Alaska Statewide Climate Summary April 2020

APRIL 2020 HIGHLIGHTS:

- **THE APRIL TEMPERATURES WERE 4º TO 8ºF HIGHER THAN AVERAGE FROM THE ALEUTIAN ISLANDS ALONG THE BERING SEA COAST TO ALASKA'S ARCTIC AND THE NORTH SLOPE.**
- **UTQIAĠVIK SET A NEW DAILY RECORD FOR LOWEST MINIMUM TEMPERATURE OF -20°F ON APRIL 29TH. THIS IS THE FIRST RECORD COLD LOW SET IN UTQIAĠVIK SINCE DECEMBER 2007.**
- **SNOWPACK IS ABOVE NORMAL IN THE INTERIOR, WESTERN ALASKA, SOUTHEAST ALASKA AND THE SUSITNA BASIN. THE SNOWPACK ACROSS THE TANANA BASIN EXCEEDS 2.5 THE NORMAL VALUE.**
- **LATE SPRING SNOWFALL CONTRIBUTED TO 400% OF THE NORMAL PRECIPITATION AMOUNT FROM THE NORTH SLOPE TO PARTS OF ALASKA'S INTERIOR. THE WEST COAST RECEIVED TWO TO THREE TIMES THE NORMAL PRECIPITATION**
- **FLOOD HAZARDS ARE SIGNIFICANT DUE TO RIVER ICE BREAKUP.**
- **A RECORD BREAKING ARCTIC OZONE HOLE DISAPPEARED AGAIN DURING APRIL. THE HOLE REACHED ITS MAXIMUM MID-MARCH AND GREW TO COVER AN AREA ABOUT THREE TIMES THE SIZE OF GREENLAND BEFORE SHRINKING.**

The following report provides an overview of the April weather. The report is based on data from selected weather stations throughout the state of Alaska. "Departure from normal" refers to the climatological average over the 1981-2010 period.

Temperature

In April 2020, the North Slope and West Coast of Alaska were significantly warmer than normal (Figure 1, Table 1). The warmer than normal temperatures extended to the Interior as far as McGrath and Bettles. Atqasuk and Umiat were 9.8ºF warmer than normal. The observed monthly average temperatures at Kotzebue were 20.1°F, 6.8°F above normal. St Paul Island followed closely with temperatures 6.7°F above normal. King Salmon and Utqiaġvik recorded

temperatures 6.5°F and 6.3°F above normal respectively. On the other hand, parts of the Interior, including Fairbanks and Delta Junction recorded colder than normal temperatures. The colder than normal temperatures extended south into Talkeetna and Anchorage and to Yakutat and Juneau in the Panhandle. Two cold periods observed during the beginning and end of April caused an average Fairbanks temperature of 30.5°F, 2°F colder than normal. Juneau and Talkeetna followed with average temperatures 1.1°F below normal in both locations.

Multiple stations set new records for mean, minimum, and maximum daily temperatures on specific days during April 2020. Cold Bay set a new daily record for highest maximum temperature on April 4th of 57°F, 8°F higher than the old record of 49°F set last year. King Salmon set new daily records for highest average temperature over multiple days, notably setting a new record on April 16th of 50.5°F, 8°F higher than the previous record of 42°F set in 1940. A similar record of 53°F was set the next day, 9°F higher than the previous record of 44°F set in 1998. Utqiaġvik set a new daily record for lowest minimum temperature of -20°F on April 29. The previous record was -19°F in 1968. This was the first record lowest minimum daily temperature set in Utqiaġvik since December 21, 2007. All values and dates are listed in Table A1, A2 and A3 in the appendix.

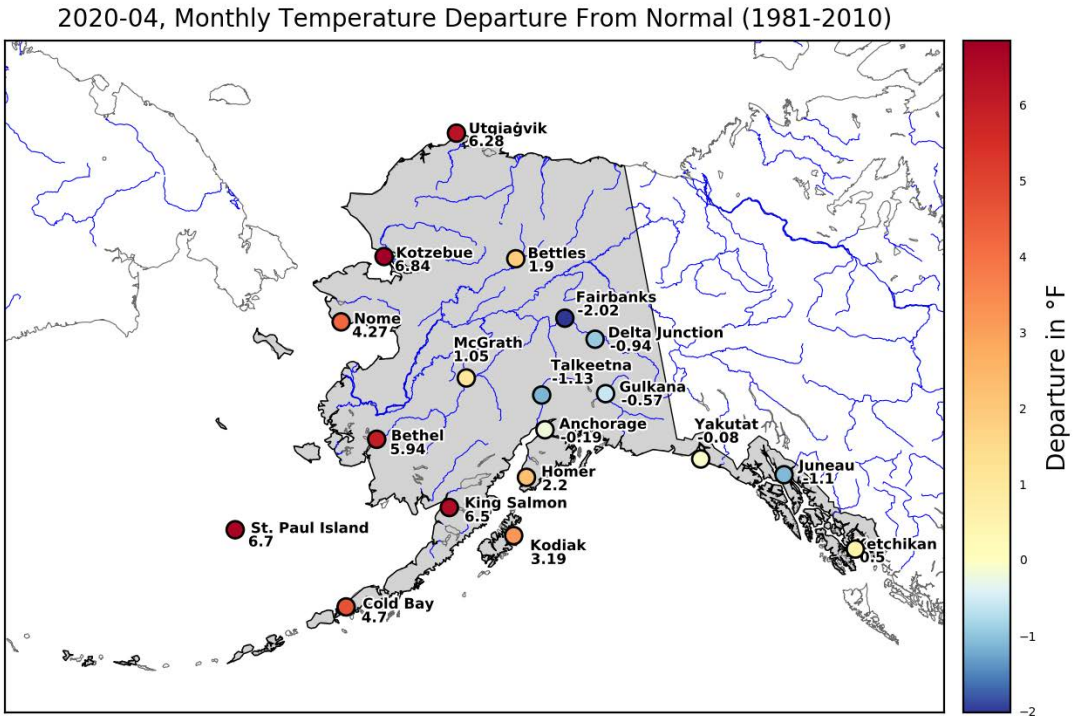

Figure 1: Monthly mean temperature departure from normal, April 2020.

Figures 2 and 3 show mean daily temperature departures from normal for 2020 in Ketchikan and King Salmon. While red and blue bars represent positive and negative departures from normal

mean daily temperatures, red and blue lines represent the highest and lowest values of mean daily temperature on record for each day of the year. Days in which red bars (positive departures) are higher than the red line indicate high mean daily temperature records (Figure 2, Table A1). As an example, King Salmon set new daily records for maximum mean temperature on April 14th, April 16th through the 18th, and April 20th (Figure 3, Table A1). The observed King Salmon temperatures were above normal except for 4 days throughout the month.

