Fire Season Prediction for Canada, 2015

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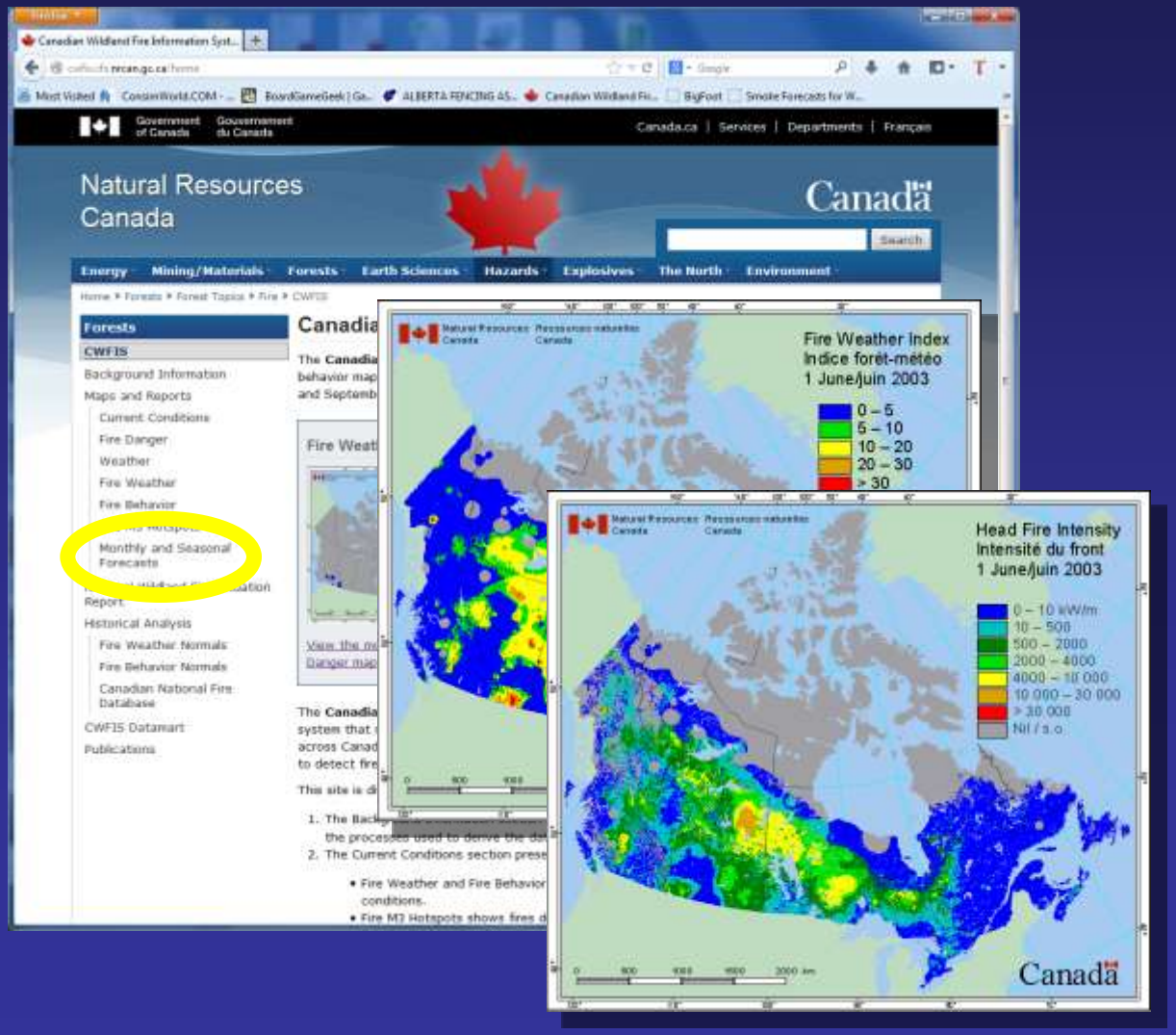
Introduction

The Canadian Forest Service is now presenting 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 2015 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,

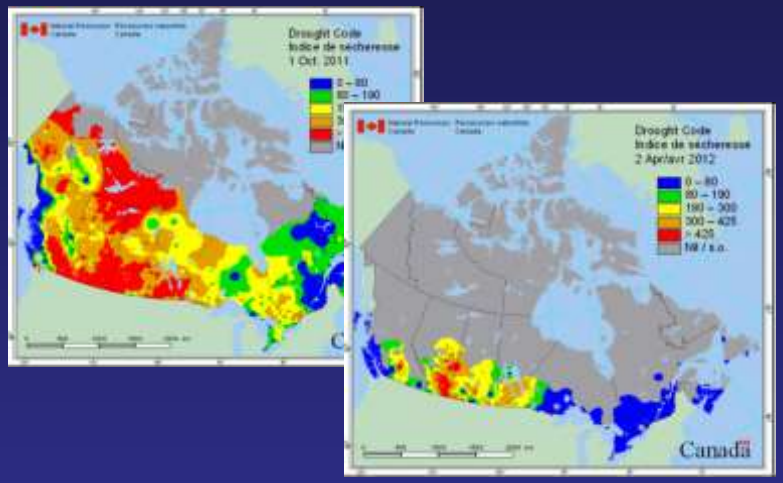
2. Calculate average daily weather for weather stations across country,

3. Incorporate Environment Canada's seasonal predictions,

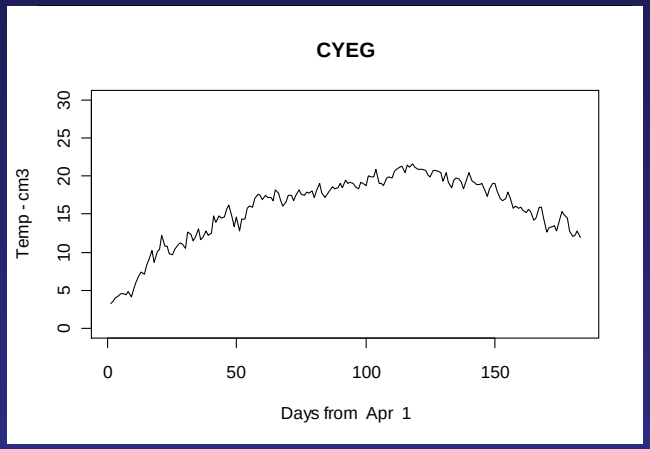
4. Determine the fire severity based on the ratio of forecasted over average monthly severity rating (MSR).

