



Alaska Statewide Climate Summary November 2019

NOVEMBER 2019 HIGHLIGHTS:

- SIGNIFICANTLY WARMER THAN NORMAL TEMPERATURES WERE MEASURED EVERYWHERE IN ALASKA, WITH VERY HIGH DEPARTURES FROM THE 1981-2010 AVERAGE, REACHING AN IMPRESSIVE 16°F IN UTQIAGVIK.
- PRECIPITATION WAS WELL ABOVE NORMAL ALMOST EVERYWHERE IN THE STATE. ONLY FEW STATIONS ON THE WEST AND DELTA JUNCTION IN THE INTERIOR EXPERIENCED BELOW NORMAL PRECIPITATION.
- DROUGHT CONDITIONS IMPROVED IN SOUTH ALASKA AND ALONG THE PANHANDLE.
- SNOWFALL HAS BEEN ABOVE NORMAL IN THE INTERIOR AND THE NORTHSLOPE. IN ANCHORAGE SNOW WAS 86% OF NORMAL, FAIRBANKS AND BETTLES RECORDED 180% AND 196% OF NORMAL VALUES. ONLY SMALL AMOUNTS OF SNOW WERE OBSERVED ALONG THE PANHANDLE.
- SEA ICE EXTENT HAS INCREASED BY ROUGHLY 27% DURING LAST MONTH. IT IS CURRENTLY CLOSE TO THE EXTENT OF 2017, WELL BELOW THE 1981-2010 MEDIAN VALUE.
- IN NOVEMBER THE CHUKCHI SEA SET A LOW RECORD OF SEA ICE EXTENT.
- LIMITED SEA ICE EXTENT HAS BEEN LINKED TO INTRODUCTION OF DEADLY VIRUS FOR MARINE MAMMALS IN THE NORTH PACIFIC.

The following report provides an overview of the November 2019 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

The trend of substantially warmer than normal temperatures continues in Alaska also during the month of November 2019. All the analyzed stations recorded positive temperature departures from the 1981-2010 average values (Figure 1, Table 1). In many stations departures were strikingly high.

With an impressive mean monthly temperature of 16.8°F, 16.1°F warmer than the normal value, Utqiagvik recorded the highest temperature departure for the month of November, among the analyzed stations. Stations of the eastern Interior and southcentral Alaska follow with temperature departures larger than 10°F. Gulkana, Anchorage, Talkeetna and King Salmon recorded 21.5, 35.7, 33.5, and 35.1°F, respectively 15.7, 13.5, 13.6, and 12.2°F warmer than normal values. With respectively 13.2, 39.8, and 16.5°F, also in Fairbanks, Delta Junction, and Homer, mean monthly temperatures were more than 10°F warmer than average values. Kodiak recorded a mean monthly temperature of 42.6°F, 8.7°F warmer than normal. In western Alaska, temperature departures were relatively smaller, though still high. McGrath, Cold Bay and Bettles measured respectively 7.7, 6.8, and 7.0°F warmer than normal temperatures. Bethel, St. Paul Island, Kotzebue and Nome recorded mean monthly temperatures equal to 21.8, 36.6, 12.4, and 20.4°F, respectively 4.4, 3.8, 3.3, and 3.5°F warmer than 1981-2010 average values. The Panhandle has experienced as well significantly above normal temperatures. The highest temperature departure, equal to 7.3°F, was measured in Yakutat, while Juneau and Ketchikan recorded respectively 5 and 5.3°F warmer than normal values.

2019-11, Monthly Temperature Departure From Normal (1981-2010)

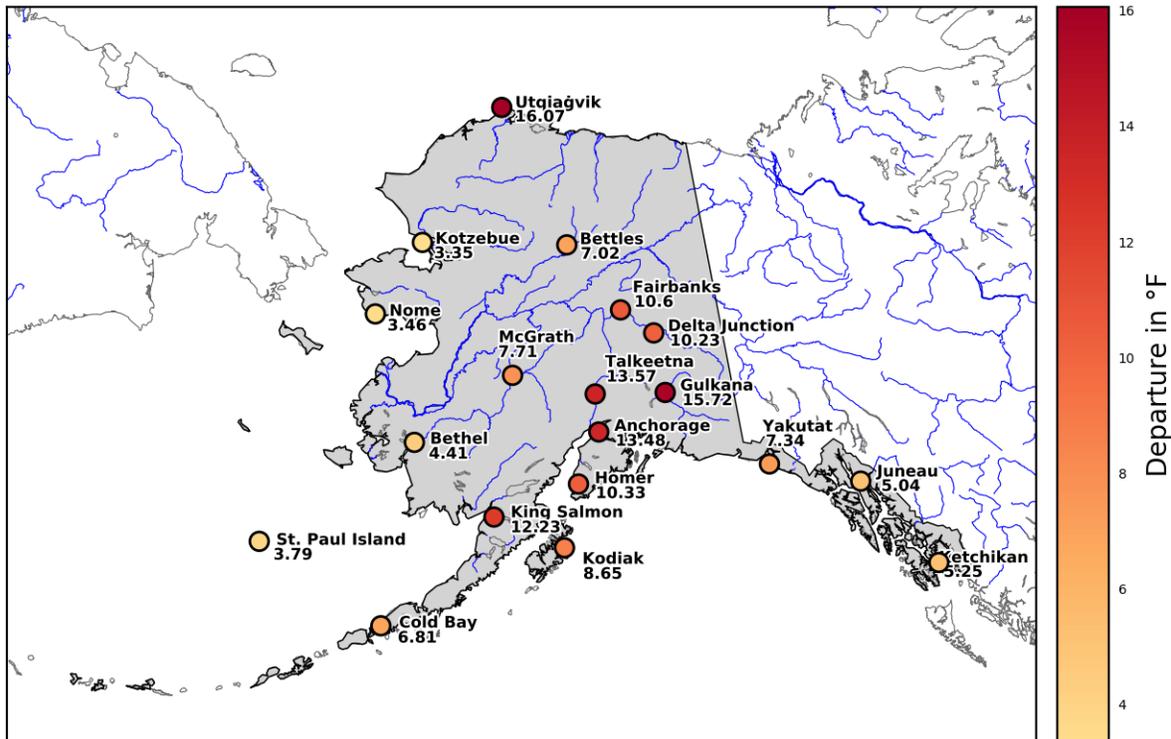


Figure 1: Monthly mean temperature departure from normal, November 2019.

