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Wildfire Season Forecast

Dr. Kerry Anderson, Fire Research Scientist, Canadian Forest Service, Natural Resources Canada

Forecast 2017

May 10, 2017

Fire Season Prediction for Canada, 2017

Kerry Anderson
Canadian Forest Service

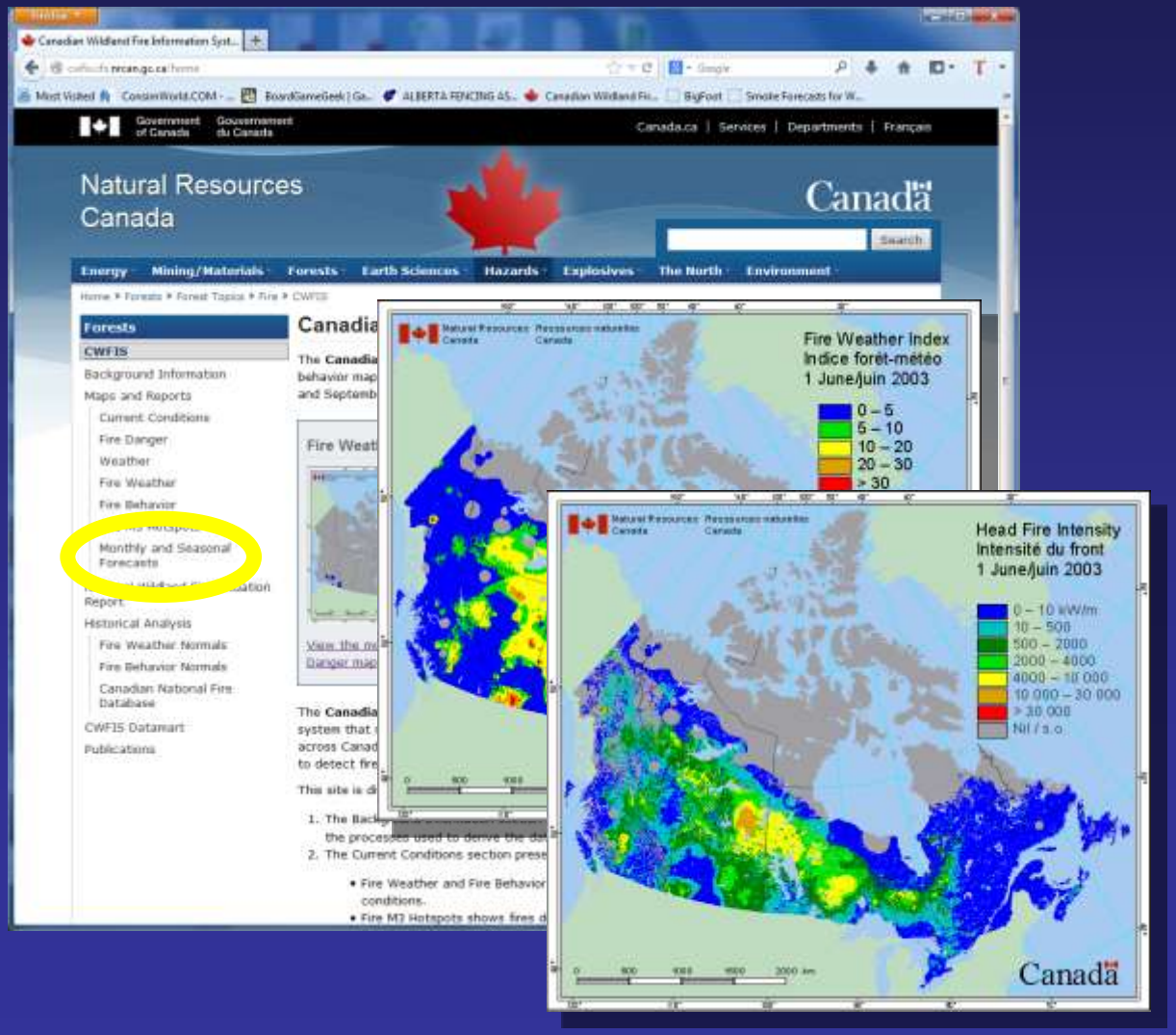
Introduction

The Canadian Forest Service present monthly and seasonal forecast maps through the Canadian Wildland Fire Information System (CWFIS).

These are based on Environment Canada's monthly and seasonal forecasts, information contained in the CWFIS, and advice provided by provincial agencies.

This presentation will summarize the current conditions in Canada and a forecast for the 2017 fire season.

Canadian Wildland Fire Information System



The Canadian Wildland Fire Information System calculates the fire weather and fire behaviour conditions across the country.

Maps are displayed over the Internet.

http://cwfis.cfs.nrcan.gc.ca/

Methodology

1. Calculate spring start-up conditions based on fall drought code (DC) values and over-winter precipitation amounts,

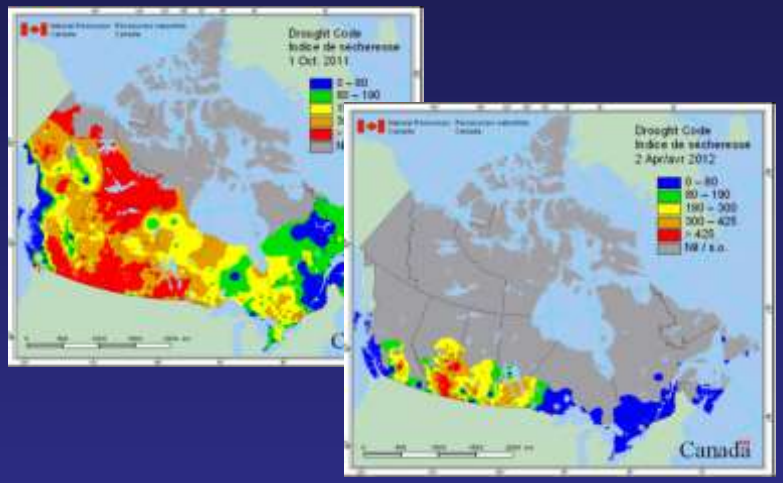
2. Calculate average daily weather for weather stations across country,

3. Incorporate Environment Canada's seasonal predictions,

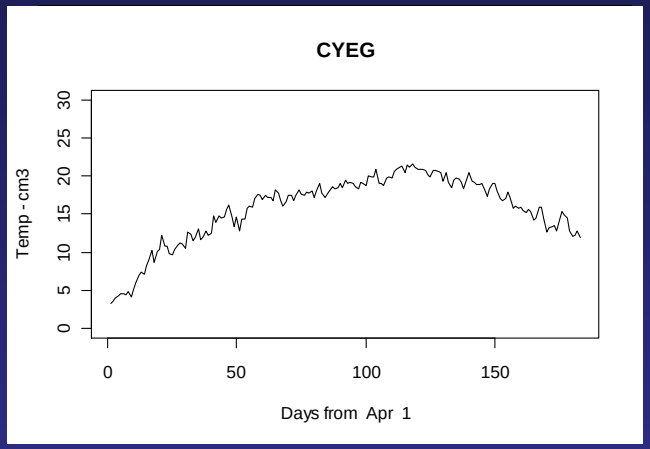
4. Determine the fire severity based on the ratio of forecasted over average monthly severity rating (MSR).

Methodology

1. Fall conditions to Spring startup

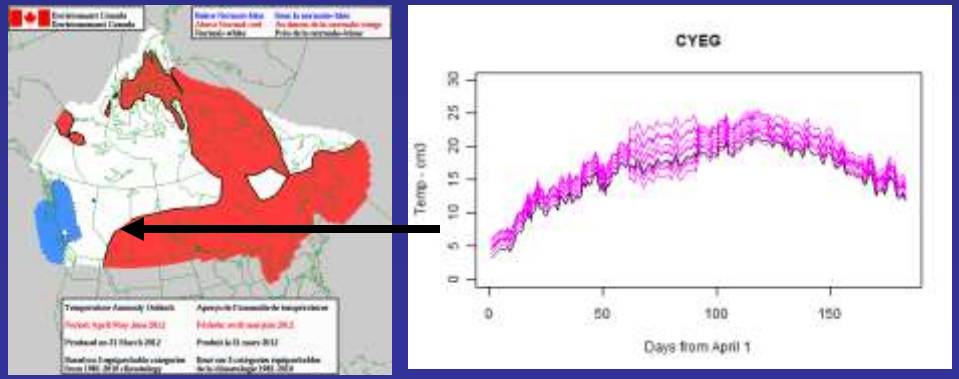


2. Calculate average daily weather



4. Calculate fire weather anomaly

3. Apply seasonal predictions



Ensemble Forecasts

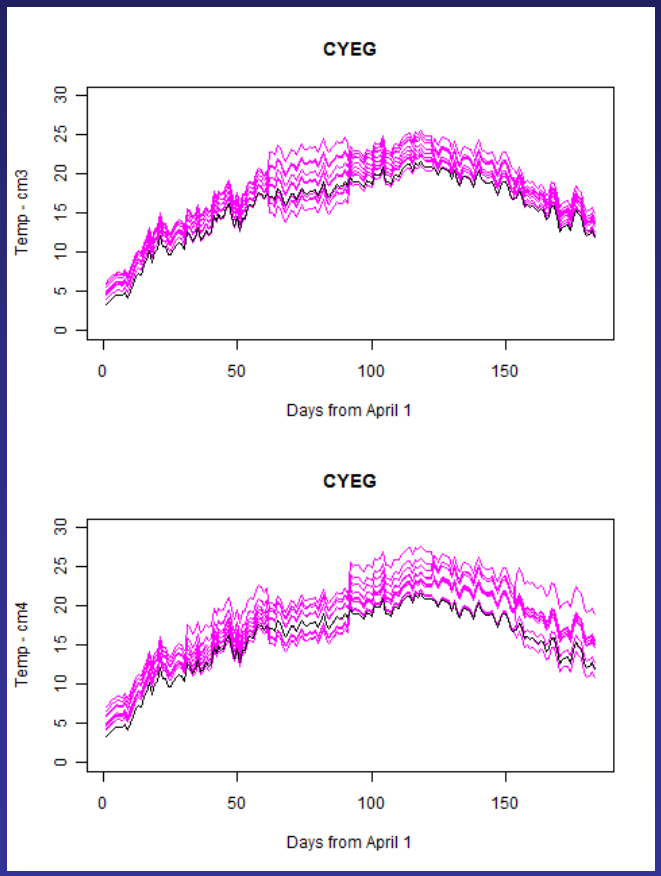
The Canadian Meteorological Centre (CMC) of Environment Canada has been providing temperature and precipitation probabilistic forecasts based on an ensemble of ten integrations of two climate models developed by Canadian Center for Climate modeling and analysis (CCCma)

1. CANCM3 (which uses the atmospheric model CANAM3 (also known as model AGCM3))
2. CANCM4 (which uses the atmospheric model CANAM4 (also known as model AGCM4))

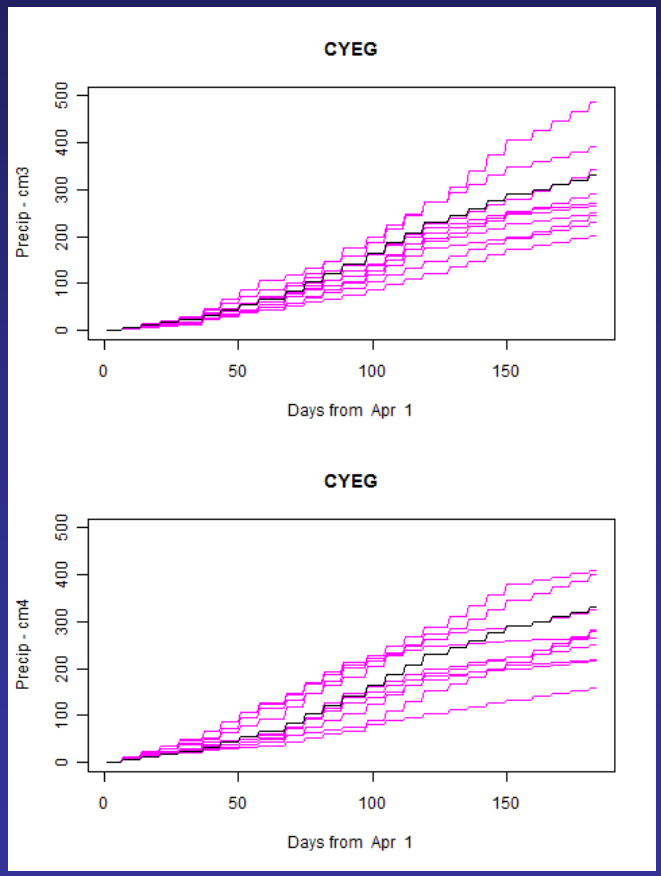
Forecasts are provided for the next twelve months.

Ensemble Forecasts

Predicted temperatures and precipitation amounts are entered into the Canadian FWI system.

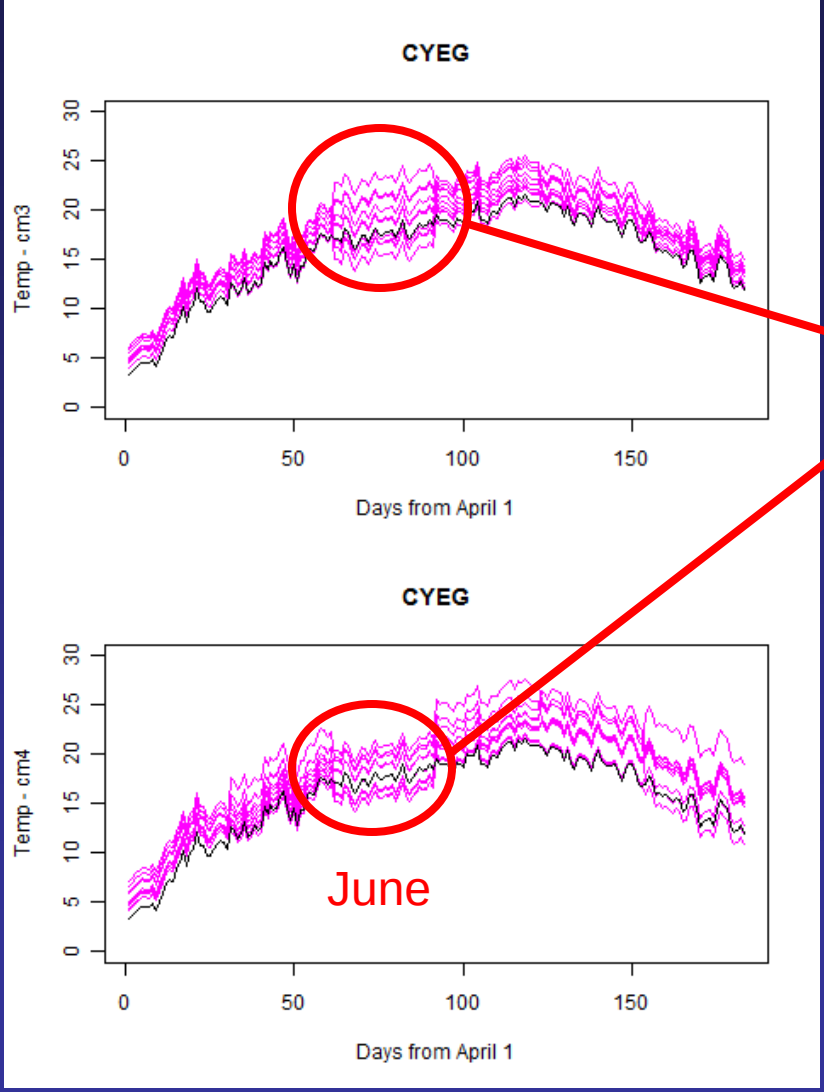


Temperature



Precipitation

Ensemble Forecasts



The ensemble approach provides a measure of confidence indicated by the spread of the ensemble members.

2016 Fire Season

2016 Prediction

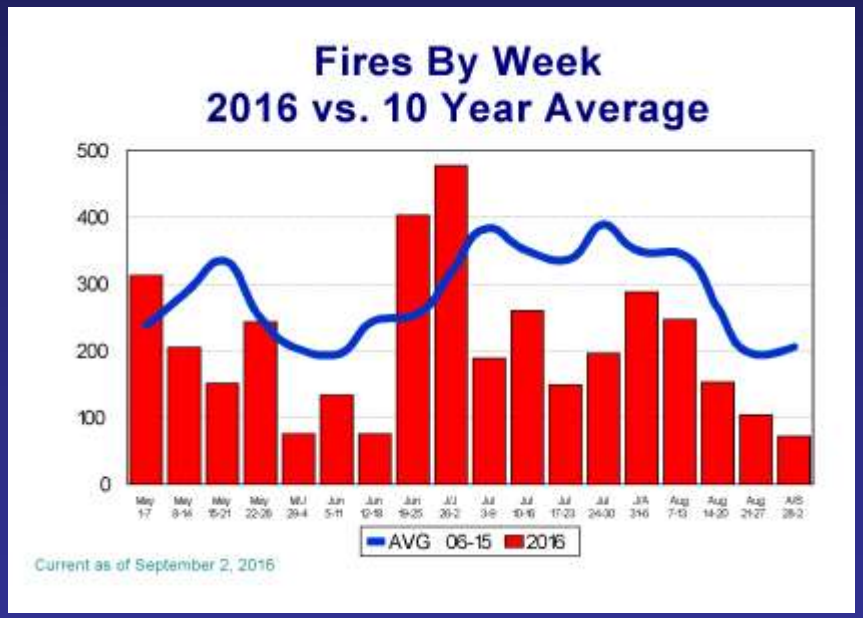
Man With Possible ISIS Connection Takes Responsibility For Fort McMurray Fire

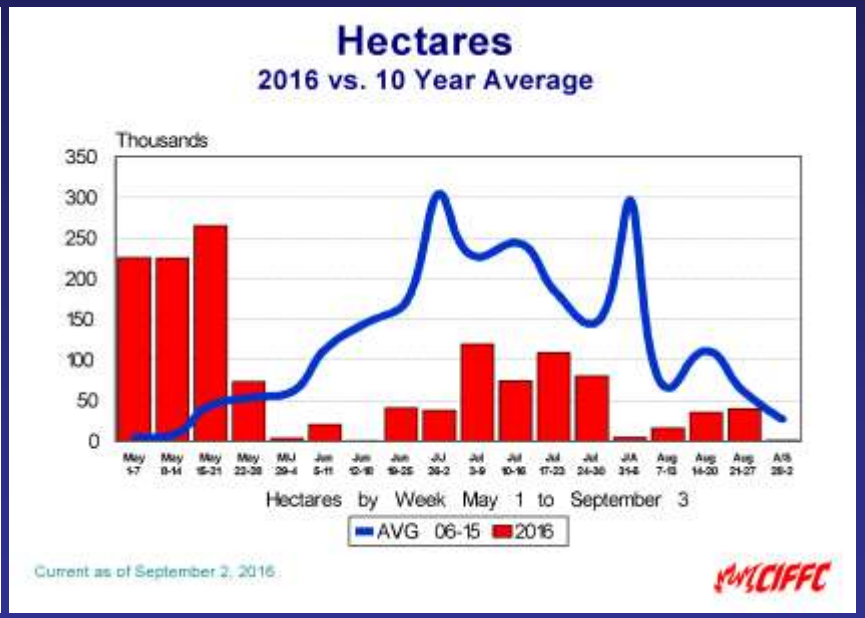
By theboss on May 8, 2016

6.3K SHARES | SHARE | TWEET | SHARE | SHARE | 0 COMMENTS

2016 Prediction

The 2016 fire season was actually a below-average year with below-average number of fires and area burned.





