



Alaska Climate Research Center
Alaska State Climate Center

MONTHLY REPORT



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Alaska’s Statewide Climate Summary for September 2020 provides an overview of weather for the month based on data from selected weather stations throughout the state. “Departure from normal” refers to the climatological average over the 1981-2010 period. We report on temperatures, precipitation and drought conditions in the state, as well as the condition of the Arctic sea ice as the summer melting season has come to a close.

HIGHLIGHTS

Warm September throughout much of the state except for the regions along the Aleutian Islands and Bristol Bay, which recorded **lower than normal temperatures** for the month.

Kodiak was affected by **extreme wind and precipitation events**.

Kotzebue remains under **moderate drought conditions** for the month and the northern part of the state was abnormally dry.

Arctic sea ice reached the **second-lowest extent** in the 42-year satellite record.

Temperature

Multiple locations around the state of Alaska reported warmer than usual temperatures, with the largest departures from normal in the far south of the state (Ketchikan, with 3.6 °F) and the far north of the state (Utqiagvik, with 3.3 °F). Cooler than average temperatures were constrained to the southwest, along the Aleutian chain (e.g., Cold Bay, with temperatures at -0.7 °F cooler) and King Salmon (-0.6 °F cooler). Figure 1 provides a visual representation of these temperature variations while Table 1 provides the numerical data.

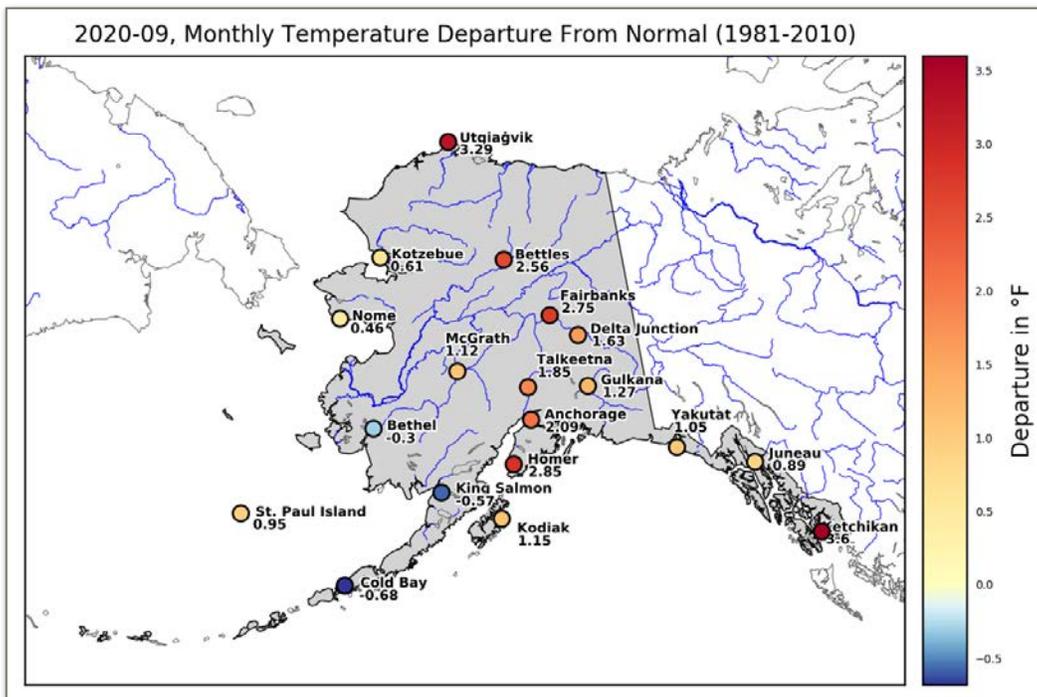


Figure 1. Monthly mean temperature departure from normal, September 2020.

Daily mean temperatures (Figure 2) reveal that, aside from Ketchikan and Utqiagvik, the cities of Anchorage, Bettles, Fairbanks and Talkeetna also showed more than half of the month with temperatures warmer than usual. Highest mean daily temperature records were broken in Delta Junction (09/07/2020) and Gulkana (09/07/2020) from the previous records, both set in 1946. A notable highest minimum daily temperature record was broken in Kodiak on the last day of the month, previously set in 1942. New low

temperature records were set as well for lowest mean daily temperature in Kodiak (09/05/2020), previously set in 1971 and lowest minimum daily temperature records were broken for Cold Bay, Gulkana and King Salmon, ranging from previous records set in 1959 through 2012. See the appendix for more details on these record-breaking temperatures.

