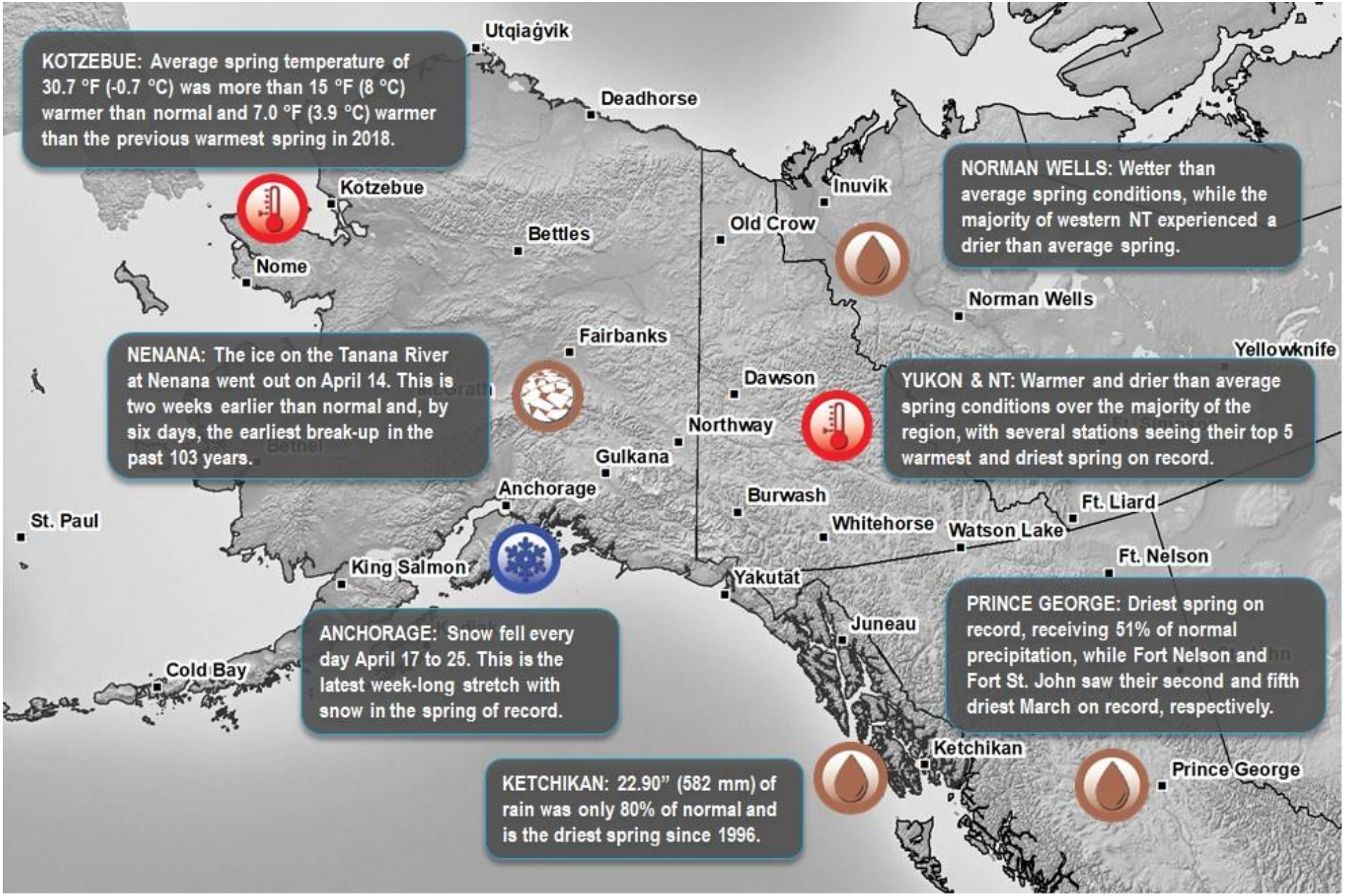
