Spring Breakup Outlook for Alaska
Valid April 19, 2024
Alaska-Pacific River Forecast Center
Next Product Issuance: April 26, 2024
www.weather.gov/aprfc

EXPERIMENTAL PRODUCT

Spring Breakup and Flood Potential Outlook

Across Alaska, the 2024 spring breakup is shaping up to be dynamic*. Temperatures are forecasted to remain below normal through the end of April, particularly for the western half of the state, and a robust snowpack persists across northeast and western Alaska. However, while we anticipate a dynamic breakup in some areas this year, the conditions aren't as favorable as they were at the beginning of the 2023 historic breakup season, which was marked by numerous significant ice jams and snowmelt floods across the Interior. If air temperatures remain cold through the remainder of April and into early May, the chances increase for a dynamic breakup and localized flooding.

*The two generalized types of river ice breakup are dynamic (or mechanical) and thermal. A dynamic breakup is characterized by cold early spring air temperatures followed by rapid warming, and can be compounded by above average headwater snowpack and river ice thicknesses, and generally moves the breakup ice front downstream in a somewhat linear fashion. Ice jam flooding occurs more often during a dynamic breakup. A thermal breakup occurs from gradually warming air temperatures, where the ice simply rots in place usually. Thermal breakups commonly result in fewer and less severe ice jams.

Updates to the previous Spring Breakup Outlook

Ice thickness across Alaska remains near normal through April. April 1 statewide snow summary showed well-above normal snowpack for the North Slope, Porcupine, Copper, Lower Yukon, and Kuskokwim river basins. Recent aerial snowpack measurements show very high snow amounts in the Nushagak Hills near Dillingham and the Holitna River near Sleetmute basins, as well as in the lower Kuskokwim River below Aniak. Normal to slightly below normal snowpack was observed in the Upper Yukon and Tanana river valleys. Climate outlooks favor elevated chances of above normal temperatures in central and eastern Alaska and equal chances of above, below, and/or normal temperatures in western Alaska through the first half of May.

Spring Breakup Village Flood Potential along major rivers in Alaska

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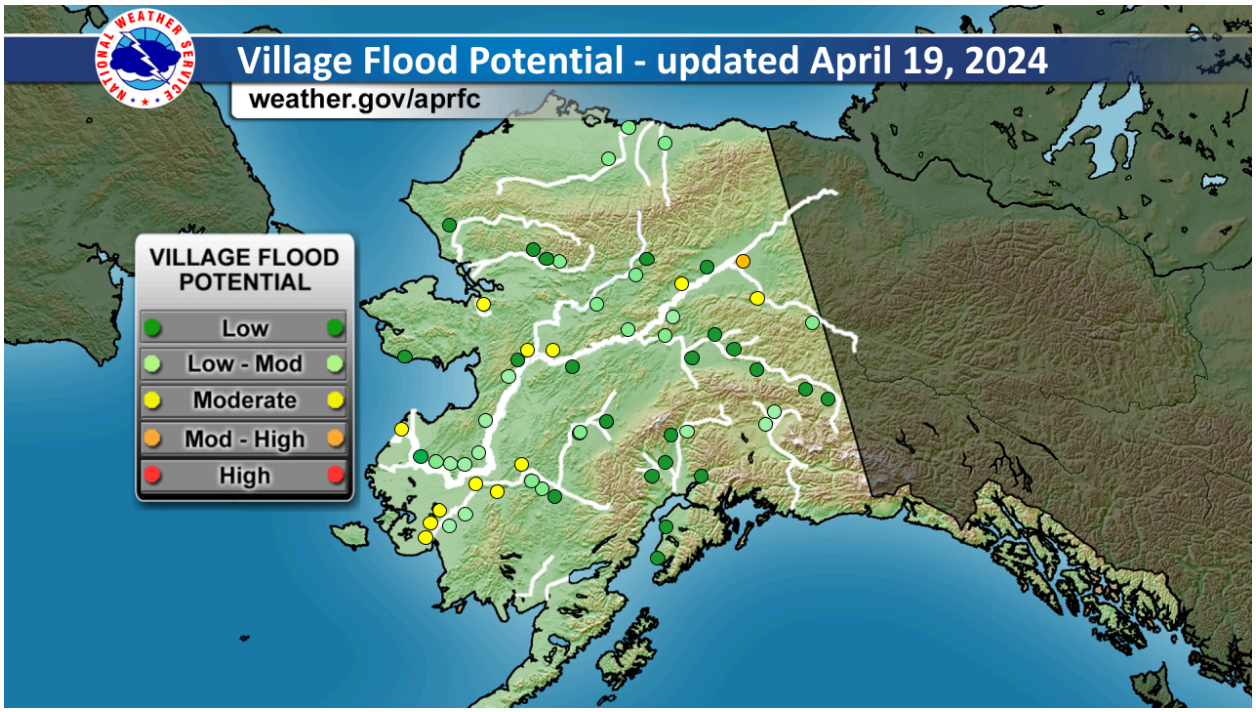
Spring breakup village flood potential considers the climate outlook, snowpack, ice thickness and condition, historical likelihood of flooding and flood severity, and community knowledge. Village flood potential is reassessed continually as outlooks change and breakup season progresses.