4,832 fires

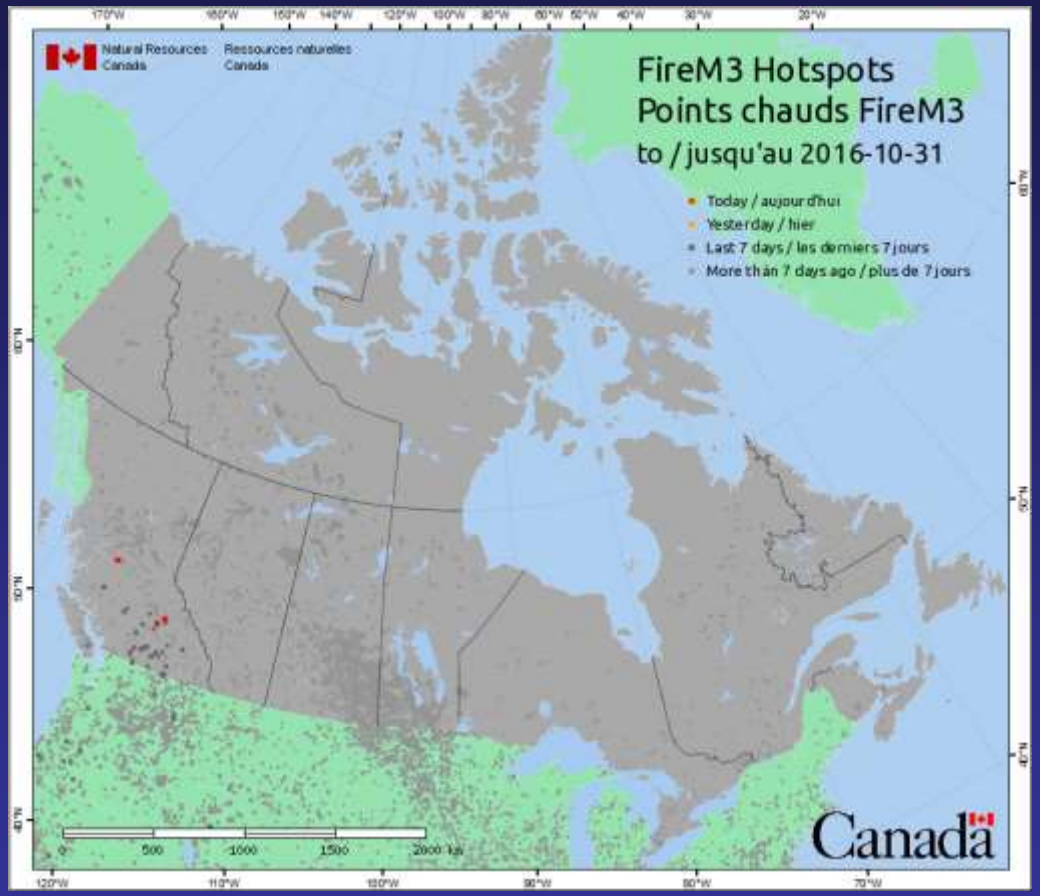
(10 year avg: 6,120)

1,390,376.22 ha

(avg: 2,560,575 ha)

Numbers based August 31, 2016 CIFFC situational report

2016 Prediction

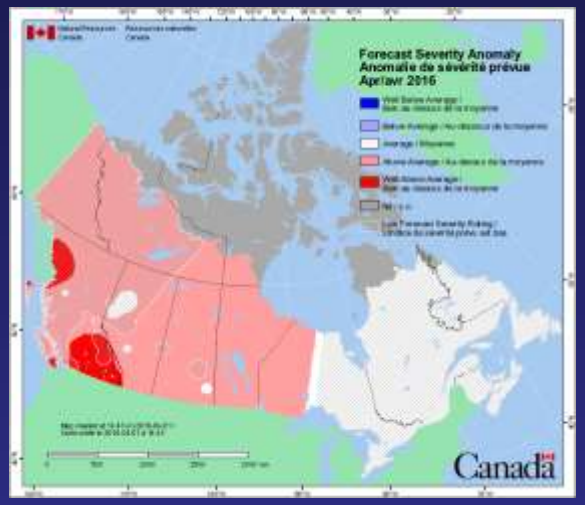


The 2016 fire season started out very early with fires in Alberta and British Columbia. In June, the conditions dropped with the collapse of El Nino.

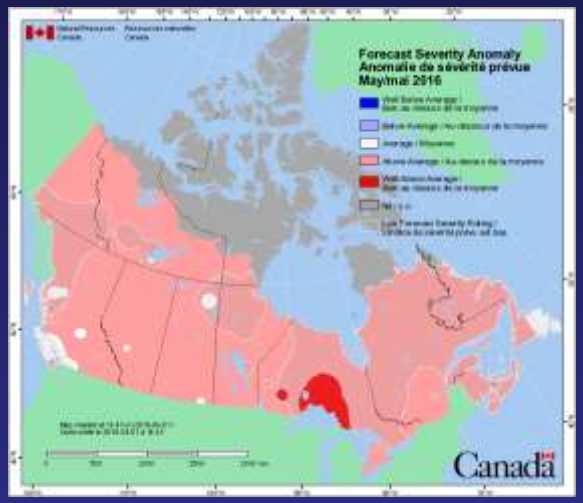
NWT and Saskatchewan saw some fire activity in July

2016 Prediction

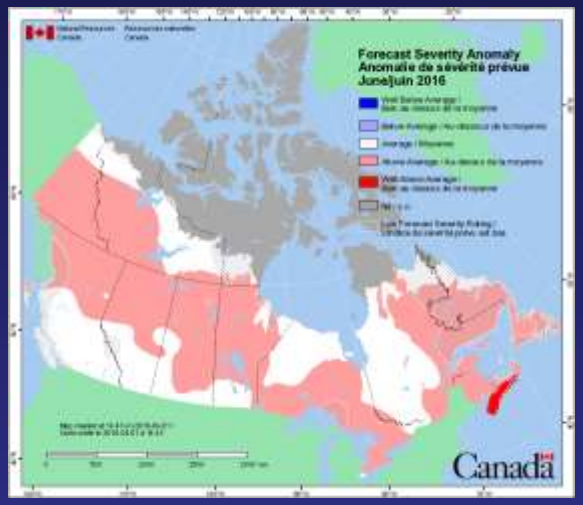
April



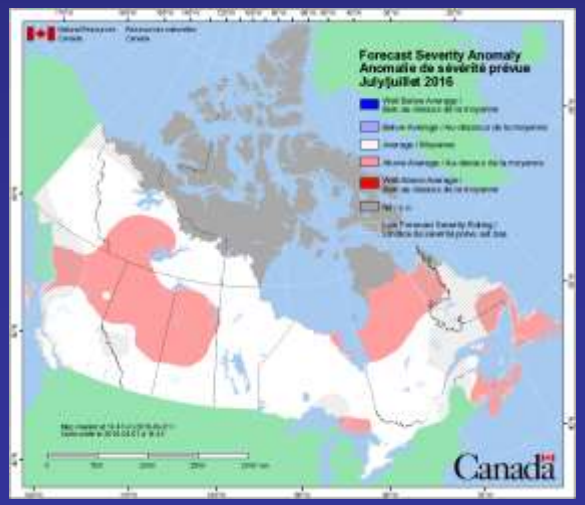
May



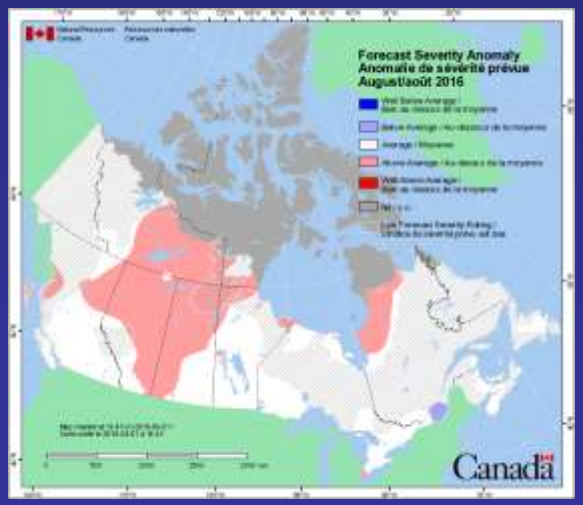
June



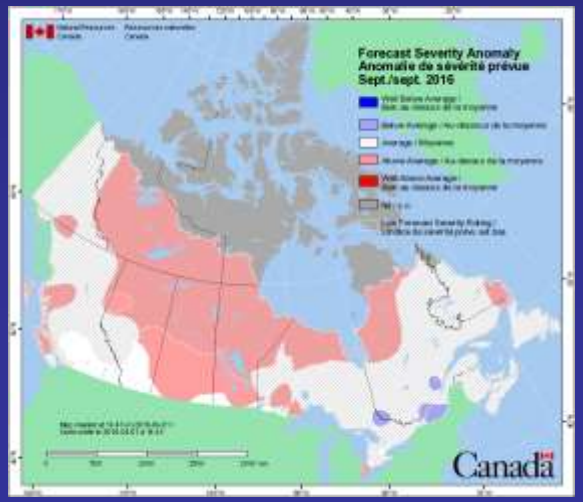
July



August

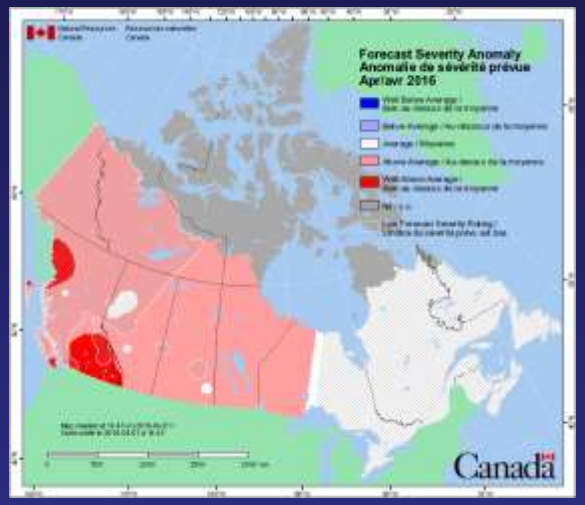


September



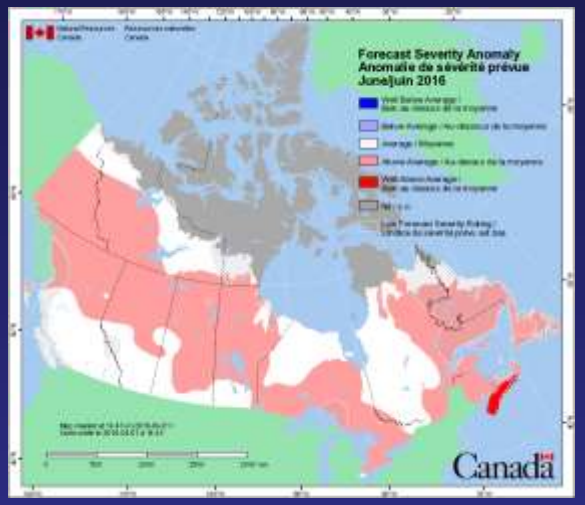
2016 Fire Activity

April

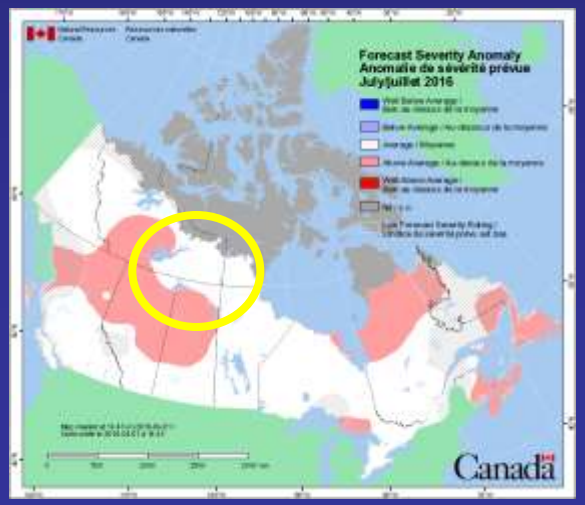


May

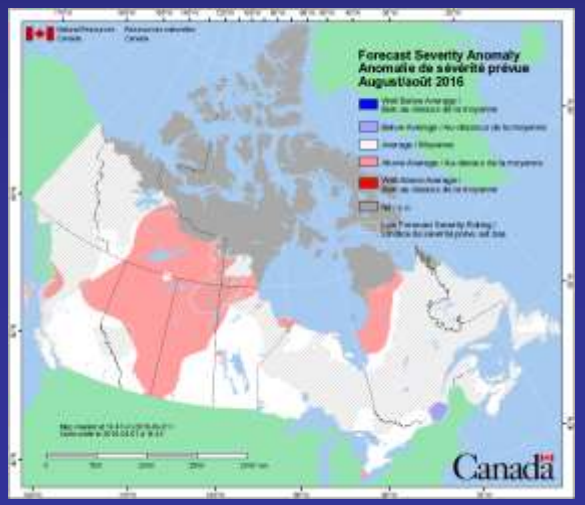
June



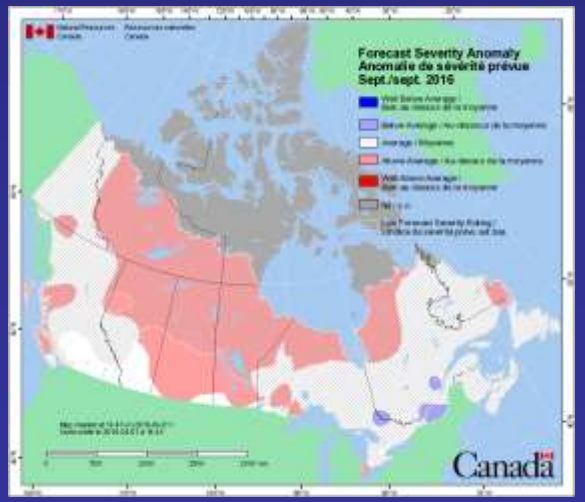
July



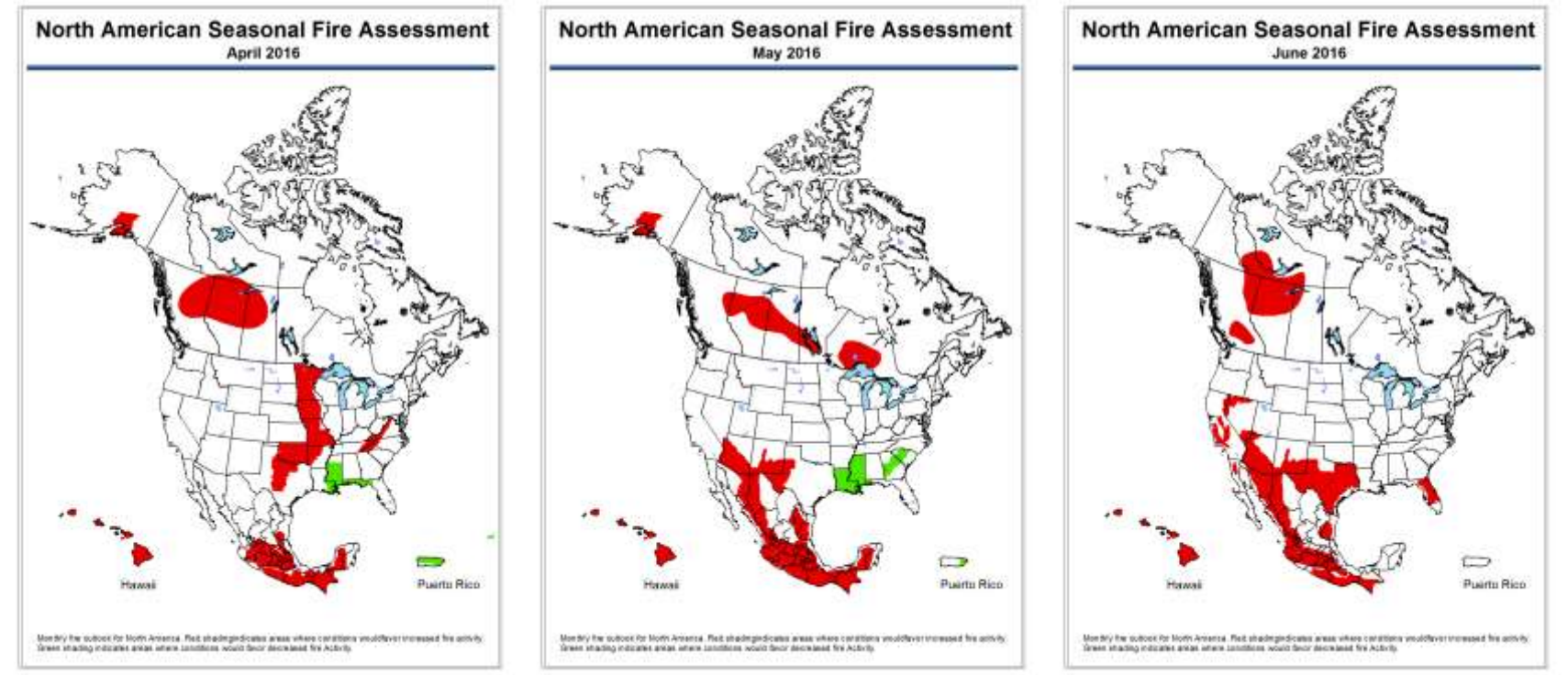
August



September



North American Seasonal Assessment



The forecast included the northern Prairies/southern NWT and western Ontario as areas of concern in the North American Seasonal Assessment.

http://www.predictiveservices.nifc.gov/outlooks/NA_Outlook.pdf

2016 Prediction

In summary, the April forecast correctly predicted the extreme conditions in Alberta, which led to the Fort McMurray fire.

Ontario was expected to see above-average conditions in May and June, which did not happen.

And as expected, conditions across Canada moderated over summer with the collapse of El Nino.

2017 Seasonal Prediction

Starting Conditions

Spring Start-up Conditions

The Canadian Forest Fire Weather Index (FWI) System allows for the carry-over of fall conditions to the spring.

This is handled by the Drought Code (DC).

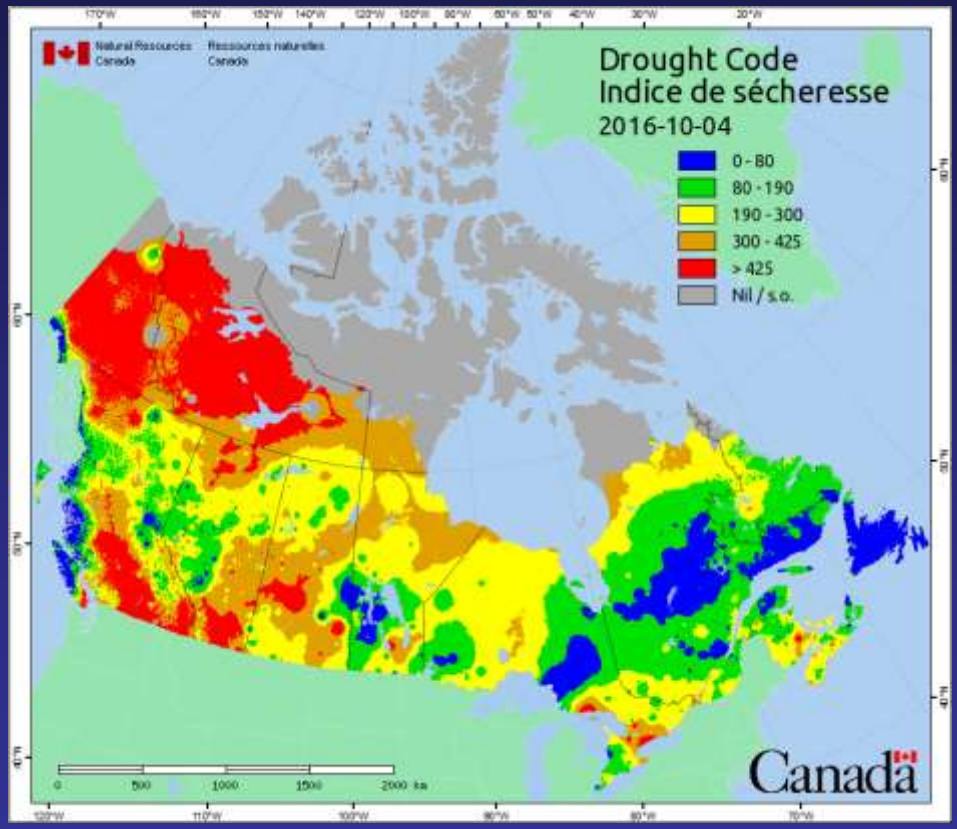
All other moisture codes in the FWI system are reset.

Fall Conditions

Fall DC values show extreme (dry) conditions in the Yukon and NWT.

Central Alberta and northern Saskatchewan were much wetter than normal due to the summer rains.

