



Agriculture and  
Agri-Food Canada

Agriculture et  
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# Drought Monitoring in Canada - The Canadian Drought Monitor -

**Trevor Hadwen**

**National Agroclimate Information Service  
Agriculture and Agri-Food Canada, Regina, SK.**

**US Drought Monitor Forum,  
West Palm Beach, Florida, April 16-18, 2013**

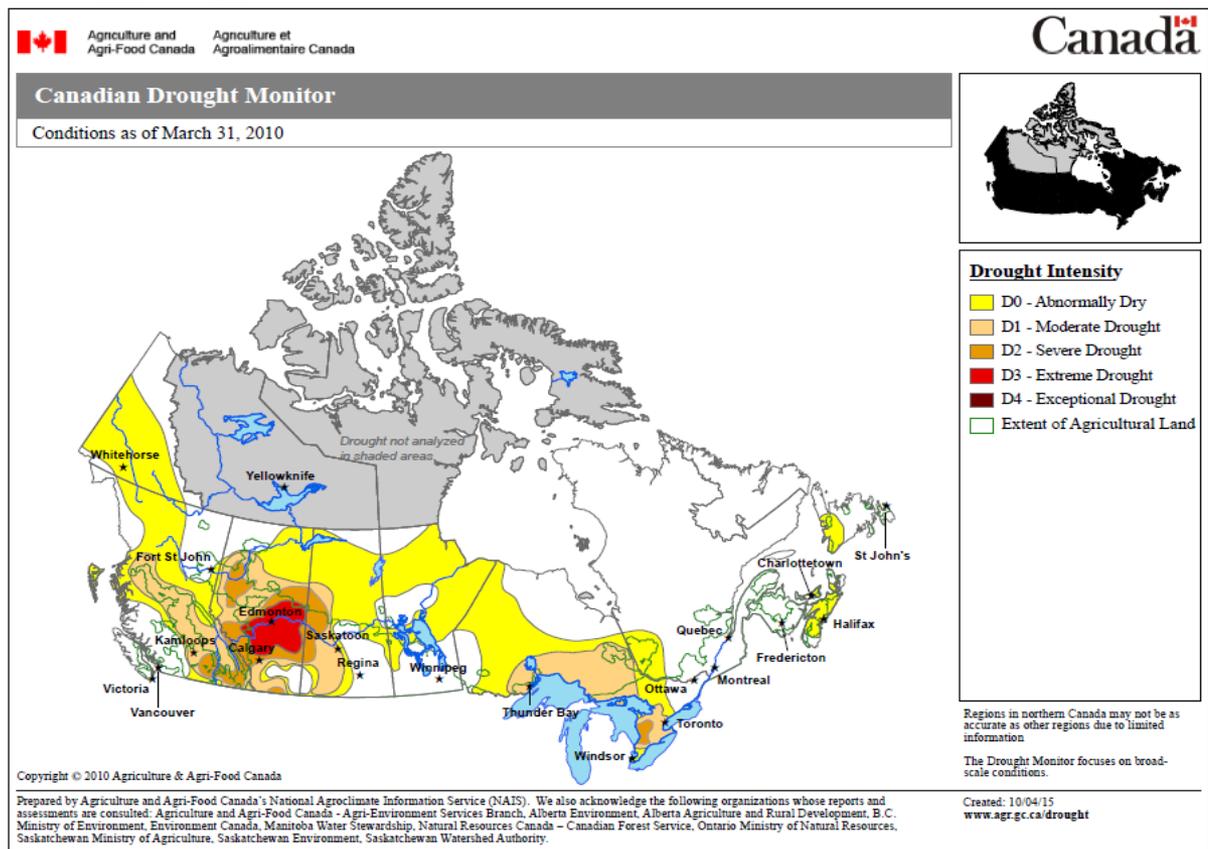
**Canada**

# Presentation Overview

- Monitoring drought in Canada
  - The Canadian Drought Monitor
- Current activities to enhance Canada's monitoring ability
  - Data integration
  - CoCoRaHS expansion into Canada
  - Development of flexible percentiles
  - Blended Indicator development for Canada
  - Developing indicators for forested regions
  - VegDRI pilot project for southern Canada.
  - **Impact reporting (Agroclimate Impact Reporter)**
- North American Climate Services Partnership (NACSP)

# The Canadian Drought Monitor

In 2009, after being involved with the NADM for close to 10 years, the National Agroclimate Information Service experimented with the development of a Canadian Drought Monitor in conjunction to our work with the NADM as a proof of concept.



The Assessment of the CanDM and the Canadian portion of the NADM are essentially the same.

# Canadian Drought Monitor

## The Goals of the Can-DM were to:

- Allow AAFC to continue to report on Canadian specific drought concerns while still maintaining the Drought Monitor concepts and process,
- Provided the opportunity to introduce the drought monitor concept to a Canadian audience; increasing the use and exposure of the monitors,
- Allow AAFC to produce detailed information packages targeted to Canada with a emphasis on the Agriculture

**Canadian Drought Monitor (Can-DM)**

Conditions as of September 30, 2011

Released: October 31, 2011

**Overview**

This report is produced by the National Agroclimate Information Service of Agriculture and Agri-Food Canada. The Canadian Drought Monitor is a cooperative effort among federal, provincial, and non-governmental agencies to provide a monthly assessment of drought conditions throughout Canada. The Canadian Drought Monitor (Can-DM) is also used as input into the continental North American Drought Monitor (NA-DM).

Canada

September 30, 2011 - Canadian Drought Monitor

**Drought Assessment - September 30, 2011**

**Highlights**

- September brought above normal temperatures to nearly every region of Canada. Above normal temperatures combined with little rainfall in western Canada kept annual harvest progressing, but also brought on concerns for drought. Abnormally dry regions remained throughout the Prairie Provinces and drought intensified in southern Manitoba and northern Ontario. There were no concerns for dry conditions in Quebec and Atlantic Canada, where a series of post-tropical storms brought high winds and heavy rainfall.
- In Manitoba, the July to September period made for one of the driest summers on record, with above average temperatures of nearly 2 degrees and precipitation deficits up to 130mm in some regions, resulting in an expansion of the D1 (Severe Drought) designation in the southern portion.
- The prairie provinces experienced an increased number of Abnormally Dry (D0) regions, particularly in southern Alberta and British Columbia, as rainfall was generally less than 75% of average across the agricultural regions. Vancouver Island experienced less than 75% of normal rainfall over the past four months, and remained in the D0 class.
- Northwest and northeast Ontario had a continuation of dry conditions, with fire bans in place and lake levels below their respective averages. The Thunder Bay region was classified as D1 once more, as October is the one recorded case of low range precipitation since April. Conditions in southern Ontario improved due to rainfall events and reversed the abnormally dry designation.

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September 30, 2011 - Canadian Drought Monitor

**Analysis & Trend - Analyzed Area**

Percent of Analyzed Area: Current Month

Percent of Analyzed Area: Previous Month

Percent of Analyzed Area: Historical

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	0	0
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1996	0	0	0	0	0	0	0	0	0	0	0	0
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1983	0	0	0	0	0	0	0	0	0	0	0	0
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1981	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0

**Analysis & Trend - Agricultural Area**

Percent of Agricultural Area in Canada

Percent of Farms

Percent of Cattle

Percent of Agricultural Area in Ontario

Percent of Farms

Percent of Cattle

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0
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1990	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0	0	0	0	0
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1983	0	0	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	0	0	0	0	0

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September 30, 2011 - Canadian Drought Monitor

**Monthly Narrative**

September brought above normal temperatures to nearly every region of Canada. Above normal temperatures combined with little rainfall in western Canada kept annual harvest progressing, but also brought on concerns for drought. Abnormally dry regions emerged throughout the Prairies and drought strengthened in southern Manitoba and northern Ontario. There were no concerns for dry conditions in Quebec and Atlantic Canada, where a series of post-tropical storms brought high winds and heavy rainfall.

The July to September period made for one of the driest summers on record in southern Manitoba. Dry conditions and above average temperatures throughout September resulted in continuation of Moderate Drought (D1). Over that time precipitation deficits were more than 110 mm (4.3 in) in some areas. The low rainfall and hot temperatures, nearly two degrees above average, were good for harvest and helped mature late seeded crops, but also shut down pasture production and forced cattle losses for the winter earlier than normal. The second crop hay yield was low due to the lack of moisture in August, and pastures were rated poor condition. Cattle producers had to dip into winter feed reserves to make up for the shortfall. Dry conditions also resulted in reduced soybean yields. By month's end soil moisture across southern Manitoba was generally rated as dry to fair.

