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# Potential Distribution and Severity of Clubroot in western Canada

**T.K. Turkington, O.O. Olfert, R. Weiss, H. Klein-Gebbinck, D. Kriticos, R. Kutcher, K.C. Falk, and S.E.S. Strelkov**

Canada

# *Acknowledgements*


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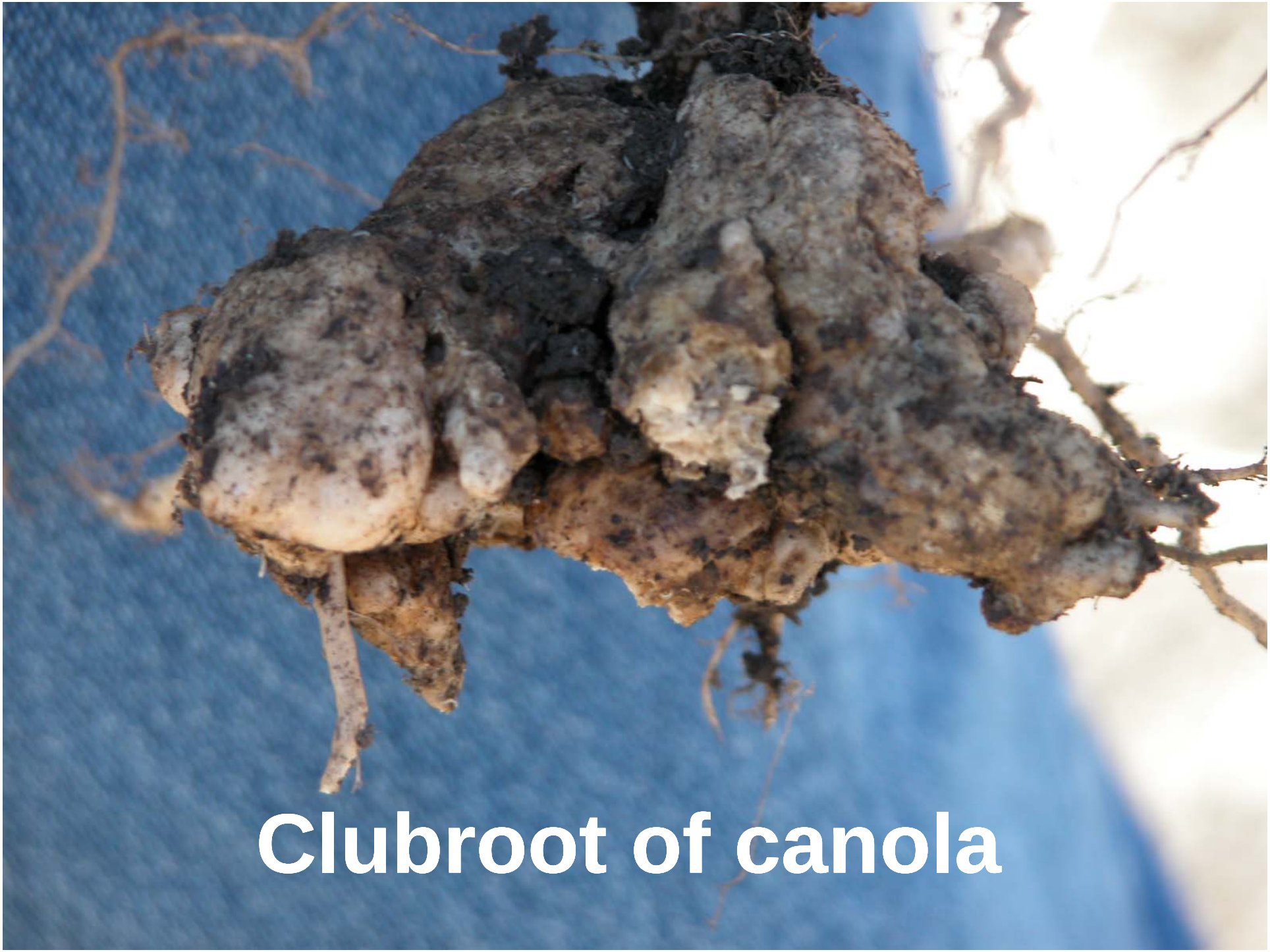