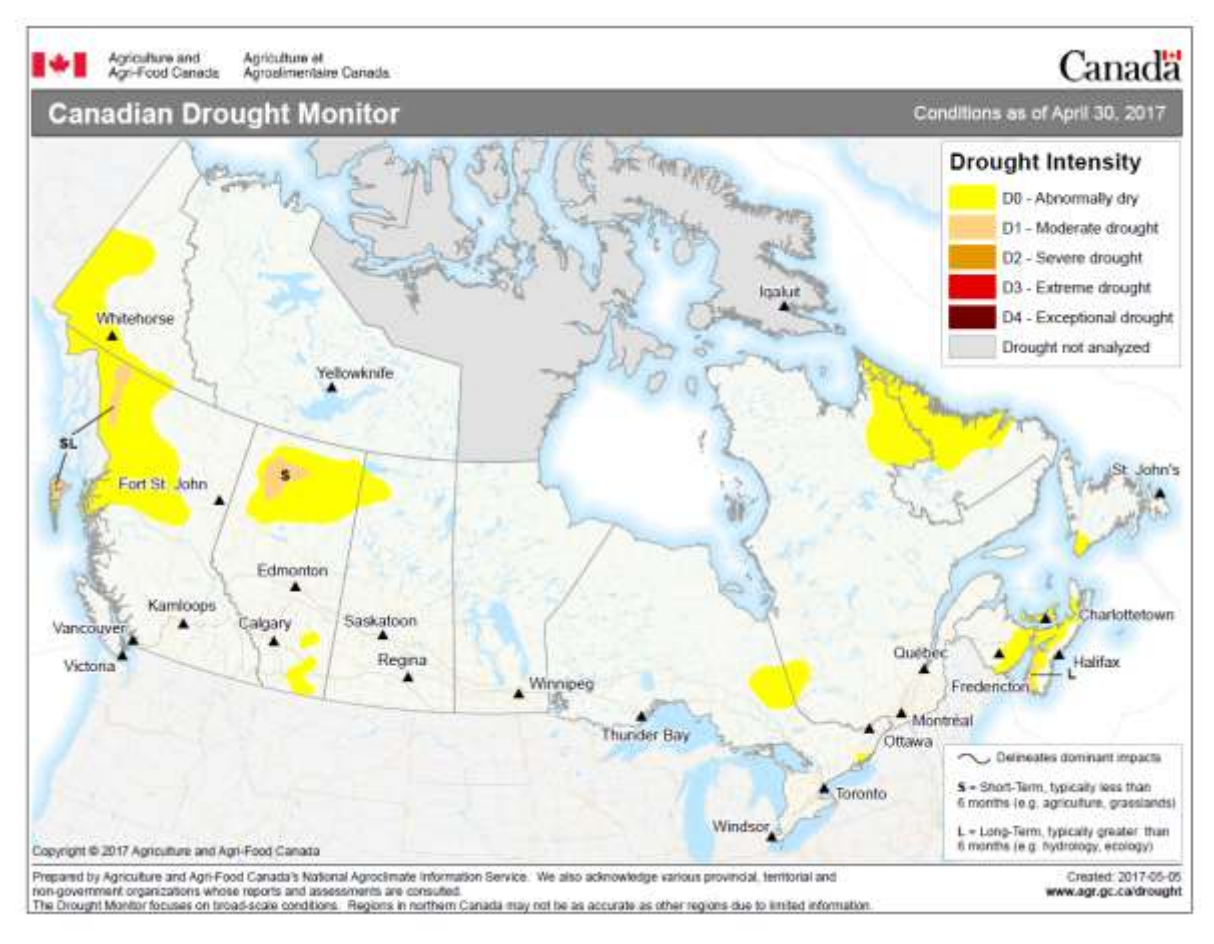
Much of the remainder of Canada were in conditions not far from normal for the fall.



Oct 4, 2016

http://cwfis.cfs.nrcan.gc.ca/maps/fw?type=dc&year=2015&month=10&day=15

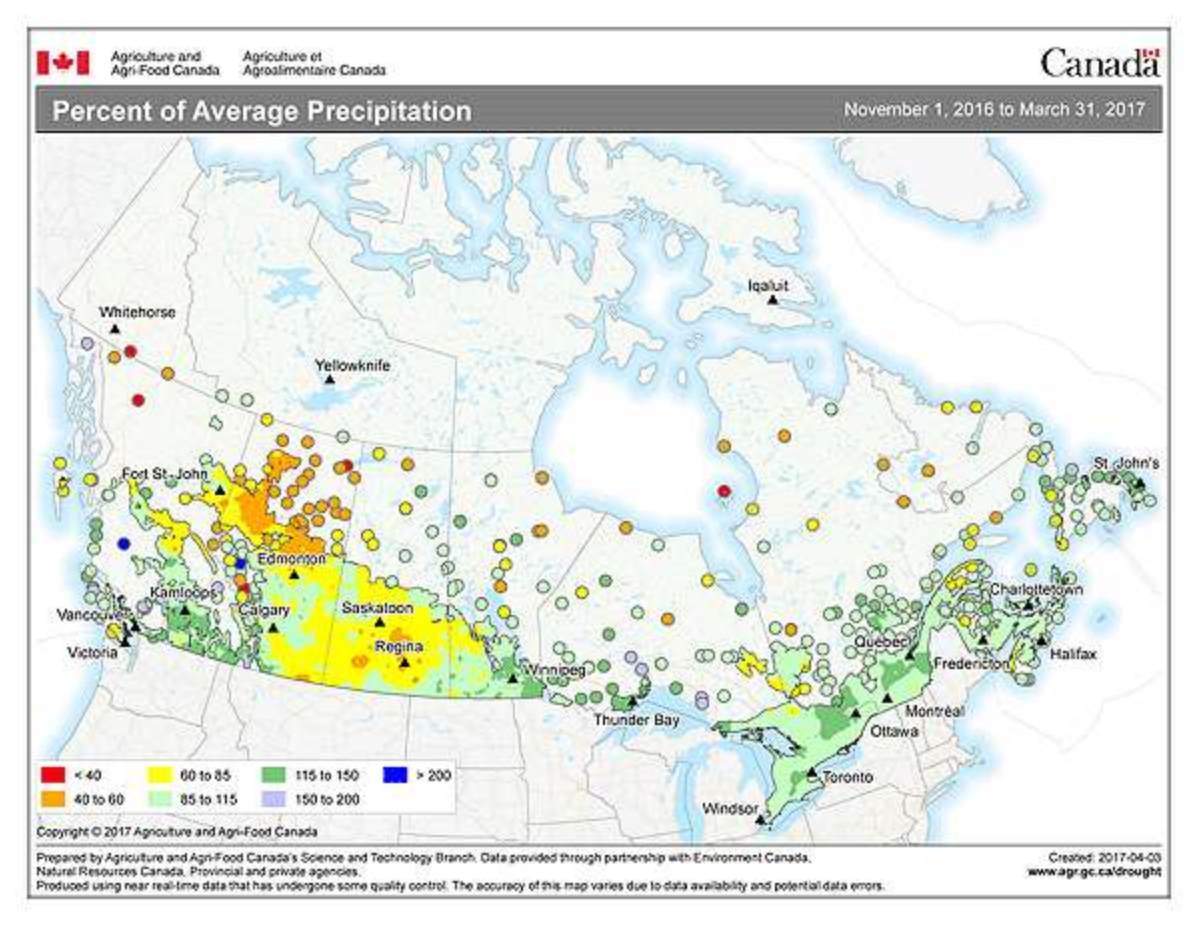
Spring Start-up Conditions



Canadian Drought Monitor indicates dry to moderate drought conditions in the Yukon, northern BC and Alberta, and parts of eastern Ontario/western Quebec.

http://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/nadm-maps.php

Overwinter Snowfall



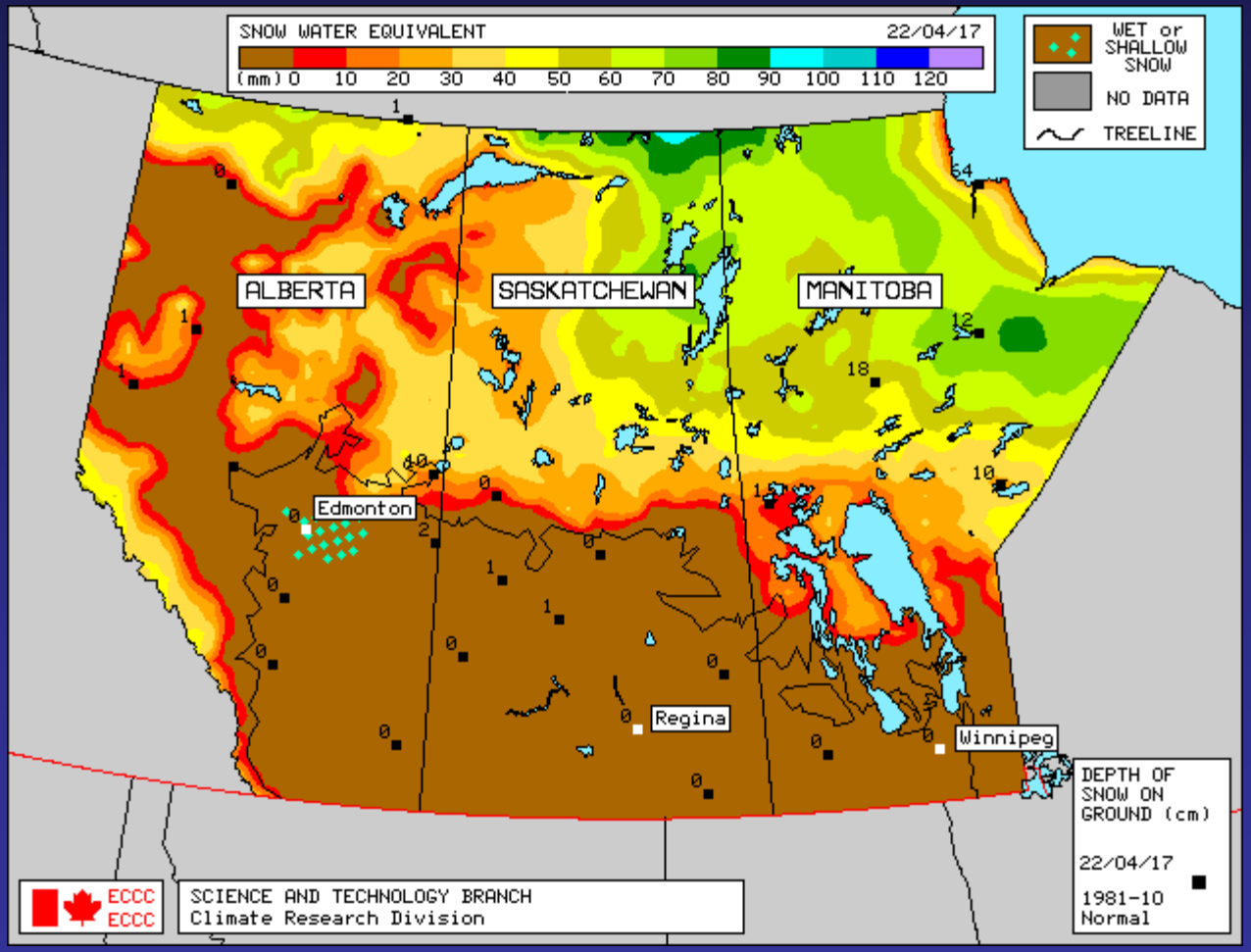
Snow amounts were well below normal in Yukon, Northern BC and Northern Alberta.

Elsewhere, Canada received average snowfall amounts.

http://www4.agr.gc.ca/DW-GS/current-actuelles.jspx?lang=eng&jsEnabled=true

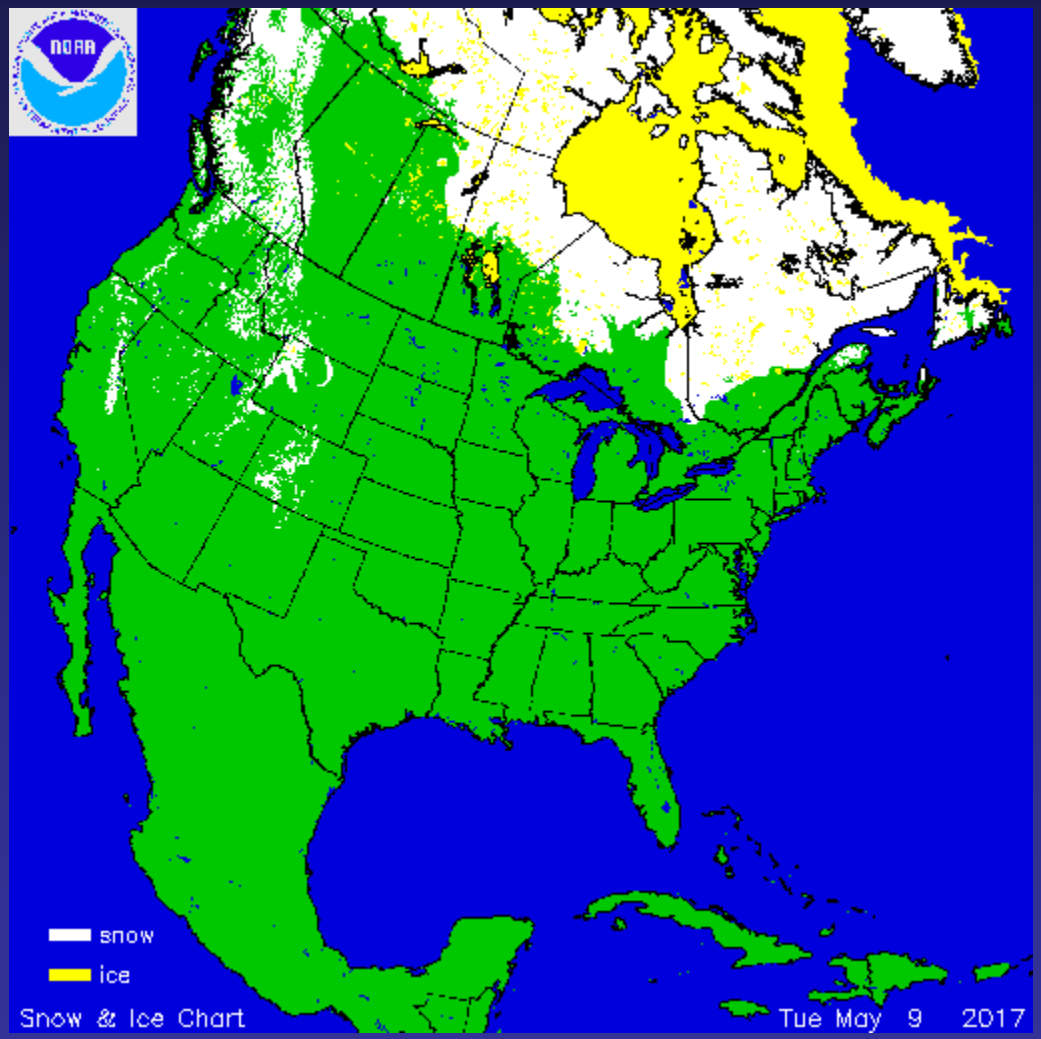
Overwinter Snowfall

Snow-water equivalent, as derived from SSM/I satellite data, show the snow-melt over the Prairies with significant snow amounts still over northern Saskatchewan and Manitoba.



https://www.ccin.ca/home/ccw/snow/current/swe

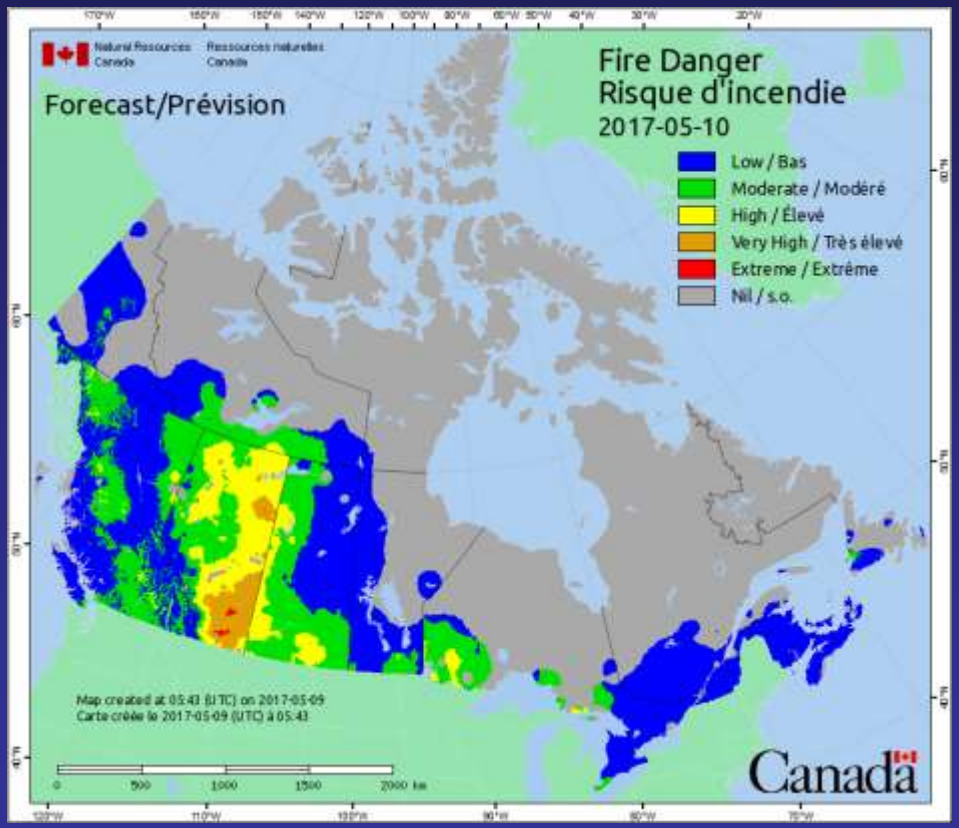
Overwinter Snowfall



Snow has now withdrawn from most of Canada with Alberta and much of western and southern Canada snowfree.

http://www.natice.noaa.gov/pub/ims/ims_gif/DATA/cursnow_usa.gif

Spring Start-up Conditions

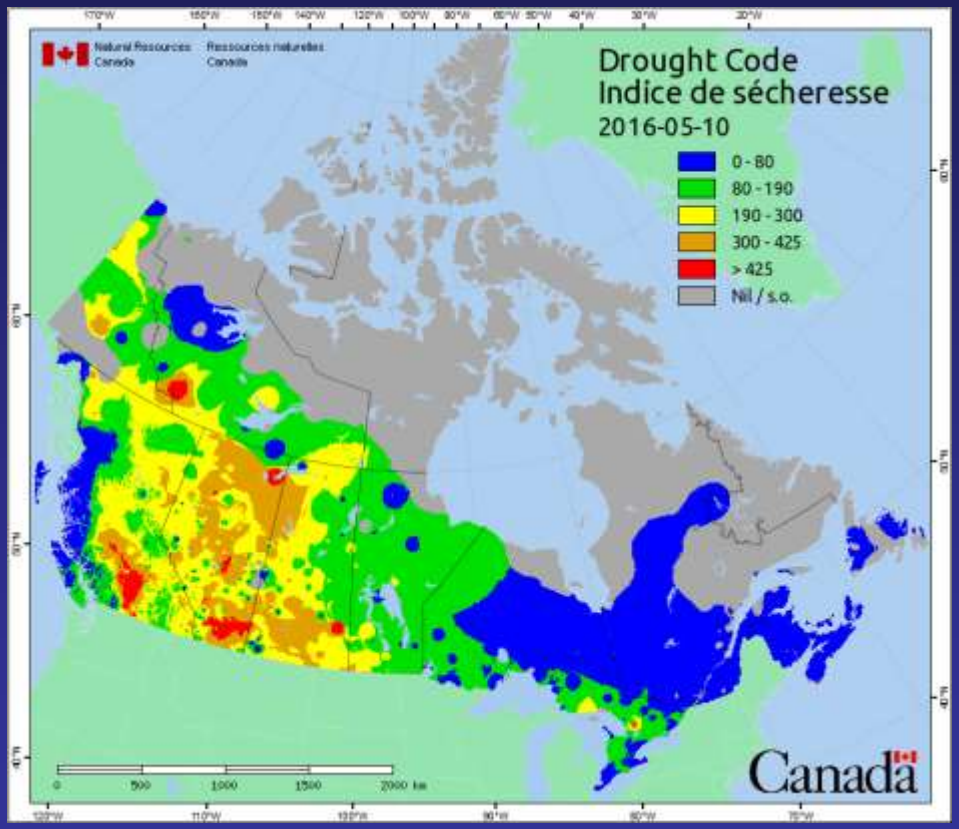


The late spring has kept much of Canada in below normal fire danger conditions.

