

Flooding and Extreme Weather Issue Table

Flooding

1. Types of Flooding

There are two types of flooding in the NWT: *open-water floods* and *ice-jam floods*.

- *Open-water floods* are floods that occur during open-water season as a result of rain events or rain-on-snow events.
- *Ice jam floods* are floods that occur during spring melt as a result of a combination of conditions, both at the site of the ice jam and in the parts of the river upstream of the ice jam. These conditions include:
Amount and density of snow; ice thickness, water temperature, stream shape, existing flow, previous Fall's soil moisture, rate and timing of thaw, weather conditions during melt period.

Both open-water and ice-jam floods are difficult to anticipate; both can lead to property damage and risk to public safety. Ice jam floods generally cause more damage than open-water floods of similar water level. Open-water flood events are somewhat easier to predict. However, each location has unique characteristics which need to be considered. With a changing climate, assumptions about past weather and water conditions cannot be counted on.

Climate change will impact the various individual components (e.g., rain, snow, wind, air temperature) and processes (e.g., evaporation, percolation, surface runoff) that make up the water cycle, as well as the relationship between components. It is a complex system with feedbacks that are not all well understood.

2. History of Flooding in the NWT

See *Timeline of Community Flooding (on table)*

3. NWT Flood Maps

Community flood mapping was completed in the 1980s. It was based on a '100-year' open-water flood. Maps are available on-line: <https://www.lands.gov.nt.ca/en/services/explore-atlas-mapping>

Efforts are underway to obtain funding to update community flood mapping.

There are 3 types of flood mapping to consider: 1. Flood Inundation Map; 2. Flood Hazard Map; 3. Flood Risk Map.

The Federal Floodplain Mapping Guidelines Series provides important information and definitions:

<https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr-prvntn-mtgtn/ndmp/fldpln-mppng-en.aspx>

4. Monitoring and Data

Where is Water Quantity Monitored in the NWT?

The Water Survey of Canada operates water quantity stations in the NWT funded by Environment and Climate Change Canada, GNWT and third parties. A map of locations and historic data can be found on-line: https://wateroffice.ec.gc.ca/index_e.html

The Value of Water Quantity and Weather Monitoring Networks and Individual Sites

- A single monitoring station may do a very good job of letting people know about the conditions at one specific site.
- Information from a single station can be tracked over many years to assess the range of expected conditions (including minimums, averages, maximums), as well as trends over time (more, less, more variable).
- The conditions at a single water quantity station are a response to the conditions at other upstream locations.
- So, if monitoring stations are not linked to each other, gaps in understanding exist which limit the ability to accurately forecast or model at any sites or across the network. A single station is unable to provide valuable information on what conditions are coming to the site (weather, water quantity) or how the site compares to others in the region.

The Importance of Other Types of Knowledge and Data

- Different types of knowledge and data are important to build a picture of historical flood events and understand future risk.
- Local knowledge and records, of both past events and current conditions, are also very important.
- Local knowledge can tell us information that monitoring stations cannot (especially if stations were only recently installed, or if they stopped working during a flood). Photographs and stories are very helpful.
- Examples of other useful data include: late-winter river ice thickness; water level (before, during and after flood); timing of flood (start, peak and end); timing of ice breakup; observations of backwater vs. ice jam release; damage from and cost of flood event.

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