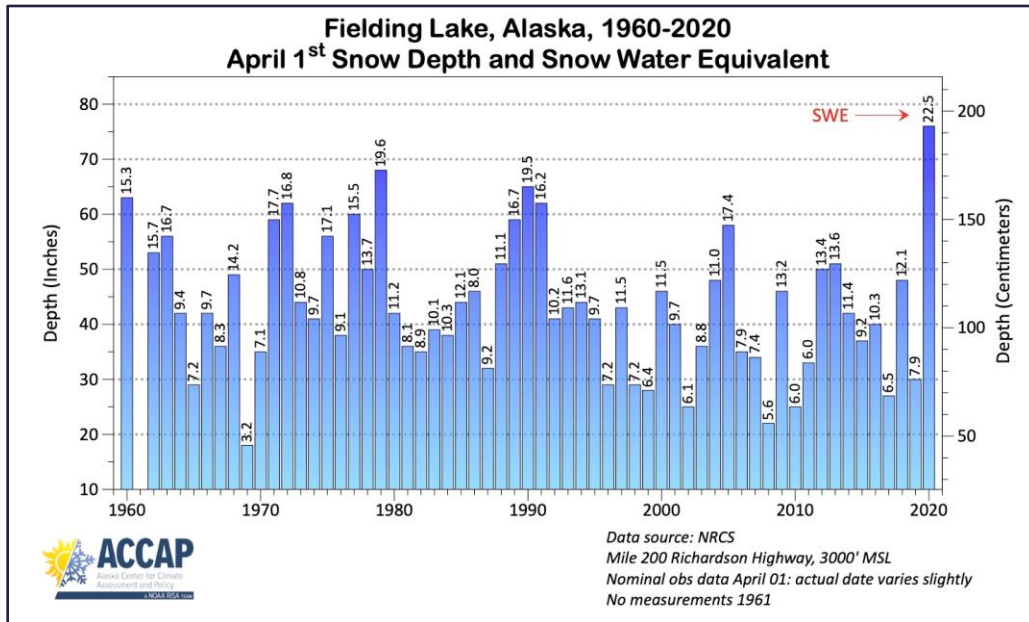


Figure 7 The highest snow depth and highest snow water equivalent ever observed at Fielding Lake.

Long-term weather trends for Interior Alaska show that March and April are typically the driest months of the year. Not so in 2020, when precipitation totals were several times the normal value in March and then again in April as per the table 1.

Location	March 2020 Precipitation Percent 1981-2010 Normal	April 2020 Precipitation Percent 1981-2010 Normal
Utqiagvik	1011%	475%
Kotzebue	259%	244%
Nome	309%	325%
McGrath	247%	249%
Fairbanks	636%	410%
Bethel	166%	277%
King Salmon	244%	276%
Anchorage	237%	306%
Talkeetna	253%	256%

Table 1 Precipitation was well above normal at numerous locations in Alaska in both March and April

These amazing departures from normal are made more possible because the value of “normal” is so low at this time of year.

Figure 8 shows trends in the depth of the snowpack at Fairbanks International Airport from March through May over the last several decades, with the measurements from the 2020 season through April 8<sup>th</sup> included as the black trace. In comparison to 2019, the snowpack in 2020 was not only deeper but also resistant to melting during the first week of the month. The blue trace depicting the snow depth in spring of 2013 was the last time Alaska had a widespread and very long-lived cold snap. The cold weather delayed breakup on the rivers

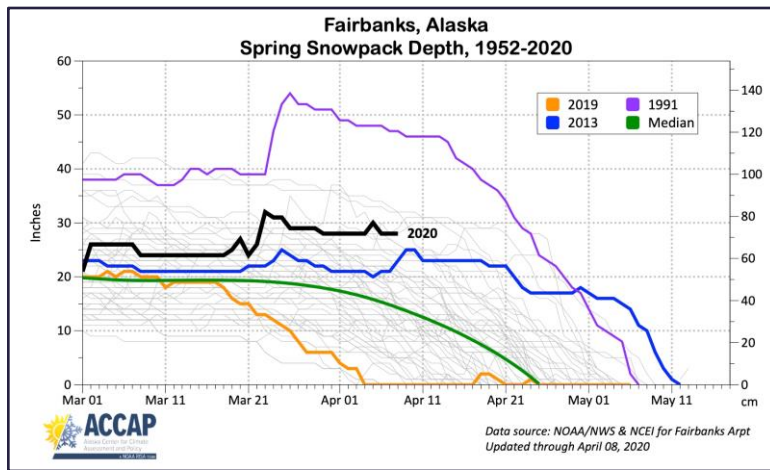


Figure 8 Depth of snowpack at Fairbanks International Airport as of April 8<sup>th</sup>. While snow depth was above average in the spring of 2020, it was nowhere close to the record set in 1991.

through the entire month of April and contributed to the ice jam flooding that devastated Galena in May of that year.