Methodology

1. Fall conditions to Spring startup

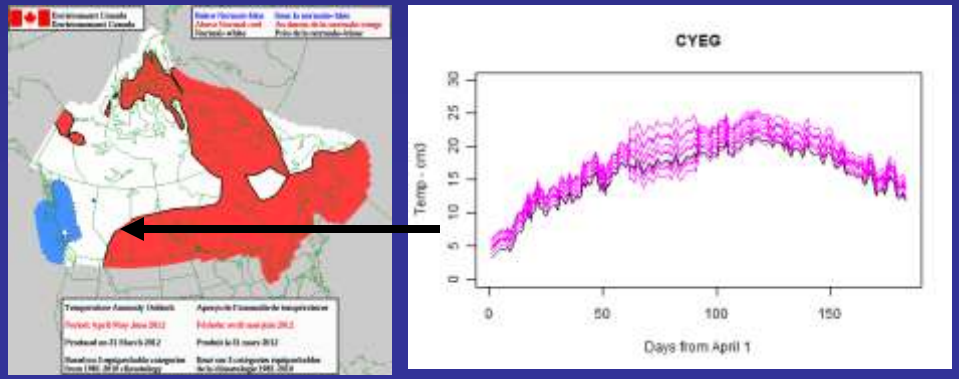


2. Calculate average daily weather



4. Calculate fire weather anomaly

3. Apply seasonal predictions



Ensemble Forecasts

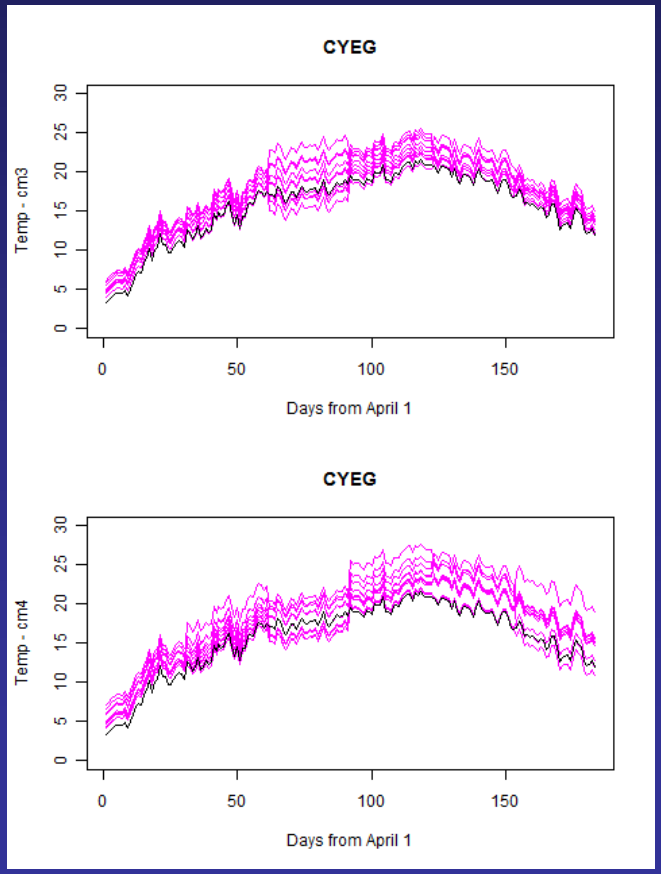
The Canadian Meteorological Centre (CMC) of Environment Canada has been providing temperature and precipitation probabilistic forecasts based on an ensemble of ten integrations of two climate models developed by Canadian Center for Climate modeling and analysis (CCCma)

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))

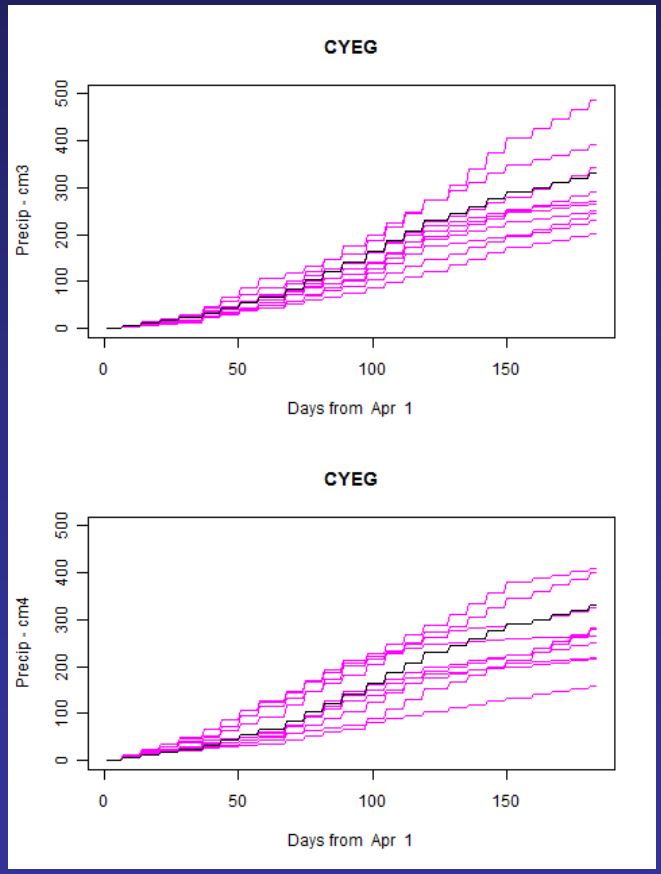
Forecasts are provided for the next twelve months.

