

## DTI Overview of Winter Weights Program

### Introduction

The ability of a road to support a given load varies throughout the year. During the winter, when much of the road structure is frozen, this ability is enhanced. A number of jurisdictions recognize this reality by allowing a winter weight premium (WWP) during the winter months. Conversely, when the same road thaws in the spring, the load carrying capacity degrades and spring load restrictions (SLR) are imposed to better match loads to the weakened road structure for the duration of the thawing period.

### Background

New Brunswick has traditionally set start/stop dates for the SLR program using historical deflection measurements. As a result, the province was divided into two zones, and dates were set one week apart for the north and south zones. While measurements were taken throughout the year, the focus was on the weakened state during the spring thaw, so this system is not well suited to timing of a WWP.



In 2014 the Province began a trial WWP using historical weather data from our network of Road Weather Information Stations (RWIS). Three years of data was used to predict, based on reported local air temperature, when conditions were such that the road was likely to be frozen or thawed. Limits were set based on current research and best practices in other jurisdictions

to ensure protection of infrastructure, while still providing opportunities for industry. It is anticipated that these limits will evolve over time as DTI gains experience and confidence with the methodology.

Ten of these sites now have sub-surface temperature probes installed that provide temperature and moisture data at 20cm intervals from 10cm down to 150cm. This provides direct measurement of frost depth in real time at those locations.

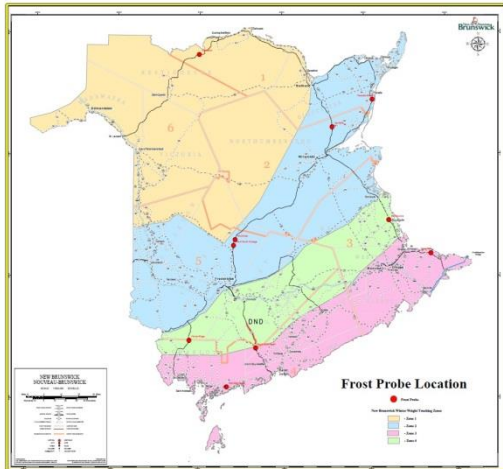
Predictive modelling based on air temperature is used to forecast conditions in nearby areas, using the measurement sites as calibration points. Now with several years of monitoring, it is possible to group measurement sites into zones based on similar response to changes in air temperature throughout the winter.

Regardless of location, the New Brunswick WWP begins when frost penetration reaches 85cm and continues until the cumulative thaw index reaches 10°C-days.

### Climate Zones

For the purpose of the WWP, the Province is divided into zones with similar freeze thaw characteristics. The northern three of these zones are consistent enough to sustain a WWP. The fourth, along the Bay of Fundy, is subject to frequent freeze-thaw cycles throughout the winter, which precludes a WWP being offered there.

The timing of the WWP in each zone will vary, as will the duration, due to the expected local weather conditions.



### Timing

From north to south the anticipated WWP dates for 2022 are:

- Zone 1 – 7-week WWP – 2 Jan to 20 Feb.
- Zone 2 – 3-week WWP – 16 Jan to 6 Feb.
- Zone 3 – 2-week WWP – 23 Jan to 6 Feb.
- Zone 4 – WWP potential under review

### Procedure

At the start of the winter season,

- DTI staff will begin entering 11:00am daily sub-surface temperatures and moisture readings from the ten (10) RWIS sites equipped with frost probes. Temperature monitoring will continue throughout the WWP period and will confirm when a site reaches the 85cm frost depth trigger point.
  - Results of the frost monitoring will be forwarded to the Manager of Trucking Initiatives, Capital Planning Branch - Department of Transportation and Infrastructure and the Trucking Technician in the Special Permits Office when an individual monitoring site is forecast to exceed the threshold value within the next 36 hours.
- A decision to initiate/delay the WWP program in a given zone will be made by the Manager of Trucking Initiatives,
  - Results of the temperature monitoring will be forwarded to the Manager of Trucking Initiatives, Capital Planning Branch - Department of Transportation and Infrastructure and the Trucking Technician in the Special Permits Office when an individual monitoring site is forecast to exceed the threshold value within the next 36 hours.
  - Temperature monitoring will be suspended at any site once the CTI value exceeds 10°C-days.
- A decision to terminate/continue the WWP program in a given zone will be made by the Manager of Trucking Initiatives, Capital Planning Branch - Department of Transportation and Infrastructure.

Capital Planning Branch - Department of Transportation and Infrastructure.

Five days prior to the anticipated start date for each of the three active WWP zones,

- DTI staff will begin entering daily high and low temperature 11:00am forecasts from ten (10) selected Environment Canada sites. Temperature monitoring will continue throughout the WWP period or until a site exceeds the Cumulative Thaw Index (CTI) limit.
- A spreadsheet has been created to record daily temperature data and automatically perform the calculation of CTI from the associated weather forecast data.
- Positive values of CTI indicate thawing conditions. Should this value exceed 10°C-days the area is considered no longer able to support a WWP.
  - The WWP for a given zone will start on the date assigned based on historical frost depth information.
  - Thawing in excess of the 10°C-days limit which occurs after the start date for a given monitoring site will result in a recommendation that the WWP be suspended in that area for this year.

- Any changes to the WWP program will be submitted to the Trucking Technician in the Special Permits Office who will advise permit holders of changes to the DTI web site.
- All participants in the WWP program (permit holders, DTI, Public Safety) will be advised twenty-four (24) hours in advance of any changes to the WWP through the DTI web site.

**Notwithstanding this winter weight program, the District Engineer maintains the authority to close or restrict truck traffic on any highway or portion of highway at their discretion to avoid road damage.**