MACKENZIE DELTA AND BEAUFORT COAST SPRING BREAKUP NEWSLETTER

Report 2020-21
8 July 2020 Wednesday

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Seasonal wrap-up

Our first report this year was issued May 4, during a week-long return to winter that interrupted an early snow-melt. The Peel River had experienced a short early peak and the Mackenzie River at Norman Wells was rising at 14 cm/day. The Aklavik ice road had closed on April 29. Water levels in the Delta were above average and creeping up at about 1 cm/day. Reports of channel ice thickness ranged from 5 to 7 ft (1.5 to 2.1 m).

In the outer Delta, first overflow onto ice in Shallow Bay (from the southern distributary of Reindeer Channel) had occurred on April 26 and by May 4 there was clear-water overflow from Napoiak Channel at the head of the bay and in the outer reach of Middle Channel. A 7x40 km floe had broken away from the landfast ice along the Tuktoyaktuk Peninsula by April 26, leaving a reduced width of 25 km.

By May 8, the Mackenzie at Arctic Red River (Tsiigehtchic) (10LC014) was rising at 14 cm/day, thus the freshet in the Delta was well established. Warm weather combined with 24-hour sunlight accelerated snowmelt again and the highway ice crossings of the Peel and Mackenzie closed over the weekend on May 9-10. Water levels began to rise again in the Peel, at 26 cm/day, and in the central Delta, at 12 cm/day in Middle Channel below Raymond (10MC008). The Peel at Fort McPherson (10MC002) crested at 14.89 m on May 28. The ice broke on East Channel at Inuvik (10LC002) on May 27 and water level peaked at 16.51 m on June 1, flooding many cabins. This was just a little shy of the 2006 flood level. Peel Channel above Aklavik (10MC003) fractured May 26 and broke May 27, with a prolonged peak reaching 14.82 m on May 27 and 28. Aklavik escaped significant flooding this year.

At the delta front, ice overflow from Reindeer Channel reached a seaward limit at a fracture 17 km northwest of the Olivier Islands on May 20, when overflow also extended far out from Middle Channel and had begun from Kuluarpak and Harry channels into Beluga Bay as well. Outflow from Middle Channel encountered a fracture north of the north end of Garry Island, 20 km out, on May 21, by which time there was also outflow from Ministicooq Channel on the west side. The first sign of outflow from East Channel into Kugmallit Bay was May 20. By May 23 there was turbid water and extensive overbank flooding in the outer delta. Water levels peaked in Napoiak (10MC023) and Kumak Channel (10LC019) on June 3.

Open water reached Tuktoyaktuk on June 17 (harbour ice-free ~June 23). Shingle Point was ice-free as of June 24. The Mackenzie Bay landfast ice bridge broke overnight June 18-19; in Kugmallit Bay it broke on June 29. Paulatuk was open by the same date, and Sachs Harbour as of July 6 (although some ice lingered across the harbour - see image below). Ulukhaktok had open water in Jacks Bay only by June 30, while landfast ice remained in Queens and Kings bays, as it did yesterday, confirmed by community observations.

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The most recent clear image of the entire southern (upper) delta, from Terra MODIS ‘true colour’ (14 June 2020), allows a comparison of the turbid waters of Mackenzie River and the lower sediment concentration in the Peel. We show the locations of Water Survey of Canada gauges referenced in the summary or in previous reports this season. The stations further north in the delta are shown on the next page.

A few lakes in the upper part of the image may still have had ice at this data, but most of the white patches are small cumulus clouds (note shadows). Image data courtesy of NASA Worldview.

At the end of this report, you will find water level records for a number of sites. Because the app we are using captures current-year daily mean data for just 30 days, we include sequential plots as of May 29 and June 29.
The outer delta yesterday (7 July 2020), with cloud over the northernmost delta, Richards Island, and Kugmallit Bay, Terra MODIS corrected reflectance “true colour” imagery (courtesy NASA Worldview). Also shown here are the other Water Survey gauges used this year and the location of the auto weather and camera station at East Whitefish.
The nearly ice-free Yukon coast yesterday (7 July 2020), Terra MODIS corrected reflectance “true colour” imagery (courtesy NASA Worldview).
Sentinel-1 synthetic aperture radar (SAR) image (VV polarization) showing remaining ice in outer Kugmallit Bay last week (3 July 2020). SAR data courtesy of European Union and Copernicus Sentinel Hub.
Wider view of the same Sentinel-1 SAR image tile (VV polarization) showing remaining ice along the Tuktoyaktuk Peninsula last week, including landfast ice between Toker and Atkinson points and at the outer end of the peninsula (3 July 2020). SAR data courtesy of European Union and Copernicus Sentinel Hub.
Sentinel-1 SAR image (VV polarization) showing remaining landfast ice at the eastern end of the Tuktoyaktuk Peninsula and in Liverpool Bay last week, including landfast ice between Toker and Atkinson points and at the outer end of the peninsula (3 July 2020). SAR data courtesy of European Union and Copernicus Sentinel Hub.
Sentinel-1 SAR image (VV polarization) showing remaining landfast ice in Franklin Bay and very little in Darnley Bay on Sunday (5 July 2020). The image tile did not include eastern Darnley Bay. SAR data courtesy of European Union and Copernicus Sentinel Hub.
Sentinel-2 “true colour” image showing details of remaining ice in part of Sachs Harbour and nearby lakes on Monday (6 July 2020). Also shows the persistence of landfast ice on the west coast of Banks Island. Image data courtesy of European Union and Copernicus Sentinel Hub.
Terra MODIS “true colour” image of Ulukhaktok and vicinity yesterday (7 July 2020), mostly cloud-obscured (courtesy NASA Worldview). We can see the remaining landfast ice in front of the community in Queens and Kings bays and south to Holman Island. Unfortunately the cloud hides the progress of breakup in Prince Albert Sound and we found no SAR data on the Sentinel Hub.
Peel River above Fort McPherson (10MC002)