Station	Observed (°F)	Normal (°F)	Departure (°F)
Anchorage	50.6	48.5	2.1
Bethel	45.3	45.6	-0.3
Bettles	43.2	40.6	2.6
Cold Bay	47.4	48.1	-0.7
Delta Junction	45.5	43.8	1.6
Fairbanks	47.6	44.8	2.8
Gulkana	44.2	43.3	1.3
Homer	50.9	48.1	2.9
Juneau	50.9	50.0	0.9
Ketchikan	56.1	52.5	3.6
King Salmon	47.0	47.6	-0.6
Kodiak	50.6	49.4	1.2
Kotzebue	42.9	42.3	0.6
McGrath	45.7	44.6	1.1
Nome	43.3	42.8	0.5
St. Paul Island	45.3	45.4	1.0
Talkeetna	49.4	47.5	1.8
Utqiagvik	35.4	32.1	3.3
Yakutat	49.4	48.4	1.1

Table 1: Mean monthly air temperature, normal (1981-2010) and departure for selected stations throughout the state, September 2020. Color-coded to Figure 1 (yellow-orange-red = warmer than usual; blue = cooler than usual).

Daily mean temperature, departure from normal (1981-2010), 2020-09

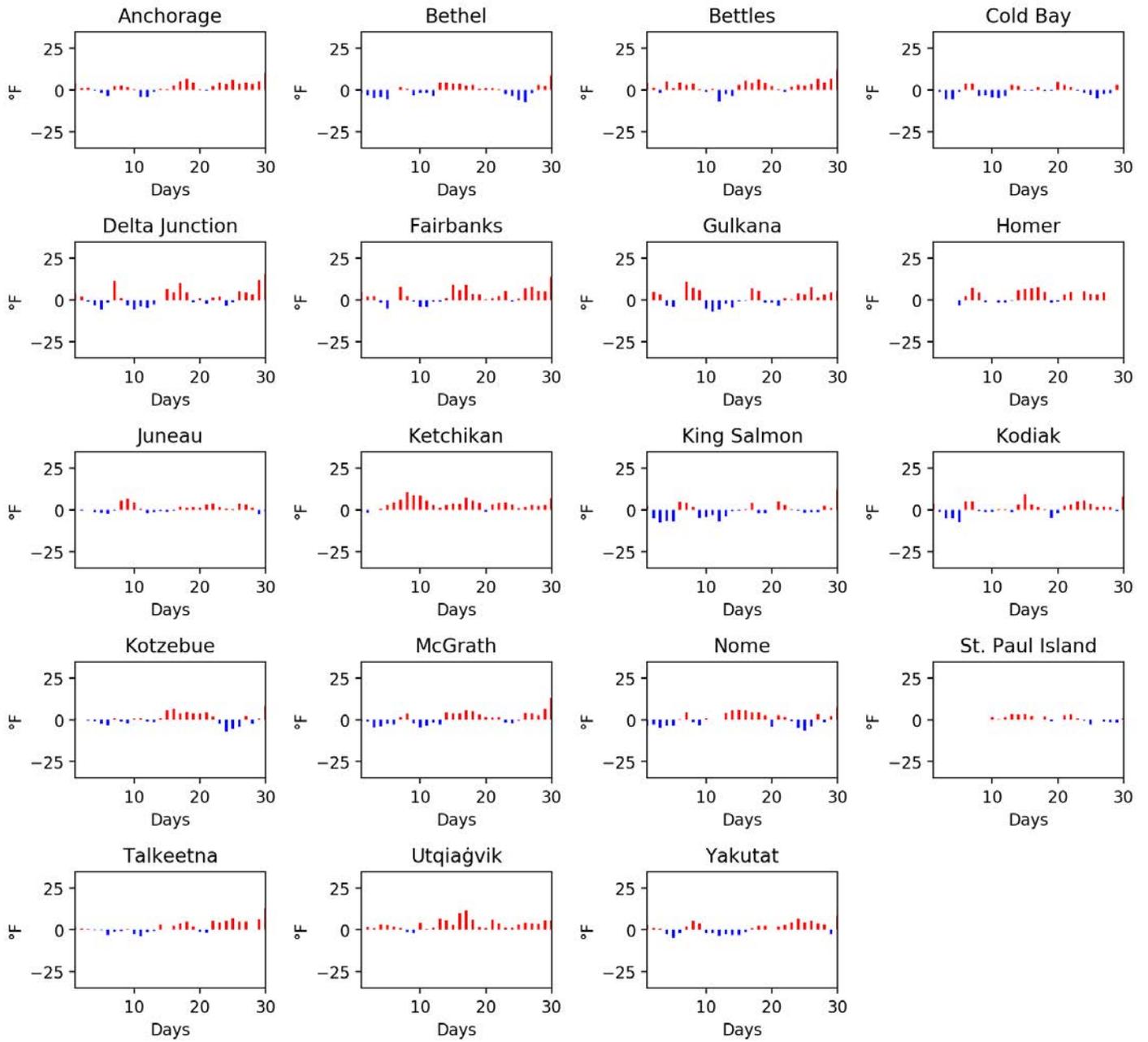


Figure 2. Daily mean temperature departures for each day in September 2020, at the selected stations.