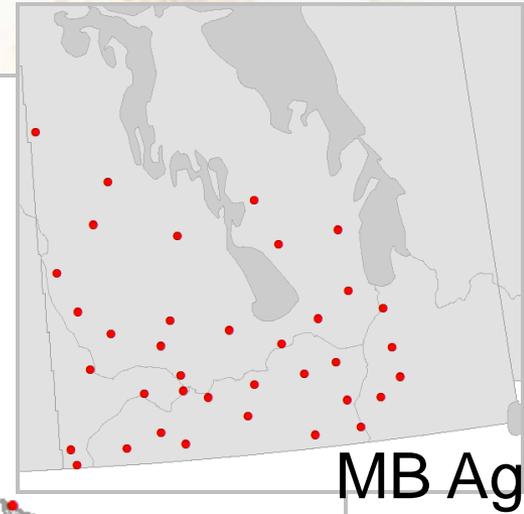
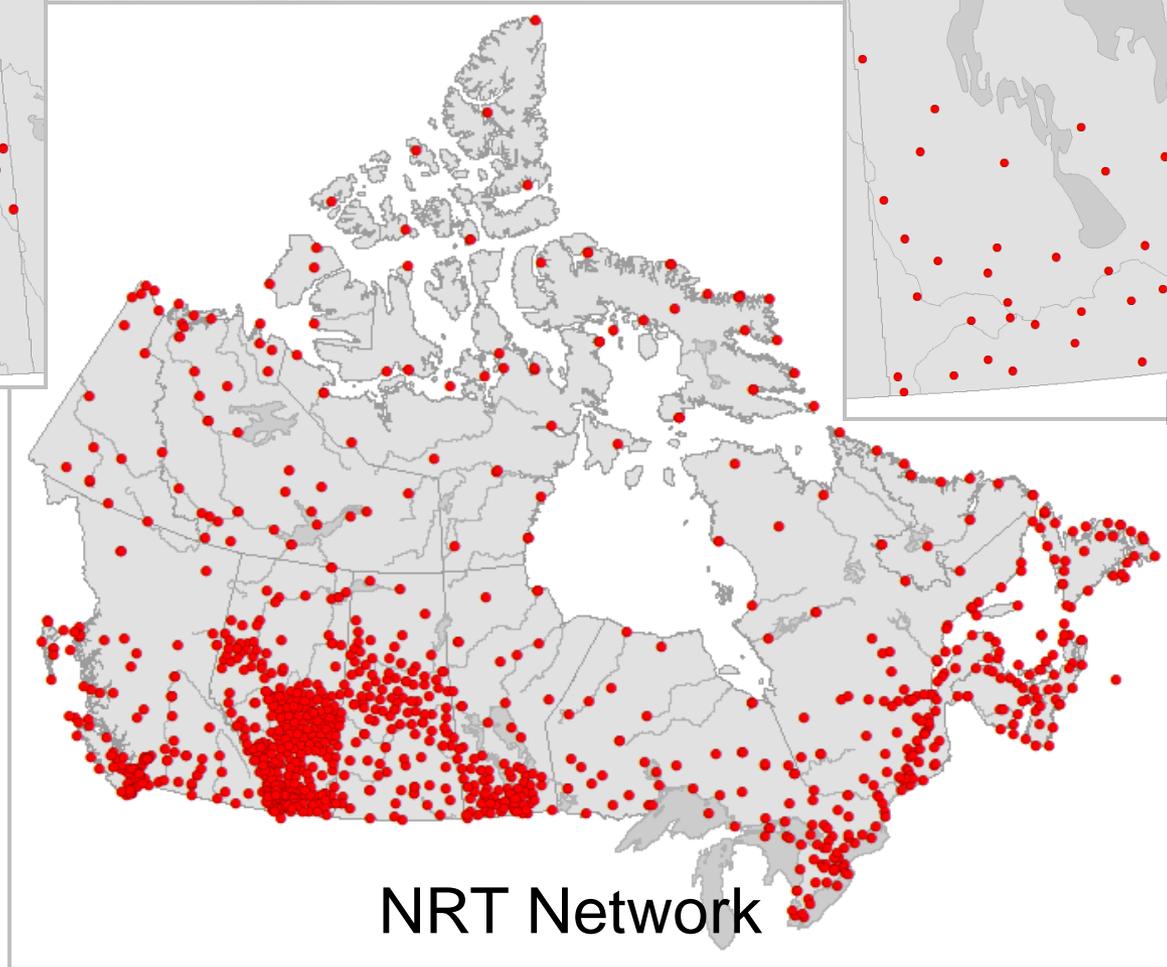
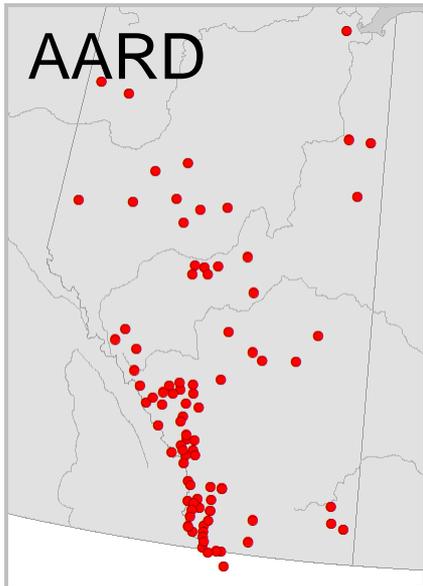
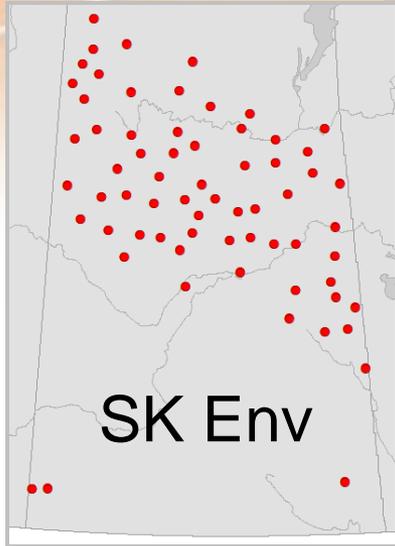
September rainfall was generally less than 50% of average across the agricultural regions of Saskatchewan, Alberta, and British Columbia which resulted in the emergence or expansion of Abnormally Dry (D0) classifications. As in Manitoba, limited rainfall and additional heat in September helped bring annual harvest to a close, but left cropland and pastures short of moisture, particularly in the south-central and western regions of Saskatchewan. Some areas of southern Saskatchewan had the fourth warmest September on record with average temperatures nearly 3°C above average. Southern Alberta also saw limited precipitation, and was designated D0. In British Columbia, parts of the southern interior near the US border and the southern region of Vancouver Island had less than 75% of normal rainfall over the past four months, and remained in the D0 class. Fire bans continued in the central-interior region of British Columbia and parts of the prairie region as well, but no water use restrictions were expected. Stream flows were still average or better throughout the province, and high elevation mountain snow accumulation had begun in some areas.

Dry conditions continued in northwest Ontario, and portions of northeastern Ontario with a large amount of these regions classified D0. Dry conditions contributed to a very busy fire season in northwest Ontario, so far the area burned is over ten times greater than the ten year average, and fire bans remained in place across the northwest. Lake levels on Superior, Michigan and Huron all remained below their respective long-term averages for September. Abnormally dry conditions also continued across northeast Ontario where rainfall was less than 60% of normal over the past three months. In southern Ontario, stream flows ranged around 75% of average up to mid-September. As a result Conservation Authorities maintained low water flow advisories in the region, which included voluntary water use restrictions.

Long-term drought remained in northwest Ontario. Following a few months of improving conditions, the Thunder Bay region was classified D1 once more. Over the past year