Four stations set new records of mean temperature for the month of November (Table 2). In Anchorage, the mean monthly temperature was 35.7°F, 0.5°F warmer than in 2001, and 2.2°F warmer than in 1979, the second and third warmest November on record. Also, Cold Bay saw the warmest November ever recorded, with 41.4°F, respectively 1.7 and 2.4°F warmer than 2018 and 1985. With 39.8°F, Homer saw the warmest November on record, 0.1 and 0.5°F warmer

than the second and third years in the ranking, occurred in 2014 and 2002. Likewise, Kodiak recorded the warmest mean monthly temperature for November with 42.6°F, roughly 2°F warmer than in 2002 and in 1957, second and third year in the ranking.

During November 2019, multiple stations set new temperature high records for mean, minimum and maximum daily temperatures on specific days. All values and dates are listed in Table A1, A2 and A3 in the appendix.

Figures 2 and 3 show mean daily temperature departures from normal for 2019 in Juneau and in King Salmon. While red and blue bars represent positive and negative departures from normal, 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. As an example, in Juneau, on 16, 17, and 20 November 2019, the mean daily temperatures were the highest ever recorded on these specific days since the beginning of the time series (Figure 2, Table A1). Likewise, on 5, 6, 7, 10, and 27 November 2019, King Salmon saw the highest mean daily temperatures ever recorded in these specific days (Figure 3, Table A1).

Table 1: Mean monthly air temperature, normal (1981-2010) and departure for selected stations throughout the state, November 2019.

Station	Observed (°F)	Normal (°F)	Departure (°F)
Anchorage	35.7	22.2	13.5
Bethel	21.8	17.4	4.4
Bettles	6.0	-1.0	7.0
Cold Bay	41.4	34.5	6.8
Delta Junction	16.5	6.2	10.2
Fairbanks	13.2	2.6	10.6
Gulkana	21.5	5.8	15.7
Homer	39.8	29.5	10.3
Juneau	38.5	33.5	5.0
Ketchikan	43.6	38.4	5.3
King Salmon	35.1	22.9	12.2
Kodiak	42.6	33.9	8.7
Kotzebue	12.4	9.1	3.3
McGrath	13.3	5.6	7.7
Nome	20.4	16.9	3.5
St. Paul Island	36.6	33.0	3.8
Talkeetna	33.5	19.4	13.6
Utqiagvik	16.8	0.7	16.1
Yakutat	39.7	32.3	7.3

Table 2: Mean monthly air temperature records set in November 2019, old records and years of old records.

Station	New Record (°F)	Year of old record	Old record (°F)
Anchorage	35.7	2002	35.2
Cold Bay	41.3	2018	39.7
Homer	39.8	2014	39.7
Kodiak	42.6	2002	40.6

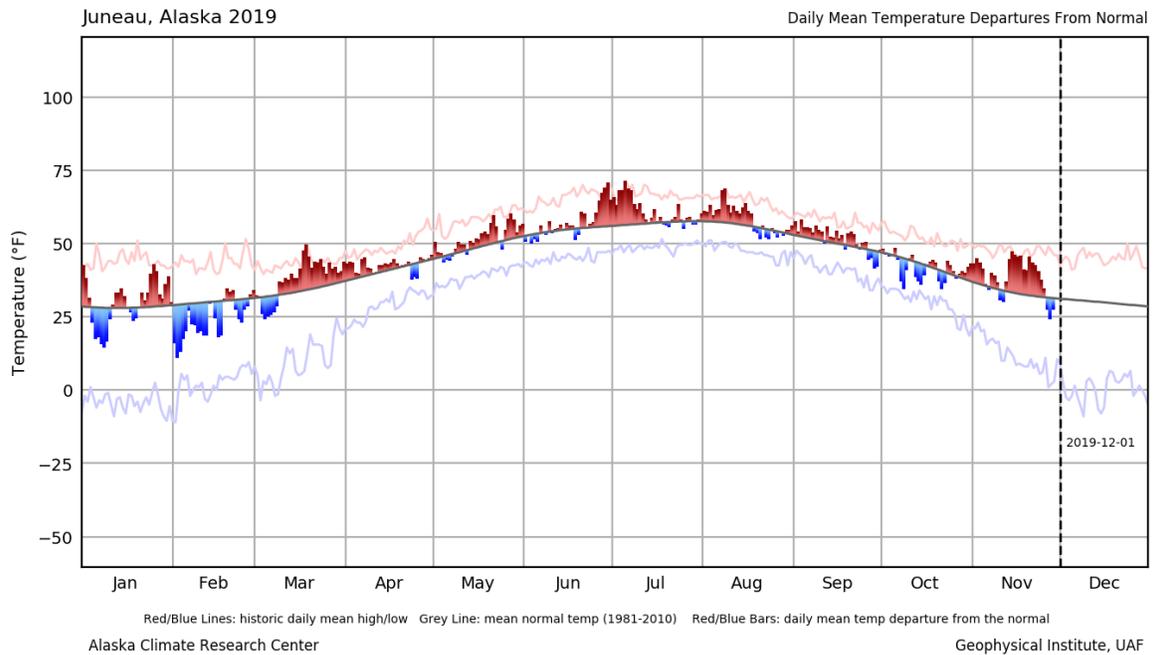


Figure 2: Juneau daily mean temperature departures from normal (1981-2010) for 2019. Red and blue bars represent positive and negative temperature departures. Grey line represents the mean normal temperature, red and blue lines represent respectively the historic highest and lowest records of mean daily temperature.