Ensemble Forecasts

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

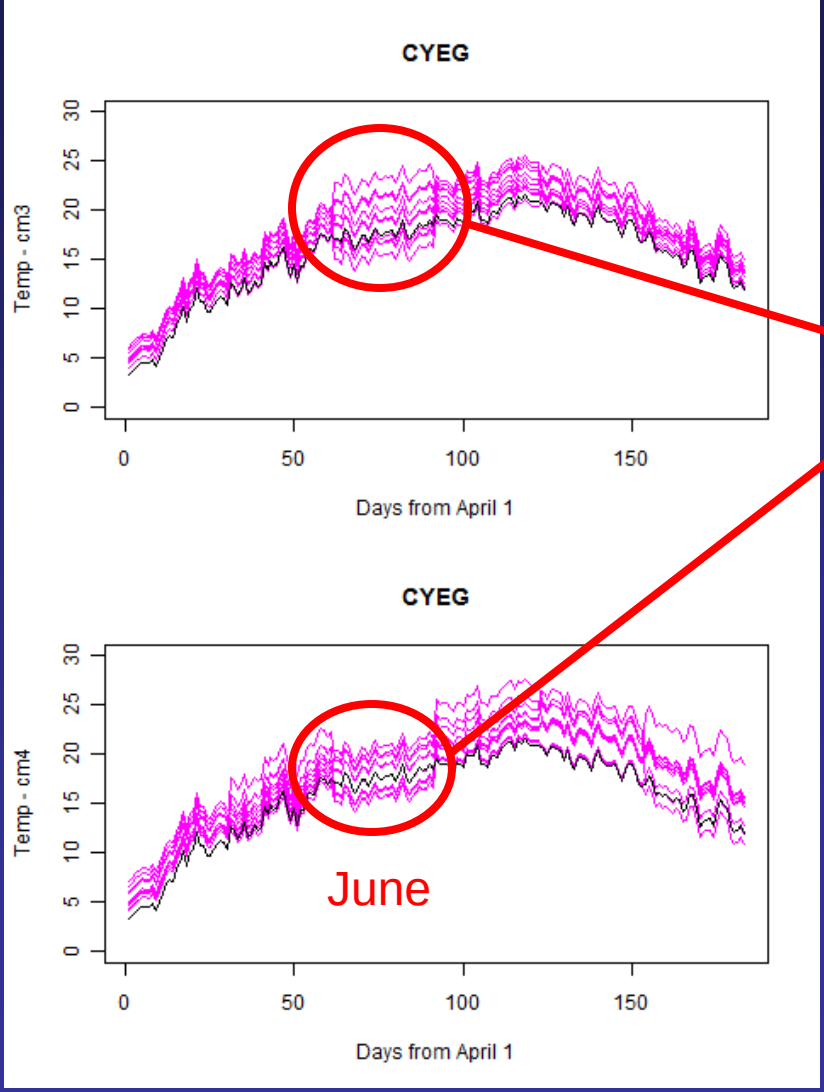


Temperature



Precipitation

Ensemble Forecasts

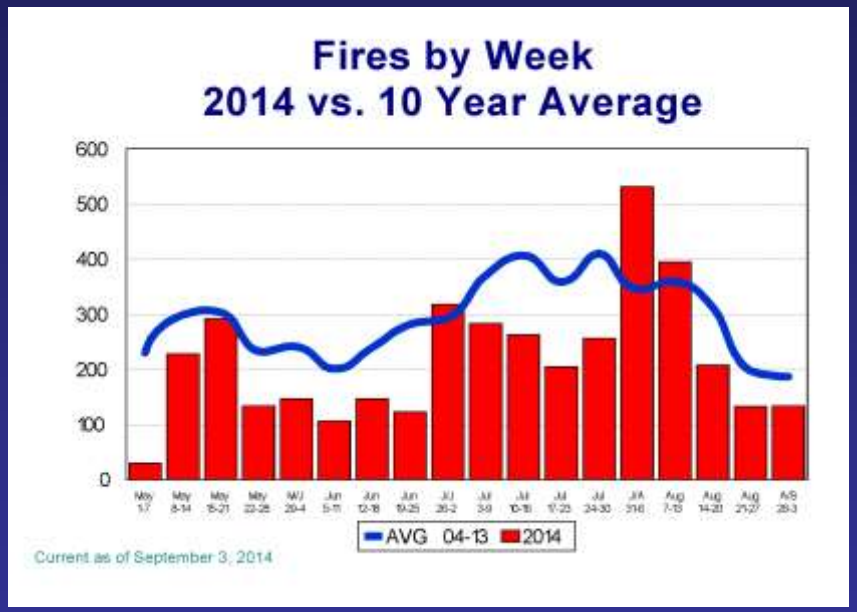


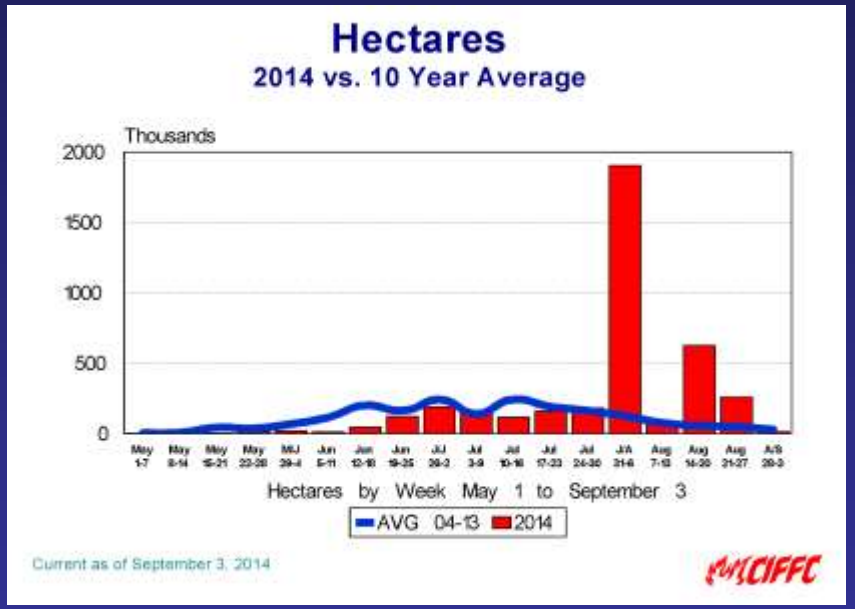
The ensemble approach provides a measure of confidence indicated by the spread of the ensemble members.

2014 Fire Season

2014 Prediction

The 2014 fire season was an extreme year with below-average number of fires and an well above-average area burned.





5,045 fires

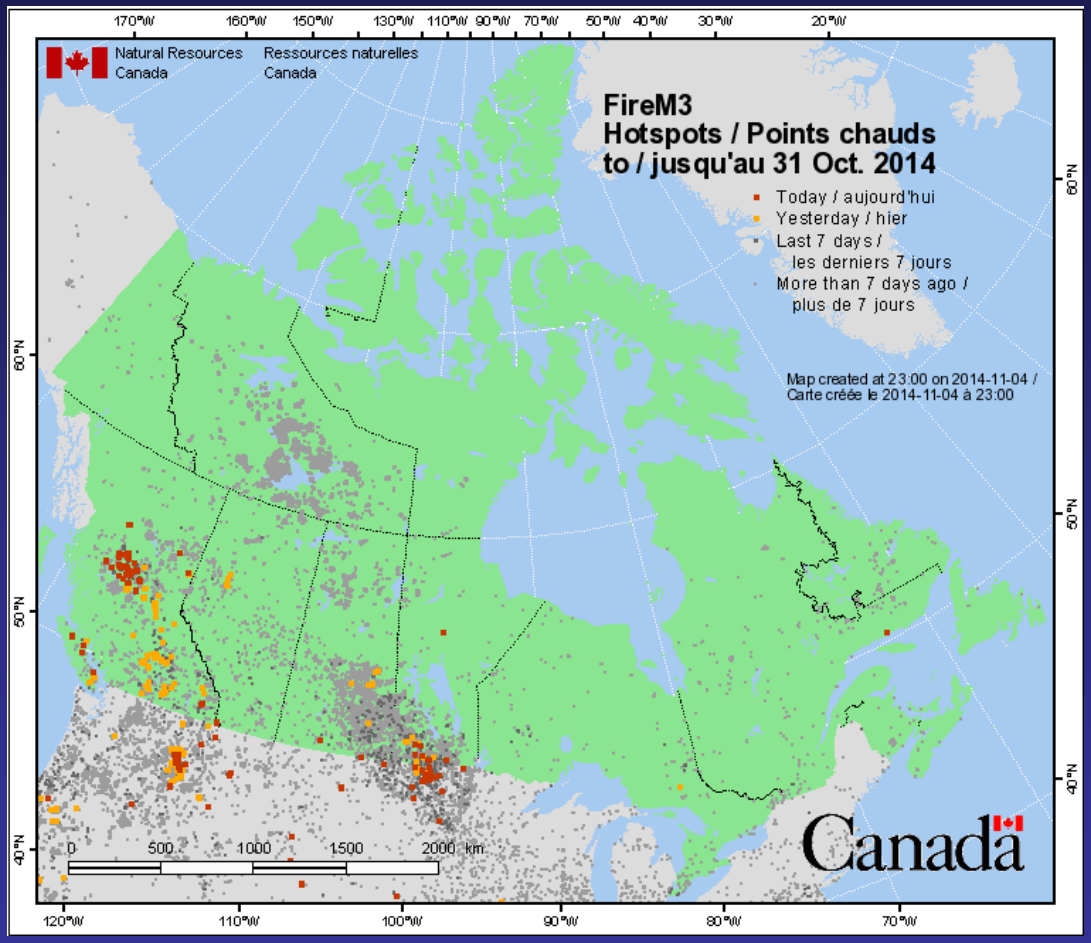
(avg: 7,084)

4,563,846 ha

(avg 2,272,702 ha)