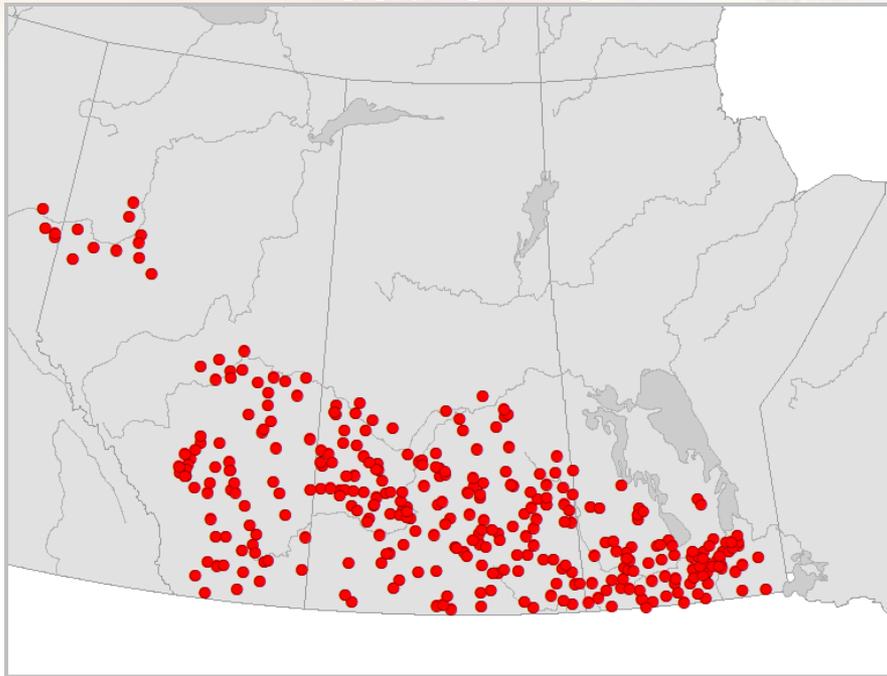
4

# Distribution of Our Real Time Data Network

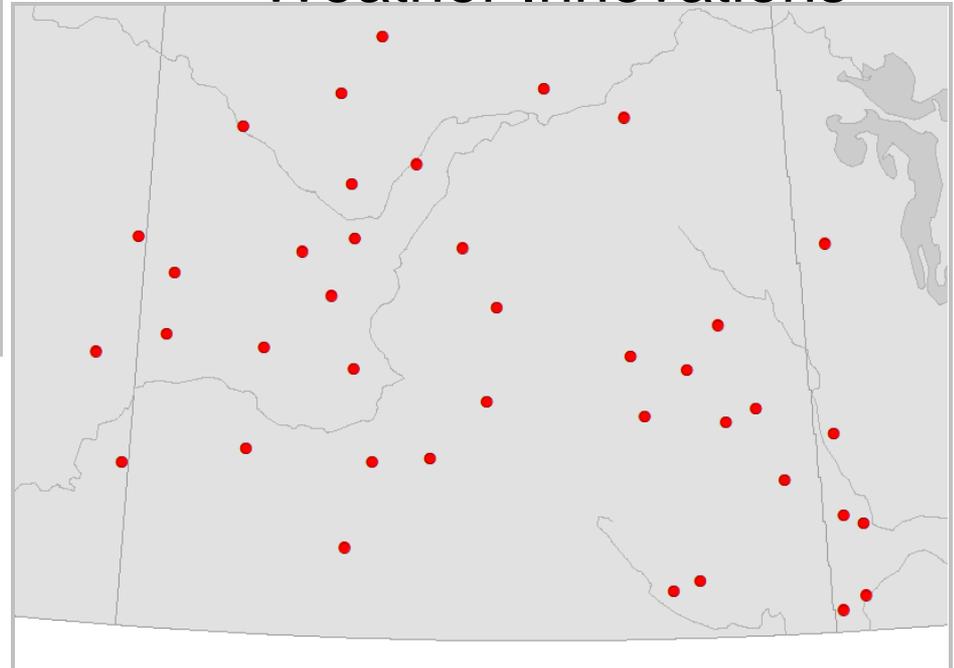


# Exploring Commercially Available Data

Weather Farm



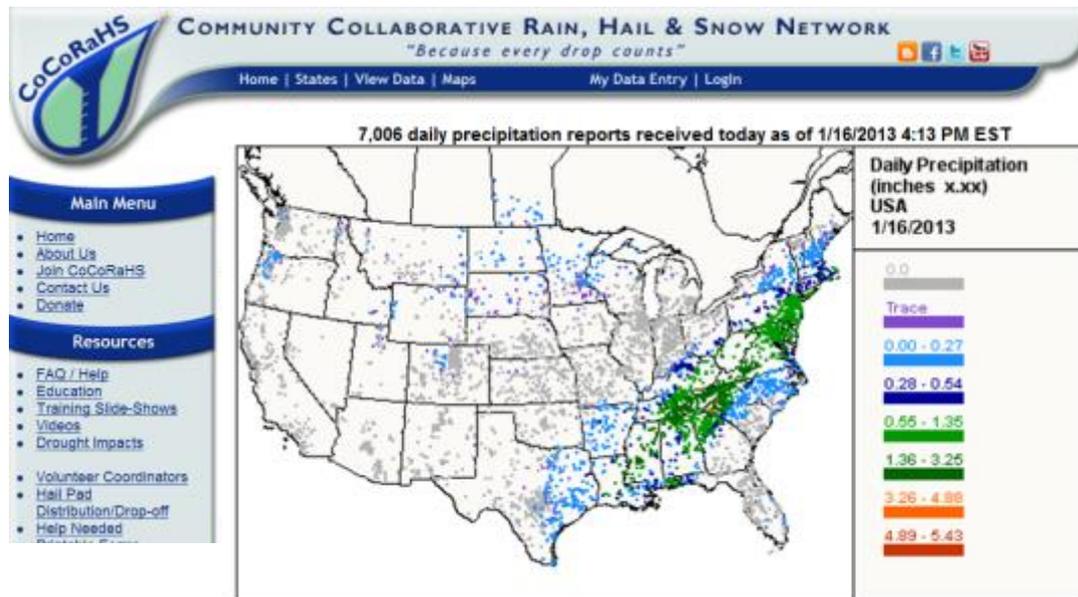
Weather Innovations



# CoCoRaHS Canada ...

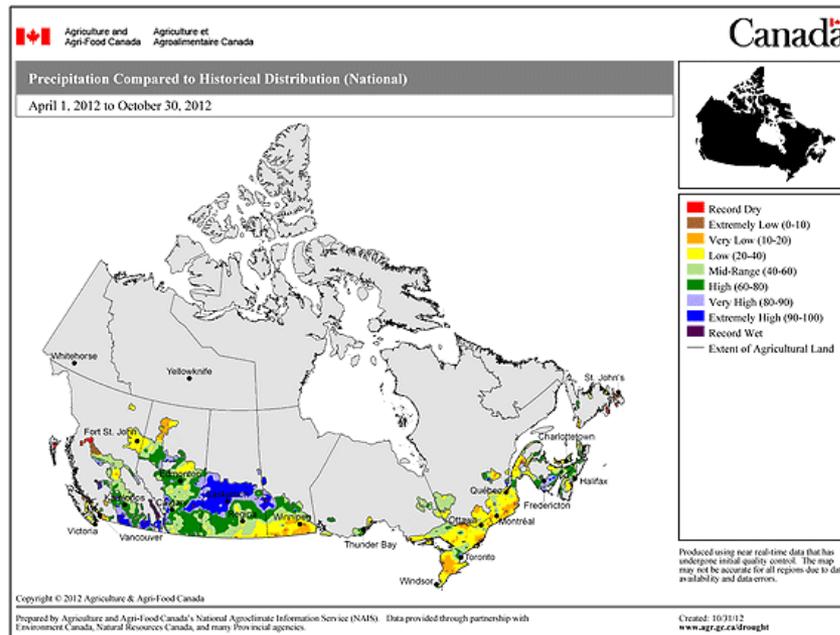
The Community Collaborative Rain, Hail and Snow Network is a international grassroots community based high density precipitation network across the United States, and **now Canada**.

[www.cocorahs.org/](http://www.cocorahs.org/)



# Creating flexible percentile products

- Current Percentiles have fixed start dates based on the three seasons AAFC monitors for -(agricultural year, growing season and winter)
- We Are currently creating the ability to easily create percentile products with flexible start dates,



# Developing Blended Indicators

- Canada is developing Blended Indicators.
- This will allow us to operationally integrate multiple indicators in a weekly or monthly update using a percentile ranking

## Short-Term Blend

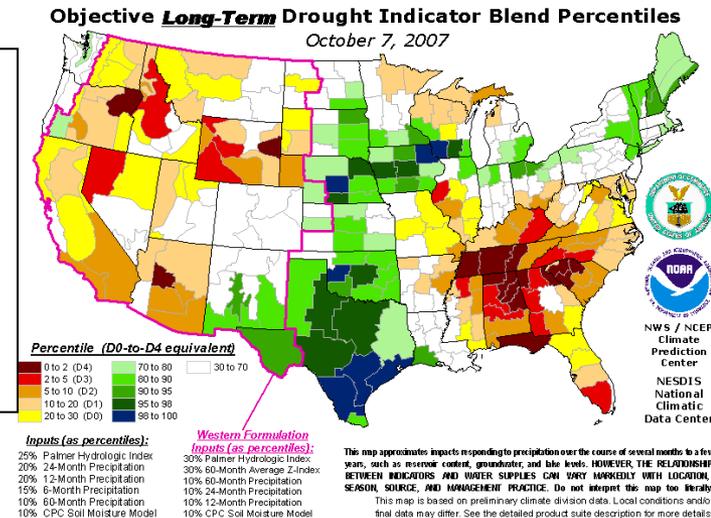
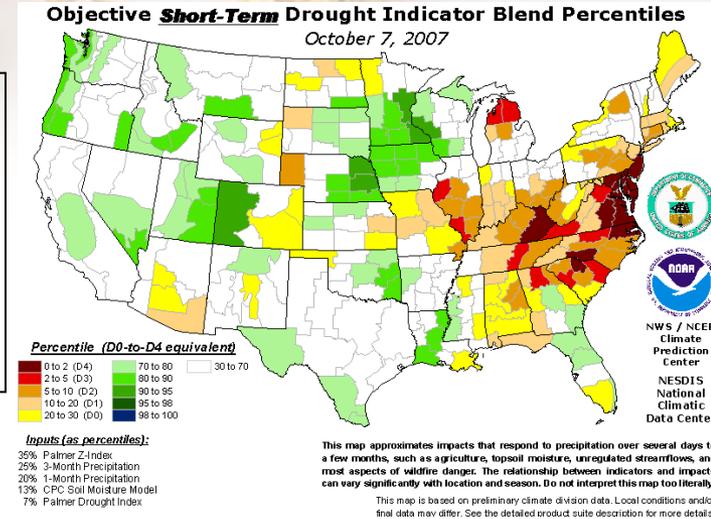
35% Palmer Z Index  
 25% 3-Month Precip.  
 20% 1-Month Precip.  
 13% CPC Soil Model  
 7% Palmer Drought Index



- This is not a easy task:
  - Convert all our data types to percentiles
  - Determine the appropriate blend or more likely blends
  - Data history may be an issue. Would need serially complete data, so could not be computed on station data

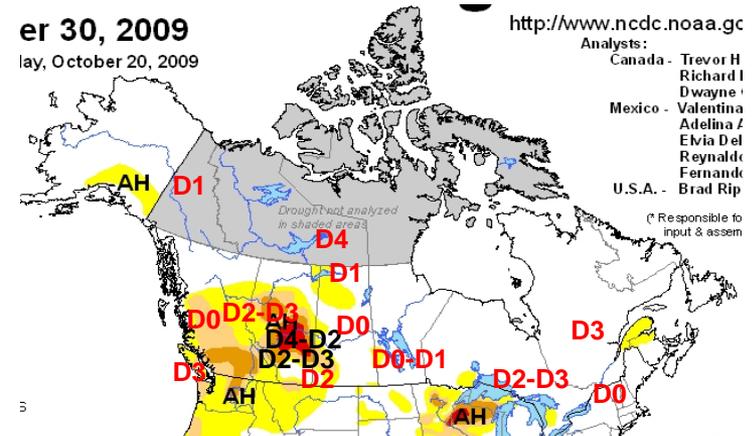
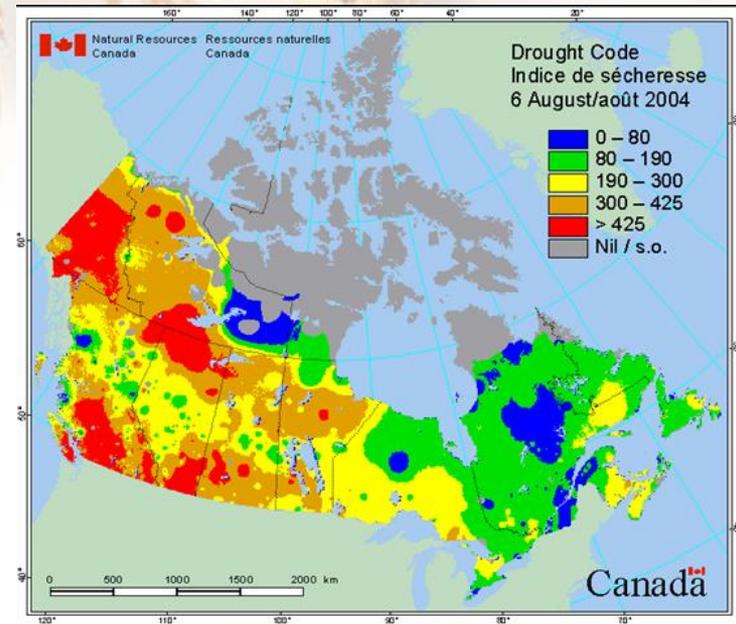
## Long-Term Blend