Currently, northern Alberta is showing signs of high fire danger.

http://http://cwfis.cfs.nrcan.gc.ca/

Spring Start-up Conditions



Compared to last year, the 2017 fire season is looking very quiet.

http://http://cwfis.cfs.nrcan.gc.ca/

2017 Seasonal Prediction

ENSO Pattern

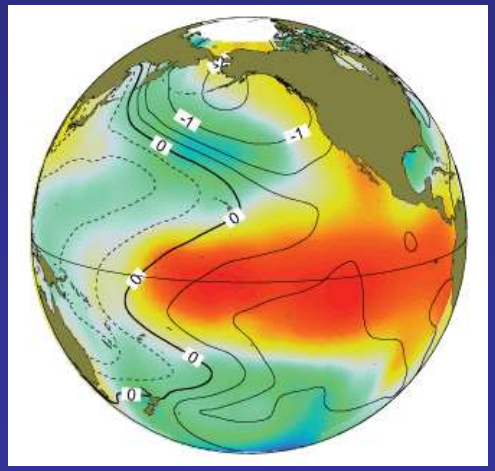
ENSO Pattern

El Niño–Southern Oscillation is a band of warm ocean water that can develop off the western coast of South America.

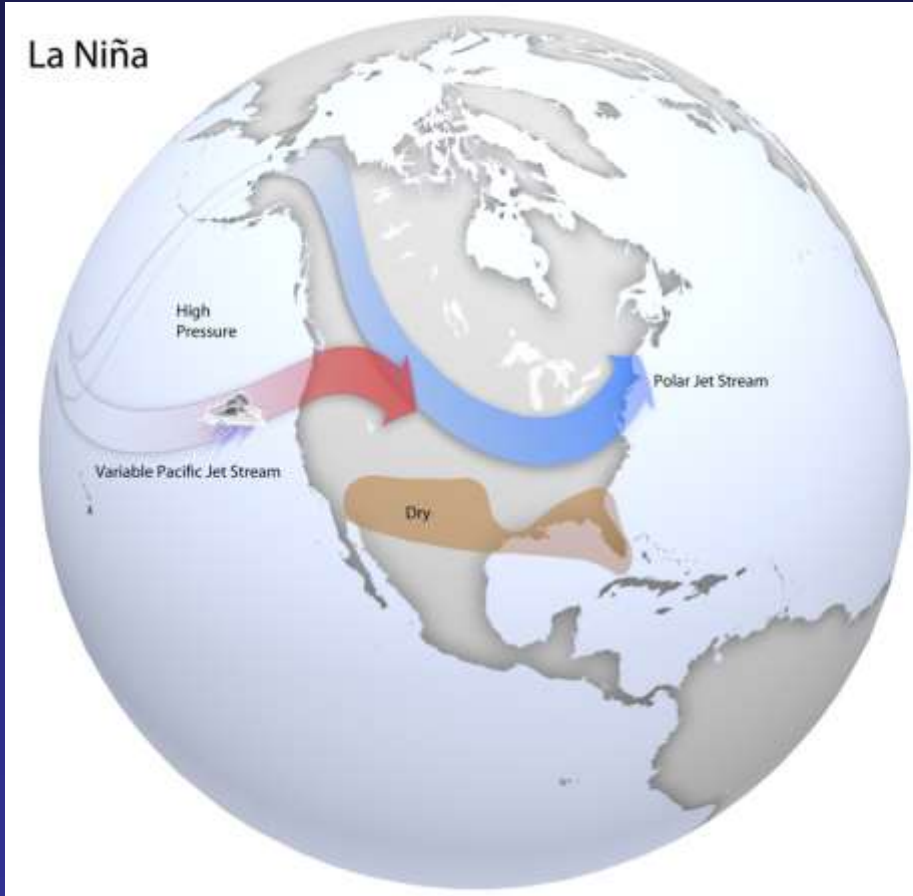
Extremes in this oscillations cause extreme weather (such as floods and droughts) in many regions of the world.

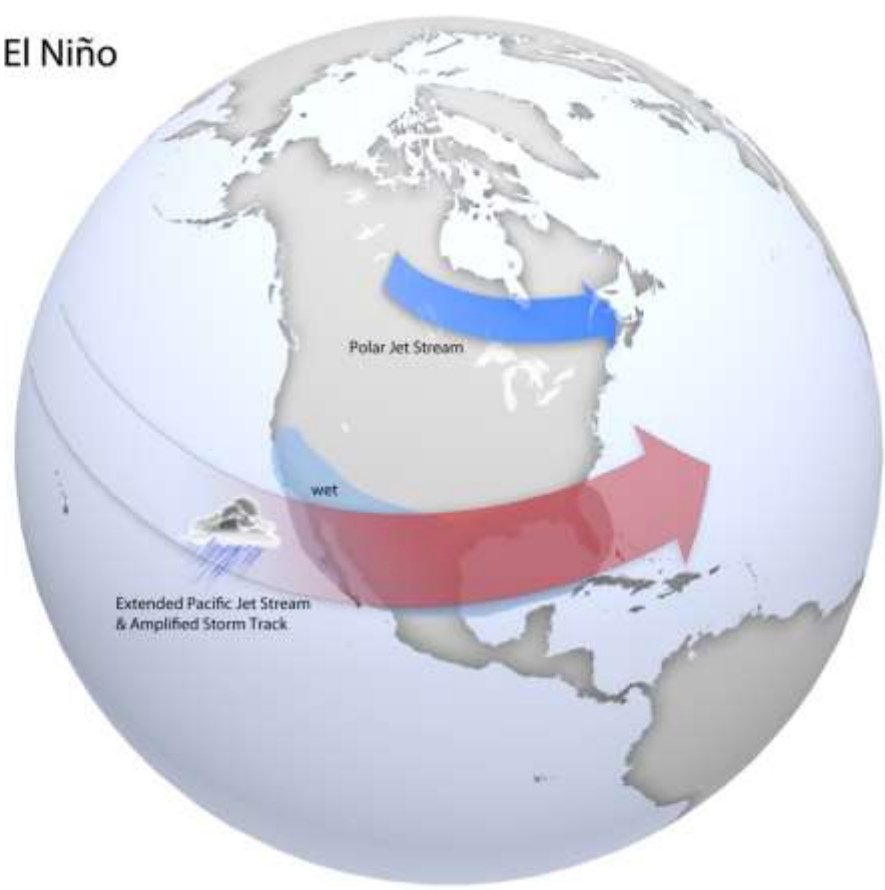
El Niño and La Nina events tend to develop during the period April-June and they

- tend to reach their maximum strength during Dec-Feb,
- typically persist for 9-12 months, though occasionally persisting for up to 2 years,
- typically recur every 2 to 7 years.



La Niña and El Niño Effects





La Niña

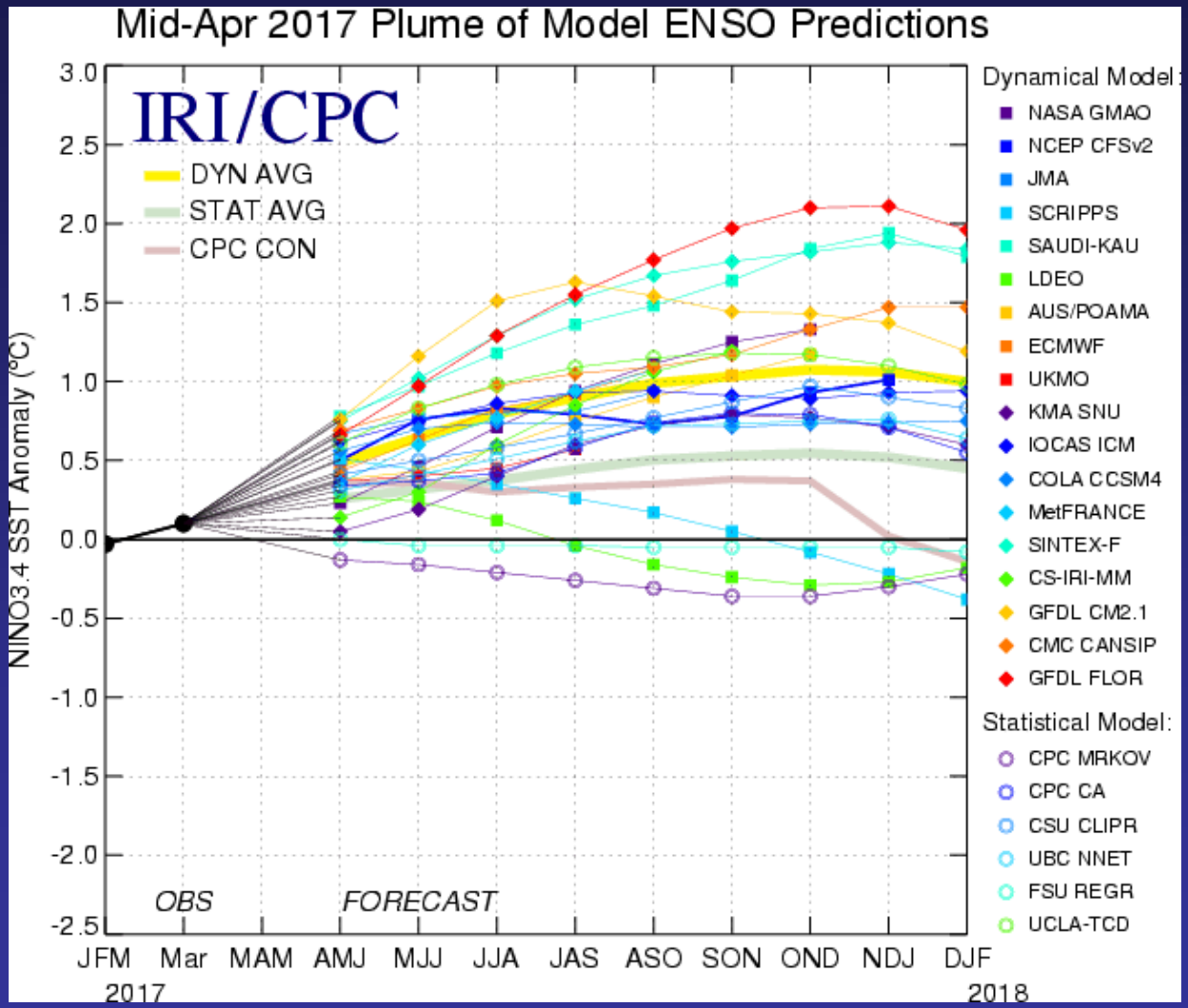
El Niño

La Niña and El Niño affects the jet stream pattern, which has significant impacts on temperature and precipitation patterns in Canada.

ENSO Pattern

Currently, La Niña have given way to neutral conditions.

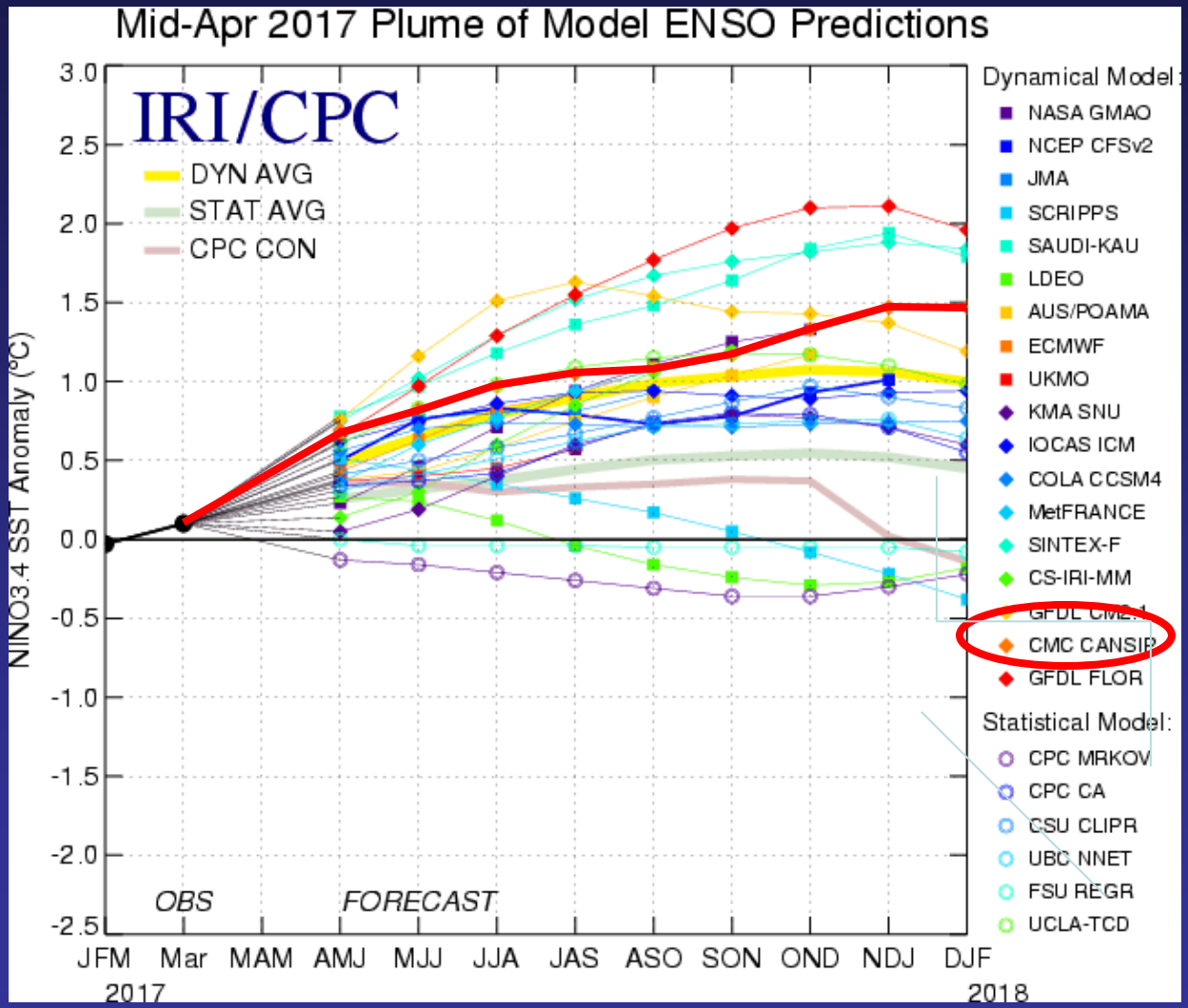
Models are suggesting El Niño conditions may develop late summer.



http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

ENSO Pattern

The Canadian CMC CANSIP model is predicting neutral conditions into July (lower than most models).



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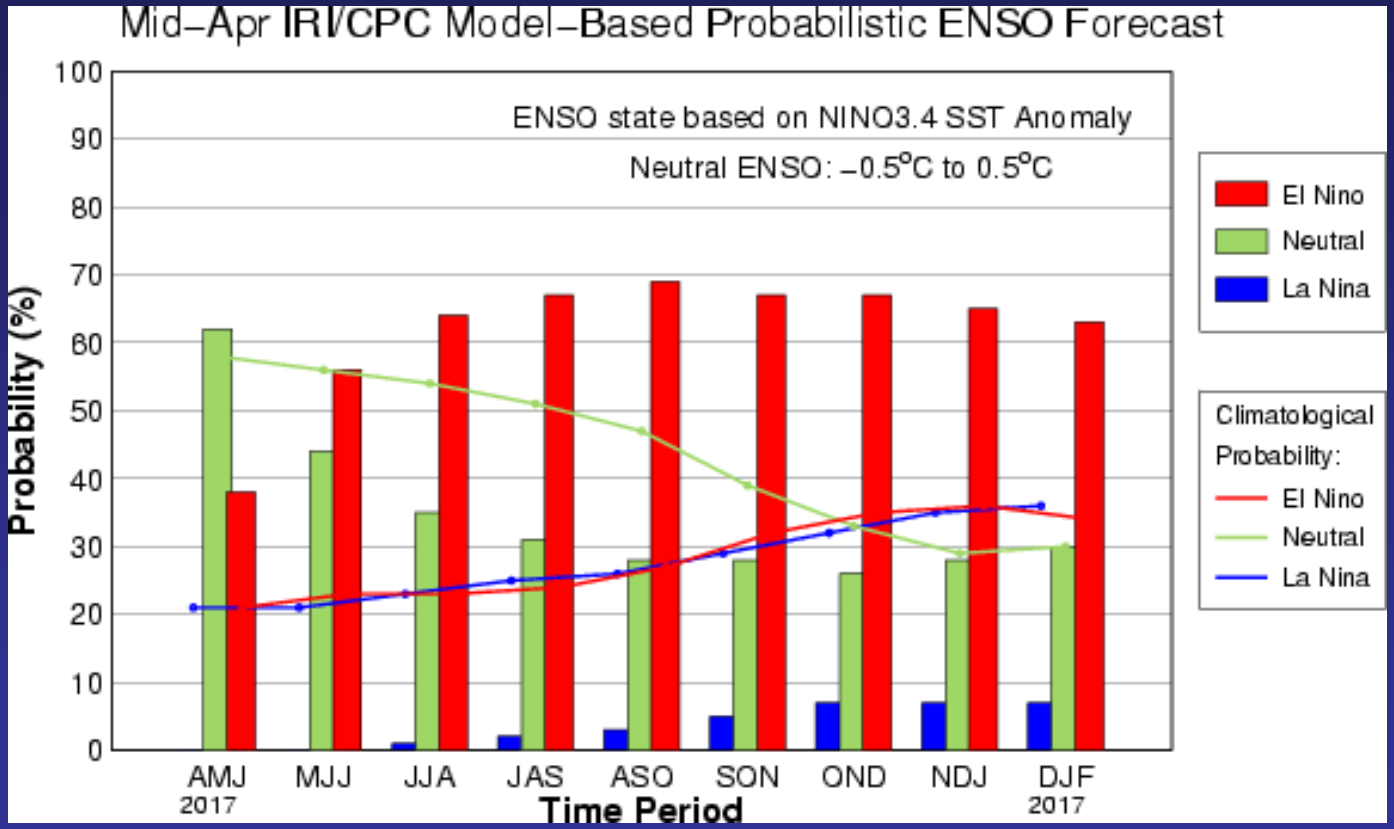
ENSO Pattern



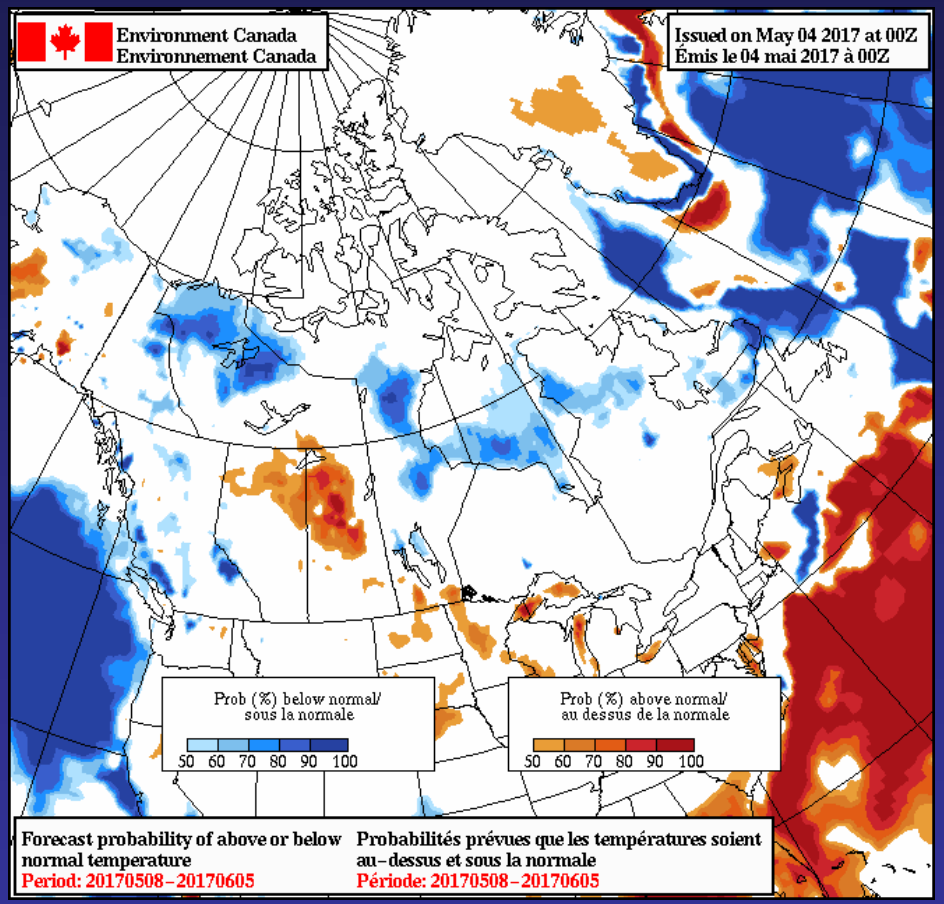
Consensus suggests El Niño to develop in August.