Numbers based December 31 totals in CIFFC Canada Report 2014

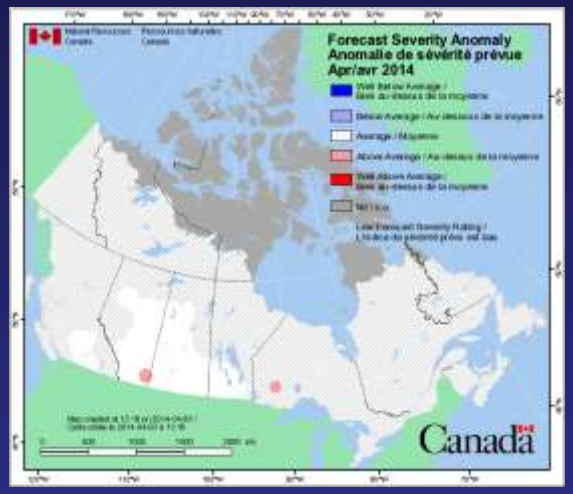
2014 Prediction



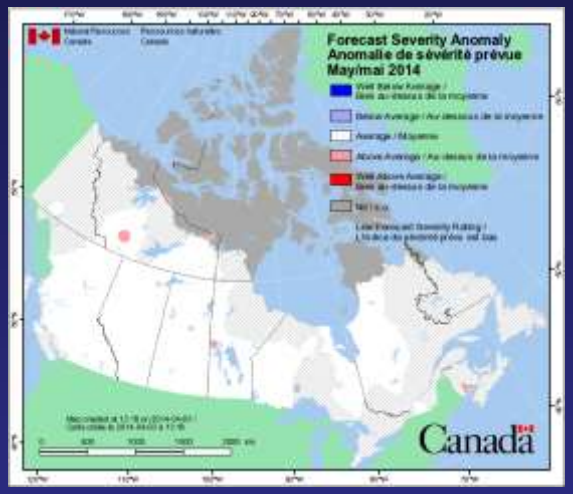
The 2014 fire season started out very slow and well-below average but beginning in June, quickly escalated for BC and the Northwest Territories.