Table 1: Mean monthly air temperature, normal (1981-2010) and departure for selected stations throughout the state, April 2020.

Station	Observed (°F)	Normal (°F)	Departure (°F)
Anchorage	36.6	36.8	-0.2
Bethel	32.8	26.9	5.9
Bettles	25.2	23.3	1.9
Cold Bay	38.7	34	4.7
Delta Junction	31.4	32.2	-0.9
Fairbanks	30.5	32.6	-2
Gulkana	31.3	31.9	-0.6
Homer	39.1	37	2.2
Juneau	39.8	40.9	-1.1
Ketchikan	43	42.5	0.5
King Salmon	40.2	33.7	6.5
Kodiak	40.8	37.6	3.2
Kotzebue	20.1	13.3	6.8
McGrath	30.8	29.7	1.1
Nome	24.8	20.5	4.3
St. Paul Island	35.8	29.2	6.7
Talkeetna	34.7	35.8	-1.1
Utqiaġvik	8.1	1.8	6.3
Yakutat	37.7	37.8	-0.1

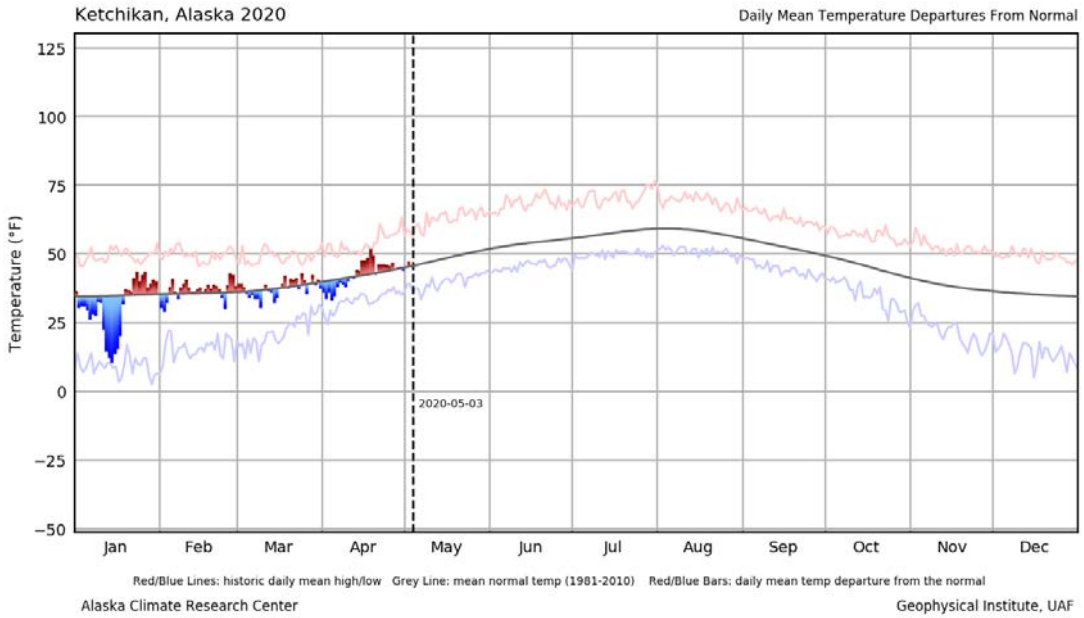

Figure 2: Ketchikan daily mean temperature departures from normal (1981-2010) for 2020. Red and blue bars represent positive and negative temperature departures. Grey line represents the mean normal temperature, red and blue lines represent respectively the historic highest and lowest records of mean daily temperature.

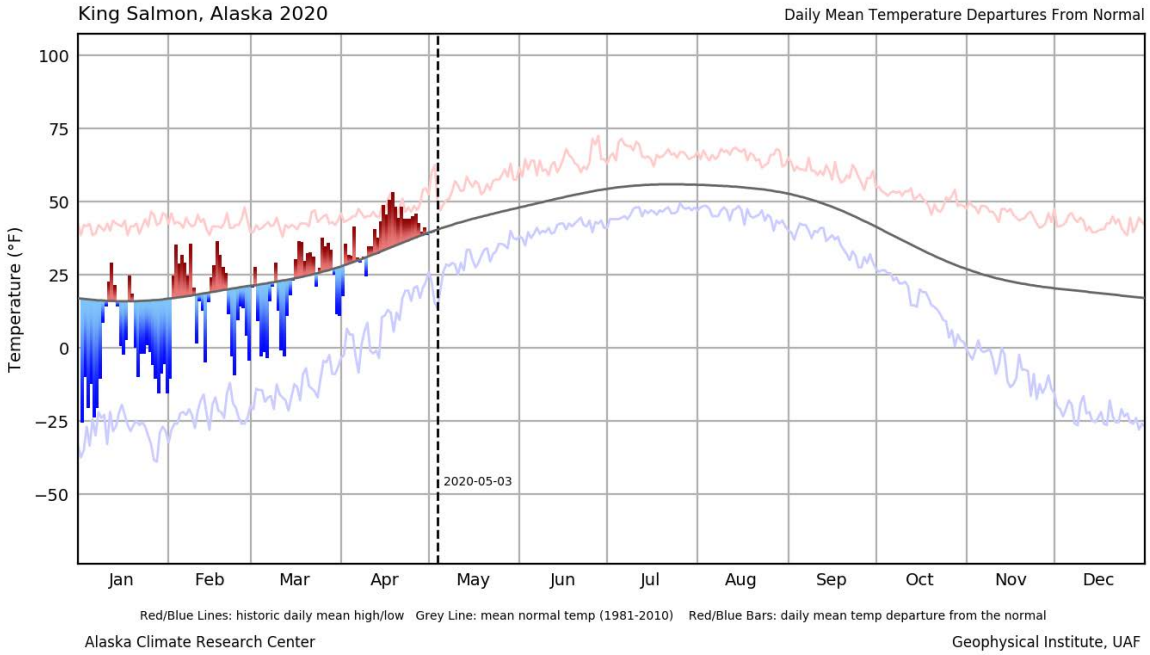

Figure 3: King Salmon daily mean temperature departures from normal (1981-2010) for 2020. Red and blue bars represent positive and negative temperature departures. Grey line represents the mean normal temperature, red and blue lines represent respectively the historic highest and lowest records of mean daily temperature.