25% Palmer Hydro. Index  
 20% 24-Month Precip.  
 20% 12-Month Precip.  
 15% 6-Month Precip.  
 10% 60-Month Precip.  
 10% CPC Soil Model

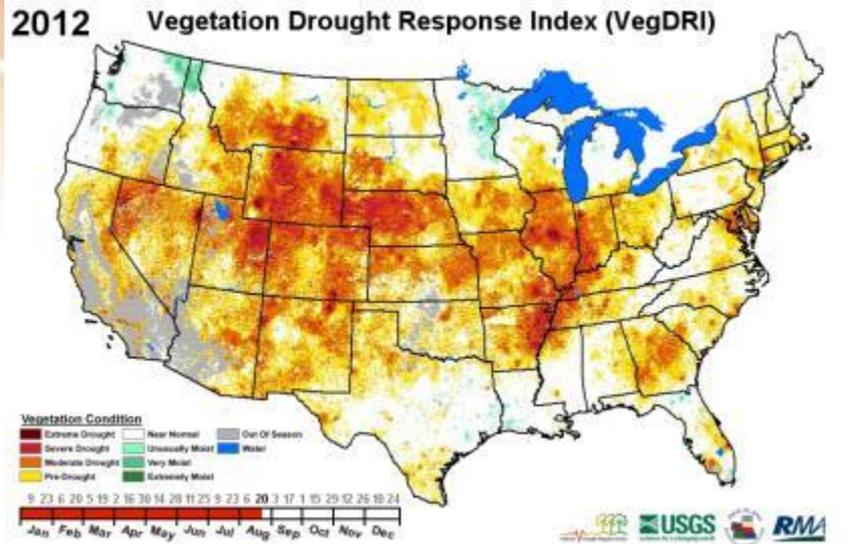


# Developing Indicators for Forested Regions

- The Canadian Forest Service currently uses absolute indicators for drought monitoring specifically for forest fire applications
- Relative indicators are being developed using Climate Moisture Index and the Fire Weather Drought Code (moisture deficit accounting indicator) using our percentile classes

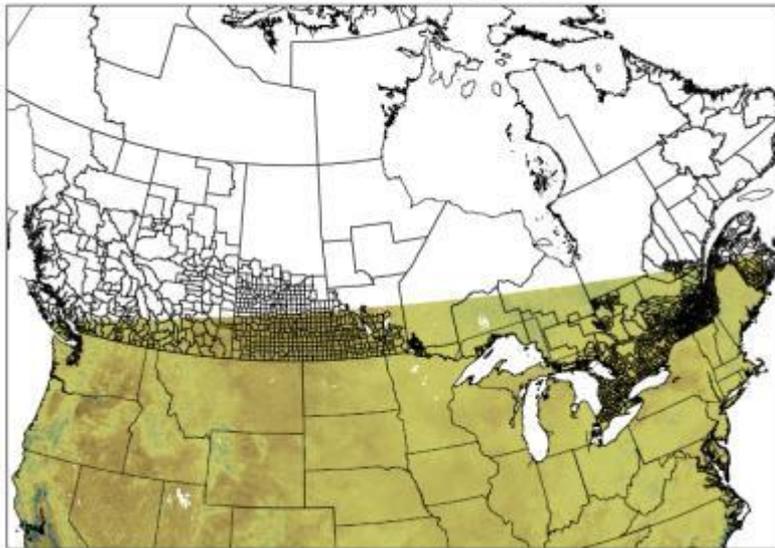


# VegDRI - Canadian Pilot



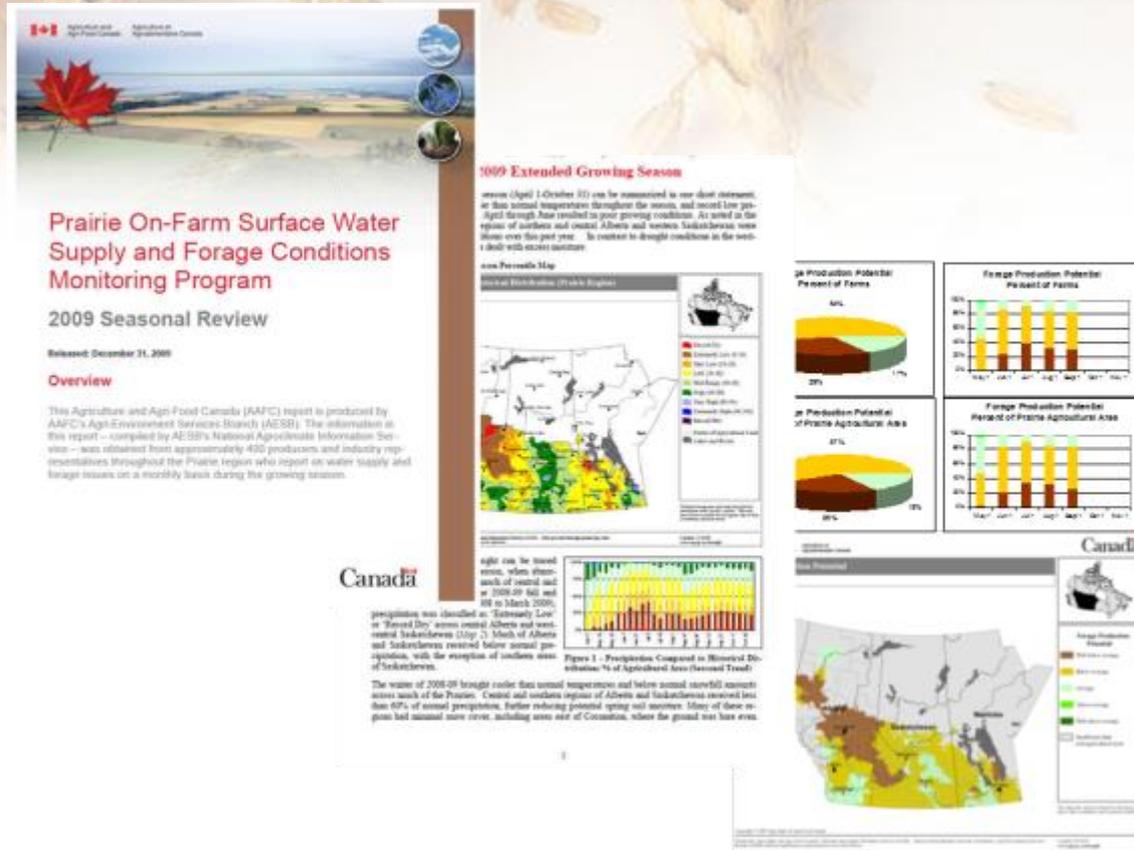
**We are currently conducting a pilot project in conjunction with the NDMC and the USGS, looking at the possibility of developing a Vegetation Drought Response Index (VegDRI) or something similar for Canada.**

Canadian VegDRI Pilot Project Coverage



# Assessing the Agroclimate Impacts

- AAFC coordinates a network of approximately 350 volunteer farmers in the prairie region, who provide information on the impacts of drought and other extreme weather impacts.



It is often more important to know the consequences resulting from extreme climate or weather event, than the details around the actual event.

# Assessing the Agroclimate Impacts

Throughout the last few years, realignment of priorities and redistribution of staff has made it increasingly difficult to effectively continue under the previous model.

We are currently:

- Transitioning to a new resource framework
- Developing a new online data collection tool (Agroclimate Impact Reporter)
- Increasing the density of the volunteer network
- Expanding the geographical scope of the program
- Increasing the value of the information collected.

# Agroclimate Impact Monitoring Network

- In 2012 we began using a custom developed system to collect information in an effective and efficient way allowing complete control over survey questions and output products.
- Members receive email surveys once a month asking them questions that can be tailored to the conditions.
- Surveys consist of 15-25 questions and take 3-5 minutes.
- The system provides an opportunity to make much better use of the data collected
- The system provided a lot of administration tools to provide efficiencies.
- Provides an opportunity to grow the producer network in existing regions and outside the Prairie region.

# Agroclimate Impact Reporter Administration



Government of Canada  
Gouvernement du Canada

Canada.gc.ca | Services | Departments | Français

## Agroclimate Impact Reporter

Canada



[Map](#) | [Submit Report](#) | [Advanced Search](#) | [About AIR](#) | [Help](#)

Home Page

### Home Page

#### Profile and Logout

- [Edit Your Profile](#)
- [Logout](#)

#### Users

- [Create/Modify User Profiles](#)
- [Create/Modify User Groups](#)
- [Manage your Facilitation List](#)
- [Survey Entry by Facilitator](#)
- [User History](#)
- [Media Survey Entry](#)

#### Surveys

- [Create/Modify Questions](#)
- [Create/Modify Templates](#)
- [Create/Modify Surveys](#)
- [Create/Modify Activities](#)
- [Mediate Impacts](#)



Welcome Austin Rosom.

Agriculture and Agri-Food Canada works with producers, industry groups and various government Departments to gather information on the impact of weather and climate on the agricultural industry. From this information the department provides various analysis and products.