2014 Prediction

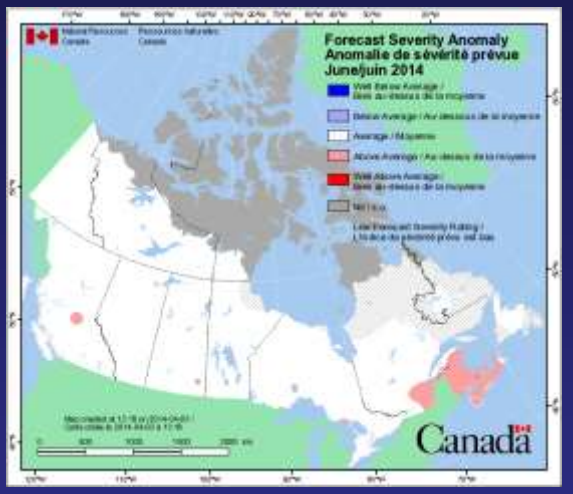
April



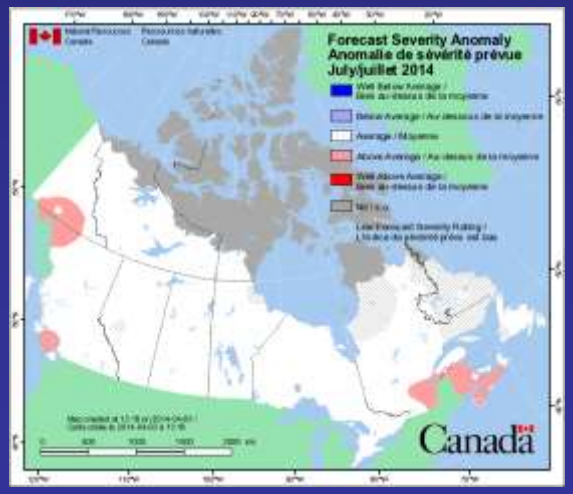
May



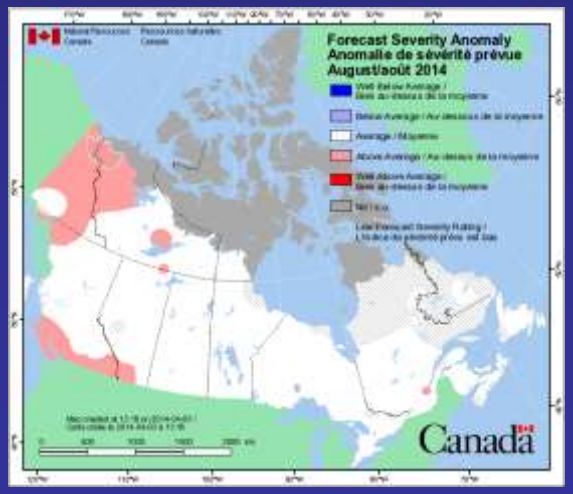
June



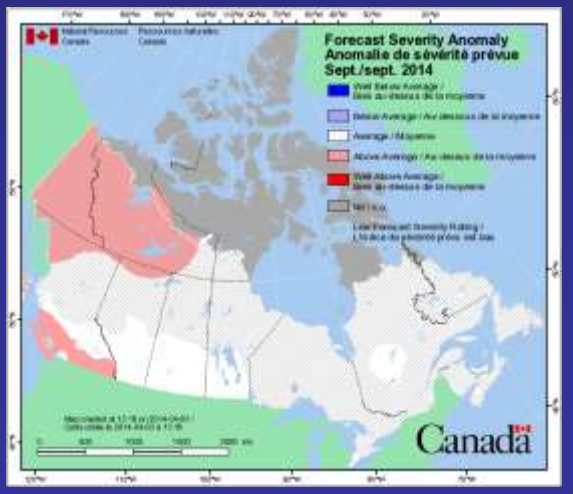
July



August

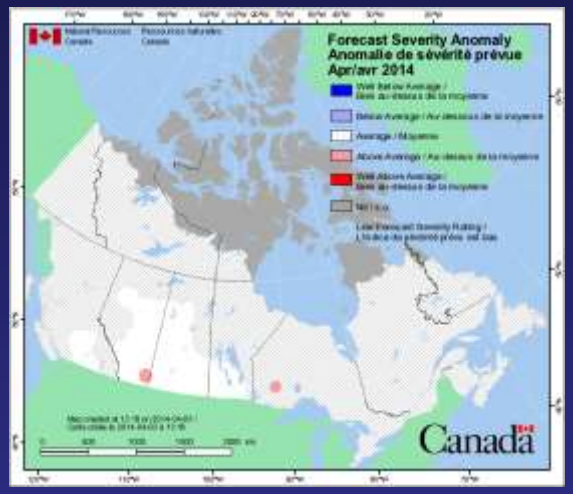


September

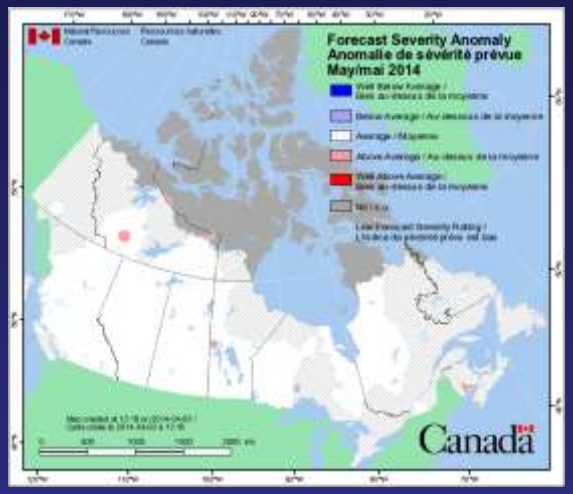


2014 Fire Activity

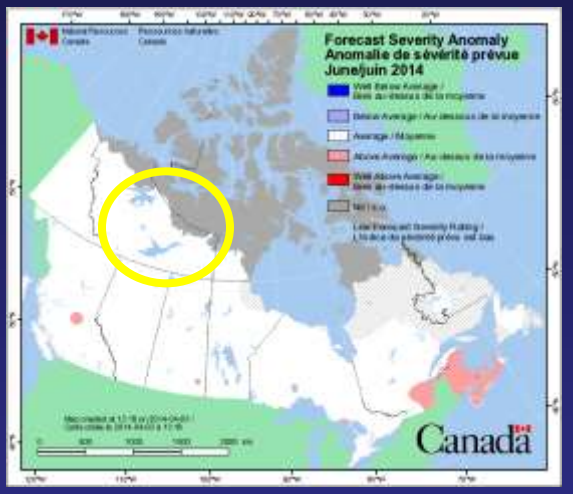
April



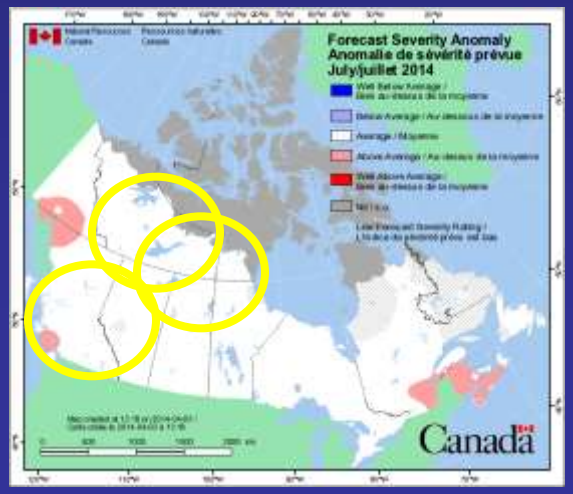
May



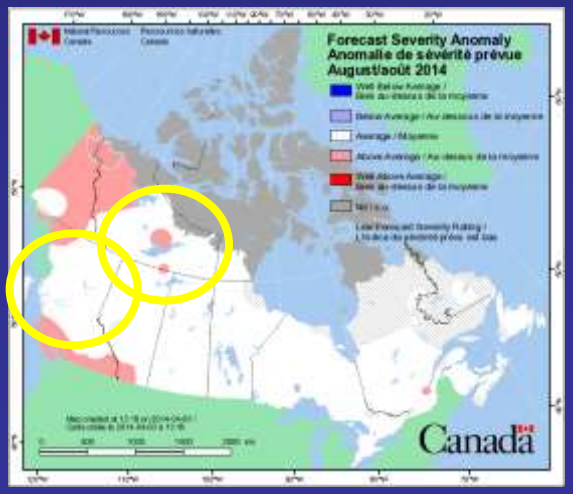
June



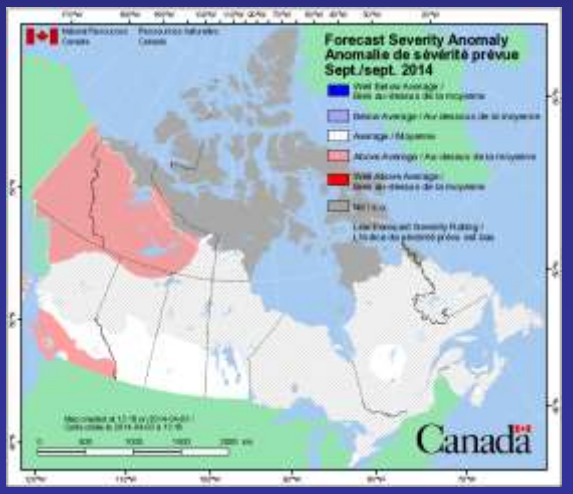
July



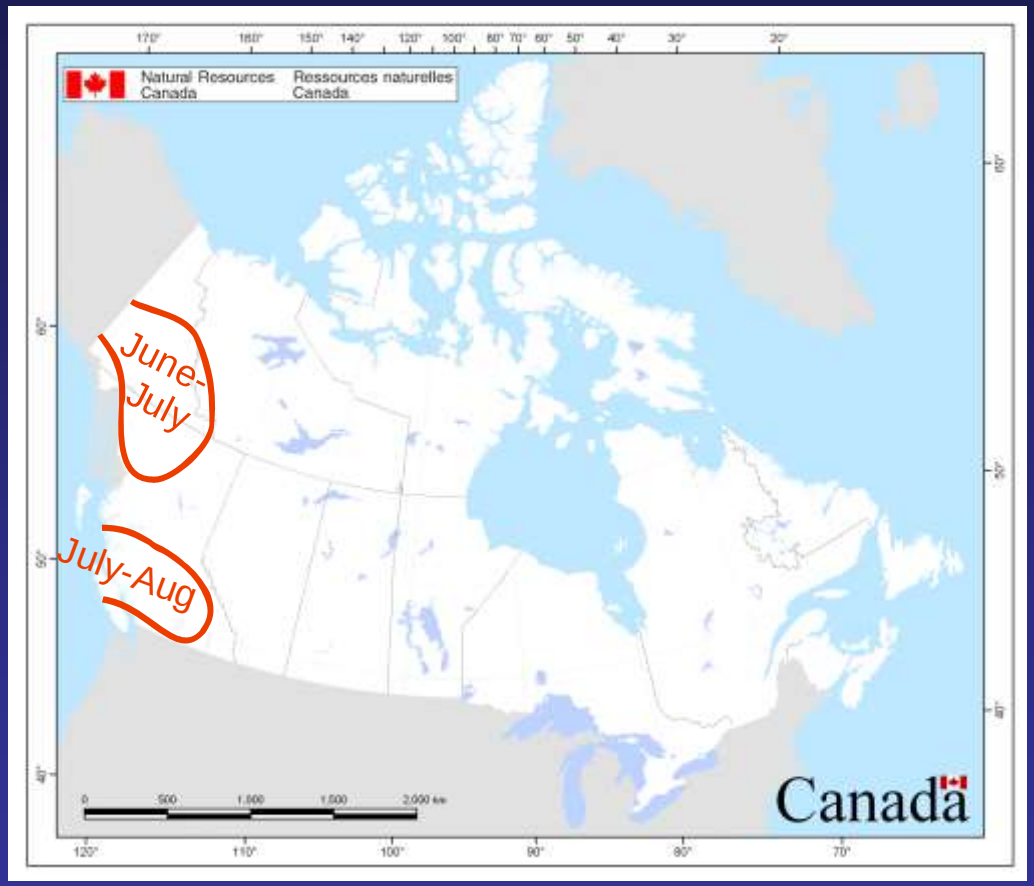
August



September



North American Seasonal Assessment



The forecast included Yukon and BC as areas of concern in the North American Seasonal Assessment.

