YUKON SNOW SURVEY BULLETIN & WATER SUPPLY FORECAST

March 1, 2020

Prepared and issued by:
Water Resources Branch
Department of Environment

Yukon

PREFACE

The Yukon Snow Survey Bulletin and Water Supply Forecast is prepared and issued three times annually – early March, April and May – by the Department of Environment's Water Resources Branch. The bulletin provides a summary of winter meteorological and streamflow conditions for Yukon, as well as current snow depth and snow water equivalent observations for 57 locations. This information is used to evaluate the potential for spring flooding caused by both breakup ice jams and large spring snowmelt (freshet) flows. It is important to note that other processes such as summer rain and glacier melt can significantly influence maximum annual water levels in specific Yukon basins.

The Snow Bulletin is presented in a new format and will continue to improve using new technologies and comments provided by users and partners. The fall and winter average weather conditions (temperatures and precipitation) are spatially presented for the entire territory in two figures. The spatial distribution of Snow Water Content (or Snow Water Equivalent, SWE) is presented for 11 watersheds (or river basins) in a separate figure. Complementary meteorological and hydrological data are presented for each basin through a maximum of five graphs, depending on data availability:

- Figure A: Daily Snow Water Equivalent (SWE) data starting in September at one specific location in the watershed, showing an overview of winter snowpack evolution.
- Figure B: Current, basin-averaged, estimated Snow Water Equivalent (SWE), from snow survey data, compared with historical data, which represents an indicator of potential runoff volumes in the spring (acknowledging that snow sublimation, evapotranspiration, rain and glacier melt also significantly affect runoff).
- Figure C: Monthly-averaged precipitation (rain and/or snow), from meteorological stations, since October compared with historical data (30-year climate normal), that complements the information presented in Figure B.
- Figure D: Cumulated degree-days of freezing (CDDF, sum of negative daily temperatures) since October, compared with historical data, functioning as an indicator of winter coldness and overall river ice thickness that influences river ice breakup scenarios in the spring.
- Figure E: Current, estimated daily discharge or measured water level, compared with historical data, that presents an overview of the watershed hydrological conditions.

Information about the bulletin, snowpack conditions, or streamflow projections can be obtained by contacting:

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There were no changes to the network for 2020. This bulletin, as well as earlier editions, are available online at: www.env.gov.yk.ca/snowbulletin

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- *Data Collection Officer, Natural Resources Conservation Service, United States Department of Agriculture*
- *Meteorologist, Wildland Fire Management, Yukon Department of Community Services, Whitehorse*
- *Officer in Charge, Water Survey of Canada, Whitehorse*
- *Water Management Engineer, Yukon Energy Corporation*
- *Vuntut Gwitchin First Nation*
- *McMaster University*

Agencies cooperating with Environment Yukon in the Snow Survey Program are:

- *B.C. Ministry of Environment, Water Stewardship Division*
- *Parks Canada, Kluane National Park and Reserve*
- *Yukon Department of Highways and Public Works*
- *Yukon Department of Energy Mines and Resources, Compliance Monitoring and Inspections Branch*
- *Yukon Department of Environment, Information Management and Technology Branch*
- *Government of the Vuntut Gwitchin First Nation*

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YUKON TERRITORY WEATHER AND SNOWPACK CONDITIONS

Fall and winter 2019-20 temperatures were generally close to the historical average[1] in most regions of the territory, with a marked cold spell in January. Precipitation was above to well-above historical average in central Yukon, in the Mackenzie Mountains and in the St. Elias Mountains.

October

Winter began with air temperatures generally close to average in southern and central Yukon, but consistently above average in northern Yukon. The entire territory saw a high temperature spike before ending the month. Whitehorse received a snowfall early in the month, but it did not remain on the ground. Mayo and Dawson ended the month with a thin snowpack.

November

The first half of the month saw close to average air temperatures in central and northern Yukon with a few cold days around November 10. During the second half of the month; however, very warm anomalies were registered in most regions, particularly in Old Crow. In Whitehorse, the entire month was relatively warm with record high air temperatures on November 20. The middle of the month was characterized by significant precipitation in central Yukon and the Mackenzie Mountains. Dawson ended the month with a record total snowfall. Average precipitation was recorded in Whitehorse and Old Crow.

December

Temperatures fluctuated significantly throughout the entire month, with minimums below -40˚C and maximums above 0˚C. Southern Yukon generally saw warmer than average conditions, especially at the end of the month, whereas the north was affected by cold anomalies. Central Yukon continued to experience higher than average snowfall whereas northern Yukon did not receive a significant accumulation.

January

2020 began with a marked cooling throughout Yukon. Temperatures were especially cold in central Yukon from January 5 to 20, but the cold anomaly also affected southern Yukon, including Whitehorse. The arctic air mass dissipated later in the month, when southern, central, and northern Yukon received the bulk of their monthly precipitation, with a record monthly total in Mayo.

February

February was characterized by a return to more normal average temperatures in most regions, but with significant fluctuations. Whitehorse ended the month with a cumulative warm anomaly whereas the opposite was observed in central and northern Yukon. Southern and central Yukon received a significant snowfall during the second week of the month, setting new records in Whitehorse. This added to the already significant snowpack in the headwaters of the Liard, Pelly and Stewart watersheds as well as in the St. Elias Range.

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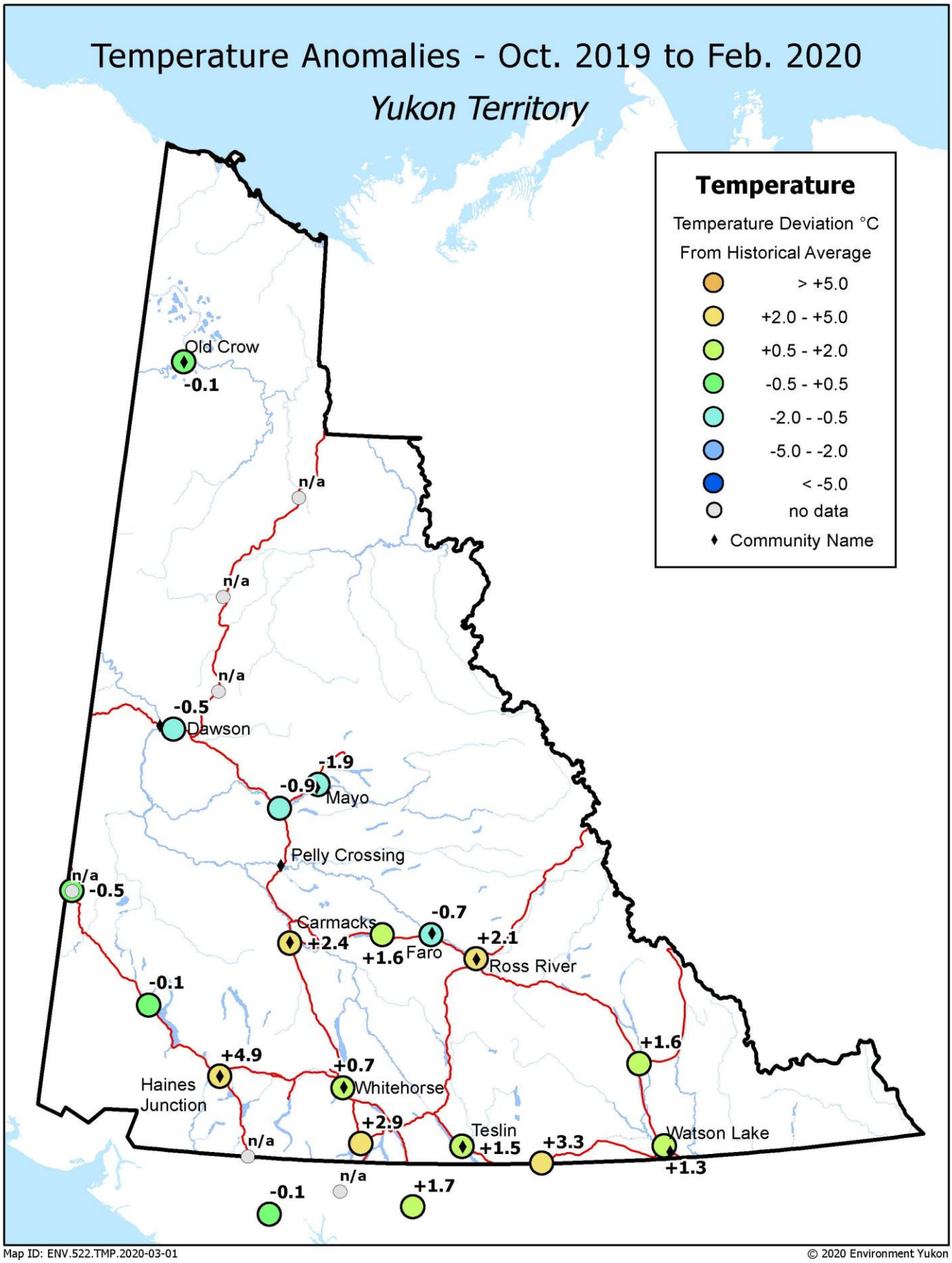
[1] Historical temperature, precipitation, snow water equivalent and discharge or water level records are not always long enough to establish a state-of-the-art “normal”, which implies 30 years of data. Therefore this document refers to historical average, or more simply, average. Historical records considered in this bulletin are always long enough to be representative of recent hydro-meteorological conditions.


