Apple Suitability Analysis

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# Growing Degree Days

## Data Source

The Growing Degree Days were derived from historical data supplied by Environment Canada from 1987 to 2016. The raw data can be downloaded from [Environment Canada's Historical Data Site](http://climate.weather.gc.ca/historical_data/search_historic_data_e.html). The following stations were used for this analysis:

* Alma;
* Aroostook;
* Bathurst;
* Bouctouche;
* Causapscal;
* Charlo;
* Edmundston;
* Fredericton;
* Gagetown;
* Grand Manan;
* Juniper;
* Kouchibouguac;
* Lyons Brook;
* Mactaquac;
* Miramichi;
* Miscou Island;
* Moncton;
* Nappan;
* Riviere Bleue;
* Saint John;
* St. Leonard;
* St. Stephen;
* Summerside;
* Sussex; and
* Woodstock

In cases where weather stations had been relocated in the same area, the newest position was used as the location and the data combined to arrive at the values.

## Formula

The values for Growing Degree Days at each site were calculated for each year based upon the formula

Where

,

,

Note that the summation was calculated over the entire year rather than just over the spring and summer seasons.

The values were than averaged to arrive at the 30-year average for Growing Degree Days for each station. Values were then derived for the entire province using a [regularized spline](http://pro.arcgis.com/en/pro-app/tool-reference/3d-analyst/how-spline-works.htm). These values were than classified into the following groups:

|  |  |
| --- | --- |
| Growing Degree Days | Value |
| < 1600 | 1 (Red) |
| ≥ 1600, < 1800 | 3 (Yellow) |
| ≥ 1800 | 5 (Green) |

# Slope

The percent slope was calculated from the Province of New Brunswick 10 metre digital elevation model and classified based on the following criteria:

|  |  |
| --- | --- |
| Percent Slope | Value |
| ≤ 2% | 5 (Green) |
| > 2%, ≤ 5% | 3 (Yellow) |
| ≤ 9% | 1 (Red) |
| > 9% | Land unusable |

# Depth to Water Table

Depth to water table was used as a measure of the drainage of the soil within an area. The depth is the measured depth to the water table at the end of summer. The data was classified as follows:

|  |  |
| --- | --- |
| Depth to Water Table | Value |
| ≤ 10 cm | Unusable wetland |
| > 10 cm, ≤ 25 cm | 1 (Red) |
| > 25 cm, ≤ 50 cm | 3 (Yellow) |
| > 50 cm | 5 (Green) |

This data was supplied to AAF as part of the research carried out by Dr. Paul Arp and Jae Ogilvie of the University of New Brunswick in 2010. Please contact them for more information about this data.

# Chance of Frost After May 25

The chance of frost after May 25 was determined by first finding the latest date in the spring where the lowest temperature is below 0°C in the datasets described in the section on [Growing Degree Days](#_Data_Source) section. These dates were than averaged and the standard deviation over the 30 year period of the data to arrive at an average date for each weather station. The percentage chance was then computed from the Normal distribution to arrive at the percentage chance of frost occurring on or after May 25th in a given year. The data was then interpolated over the entire province using [Inverse Distance Weighting](http://pro.arcgis.com/en/pro-app/help/analysis/geostatistical-analyst/how-inverse-distance-weighted-interpolation-works.htm) to arrive at measure of the risk of frost for the entire province of New Brunswick.

The data was then classified based upon the following criteria:

|  |  |
| --- | --- |
| Chance of Frost | Value |
| > 30% | 1 (Red) |
| > 15%, ≤ 30% | 3 (Yellow) |
| ≤ 15% | 5 (Green) |

# Final Analysis

The categorized values from the previous sections were then combined to arrive at a final classification of sites via the formula

Where

The resultant values were than classified based upon the following criteria:

|  |  |
| --- | --- |
| Value | Classification |
| < 7 | Poor (Red) |
| ≥ 7, < 20.5 | Fair (Yellow) |
| ≥ 20.5 | Good (Green) |

Finally, the following areas were removed from the results because the land would not be available for agriculture under any circumstance:

* National and Provincial Parks;
* Protected Natural Areas;
* Military Bases;
* Federal Land; and
* First Nations Communities.