## The Status of Drought in Alaska upon Breakup

Thanks to the healthy precipitation totals received over most of the state through the winter, Alaska

began the 2020 wildfire season with no portion of the state in drought status according to the official US Drought Monitor. By way of comparison, Alaska began the 2019 wildfire season with the Southeast Panhandle in a state of moderate drought. These indicators suggested

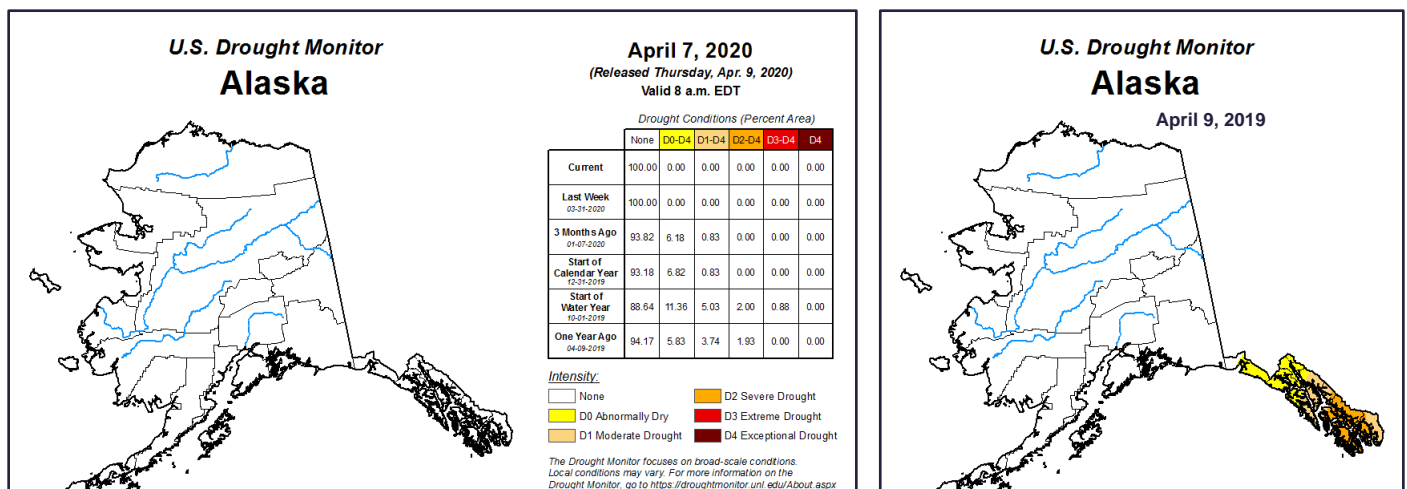


Figure 9 US Drought Monitor showing all of Alaska being drought-free as of April 7<sup>th</sup>.

that extreme wildfire behavior would be quite unlikely during the early part of the season when the character of the remaining snowpack is most influential on fires.

## The Seasonal Forecast

Predictive Services issued a four-month forecast at the end of March 2020 expressing the likelihood of wildfire activity being either below normal, around normal, or above normal for each month. Unfortunately, these forecasts can be disappointingly unreliable in Alaska, primarily due to the loose connection between Alaska's weather and global forcing mechanisms such as El Niño during the summer. The forecast called for below normal



wildfire activity over Alaska's Interior in April due to the unusually high amount of liquid water within the snowpack. The forecasts for May through July were less declarative, calling for the state to have roughly normal conditions.