Temperature Anomalies - Oct. 2019 to Feb. 2020
Yukon Territory
Temperature
Temperature Deviation °C
From Historical Average
> +5.0
+2.0 - +5.0
+0.5 - +2.0
-0.5 - +0.5
-2.0 - -0.5
-5.0 - -2.0
< -5.0
no data
Community Name
Old Crow
-0.1
n/a
n/a
n/a
-0.5
Dawson
-1.9
-0.9
Mayo
Pelly Crossing
n/a
-0.5
Carmacks
+2.4
+1.6
Faro
-0.7
+2.1
Ross River
-0.1
+4.9
Haines
Junction
+0.7
Whitehorse
+2.9
n/a
Teslin
+1.5
+3.3
+1.6
Watson Lake
+1.3
n/a
-0.1
+1.7
Map ID: ENV.522.TMP.2020-03-01
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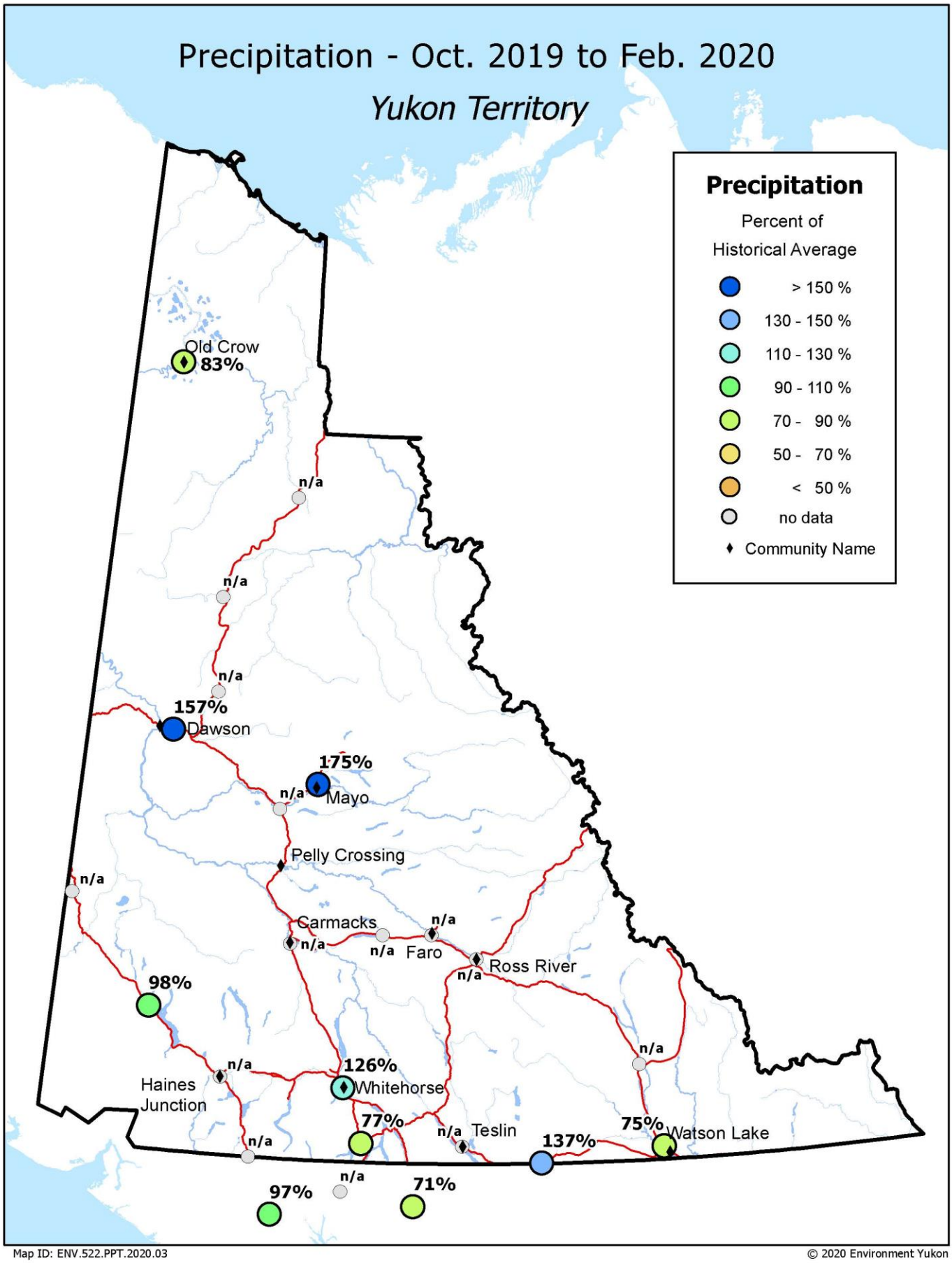
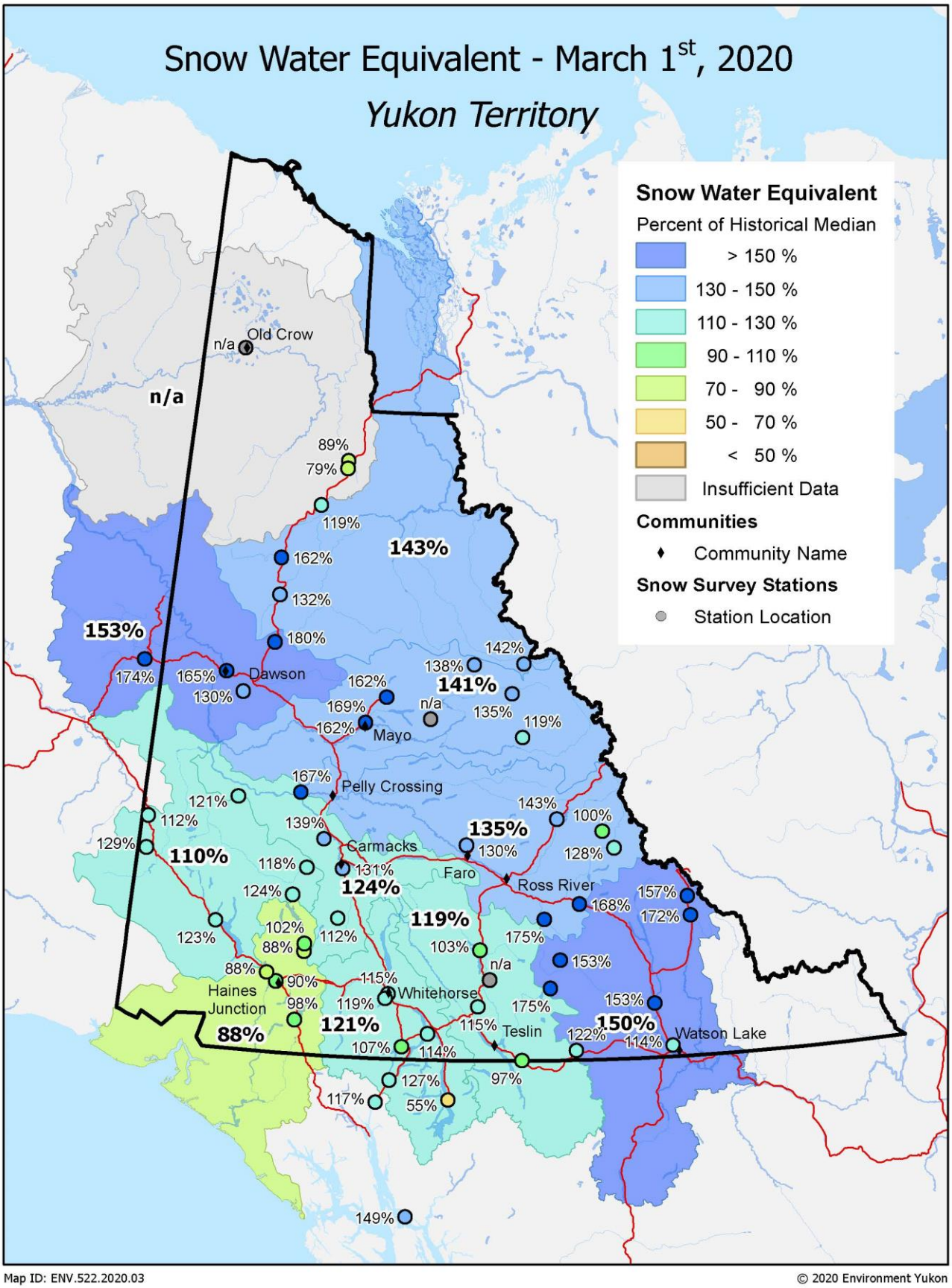

Precipitation - Oct. 2019 to Feb. 2020
Yukon Territory
Precipitation
Percent of
Historical Average
> 150 %
130 - 150 %
110 - 130 %
90 - 110 %
70 - 90 %
50 - 70 %
< 50 %
no data
Community Name
Old Crow
83%
n/a
n/a
n/a
157%
Dawson
175%
Mayo
n/a
Pelly Crossing
n/a
Carmacks
n/a
n/a
Faro
n/a
Ross River
98%
n/a
126%
Whitehorse
Haines
Junction
77%
n/a
Teslin
137%
75%
Watson Lake
n/a
n/a
97%
n/a
71%
Map ID: ENV.522.PPT.2020.03
© 2020 Environment Yukon