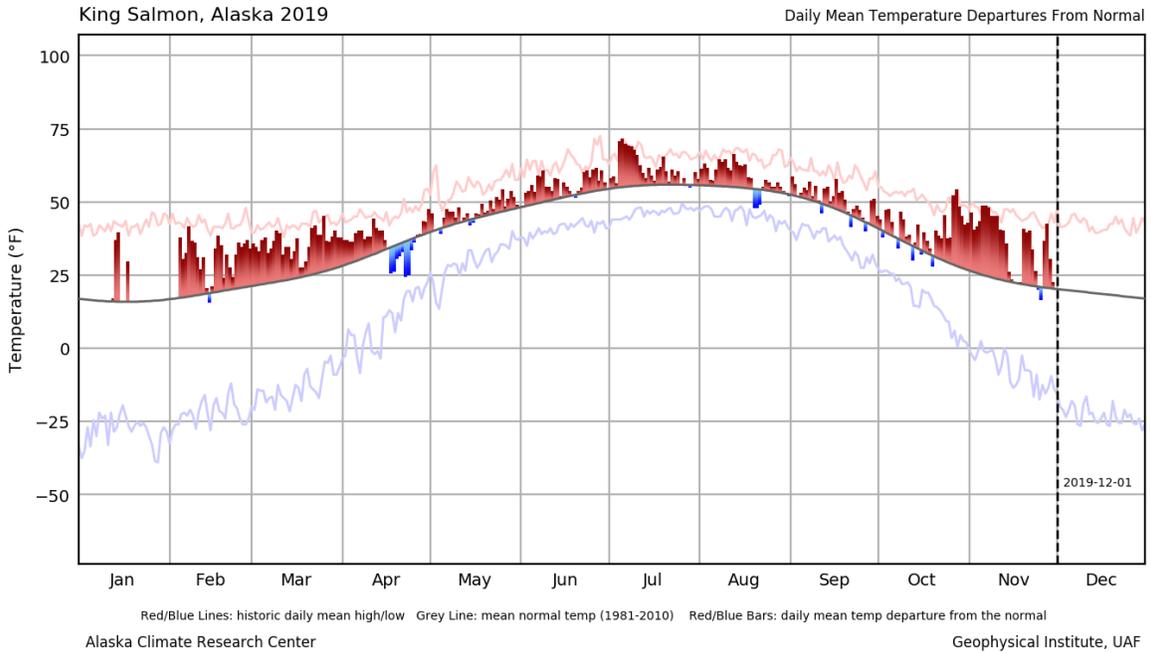


Figure 3: King Salmon daily mean temperature departures from normal (1981-2010) for 2019. Red and blue bars represent positive and negative temperature departures. Grey line represents the mean normal temperature, red and blue lines represent respectively the historic highest and lowest records of mean daily temperature.