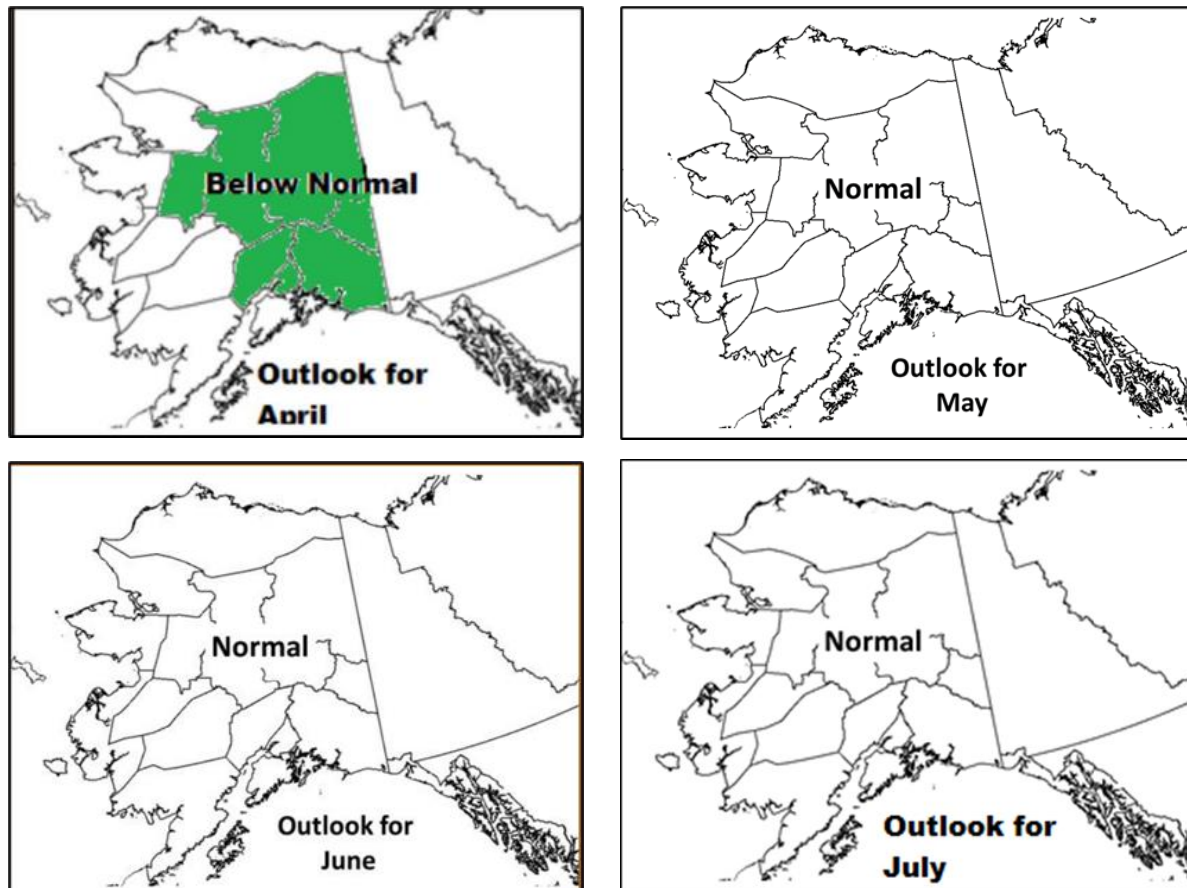


Figure 10 The four-month forecast for the majority of Alaska's wildfire season, as issued at the end of March

# WEATHER MONTH BY MONTH

## April

Temperatures across Alaska in April included slight departures from normal, both positive and negative, over the Interior and the Southeast Panhandle. At the same time, the North Slope and western Alaska were uniformly and dramatically warmer than normal.

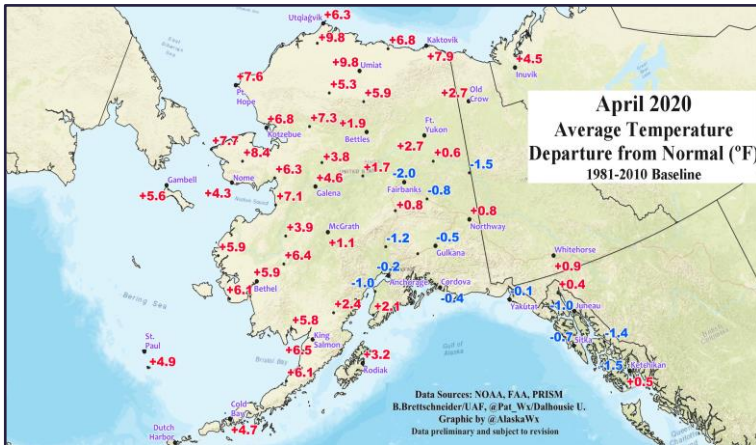


Figure 11 Departure from normal temperatures in April showing the uneven distribution of the hottest weather.

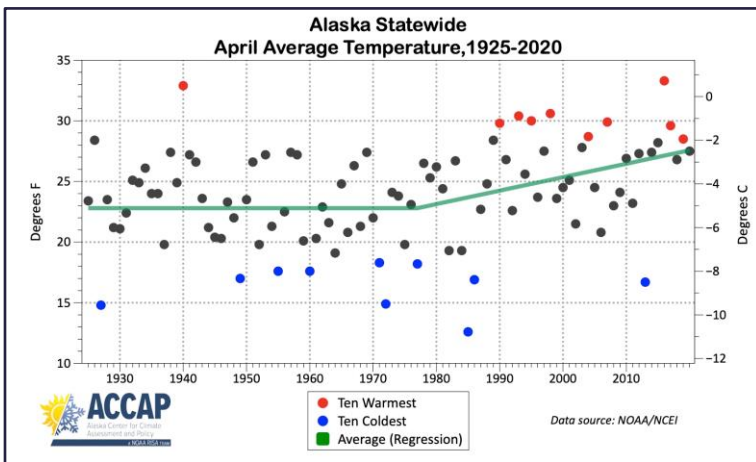


Figure 12 Statewide average temperatures in April.

and western Alaska were uniformly and dramatically warmer than normal. The noticeable positive departures in temperature along the West Coast and North Slope are not a new phenomenon. Per figure 12, a statewide warming trend has been underway for several decades, and this trend has been most prominent along Alaska’s Arctic and Bering coastlines.