2014 Prediction

In summary, the forecast predicted a low fire season throughout Canada with the only areas of concern being BC and the Yukon.

The forecast was correct for eastern Canada but underrated the fire activity in the west.

The prediction correctly selected BC as an area of above-average fire conditions, but misplaced above-average conditions in the Yukon instead of the neighboring NWT.

2015 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.

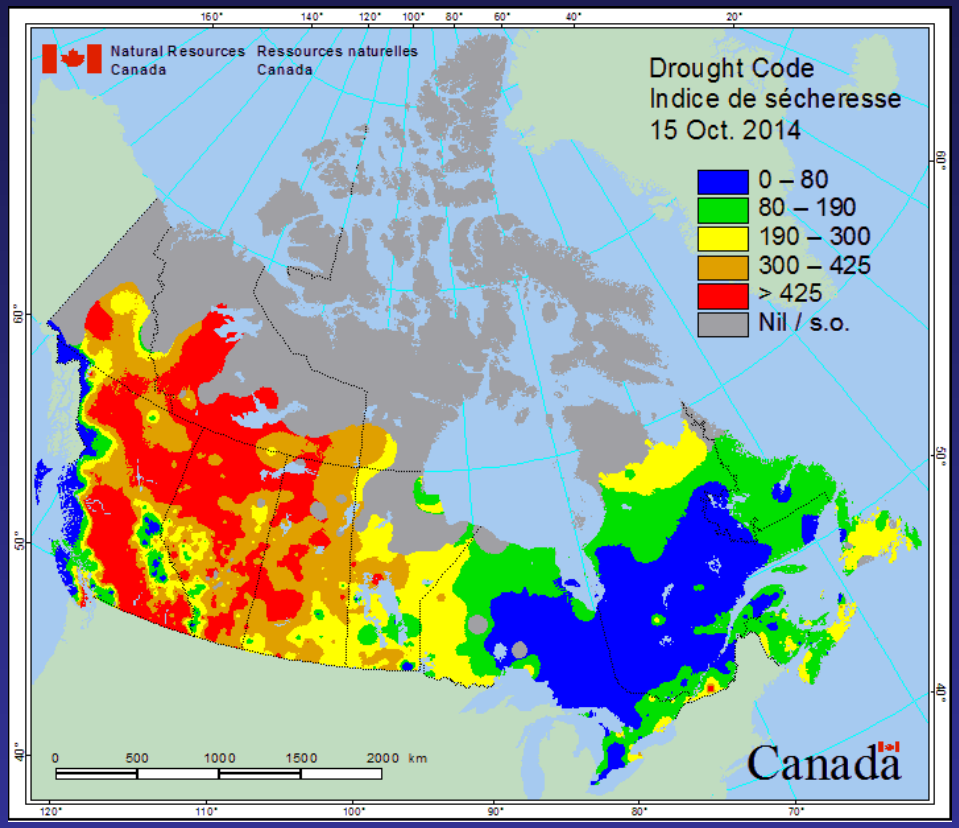
This is handled by the Drought Code (DC) (similar to the 1000 hour moisture code).

All other moisture codes in the FWI system are reset.

Fall Conditions

Fall DC values show extreme (dry) conditions throughout much of Western Canada and the Territories.

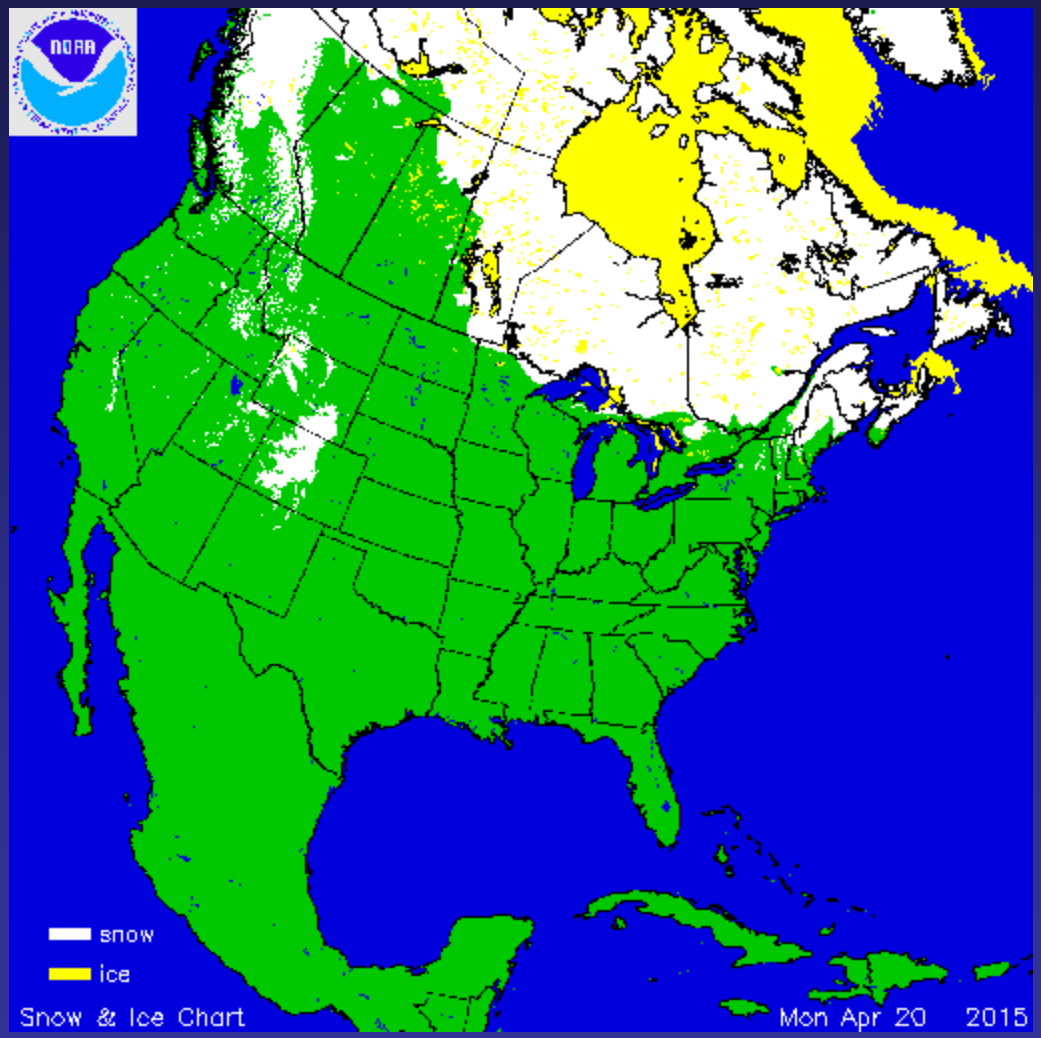
Eastern and Northern Canada experienced a cold winter with much snow, while southern portions of the Prairies and BC experienced a warm winter.