Snow Water Equivalent - March 1st, 2020
Yukon Territory
Snow Water Equivalent
Percent of Historical Median
> 150 %
130 - 150 %
110 - 130 %
90 - 110 %
70 - 90 %
50 - 70 %
< 50 %
Insufficient Data
Communities
Community Name
Snow Survey Stations
Station Location
Old Crow
n/a
n/a
89%
79%
119%
143%
162%
132%
153%
180%
142%
138%
174%
165%
Dawson
130%
162%
141%
169%
n/a
135%
162%
Mayo
119%
167%
Pelly Crossing
121%
112%
139%
143%
100%
135%
129%
Carmacks
130%
128%
110%
118%
131%
Faro
124%
Ross River
124%
168%
157%
172%
119%
102%
112%
175%
123%
88%
103%
153%
n/a
88%
90%
115%
Haines
Junction
98%
Whitehorse
119%
175%
153%
88%
121%
115%
Teslin
122%
150%
Watson Lake
107%
114%
114%
127%
97%
117%
55%
149%
Map ID: ENV.522.2020.03
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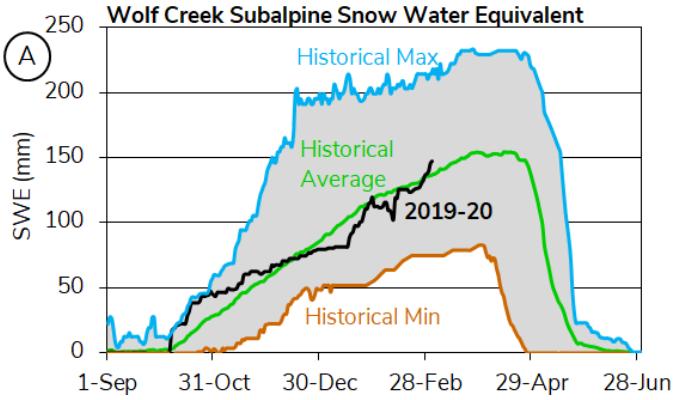
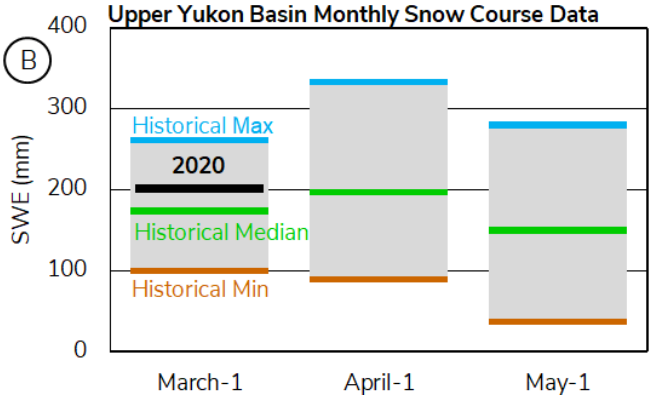
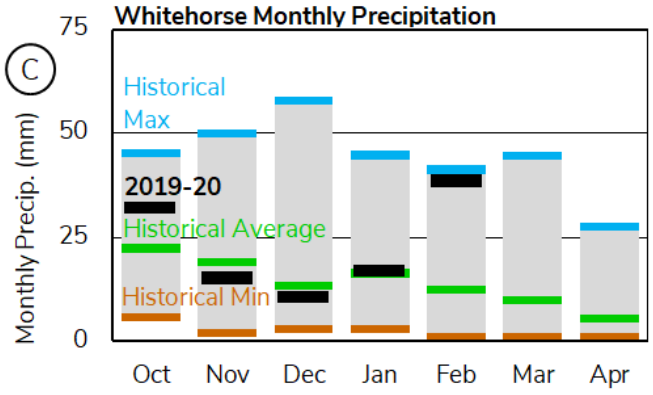
UPPER YUKON RIVER BASIN (SOUTHERN LAKES / WHITEHORSE)

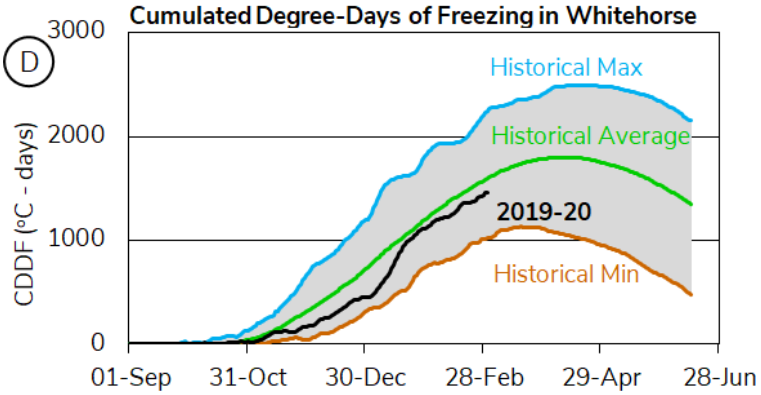
At Wolf Creek Subalpine Station, Snow Water Equivalent (SWE) is measured to be **106%** of the **historical average** (Figure A). The Upper Yukon basin-averaged SWE is estimated to be **121%** of the **historical median**, with **202 mm** on March 1 (Figure B).



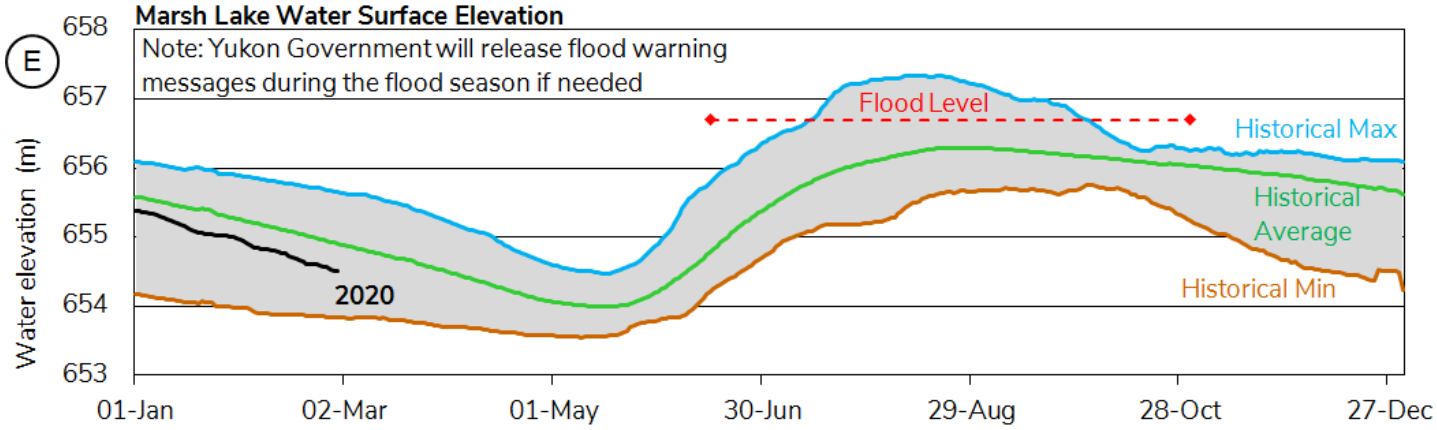


Monthly precipitation at Whitehorse Airport during fall and winter was at times above average and at others below average (Figure C) with the total precipitation being **above average** on March 1. Cumulative degree-days of freezing (CDDF) are currently close to **average**, with 1460 °C-Days (Figure D), which indicates a **normal** winter. The thickness of the ice cover on rivers and lakes of the region is probably **close to normal**.



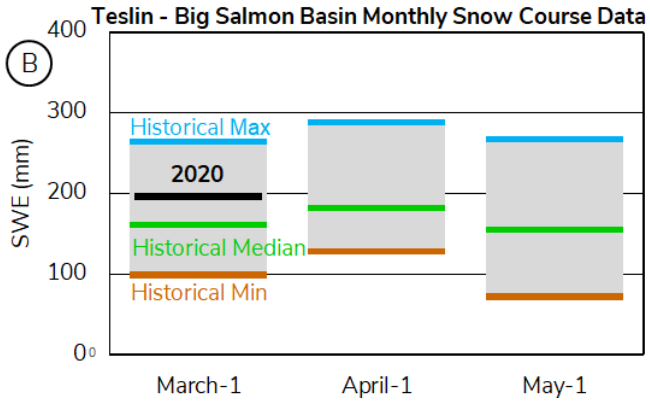


The measured water surface elevation (relative to sea level) in Marsh Lake is currently 0.4 m **lower** than the **historical average** (Figure E). It is too early in the season to determine if 2020 will be a high water level year, but the **higher** than **median** snowpack suggests a **normal** to **high** **potential for late-summer floods**. Weather conditions in next 5 months will determine the most probable late-summer scenario.