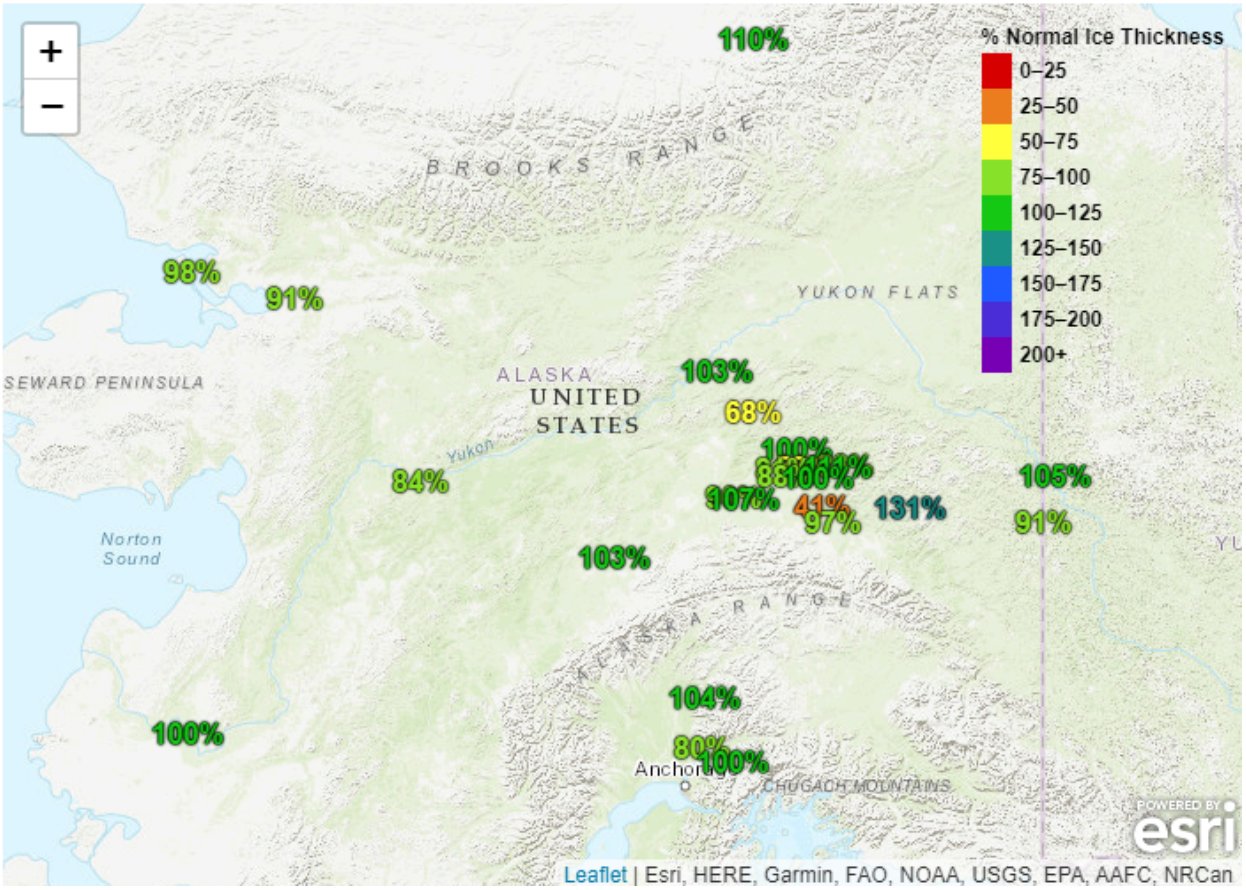


Link to the current Village Flood Potential and Snowmelt Runoff Maps

River Ice Observations

April 1st river ice observations are available for a limited number of sites in Alaska. Late March through mid- April measurements indicate that ice thicknesses are near normal across the state. Observations across interior Alaska range from 81%-111% of normal. However, dense jumble ice has been observed on the middle Yukon River between Rampart and Tanana. Recent UAF Fresh Eyes On Ice team (FEOI) reconnaissance confirmed that ice this year (2024) along the middle Yukon and Tanana River was on average thicker than last year (2023). Yukon River ice thickness at Eagle appears to be thicker than the past two winters (2022-2023), with river observers noting significant jumbled ice in the vicinity. Observers on the Kuskokwim River reported normal to slightly below normal ice thicknesses between Aniak and Bethel, with recent reports indicating that river ice has begun to deteriorate, and/or soften in some locations. Ice thicknesses along the Kuskokwim are, on average, 20% less than this time last year. No freeze-up jams or mid-winter breakups were reported in the Yukon or Kuskokwim river basins this winter.

% Average Ice Thickness Map



Link to % Average Ice Thickness map

Freezing Degree Days

Cumulative freezing degree days (FDD), which can serve as a proxy for river ice thickness, are near normal across most of Alaska. Colder conditions were observed across coastal sites along the Gulf of Alaska (Homer to Sitka), where FDD was reported to be 110% to 200% of normal. Near normal FDD conditions have been observed across Southcentral and Copper River Valley. The West Coast, Interior, and North Slope observed near to below normal FDD, ranging from 83% to 101% of normal.

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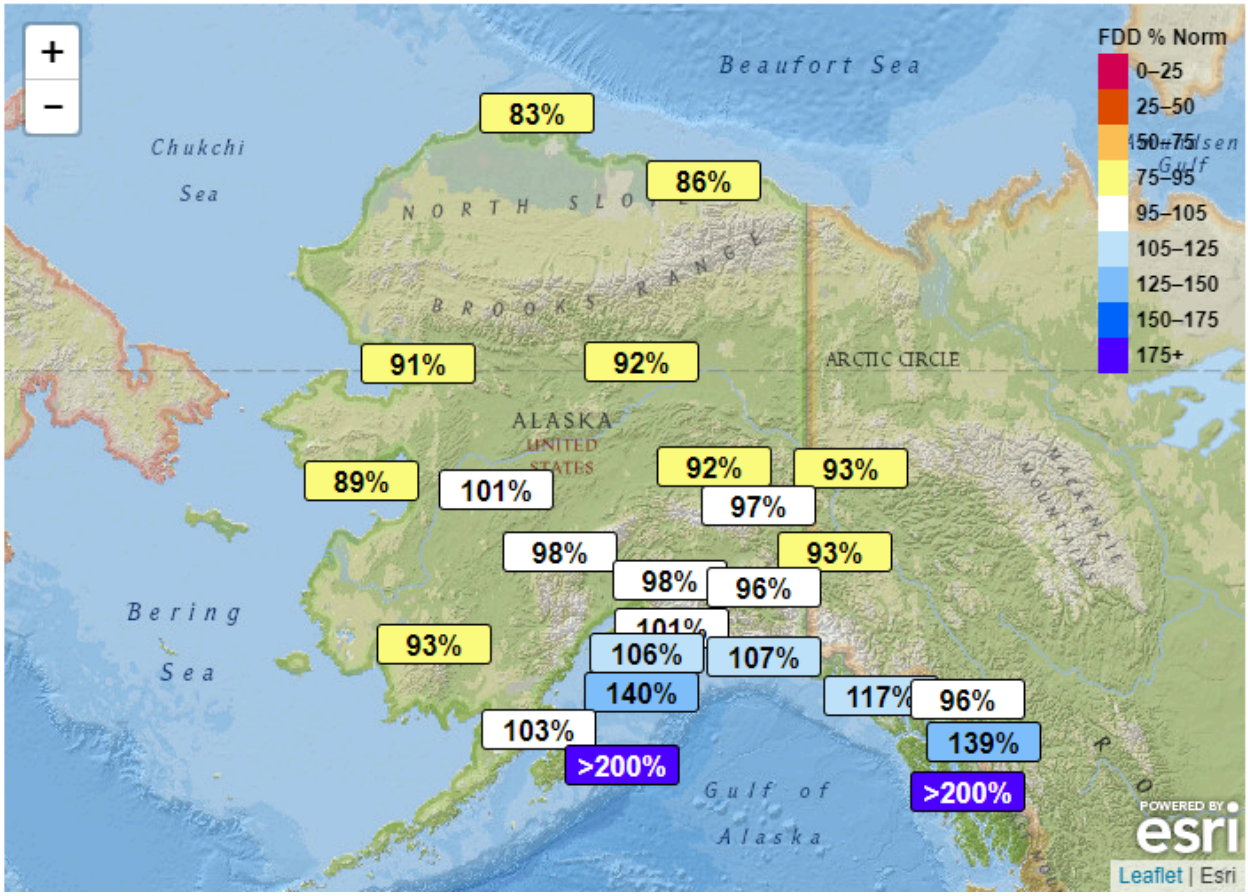
Freezing Degree Days - Percent of Normal