The ice on the Tanana River at Nenana broke up on April 27<sup>th</sup>, a date typical in recent decades. But per figure 12, April 27<sup>th</sup> is rather early within the broader data set going back to before 1920. Note the date of breakup in 2019, April 14<sup>th</sup>, by far the earliest moving of the tripod on record.

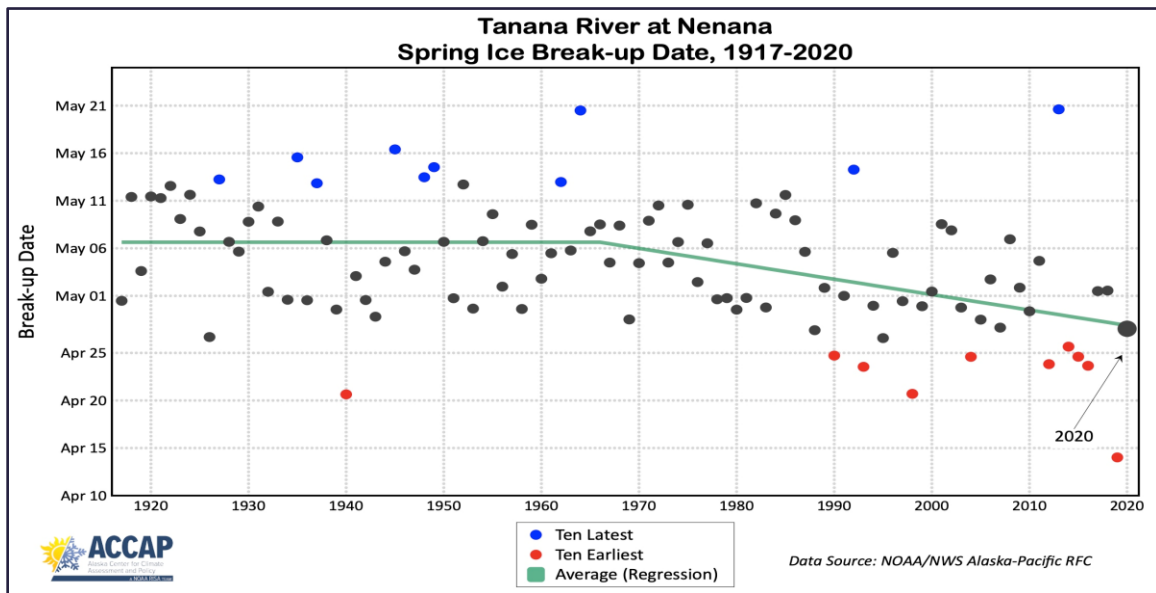


Figure 14 Date of breakup for the Nenana Ice Classic. Note that the date of April 14<sup>th</sup> observed in 2019 is by far the earliest breakup.



Figure 13 Drip torch operations at the Trumpeter Fire on April 30<sup>th</sup>.

As usual during breakup, by month's end enough cured grasses had been exposed by the melting snow to allow for grass fires to break out, and proscribed burning was also initiated. The picture above shows drip torch operations at the Trumpeter Fire near Point MacKanzie on April 30<sup>th</sup>.

## May

May began with a very respectable heat wave over the Interior during Mother’s Day Weekend, and accordingly the first handful of Red Flag Warnings of the year were issued for hot, dry, and windy conditions between Fairbanks and Tok. The temperature at Fairbanks International Airport reached 82 (F) on May 10<sup>th</sup>, a reading which was, quite surprisingly, destined to be the hottest temperature for the entire summer at Fairbanks. The last time Fairbanks’ high for the season occurred during the first half of May was back in 1995 with a reading of 88 degrees on May 11<sup>th</sup>. Red Flag Warnings were also issued on May 21<sup>st</sup> and

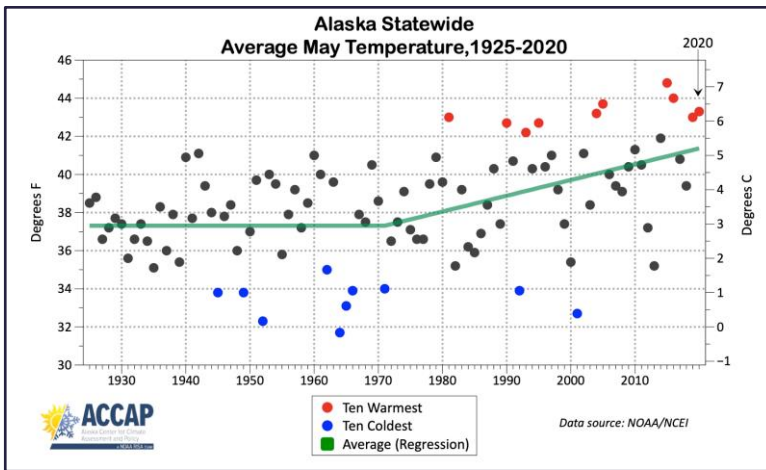


Figure 15 Timeseries of statewide temperatures in April.