# Clubroot of canola

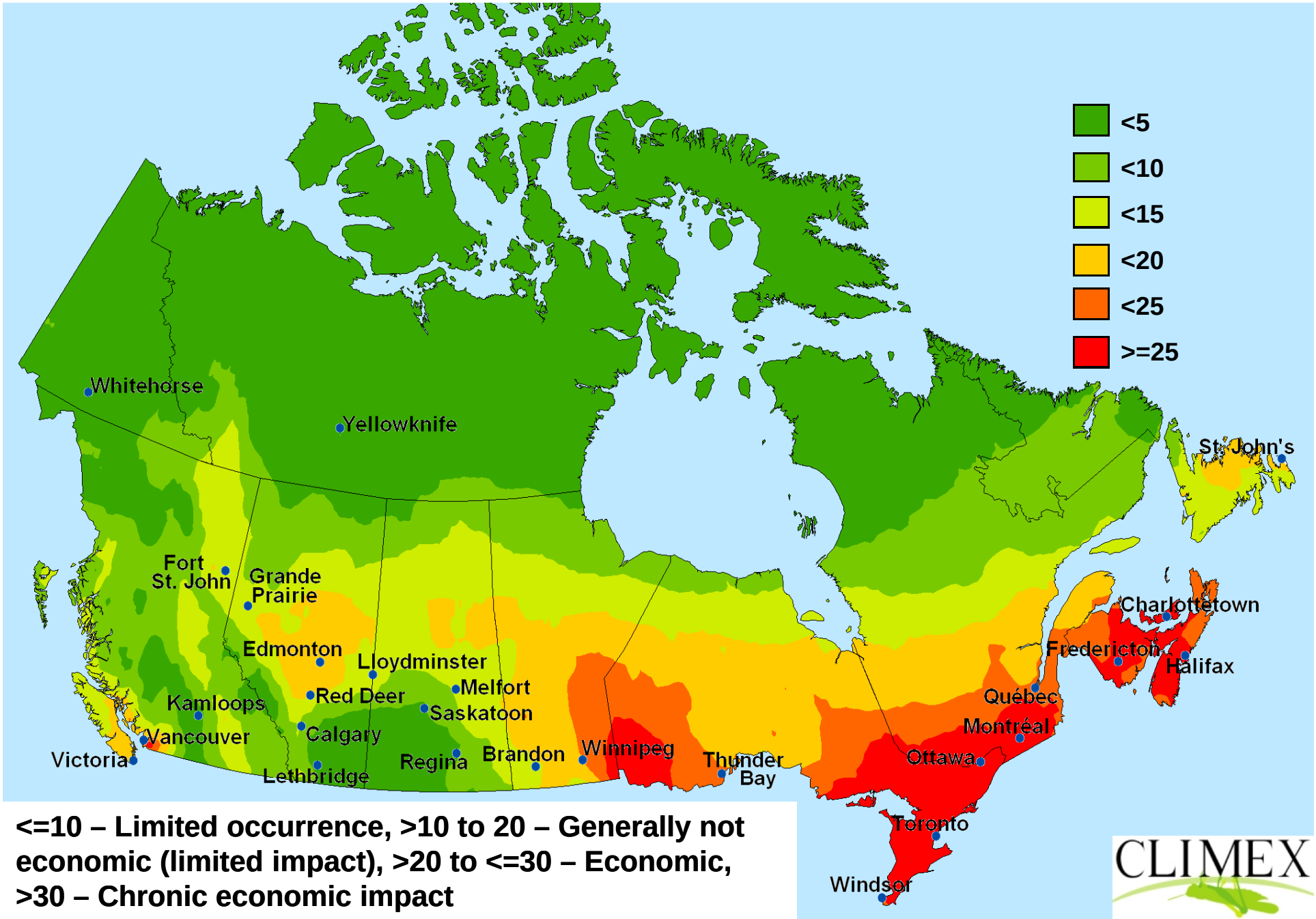
# CLIMEX™, Sutherst et al. (1999)

- **Computer simulation program**
  - **Used to estimate potential distribution and abundance of pest species**
    - **Based on climate**
  - **Inferential approach to forecasting**
  - **Applied to different biological entities**
    - **Select values for parameters that describe pest species response to**
      - **Temperature, moisture, and light**

# CLIMEX™, Sutherst et al. (1999)

- **Growth and stress indices calculated**
  - **E.g. weekly responses to temperature and moisture**
  - **Growth indices indicate potential for growing season development**
  - **Stress indices typically reflect the impact of overwintering stress on survival**
- **Annual ecoclimatic index derived from growth and stress indices**
  - **Provides measure of favourableness of location**

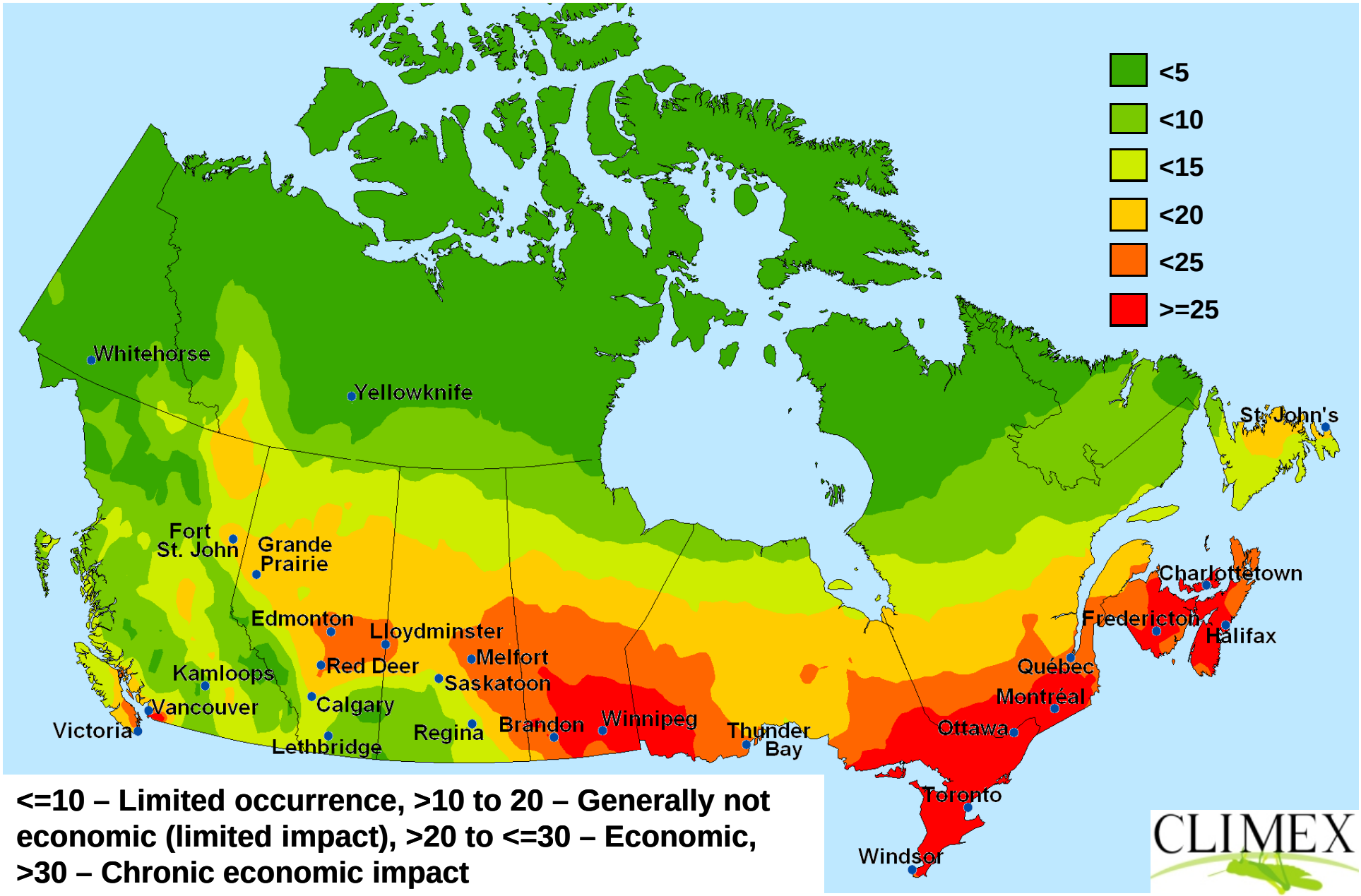
# Ecoclimatic Index Values: Dryland Clubroot Threat Scenario




