

Hydrologic Forecasting and Water Management Manitoba Infrastructure & Transportation Flood Terminology Definitions

General Terminology

- **Channel Capacity:** The level and/or flow that is determined to result in water filling the main channel to the point of overflowing, at or near the gauging station referenced. At this point, the stage of the waterway will begin to overtop its banks and spread into the floodplain.
- **Floodplain:** An area of low-lying ground adjacent to a river or stream, which stretches from the banks of its channel to the base of enclosing valley walls. These areas can experience flooding during periods of high flow.
- **Flow/Discharge:** The volume of water that passes a given location within a given period of time; expressed in cubic feet per second (cfs) or cubic metres per second (cms).
- **FPL – Flood Protection Level:** The water level that is the greater of the flood of record or the 1-in-200-yr flood, plus a freeboard allowance for a particular waterway (typically 2 ft) or water body (i.e., the freeboard is site specific). The FPL is provided by the Hydrologic Forecasting and Water Management (HFWM) branch of Manitoba Transportation and Infrastructure on a site-specific and structure-specific basis.
 - This is formally set by the Water Resources Administration Act for the Red River Designated Flood Areas. In non Designated Flood Areas, the province uses the determined FPLs. For other works or developments, the FPL is recommended by the province, but ultimately regulated by the local planning districts and/or municipalities.
- **Ice Jam:** A blockage of ice on a river/stream which restricts flow, resulting in increased water levels upstream. Jams may occur due to changing river geometry, bends in the river channel, depth and thickness of ice, rate of water level rise, or a solid section of ice downstream.

Flood Alerts

- **Above Community Flood Protection Level:** Water levels are above or projected to be above the community dike levels within 24 hours, causing severe flooding.
- **Flood Warning:** A Flood Warning is issued when water levels are expected to be above flood stage within the next 24 hours, resulting in minor to severe flooding. The degree of flooding will be categorized using flood stages (minor, moderate, major and severe) where impact levels are verified. A general flood stage will be used where direct impact levels are limited or unknown; values will be estimated based on historical water level review.
- **Flood Watch:** A Flood Watch is issued when water levels are rising and nearing minor/general flood stage, but not expected to rise significantly over channel capacity within the next 24 hours. A Flood Watch can be an early indicator for conditions that may develop into a Flood Warning.
- **High Water Advisory:** A High Water Advisory may be issued when water levels are above seasonal levels. Water levels would be between channel capacity level and minor/general flood stage. A High Water Advisory can be an early indicator for conditions that may develop into a Flood Watch.
- **Overland Flood Warning:** A severe weather warning that is issued to alert the public that overland flooding is imminent or occurring in the warned area. Overland flooding is a quick onset of flood conditions, usually occurring after heavy rain that may not be linked to a specific waterway or lake. Rainfall intensity and duration, topography, soil conditions and ground cover are factors impacting overland flooding. Overland flooding can also occur because of a sudden release of water held by an ice jam.

- **Overland Flood Watch:** A severe weather watch that is issued when conditions are favourable for overland flooding. Normally issued when significant rainfall is expected in locations with saturated soil.
- **High Wind Effect Alert:** Issued when static lake levels are forecast to increase by 0.9 – 1.5 m and wave action is expected to be significant. Alerts will be issued with a description of the general area and waterbody, with more detailed extents available on the published Wind Effect Alert Map.
- **Severe Wind Effect Alert:** Issued when static lake levels are forecast to increase by more than 1.5 m and wave action is expected to be very significant and forceful. Alerts will be issued with a description of the general area and waterbody with more detailed extents available on the published Wind Effect Alert Map.

Other Flood Condition Indicators - Forecast Information Map only

- **No Flooding:** Water levels are below channel capacity and near or below seasonal levels. No flooding is expected at these levels.
- **No Current Data:** There is no data or information available at gauging stations to classify the flood alerts. This can occur at seasonal, high water only, or malfunctioning gauges.

Flood Extent Definitions

- **Minor Risk of Flooding:** Forecasted flows and levels will remain below channel capacity even for the unfavourable future weather conditions.
- **Moderate Risk of Flooding:** Forecasted flows and levels exceed channel capacity for the unfavourable future weather conditions but forecasted flows and levels are below channel capacity for the normal or favourable future weather conditions.
- **Major Risk of Flooding:** Forecasted flows and levels exceed channel capacity and cause flooding for near normal and unfavourable future weather conditions.