Precipitation

Multiple locations around the state reported lower than usual amounts of precipitation, with the largest departures from normal along the southern and eastern coasts (Figure 3, Table 2). Notably, Gulkana, Homer and Juneau received less than 50% of their normal precipitation. Areas in the interior, such as Bettles (at 149% of normal), received larger amounts of precipitation than usual. Along the Aleutian Islands, correlating with cooler temperatures, Cold Bay (125% of normal) received notably larger amounts of precipitation, as did Kodiak (153% of normal). Compared with normal monthly precipitation for this time of year (Figure 4), other than the locations previously mentioned, Anchorage, Bethel, Ketchikan and Yakutat received much less precipitation.

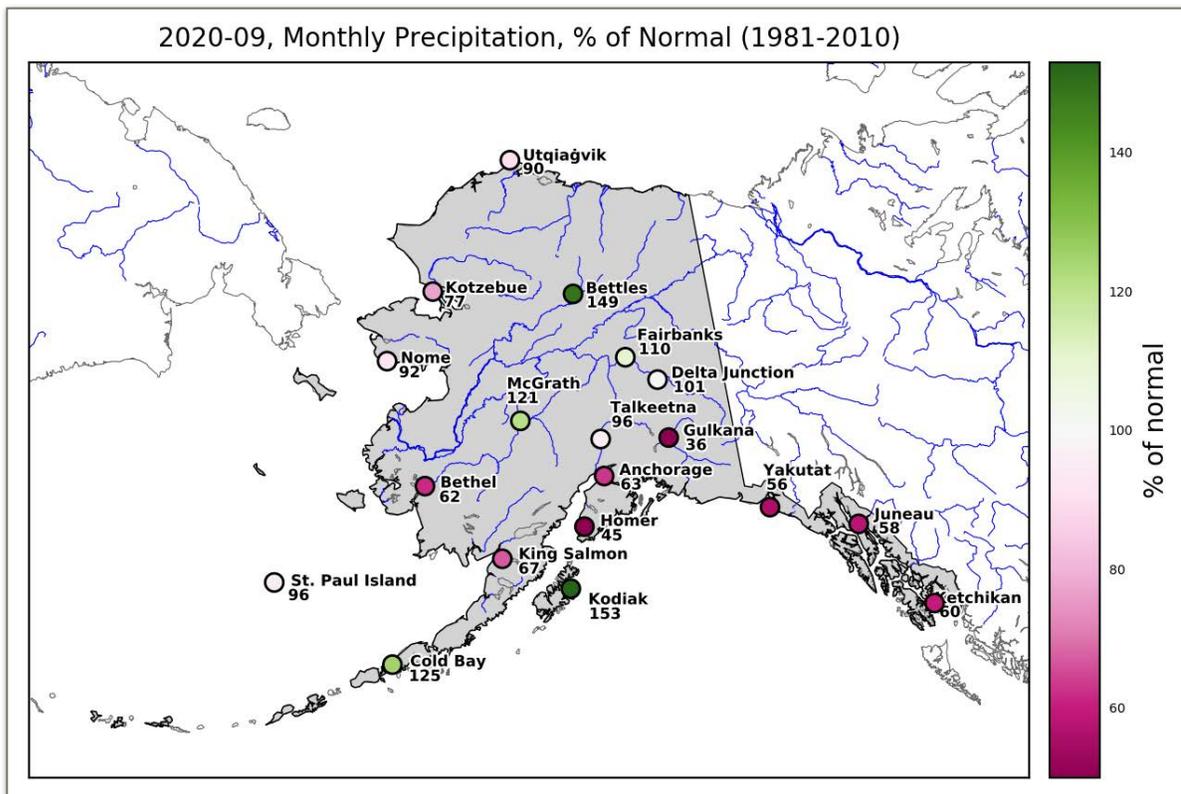


Figure 3. Monthly precipitation sums expressed as percent of normal (1981-2010), September 2020.