[Link to Freezing Degree Day (FDD) map]

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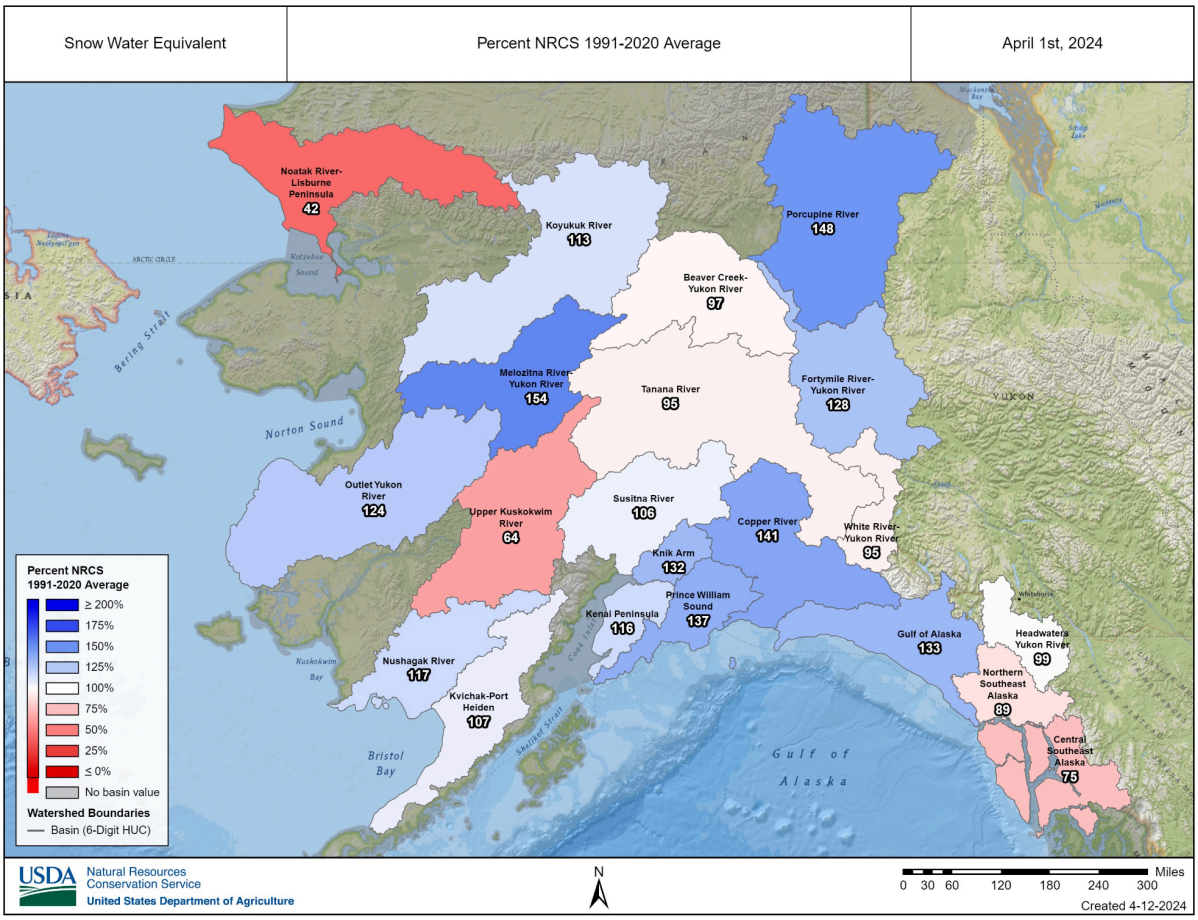
Snowpack

April 1 Natural Resources Conservation Service (NRCS) snowpack analysis indicates an above average snowpack for the majority of the state.