Oct 15, 2014

http://cwfis.cfs.nrcan.gc.ca/maps/fw?type=dc&year=2013&month=10&day=21

Overwinter Snowfall

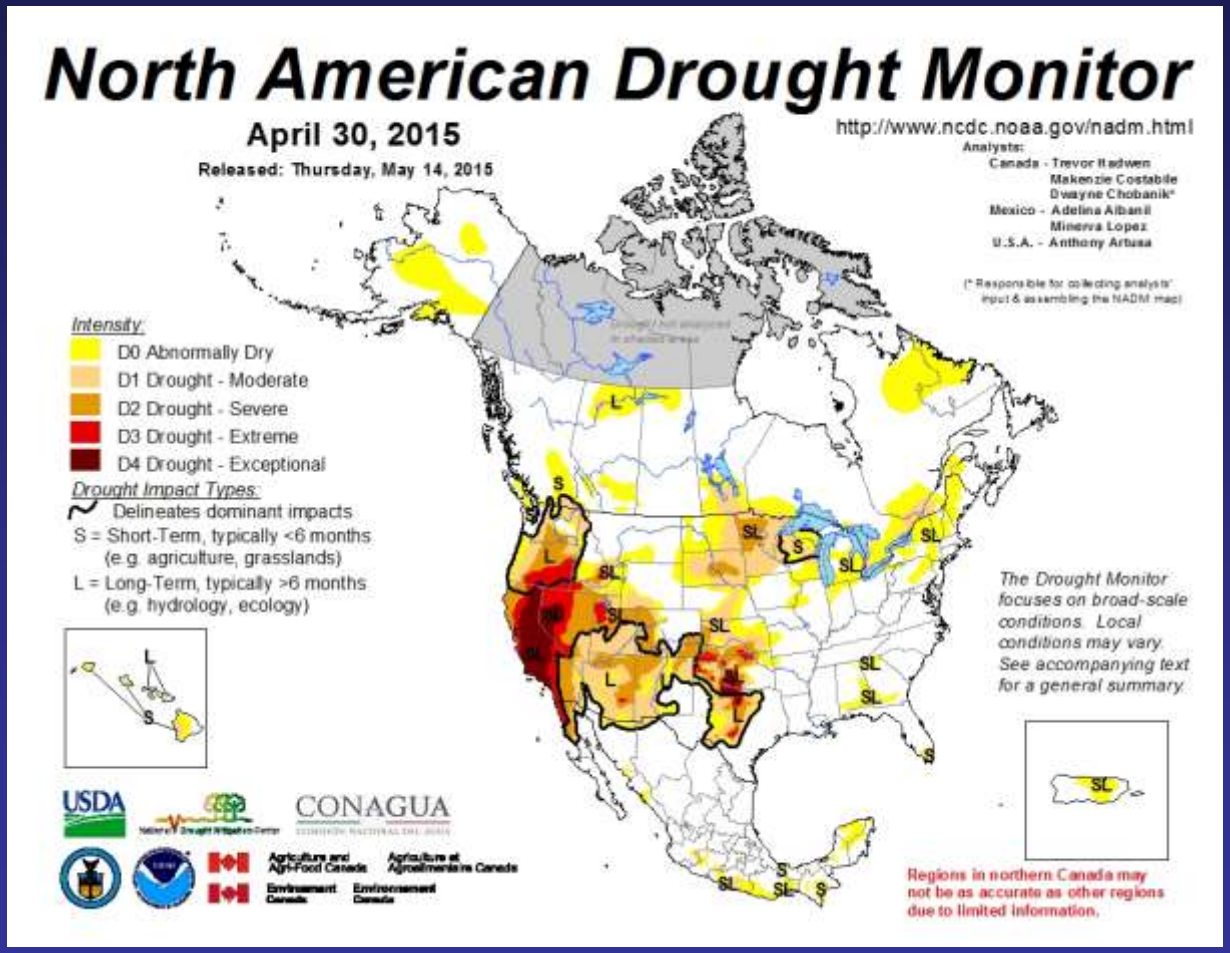


Snow melt was rapid this spring in western Canada leading to an early start to the fire season.

Eastern Canada had late snow melt delaying the fire season.

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

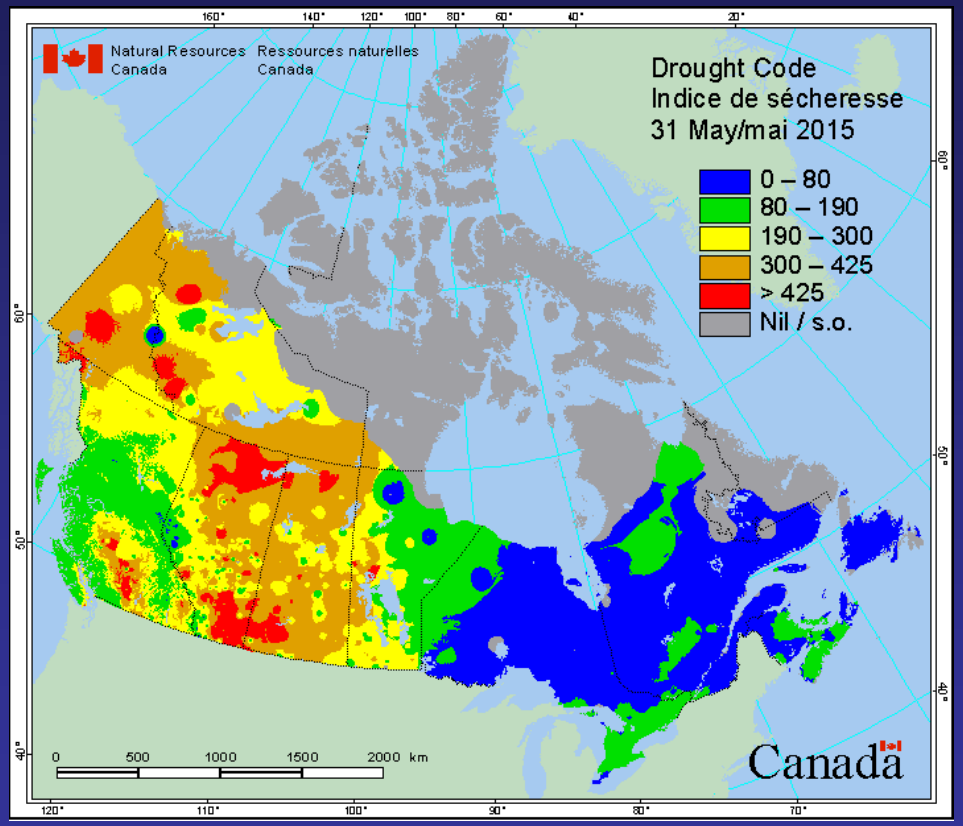
Spring Start-up Conditions



North American Drought Monitor indicates scattered patches of abnormally dry conditions in Canada with moderate drought conditions in southern Manitoba and the St. Lawrence region.