http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

2017 Seasonal Prediction

CMC Forecasts

Seasonal Forecasts



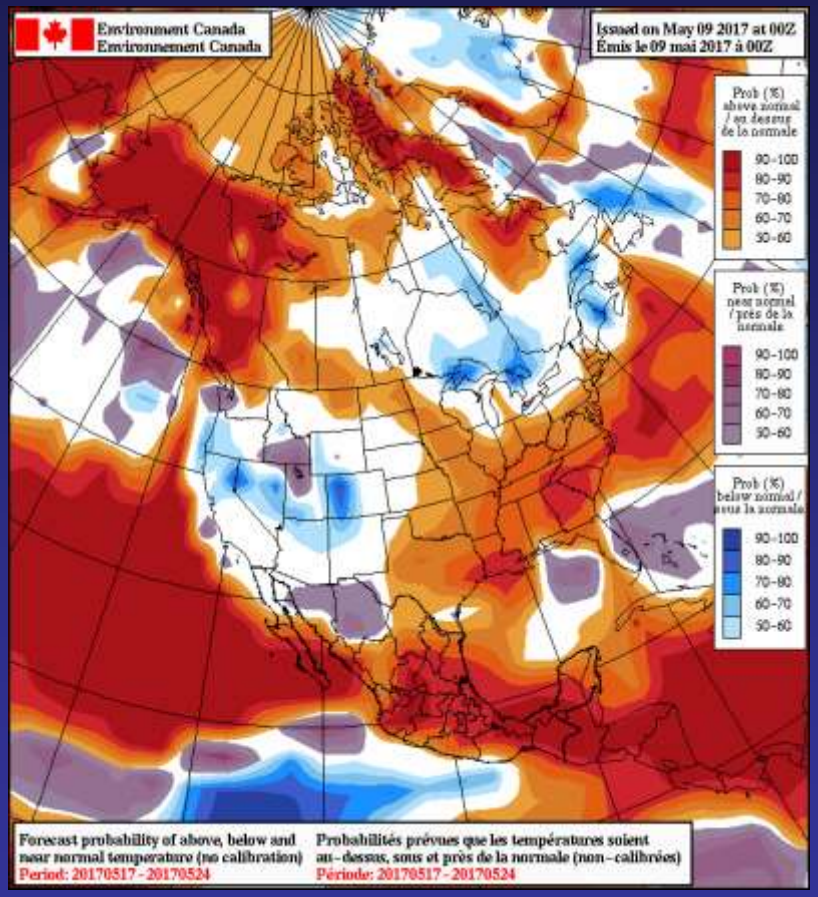
Monthly Forecast:

Temperature anomalies are average for most of Canada with the exception of part of northern Alberta and Saskatchewan.

May 8 – June 5

http://http://weather.gc.ca/saisons/image_e.html?img=mfe1t_s

Ensemble Forecasts



May 17– May 24

Day 8 to 14 Outlooks:

Temperatures are expected to rise in BC, Alberta, NWT and the Yukon in mid-May.

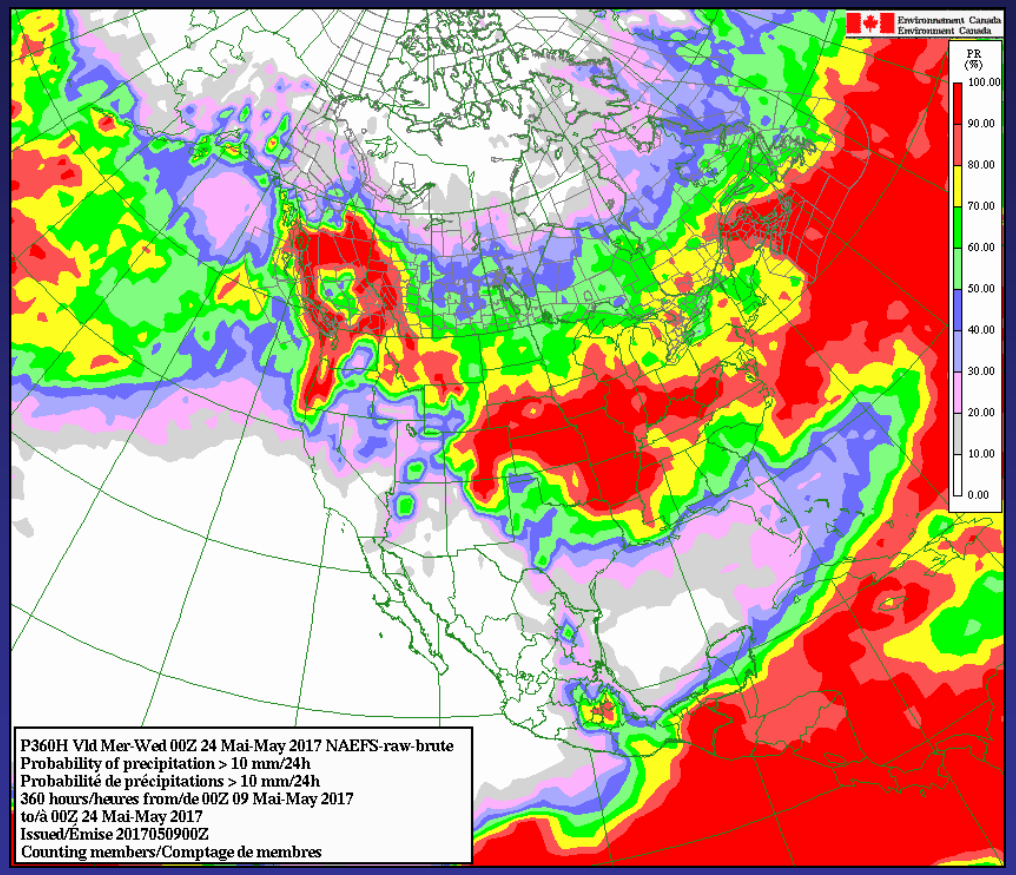
Eastern Canada will continue to see below average temperatures.

http://weather.gc.ca/ensemble/naefs/semaine2_combinee_e.html

Ensemble Forecasts

The probability of precipitation over 10 mm at least one day over the next two weeks:

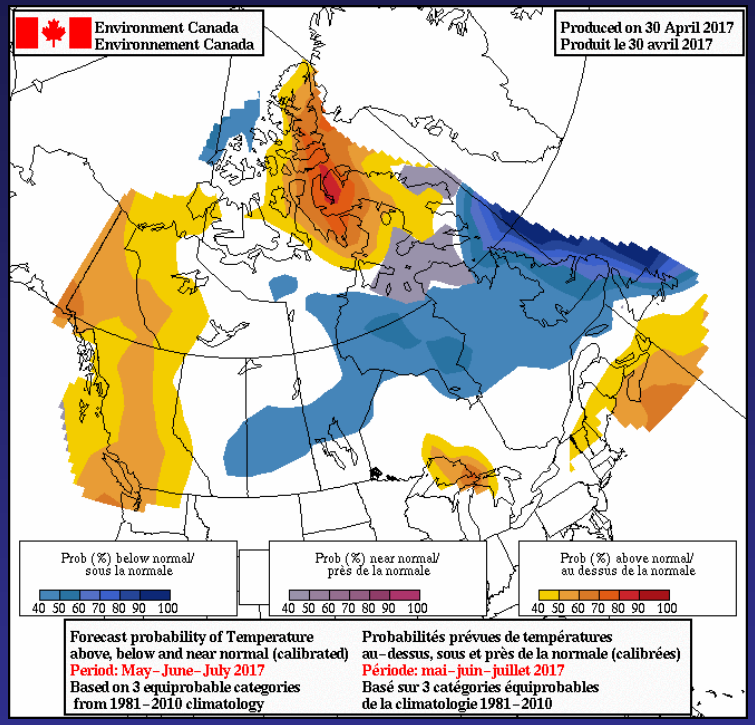
High for the west coast, northern BC, western Alberta and much of Quebec and the Maritimes.

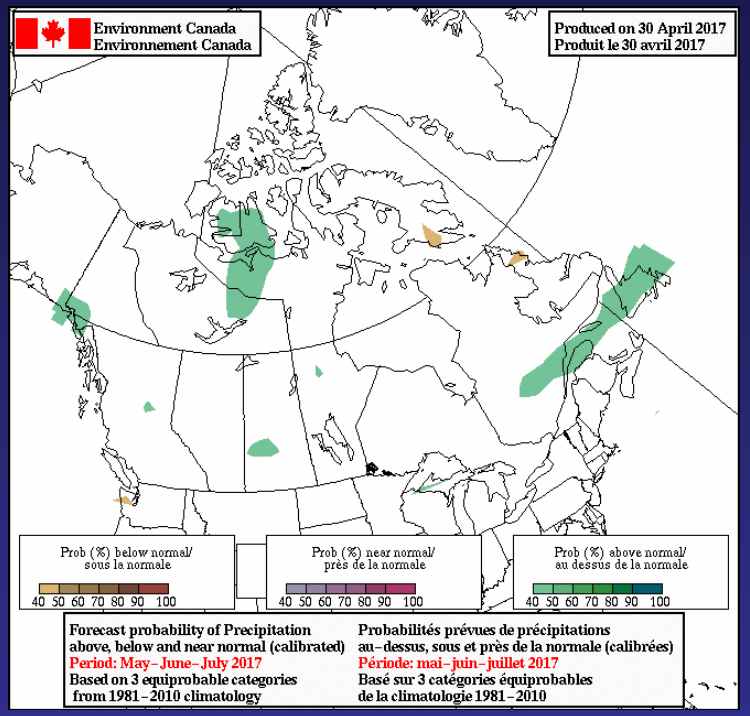


May 9 - May 24

http://weather.gc.ca/ensemble/naefs/produits_e.html

Seasonal Forecasts





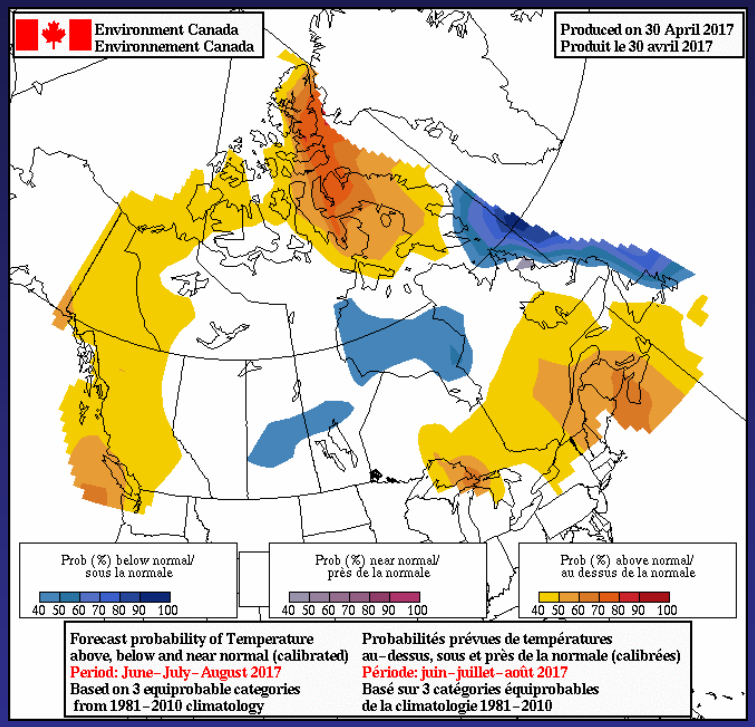
May-June-July

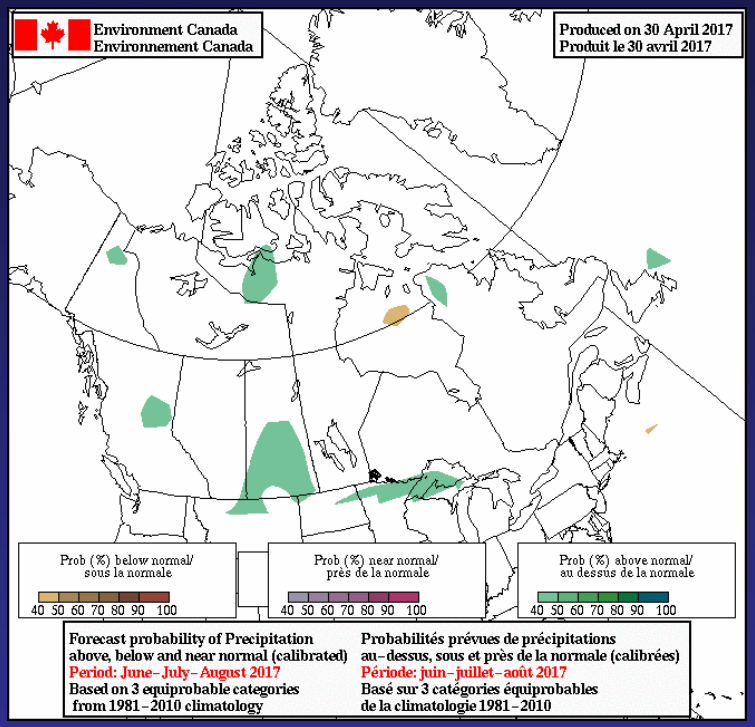
Above-average temperature are highly likely for most of Canada.

Above-average precipitation is possible for northern Ontario and Quebec.

http://weather.gc.ca/saisons/prob_e.html

Seasonal Forecasts





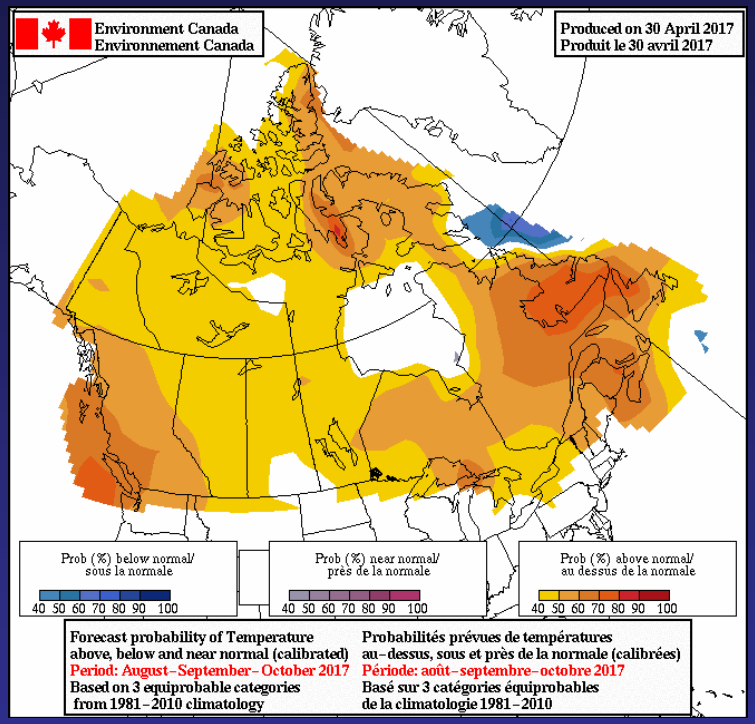
June-July-August

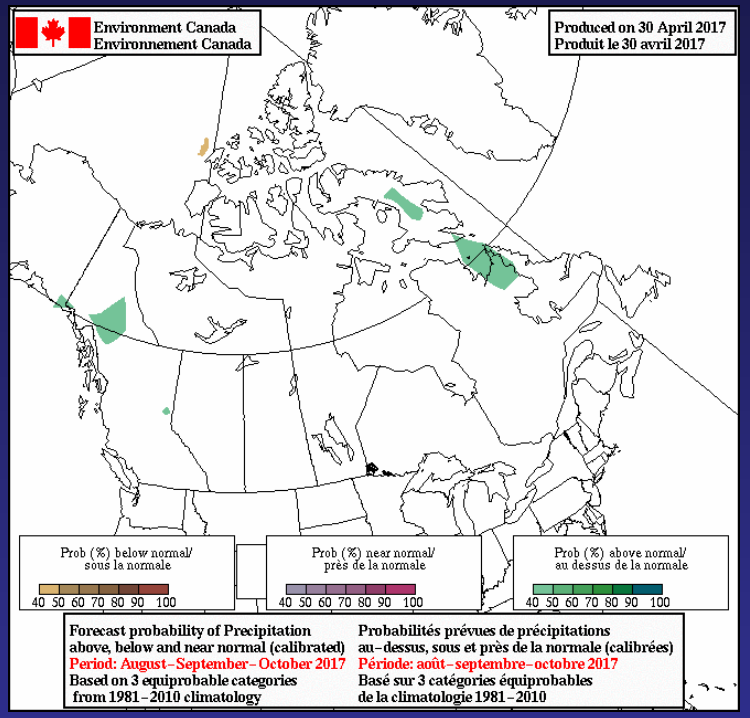
As summer develops, conditions normalize though central Canada, while above-average temperatures are less than the previous period.

Normal precipitation is forecasted.

http://weather.gc.ca/saisons/prob_e.html

Seasonal Forecasts





August-September-October

Above-average temperatures will likely persist across Canada (mostly in the east) into the late summer.

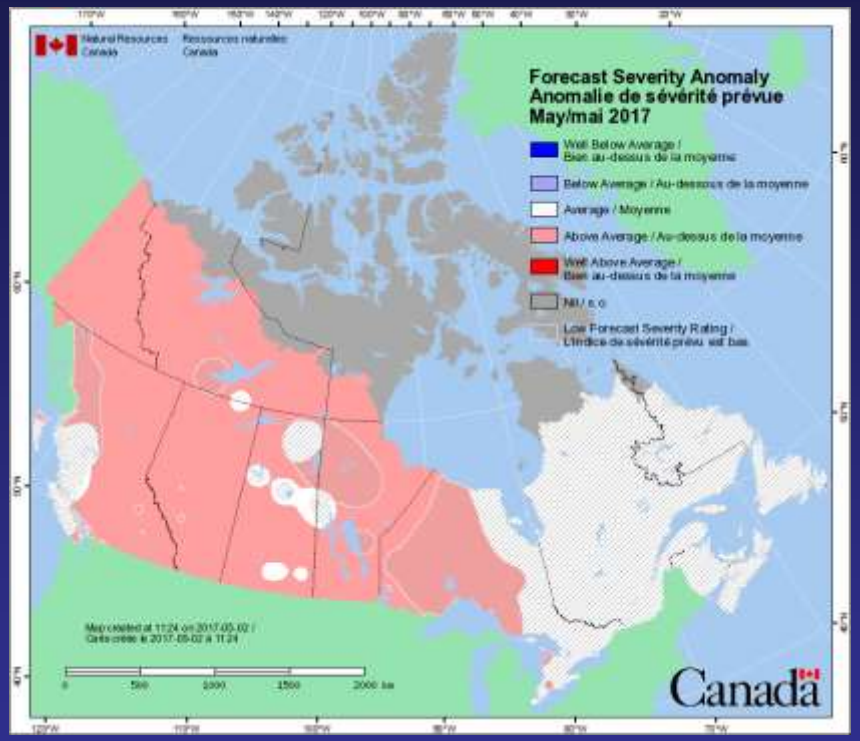
Above-average precipitation is likely only in the northern BC and Yukon.