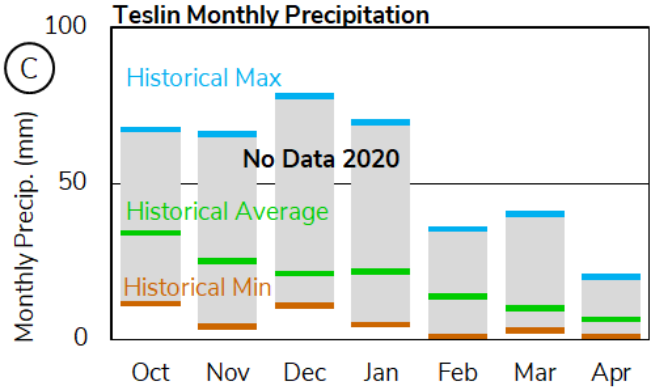


TESLIN RIVER BASIN

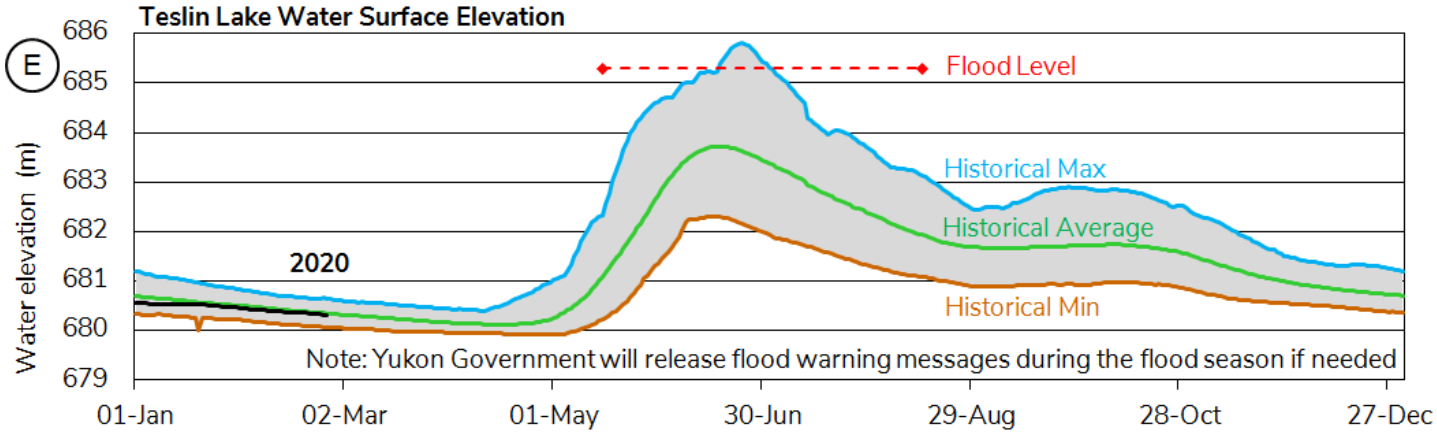
The Teslin River basin-averaged SWE is estimated at **119%** of the **historical median**, with **196 mm** on March 1 (Figure B).



Teslin monthly precipitation since October 2019 has not been recorded (Figure C), but values are probably **higher** than **average**.

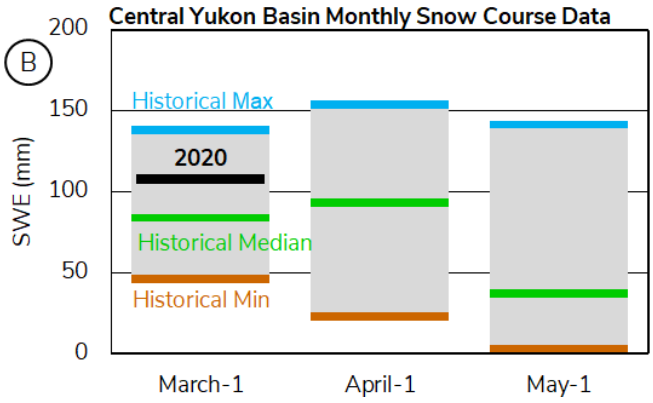


The measured water surface elevation (relative to sea level) in Teslin Lake is currently close to the **historical average** (Figure E). It is too early in the season to determine if 2020 will be a high water level year, but the **higher** than **median** snowpack and the **close-to-average** water level suggest a **normal** to **high** **potential for late-summer floods**. Weather conditions in March and April will determine the most probable spring scenario.

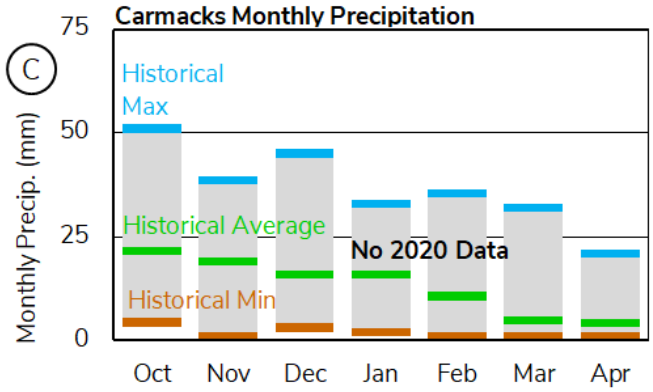


CENTRAL YUKON RIVER BASIN (CARMACKS AREA)

The Central Yukon basin-averaged SWE is estimated to be **124%** of the **historical median**, with **107 mm** on March 1 (Figure B).

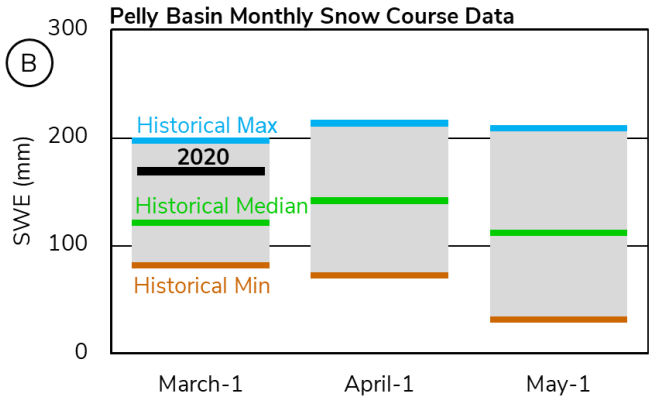


Carmacks monthly precipitation since October 2019 has not been recorded (Figure C), but values are probably **higher** than **average**.

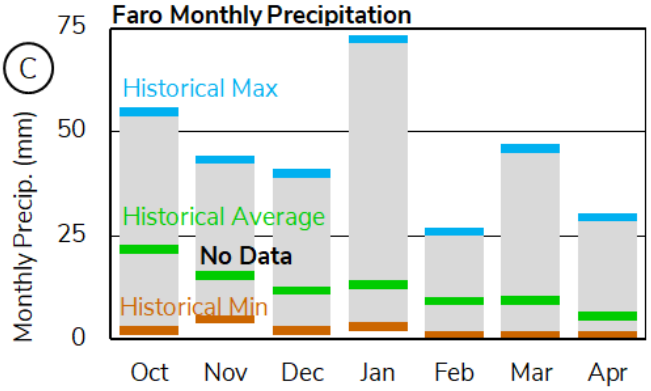


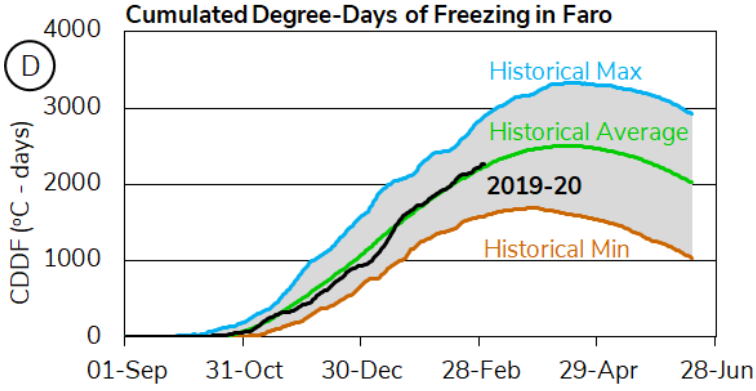
PELLY RIVER BASIN

The Pelly River basin-averaged SWE is estimated to be **135%** of the **historical median**, with **168 mm** as of March 1 (Figure B). This can be considered a significant snowpack for the area.

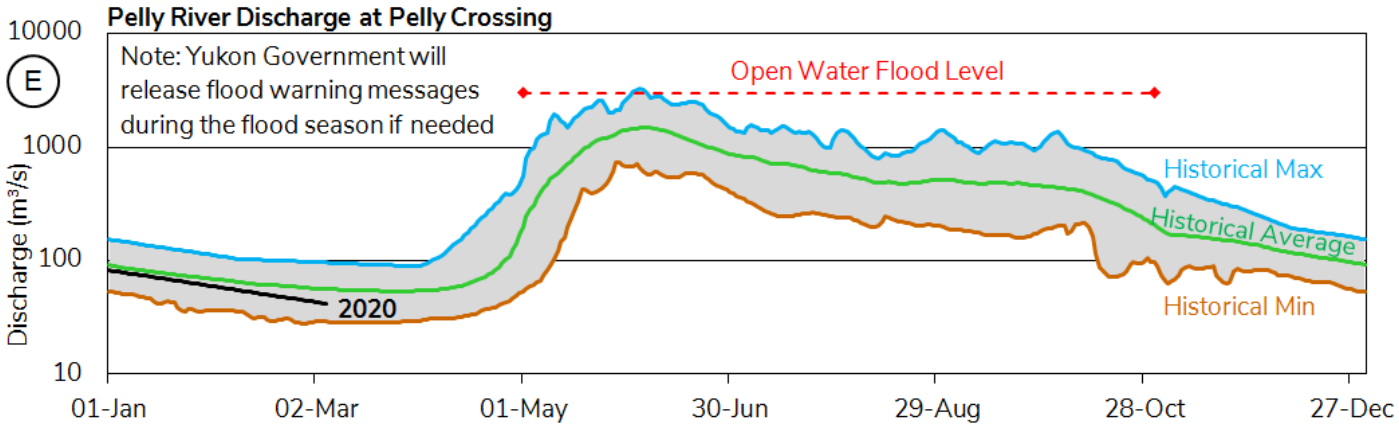


Precipitation at Faro has not been recorded (Figure C), but is expected to be overall **above average**. Cumulated degree-days of freezing (CDDF) at Faro are **close to average**, with 2260 °C-Days (Figure D), which indicates a **normally cold winter**. The thickness of the ice cover on rivers and lakes of the region is probably **close to normal**.