Extreme weather and climate have a significant input on agriculture in Canada. Monitoring the impacts of climate and weather on agricultural water, soil, biodiversity and production are essential to increasing Canadas capacity to cope with extreme events like drought and flood. Timely weather and climate related information is essential to assist producers, decision-makers and the agricultural industry as a whole to manage risks. The Agroclimate Impact Reporter is an online tool which provides the ability to collect, manage and display the impacts of weather and climate on agricultural systems across Canada

Date Modified: 2013-04-08

[Terms and conditions](#) | [Transparency](#)



HEALTH  
[healthycanadians.gc.ca](http://healthycanadians.gc.ca)

TRAVEL  
[travel.gc.ca](http://travel.gc.ca)

SERVICE CANADA  
[servicecanada.gc.ca](http://servicecanada.gc.ca)

JOBS  
[jobbank.gc.ca](http://jobbank.gc.ca)

ECONOMY  
[actionplan.gc.ca](http://actionplan.gc.ca)

Canada.gc.ca

# Administration Tools

The system was designed to be very flexible and allows the users to develop new questions, surveys, templates, and allows surveys to be tailored and assigned to different user groups.

[Map](#) [Submit Report](#) [Advanced Search](#) [About AIR](#) [Help](#)

[Home Page](#) > [Surveys](#) > [Create/Modify Questions](#)

## Create/Modify Questions

[Add Free Form Text](#) [Add List Question](#) [Add Value Question](#)  
[Add Month Question](#) [Add Year Question](#) [Add Other Question](#)

**Search for Questions**

Question Text

Description

Type

Status

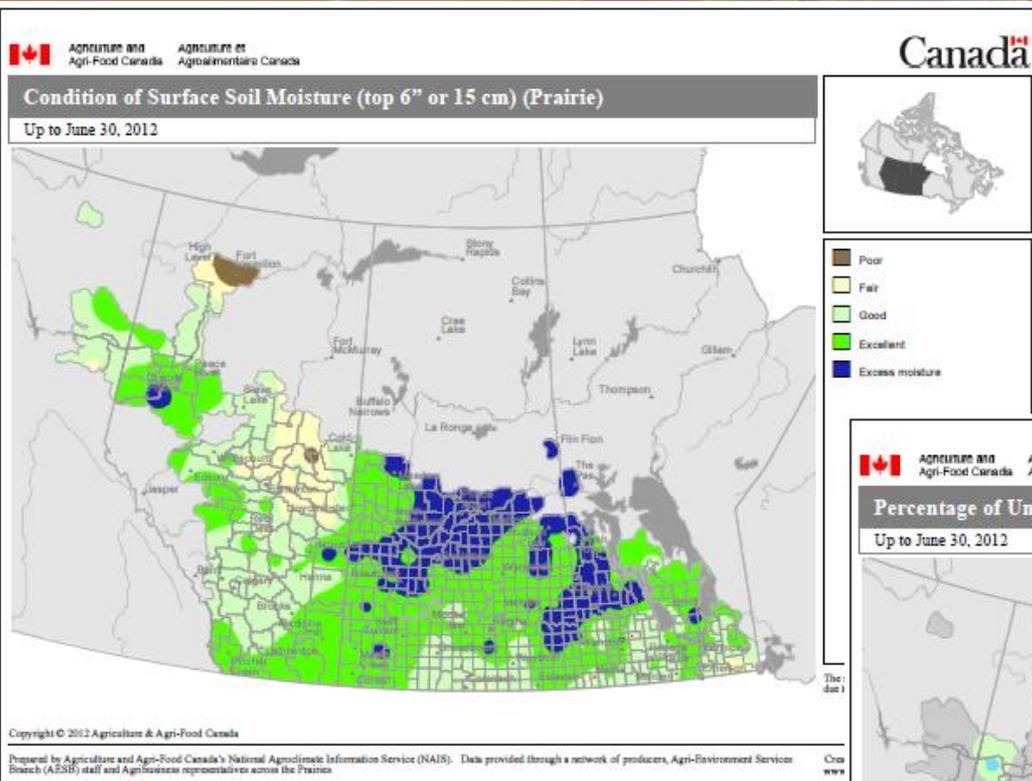
[Search](#) [Clear](#)

Date Modified: 2013-04-08

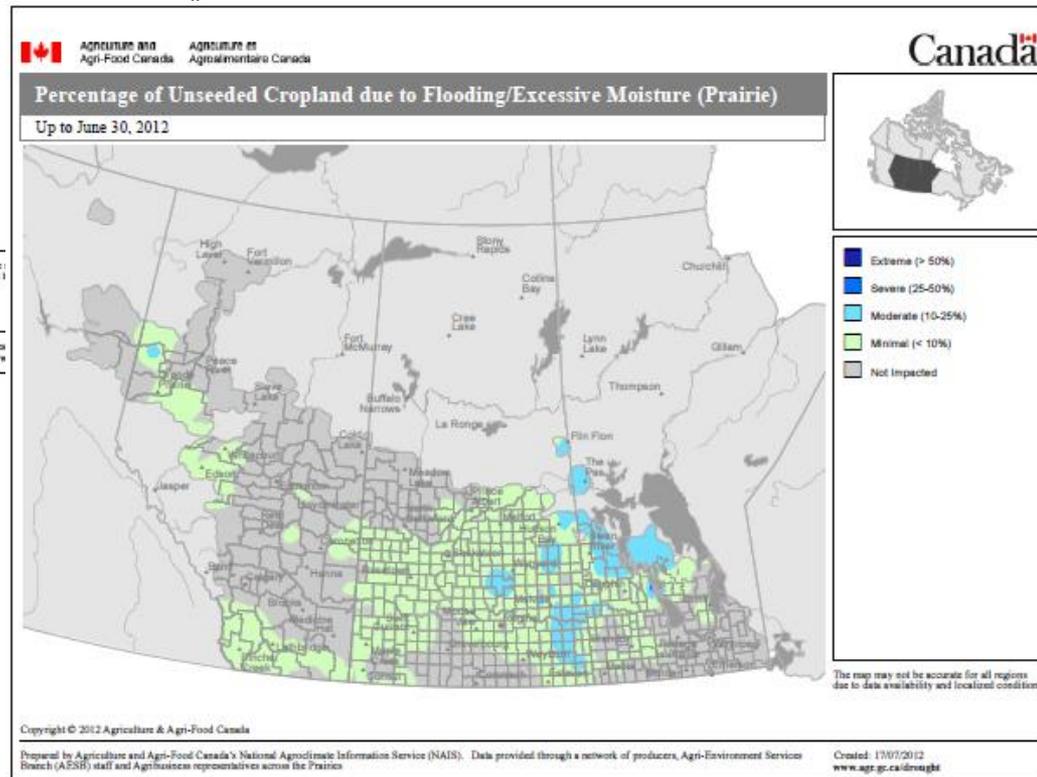
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# 2012 Spring – Agroclimate Impacts



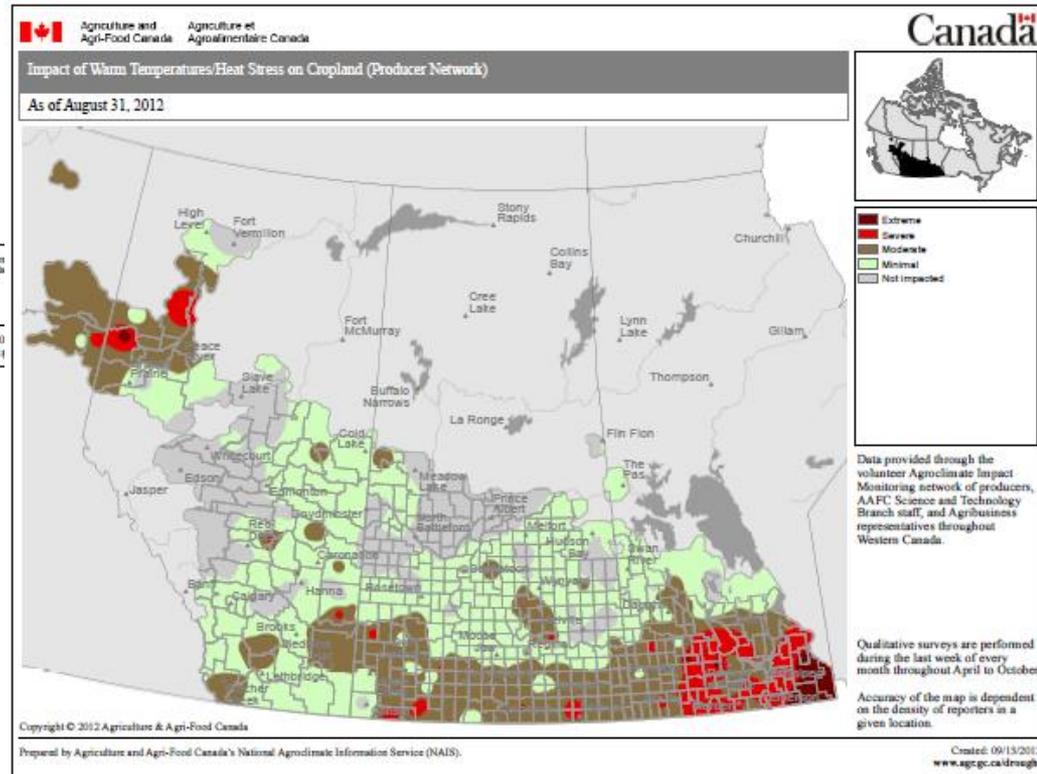
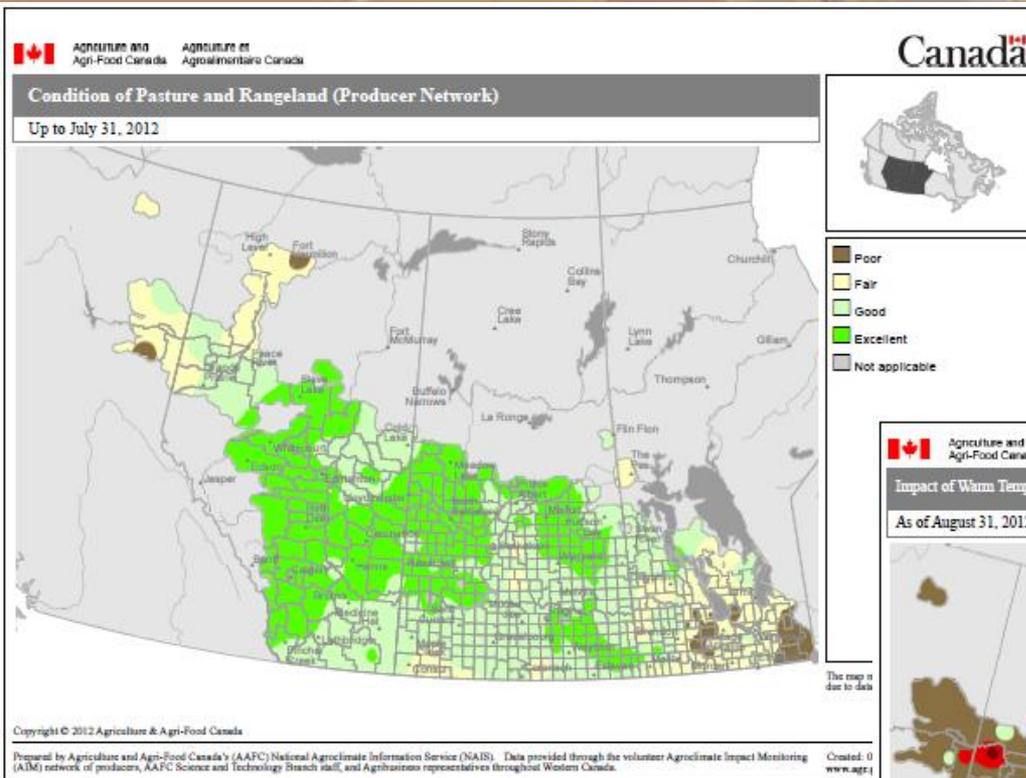
## Surface Moisture