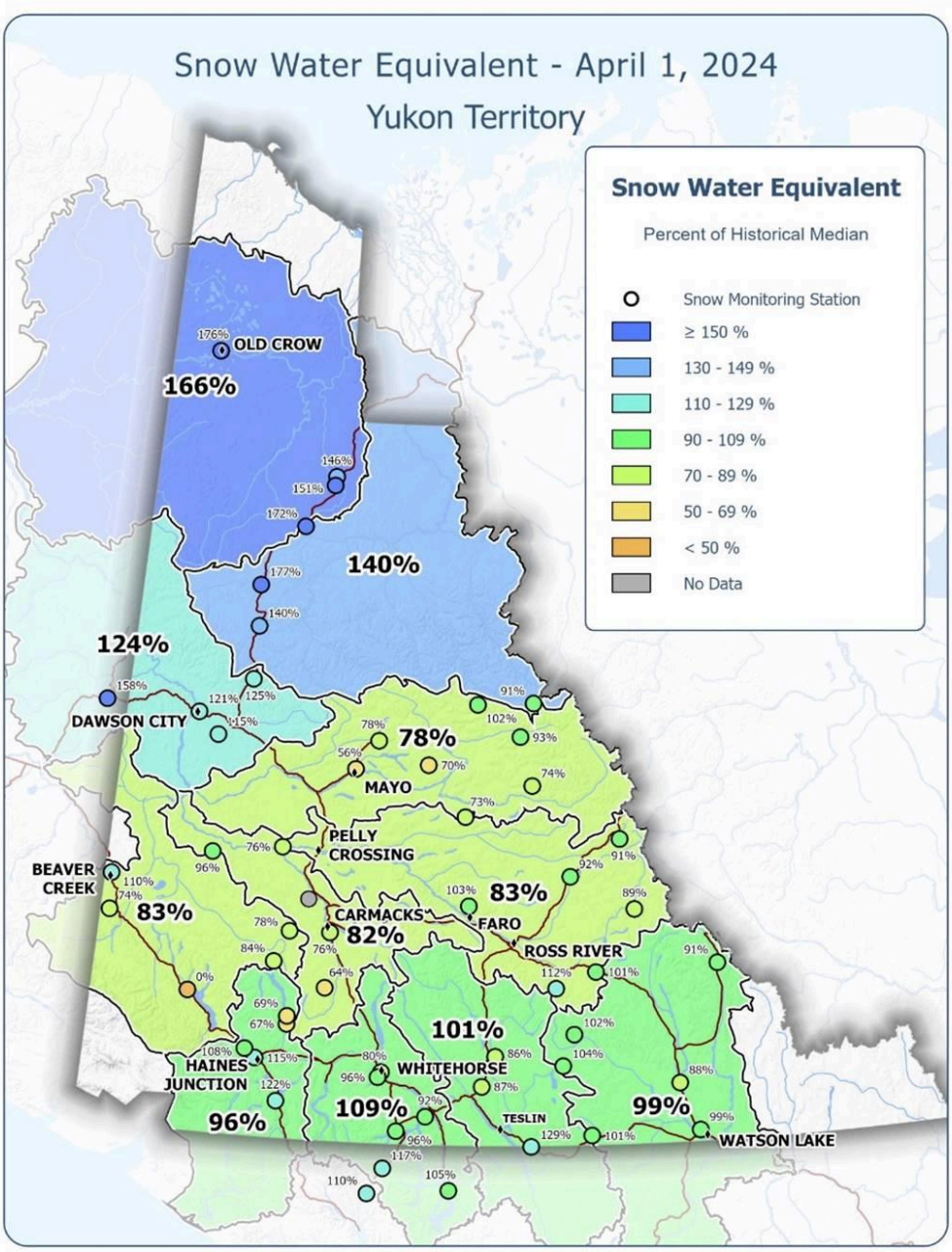


NRCS April 1 Statewide Snow Water Equivalent map

Although snowpack observations are limited, North Slope winter precipitation is well-above average indicating likely above average snowpack north of the Brooks Range. In fact, year-to-date precipitation at Utqiaġvik Airport and Prudhoe Bay are the highest on record. The record at Utqiaġvik goes back eighty-nine years.

In the northeastern region of Alaska, the Porcupine basin has a measured snowpack well-above average, with Old Crow village in the northern Yukon Territory recording its highest snowpack levels in over four decades of monitoring. However, as one moves towards the southern half of the Yukon Territory, snowpack conditions vary, with areas from Whitehorse to Mayo

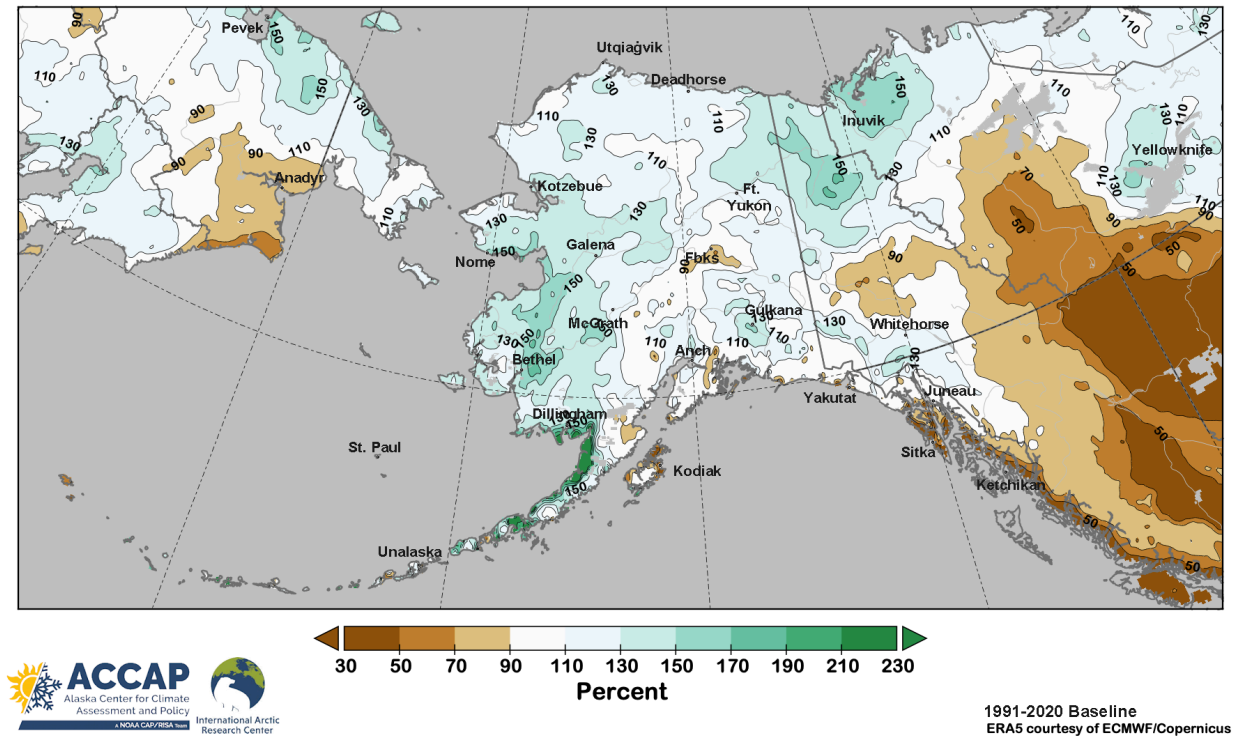
experiencing average to below-average levels. Meanwhile, the Upper Yukon basin spanning from Dawson to Fort Yukon, as well as the Fortymile basin, exhibit snowpack levels well-above average, measuring around 130% of the 1991-2020 normal.