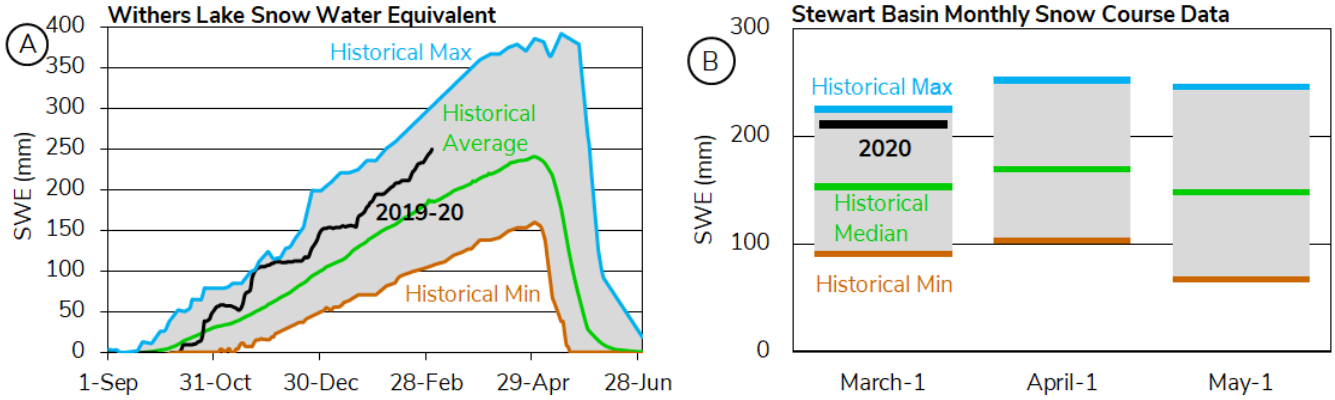


The estimated Pelly River discharge at Pelly Crossing is currently **below historical average** (Figure E). It is too early in the season to confirm that 2020 will be a high water year, but the **well-above median** snowpack in the watershed suggests a **high potential** **for significant spring freshet flows**. Weather conditions in March and April will determine the most probable spring scenario.

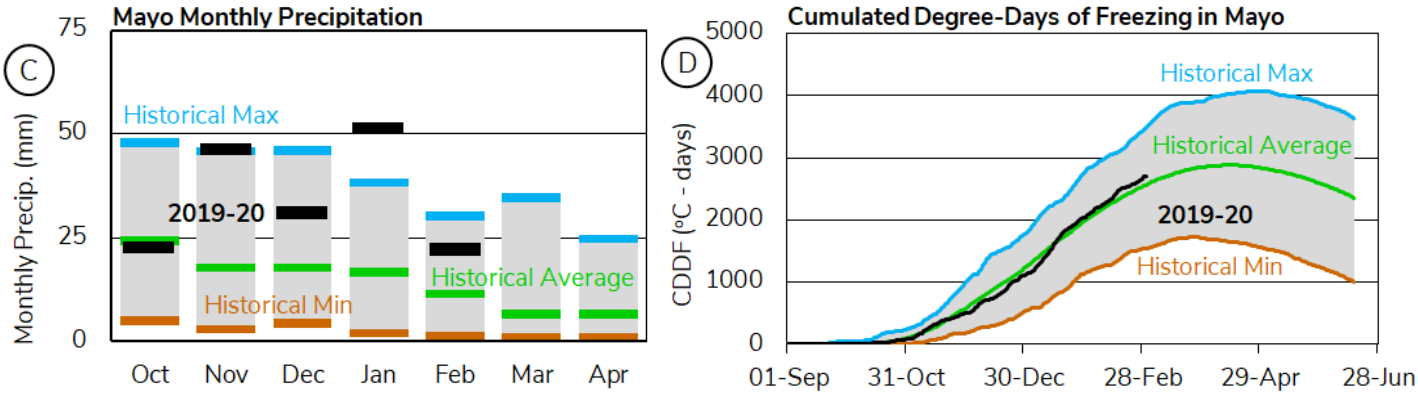


STEWART RIVER BASIN

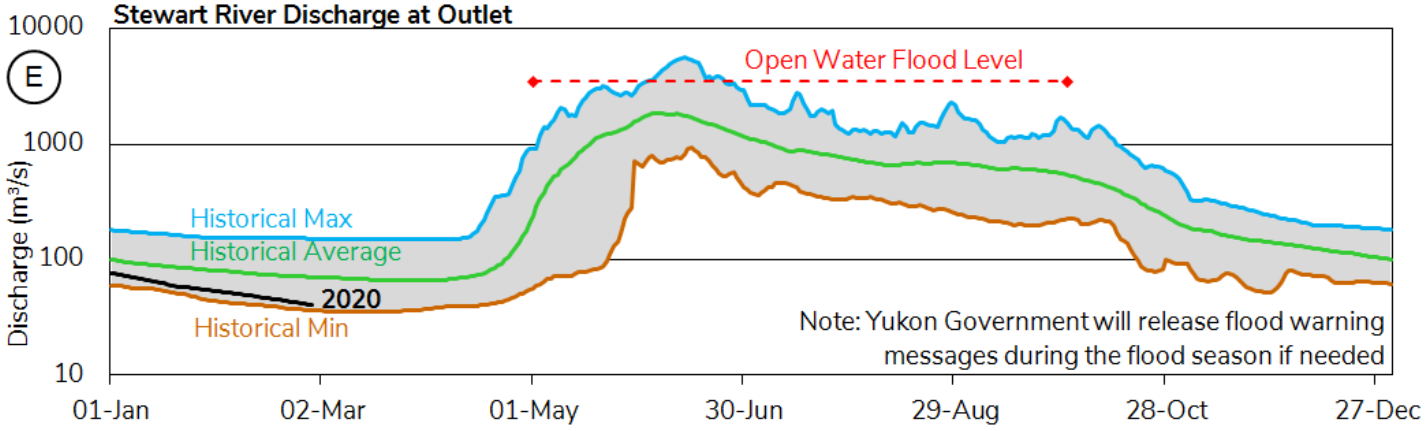
At Withers Lake Meteorological station, Snow Water Equivalent (SWE) is measured to be **134%** of the **historical average** (Figure A). The Stewart River basin-averaged SWE is estimated to be **141%** of **historical median**, with **211 mm** as of March 1 (Figure B). This can be considered a significant snowpack for the area.



Precipitation at Mayo Airport has been consistently **above average** for winter, with a record high total accumulation in January 2020 (Figure C). Cumulated degree-days of freezing (CDDF) are **close to average**, with 2700 °C-Days (Figure D). The thickness of the ice cover on rivers and lakes of the region is probably **close to normal**.

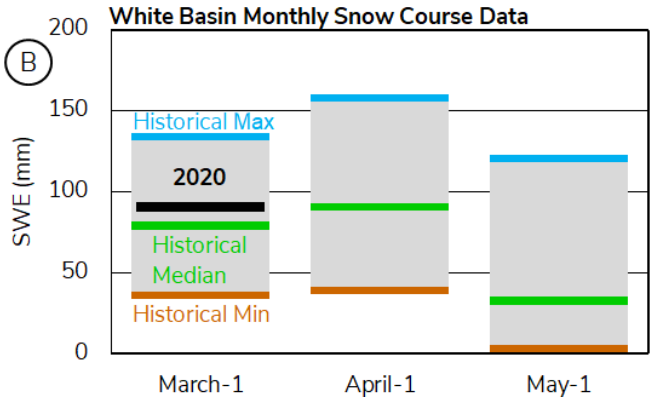


The estimated Stewart River discharge at the outlet is currently **below historical average** (Figure E). This is the result of a very dry 2019. It is too early in the season to confirm that 2020 will be a high water year, but the **well-above median** snowpack in the watershed suggests a **high potential** **for significant spring freshet flows**. Weather conditions in March and April will determine the most probable spring scenario.

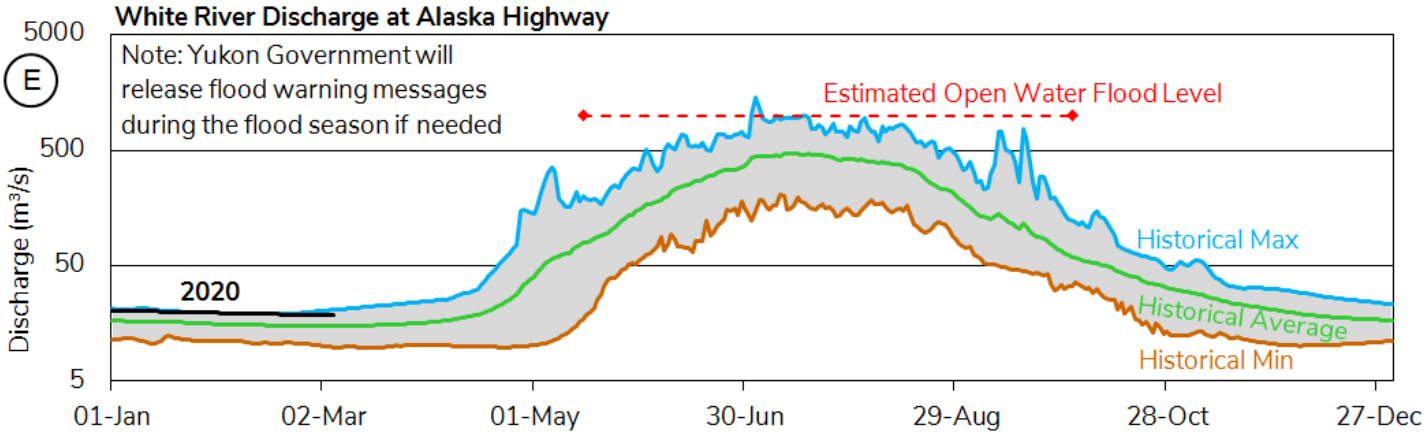


WHITE RIVER BASIN

The White River basin-averaged SWE is estimated to be **110%** of the **historical median**, with **90 mm** as of March 1 (Figure B). This, however, could be more representative of the foothills of the St. Elias Range, while the relative SWE (%) in the range itself could be higher.