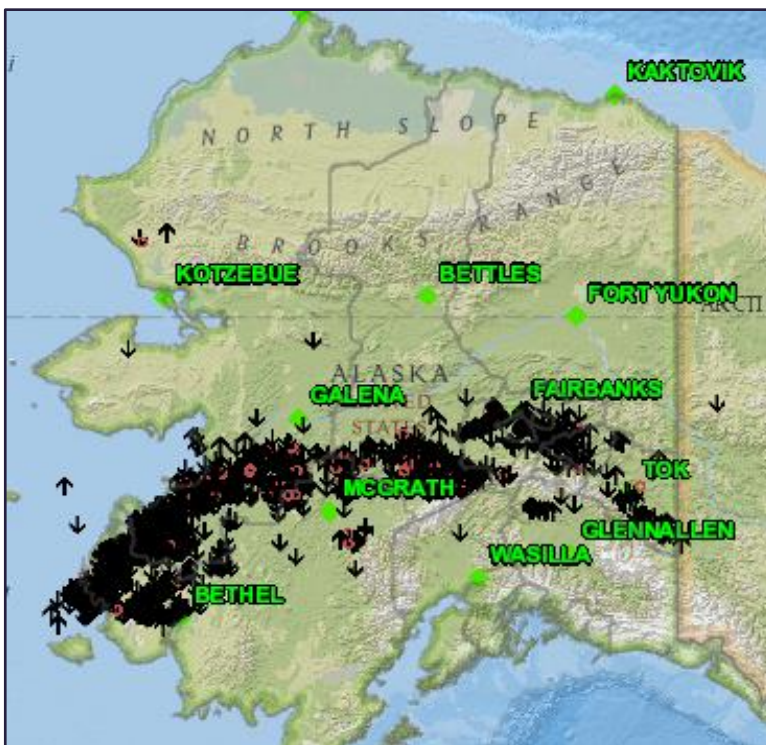


Figure 16 Cloud-to-ground lightning strikes detected on May 31<sup>st</sup>, 2020.

22<sup>nd</sup> for the Yukon Flats north and east of Ft Yukon. During the last days of the month, several Fire Weather Watches and Red Flag Warnings were issued for portions of the Interior, western Alaska and the Susitna Valley as a period of warm, dry, and breezy weather settled over Alaska and thunderstorm activity intensified. By June 1<sup>st</sup>, all the warnings had expired. This flurry of warnings proved to be the most widespread Red Flag event of the entire season.

Warm weather continued over a broad portion of the state until the end of the month. May of 2020 thus entered the record books as one of the ten hottest Mays ever observed in Alaska. The date of spring green-up, or “leaf day,” on Chena Ridge outside Fairbanks has been tracked consistently since the 1970s. Green-up typically occurs in early

May, or in late April during recent decades. Green-up in 2020 arrived on May 10<sup>th</sup>, a date that falls within the range of nearly normal values. May literally ended with a bang, as numerous thunderstorms erupted over the southern Interior and Southwest Alaska on May 30<sup>th</sup> and 31<sup>st</sup>. As was the case during all thunderstorm outbreaks in 2020, these thunderstorms were predominantly wet. Despite the ample rainfall, these thunderstorms started 9 new fires on May 30<sup>th</sup> and 13 new fires on May 31<sup>st</sup>.

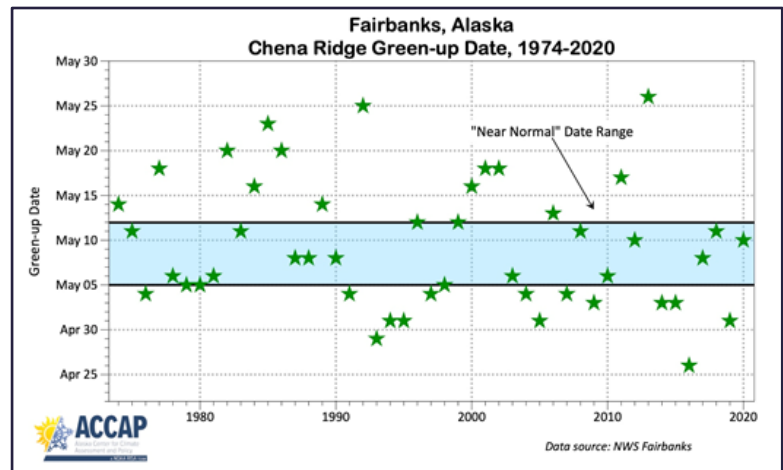


Figure 17 Timeseries of Green-up dates in Fairbanks



Figure 18 Retardant is dropped at the Murray Creek Fire on May 10<sup>th</sup> as residents look on.