Station	Precipitation (in)	Normal (in)	% of Normal
Anchorage	1.9	3.0	62.9
Bethel	1.7	2.8	62.2
Bettles	2.8	1.9	148.7
Cold Bay	5.9	4.7	125.4
Delta Junction	1.0	1.0	101.0
Fairbanks	1.2	1.1	110.0
Gulkana	0.6	1.6	36.1
Homer	1.5	3.3	44.7
Juneau	5.0	8.6	58.1
Ketchikan	8.3	13.8	60.5
King Salmon	2.1	3.2	67.1
Kodiak	11.3	7.4	153.2
Kotzebue	1.2	1.6	77.2
McGrath	3.0	2.5	121.3
Nome	2.3	2.4	92.2
St. Paul Island	2.9	3.0	95.7
Talkeetna	4.1	4.3	95.6
Utqiagvik	0.7	0.7	90.3
Yakutat	11.8	21.1	55.9

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, September 2020. Shades of purple and green correlate with Figure 3.

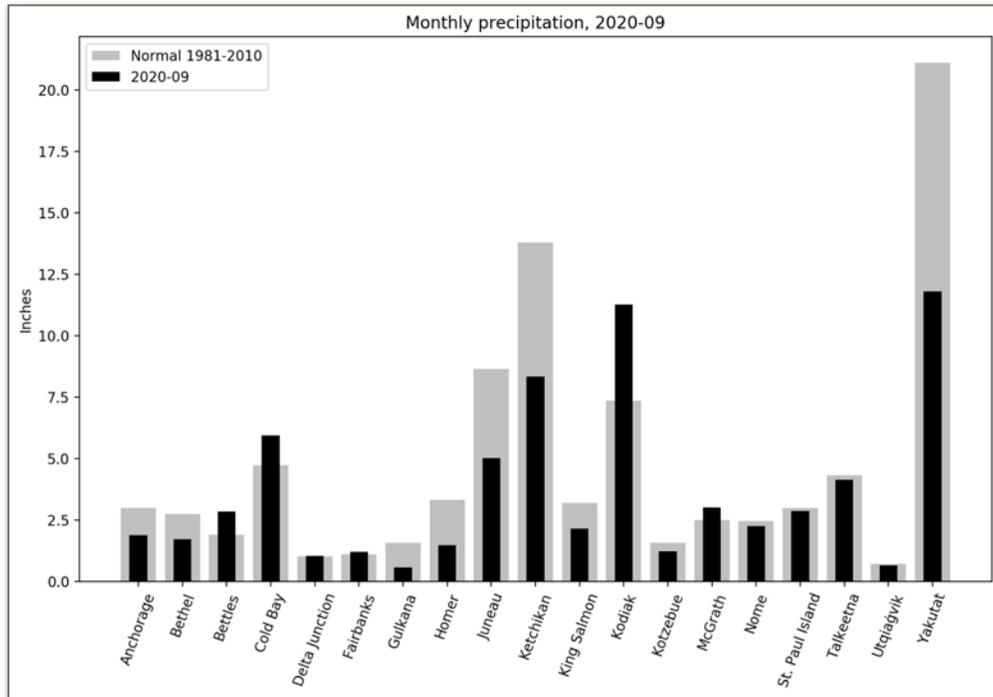


Figure 4. Monthly precipitation sums for September 2020 at the selected stations compared to the normal (1981-2010), in inches.

Snow

It’s that time of year - when the snow starts falling in Alaska. In the last 30 years, this has varied from late September to late October, depending on the location. Up in the North, Utqiagvik is seeing snow sticking as of October 6th this year. For Fairbanks in particular, last year saw the continuous winter snow cover start on November 2nd, while in the last 5 years it has varied from late October (10/29/2015) to the first week in November (11/06/2016; 11/04/2017; 11/09/2018; and 11/02/2019). We have yet to see our first snow in Fairbanks, so keep your eyes to the skies (Figure 5).