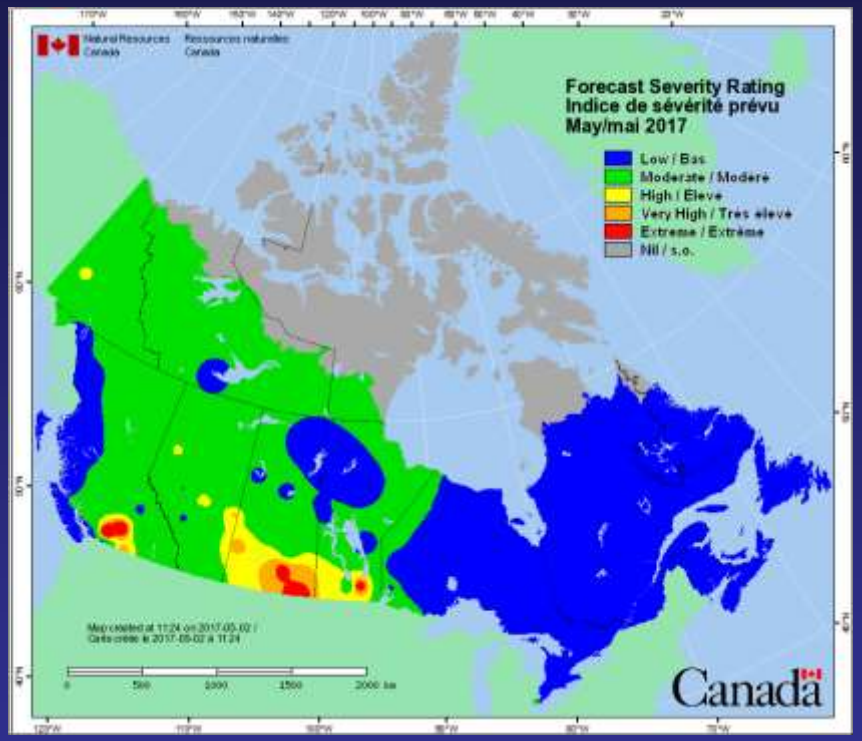
http://weather.gc.ca/saisons/prob_e.html

2017 Seasonal Prediction

Model Predictions

May 2017



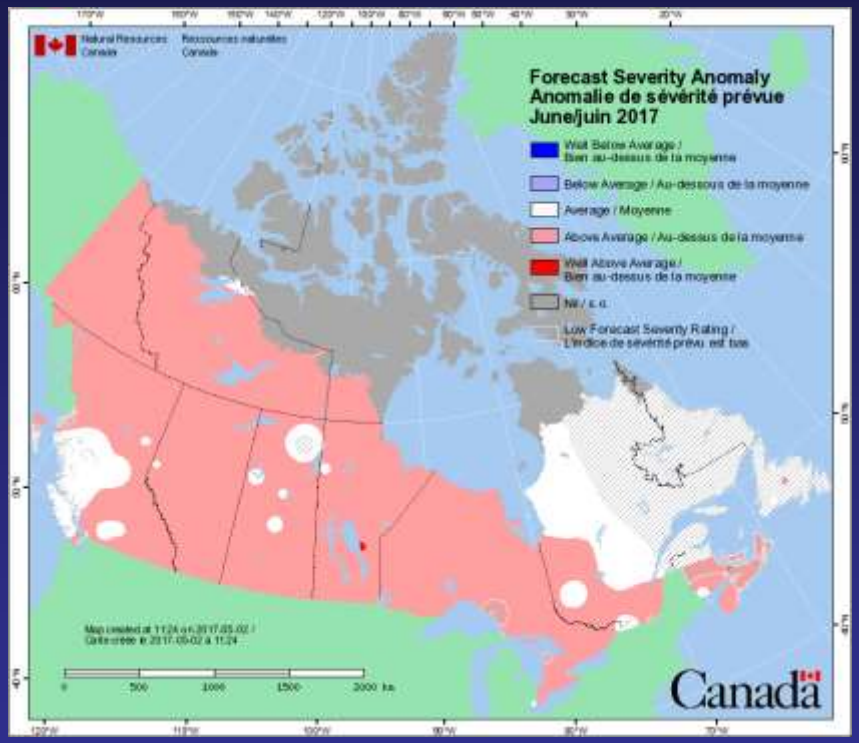


Anomaly
(predicted values normalized against average weather)

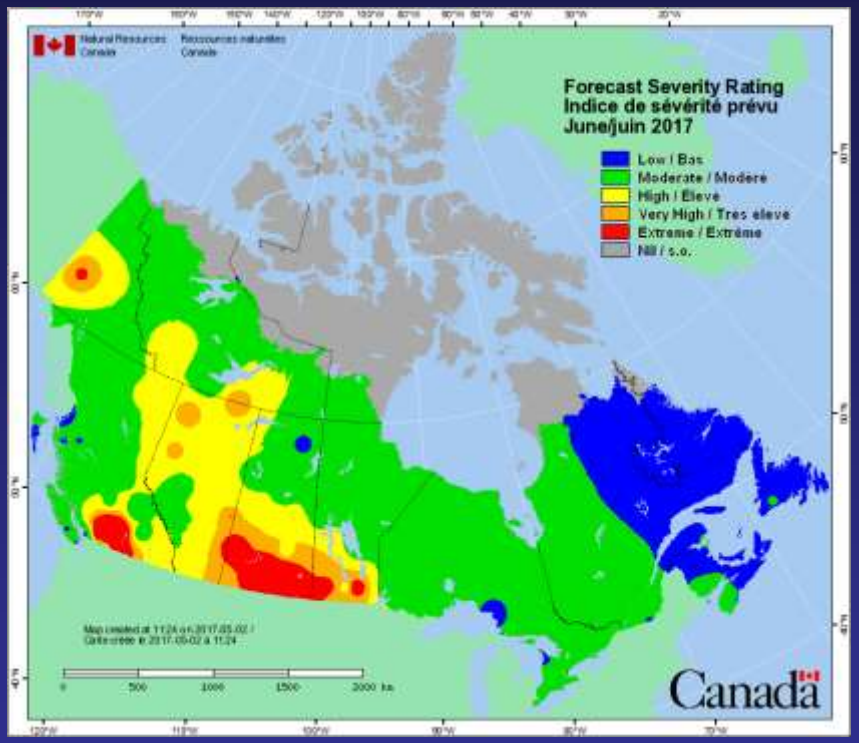
Forecast
(Monthly Severity Rating)

Above-average conditions cover much of western Canada, with the exception of southern BC and the Alberta foothills.

June 2017



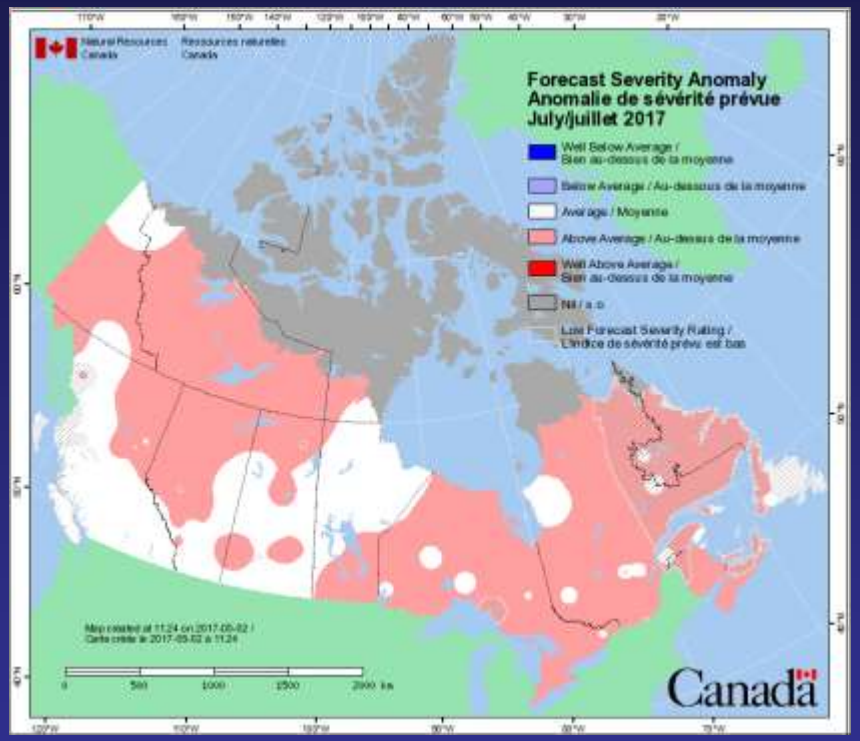
Prediction
(predicted values normalized against average weather)



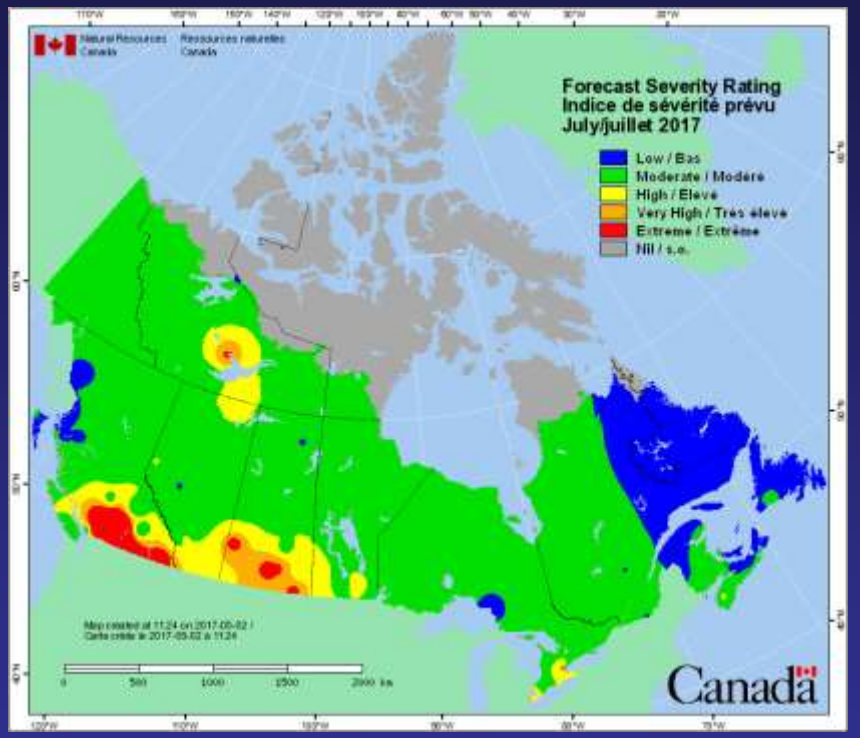
Forecast
(Monthly Severity Rating)

Above-average expand to stretch from Yukon to Ontario as well as parts of Quebec and the Maritimes.

July 2017



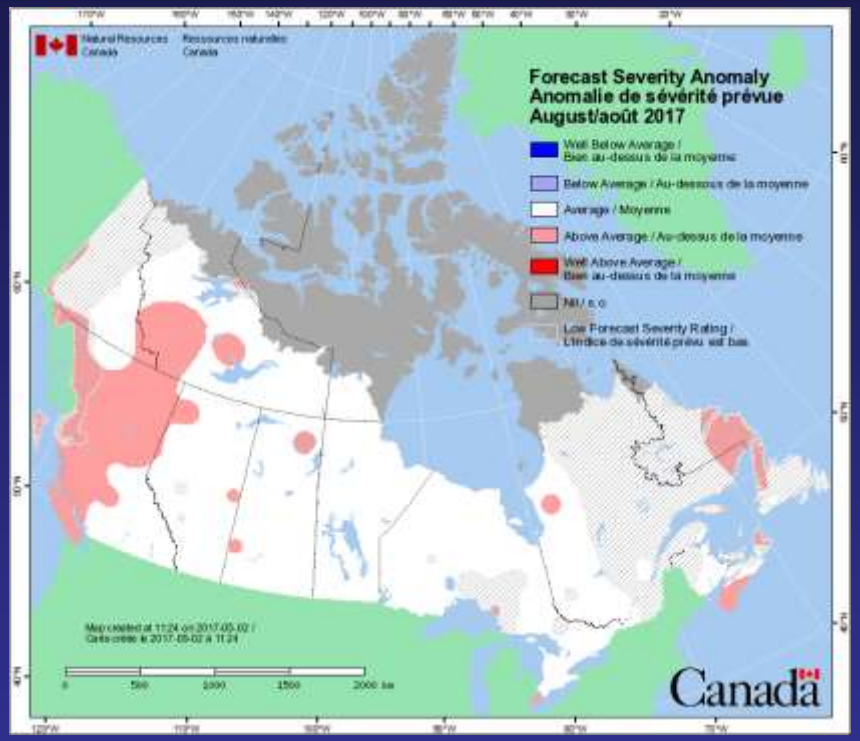
Prediction
(predicted values normalized against average weather)



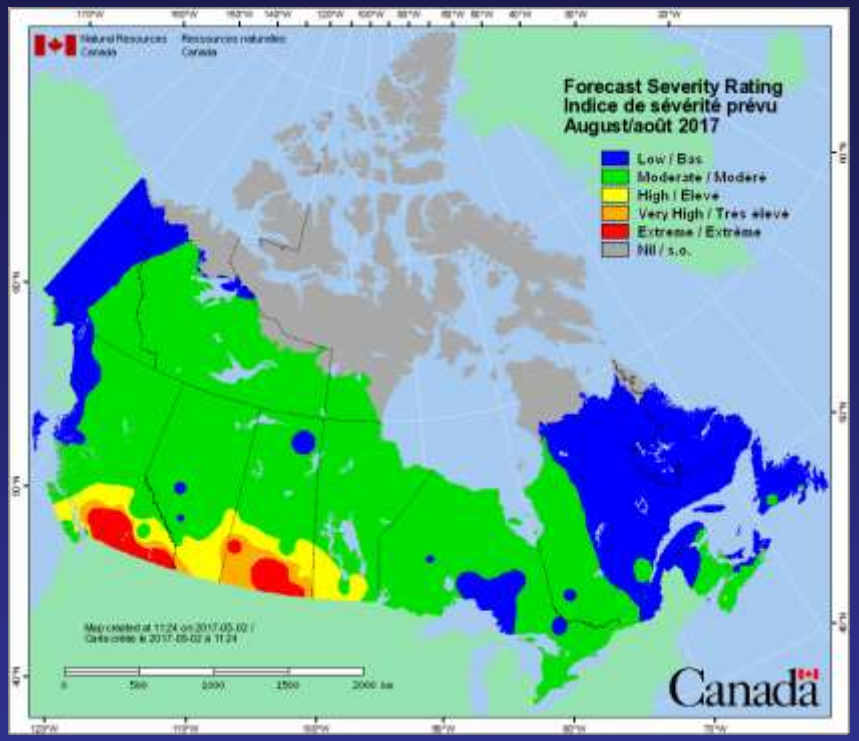
Forecast
(Monthly Severity Rating)

As summer develops, fire danger conditions begin to settle though above-average conditions are still present in the northwest and in the east.

August 2017



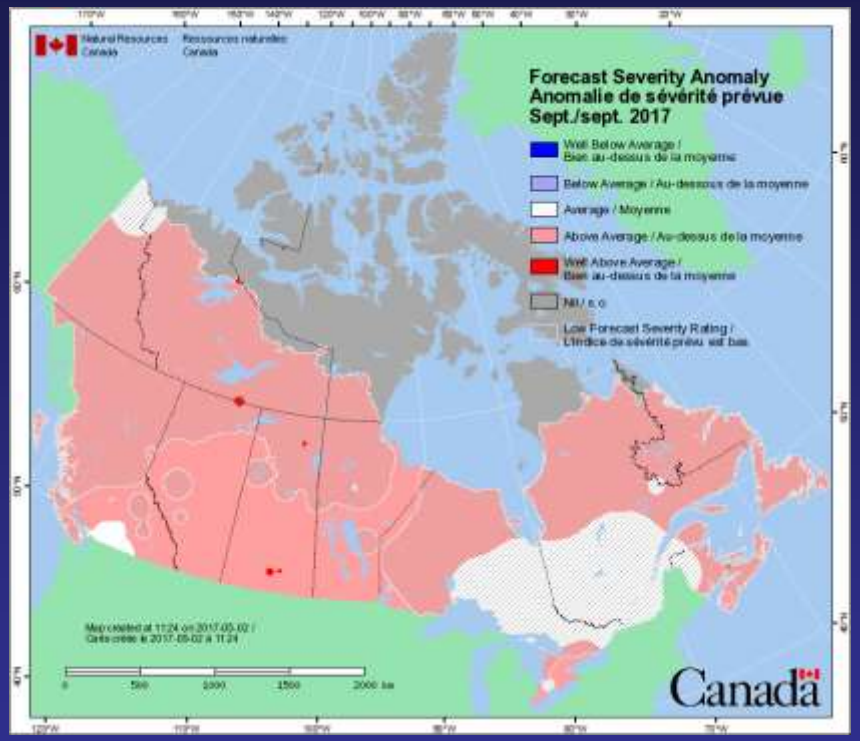
Prediction
(predicted values normalized against average weather)

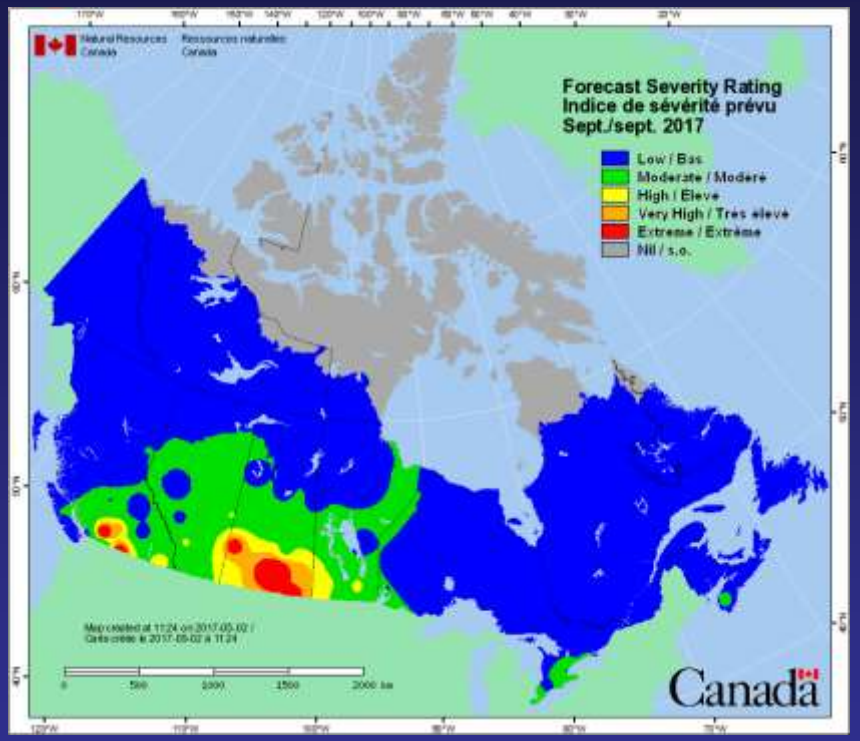


Forecast
(Monthly Severity Rating)

Conditions fall to normal with only BC, NWT and NS showing any fire danger conditions.