Daily mean temperature, departure from normal (1981-2010), 2019-11

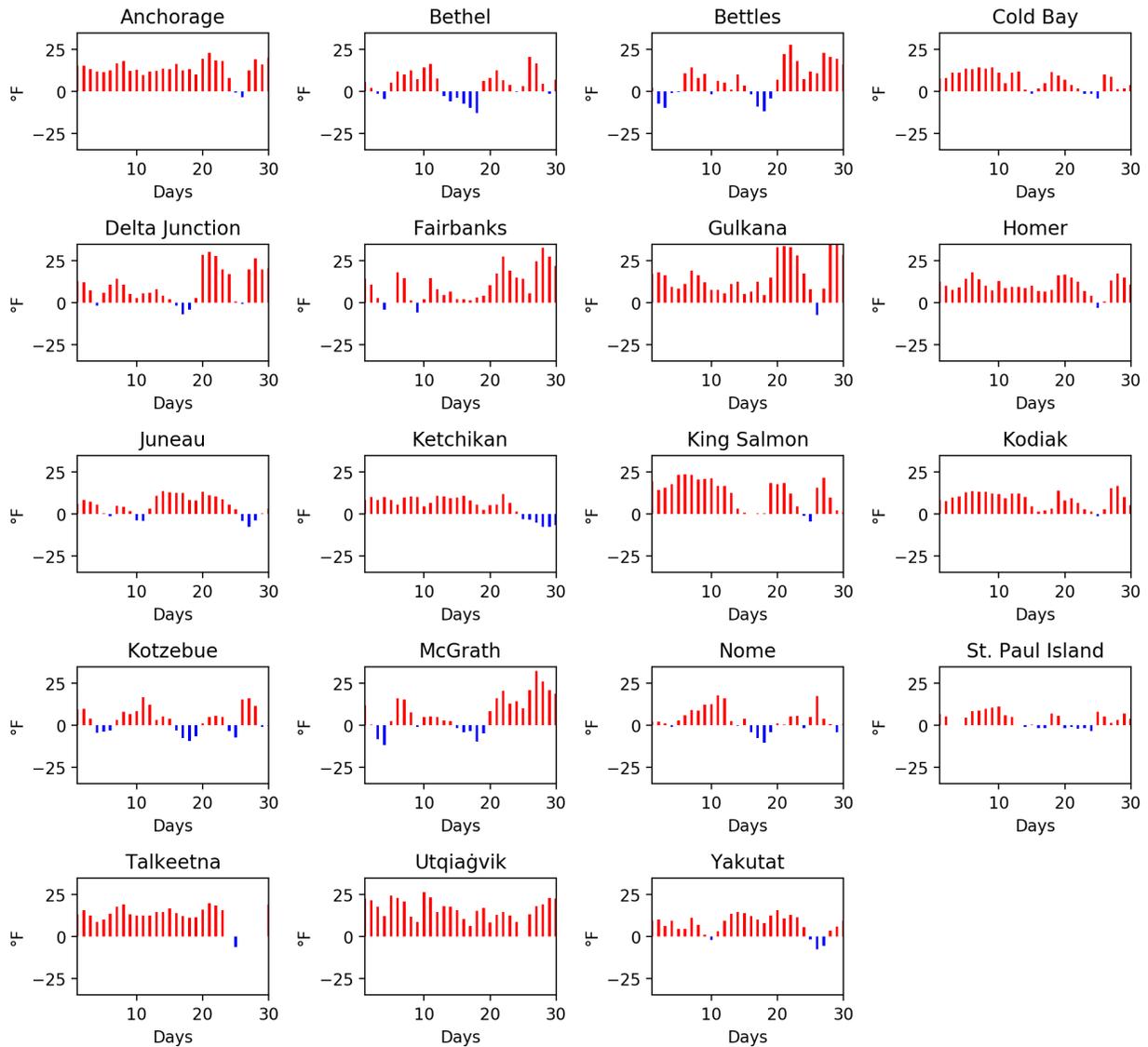


Figure 4: Daily mean temperature departures for each day in November 2019, at the selected stations.

Figure 4 shows temperature deviations at all of the selected stations for each day of the month. All stations show consistent and significant positive deviations from normal throughout most of November 2019 (Figure 4). In particular, Utqiagvik and most of the stations in the Interior and in southcentral Alaska, such as Anchorage, Gulkana, Talkeetna, Fairbanks, King Salmon, Kodiak and Homer recorded above normal temperatures almost every day of the month. Conversely, Bethel, Bettles, Kotzebue, McGrath and Nome on the West experienced few days with mean daily temperature cooler than normal, especially at the beginning and in the middle of November. Similarly, in Juneau and Ketchikan cooler than normal temperatures were recorded towards the end of the month.

Precipitation

In November 2019, precipitation was above normal almost everywhere in Alaska (Figure 5, Table 3). Only few stations in the West, and Delta Junction in the Interior measured precipitation below normal, while St. Paul Island recorded precipitation close to the average value for the period 1981-2010.

The highest precipitation departures, in relative terms, were recorded along the Arctic Coast in Utqiagvik, and in the Interior in McGrath, Bettles and in Fairbanks, with respectively 433, 323, 287, and 273% of normal values. King Salmon, Gulkana, and Bethel in the South measured around 200% of average precipitation values for the period 1981-2010. Kodiak and Anchorage in the South saw precipitation departures equal respectively to 180 and 176% of normal. More than 120% of normal precipitation was measured in Talkeetna, Homer, and Cold Bay. In November 2019, also the Panhandle was wetter than normal: Juneau measured 166% of normal precipitation values, while Ketchikan and Yakutat recorded departures respectively equal to 128 and 130%.

Total monthly precipitation in Delta Junction was 84% of normal. Nome recorded the lowest precipitation departure in relative terms, equal to 30%.