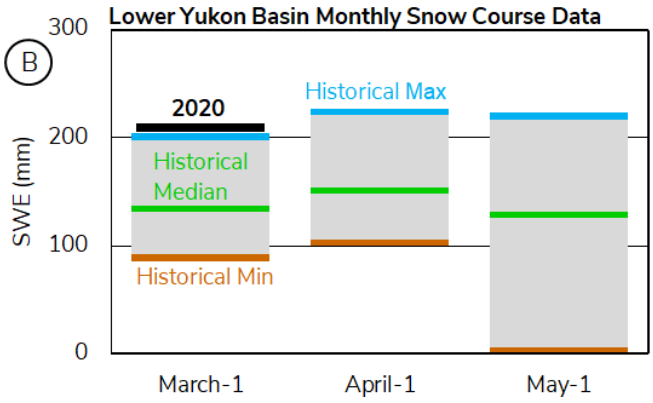


The estimated White River discharge at the Alaska Highway is currently **above** the **historical average** (Figure E). High flows in this watershed are dominated by mountain snowmelt and glacial melt that are largely influenced by summer temperatures and precipitation. The slightly **above median** snowpack currently suggests a **potentially higher than average spring freshet volume**.

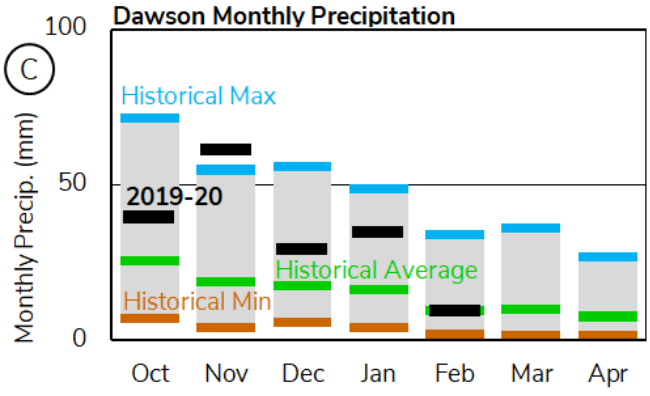


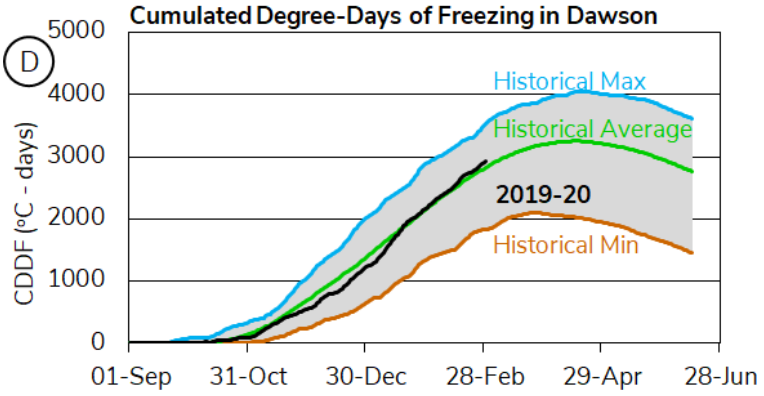
LOWER YUKON RIVER BASIN (DAWSON AREA)

The Lower Yukon basin-averaged SWE is estimated to be **153%** of the **historical median**, with **210 mm** as of March 1 (Figure B). This represents the highest historical value since 1980.

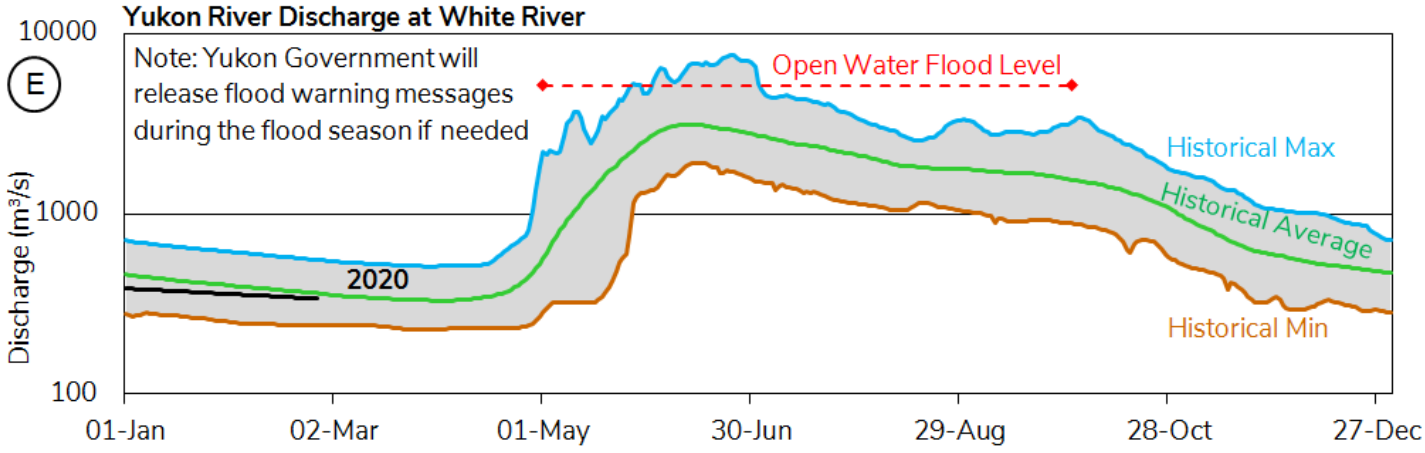


Precipitation at Dawson Airport was generally **well-above average** monthly values during fall and winter (Figure C) with a record high precipitation value in November 2019. Cumulated degree-days of freezing (CDDF) are **close to average**, with 2940 °C-Days (Figure D), which indicates a **normal** winter intensity and **average** ice cover thickness on lakes and rivers of the region.



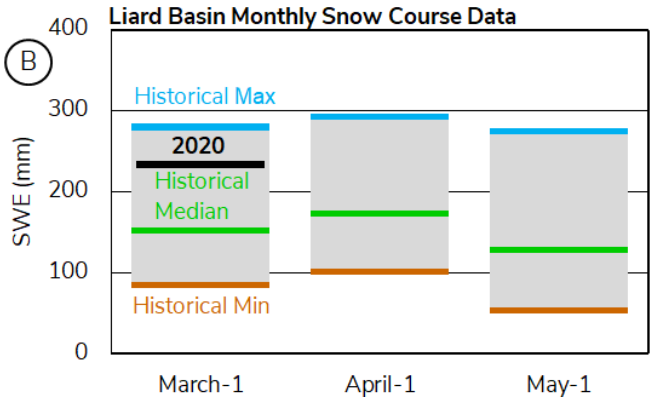


The estimated Yukon River discharge at the White River is **close to historical average** (Figure E). It is too early in the season to determine if 2020 will be a high water year, but the **well-above median** snowpack in all upstream basins suggests a **high potential** **for significant spring freshet flows**. This statement also applies to the Klondike River. Weather conditions in March and April will determine the most probable spring scenario.

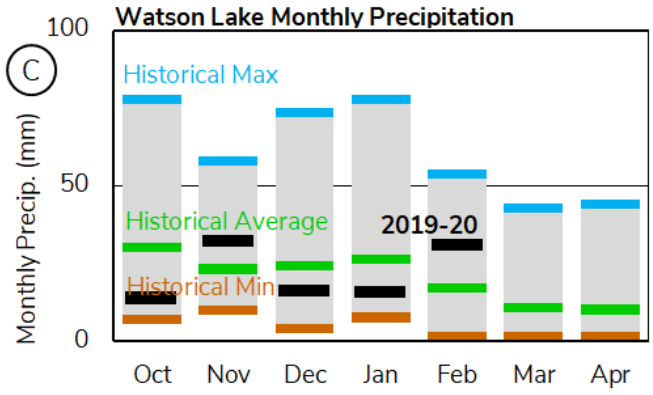


LIARD RIVER BASIN

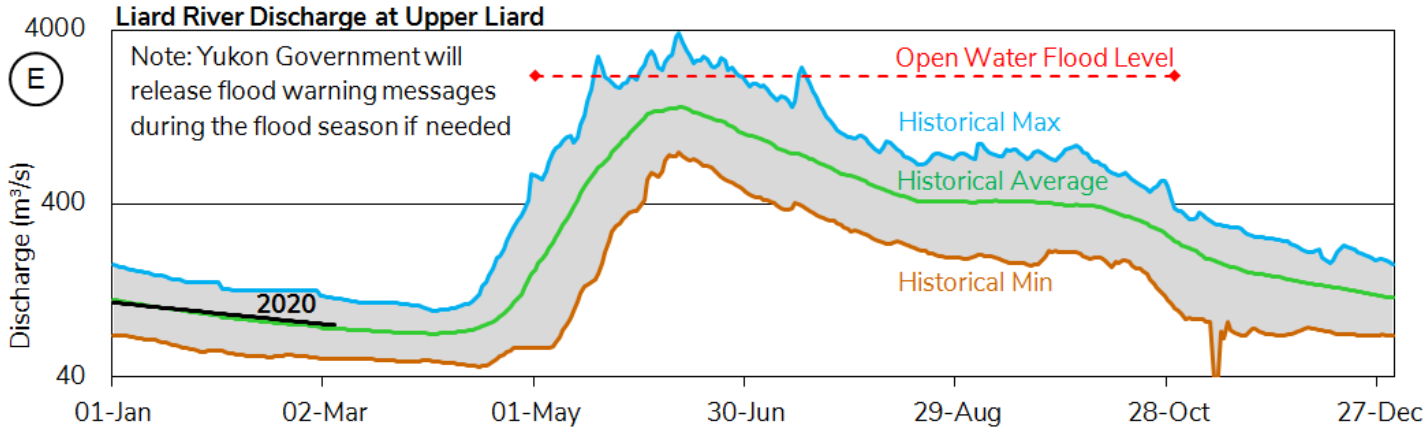
The Liard River basin-averaged SWE is estimated to be **150%** of the **historical median**, with **234 mm** as of March 1 (Figure B). This can be considered a significant snowpack for the area.