Yukon Territory Snow Water Equivalent (SWE) Map courtesy of Government of Yukon

Further down the Yukon, snowpack remains near average until reaching the lower Yukon, where the snowpack is ~120-135% of normal. The Tanana and Upper Kuskokwim basins snowpack ranges from average to slightly below average. However, in the middle to lower Kuskokwim snowpack levels are significantly higher, reaching approximately 150-170% of the April 1 average (1991-2020), as indicated by ERA5 model analysis. This assessment is corroborated by anecdotal reports and in-situ observations, notably in Bethel, which has a measured record high April 1 snow depth based on 100 years of record.

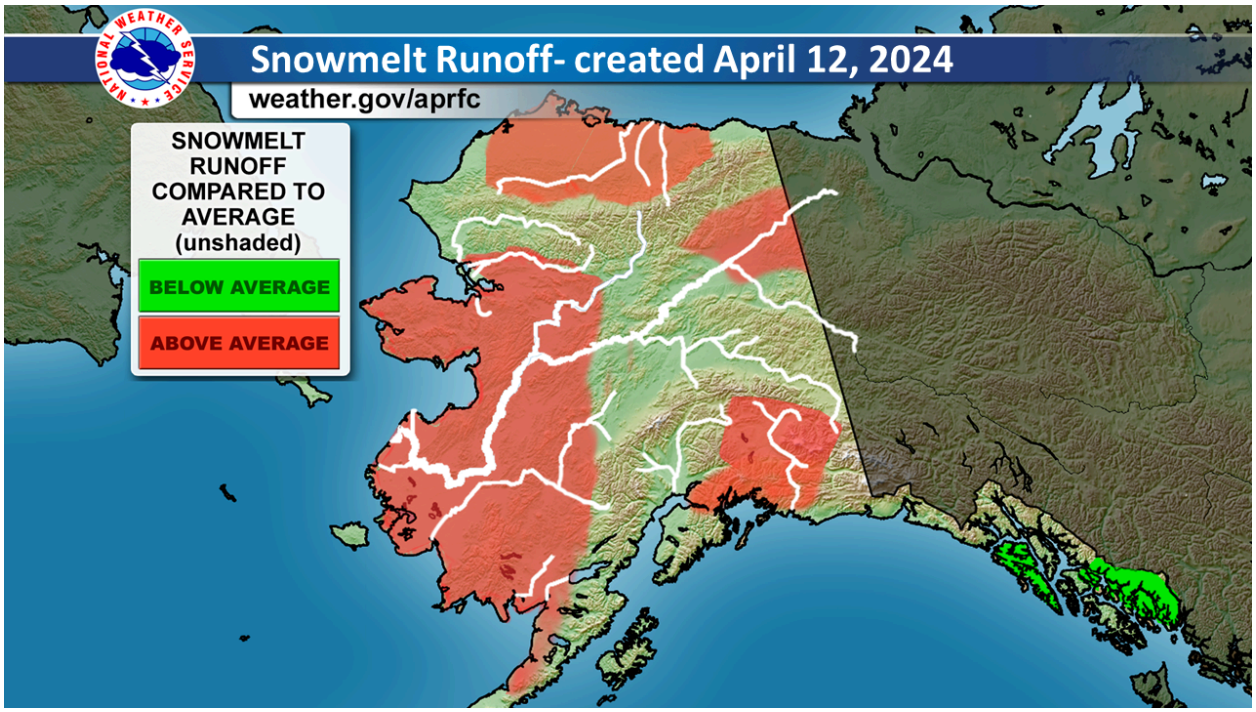
Snowpack Snow Water Equivalent: Percent of Median
April 1, 2024



In Southcentral Alaska, the snowpack in the Copper basin stands at around 140% of the April 1 average. Monitoring sites throughout the basin are consistently reporting higher-than-average snowpack. Notably, four sites within the basin rank within the top three of historical records for snowpack levels as of April 1. However, it's important to note that despite this above-average snowpack, the basin's snowpack remains lower than the levels observed in 2022 (180%) and 2023 (160%), both of which resulted in flooding in Glennallen.

Across the rest of Southcentral Alaska, the Susitna basin is reporting normal snowpack, while the Cook Inlet watershed and Kenai Peninsula have an above-average snowpack.

Snowpack depth and extent is used to estimate the snowmelt runoff potential across Alaska.



Snowmelt Runoff Potential Compared to Average

In summary, the state's snowpack is generally above average, with anomalies increasing from average in the east to above average in the west. A well-above average snowpack is noted in the Porcupine, Yukon, and Lower Kuskokwim, as well as the Copper basins. Although above average this year, snowpack across most of the interior is notably less than the previous two years.

The next NRCS Statewide Snowpack Summary is expected after the first week of May.

Climate Outlook

The most important factor determining the severity of ice breakup remains the weather during April and May. Dynamic breakups, with a high potential for ice jam flooding, typically require cooler than normal temperatures in early April followed by an abrupt transition to warm, summer-like temperatures in late April to early May.

Please refer to the graphics below which illustrate the following discussion:

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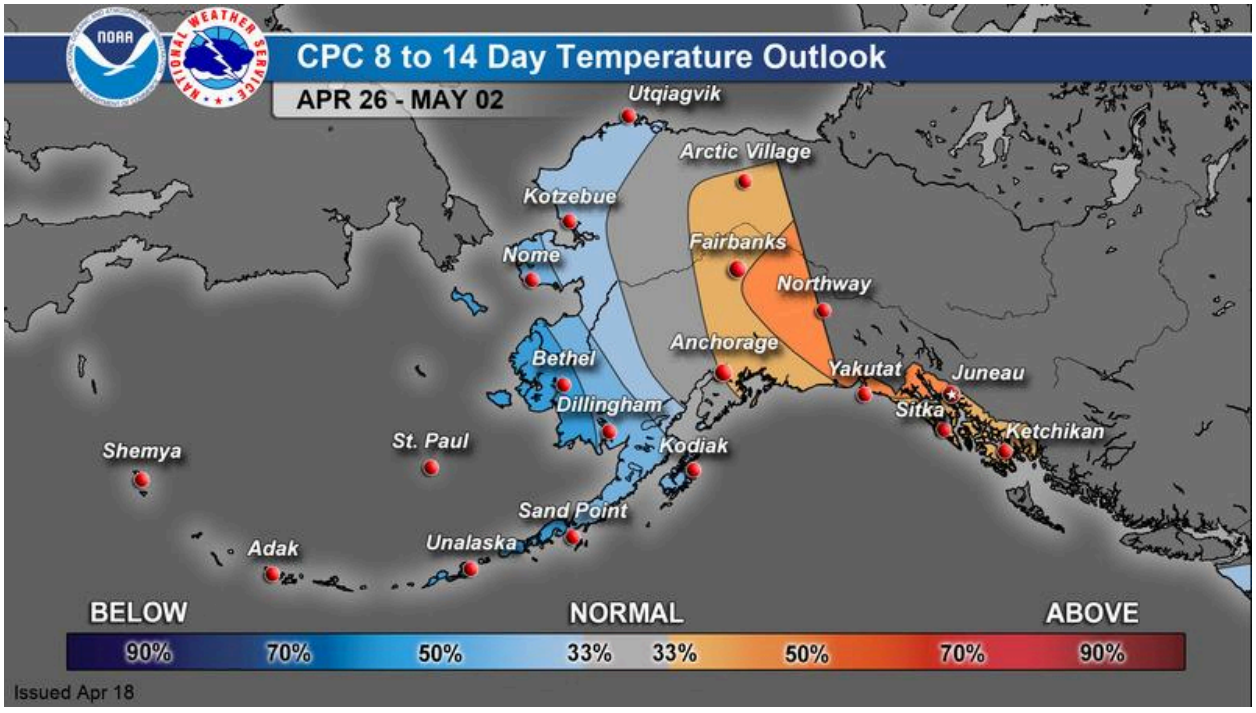
The amplified pattern across mainland Alaska is expected to quickly transition from enhanced ridging to moderate troughing over the eastern Bering Sea and Arctic Ocean through the end of April. Under this pattern, the Climate Prediction Center's climate outlook for the 8-14 day range favors better chances for below normal temperatures for the western half of the state. Meanwhile over eastern Alaska, persistent ridging will yield higher chances for above normal temperatures, primarily along the Yukon border.

The week 3-4 timeframe continues to feature better than average chances for above normal temperatures for much of eastern Alaska. For interior and western Alaska, equal chances of above, below, and/or normal temperatures are predicted. It should be noted that there is considerable uncertainty during this time period leading to low confidence in any solution.

Looking ahead at the longer, 3-month outlook, which includes May, June, and July, there's an elevated probability (40-60% chance) of above-normal temperatures across the eastern two-thirds of Alaska.



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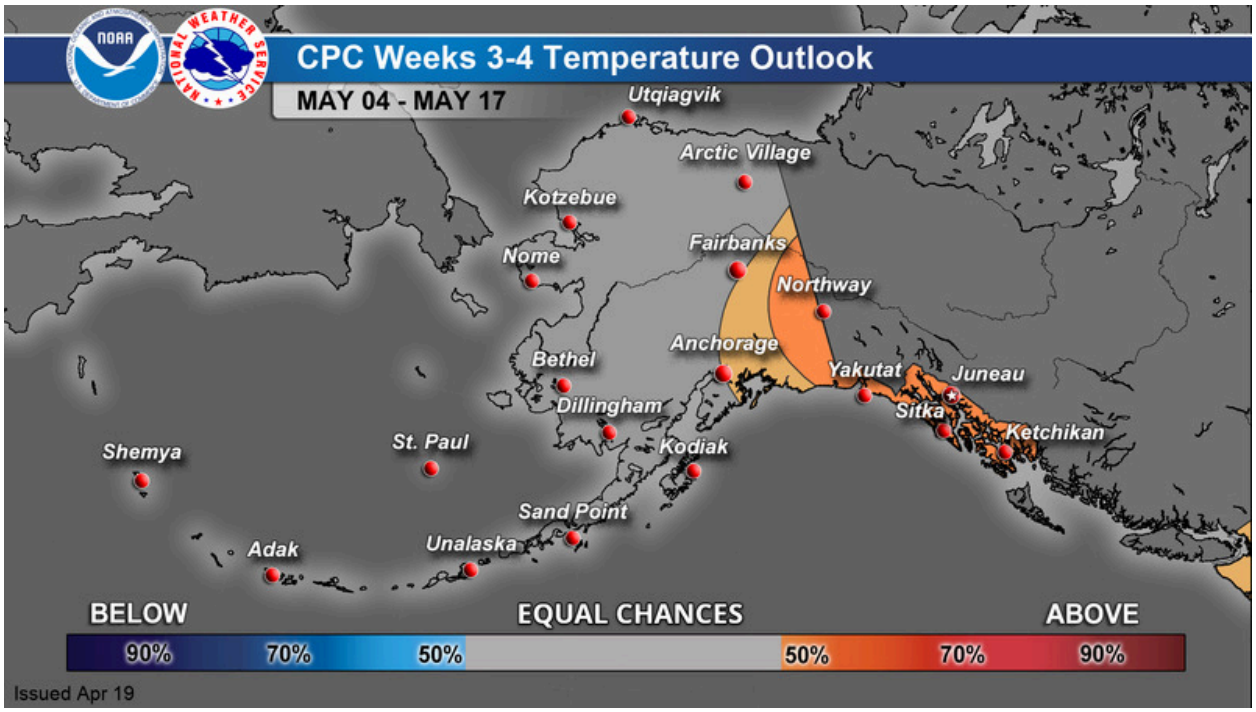