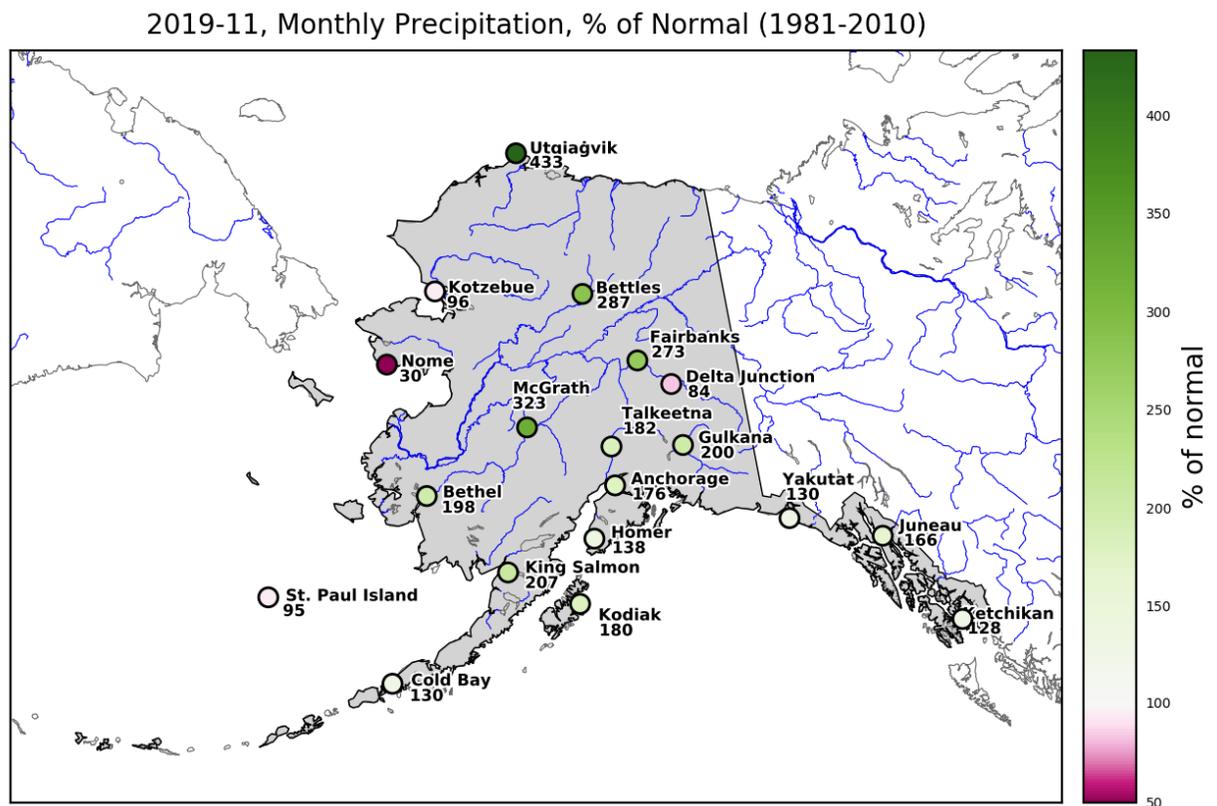


Figure 5: Monthly precipitation sums expressed as percent of normal (1981-2010), November 2019.

Table 3: Monthly precipitation sum, normal (1981-2010) and departure expressed as a percentage of the normal (1981-2010) for selected stations throughout the state, November 2019.

Station	Precipitation (in)	Normal (in)	% of normal
Anchorage	2.0	1.2	175.9
Bethel	3.2	1.6	198.1
Bettles	2.6	0.9	286.8
Cold Bay	6.5	5.0	129.7
Delta Junction	0.5	0.6	84.1
Fairbanks	1.8	0.7	273.1
Gulkana	1.4	0.7	200.0
Homer	3.9	2.8	138.4
Juneau	9.9	6.0	165.8
Ketchikan	21.3	16.6	127.9
King Salmon	2.9	1.4	207.2
Kodiak	12.4	6.9	180.3
Kotzebue	0.7	0.8	96.1
McGrath	4.5	1.4	322.7
Nome	0.4	1.2	29.5
St. Paul Island	2.7	2.9	94.8
Talkeetna	3.0	1.6	182.2
Utqiagvik	0.9	0.2	433.3
Yakutat	18.7	14.5	129.6

Figure 6 shows the monthly precipitation sums at each station in inches. It can be seen how strongly precipitation varies between stations not only during the past month but also in the climatological mean, due to the diverse climatological conditions that can be found in Alaska.

The highest increase in precipitation in absolute terms was recorded in Kodiak, where a total of 12.4 inches of rain fell in November, 5.5 inches more than the normal value of 6.9 inches. Also the Panhandle has been particularly wet in November: Ketchikan, Yakutat and Juneau recorded 21.3, 18.7, and 9.9 inches of rain, respectively 4.7, 4.2, and 3.9 more than normal values. McGrath and Bettles in the Interior, and Bethel, King Salmon and Cold Bay in the south saw more than 1.5 inches more rainfall than the 1981-2010 average. Fairbanks and Homer measured roughly 1 inch more than normal precipitation. Conversely, Nome on the West measured 0.8 inch of precipitation less than normal (Figure 6, Table 3).

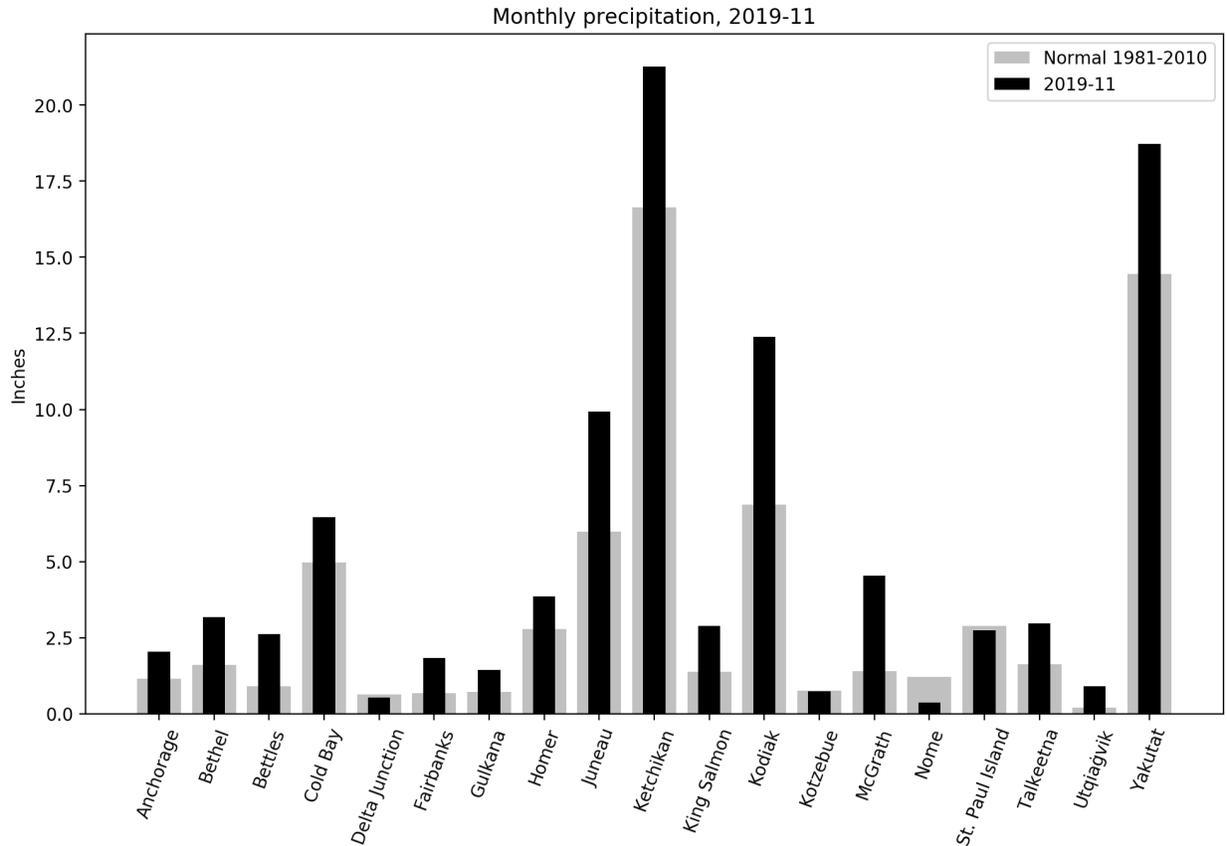


Figure 6: Monthly precipitation sums for November 2019 at the selected stations compared to the normal (1981-2010), in inches.