Figure 19 The Moose Meadow Fire, May 16<sup>th</sup>.

## June

Alaska's wildfire season typically kicks into high gear in June with warming temperatures, increasingly frequent thunderstorms, and a drying duff layer. June 2020, however, proved to be quite wet over Alaska's Interior, with several bouts of rain soaking the southeastern Interior via the classic "back door" pattern in which a closed area of low pressure centered over the Gulf of Alaska sends waves of moisture into the Interior from the southeast.

Broad swaths of Alaska received twice the normal amount of rainfall in June, and some local areas were even wetter. The Panhandle, the Interior, and western Alaska all finished the month with totals well above normal.

One region of Alaska that was particularly soaked in June was the central Interior around Fairbanks, as total rainfall in the greater Fairbanks area in June ranged from three to six inches. Fairbanks International Airport set a record for the highest total rainfall accumulated over any three-day period in June: 2.14 inches from June 19<sup>th</sup> through the 21<sup>st</sup>. In fact, so much rain fell that some fire crews redirected their efforts from firefighting toward protecting Nenana from being flooded by the swollen Tanana River.

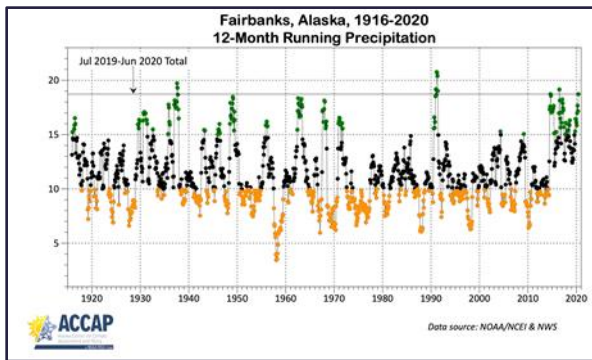


Figure 20 Increase in precipitation in Fairbanks

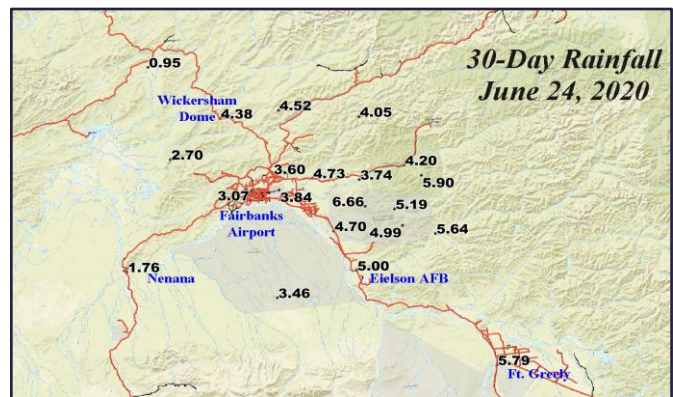


Figure 21 Rainfall in the Fairbanks region for the 30-day period ending on June 24<sup>th</sup>.



Figure 22 Members of the White Mountain Fire Crew fill sandbags in Nenana on June 25<sup>th</sup>.

Temperatures in June were roughly around normal for the Panhandle, South Central Alaska, and the Interior, with a scattering of minor departures from normal in both the positive and negative directions. In contrast, departures from normal were uniformly on the warm side for western Alaska and the North Slope, continuing a trend in recent decades of warming temperatures along the coast reflecting the reduction in sea ice and a rising of sea surface temperatures.

The most impactful fire of the 2020 season was ignited by lightning during the first week of June along the Dalton Highway near the Yukon River Bridge, a comparatively sensitive location due to the proximity of the highway and the Trans-Alaska Pipeline. The resulting Isom Creek Fire eventually grew to 12,000 acres.

Thunderstorms are typical in Alaska in June, especially over the Interior, and June of 2020 was more convectively active than usual. Thunderstorms rumbled through Anchorage three days in a row from June 5-7, and Fairbanks International Airport recorded thunderstorms on nine different days during the month, the second-highest number of thunderstorm days at Fairbanks ever observed in June. These thunderstorms were quite wet and occurred in areas where the fuels were not receptive to a large numbers of new ignitions.

Hot, dry, and windy weather necessitated the issuance of Red Flag Warnings over portions of the Interior on June 13<sup>th</sup>. Red Flags were also issued for gusty Chinook winds surfacing from Isabel Pass north to Delta Junction in the afternoon and early evening on June 17<sup>th</sup>.



Figure 23 Scorched Earth Services crew members from Huslia and Allakaket at Fairbanks International Airport preparing to deploy to the Isom Creek Fire, June 9, 2020.