**<=10 – Limited occurrence, >10 to 20 – Generally not economic (limited impact), >20 to <=30 – Economic, >30 – Chronic economic impact**

CLIMEX

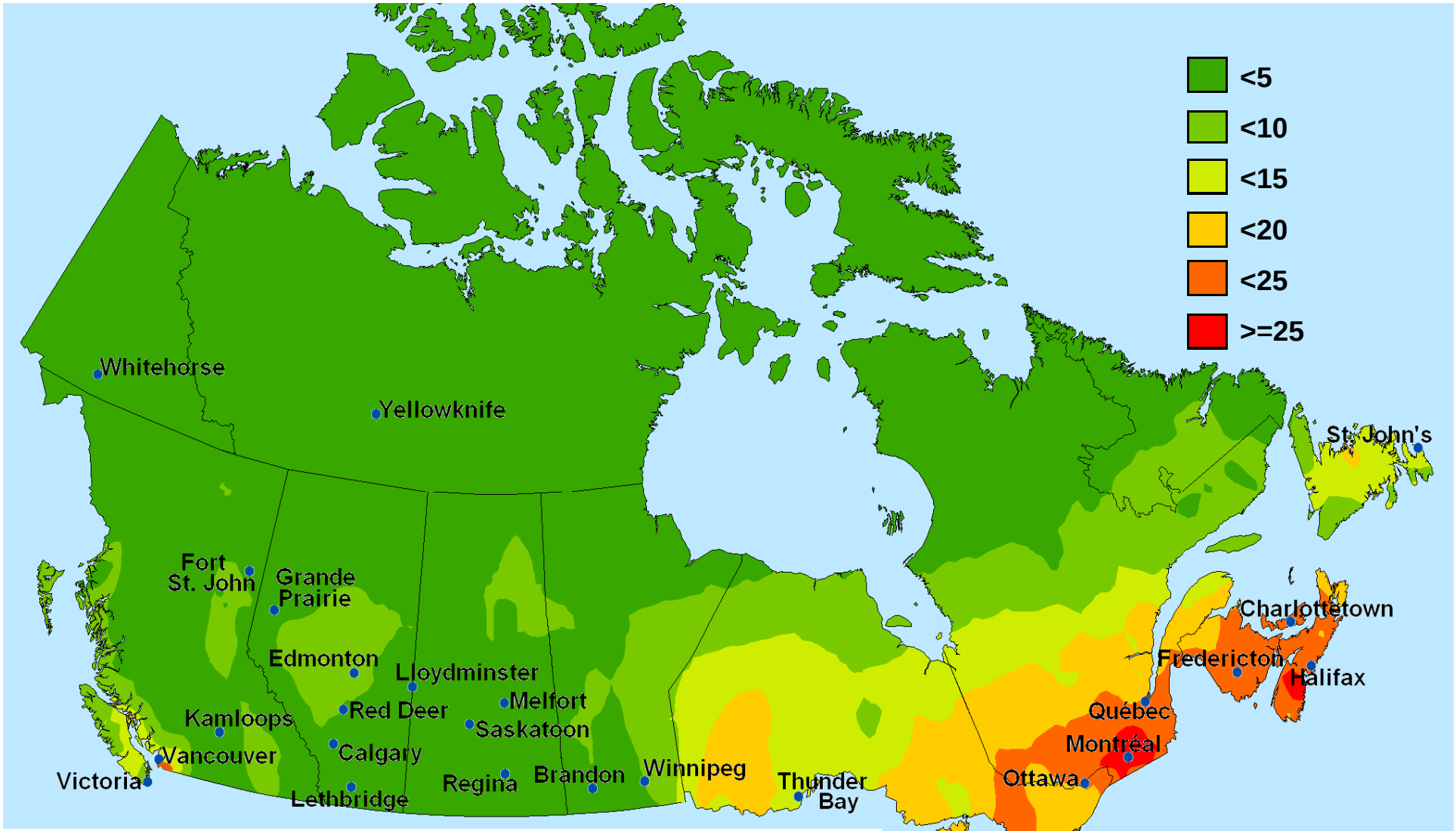
# Ecoclimatic Index Values: Dryland Clubroot Threat Scenario, 30% increase in Summer Rainfall




**<=10 – Limited occurrence, >10 to 20 – Generally not economic (limited impact), >20 to <=30 – Economic, >30 – Chronic economic impact**