Snow

Snowfall in Alaska was above average in the Interior and the Northslope, and much lower than average along the Panhandle in November 2019 (Table 4).

The National Weather Service discontinues snow observation at most Alaska offices, thus most of the stations did not report snow observations.

With 10.8 inches of snow, Anchorage measured 86% of normal snowfall totals for the month of November. Conversely, Fairbanks and Bettles saw significantly above normal snowfall with 23.7 and 31.6 inches of snow, respectively 180 and 196% of the average value for the 1981-2010 period.

Table 4: Monthly snowfall sum, normal (1981-2010) and departure expressed as a percentage of the normal (1981-2010) for selected stations throughout the state, November 2019.

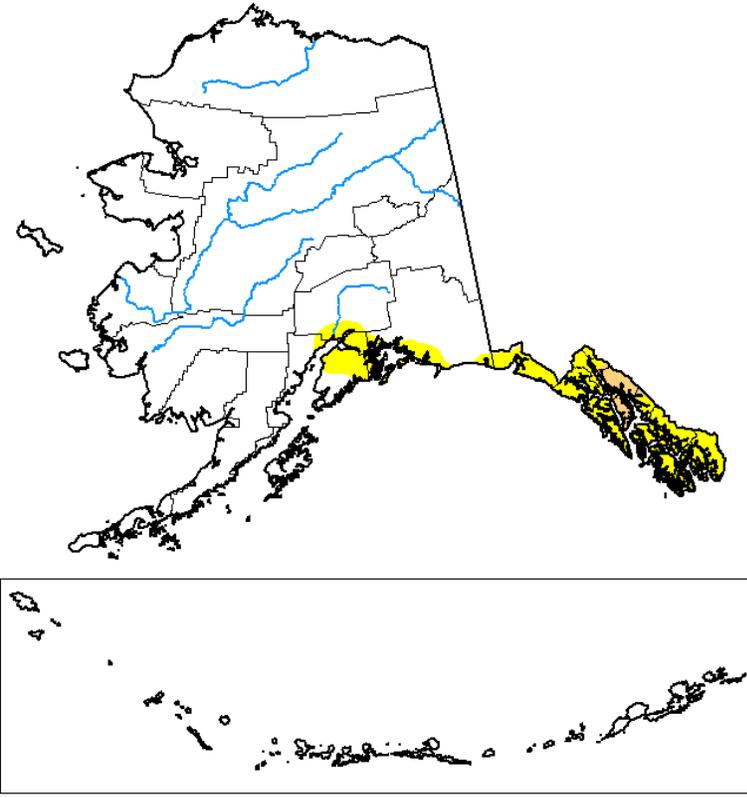
Station	Snowfall (in)	Normal (in)	% of normal
Anchorage	10.8	13.1	82.4
Bettles	31.6	16.1	196.3
Fairbanks	23.7	13.2	179.5
Juneau	0.9	13.1	6.9

Drought Conditions

Above normal precipitation observed during the last month of November 2019, further improved drought conditions in south and southeast Alaska (Figure 5, Figure 6). Information updated until November 26th (Figure 7, source: <https://droughtmonitor.unl.edu>) show that the area of Anchorage and large part of the Panhandle are still under abnormally dry conditions. Conversely, the Kenai Peninsula recovered from abnormally dry conditions recorded last month. Situations improved also along the Panhandle, which has been under severe and extreme drought in the previous months. The areas of Yakutat and Ketchikan currently experience abnormally dry conditions, while Juneau is still subject to moderate drought.

**U.S. Drought Monitor
Alaska**

November 26, 2019
(Released Wednesday, Nov. 27, 2019)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	91.17	8.83	0.83	0.00	0.00	0.00
Last Week <small>11-19-2019</small>	91.17	8.83	0.83	0.00	0.00	0.00
3 Months Ago <small>08-27-2019</small>	66.67	33.33	17.84	6.77	1.50	0.00
Start of Calendar Year <small>01-01-2019</small>	94.17	5.83	2.35	1.02	0.00	0.00
Start of Water Year <small>10-01-2019</small>	88.64	11.36	5.03	2.00	0.88	0.00
One Year Ago <small>11-27-2018</small>	94.17	5.83	2.35	2.07	0.00	0.00

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

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droughtmonitor.unl.edu

Figure 7: U.S. Drought Monitor map for Alaska, updated on 03 October 2019. 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>).

Arctic Sea Ice

Figure 8 and Figure 9 show the time series of daily Arctic sea ice extent and sea ice concentration updated respectively until November 21 and December 01, 2019.

During this month sea ice extent has increased by roughly 27%, from about 7.7 M km² measured on October 31 to 9.8 M km² measured on November 21 (yellow line in Figure 8). The sea ice

extent is currently very close to the level of 2017 (magenta line in Figure 8), still well below the median value for the period 1981-2010.