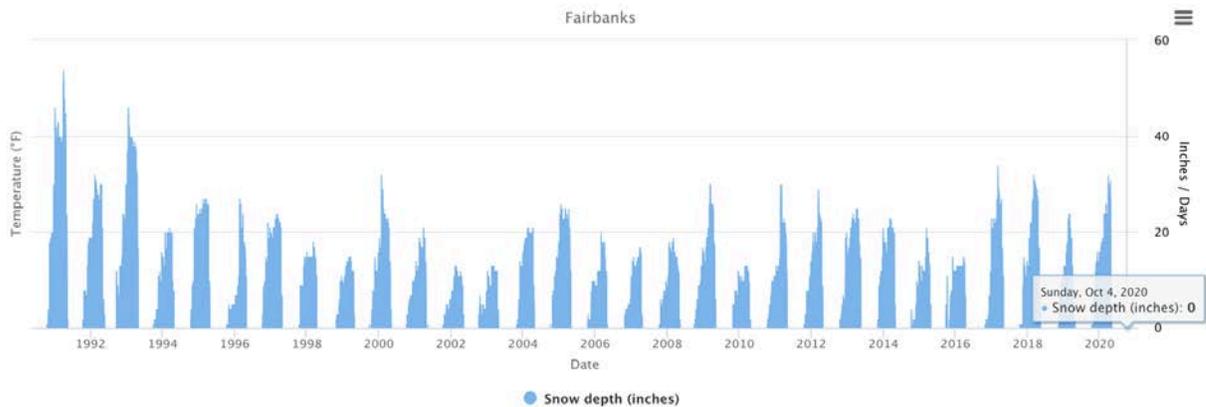


Figure 5. Snow depth (in inches) in Fairbanks for the last 30 years. Note that as of Sunday, October 4, 2020, there is no snow on the ground yet.

Drought Conditions

Below normal precipitation in over half of the locations from which data were collected reveal drought conditions (rated D0: abnormally dry) in the north/northwestern and south-central parts of the state (Figure 6). Kotzebue, which at 16% of normal precipitation for August 2020 and back up to 77.2% of normal for September 2020, still remains under moderate drought conditions (D1, seen as pale orange in figure 6). The figure below has been produced through a collaboration of the USDA, NOAA and the National Drought Mitigation Center.