Precipitation at Watson Lake Airport has been variable in the last five months, with October, December and January monthly values **below average**, and November and February values **above average** (Figure C). The cumulative result is close to **average**, but this only applies to the southern part of the watershed.

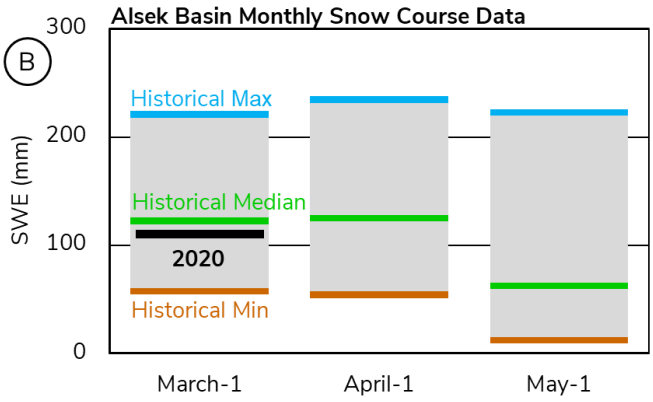


The estimated Liard River discharge at Upper Liard is currently close to **historical average** (Figure E). It is too early in the season to confirm whether 2020 will be a high water year, but the **well-above median** snowpack in the upper watershed suggests a **high potential** **for significant spring freshet flows**. Weather conditions in March and April will determine the most probable spring scenario.

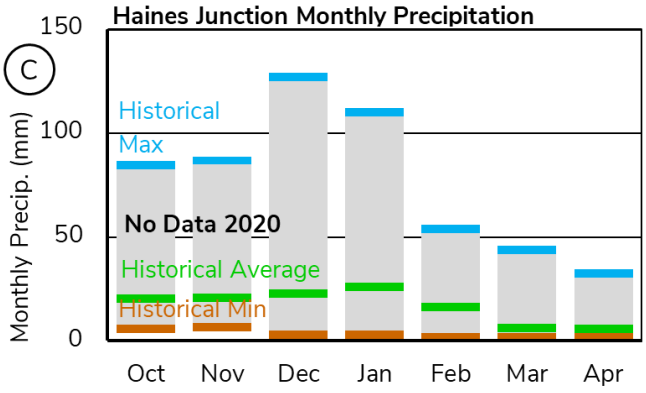


ALSEK RIVER BASIN

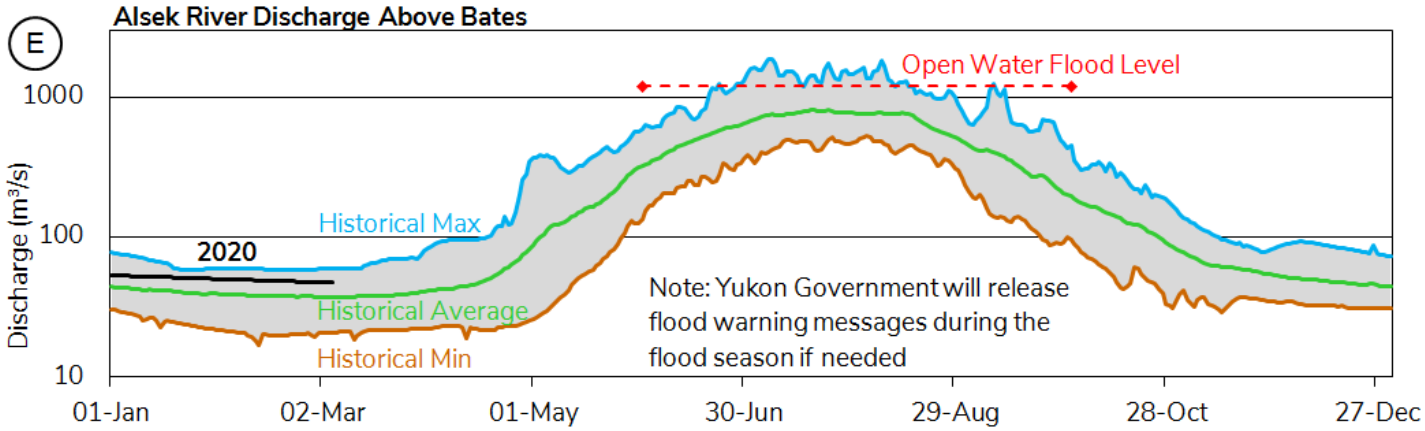
The Alsek River basin-averaged SWE is estimated to be **88%** of the **historical median**, with **110 mm** as of March 1 (Figure B). This, however, may only be representative of the Kluane and Aishihik Lake areas while the snowpack in the St. Elias Range is probably **above historical median**.



Precipitation at Haines Junction has not been recorded (Figure C), but is expected to be overall slightly **lower** than **average**.

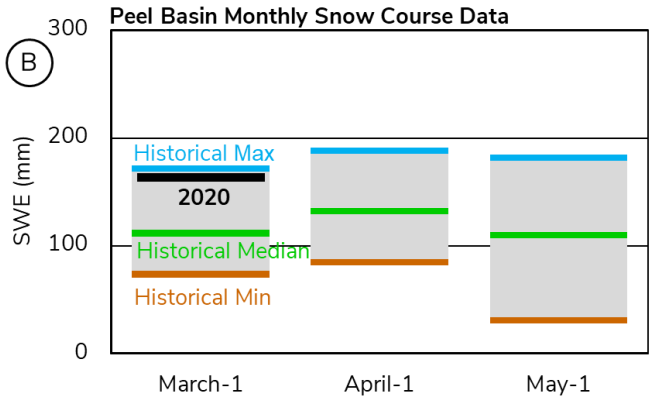


The estimated Alsek River discharge is currently **above historical average** (Figure E). High flows in this watershed are dominated by mountain snowmelt and glacial melt that are largely influenced by summer temperatures and precipitation. Therefore, the snow data presented above only provides a partial indicator of potential summer flows.

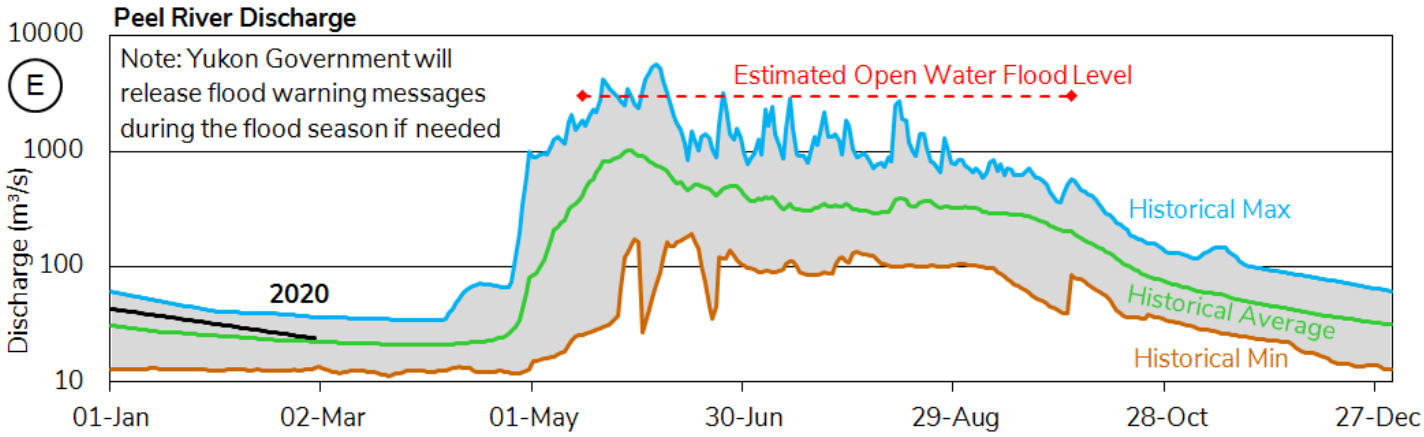


PEEL RIVER BASIN

The Peel River basin-averaged SWE is estimated to be **143%** of the **historical median**, with **164 mm** on March 1 (Figure B). This can be considered a significant snowpack for the area.



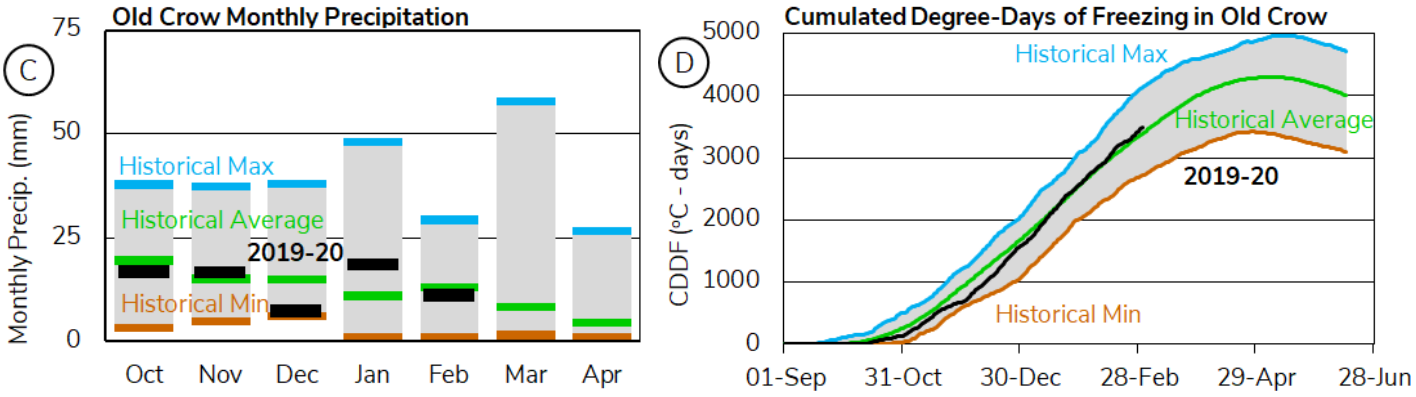
The estimated Peel River discharge on February 28 was slightly **above the historical average** (Figure E). It is too early in the season to determine if **2020** will be a high water level year, but the **well-above median** snowpack suggests a **high potential** **for significant spring freshet flows**. Weather conditions in March and April will determine the most probable spring scenario.