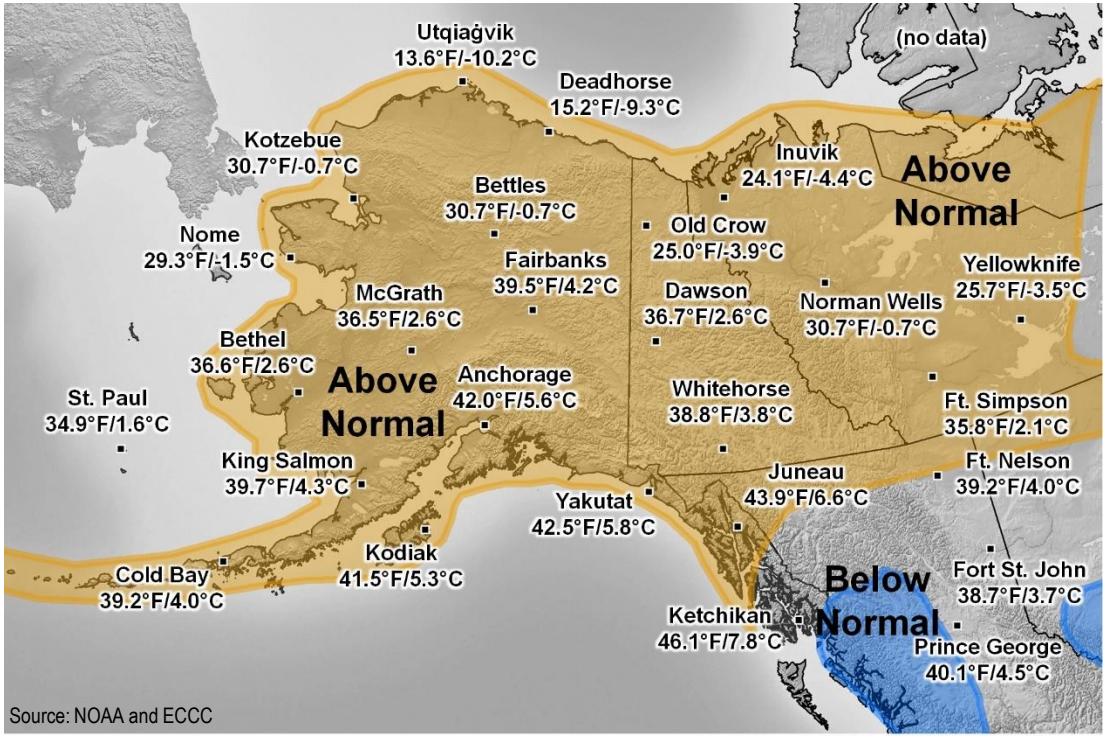
ALASKA and NORTHWESTERN CANADA

