

ALASKA and NORTHWESTERN CANADA

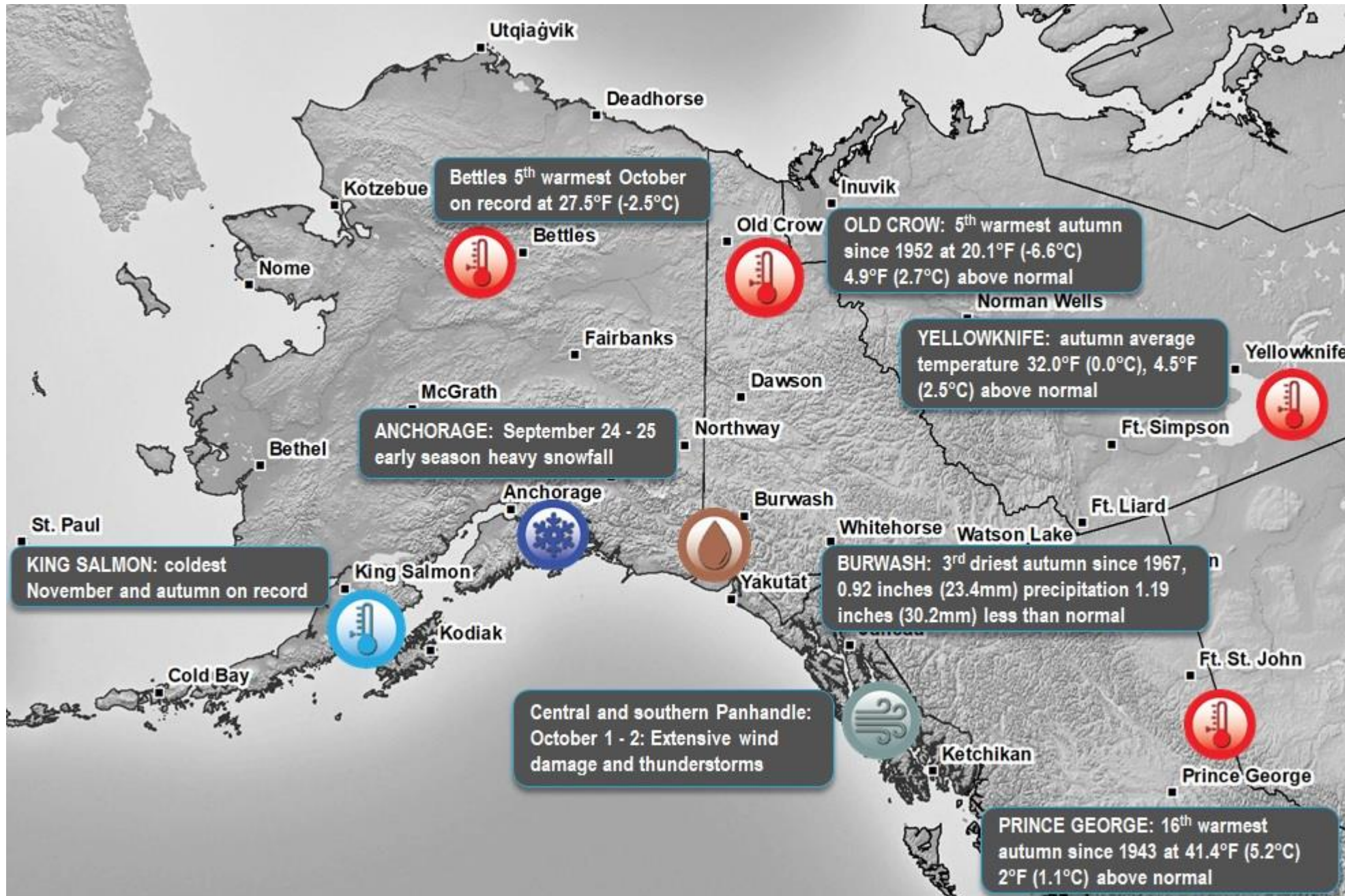
Weather and Climate Highlights and Impacts, September to November 2021

Climate Outlook, December 2021 to February 2022



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Sept-Nov 2021 Temperature Averages (°F/°C) & Anomalies- **Below** / **Above** / Normal.