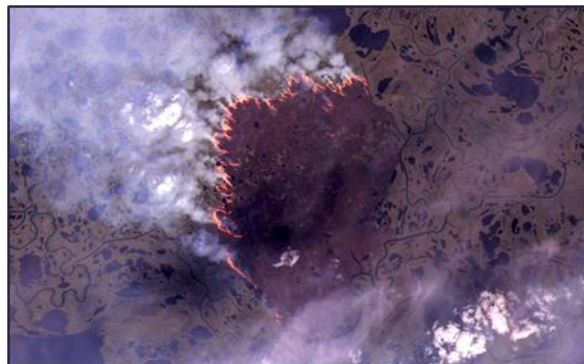


Figure 24 Landsat 8 visible and thermal imagery showing the active fire front on the Isom Creek Fire, June 11, 2020.





northeastern Interior, northeast of Ft Yukon. Northwest Alaska was dry as well, as Kotzebue received just over half its normal precipitation over the month.

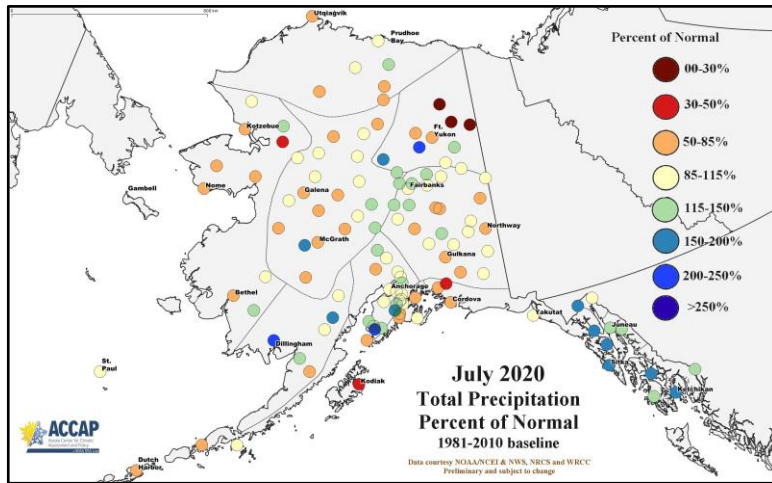


Figure 27 Precipitation in Alaska in July

As appropriate for a month in which only 8,840 acres were consumed by wildfires, only two Red Flag Warnings were issued across the state during the month. On July 2<sup>nd</sup> Red Flags were issued for dry and windy weather in the Haines and Skagway areas of the northern Panhandle, and these warnings proved to be the only Red Flags issued for the Panhandle through

the entire season. On July 3<sup>rd</sup> a Red Flag Warning was needed for the Copper River Basin during a widespread outbreak of wet thunderstorms. Quite remarkably, no Red Flags were issued in Interior or Western Alaska through the entire month.

A comparison of the Buildup Index (BUI) from July 7<sup>th</sup> of 2019 and July 7<sup>th</sup> of 2020 illustrates the contrast between the two seasons.

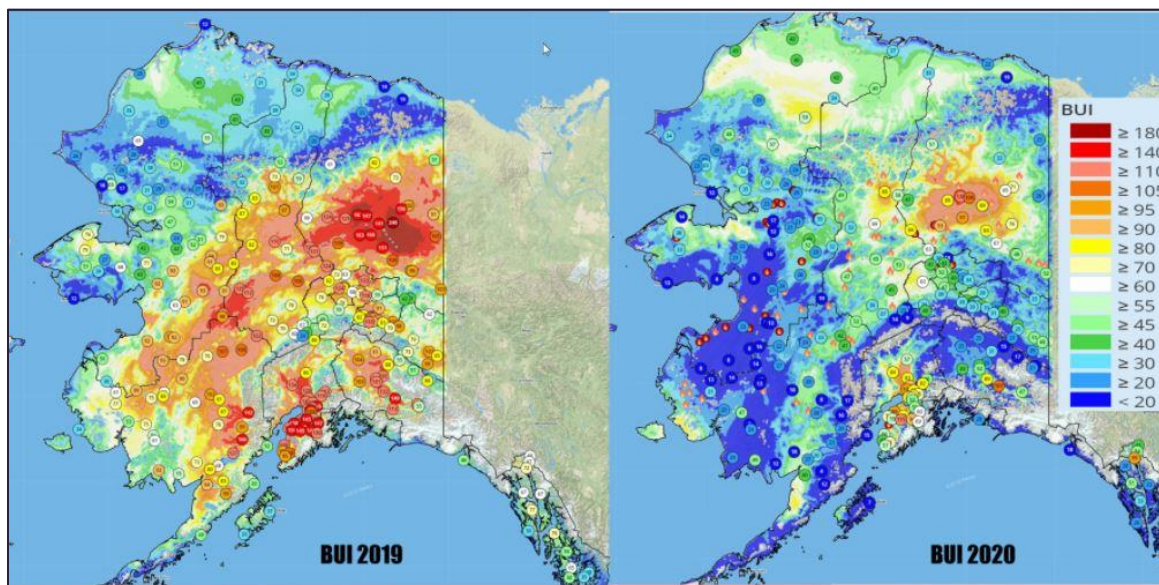


Figure 28 Analysis of Buildup Index for July 7<sup>th</sup> in 2019 and 2020.