Weather and Climate Highlights and Impacts, March – May 2019; Climate Outlook July – Sept. 2019

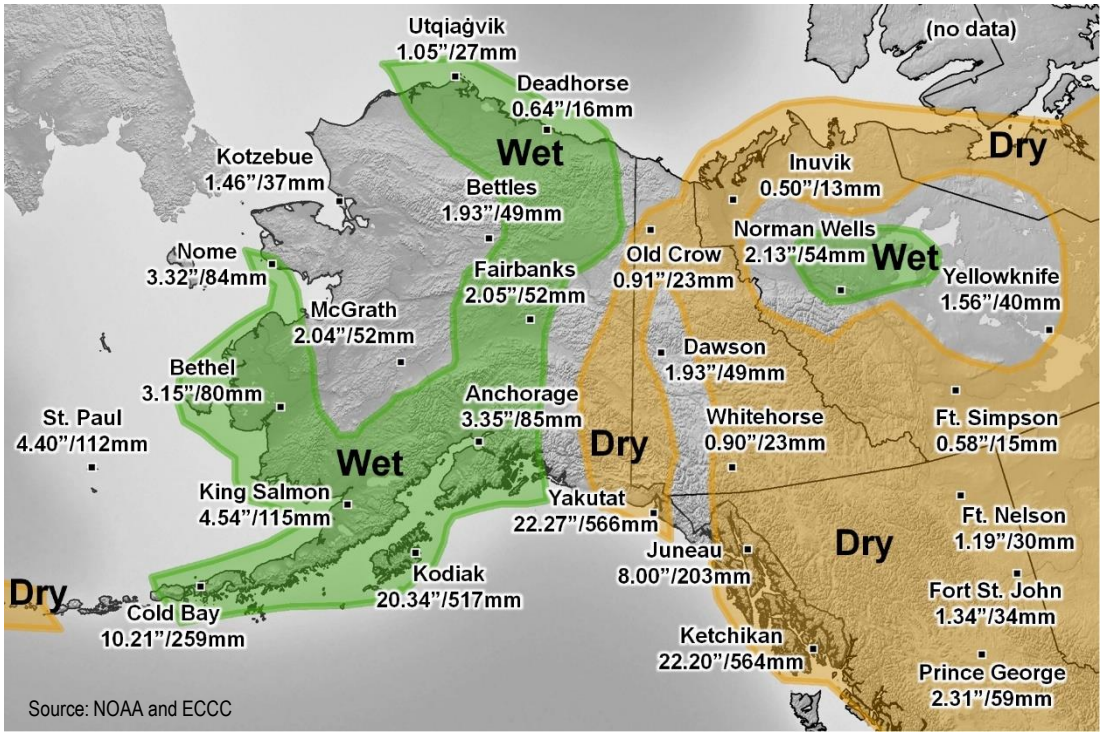
Environment and Climate Change Canada | Environnement et Changement climatique Canada



March to May 2019 Temperature Averages and Anomalies



March to May 2019 Precipitation Totals and Anomalies



Temperature & Precipitation, March – May 2019

Most of Alaska, Yukon, the western portion of the NT and northern BC were significantly warmer than normal during this past spring, with some areas in Yukon, and the NT near record warmth. In contrast, a small area in northwestern BC was colder than normal. Temperatures over the remainder of BC averaged near normal. Precipitation totals this past spring were well below normal over BC, a large part of the NT, Yukon, southeast Alaska, and the western Aleutian Islands. A small area near Great Bear Lake, NT and the majority of mainland Alaska, with the exception of the northwestern regions, were wetter than average. Like temperatures, there were only small areas with near normal precipitation.

The modified maritime climate of Anchorage is not typically conducive to thunderstorm formation. The long-term average is only 1.4 thunderstorms per year. On May 16, 2019, a near record early thunderstorm developed directly over the city of Anchorage and produced heavy rain, hail, and frequent lightning. Several more thunderstorms formed over Anchorage the following two weeks. Photo credit: Joe Connolly with Chugach Peaks Photography.

Precipitation in northern BC and Yukon was well below average between March and May 2019. Combined with above normal temperatures, the transition from winter to spring weather came earlier than normal over those regions. From a forestry and hydrology perspective, the dry, and at times windy, spring conditions will continue to have implications with respect to the risk of wildfires, tree mortality, drought, and low river flows this coming summer. The photo above shows the early melting snowpack at the Whitehorse airport on March 19, 2019. Photo credit: Canadian Arctic Weather Science.

A very warm month of March: the influence of the atmosphere, oceans and sea ice

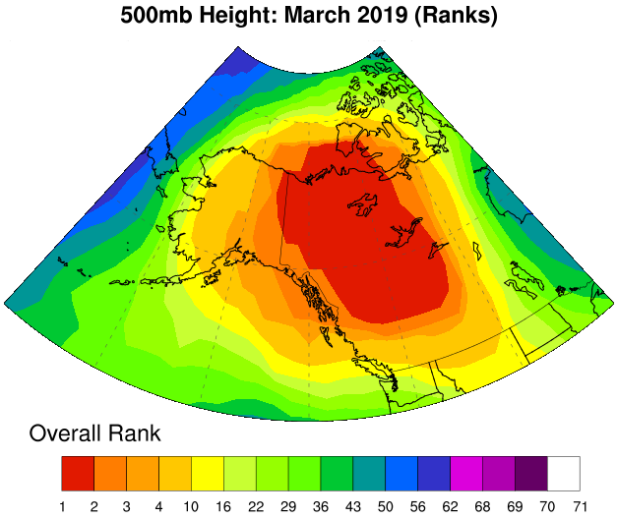
March 2019 was exceptionally mild over nearly all of Alaska and northwest Canada, with many locations in mainland Alaska, Yukon and western NT recording the mildest March on record by a wide margin. At Inuvik, NT, the average March temperature was a stunning 14.4 °C (25.9 °F) above the 1981-2010 normal. In Alaska, the Deadhorse Airport at Prudhoe Bay averaged 23.8 °F (13.2°C) above normal, and Fairbanks had the warmest March in 115 years of climate records.