September 2017



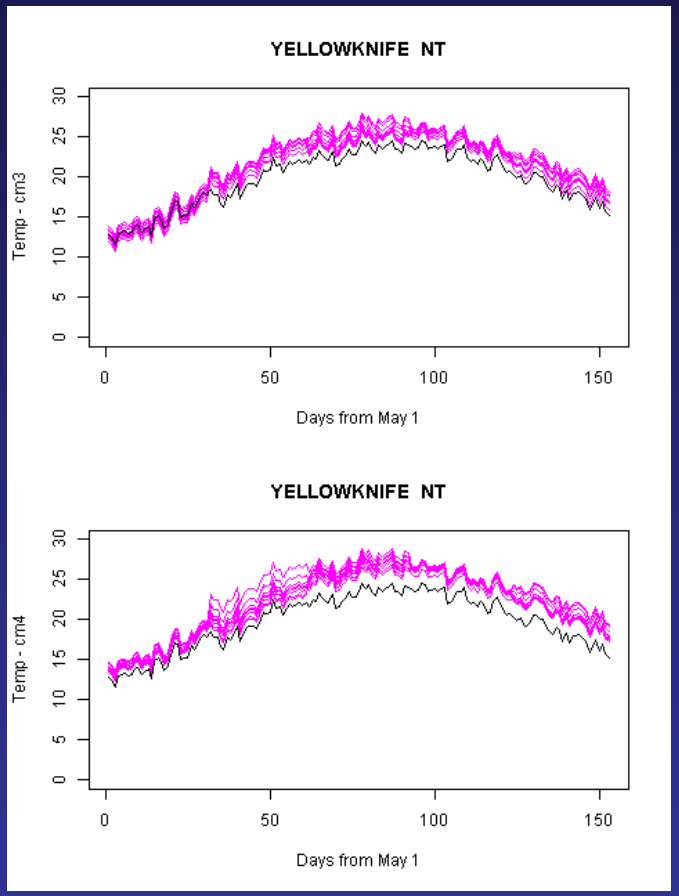


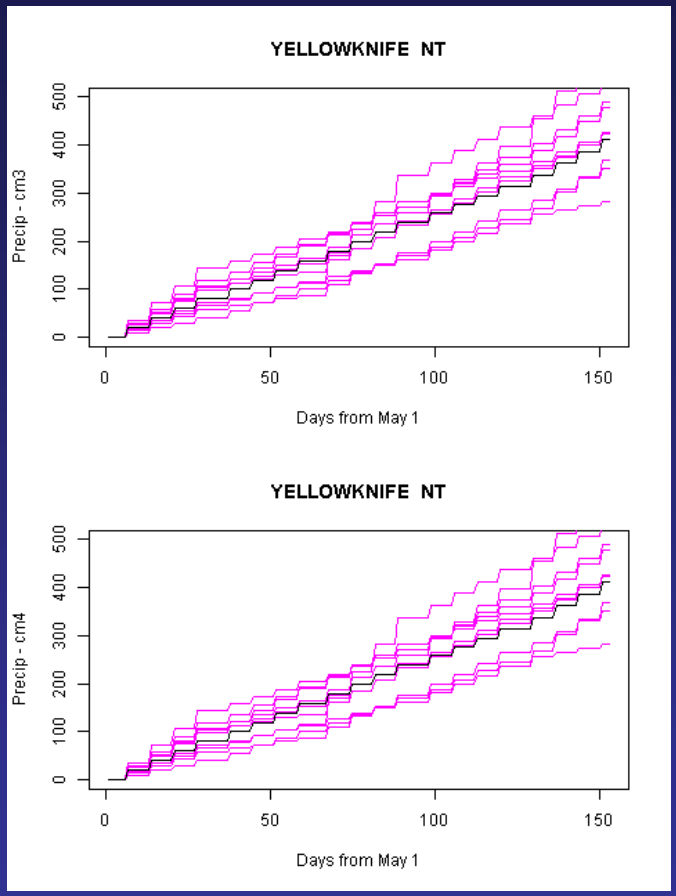
Prediction
(predicted values normalized against average weather)

Forecast
(Monthly Severity Rating)

As fall takes hold, only central Alberta and Saskatchewan and southern BC may see activity.

Yellowknife 2017



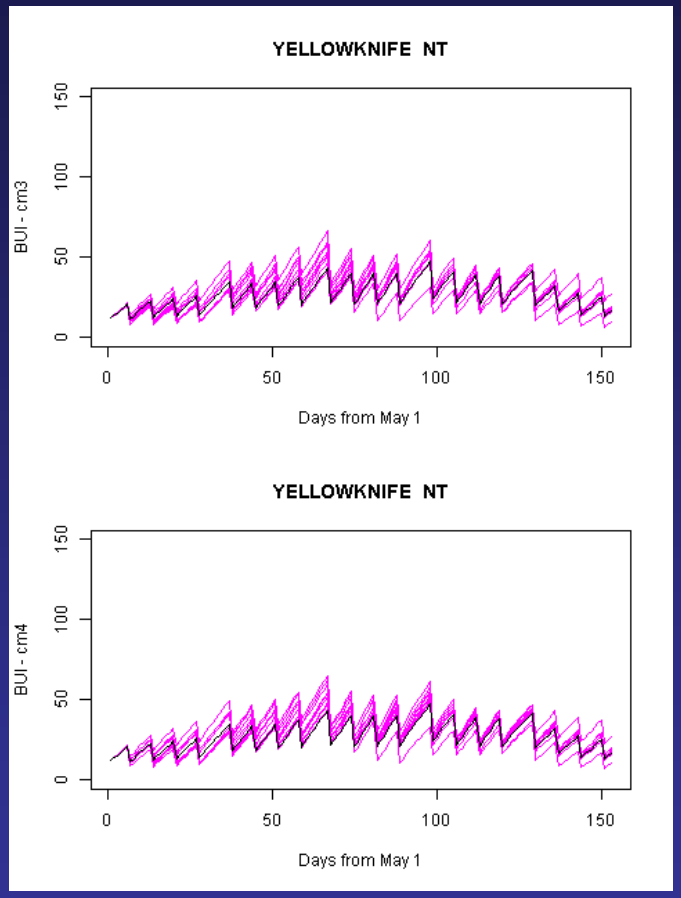


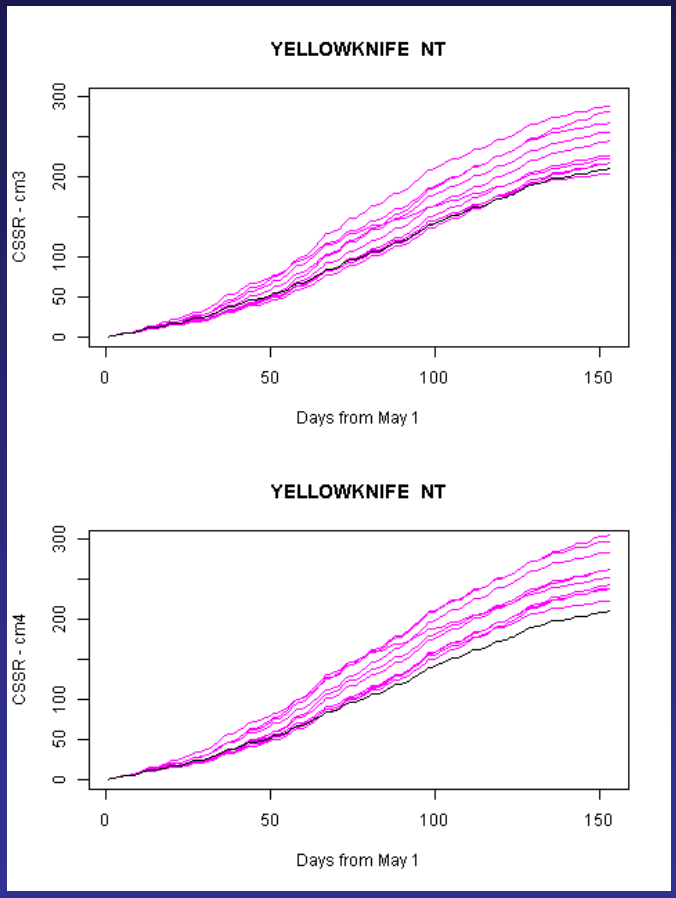
Temperature

Precipitation

Yellowknife shows above-average temperatures for the entire summer while precipitation appear to be average.

Yellowknife 2017



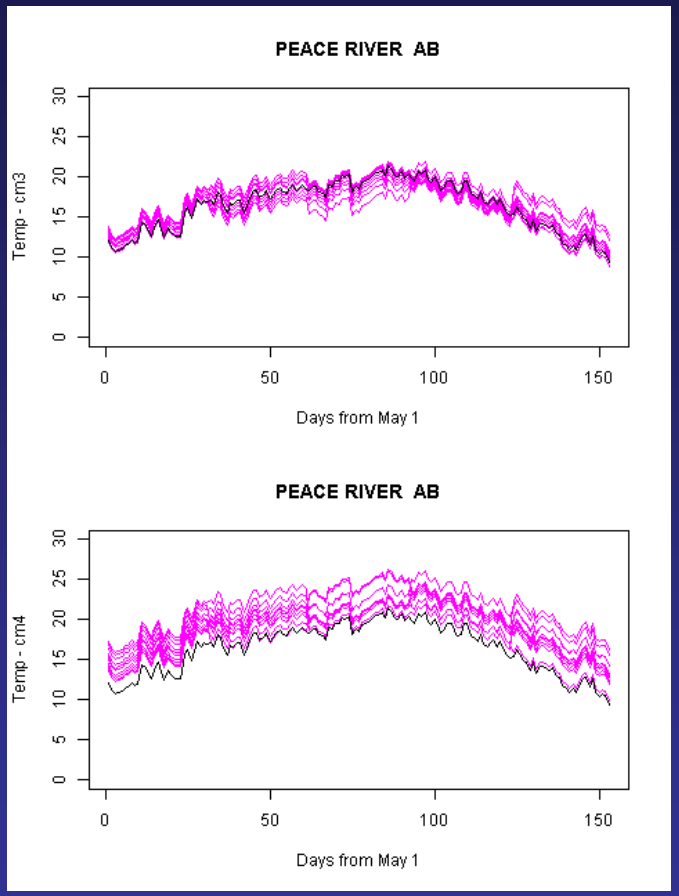


BUI

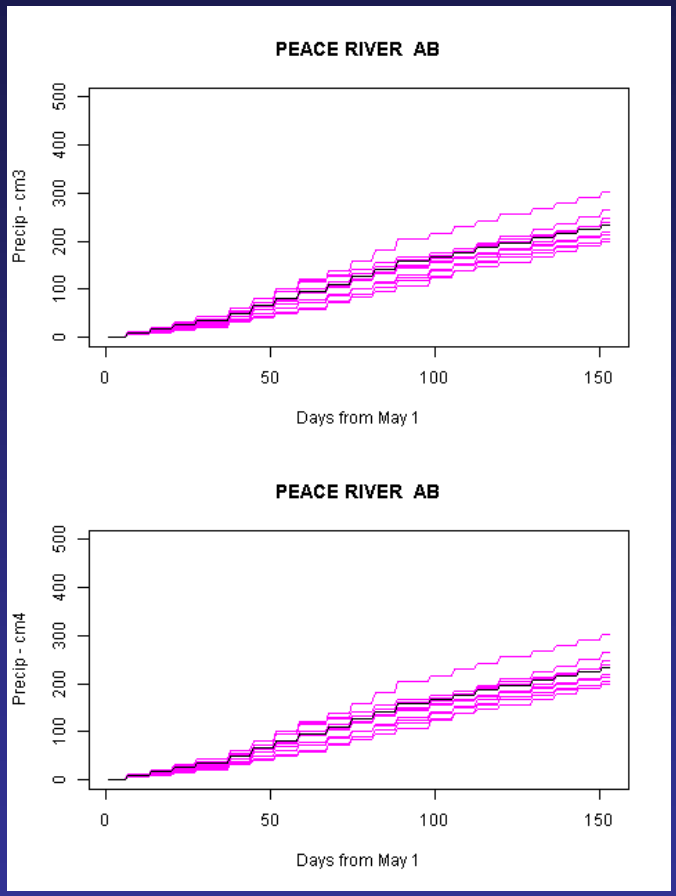
CSSR

Yellowknife may see an elevated BUI conditions in May and June but this drops to average values for the remainder of the season.

Peace River 2017



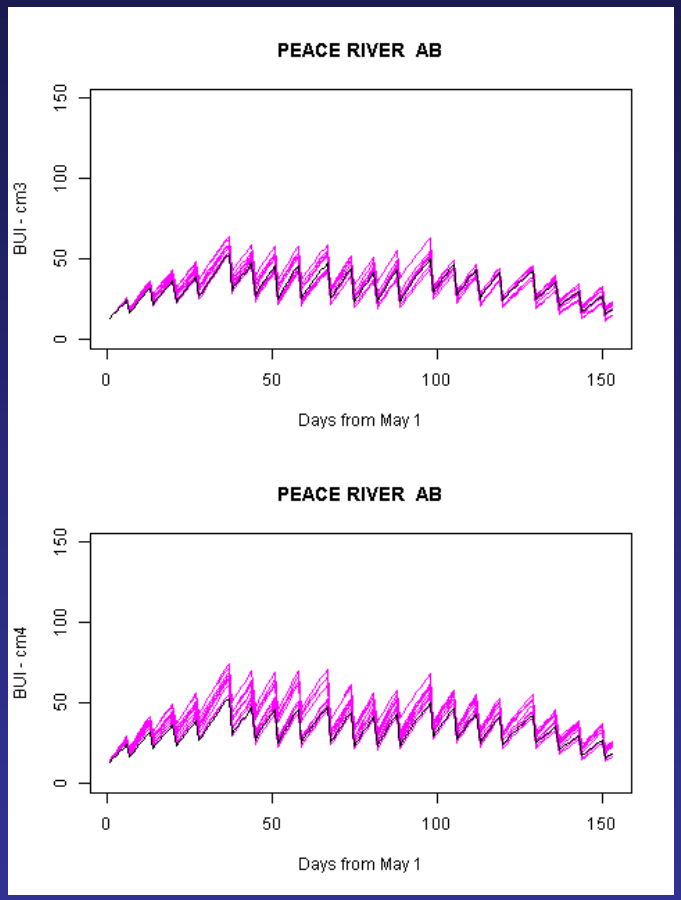
Temperature

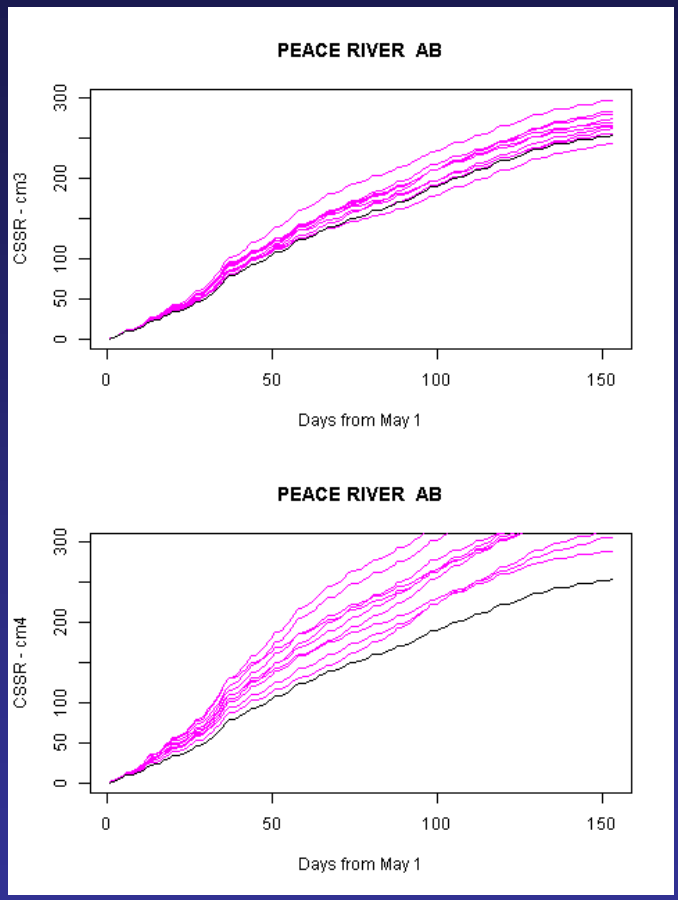


Precipitation

While Peace River show average temperatures (cm3) both models show below-average precipitation for most of the summer.

Peace River 2017



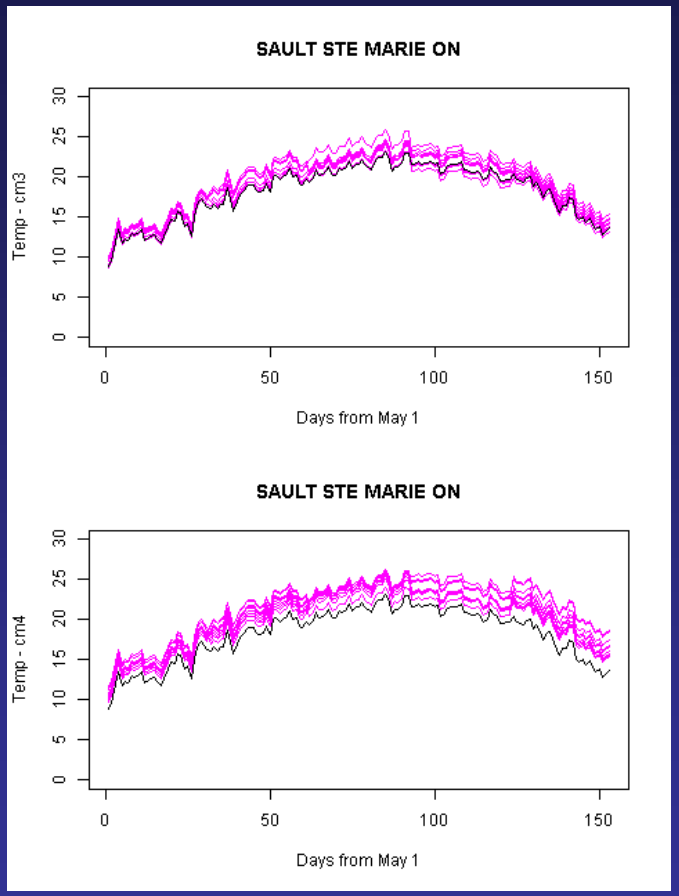


BUI

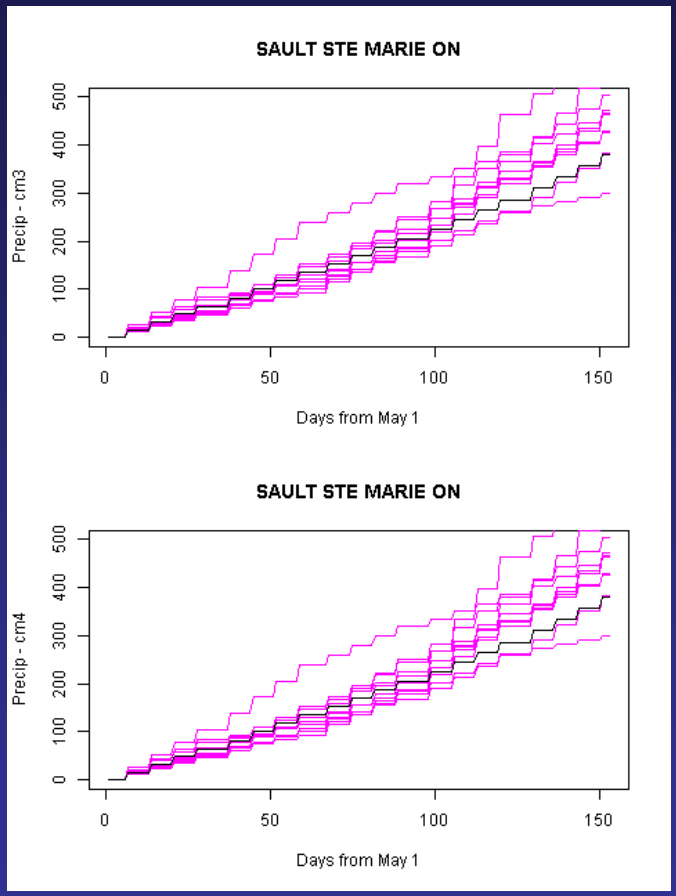
CSSR

Elevated BUI conditions in May and June but conditions normalize in July and August.