CLIMEX

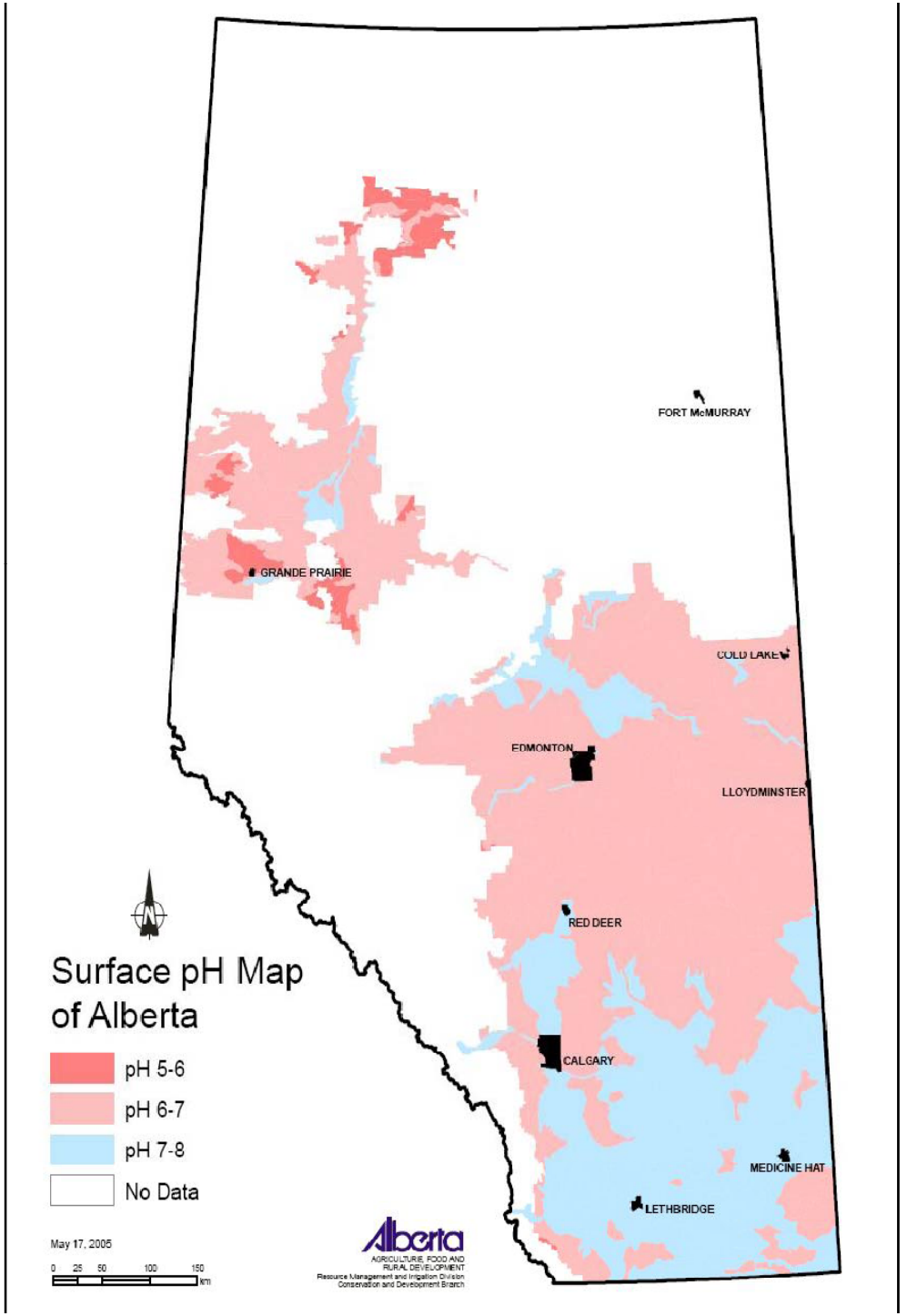
# Ecoclimatic Index Values: Dryland Clubroot Threat Scenario, 30% Decrease in Summer Rainfall