So why was it so remarkably mild over such a large area? Three main factors were involved:

1) A persistent high pressure system over the region
2) Record-low sea ice extent
3) Warm ocean temperatures.

These factors, explained below, illustrate the cumulative importance of the atmosphere, oceans and sea ice to the regional climate.

First, a massive high pressure at mid-levels (500 mb) of the atmosphere was anchored most of the month over eastern Alaska and northwest Canada. High-pressure systems are typically associated with clear skies and calm weather. The absence of clouds in the atmosphere to block incoming solar radiation causes surface air temperature to rise during the day. In March 2019, the persistent high-pressure system was one of the strongest at this time of year in the region since 1949, as shown by the red and orange areas on the figure below. The associated warm air, combined with longer daylight, sunshine and accelerated snowmelt gave a major boost to temperatures.



The figure on the left shows the rank of the March 2019 500 mb height. The ranks are from 1 (red, highest 500 mb height) to 71 (purple, lowest 500 mb height), since 1949. The red areas on the figure show regions where the March 2019 500 mb height was the highest since 1949. High values of 500 mb height are associated with high-pressure systems. In this case, the stronger the high-pressure system, the more likely surface air temperatures are to be above average. Data source: Earth System Research Laboratory (ESRL) R1, courtesy of the University of Alaska Fairbanks.

Secondly, sea ice extent in the Bering Sea was the lowest on record in March 2019. This low sea ice extent was associated with frequent areas of exposed water in the southern Chukchi Sea. The mere presence of water instead of the normal snow covered sea ice is a significant source of heat transfer from the ocean surface to the atmosphere as greater warming occurs in ice-free regions. The figure on the top-right illustrated open water on the Bering Sea on March 13, 2019.

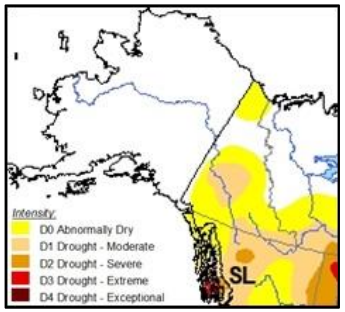
Thirdly, south of the sea ice in the Bering Sea, ocean surface temperatures were well above normal, as they have been for much of the past several years. These warm ocean surface temperatures provided an additional source of ocean heat, which in turn, contributed to the warming of surface air temperatures in southwest Alaska.

Aliy Zirkle heads toward the finish line of the Iditarod Race in Nome, Alaska on March 13, 2019. The race route had to be modified this year to accommodate the unprecedented open water on the Bering Sea. Photo credit: Jeff Schultz.

These three factors, along with the long-term warming climate combined to produce an unprecedented March 2019 in Alaska and northwest Canada. Warmer than normal conditions throughout the northwest of the continent will likely continue into summer 2019. At the same time, near normal to dry conditions are probable in the region. This dryness, combined with higher than normal temperatures, will continue to have implications for the upcoming wildfire season in the region.

Low precipitation, drought, and impacts on water levels

Most of northwestern Canada and Alaska had low winter 2019 snowfall accumulations, with some areas seeing some of their driest winter on record. This is a continuation of low precipitation and dry conditions in the region. In fact, parts of southeast Alaska, northern BC, and southern Yukon have been experiencing drought conditions for the last two years as a result of low precipitation amounts (see Figure below).