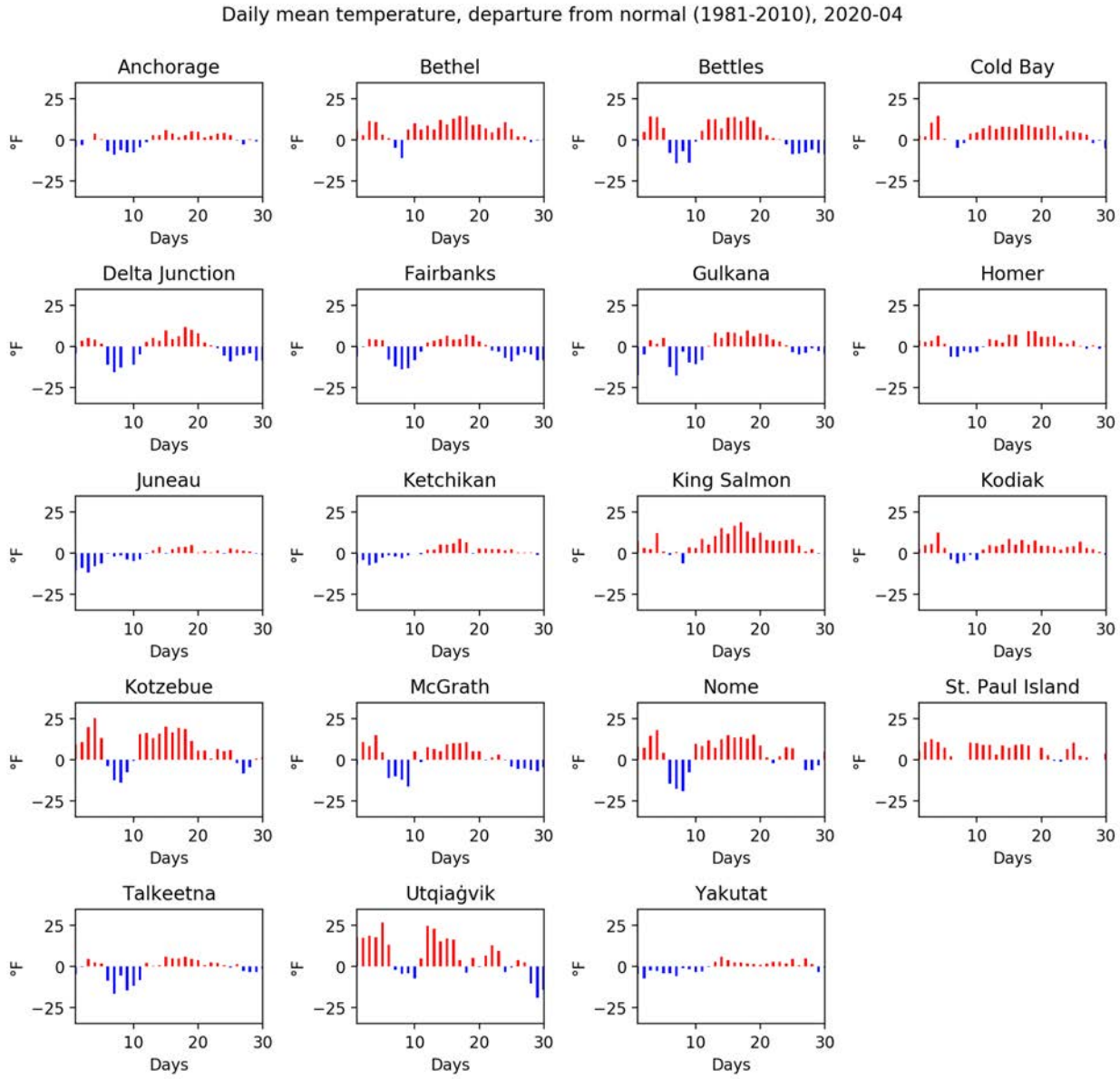

Figure 4: Daily mean temperature departures for each day in April 2020, at the selected stations.

April started out colder than normal over Anchorage and the Panhandle, while the North Slope, Interior, and West Coast were warmer than normal. On the 4th through the 6th, a winter storm brought colder air blowing from the north with gusts up to 28 knots (32 mph) into the West Coast and Interior causing temperatures in those regions to fall below normal. Storm systems moved across the Yukon Delta through the Interior and brought snow into the interior on the 9th through the 11th. On the 13th, warm air moved into the Southcentral region from the southeast while storms moved across the Interior bringing warmer air blowing from the south and southeast. Another low pressure system moved through the West Coast and into the Interior on the 15th; warmer air and rain was observed across most of Alaska. The week of the 20th, Fairbanks and parts of the Interior were again cooler and drier due to high pressure over the

region. On April 27th, the high pressure extended to the south, bringing clearer skies and cooler than normal temperatures to Anchorage and the West Coast.

Precipitation

Precipitation in April, similar to that in March, was significantly above normal across most of Alaska. The North Slope received regionally more than 300% of the normal snowfall amount. Precipitation along the northern Pacific was decreased. Snowfall events and some rain events from the Interior to the Bering Sea caused observed precipitations sums to amount to 200% to 300% of the average precipitation

Regions along the Gulf of Alaska and the Aleutian Islands were drier than normal. These drier regions include Cold Bay, Kodiak, and Yakutat. Only 65% of the normal April precipitation was recorded along the Southern Aleutians.

Utqiaġvik recorded 0.8 inches (Snow Water Equivalent or SWE) of snow, 475% of normal precipitation. Fairbanks received 1.3 inches of precipitation as a combination of SWE and rainfall, 409.7% of normal. The precipitation in Fairbanks included 7.9 inches of snowfall, 272.4 percent of long-term normal snowfall for April. It snowed in Fairbanks on April 3rd through the 7th and on the 10th. On April 13th, Fairbanks received 0.08 inches of freezing rain. Fairbanks received a tenth of an inch or less of rainfall per day on April 15th through the 20th; 0.12 inches of rain fell on the 21st. Bettles similarly was wetter than normal; 12.7 inches of snowfall were measured in Bettles exceeding the long-term normal snowfall by 201.6%. Nome received 325% of normal precipitation, as a mix of snow and rain. Bethel and King Salmon reported 277% and 276.3% of normal precipitation. McGrath and Kotzebue received 248.6% and 244.4% of normal precipitation respectively. Anchorage received 1.0 inch of precipitation, 206.4% of normal; this included 5 inches of snow, 125% of normal snowfall. It snowed in Anchorage on April 2nd through the 5th. On April 12th, there was a mix of snow and rain in Anchorage. On the 13th, it rained 0.03 inches. There was 0.12 inches of rain on the 15th and 0.01 inches on the morning of the 16th. There was a trace of rain in Anchorage on the 17th and 18th. There was at least 0.1 inches of rain each day from April 21st through the 24th. The 25th through 29th were dry and it rained 0.07 inches on the 30th. Juneau received 5.1 inches of mostly rain and little snow, 172.4% of normal; this included 0.1 inches of snowfall, 9.1% of normal. There was a mix of rain and snow on the 6th, with Juneau receiving 0.01 inches of precipitation. It rained in Juneau April 13th through the 17th and April 20th through the end of the month. The wettest days in Juneau were April 22nd with an inch of rainfall, followed by April 27th with 0.79 inches of rainfall.