## Unseeded Cropland

# 2012 Summer – Agroclimate Impacts

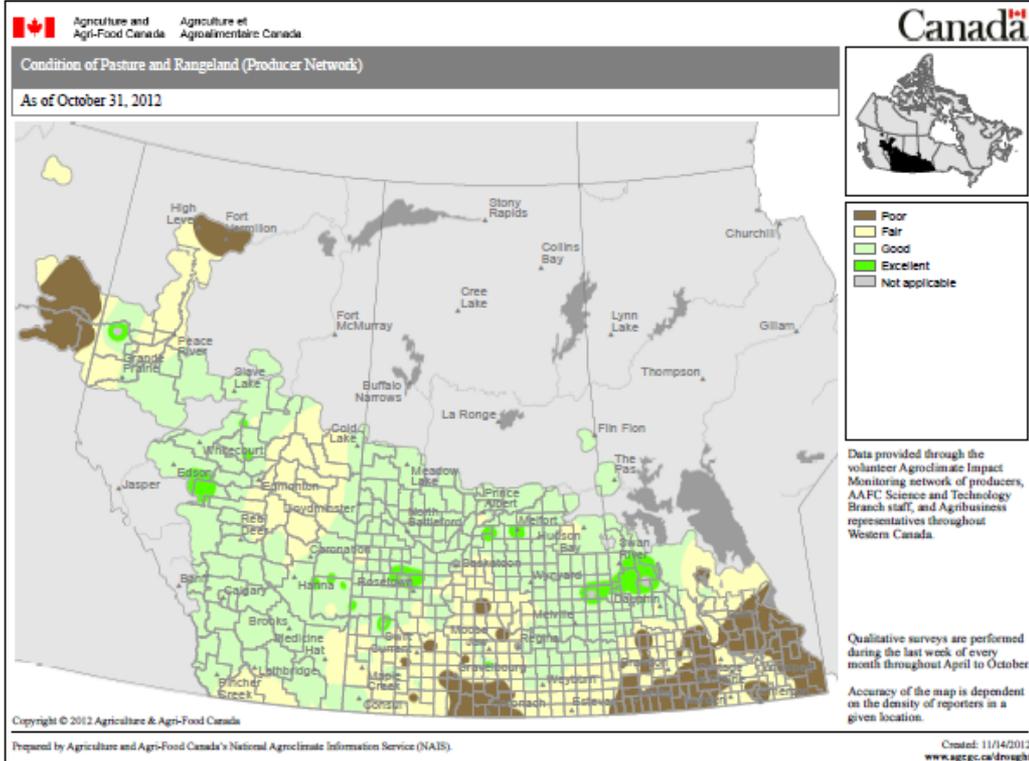
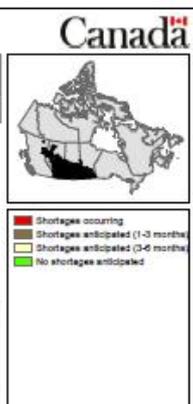
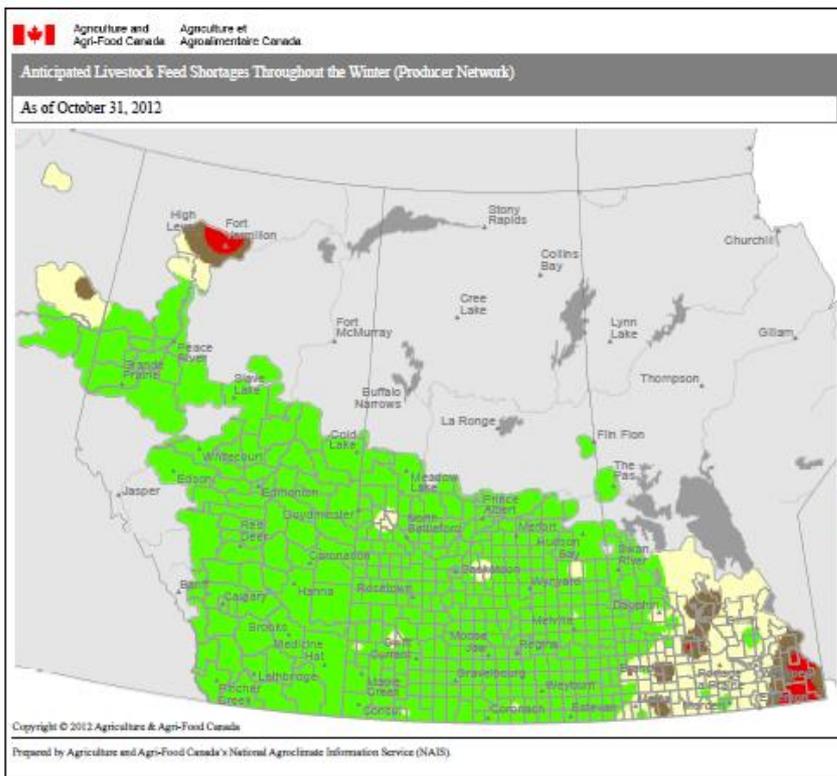
## Pasture and Rangeland Condition



## Heat Stress

# 2012 Fall – Agroclimate Impacts

## Anticipated Feed Shortages



## Pasture and Rangeland Condition



# Anticipated Water Shortages



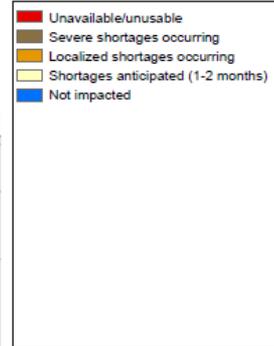
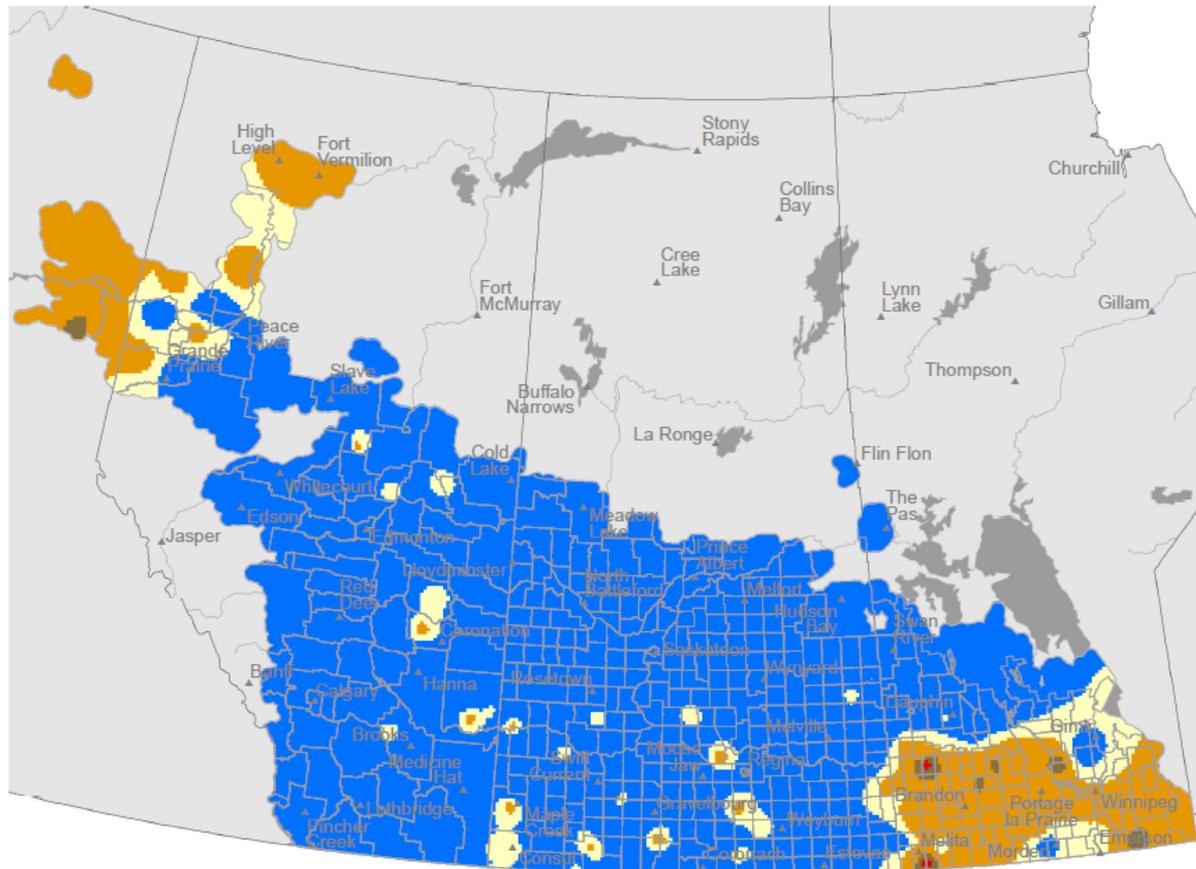
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Agri-Food Canada

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Agroalimentaire Canada

Canada

## Agricultural Water Shortages (Producer Network)

As of October 31, 2012



Data provided through the volunteer Agroclimate Impact Monitoring network of producers, AAFC Science and Technology Branch staff, and Agribusiness representatives throughout Western Canada.