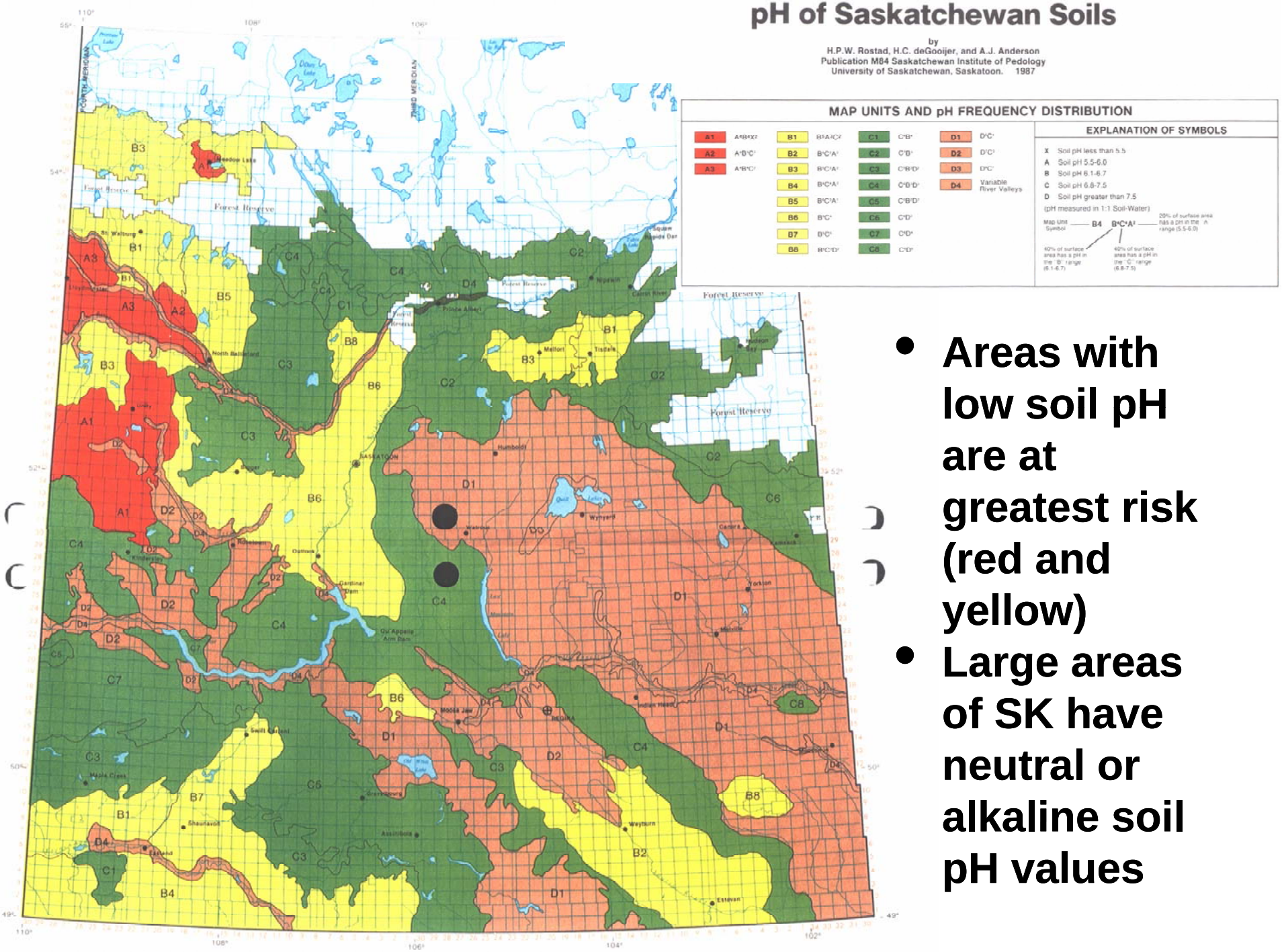



**<=10 – Limited occurrence, >10 to 20 – Generally not economic (limited impact), >20 to <=30 – Economic, >30 – Chronic economic impact**

CLIMEX

- **Areas with low soil pH are at greatest risk**
- **Large areas of central Alberta and the Peace Region have acidic (pH <7) soils**

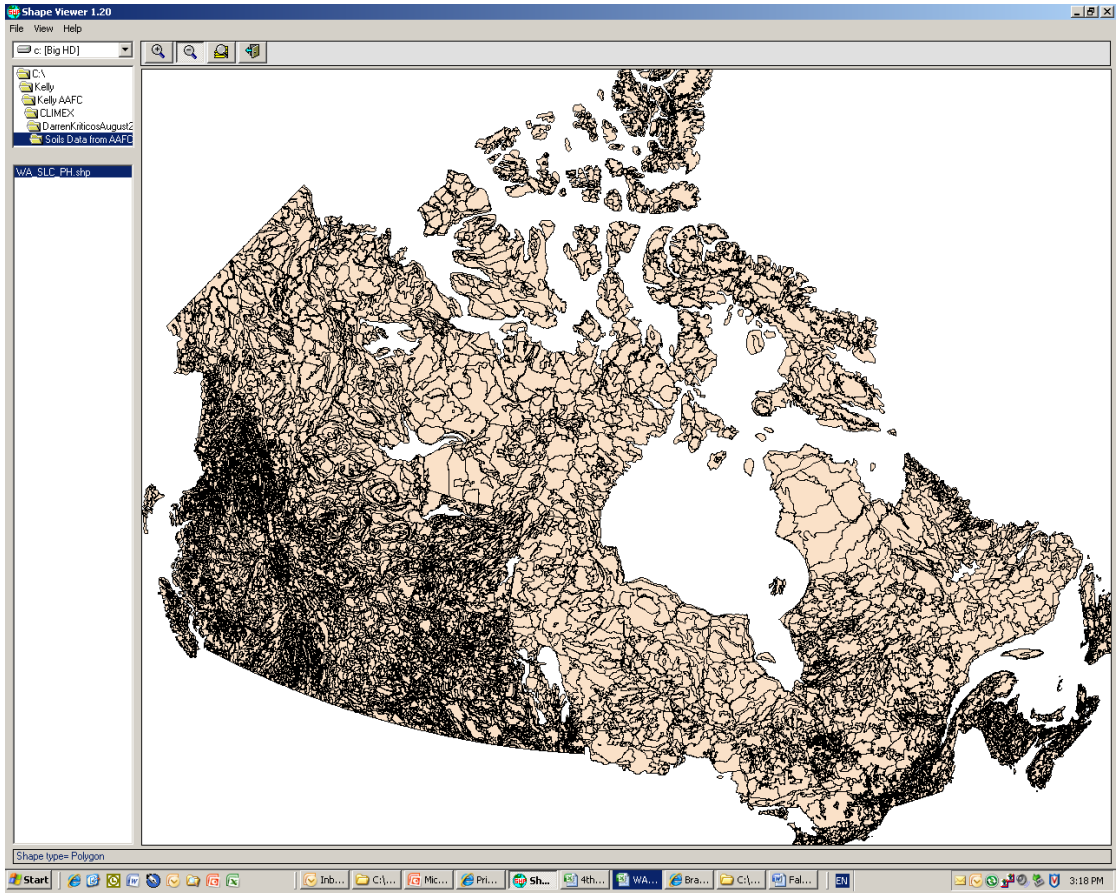





- **Areas with low soil pH are at greatest risk (red and yellow)**
- **Large areas of SK have neutral or alkaline soil pH values**

# Soil texture and pH data is now available from Xiaoyuan Geng Canadian Soil Information System (CanSIS)

- **Large data sets for soil texture and pH are being evaluated for use as part of CLIMEX-based forecasts**