Yakutat was drier than normal, reporting 5.5 inches of precipitation, 60.2% of the long-term normal for the month. Kodiak and Cold Bay similarly received 64.0% and 64.9% of normal precipitation respectively.

Comparisons of precipitation (rain plus SWE) measurements with the 1981-2010 normal data are provided in Table 2 and Figure 6. Nome set a new record for April precipitation with a total of 2.47 inches for the month. The previous record was 2.15 inches in 1961.

Noteworthy snow events:

There were some days in early April with high snowfall amounts as strong systems passed through the state. On April 2nd, Anchorage received 2.4 inches of snowfall followed by another 2.0 inches on April 3rd. The 1981-2010 normal snowfall for April in Anchorage is 4.0 inches. On April 4th, Bettles reported 3.7 inches of snowfall, more than half of the 6.3 inches that Bettles normally receives in April. The same day, Fairbanks received 2.8 inches of snowfall, almost equal to the average of 2.9 inches of snowfall in Fairbanks normally receives in April. On April 5th and 6th, Bettles reported 2.0 inches and 1.6 inches of snowfall respectively. On April 10th, Fairbanks received 3.6 inches of snowfall and Bettles received 2.4 inches of snowfall.

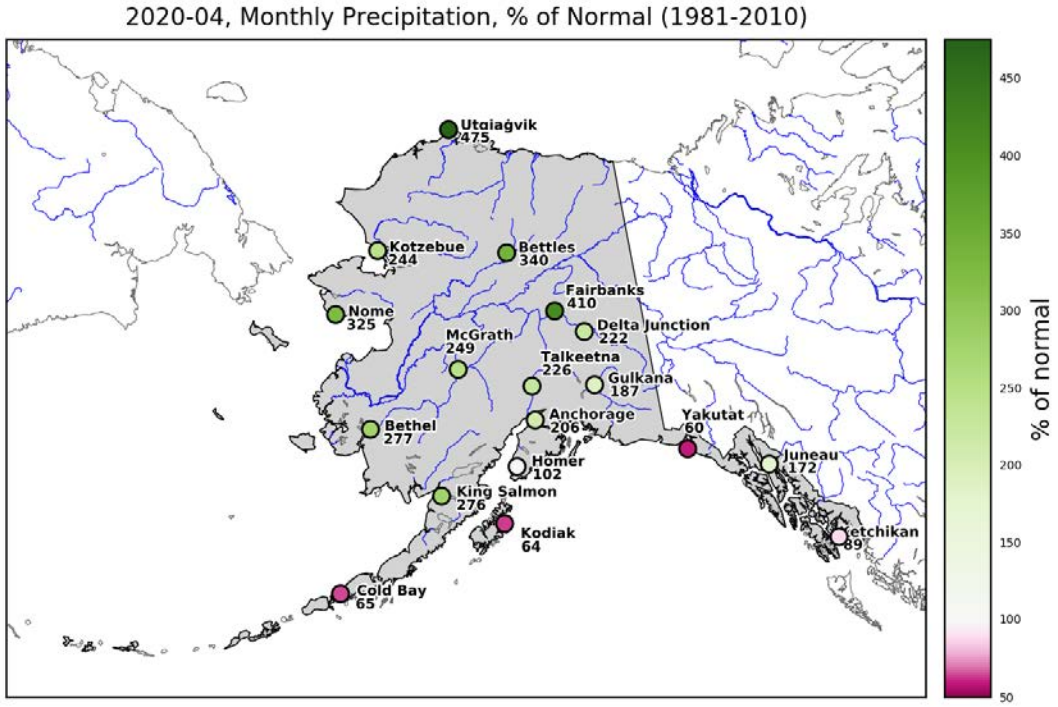

Figure 5: Monthly precipitation sums expressed as percent of normal (1981-2010), April 2020.

Table 2: Monthly precipitation sum, normal (1981-2010) and departure expressed as a percentage of the normal (1981-2010) for selected stations throughout the state, April 2020.

Station	Precipitation (in)	Normal (in)	% of normal
Anchorage	1.0	0.5	206.4
Bethel	2.0	0.7	277
Bettles	2.0	0.6	340
Cold Bay	1.6	2.4	64.9
Delta Junction	0.5	0.2	221.7
Fairbanks	1.3	0.3	409.7
Gulkana	0.4	0.2	187.5
Homer	1.1	1.1	101.9
Juneau	5.1	2.9	172.4
Ketchikan	8.4	9.4	89.3
King Salmon	2.7	1.0	276.3
Kodiak	3.7	5.8	64
Kotzebue	1.3	0.5	244.4
McGrath	1.8	0.7	248.6
Nome	2.5	0.8	325
Talkeetna	2.9	1.3	226.4
Utqiaġvik	0.8	0.2	475
Yakutat	5.5	9.2	60.2