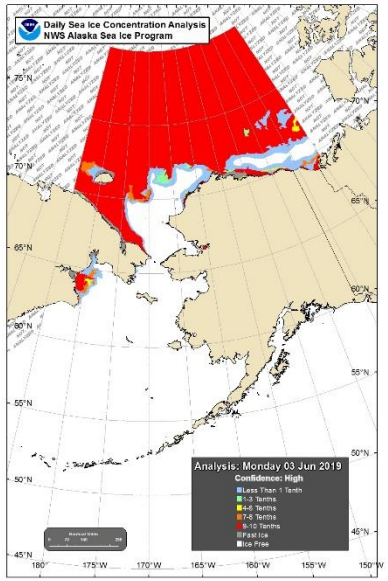


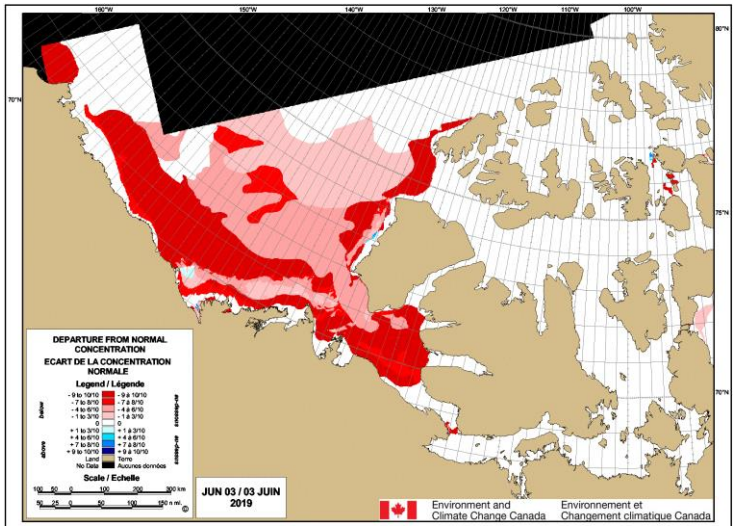
The figure on the left shows the drought conditions on May 31, 2019 for Alaska and northwest Canada. By the end of May 2019, drought severity over the region ranged from abnormally dry (yellow) to extreme (red), with both short-term (S) and long-term impacts (L) to the hydrology of the region. Map adapted from North American Drought Monitor, NOAA.

As a consequence of low precipitation amounts, most Yukon, NT, and Alaska rivers were running below average in May 2019. Along the Yukon River near Whitehorse, these low water levels had an unexpected consequence: historical objects and structures such as old rusty nails, wooden logs and pieces of sternwheelers that are typically well hidden under water or ice have been uncovered. These artifacts provide a piece of history along the Yukon River.

However, despite low precipitation and low river flows, near record-breaking March 2019 temperatures produced rapid spring snowmelt. This led to localized flooding in some Whitehorse neighborhoods as the rapid melt overwhelmed the storm drains in late March.

Sea Ice Conditions at the end of May and beginning of June 2019 in the Beaufort and Chukchi Seas