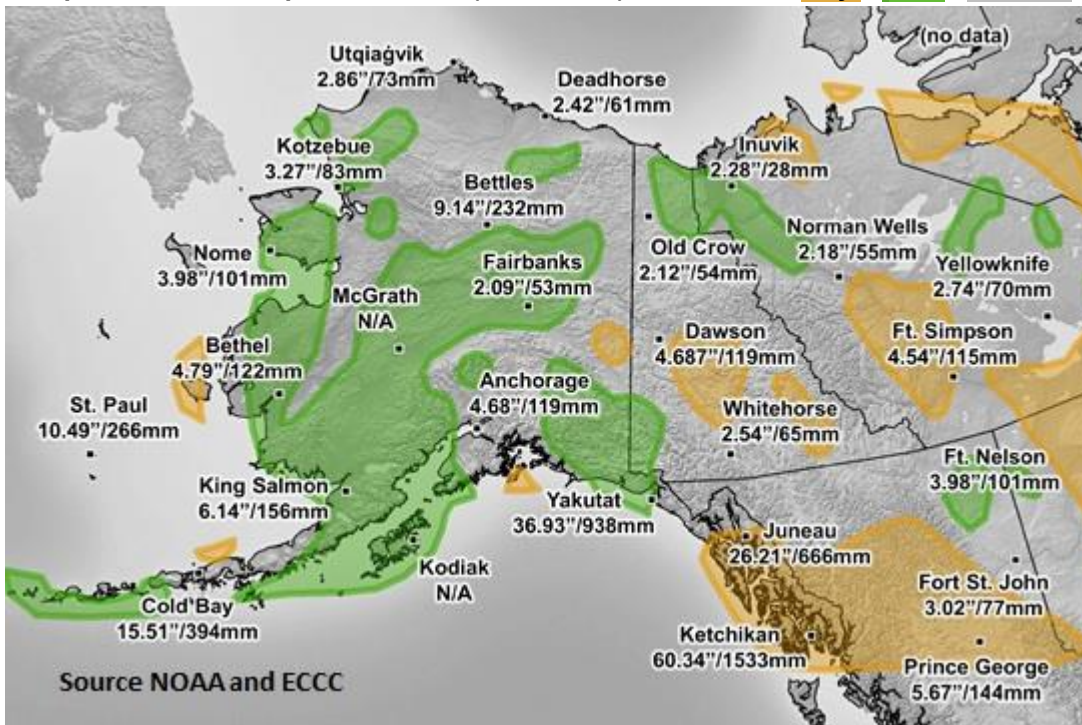


Canyon Lake, Credit: Yukon Energy



Canyon Lake is the highest elevation lake feeding into the Aishihik hydro-electric generating station about 120 km northwest of Whitehorse (Photo: Late autumn 2021)

Sept-Nov 2021 Precipitation Totals (inches/mm) & Anomalies- **Dry** / **Wet** / Normal.



During autumn 2021, the southern and central regions of British Columbia were greatly impacted by extreme weather, whereas the Yukon was far less affected. Rainfall was slightly above average for most locations in Yukon except for Old Crow where the rainfall of 2.1 inches (53.9 mm) was 79% of the total normal amount.

All three Yukon hydro-electric reservoirs: Aishihik, Mayo and Marsh, refilled to their regulated full supply levels this year due to regular light to moderate rain days throughout fall. The Whitehorse Rapids Generating Station, fed by the Southern Lakes watershed, is effectively a run-of-river system outside of the winter months. The basin's spring/summer unregulated refill periodically exceeds Yukon Energy's full supply level for Marsh Lake. This year a record maximum level was reached.

Fall temperatures have been normal at Whitehorse, Mayo and Dawson City, and warmer than normal at Watson Lake, while Old Crow experienced its fifth warmest fall since 1952. Colder than normal conditions were recorded in Burwash where the third driest fall with 0.92 inches (23.4mm) of precipitation was recorded since 1967.

Record Cold in Southwest Alaska



Alaska Logistics' barge, the Madison Rose, frozen into the Eek River. Photo credit: John Foster

Most of the globe experienced a warmer, to much warmer than normal Fall. In the Northern Hemisphere, the most anomalously cold temperatures (compared to normal) occurred in southwestern Alaska. In the month of November, record cold temperatures were observed at many locations in Alaska between Kotzebue on the west coast, to King Salmon on the Alaska Peninsula.