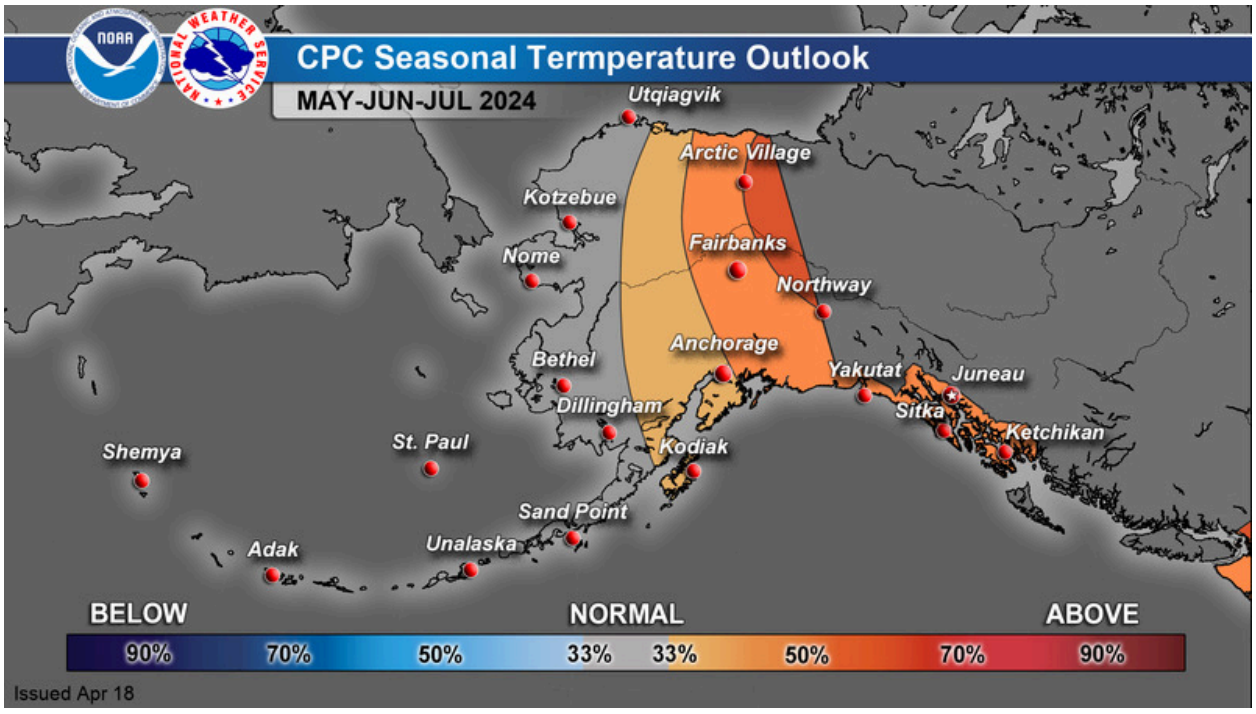

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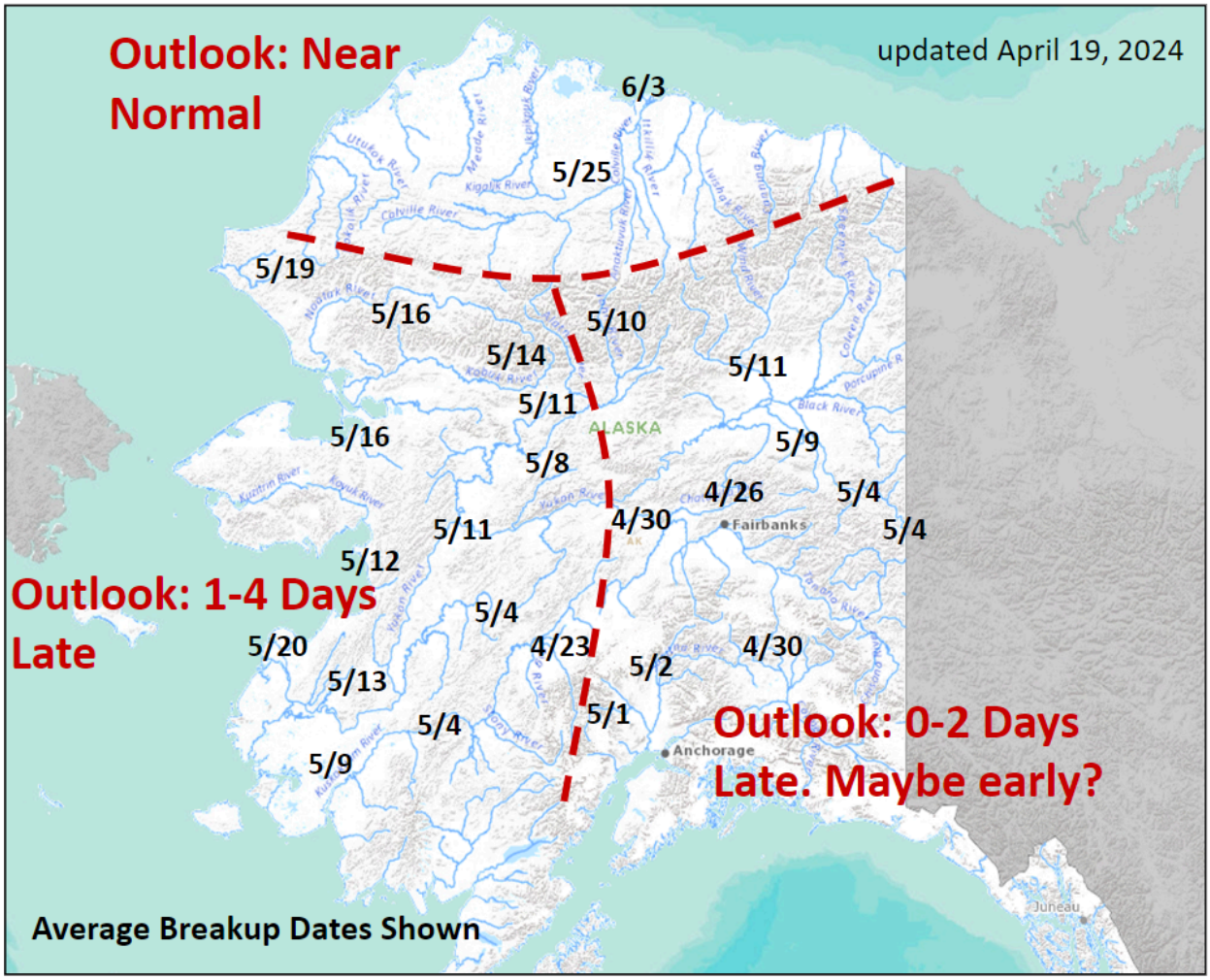
Spring Breakup Timing

Timing of river breakup takes into account all previously described variables and relates it to the historical median breakup date for individual locations. Based on this evaluation, breakup is expected to be 0-2 days later in the eastern half of Alaska, although some locations may break up early. Western and Southwest Alaska are forecast to break up 1-4 days later. The North Slope is expected to break up closer to its median date.