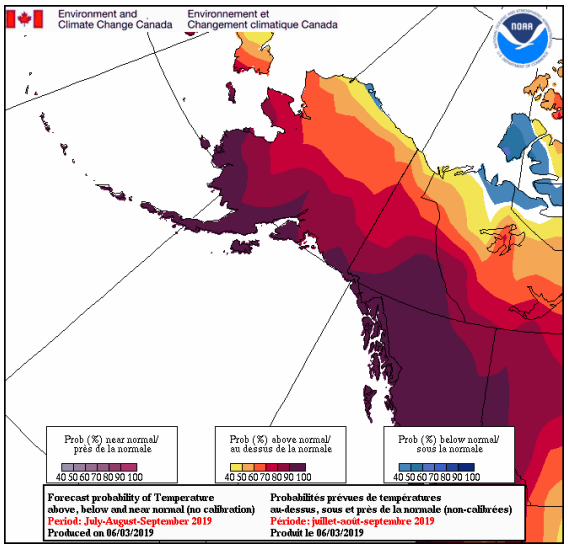




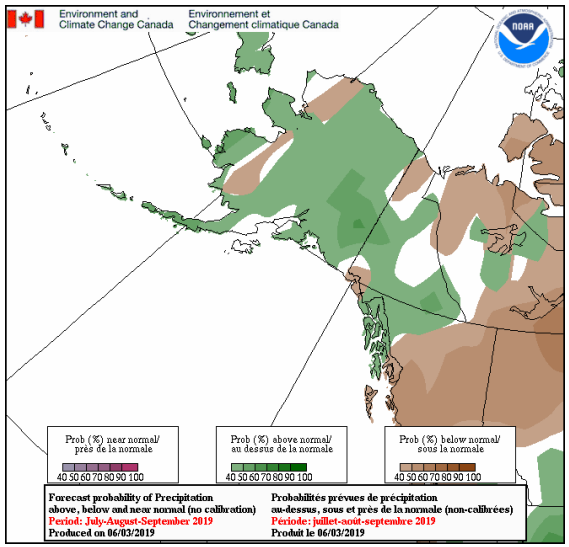
Sea ice extent in the Bering Sea was at a record low (since 1979) in March 2019, which is even lower than in 2018. Early April 2019 saw some recovery in extent, but the new ice was very thin and quickly melted out when the weather pattern changed. Sea ice in the southern Chukchi Sea was fractured and mobile in March and early April 2019, with open water frequently appearing in Kotzebue Sound. Seasonal melt began in earnest in mid-April 2019 and rapidly expanded northward, with total sea ice extent at record low levels in mid and late May 2019. In the Beaufort Sea, sea ice melt beyond the shorefast ice was very rapid and 6 to 8 weeks ahead of 2018 melt. By the first days of June 2019, the only remaining sea ice in the Bering Sea was in the western Gulf of Anadyr. At the same time, the Chukchi Sea open water was found northwest of Utqiaġvik at 72° N, and only a thin band of sea ice northeast of Point Barrow separated open water from the Chukchi and Beaufort Seas.

The ice extent in the Beaufort Sea was stable for the latter part of winter and into the first part of spring. However, after mid-April 2019, signs of breakup began to appear in the southeastern part of the Beaufort Sea, just north of the Tuktoyaktuk Peninsula, NT. By the end of May/early June 2019, the breakup was well underway in most of Amundsen Gulf, the southeastern Beaufort Sea area, and the region near Point Barrow. In fact, the open water along parts of the northern Alaskan coast was up to six weeks to two months earlier than normal. In the meantime, the coastal fast ice was fracturing two weeks earlier than normal. By the end of May 2019, significant open water areas and looser than normal ice conditions from the Amundsen Gulf to the north coast of Alaska represented ice conditions up to two months earlier than normal.

Temperature Outlook: July-Sept. 2019



Precipitation Outlook: July-Sept. 2019



A combined Canada-USA climate forecast model is used to provide temperature and precipitation outlook for July-September 2019.

The temperature outlook for July through September 2019 shows that Alaska and northwest Canada have a 40-95% chance of above average temperature (orange-red colors), with highest probabilities found in the southwestern parts Alaska (including the Aleutian Islands), southern Yukon, and northern BC. A small area in northwestern NT along the Beaufort Sea including Banks Island and the western portion of Victoria Island, as well as an isolated pocket in northern Alaska, have a 40-50 % chance of below average temperature (blue areas).

The precipitation outlook for July through September 2019 shows that the majority of Alaska, northern BC, southern and western Yukon, along with the regions east and south of Great Bear Lake, NT, have a 40-50% chance of above normal precipitation (green areas). The majority of the NT, and small isolated pockets in western Alaska and northern Yukon have a 40-50% likelihood of below normal precipitation (brown areas).

Content and graphics prepared in partnership with the Alaska Center for Climate Assessment and Policy and Environment and Climate Change Canada.

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