Sault Ste. Marie 2017



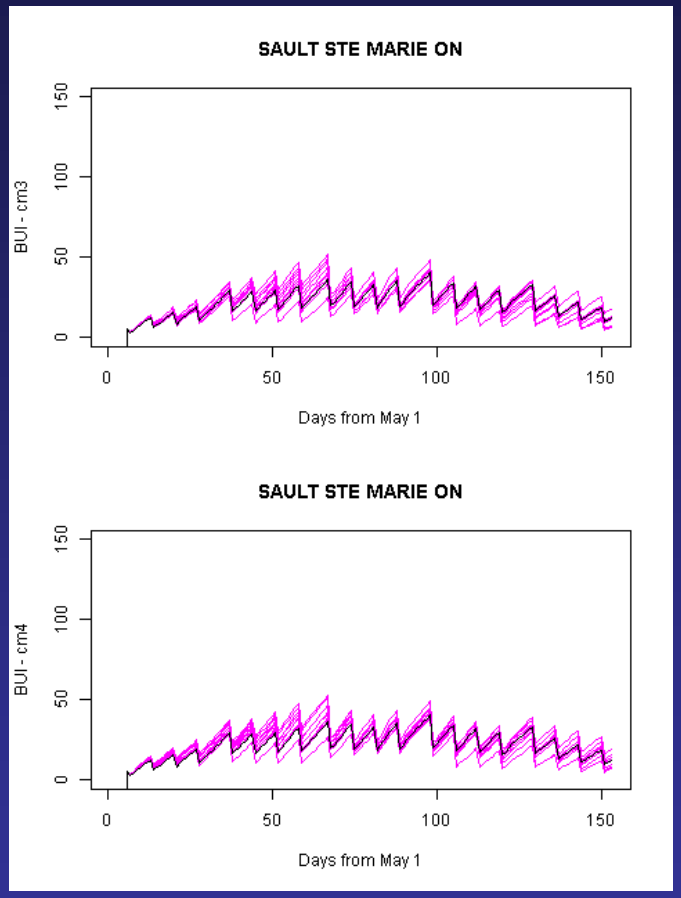
Temperature

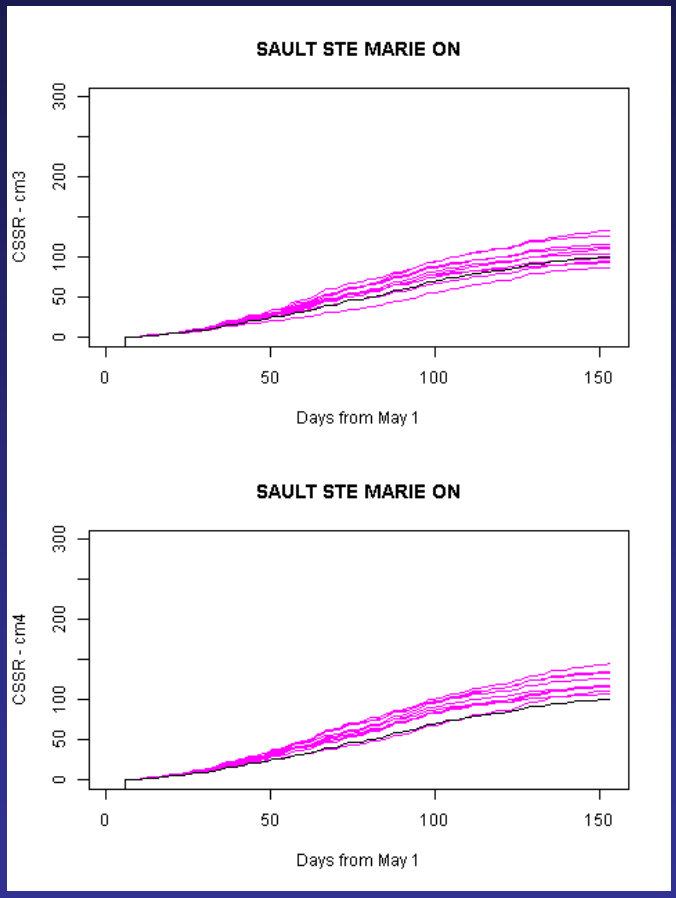


Precipitation

Above-average temperatures for most of the summer along with below-average precipitation until August.

Sault Ste. Marie 2017



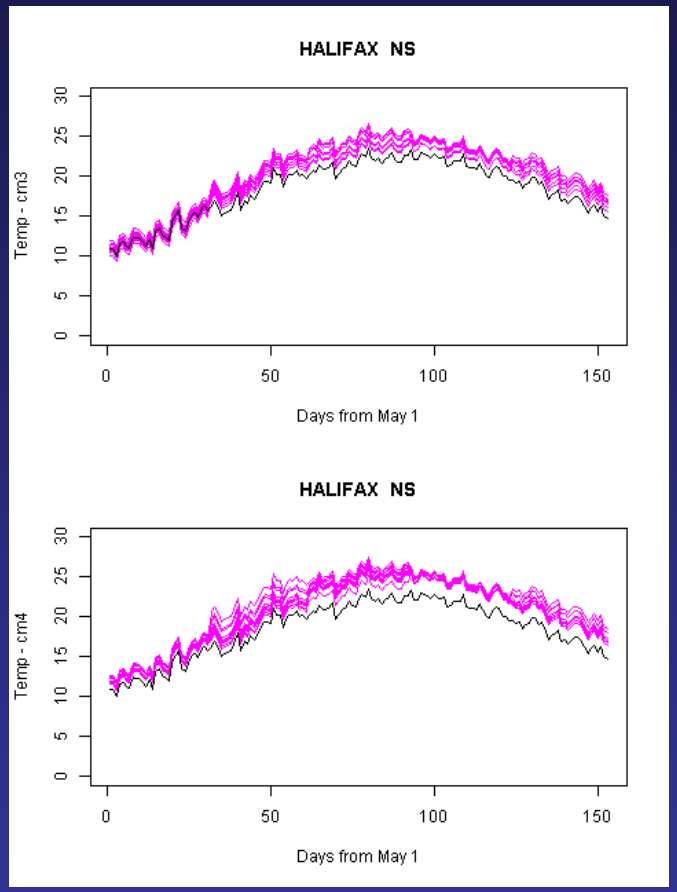


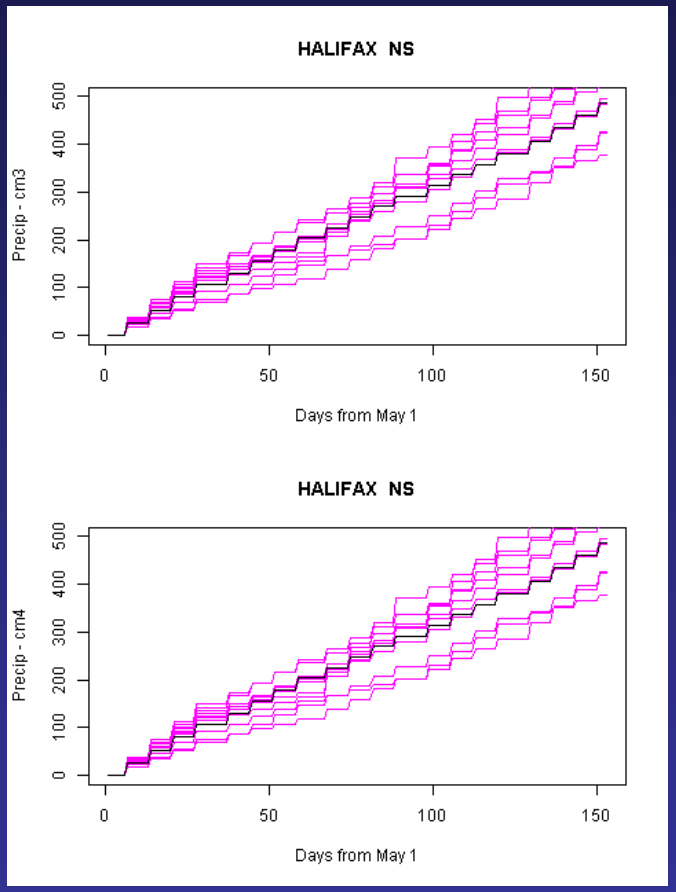
BUI

CSSR

The BUI pattern in eastern Canada is typically less dramatic but still above average May and June.

Halifax 2017



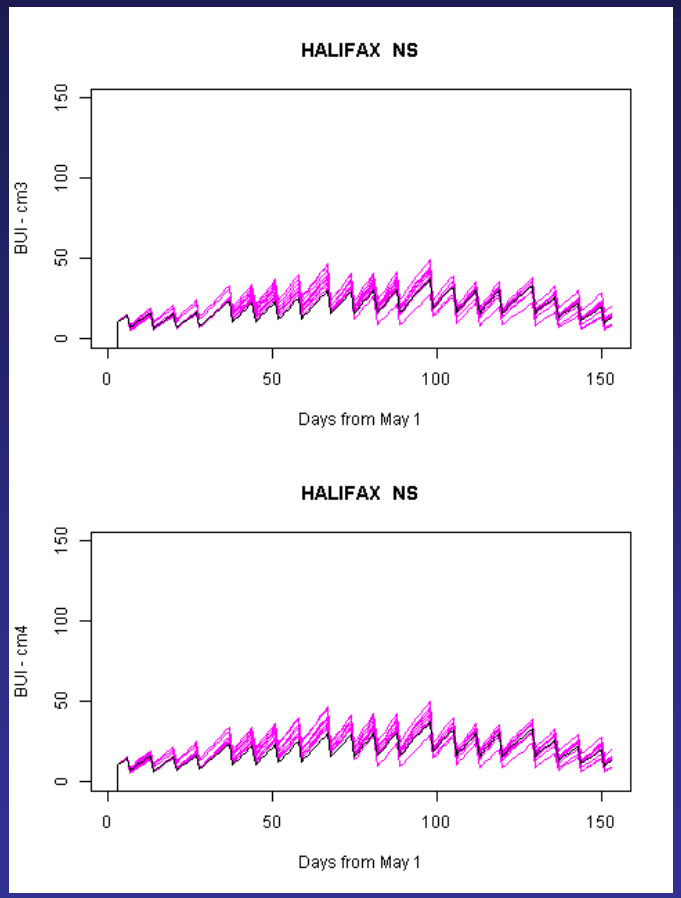


Temperature

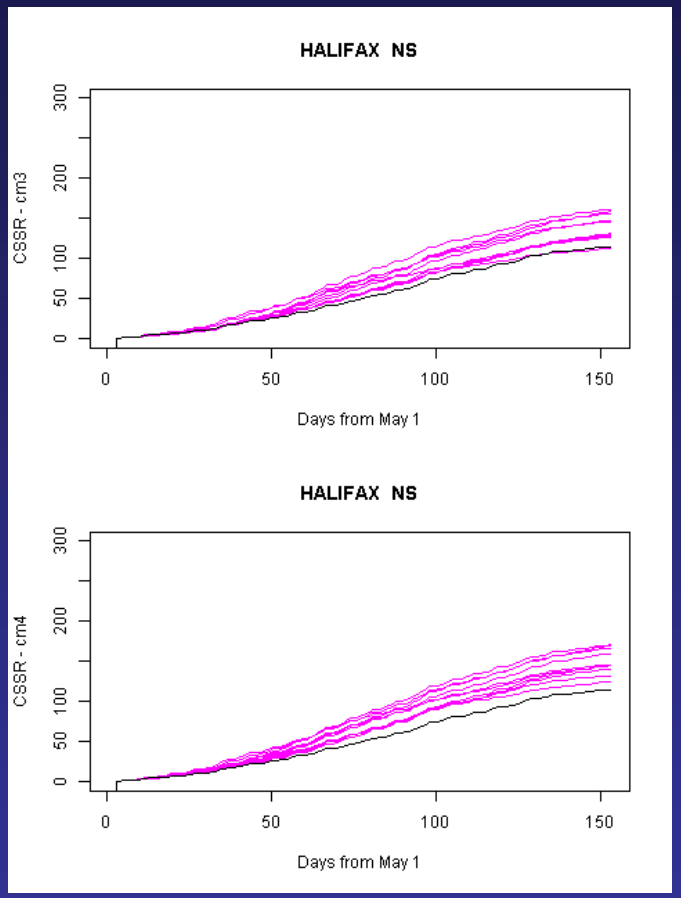
Precipitation

Halifax is showing above-average temperatures and average precipitation for most of the summer

Halifax 2017



BUI



CSSR

Halifax typically experiences a spring fire season, which may extend into July, but this drops to average values for the remainder of the season.

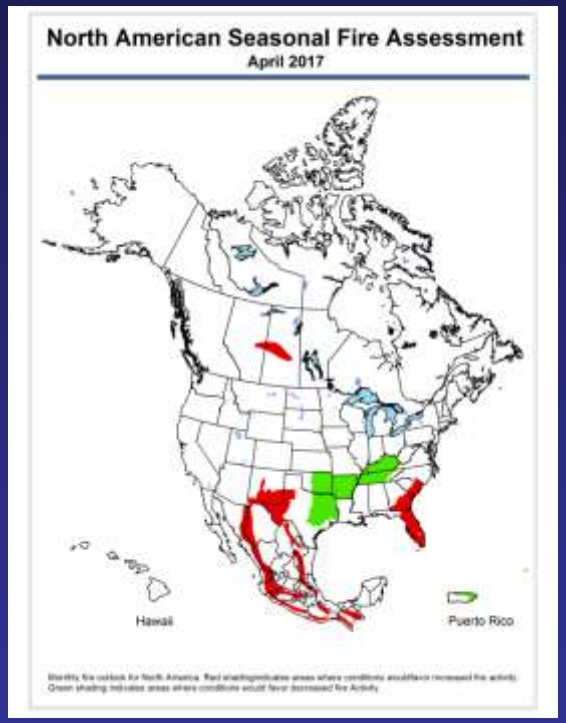
2017 Prediction

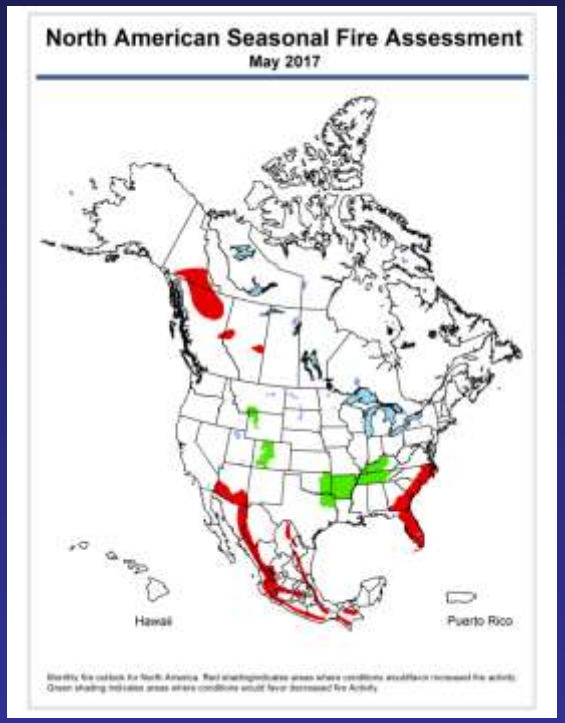
In summary, it appears that northwestern portions Canada (Yukon, northern BC and Alberta, NWT) may see fire activity this spring due to dry conditions and warmer temperatures.

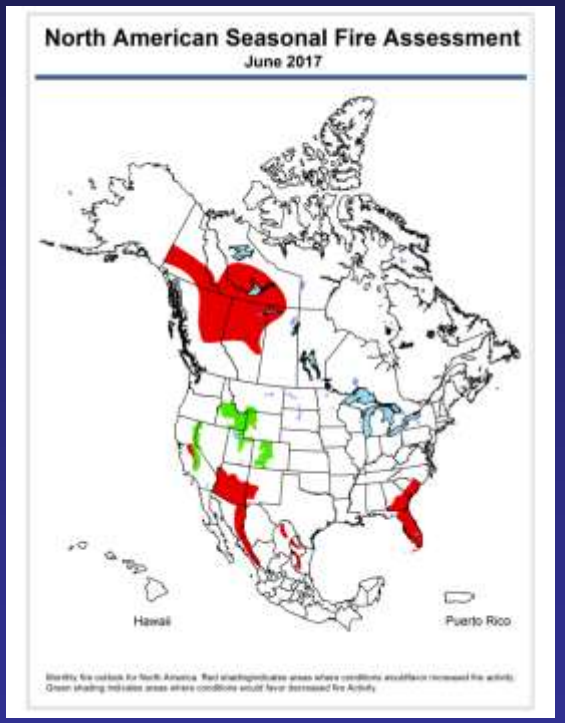
Maritimes may see activity in May to July.

Most indications are that the fire season will likely peak in June and then moderate for the remainder of the summer throughout all of Canada.

North American Seasonal Assessment



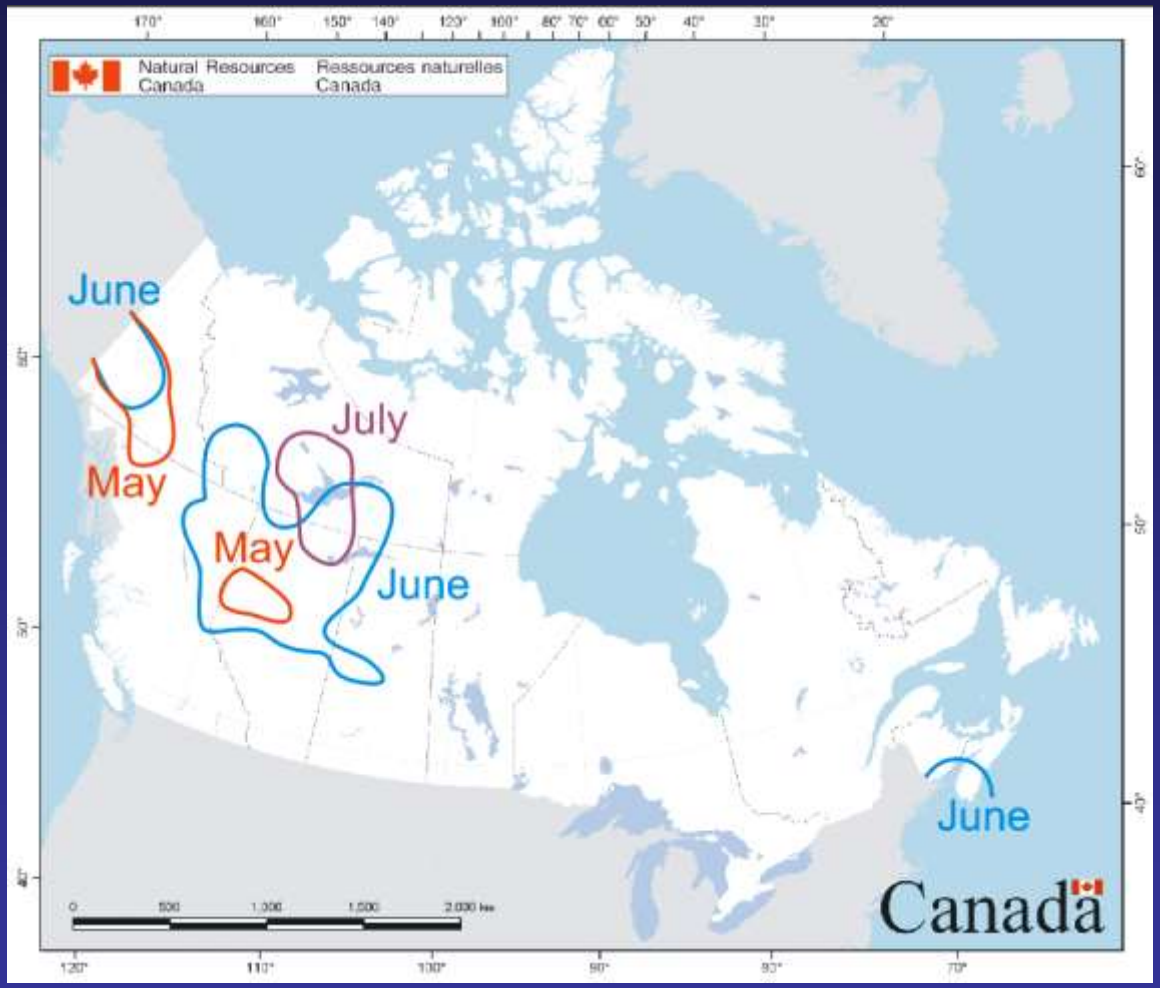




The forecast (released last month) indicates moderate fire danger in western Canada peaking in June.

http://www.predictiveservices.nifc.gov/outlooks/NA_Outlook.pdf

Canadian Seasonal Assessment



The forecast indicates moderate fire danger in western Canada peaking in June. Maritimes may see activity in June and July.

Questions?

Contact

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Fire Research Scientist

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Edmonton, AB

(780) 435-7320

Kerry.Anderson@Canada.ca