King Salmon set or tied eleven low temperature records during the Fall – including tying the November all-time record low of -28°F (-33°C) on November 28th. For a remarkable 22 consecutive days in November, King Salmon was at least 15°F (8.3°C) below normal each day. On 8 of those days, they were at least 30°F (16.7°C) below normal.

Cold Bay, Alaska, also set a record for the coldest November on record with an average temperature of 27.7°F (-2.4°C). Farther west, St. Paul Island recorded their 5th coldest November, Kotzebue and Nome each recorded their 4th coldest November, and Bethel recorded their 2nd coldest November. The cold temperatures were in stark contrast to the warmth observed in recent Fall seasons.

Early Snowfall in Anchorage, Alaska



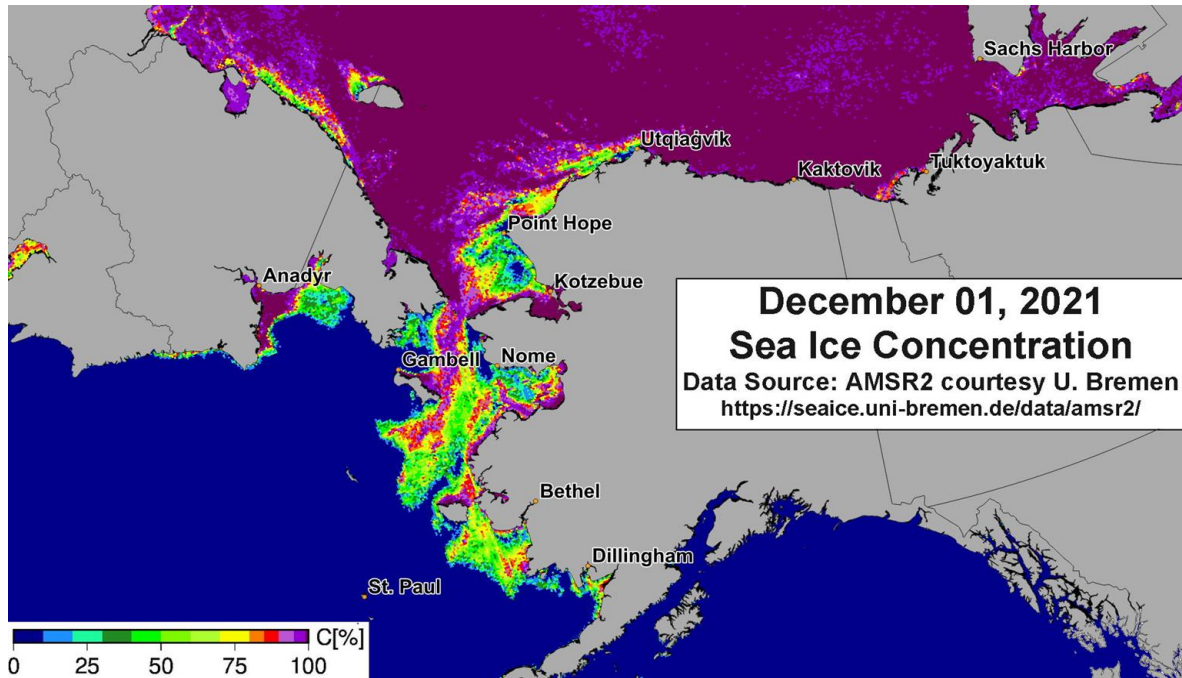
Snow along the road leading to the Prospect Heights trail head. Note the trees still have all of their leaves. Credit: Brian Brettschneider

On September 24-25, 2021, a rare early season snowfall impacted Anchorage, Alaska. The official climate station at the Anchorage International Airport did not receive any snow at all, but the eastern half of the city was blanketed with 1"-3" of snow (2.5 to 7.5 cm). The "Hillside" part of town includes residences that extend into the front range of the Chugach Mountains up to an elevation of 2,200' (670 m). These locations received 6" (15 cm) to as much as 30" (76 cm) in little more than 24 hours.

The snow occurred during the early Fall season before leaves fell from the trees. This created significant problems with tree branches, causing many branches to break due to their inability to cope with the weight of the snow. In the part of Anchorage called Eagle River, about half of all birch trees between 500' and 1,500' elevation (150 to 450 m) sustained damage. Power lines were knocked down in many neighborhoods. The unseasonable early snow was likely the heaviest in over 50 years during the month of September.