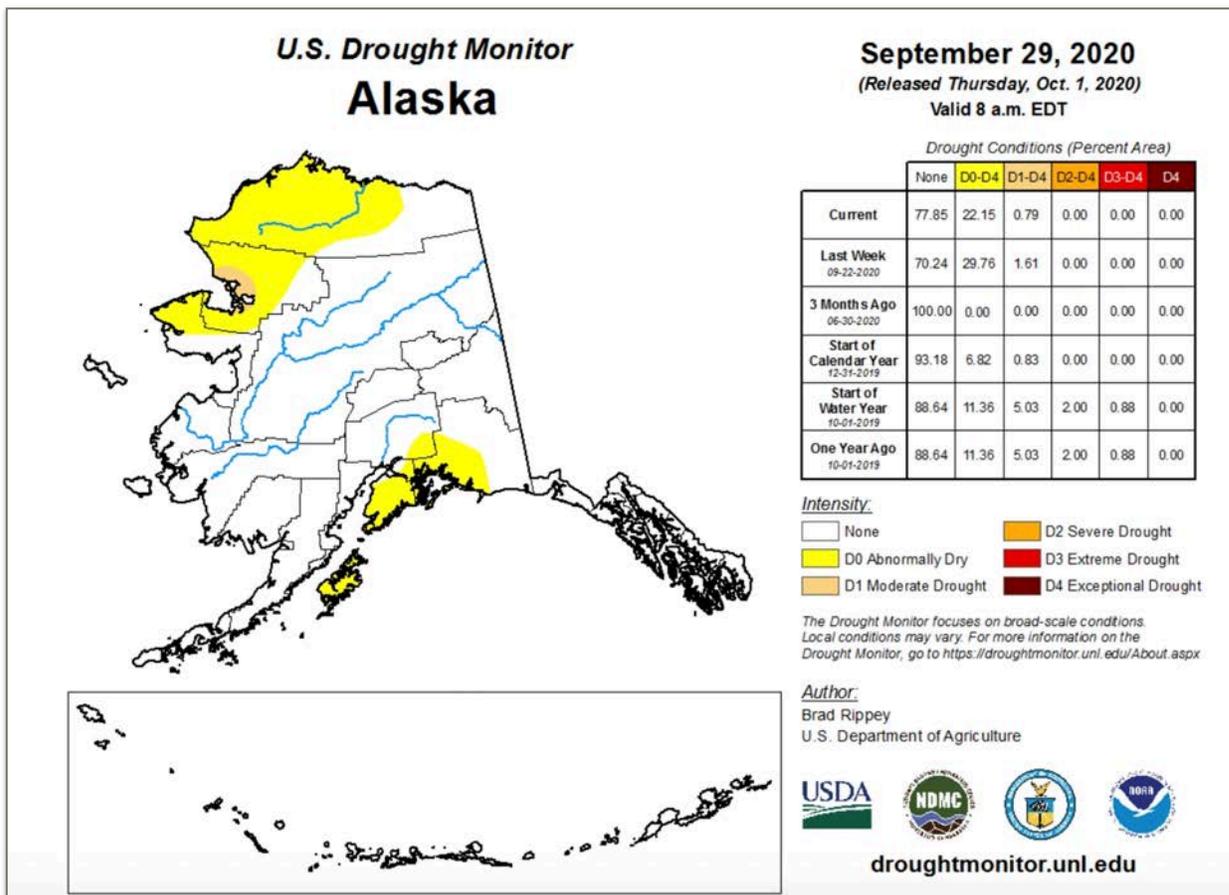


Figure 6. U.S. Drought Monitor map for Alaska, updated on October 1, 2020. The table on the right shows the percent area affected by different categories of drought intensity. Figures and data produced and released by the U.S. Drought Monitor, a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration (<https://droughtmonitor.unl.edu>).

Arctic Sea Ice

At the end of September 2020, the sea ice extent in the Arctic averaged 3.92 million square kilometers, the second-lowest in the 42-year satellite record. The previous low record was set in 2012. The minimum seasonal extent occurred on September 15th, followed by ice growth in the northern Beaufort, Chukchi, and East Siberian Seas, marking the official end of the summer melting season. Ten days after the minimum extent was reached, the total extent increased to 4 million square kilometers and near the end of the month, the ice extent was at 4.25 million square kilometers, still the second lowest in terms of daily extent. As of October 1st, the sea ice is at 4.42 million square kilometers and slowly growing. While average and below average air temperatures characterized the Arctic Ocean in the winter of 2019 to 2020, exceptionally warm conditions prevailed this past summer. Figures 7 and 8 show Arctic sea ice extent when compared to previous years, as well as the concentration for September 2020 (Figure 8 A).