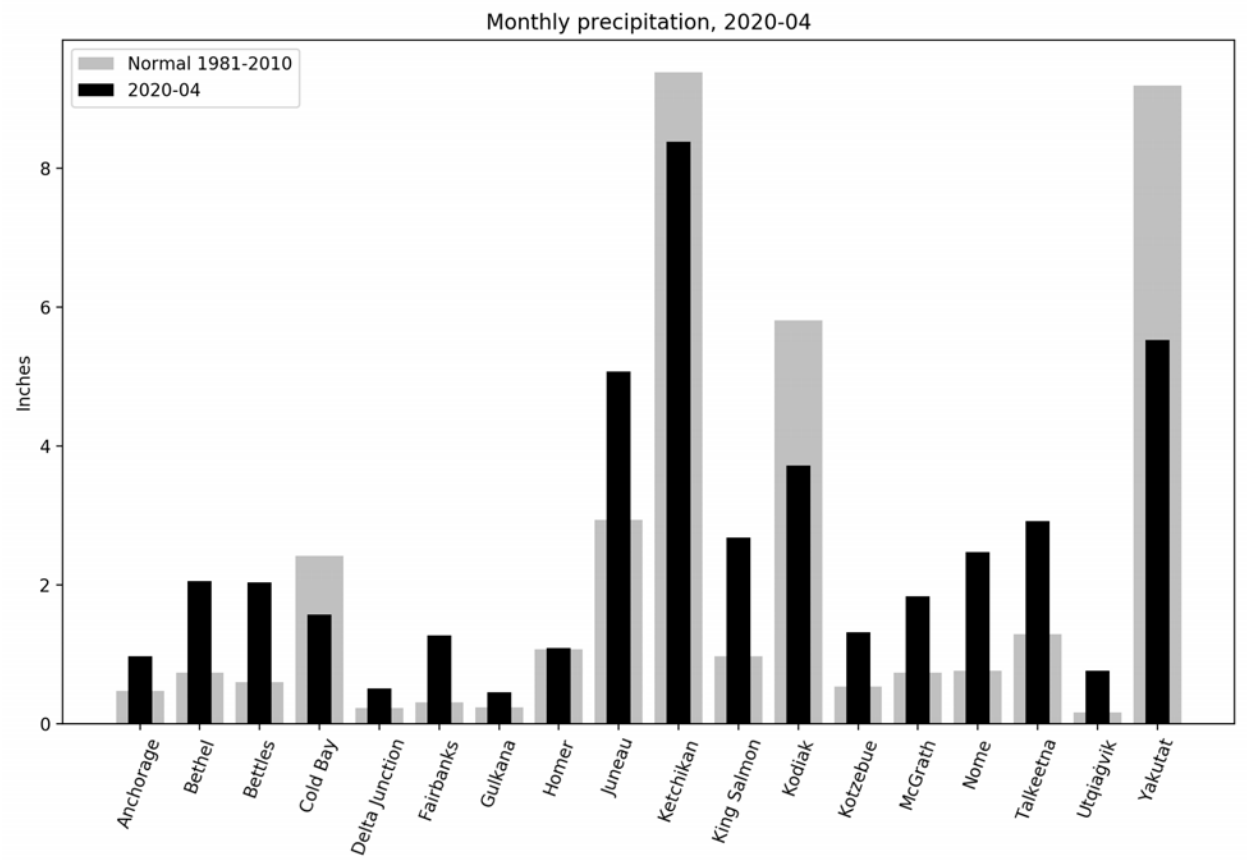

Figure 6: Monthly precipitation sums for April 2020 at the selected stations compared to the normal (1981-2010), in inches.

Table 3: Monthly snowfall sum, normal (1981-2010) and departure expressed as a percentage of the normal (1981-2010) for the selected stations that measure snowfall, April 2020.

Station	Snowfall (in)	Normal (in)	% of normal
Anchorage	5.0	4.0	125
Bettles	12.7	6.3	201.6
Fairbanks	7.9	2.9	272.4
Juneau	0.1	1.1	9.1

Snowpack

The Interior, western Alaska, Southeast Alaska, and the Susitna Basin all have above normal snowpack (NRCS Alaska Snow Survey Report, May 2020). The Tanana Basin has above normal snowpack, averaging 256% of median across the basin (Table 4). With 14.4 inches of water

content, Cleary Summit Snow Course set a new all-time record high snowpack. The previous record was 13.8 inches set in April 1993. The Koyukuk Basin has above normal snowpack, but less than last year. Portions of the Kuskokwim basin have much above normal snowpack. McGrath has twice the normal snowpack. The Upper Yukon Basin has above average snowpack, with 136% of median 1981-2010 snowpack. The measured snowpack in the Central Yukon Basin is above normal. The Koyukuk Basin has 132% above median snowpack, but less than last year when there was 178% of median snowpack. The Seward Peninsula received much above normal precipitation during April, but snowpack there is less than the last two years. Storms in the Susitna Valley kept snowpack there at above normal levels. The snow sites in the Susitna Valley averaged 151% of normal snowpack. Southeast Alaska averaged 130% of median snowpack for April, compared to 34% last year.

The Kenai Peninsula and portions of Southcentral Alaska have below normal snowpack. Snowpack in the Northern Cook Inlet area is well below normal, with sites averaging 57% of normal. The snowpack on the Kenai Peninsula is the lowest across the state, with stations averaging 24% of median snowpack.

Table 4: Current and previous year Basin Index (% of 1981-2010 median snowpack water content) for selected river basins throughout the state, May 1, 2020. (source: NRCS Alaska Snow Survey Report, May 2020)

Basin	Basin Index Current % of Median	Basin Index Last Year % of Median
Upper Yukon Basin	136	53
Central Yukon Basin	156	143
Tanana Basin	256	93
Koyukuk Basin	132	178
Kuskokwim Basin	240	90
Copper Basin	129	81
Matanuska-Susitna Basin	151	79
Northern Cook Inlet	57	54
Kenai Peninsula	24	60
Western Gulf of Alaska	52	54
Southeast Alaska	130	34

Drought Conditions

Alaska continued to be free of abnormal dryness and drought through April 2020 (Figure 7). In the April 7, 2020 drought summary, National Resources Conservation Service SNOTEL stations across the Interior reported above normal SWE levels, while numerous stations further south on the Kenai Peninsula were well below normal. (source: https://droughtmonitor.unl.edu/).