May 29, 2020

Current Water Level (m) 11.74

Current Discharge (cms) 6950

24 Hour Water Level Change (m) -0.13

24 Hour Discharge Change (cms) -220

Most recent partial daily water level (date shown) vs the highest recorded daily peak (2013).

Last Updated (MST) 2020-05-29 5:35:00 AM

Peel River above Fort McPherson (10MC002)

**Most recent partial daily water level (date shown) vs the highest recorded daily peak (2013).**

- **Current Water Level (m):** 8.59
- **Current Discharge (cms):** 2700
- **24 Hour Water Level Change (m):** -0.63
- **24 Hour Discharge Change (cms):** -670

Mackenzie River at Arctic Red River (Tsiigehtchic) (10LC014)

- **Current Water Level (m):** 6.56
- **Current Discharge (cms):** 13K
- **24 Hour Water Level Change (m):** 0.85
- **24 Hour Discharge Change (cubic m/s):** 3100

**Daily Water Level (2006 - 2019):**

- Water Level / Niveau d'eau (m)
- May 2020 to Jun 2020

**Most recent partial daily water level (date shown) vs the highest recorded daily peak (2006):**

- May 15, 2020
- 6.41
- 19.44

**Last Updated (MST):** 2020-05-15 3:35:00 AM

Real-time water level and discharge data are courtesy of Environment Canada - Water Survey of Canada.

June 29, 2020

Most recent partial daily water level (date shown) vs the highest recorded daily peak (2006).

Last Updated (MST)
2020-06-29 3:35:00 AM

Current Water Level (m) 8.15
Current Discharge (cms) 27K
24 Hour Water Level Change (m) -0.18
24 Hour Discharge Change (cubic m/s) -1000

East Channel at Inuvik (10LC002)

May 29, 2020
15.44
Most recent partial daily water level (date shown) vs. the max recorded daily level (2006).

Last Updated (MST)
2020-05-29 4:35 AM

Current Water Level (m)
15.47

24 Hour Change (m)
0.27

Real-time water level and discharge data are courtesy of Environment Canada - Water Survey of Canada.
East Channel at Inuvik (10LC002)

Water Level / Niveau d'eau (m)

- May 31: 16.9
- Jun 07: 16.7
- Jun 14: 14.1
- Jun 21: 14.0
- Jun 28: 15.4

June 29, 2020

Current Water Level (m) 14.13

Last Updated (MST) 2020-06-29 3:35 AM

24 Hour Change (m) -0.01

Most recent partial daily water level (date shown) vs. the max recorded daily level (2006).

Peel Channel above Aklavik (10MC003)

Water Level / Niveau d'eau (m)

<table>
<thead>
<tr>
<th>Date</th>
<th>Water Level</th>
<th>24 Hour Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jun 07</td>
<td>15.0</td>
<td></td>
</tr>
<tr>
<td>Jun 14</td>
<td>14.9</td>
<td>-0.03</td>
</tr>
<tr>
<td>Jun 21</td>
<td>12.4</td>
<td></td>
</tr>
<tr>
<td>Jun 28</td>
<td>13.1</td>
<td></td>
</tr>
</tbody>
</table>

Most recent partial daily water level (date shown) vs the max recorded daily peak (2006).

Current Water Level (m) 13.02

24 Hour Change (m) -0.03

Real-time water level and discharge data are courtesy of Environment Canada - Water Survey of Canada.

Mackenzie River (Napoiak Channel) above Shallow Bay (10MC023)

Most recent partial daily water level (date shown) vs. the max recorded daily level (2006).

Current Water Level (m) 13.11
24 Hour Water Level Change (m) 0.15

Real-time water level and discharge data are courtesy of Environment Canada - Water Survey of Canada.

https://www.canada.ca/en/environment-climate-change/services/water
Mackenzie River (Napoiak Channel) above Shallow Bay (10MC023)

Daily Water Level (1999 - 2020)

- **Water Level / Niveau d'eau (m)**
  - May 31: 13.51
  - June 07: 13.83
  - June 14: 12.16
  - June 21: 11.72
  - June 28: 11.90

June 29, 2020

- **Current Water Level (m)**: 12.10
- **Last Updated (MST)**: 6/29/2020 2:25:00 AM
- **Most recent partial daily water level (date shown) vs. the max recorded daily level (2006).**

- **Daily Water Level Change (m)**: -0.01
- **24 Hour Water Level Change (m)**: -0.01

Real-time water level and discharge data are courtesy of Environment Canada - Water Survey of Canada.