Flood Potential

The likelihood of flooding from snowmelt and/or ice jams is initially calculated based on the flood frequency for the current 2000 to 2021 historical record and adjusted to reflect current conditions.

The following tables give an estimation of snowmelt runoff volume, flood potential, and forecast breakup date range for various locations across the state.

Median breakup dates are for the period 1980 through 2023 and are calculated for locations with at least 5 years of data.

Forecast breakup timing is expressed as a range based on snowmelt runoff volume and flood potential. Locations where breakup has already occurred are identified with two asterisks preceding a single date; for example Kuskokwim River at Nikolai breakup occurred on April 16, 2024 (**4/16).

Tanana/Fairbanks

River-Reach	Location	Snowmelt Runoff Volume	Flood Potential	Median* Breakup Date	Years of Record	Forecast Breakup Date Range
Chena River		Average				
	Chena Lakes		Low			
	Fairbanks		Low	4/26	31	4/23-4/29
Tanana River		Average				
	Northway		Low	4/26	31	4/24-4/30
	Salcha		Low	4/26	3	4/24-4/30
	Fairbanks		Low	4/26	31	4/24-4/30
	Nenana		Low	4/30	44	4/28-5/4
	Manley HS		Low-Moderate	5/3	32	5/1-5/7

Yukon

River-Reach	Location	Snowmelt Runoff Volume	Flood Potential	Median* Breakup Date	Years of Record	Forecast Breakup Date Range
Yukon River (Upper)		Average				

	Dawson, YT		Low-Moderate	5/5	44	5/2-5/8
	Eagle		Low-Moderate	5/4	44	5/1-5/7
	Circle		Moderate	5/9	40	5/7-5/13
	Fort Yukon		Moderate-High	5/11	40	5/10-5/16
	Beaver		Low	5/10	27	5/9-5/15
	Stevens Village		Moderate	5/11	25	5/10-5/16
	Rampart		Low-Moderate	5/11	27	5/10-5/16
		Average				
	Tanana		Low-Moderate	5/8	39	5/8-5/14
	Ruby		Low	5/9	38	5/9-5/15
	Galena		Moderate	5/11	43	5/11-5/17
	Koyukuk		Moderate	5/9	17	5/9-5/15
	Nulato		Low	5/12	26	5/12-5/18
	Kaltag		Low-Moderate	5/12	38	5/12-5/18
	Anvik		Low-Moderate	5/14	35	5/14-5/20
Yukon River (Lower)		Above				
	Holy Cross		Low-Moderate	5/14	37	5/15-5/21
	Russian Mission		Low-Moderate	5/15	37	5/16-5/22
	Marshall		Low-Moderate	5/15	32	5/16-5/22
	Pilot Station		Low-Moderate	5/13	27	5/14-5/20
	Mountain Village		Low	5/14	37	5/15-5/21
	Alakanuk/Emmonak		Moderate	5/20	38	5/21-5/27
Koyukuk River		Above				
	Bettles		Low	5/10	42	5/8-5/14
	Allakaket		Low-Moderate	5/11	37	5/9-5/15
	Hughes		Low-Moderate	5/11	37	5/9-5/15

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Kuskokwim

River-Reach	Location	Snowmelt Runoff Volume	Flood Potential	Median* Breakup Date	Years of Record	Forecast Breakup Date Range
Kuskokwim River		Average				
	Nikolai		Low	4/23	38	4/16**
	McGrath		Low-Moderate	5/5	44	5/3-5/9
	Stony River		Low	5/2	36	4/30-5/6
	Sleetmute		Low-Moderate	5/1	35	4/29-5/5
	Red Devil		Low-Moderate	5/4	38	5/2-5/8
	Crooked Creek		Moderate	5/4	38	5/2-5/8
	Aniak		Moderate	5/6	41	5/5-5/11
	Kalskag		Moderate	5/5	35	5/4-5/10
	Tuluksak		Low-Moderate	5/7	32	5/6-5/12
	Akiak		Low-Moderate	5/8	38	5/7-5/13
	Kwethluk		Moderate	5/5	12	5/4-5/10
	Bethel		Moderate	5/9	44	5/8-5/14
	Napakiak		Moderate	5/9	29	5/8-5/14

Southeast/Southcentral

River-Reach	Location	Snowmelt Runoff Volume	Flood Potential	Median* Breakup Date	Years of Record	Forecast Breakup Date Range
Southeast		Average	Low			
Kenai River		Average	Low			4/1**
Anchor River		Average	Low	4/17	16	4/17**
Matanuska River		Above	Low			
Susitna River		Average				
	Gold Creek		Low-Moderate	5/2	9	4/29-5/5
	Sunshine		Low	5/2	35	4/29-5/5
Talkeetna		Average				

	Talkeetna		Low	4/28	5	4/25-5/1
Yentna River		Average				
	Lake Creek		Low	5/2	32	4/30-5/6
Skwentna		Average				
	Skwentna		Low	4/30	29	4/20-4/26
Copper River		Above				
	Gakona		Low-Moderate	4/30	35	4/28-5/4
	Gulkana		Low-Moderate	5/1	34	4/29-5/5

North Slope/Northwest

River-Reach	Location	Snowmelt Runoff Volume	Flood Potential	Median* Breakup Date	Years of Record	Forecast Breakup Date Range
Seward Peninsula		Above				
	Buckland		Moderate	5/18	34	5/18-5/24
Kobuk River		Above				
	Kobuk		Low-Moderate	5/14	40	5/14-5/20
	Shungnak		Low	5/16	32	5/16-5/22
	Ambler		Low	5/16	38	5/16-5/22
	Kiana		Low	5/18	13	5/18-5/24
Noatak River		Above				
	Noatak		Low	5/19	26	5/19-5/25
Brooks Range		Above				
	Colville at Umiat		Low-Moderate	5/24	21	5/20-5/16
	Colville at Colville Village		Low-Moderate	6/3	22	5/30-6/5
Sagavanirktok River		Above				

	Dalton Highway		Low-Moderate			5/24-5/30

The next Spring Breakup Outlook will be published April 26, 2024.

This product is experimental. For more information and to submit comments, please contact:

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