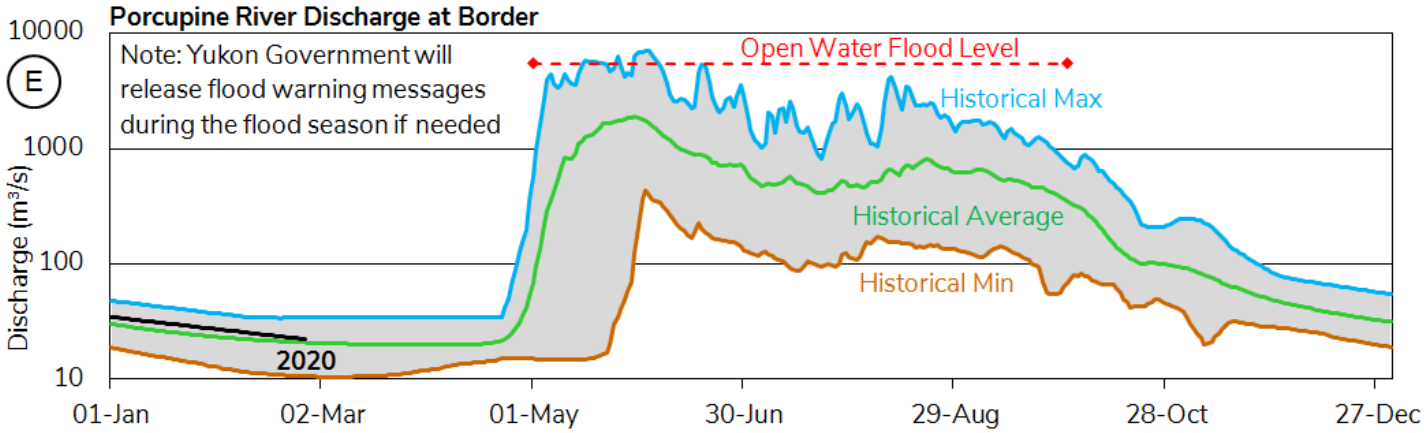
PORCUPINE RIVER BASIN

The Porcupine River basin-averaged SWE cannot be estimated due to limited data available on March 1.

Precipitation at Old Crow shows overall **close to average** monthly values during fall and winter (Figure C). Cumulated degree-days of freezing (CDDF) are also **close to average**, with 3500 °C-Days as of March 1, which indicates an **average** winter intensity (Figure D) and a **normal** ice cover thickness on lakes and rivers in the region.



The estimated Porcupine River discharge is **close to the historical average** (Figure E). It is too early in the season to determine if 2020 will be a high water level year. Snow surveys and weather data in March and April will determine the most probable spring scenario. Spring breakup monitoring and forecasting will begin at the end of April.



Drainage Basin and Snow Course

For Sample Date: 2020-03-01

Name	Number	Elevation (m)	Date of survey	This year snow depth (cm)	Water content (SWE) (mm)	Last year (mm)	Median Historical SWE (mm)	Years of record
Alsek River Basin								
Canyon Lake	08AA-SC01	1160	2020-02-26	43	70	38	80	42
Alder Creek	08AA-SC02	768	2020-02-24	72	131	86	144	39
Aishihik Lake	08AA-SC03	945	2020-02-26	42	69	32	72	26
Haines Junction Farm	08AA-SC04	610	2020-02-28	42	78	27	86	20
Summit	08AB-SC03	1000	2020-02-28	92	203	148	234	40
Yukon River Basin								
Tagish	09AA-SC01	1080	2020-02-27	69	143	70	126	44
Montana Mountain	09AA-SC02	1020	2020-02-27	64	140	72	130	44
Log Cabin (B.C.)	09AA-SC03	884	2020-02-26	142	405	232	328	58
Atlin (B.C)	09AA-SC04	730	2020-02-25	28	54	66	108	54
Mt McIntyre B	09AB-SC01B	1097	2020-02-27	78	157	97	135	44
Whitehorse Airport	09AB-SC02	700	2020-02-26	55	105	40	91	55
Meadow Creek	09AD-SC01	1235	2020-02-25	123	277	120	243	43
Jordan Lake	09AD-SC02	930	No Survey			82	125	30
Morley Lake	09AE-SC01	824	2020-02-26	68	123	82	138	31
Mount Berdoe	09AH-SC01	1035	2020-02-24	75	124	56	96	44
Satasha Lake	09AH-SC03	1106	2020-02-24	53	89	46	83	32
Williams Creek	09AH-SC04	914	2020-02-24	67	110	49	86	23
Twin Creeks B	09BA-SC02B	900	2020-02-26	90	181	113	116	3
Hoole River	09BA-SC03	1036	2020-02-27	99	203	84	120	41
Burns Lake	09BA-SC04	1112	2020-02-26	113	248	195	197	31
Finlayson Airstrip	09BA-SC05	988	2020-02-27	74	146	99	92	33
Fuller Lake	09BB-SC03	1126	2020-02-26	91	171	146	169	30
Russell Lake	09BB-SC04	1060	2020-02-26	101	196	145	200	32
Rose Creek	09BC-SC01	1080	2020-02-25	63	121	73	97	25
Mount Nansen	09CA-SC01	1021	2020-02-24	55	79	39	68	43
MacIntosh	09CA-SC02	1160	2020-02-24	59	94	47	81	43
Burwash Airstrip	09CA-SC03	810	2020-02-27	29	49	33	40	43
Beaver Creek	09CB-SC01	655	2020-02-26	45	70	45	73	44
Chair Mountain	09CB-SC02	1067	2020-02-26	56	99	71	84	26
Casino Creek	09CD-SC01	1065	2020-02-24	82	128	65	108	41
Pelly Farm	09CD-SC03	472	2020-02-26	67	127	31	75	33
Plata Airstrip	09DA-SC01	830	2020-02-26	93	191	129	168	38
Withers Lake	09DB-SC01	975	2020-02-26	110	253	144	196	32
Rackla Lake	09DB-SC02	1040	2020-02-26	102	218	138	162	29

Code "E" - Estimate, Code "B" - Survey date is outside of valid sampling range, “N.S.” – No survey.

Drainage Basin and Snow Course

For Sample Date: 2020-03-01

Name	Number	Elevation (m)	Date of survey	This year snow depth (cm)	Water content (mm)	Last year (mm)	Water content average	Years of record
Yukon River Basin								
Mayo Airport A	09DC-SC01A	540	2020-02-24	88	154	68	89	49
Mayo Airport B	09DC-SC01B	540	2020-02-24	92	150	60	93	30
Edwards Lake	09DC-SC02	830	No Survey			87	142	31
Calumet	09DD-SC01	1310	2020-02-25	133	277	130	172	42
King Solomon Dome	09EA-SC01	1080	2020-02-27	104	189	116	147	45
Grizzly Creek	09EA-SC02	975	2020-02-25	119	263	138	153	44
Midnight Dome	09EB-SC01	855	2020-02-24	106	218	119	134	44
Boundary (Alaska)	09EC-SC02	1005	2020-03-02	89	198	114	115	41
Porcupine River Basin								
Riff's Ridge	09FA-SC01	650	2020-02-25	82	155	143	130	33
Eagle Plains	09FB-SC01	710	2020-02-25	74	115	192	151	37
Eagle River	09FB-SC02	340	2020-02-25	60	97	145	114	36
Old Crow	09FD-SC01	299	No Survey			N.S.	106	27
Liard River Basin								
Watson Lake Airport	10AA-SC01	685	2020-02-26	70	135	90	131	55
Tintina Airstrip	10AA-SC02	1067	2020-02-27	117	274	155	185	39
Pine Lake Airstrip	10AA-SC03	995	2020-02-26	108	229	144	198	43
Ford Lake	10AA-SC04	1110	2020-02-27	119	279	149	170	30
Frances River	10AB-SC01	730	2020-02-26	98	206	116	141	44
Hyland River	10AD-SC01	855	2020-02-27	117	263	155	154	44
Hyland River B	10AD-SC01B	880	2020-02-27	120	275	173	158	2
Peel River Basin								
Blackstone River	10MA-SC01	920	2020-02-25	71	111	83	86	44
Ogilvie River	10MA-SC02	595	2020-02-25	83	144	106	92	44
Bonnet Plume Lake	10MB-SC01	1120	2020-02-26	97	203	115	148	29
Alaska Snow Courses								
Eaglecrest	08AK-SC01	305	2020-03-02	206	643	188	413	37
Moore Creek Bridge	08AK-SC02	700	2020-02-28	201	518	434 E	452	27

Code "E" - Estimate, Code "B" - Survey date is outside of valid sampling range, “N.S.” – No survey.

Location of water resource snow courses