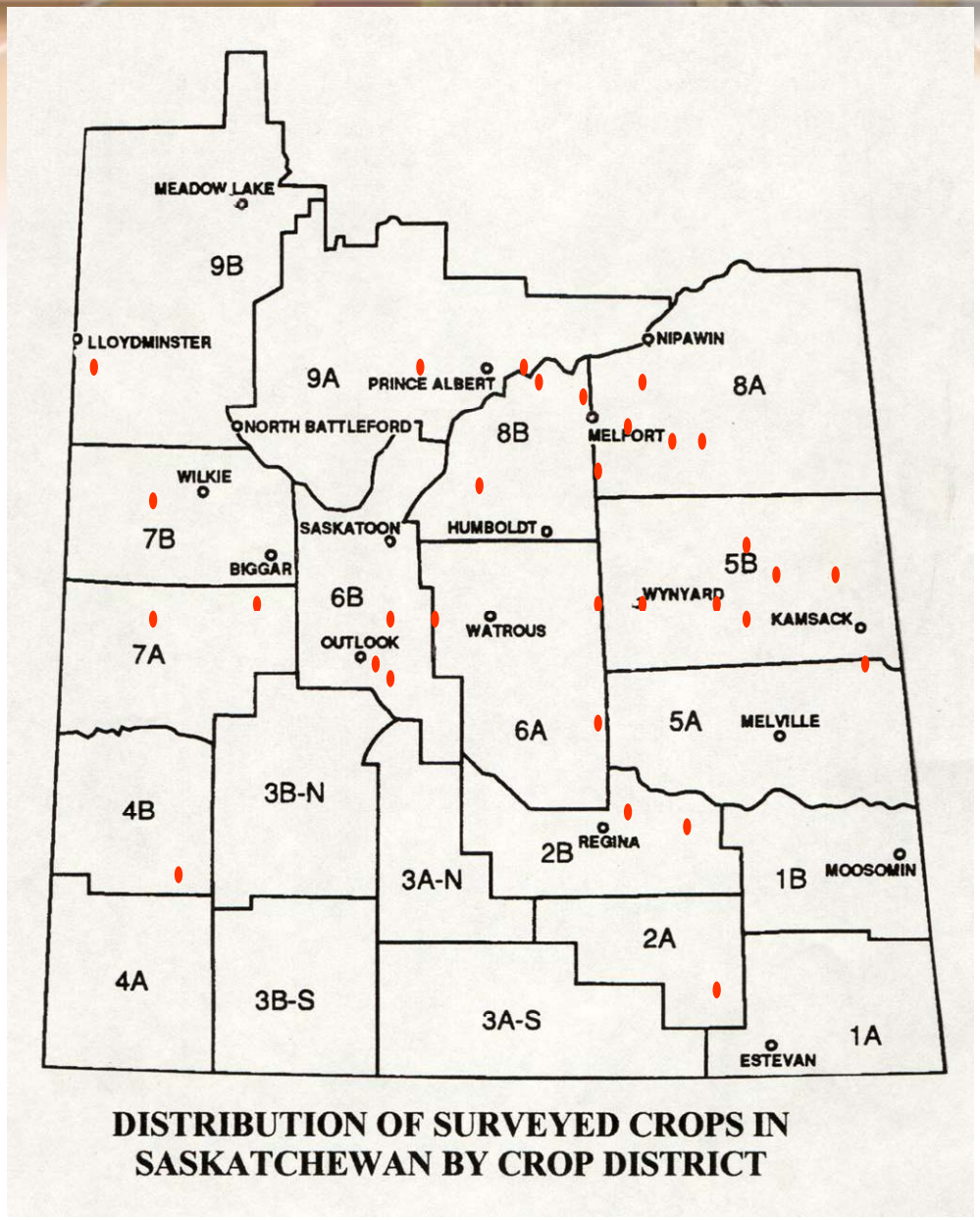
# DYMEX ® - Henry Klein-Gebbinck


- **Literature review still in progress**
  - **Evaluate information that may be used to develop equations**
- **A tentative modeling approach is being considered**
  - **In DYMEX®, roots and inocula will be modeled**
    - **The model will be concerned with total root hairs, susceptible root hairs, infectious roots giving rise to secondary zoospores,**
    - **A second component will be modeled for infection of main roots by the secondary zoospores**

# Clubroot survey initiated in SK in 2008

- **Annual survey of canola diseases in the province for many years – through volunteers. Usually ~100 fields.**
- **In 2006-2007 increased detection in AB.**
- **Funds provided by SaskCanola (formerly SCDC) through the Canola Council to pay for diagnostic analysis of 30 samples collected during the annual canola survey in SK in 2008.**
- **Soils samples analysed for the presence of the pathogen using a PCR test to detect the presence of pathogen (DNA) in the lab of Stephen Strelkov.**

# Saskatchewan fields surveyed for clubroot in 2008 (diagnositic test of soil for the pathogen)



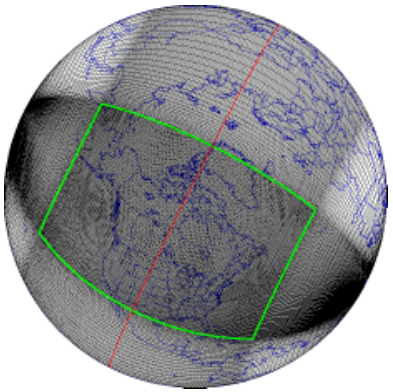

**DISTRIBUTION OF SURVEYED CROPS IN SASKATCHEWAN BY CROP DISTRICT**

# Clubroot suspected at one Manitoba location

# Boots and bleach

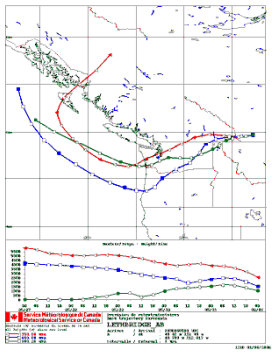
# Soil particle movement: Wind events

- **Three-altitude trajectory models (prognostic numerical model GEM [Global Environmental Model]) are used**
  - **Previously used to forecast movement of diamondback moth into western Canada**
  - **Currently, air parcel trajectories are being constructed from wind fields at discrete intervals and solved numerically**
  - **The trajectories utilize wind fields of GEM**
    - **Horizontal resolution of 33 km and 58 vertical levels over North America**