In November, a record low in sea ice extent was recorded in the Chukchi Sea, while Beaufort Sea got very close to a low record.

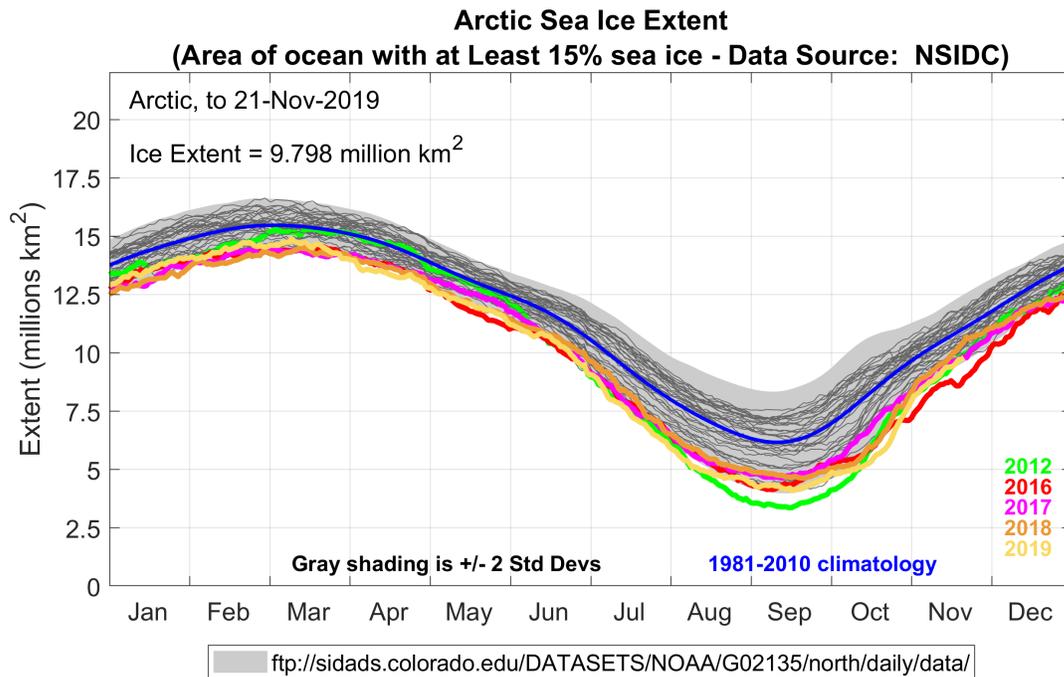


Figure 8: Time series of daily Arctic sea ice extent. This year's data (yellow) are updated until November 21, 2019. The median sea ice extent for the 1981-2010 reference period is depicted in blue. Specific years are highlighted in colors. Plot Compiled by: Howard J. Diamond, PhD; Climate Science Program Manager at NOAA's Air Resources Laboratory Data Source: National Snow & Ice Data Center (NSIDC; <https://nsidc.org/>).

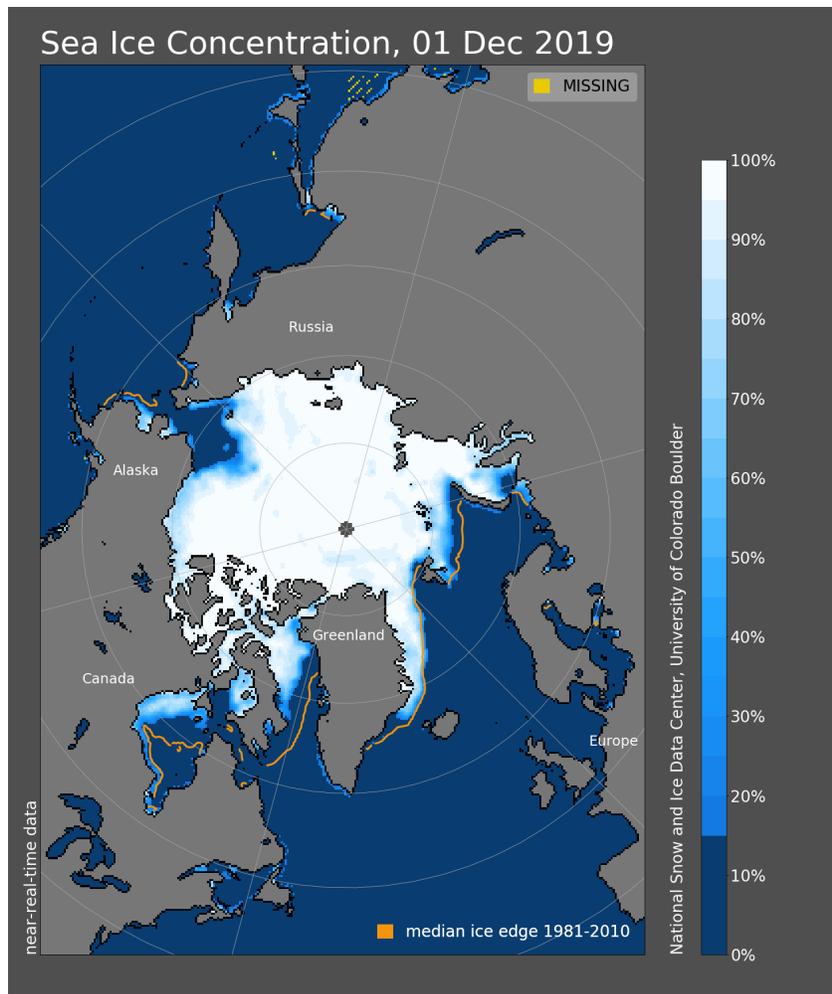


Figure 9: Daily Arctic Sea Ice concentration on December 01, 2019. Median ice edge for the 1981-2010 reference period is depicted in yellow. Very low and equal to zero sea ice concentration are observed in the Bering, Chukchi and Beaufort Sea. Image: NSIDC (nsidc.org)

Newsworthy information

The decline in Arctic sea ice has been linked to the emergence of a deadly virus threatening mammals in the North Pacific. According to a study from the University of California, low sea ice extent observed in the Arctic in the last years might have opened pathways for contact between Arctic and sub-Arctic seals, allowing the introduction of the virus. The virus debilitates the immune system of seals which become more susceptible to pneumonia.