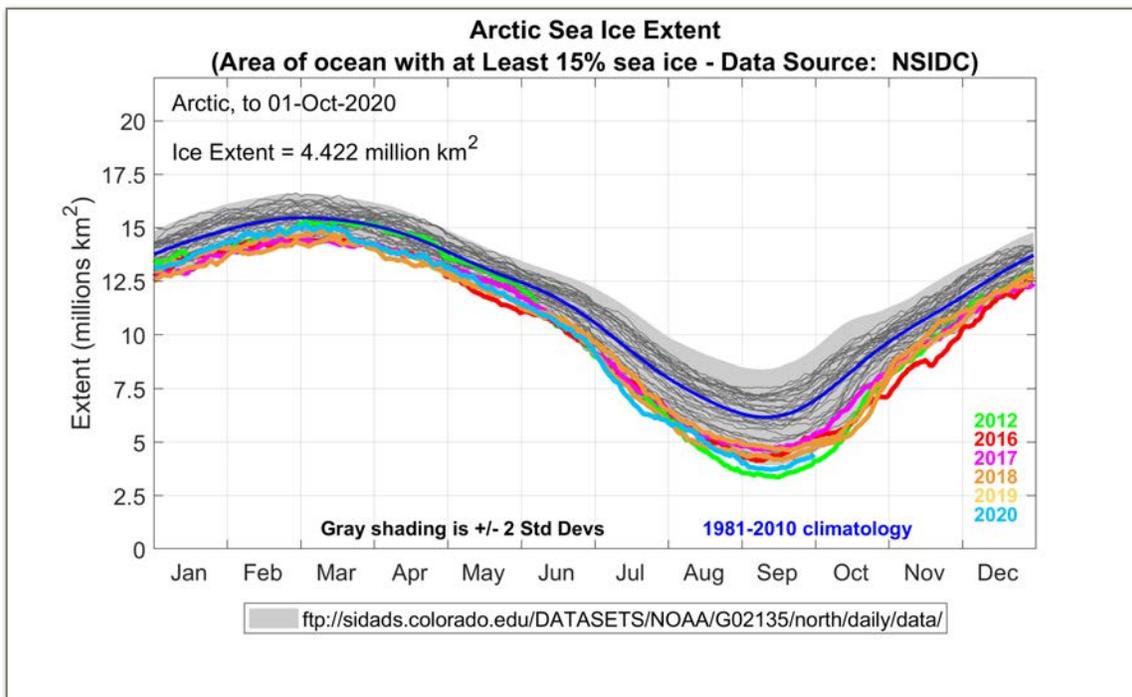


Figure 7. Time series of daily Arctic sea ice extent. This year’s data (light blue) are updated until October 1, 2020. The median sea ice extent for the 1981-2010 reference period is depicted in blue. Specific years are highlighted in colors. Plot Compiled by: Howard J. Diamond, PhD; Climate Science Program Manager at NOAA's Air Resources Laboratory Data Source: National Snow & Ice Data Center (<https://nsidc.org/>).

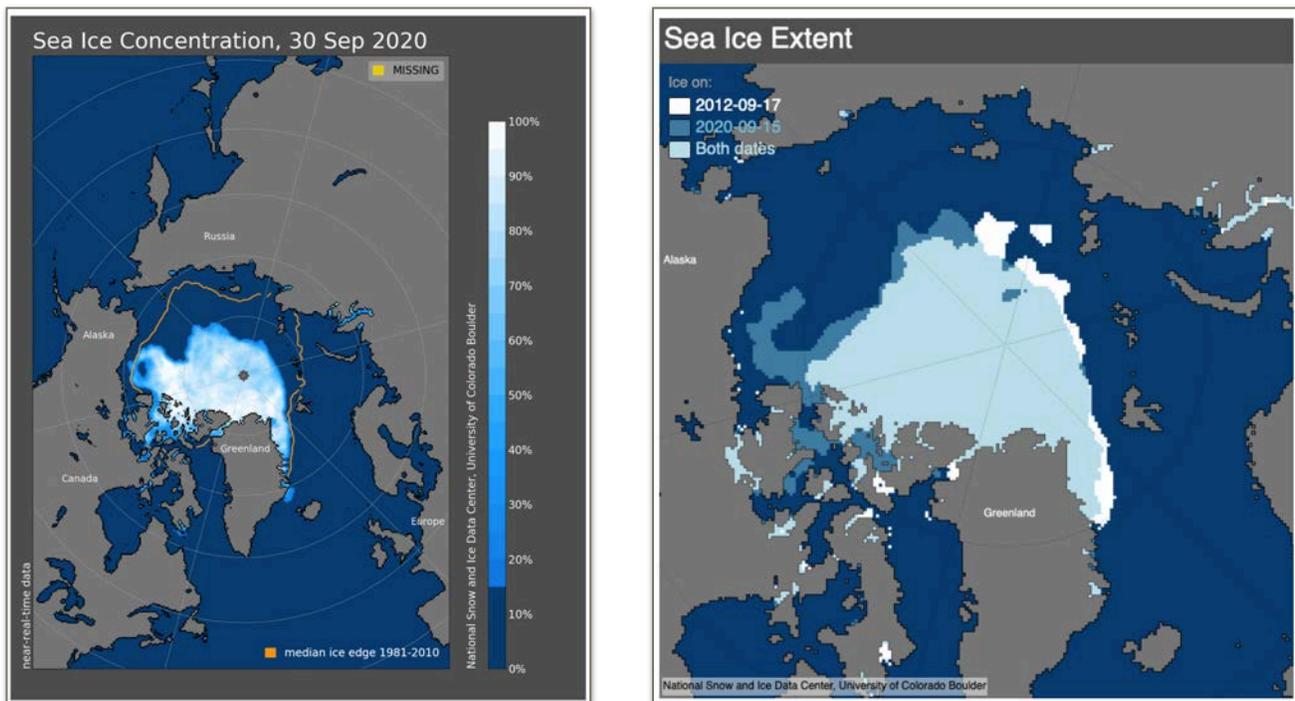


Figure 8. (A) Monthly Arctic sea ice concentration for September 2020. Magenta line is outline of the 30-year (1981-2010) median extent for that month. (B) Sea ice extent, comparing locations of the minimum extents for 2012 (September 17th) and 2020 (September 15th). Images: NSIDC (nsidc.org).