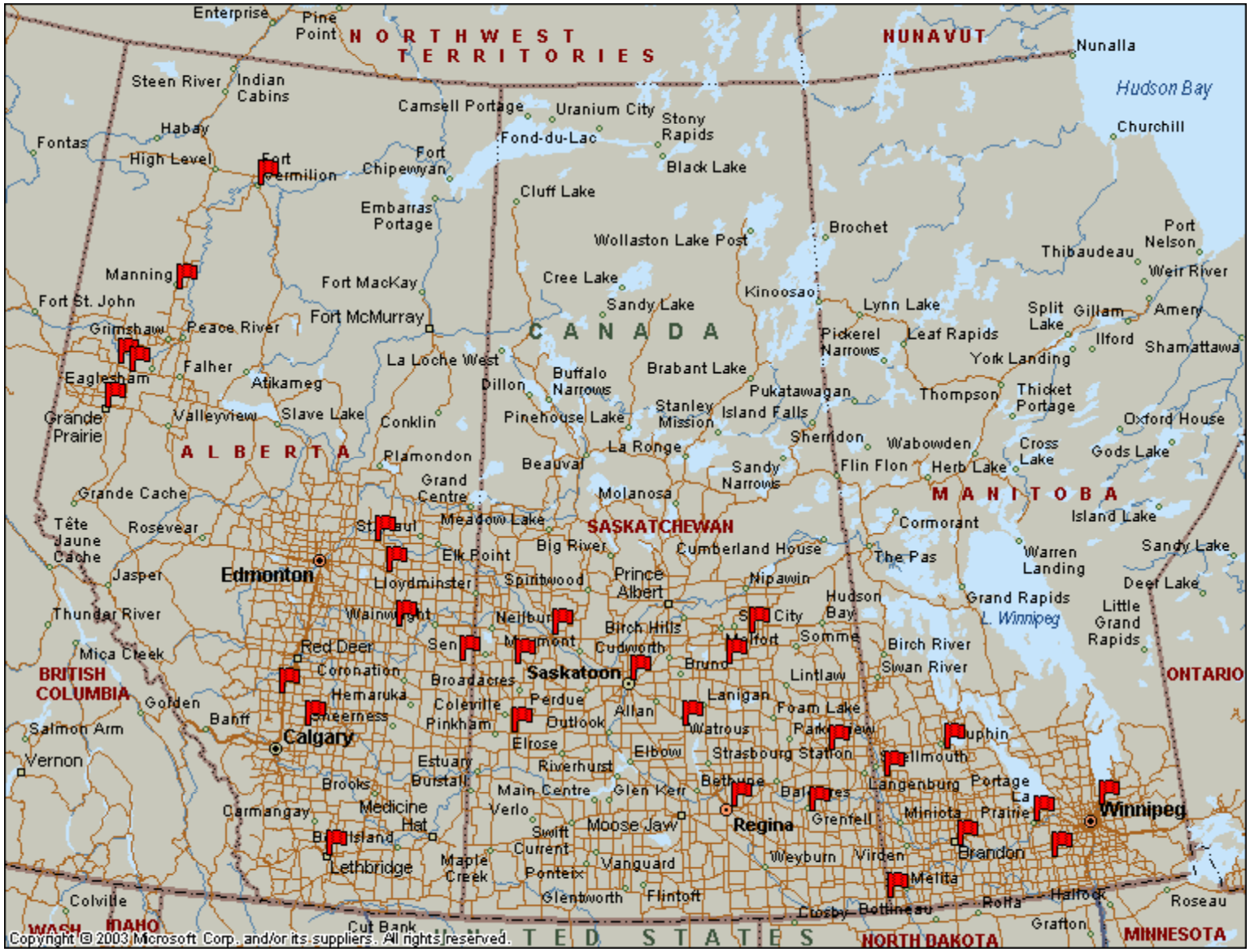


# Soil particle movement: Wind events

- **Three-altitude trajectory was used**
  - **Backward trajectories follow a five day time frame backward in time**
    - **For air parcels moving over specific at risk locations in western Canada**
    - **Potential wind events that may carry soil particles (dust) from clubroot source areas in the Edmonton area of Alberta**
- **Backward trajectories forecast where air parcels have come from**
  - **For specific at risk locations in western Canada**



# Reverse trajectory locations



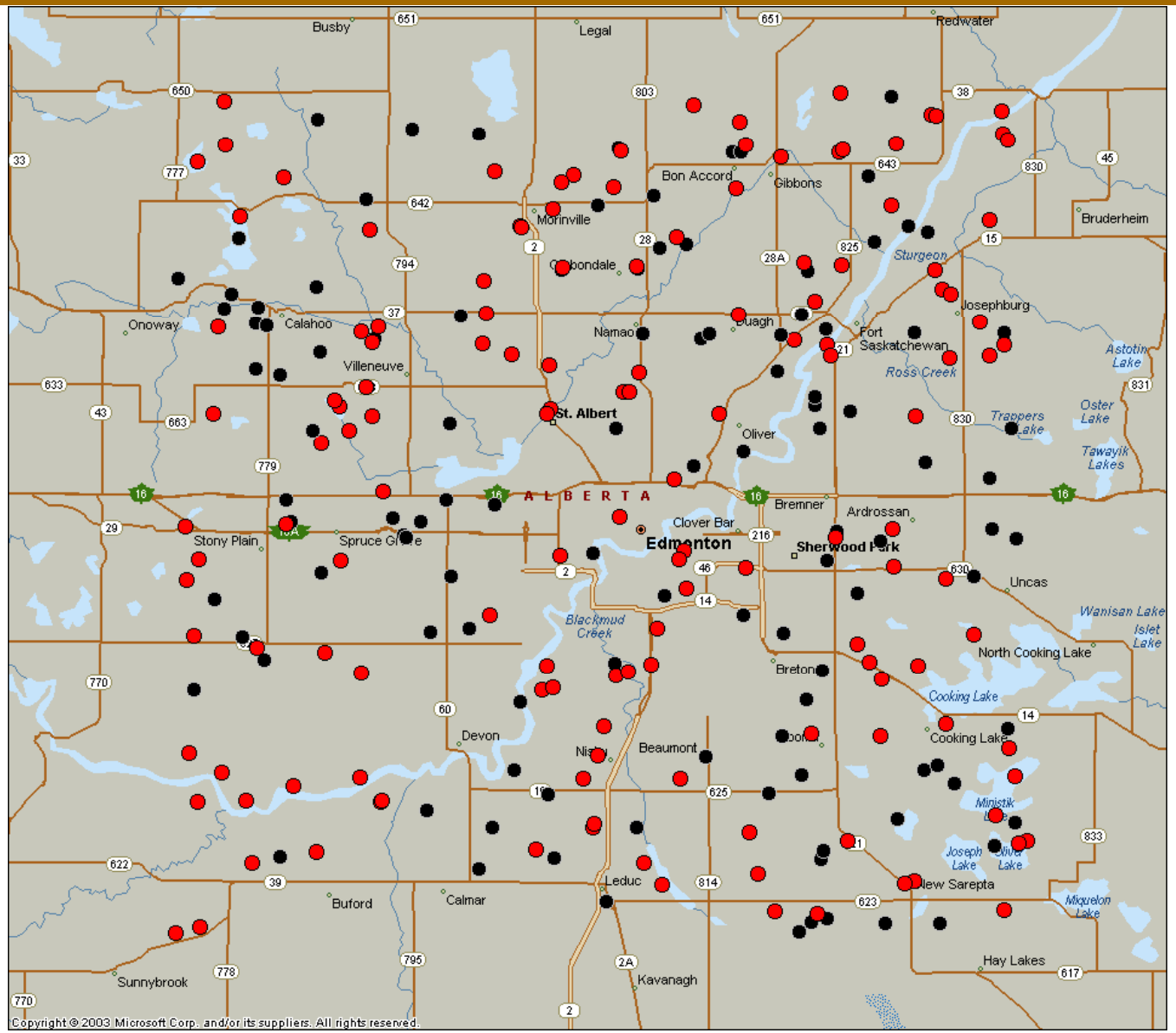
# Origin of wind trajectories (250, 500 and 750 m AGL) that passed over reverse trajectory locations in AB, SK, and MB from April to August, 2007 and 2008