Qualitative surveys are performed during the last week of every month throughout April to October.

Accuracy of the map is dependent on the density of reporters in a given location.

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Prepared by Agriculture and Agri-Food Canada's National Agroclimate Information Service (NAIS).

Created: 11/22/2012  
www.agr.gc.ca/drought

# Impact of Drought



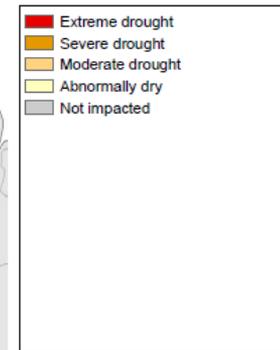
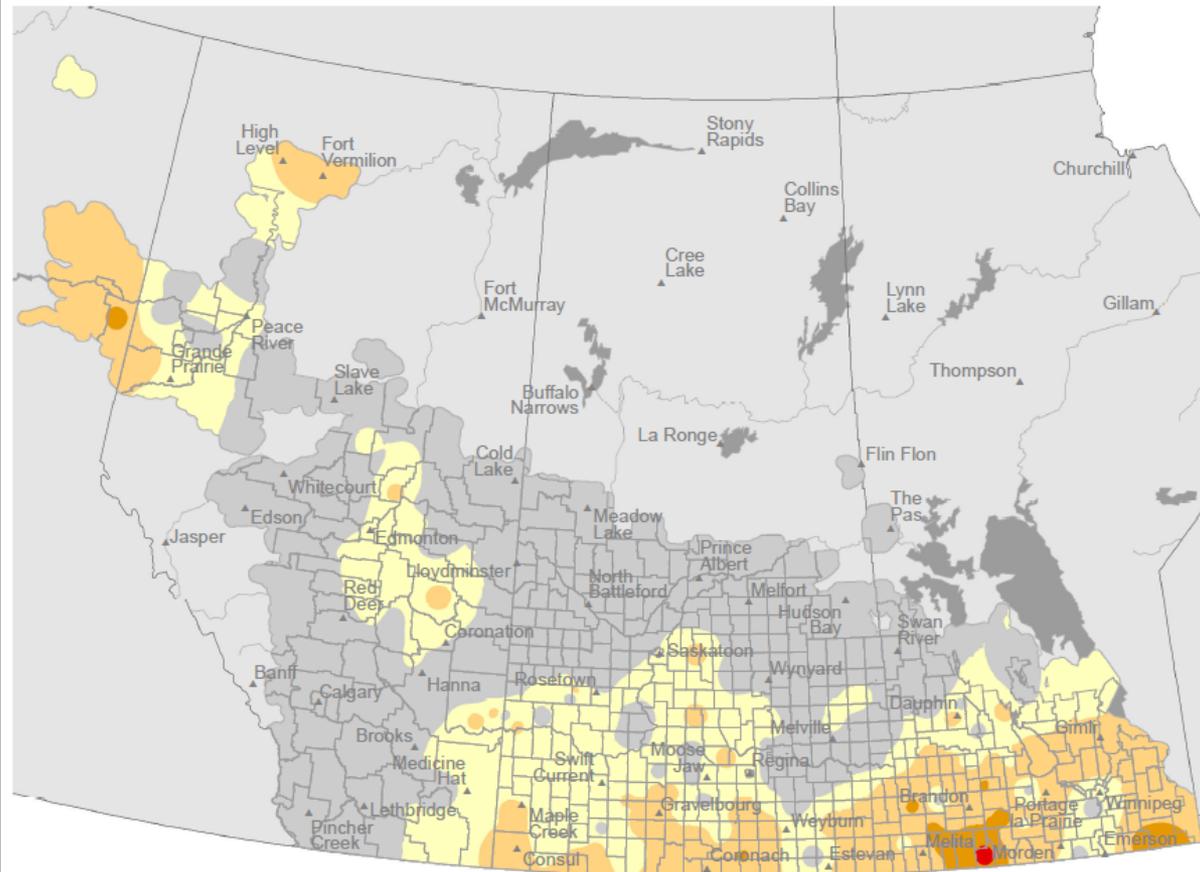
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Agroalimentaire Canada

Canada

## Impact of Drought Conditions on Agricultural Operations (Producer Network)

As of October 31, 2012



Data provided through the volunteer Agroclimate Impact Monitoring network of producers, AAFC Science and Technology Branch staff, and Agribusiness representatives throughout Western Canada.

Qualitative surveys are performed during the last week of every month throughout April to October.

Accuracy of the map is dependent on the density of reporters in a given location.

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Prepared by Agriculture and Agri-Food Canada's National Agroclimate Information Service (NAIS).

Created: 11/14/2012  
[www.agr.gc.ca/drought](http://www.agr.gc.ca/drought)

# Agroclimate Impact Reporter

The Public accessible portion of the Agroclimate Impact reporter will launched in the Spring of 2013.

The screenshot shows the Agroclimate Impact Reporter web application. At the top, there is a header with the Government of Canada logo and navigation links for Canada.gc.ca, Services, Departments, and Français. Below this is a blue banner with the title "Agroclimate Impact Reporter" and the Canada wordmark. A navigation menu includes "Map", "Submit Report", "Advanced Search", "About AIR", and "Help".

The main content area features a map of Canada with a search bar for "Find address or place". A "Summary of current map" window is open, displaying the following data:

Summary of current map	
Location	Canada
Time period (m/d/yyyy)	04/22/12 to 04/22/12
Reported by	Public, Anonymous User, Registered User
Severity	Severe, Moderate, Normal
Agroclimate impacts reported	
Moisture	90
Severe Weather	171
Flood	62
Other	12
Drought	907
Frost	153
Heat	159
<b>Total</b>	<b>1160</b>

A "Submit a Report" window is also open, showing options for Location, Category, Reporter Type, and Severity. The "Submit a Report" window includes a "Find address or place" search bar and a "Submit a Report" button.

## Agroclimate Impact Reporter (AIR)

The National Agroclimate Information Service and Canada (AAFC) has successfully launched a public accessible portion of the agroclimate impacts reporter.

The reporter will collect, compile, and integrate agroclimate impact data into one database. It will offer the public a user-friendly tool to help support the agricultural sector.

## Submit a Report

Are weather impacts affecting your agricultural operations? If so, click on the "Submit a Report" link above and follow the easy step-by-step instructions. You can even include before and after photos if you wish.

## Find Impacts

The default map view shows all impact reports provided for the last 30 days for all Census Districts. To query the database, use the map view to drill down to the Consolidate Census Subdivision (Municipality), and click on the edit within the Impact Summary window to modify your search. You can also use the Advanced Search to view multiple locations.

- [Using the map](#)
- [What is an impact?](#)
- [Refining my Search](#)
- [Types of Reports](#)
- [Where do Reports come from?](#)
- [How do I overlay data?](#)

# Agroclimate Impact Reporter

Government of Canada / Gouvernement du Canada

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## Agriculture and Agri-Food Canada

[Section 1](#) | [Section 2](#) | [Section 3](#) | [Section 4](#) | [Section 5](#) | [Section 6](#) | [Section 7](#)

Additional Layers....

Summary

Enter a location or address

Select a location to find out more information

Division 10, Saskatchewan, query date, report types

	Div	Prov
<b>Total</b>	<b>75</b>	<b>150</b>
Drought	1	25
Flooding	5	13
Excessive Moisture	1	10
Frost	6	55
Heat Stress	8	12
Severe Weather	55	56
Management/Overgrazing	0	0
Pests/Disease	5	8
Other	2	2

View City/Municipality/Region map for Saskatchewan

**Canada**

Drought	20
Flooding	55
Excessive Moisture	12
Frost	16
Heat Stress	18
Severe Weather	555
Management/Overgrazing	1
Pests/Disease	15
Other	2
<b>Total</b>	<b>655</b>