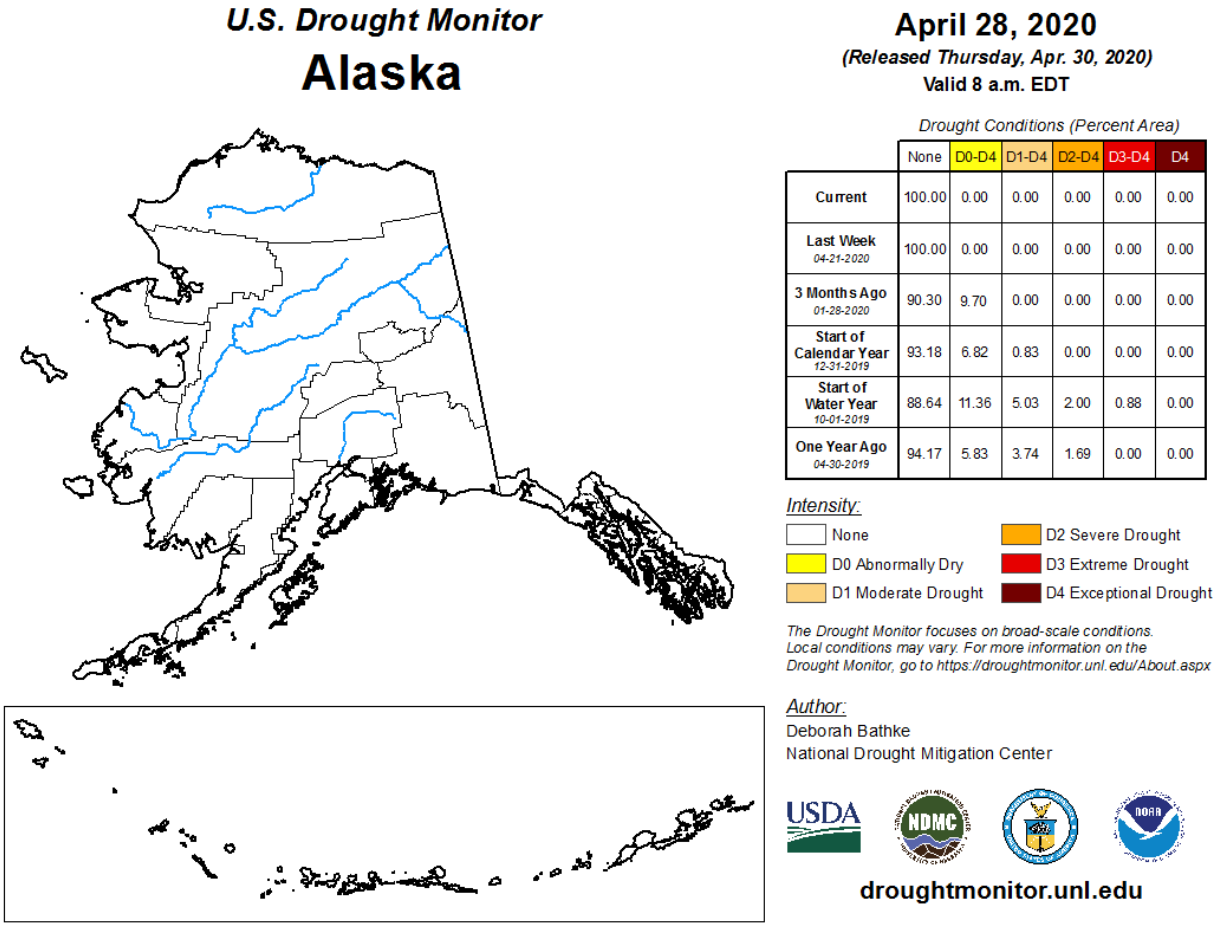

Figure 7: U.S. Drought Monitor map for Alaska, updated on April 28, 2020. The table on the right shows the percent area affected by different categories of drought intensity. Figures and data produced and released by the U.S. Drought Monitor, a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration (https://droughtmonitor.unl.edu).

RIVER ICE

After a cold winter with above normal snowfall, the National Weather Service (NWS) and the State Emergency Operations response manager have warned villages to prepare for an increased risk of flooding during the spring breakup. At the same the Coronavirus has made surveys from aircraft more difficult. This has put more reliance than ever on Direct Broadcast satellite products to monitor flooding along major rivers. The following information has been derived by the **Geographic Information Network of Alaska** (GINA, http://www.gina.alaska.edu/), which received direct broadcast satellite data in real time and processes satellite products to monitor

river ice breakup for flood monitoring. Two specialized satellite products have been developed to help monitor river flooding and ice concentration.

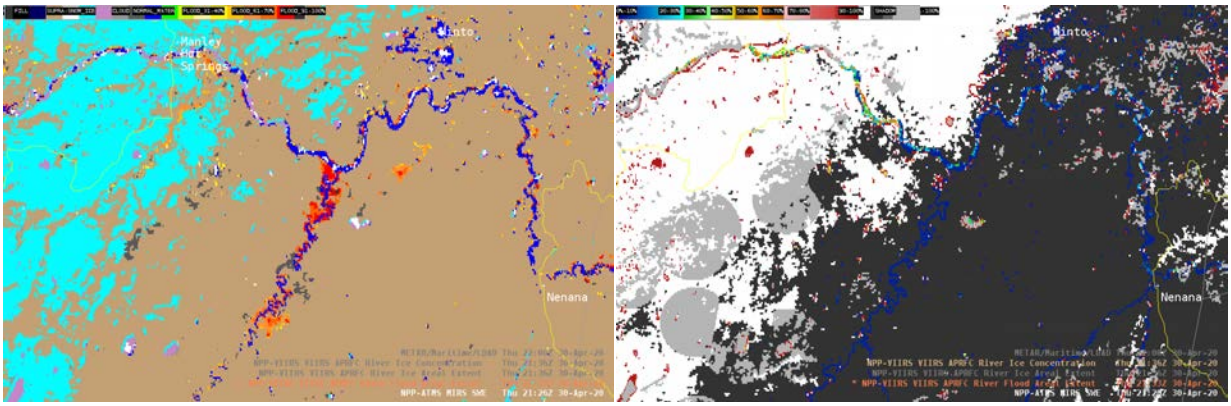

Figure 8: River Flood Areal Extent product (left) and River Ice Concentration product (right). Left: The yellow, orange, red colors indicate the percentage of water in inundated areas. Blue designates liquid water within normal river and lake banks. Magenta refers to river/lake ice, white indicates supra snow/ice, and cyan indicates snow (left image product developed at George Mason University). Right: Colors from blue -> green -> yellow -> orange -> red represent increasing concentrations of detected ice in the rivers. White indicates snow (product developed by Community College of New York).

The image on the left above (Figure 8) is an example of the River Flood Areal Extent product. The above product indicates some flooding on portions of the Kantishna River where it joins the Tanana River.

Figure 8-right is an example of the River Ice Concentration. Here the This product is for the same satellite pass as the image on the left and it shows some ice near the confluence of the Kantishna and Tanana Rivers which could be a factor in some of the elevated water levels.

On April 30, 2020, a Flood Warning caused by Ice Jams was issued by NWS River Forecast Center for the Kuskokwim River from Napaimute to Kalskag that included Aniak. The image shows the River Flood product for a portion of the Kuskokwim River at that time. Repeated observations from satellite aid to assess rapid changes in river ice causing flood conditions.