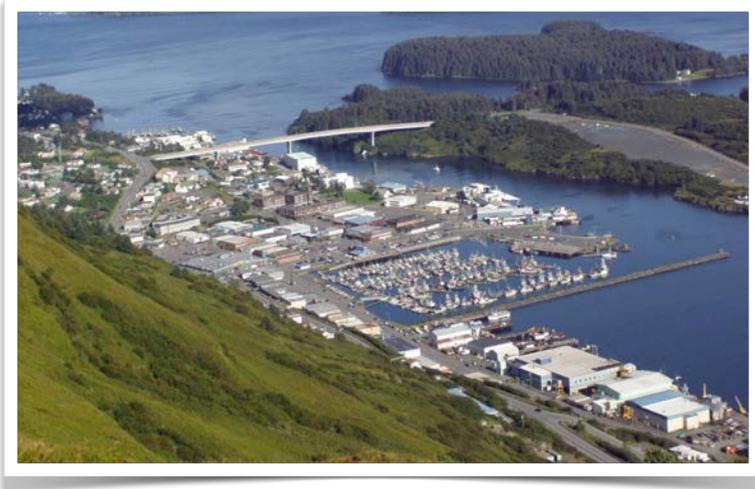
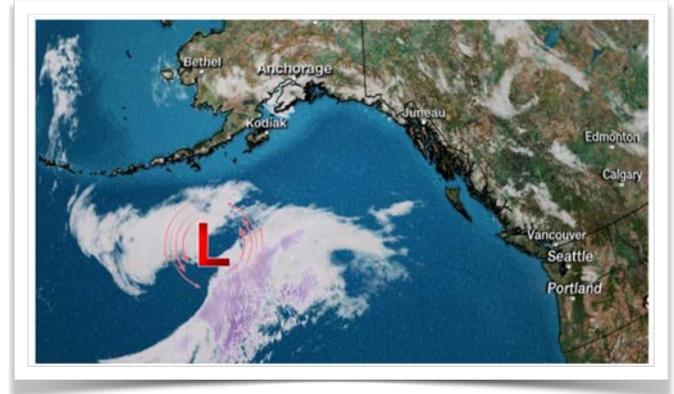
Newsorthy Information



Report on how climate change affects polar bears: <https://www.adn.com/alaska-news/2020/10/03/long-delayed-trump-administration-study-finds-that-climate-change-threatens-polar-bears/>

Polar bears pass a ridge of sea ice in the Arctic Ocean beyond Utqiagvik. (Washington Post photo - Bonnie Jo Mount)

A low pressure system in the Gulf approached the Alaskan coast on September 26th, bringing strong winds and big waves to the southeastern Alaskan coast: <https://www.cnn.com/2020/09/26/weather/hurricane-force-wind-warning-alaska-saturday-trnd/index.html>



Kodiak experiences extreme weather due to two powerful weather systems at the end of September: <https://kmxt.org/2020/09/kodiak-braces-for-week-of-extreme-weather/>

A sediment sample from the remote St. Matthew Island offers insight into the Bering Sea ice over the last 5,000 years: <https://www.adn.com/alaska-news/science/2020/09/26/sediment-sample-from-remote-island-offers-insight-into-bering-sea-ice-over-the-last-5000-years/>



Appendix

Table A1: September 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. Four highest mean daily temperatures were set along with one lowest mean daily temperature record.

Highest Mean Daily Temperature on Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
Delta Junction	2020-09-07	59.5	1946	58.5
Gulkana	2020-09-07	57.5	1946	57
Juneau	2020-09-09	58	1989	57.5
McGrath	2020-09-30	50	2003	49.5

Lowest Mean Daily Temperature Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
Kodiak	2020-09-05	45	1971	46

Table A2: September 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. Three highest records and four lowest records were set this month.

Highest Minimum Daily Temperature on Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
Gulkana	2020-09-07	51	1987	50
Ketchikan	2020-09-09	58	1963	57
Kodiak	2020-09-30	51	1942	50

Lowest Minimum Daily Temperature Record				
Station	Date	New Record (°F)	Year of Old Record	Old Record (°F)
Cold Bay	2020-09-03	35	1982	37
Cold Bay	2020-09-04	32	1960	36
Gulkana	2020-09-14	21	2012	22
King Salmon	2020-09-12	23	1959	29

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 comments, ideas or any errors to webmaster@akclimate.org.