On November 16, Anchorage set both a daily snowfall and an hourly high temperature record with 8.4 inches of snowfall, 0.1 more than the previous record of 1958 and 45°F recorded at 2.33 am.

On Monday November 18, Utqiagvik saw its last sunset. The next sunrise will be on January 23 after 65 days.

This information consists of preliminary 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 web site at <http://akclimate.org>. Please report any errors to webmaster@akclimate.org.

Appendix

Table A1: November 2019 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)
Anchorage	2019-11-21	43.5	1967	40.5
Cold Bay	2019-11-03	47.5	2002	47
Cold Bay	2019-11-04	47.5	2002	45.5
Cold Bay	2019-11-05	49.5	2002	44
Cold Bay	2019-11-06	49	2013	45
Cold Bay	2019-11-07	50	1986	49
Cold Bay	2019-11-08	49	1986	48
Cold Bay	2019-11-09	49.5	2013	48.5
Cold Bay	2019-11-10	46.5	2009	44.5
Cold Bay	2019-11-12	46	1959	45.5
Cold Bay	2019-11-18	45.5	1967	44.5
Gulkana	2019-11-21	37	1952	35
Homer	2019-11-06	49	2003	47
Homer	2019-11-28	45.5	1976	44.5
Juneau	2019-11-16	45.5	1979	43.5
Juneau	2019-11-17	45.5	2005	45
Juneau	2019-11-20	45.5	2018	44.5
King Salmon	2019-11-05	48.5	1991	45.5
King Salmon	2019-11-06	48.5	1957	45
King Salmon	2019-11-07	48	1957	46.5
King Salmon	2019-11-10	45	2014	43
King Salmon	2019-11-27	42.5	2004	39
Kodiak	2019-11-05	48.5	1936	47.5
Kodiak	2019-11-06	49	1979	47.5
Kodiak	2019-11-13	46.5	2014	46
Kodiak	2019-11-27	47.5	1978	45
Kodiak	2019-11-28	49	1983	46.5
Nome	2019-11-11	36	1982	35
St. Paul Island	2019-11-09	44.5	1978	42.5
St. Paul Island	2019-11-10	45	1978	42
Utqiagvik	2019-11-05	29.5	1998	29
Yakutat	2019-11-13	46	2018	44.5
Yakutat	2019-11-20	47	1954	44

Table A2: November 2019 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. 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)
Anchorage	2019-11-21	49	2007	46
Cold Bay	2019-11-04	49	1969	48
Cold Bay	2019-11-05	52	1986	49
Cold Bay	2019-11-12	51	1959	48
Homer	2019-11-06	53	2003	50
Homer	2019-11-19	52	1935	49
Juneau	2019-11-16	48	1944	46
King Salmon	2019-11-05	53	2002	52
King Salmon	2019-11-06	51	2002	50
King Salmon	2019-11-07	53	1979	49
King Salmon	2019-11-08	52	1979	50
King Salmon	2019-11-09	51	1993	50
King Salmon	2019-11-10	51	1979	49
King Salmon	2019-11-19	50	1924	49
King Salmon	2019-11-27	50	2004	47
Kodiak	2019-11-28	52	1983	48
Nome	2019-11-12	41	1937	38
St. Paul Island	2019-11-10	47	1979	46
St. Paul Island	2019-11-11	45	1959	44
Utqiagvik	2019-11-04	34	1951	33
Yakutat	2019-11-20	50	1949	48

Table A3: November 2019 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 Minimum Daily Temperature on record				
Station	Date	New Record (°F)	Year of old record	Old record (°F)
Anchorage	2019-11-02	40	2002	38
Cold Bay	2019-11-03	45	2002	44
Cold Bay	2019-11-04	46	2002	44
Cold Bay	2019-11-05	47	1962	40
Cold Bay	2019-11-06	46	1998	42
Cold Bay	2019-11-07	48	1986	46
Cold Bay	2019-11-09	46	2000	44
Cold Bay	2019-11-10	45	2009	40
Fairbanks	2019-11-28	27	1976	20
Gulkana	2019-11-21	33	1952	32
Homer	2019-11-28	43	1976	41
Juneau	2019-11-15	45	1944	42
Juneau	2019-11-16	43	1979	42
Juneau	2019-11-17	42	1936	40
Juneau	2019-11-20	43	1944	42
Ketchikan	2019-11-16	46	1979	45
King Salmon	2019-11-05	44	1991	43
King Salmon	2019-11-06	46	1957	42
Kodiak	2019-11-05	48	1991	45
Kodiak	2019-11-06	48	1979	45
Kodiak	2019-11-08	48	1979	47
Kodiak	2019-11-09	46	1983	45
Kodiak	2019-11-27	42	1976	41
Kodiak	2019-11-28	46	1983	45
St. Paul Island	2019-11-09	43	1978	41
St. Paul Island	2019-11-10	43	1974	40
Talkeetna	2019-11-01	36	1954	35
Talkeetna	2019-11-14	32	1967	31
Utqiagvik	2019-11-01	26	1911	25
Utqiagvik	2019-11-29	17	1950	12
Yakutat	2019-11-14	45	1926	41
Yakutat	2019-11-20	44	1917	41