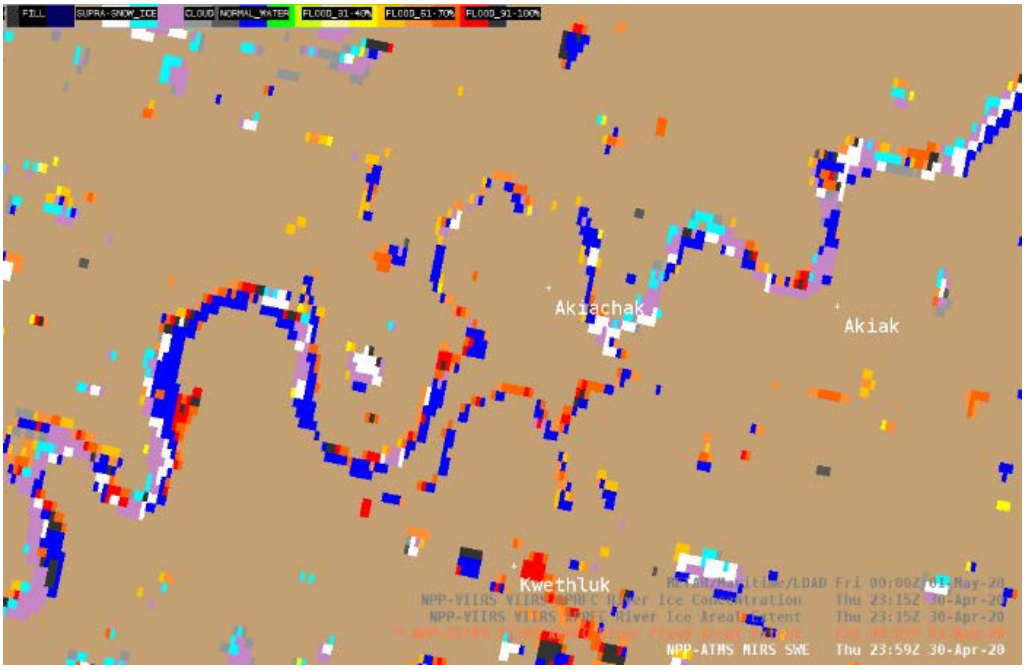

Figure 9: River Flood product for a portion of the Kuskokwim River on April 30, 2020.

Arctic Sea Ice

Over the weeks of March 26th to April 9th, sea ice decreased by 4.23% to 13.826 M km^2. During the weeks of April 9th to April 23rd, sea ice decreased by 2.01%, about half the decrease rate of the previous two-week period, to 13.548 M km^2. Sea ice extent decreased by 6.16% from March 26th to April 23rd. The sea ice extent (light blue line in figure 10) is about even with the 2016 level (red line). As of May 2nd, 2020, sea ice extent is extremely low in the Bering Sea (Figure 11).

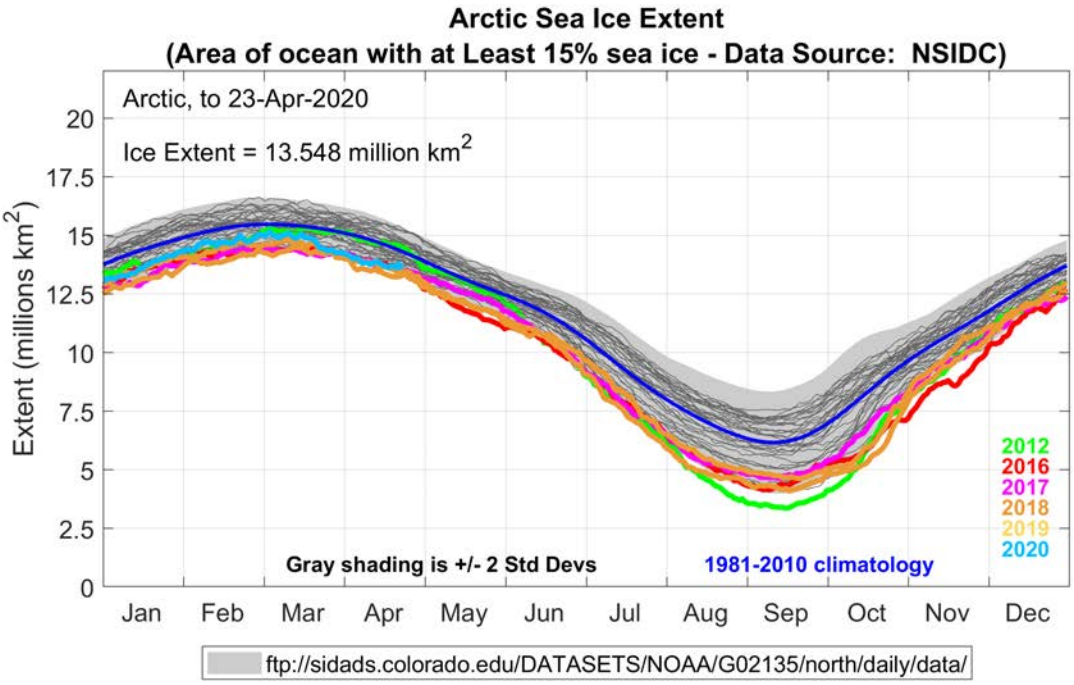

Figure 10: Time series of daily Arctic sea ice extent. This year's data (light blue) are updated until April 23, 2020. The median sea ice extent for the 1981-2010 reference period is depicted in blue. Specific years are highlighted in colors. Plot Compiled by: Howard J. Diamond, PhD; Climate Science Program Manager at NOAA's Air Resources Laboratory Data Source: National Snow & Ice Data Center (NSIDC; https://nsidc.org/).

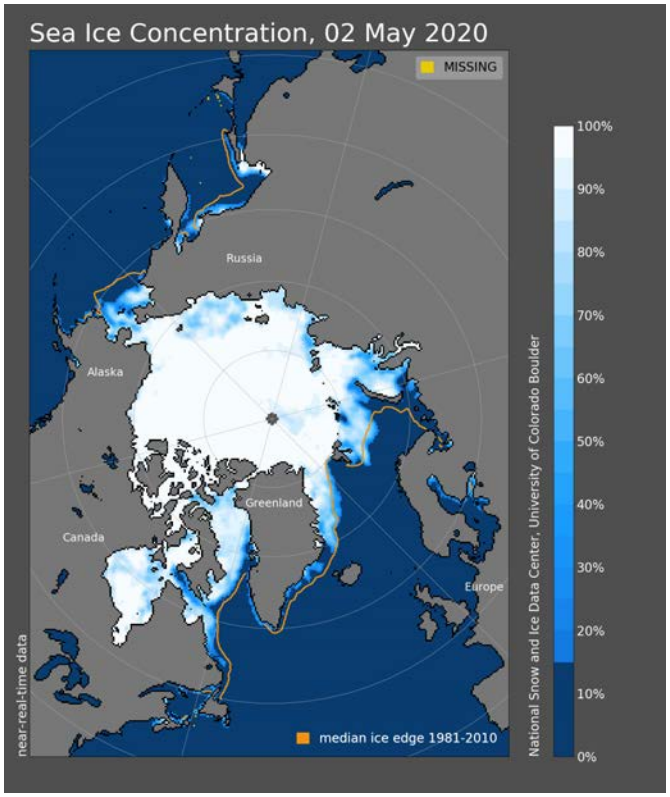

Figure 11: Daily Arctic Sea Ice concentration for May 2, 2020. Median ice edge for the 1981-2010 reference period is depicted in yellow. Image: NSIDC (nsidc.org)

Newsworthy information

The Nenana Ice Classic ended at 12:56 PM AST on Monday, April 27th according to www.nenanaiceclassic.com. The classic is an Alaska tradition, which started in 1917 when railroad engineers bet $800 to guess when the ice on the river would break up (https://nsidc.org/data/NSIDC-0064/versions/1). Last year was the earliest break up date, April 14th. The latest ice breakups on record were on May 20 in both 1964 and 2013 (https://www.ktuu.com/content/news/The-tripod-has-fallen-on-the-Tanana-River-569968521.html).