## August

August, along with July, is typically the heart of the wet season for much of Alaska, and the weather in August of 2020 was indeed wet and in general did not support extreme wildfire behavior.

As a symbol of the overall wet nature of the 2020 wildfire season, a thunderstorm poured 0.61” of rain at Anchorage International Airport in only one hour on August 9<sup>th</sup>, setting a new record for the most intense one-hour rainfall ever recorded. Wet thunderstorms also continued into August over Alaska’s Interior, and by the end of the month staff at Fairbanks International Airport had observed lightning on a total of 19 days for the entire season, tying the record for the greatest number of thunderstorms observed in a single season that was originally set in 1988.

Precipitation in August again was most prominent over the Interior, with much

of this area receiving 200% or more of the normal rainfall. Results were quite different over Western Alaska, especially in the Kotzebue region, where the weather was dry enough for the second month in a row to bring that area into a category of Moderate Drought.

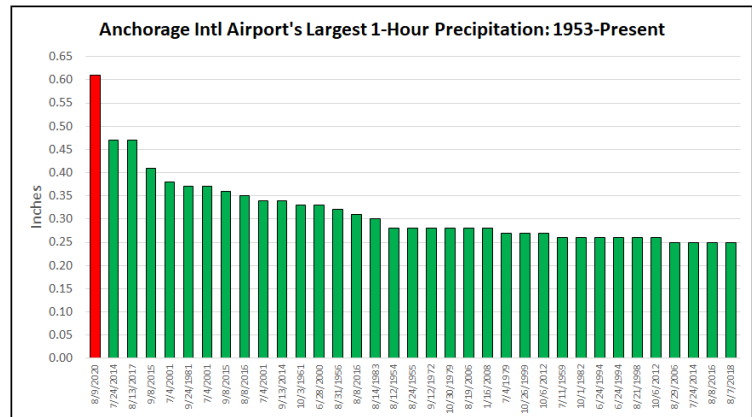


Figure 29 Greatest one-hour rainfall events in Anchorage

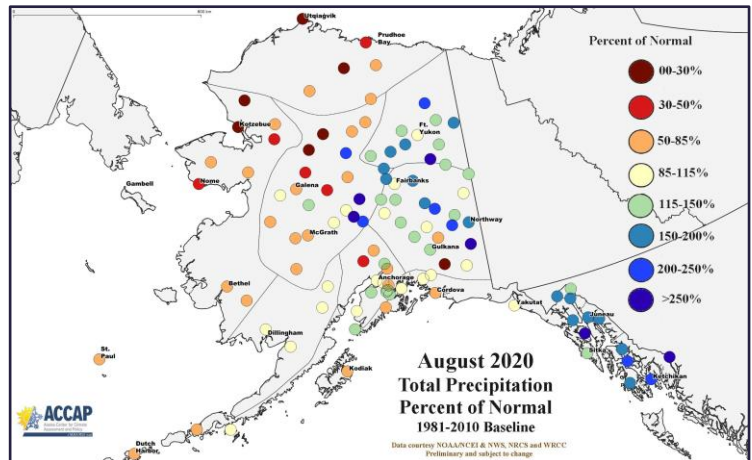


Figure 30 Precipitation in August across Alaska

Wildfire activity in Alaska typically tapers off with the arrival of seasonal rains, cooling temperatures, and diminishing hours of daylight. The highest temperatures reached during the entire season were comparatively low over much of Alaska, with even the Interior failing to rise above the upper 70s and lower 80s.

Only a handful of Red Flag Warnings were issued during the month, with the bulk of those warnings pertaining to a stretch of comparatively hot, dry, and windy weather over South Central Alaska during the middle of the month. The final Red Flag Warning of the 2020 season was issued on August 19<sup>th</sup> for hot, dry, and windy conditions over the Susitna Valley and expired at 2200 hours.



Figure 31 The highest temperatures observed in the 2020 season

By the end of August temperatures cooled even further, and the initial snows of the autumn season fell over the higher terrain. With the wildfire season effectively over, weather briefings were concluded on August 28<sup>th</sup>.



Figure 32 FAA webcam view of Denali on August 30<sup>th</sup>.

# ACKNOWLEDGEMENTS

Thanks are given to those who contributed to this report. The staff at the Alaska Center for Climate Assessment and Prediction (ACCAP), and Rick Thoman in particular, produced many of the helpful graphs. GaBriella Branson and Chris Moore of the Alaska Interagency Coordination Center provided statistical input regarding acres burned and the state of the fuels indices through the season. Tim Mowery, Public Information Officer with the Alaska Fire Service, and Beth Ipsen, Public Affairs Specialist with the Bureau of Land Management, provided many of the images from the field shown in the document.