Elevations even higher in the mountains received upward of 36" (1 m) of snow. The heavy snow was the base for the winter snowpack. The earliest establishment on record.

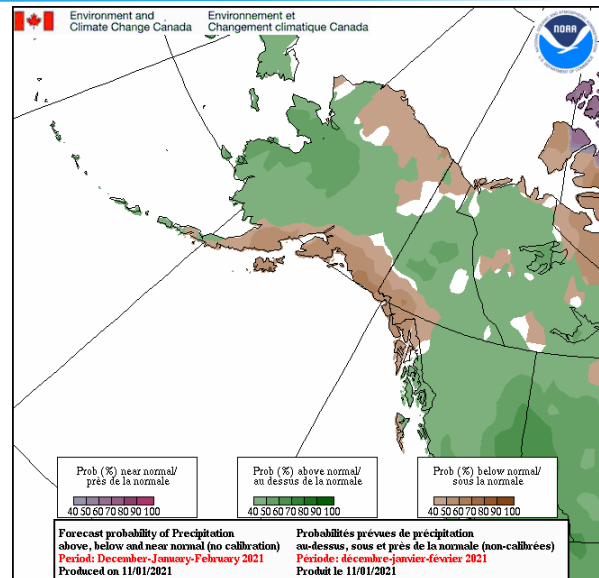
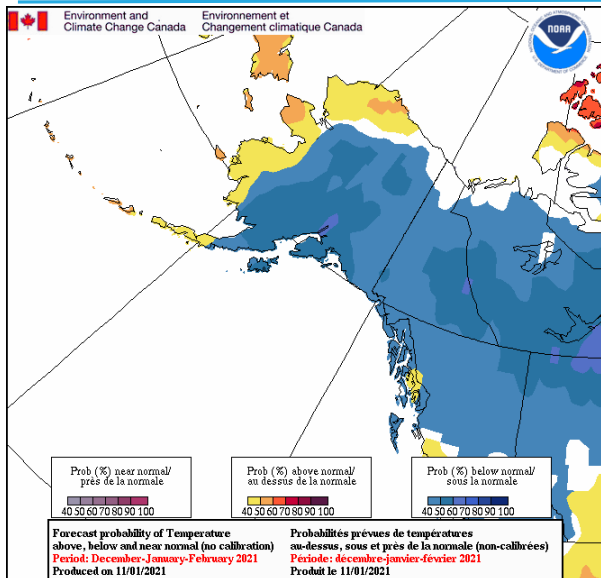
Sea Ice Concentration Conditions End of Autumn 2021 in the Bering, Chukchi and Beaufort Seas



The Chukchi Sea minimum sea ice extent for the season was reached in mid-September and was much greater than in recent years. This gave a jump start on freeze-up. Combined with sustained cold weather from mid-October onward, ice-over of the Chukchi Sea was the earliest since 2012. Sustained cold and dry weather south of the Bering Strait in November allowed for earlier sea ice development along the Alaska coast of the Bering Sea than most recent years, though there was only very limited ice growth by the end of autumn west of St. Lawrence Island.

Freeze-up in the Beaufort Sea began around mid-September and, for the most part, tracked near to slightly above the median ice concentration based on the Canadian Ice Service's new 30 year ice climatology (1991-2020). Yet from late October to early November, the ice concentration dipped below the median due to a strong southeasterly circulation and very mild temperatures. Ice growth was paused or slowed down during this period. Around mid-November, ice growth recovered to median ice concentration values until the end of the month.

Temperature Outlook: Dec 2021 - Feb 2022 Precipitation Outlook: Dec 2021 - Feb 2022



A combined Canada - USA forecast model is used to provide a temperature and a precipitation outlook for December 2021 to February 2022.

The temperature outlook map shows that all of Alaska (except northern and western coastal areas), and northern coastal Canada have a 40% to 70% chance of below average temperature (blue to purple colors), with the highest probabilities found near Anchorage and along the boundary areas between Yukon and Northwest Territories.

The precipitation outlook map shows that almost all of Alaska (except northern and southern coastal areas), and northern coastal Canada have a 40% to 60% chance of above average precipitation (green colors), with the highest probabilities found in central western coastal areas of Alaska and the central Yukon (medium- green color).

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