Weather Scenarios: Used to account for future weather such as additional snow, melt rates and spring rainfall. These are determined by statistical analysis of the past 30 to 40 years of climate data. Three scenarios are used and the Province's practice is to plan/prepare to the unfavourable (upper decile) condition.

- **Favourable weather** (lower decile): There is a 10% chance of the weather being 'favourable' or better. 90% of the time the weather will be worse than this 'favourable' condition. Characterized by little additional precipitation and a gradual snow melt.
- **Normal weather** (median): There is a 50% chance of the weather being 'normal' or better. Characterized by normal rainfall and temperature and typically used to describe historic climate conditions.
- **Unfavourable weather** (upper decile): There is a 10% chance of the weather being 'unfavourable' or worse. 90% of the time the weather will be better than this 'unfavourable' condition. Characterized by significant widespread precipitation with a rapid snow melt.

Forecasts:

- **Operational Forecasts:** An estimated future crest water level and/or flow and date of occurrence. Operational Forecasts are provided once active melt and river flow has begun. Estimates are modelled based on observed flow, existing conditions (including channel capacity, topography, and remaining snowpack) and normal future weather. Observed conditions are

monitored throughout the flood and compared against the historic climate data used to generate the forecast. Forecasts are updated when weather conditions are outside the range of historical climate data used to generate the forecast. A range of forecasted values is provided further in advance of an upcoming forecasted crest because of unknowns in the basin conditions and river flows, and limitations in the modelling procedures. All forecasted values generated during a flood event are provided on the published Flood Sheets and Flood Hydrographs.

- **Flood Outlook:** Estimated spring peak water levels and flows provided before spring water flow begins. Estimates are based on diverse information, such as soil moisture, winter precipitation, snow pack, topography, current water level, channel capacity, and future weather conditions scenarios (precipitation, temperatures, etc.). Estimates are provided for three weather scenarios (favourable, normal, and unfavourable) which correspond to three different probabilities of occurrence (lower decile, median, and upper decile).

Flood Products:

- **Morning Conditions Report:** A summary of water levels and flows as recorded at the start of the day, and change in water level from the prior day, for basins that are experiencing conditions above the seasonal norm. The hydrometric data (water level and flow) presented is raw gauge data and may include impacts from ice, wind or monitoring equipment malfunctions. The report provide a brief overview of the morning conditions for the basin presented.
- **Flood Sheet:** A summary of morning water levels, change in water level from the prior day, flow (where possible), operational forecasts, dike elevations, existing channel capacities, and reference years data, including last year and one or two representative past years. The presented hydrometric data (water level and flow) undergoes quality control checks for impacts from ice, wind, or monitoring equipment malfunctions. The flood sheets may be published at any time throughout the day as forecasts are continually reviewed before publishing to provide the most up-to-date data. Flood Sheets are published for basins where conditions are above the seasonal normal and operational forecasts are available.
- **Flood Hydrograph:** A graphical representation of the data published in the Flood Sheet; they are published for basins where a Flood Sheet is available.
- **Flood Alerts:** A summary of the current flood alerts issued by the Hydrologic Forecast Centre (HFC); see Flood Alert section for definitions of the different types of alerts. The report is available each morning during a flood event.
- **Flood Report:** A summary of the current flood alerts, observed and forecasted weather, flood control infrastructure operations, provincial dike closures, and basin specific updates that are not included in other flood products, such as long-term trend forecasts or specific weather impacts forecast.
- **Wind Effect Alert Maps:** The Hydrologic Forecast Centre (HFC) prepares daily wind effect maps for major lakes in Manitoba during open water season and issues warnings and advisories as required. Wind effect alert categories include no alert, low, moderate, moderate-high, high, and severe. High and Severe wind effect alerts will also be included on the Flood Alerts report.
- **Lake Levels and Forecasts:** The HFC prepares regular lake levels updates and forecasts throughout the year.
- **River Flow Plots:** The HFC prepares regular updates on current river flows with historical data comparisons, such as the lower decile, median, upper decile and historic maximums.
- **Operation of Flood Control Infrastructure Reports:** The operation of the Provincial Flood Control Infrastructure is reported within the Flood Report during a flood event. The specific

operation details, such as gate changes and conditions plots, are updated as required to provide up-to-date information on how the structures are being operated.