<p><u>Location</u></p> <p>National Extent</p> <p><u>Date</u></p> <p>Last Month</p>	<p><u>Category</u></p> <p><input checked="" type="checkbox"/> Drought</p> <p><input checked="" type="checkbox"/> Flooding</p> <p><input checked="" type="checkbox"/> Excessive Moisture</p> <p><input checked="" type="checkbox"/> Frost</p> <p><input checked="" type="checkbox"/> Heat Stress</p> <p><input checked="" type="checkbox"/> Severe Weather</p> <p><input checked="" type="checkbox"/> Management/Overgrazing</p> <p><input checked="" type="checkbox"/> Pests/Disease</p> <p><input checked="" type="checkbox"/> Other</p>	<p><u>Report Type</u></p> <p><input checked="" type="checkbox"/> Media</p> <p><input checked="" type="checkbox"/> Anonymous User</p> <p><input checked="" type="checkbox"/> Registered User</p> <p><u>Severity</u></p> <p><input checked="" type="checkbox"/> High</p> <p><input checked="" type="checkbox"/> Medium</p> <p><input checked="" type="checkbox"/> Low</p> <p style="text-align: center; margin-top: 10px;"><input type="button" value="Update Map"/></p>
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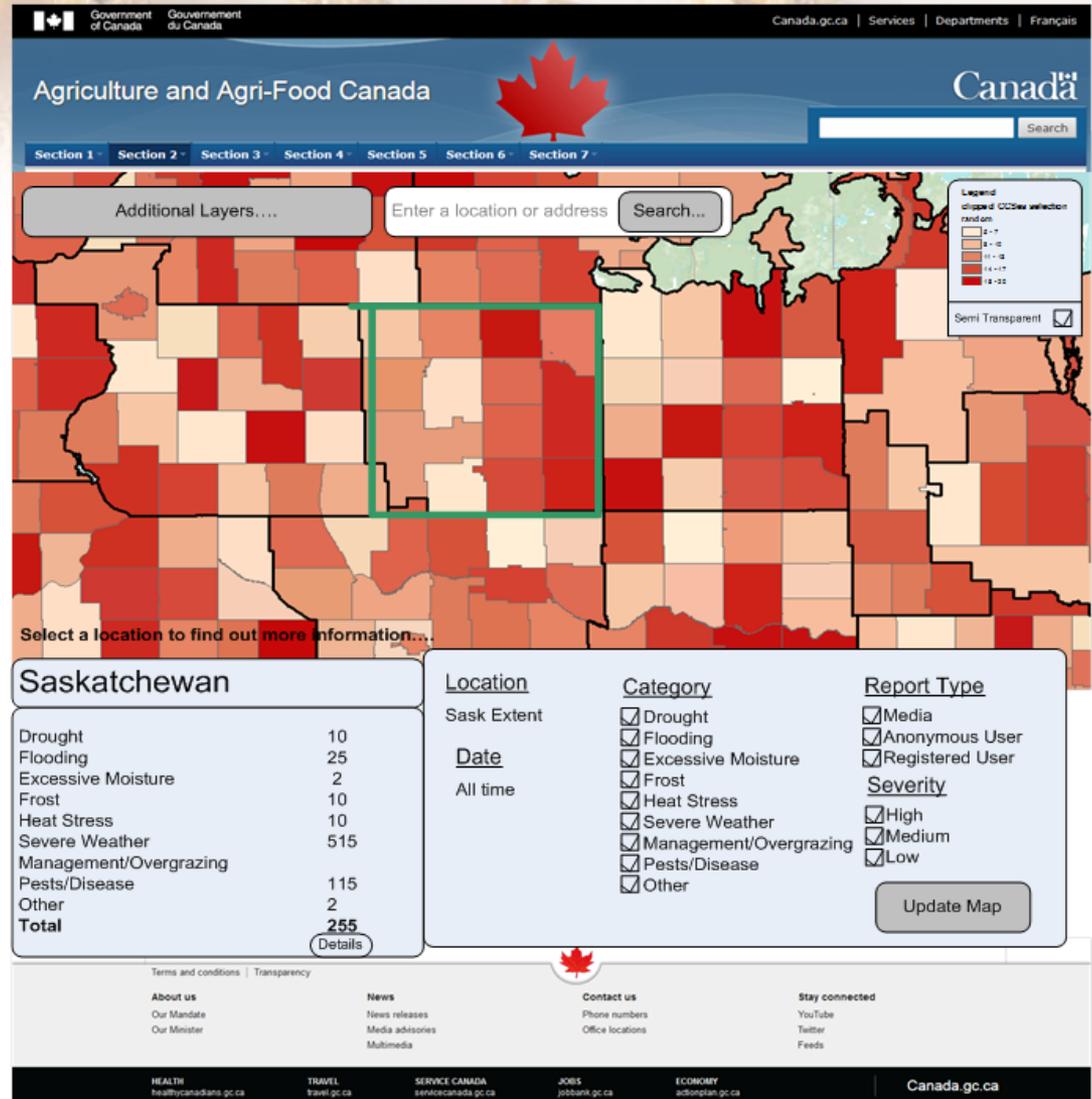
**ECONOMY**

[economy.gc.ca](#)

[Canada.gc.ca](#)

# Census division and county level impacts

Impacts can be view at census division or county levels. Individual reports can be viewed as well.



# Submit Impact Report

Anonymous users have a simple form to enter, categorize and locate their impact report.

### Submit Report

You are about to submit information to the Agro-Climate Reporter. We call this information a report. After reports are moderated, they will be visible on the reports layer of the Agro-Climate Impact Reporter.

\* - mandatory

#### Description

\* Title:

\* Description:

\* Start Date:   End Date:

Related Link:

Attach Image 1:  Yes  No

Attach Image 2:  Yes  No

Attach Image 3:  Yes  No

#### \* Category

You must provide a severity for at least one of the following impact types.

Drought:

Flooding:

Excess Moisture:

Frost:

Heat Stress:

Severe Weather:

Other:

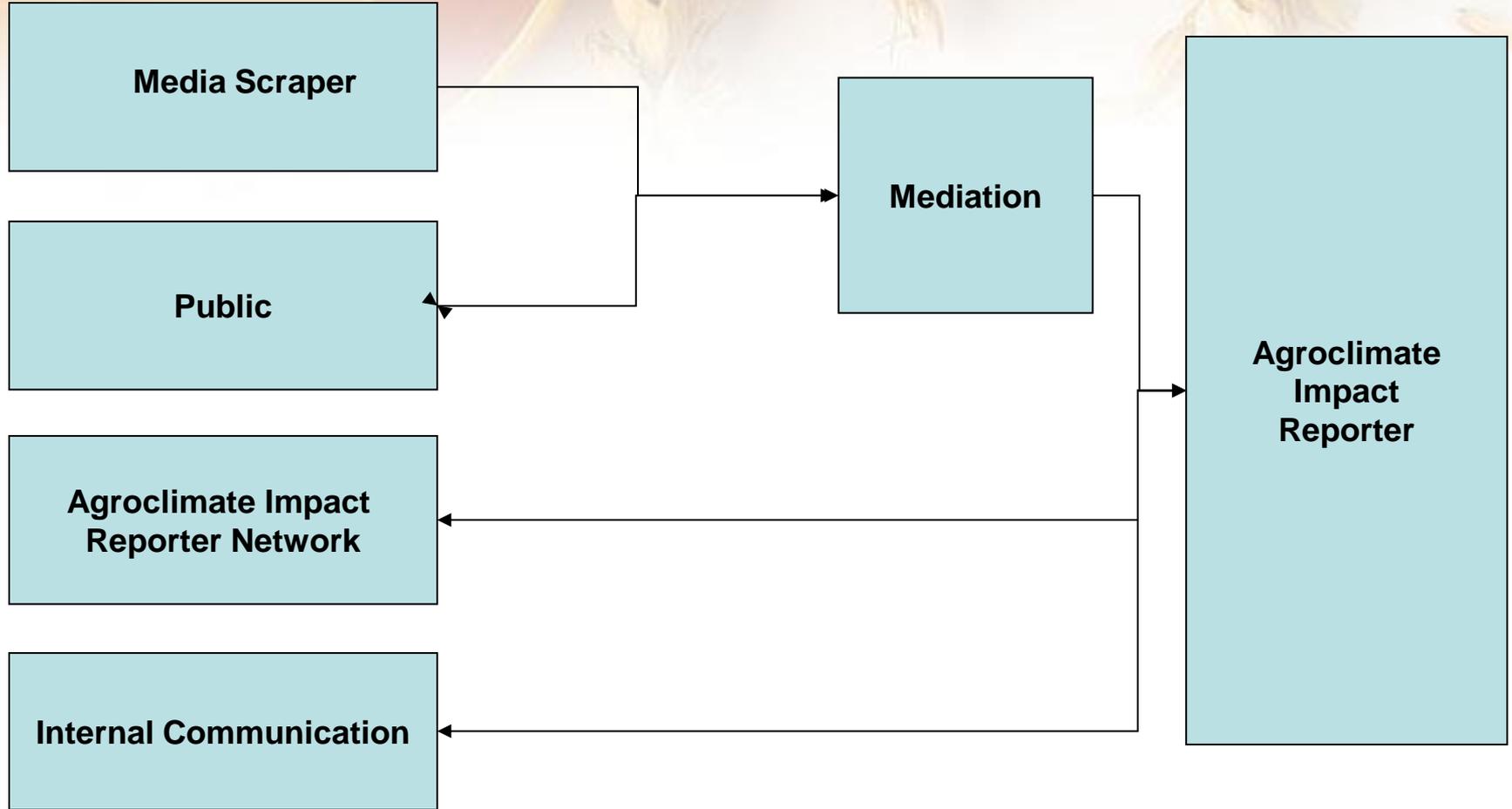
#### \* Affected Area

The latitude and longitude need to be provided for the affected area. You may enter them manually or use the map below to select the location.



\* Latitude:  \* Longitude:

# The Agroclimate Impact Reporter



# North American Climate Services Partnership

Established between Canada (EC) the US (NOAA) and Mexico (NM de M) in January 2012

Intended to facilitate the exchange of information, technology and management practices related to the development of climate information and the delivery of integrated climate services for North America.

Drought is one of four initiatives put in place:

Drought Plan drafted in 2012

- Focus is on:
  - Scoping activity: e.g. end user analysis of the NADM
  - Pilot Activity
  - Long term plan

# North American Climate Services Partnership

## Next Steps:

- Need to get US and Mexico to approve the plan
  - US is supportive of it but we need to get Mexico's viewpoints
  - Canada has already started a user needs study
- Finalize the plan - identify & prioritize ideas for the pilot study
- Develop proposals for action

## Short term goals (1-3 years)

Build on what is already in place

Collaborate with other initiatives e.g. Rio Grande-Rio Bravo

## Longer term vision (3-5+ years)

e.g. A regional or continental drought centre?

For more info - Allan Howard – [allan.howard@agr.gc.ca](mailto:allan.howard@agr.gc.ca)

# Thank You



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# Canada