Rapid snow melt and river breakups caused flooding in low-lying areas across the Interior. The Taylor Highway was closed after an overflowing river washed out a section of the road at Mile 54 on April 22nd. An ice jam in the Chena River resulted in a 2-feet rise in water levels in downtown Fairbanks and minor river overflows along the Chena Hot Springs Road, the Dalton Highway, the Elliott Highway, and the Taylor Highway on April 23rd. (http://www.newsminer.com/news/local_news/river-breakups-cause-minor-flooding-across-interior-alaska/article_a098253c-85cb-11ea-847a-53cf445ed743.html).

A wildfire at Point MacKenzie is thought to have been human caused. The Trumpeter fire was 130 acres as of May 1st and was estimated to be 75% contained. Firefighters responded to a

small one-acre debris burn grass fire earlier in the week. Officials say the occurrence of two burns within the same week is an indication that the valley is extremely dry. (https://www.ktuu.com/content/news/Firefighting-crews-working-on-wildfire-off-KGB-Rd--570065221.html)

A record-breaking Arctic ozone hole has closed. The Earth's ozone layer acts as protection between the sun's harmful UV radiation and the Earth's surface. The ozone hole opened up in March before becoming the largest stratospheric ozone hole observed over the Arctic. The hole was driven by an unusually strong and long-lived polar vortex. Earlier in April, scientists from the European Space Agency said that the hole covered an area about three times the size of Greenland. The hole disappeared as temperatures increased, breaking down the Arctic polar vortex and allowing ozone-depleted air to mix with ozone-rich air from lower latitudes. Copernicus Atmosphere Monitoring Service announced the closure on April 23rd. Paul Newman, chief scientist for Earth Sciences at NASA's Goddard Space Flight Center said that if people hadn't stopped putting chlorofluorocarbons into the atmosphere because of the Montreal Protocol, the ozone hole would have been much worse. (https://www.cbsnews.com/news/arctic-ozone-hole-largest-closed/)

This information consists of climatological data compiled by the Alaska Climate Research Center, Geophysical Institute, University of Alaska Fairbanks. For more information on weather and climatology, visit the center website at http://akclimate.org. Please report any errors to webmaster@akclimate.org. River ice information has been received from GINA, the Geographic Information Network of Alaska, Geophysical Institute, University of Alaska Fairbanks.

Appendix

Table A1: April 2020 daily records of mean daily temperature, i.e. highest/lowest values of mean daily temperature ever recorded on specific days. Records are computed since the beginning of the respective time series. Only highest records were set this month.

Highest Mean Daily Temperature on record

Station	Date	New Record (°F)	Year of old record	Old record (°F)
Bethel	2020-04-16	40.0	1988	39.0
Bethel	2020-04-18	42.5	1999	42.0
Cold Bay	2020-04-04	46.5	2019	43.0
Cold Bay	2020-04-21	44.0	1979	43.0
Gulkana	2020-04-18	43.5	1953	42.0
Gulkana	2020-04-20	43.0	2005	42.5
Homer	2020-04-16	44.0	2016	43.5
Homer	2020-04-19	47.5	2014	46.5
King Salmon	2020-04-14	48.5	2016	43.5
King Salmon	2020-04-16	50.5	1940	42.0
King Salmon	2020-04-17	53.0	1998	44.0
King Salmon	2020-04-18	48.0	1993	45.0
King Salmon	2020-04-20	48.0	2016	46.0
Kodiak	2020-04-04	47.5	1948	45.5
St. Paul Island	2020-04-03	39.0	1979	38.5
St. Paul Island	2020-04-25	42.0	2016	41.0

Table A2: April 2020 daily records of minimum daily temperature, i.e. highest/lowest values of minimum daily temperature ever recorded on specific days. Records are computed since the beginning of the respective time series. One lowest record and multiple highest records were set this month.

Highest Minimum Daily Temperature on record

Station	Date	New Record (°F)	Year of old record	Old record (°F)
Anchorage	2020-04-15	36.0	1970	35.0
Bethel	2020-04-17	38.0	1936	36.0
Bethel	2020-04-18	38.0	1999	35.0
Bettles	2020-04-15	34.0	1978	33.0
Bettles	2020-04-18	35.0	1998	34.0
Cold Bay	2020-04-17	41.0	1965	36.0
Gulkana	2020-04-20	37.0	2005	36.0
Homer	2020-04-19	41.0	1990	40.0
King Salmon	2020-04-14	40.0	1951	37.0
King Salmon	2020-04-15	41.0	1951	38.0
King Salmon	2020-04-16	40.0	1988	37.0
King Salmon	2020-04-17	45.0	1945	38.0
King Salmon	2020-04-19	39.0	2016	38.0
King Salmon	2020-04-20	40.0	2001	39.0
Kodiak	2020-04-14	41.0	1979	40.0
Kotzebue	2020-04-17	33.0	1951	32.0
Kotzebue	2020-04-18	32.0	1988	31.0
Nome	2020-04-17	34.0	1912	32.0
St. Paul Island	2020-04-03	37.0	1967	36.0
St. Paul Island	2020-04-20	35.0	1951	34.0
Talkeetna	2020-04-15	36.0	1996	35.0
Talkeetna	2020-04-20	36.0	1928	35.0

Lowest Minimum Daily Temperature on record

Station	Date	New Record (°F)	Year of old record	Old record (°F)
Utqiaġvik	2020-04-29	-20.0	1968	-19.0

Table A3: April 2020 daily records of maximum daily temperature, i.e. highest/lowest values of maximum daily temperature ever recorded on specific days. Records are computed since the beginning of the respective time series. Only highest records were set this month.

Highest Maximum Daily Temperature on record

Station	Date	New Record (°F)	Year of old record	Old record (°F)
Cold Bay	2020-04-04	57.0	2019	49.0
Cold Bay	2020-04-19	49.0	1979	47.0
Cold Bay	2020-04-20	51.0	1981	49.0
Cold Bay	2020-04-22	51.0	1964	49.0
Gulkana	2020-04-18	60.0	1953	55.0
Juneau	2020-04-18	61.0	1953	59.0
King Salmon	2020-04-16	61.0	2016	57.0
King Salmon	2020-04-17	61.0	1965	55.0
King Salmon	2020-04-18	59.0	1930	57.0
Kodiak	2020-04-04	58.0	1948	53.0
St. Paul Island	2020-04-14	42.0	1978	41.0
St. Paul Island	2020-04-25	49.0	2016	46.0