**2008 (189)** ●

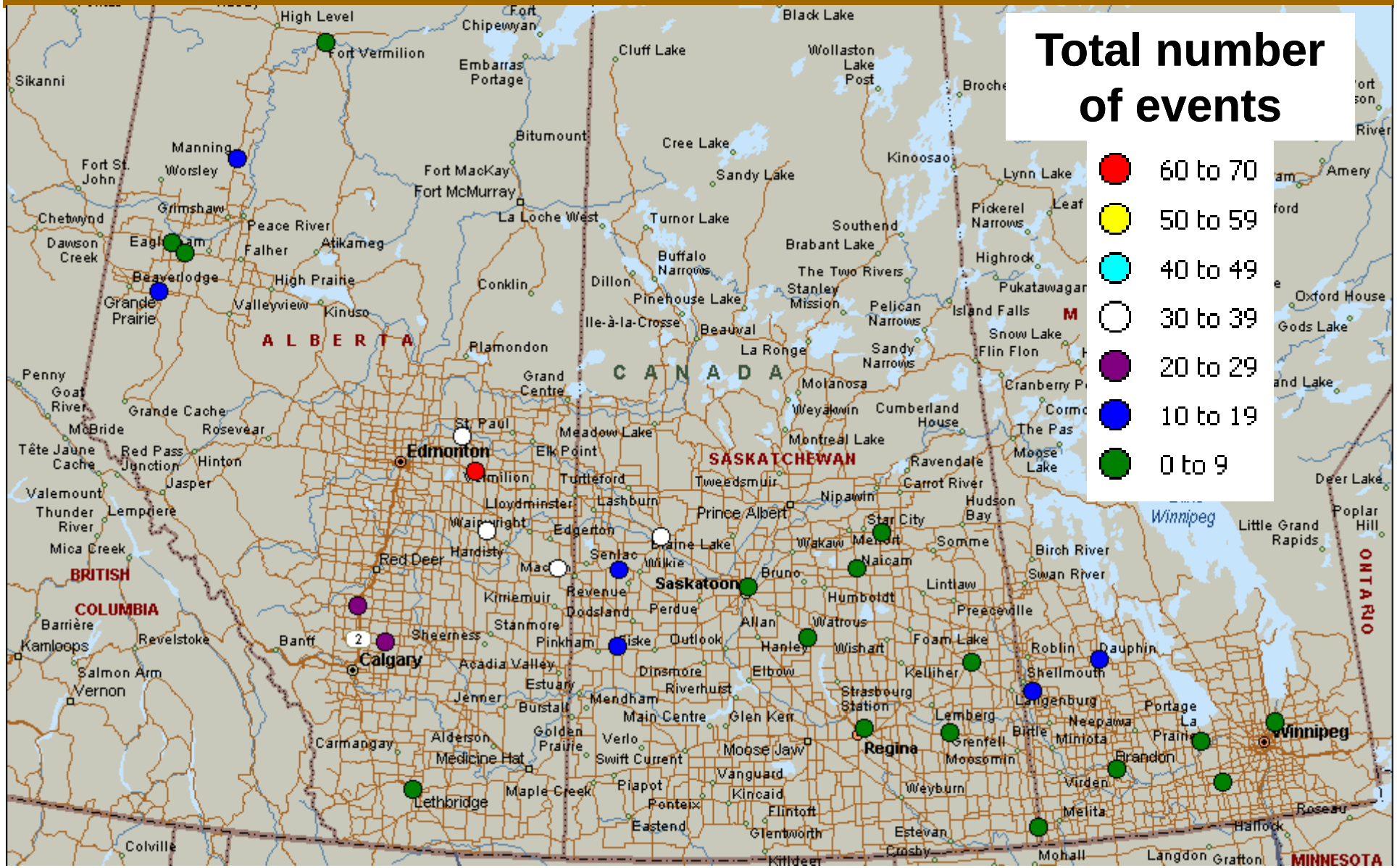
May and June only - 68

**2007 (146)** ●

May and June only - 55



# Total number of events (250, 500, and 750 m AGL) that originated in the Edmonton area for reverse trajectory locations in AB, SK, and MB from April to August, 2007 and 2008

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