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

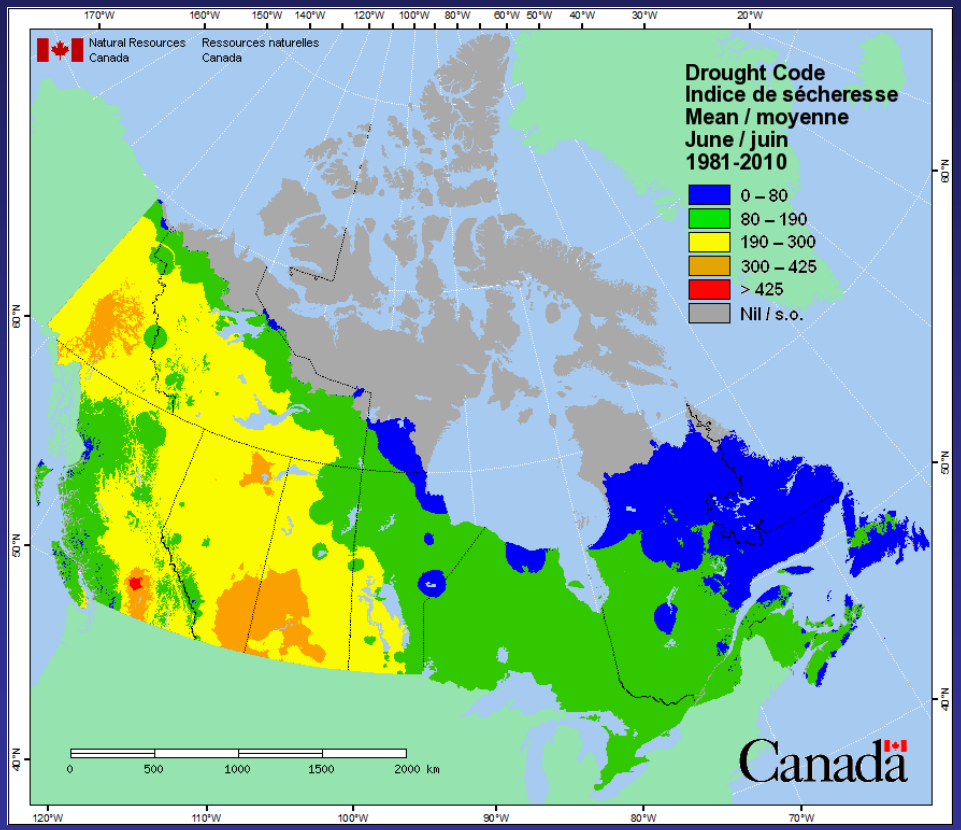
Current Conditions



An early spring has resulted in elevated conditions in the Territories, the Prairies and the interior of BC.

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

Current Conditions



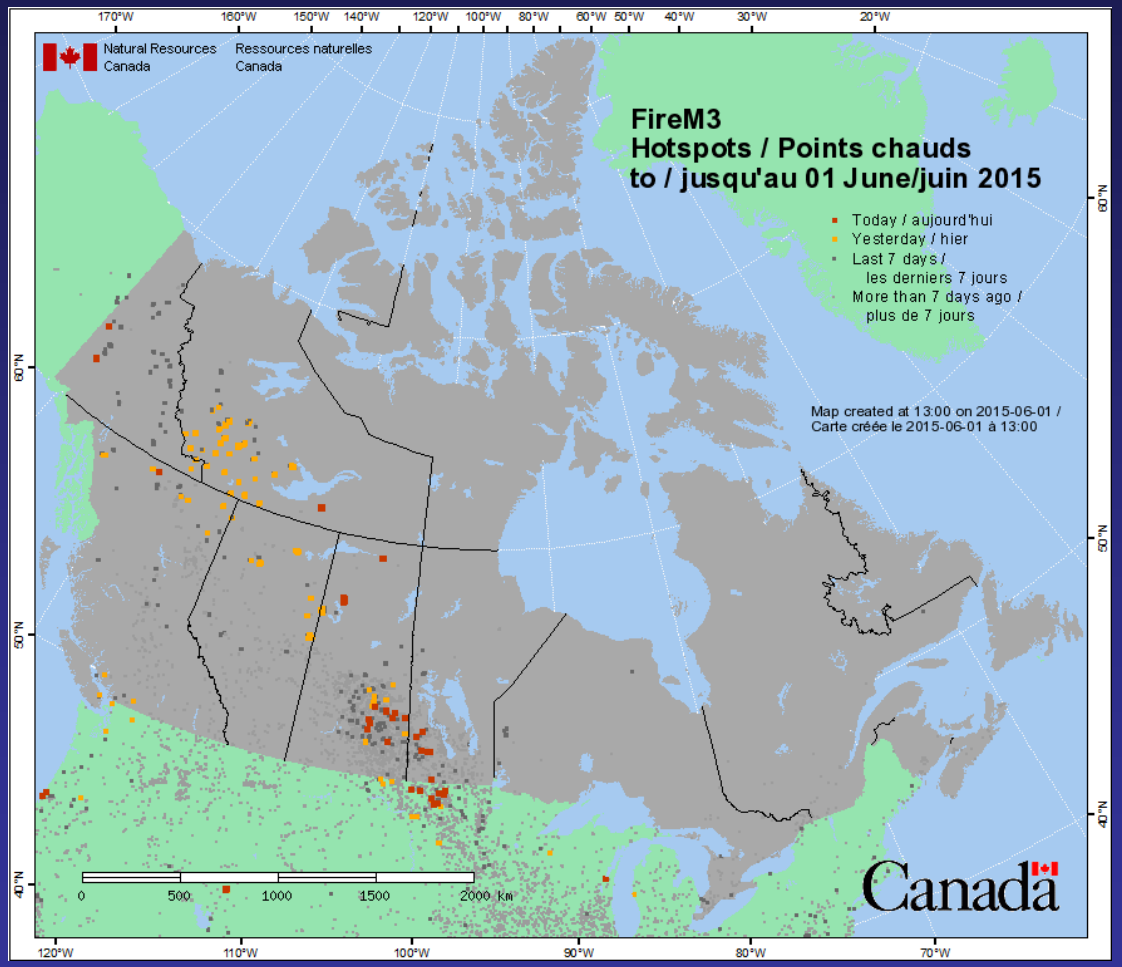
Compared to the 30 year means, conditions in western Canada are much higher than normal, while conditions in eastern Canada are well below normal.

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

Current Situation

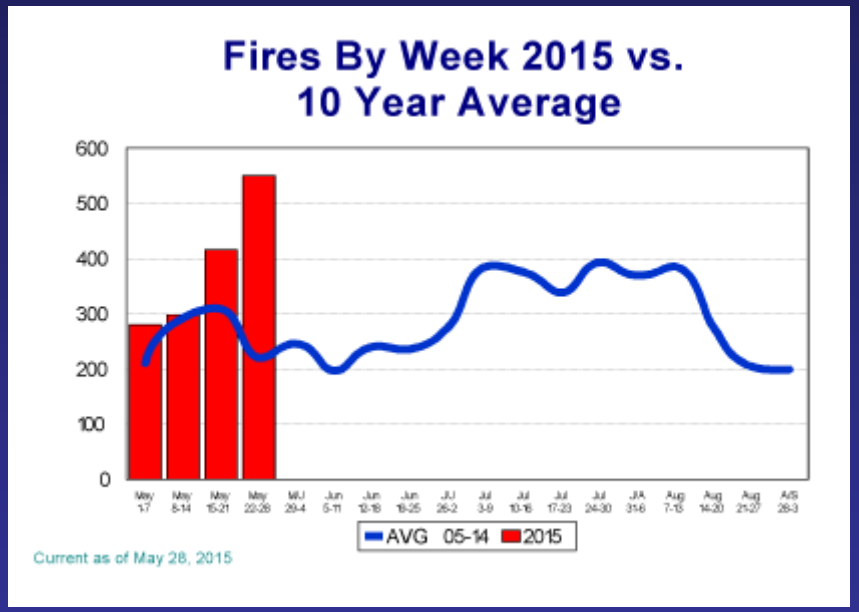
BC, Alberta, Saskatchewan, Yukon and NWT have experienced most of the fire activity.

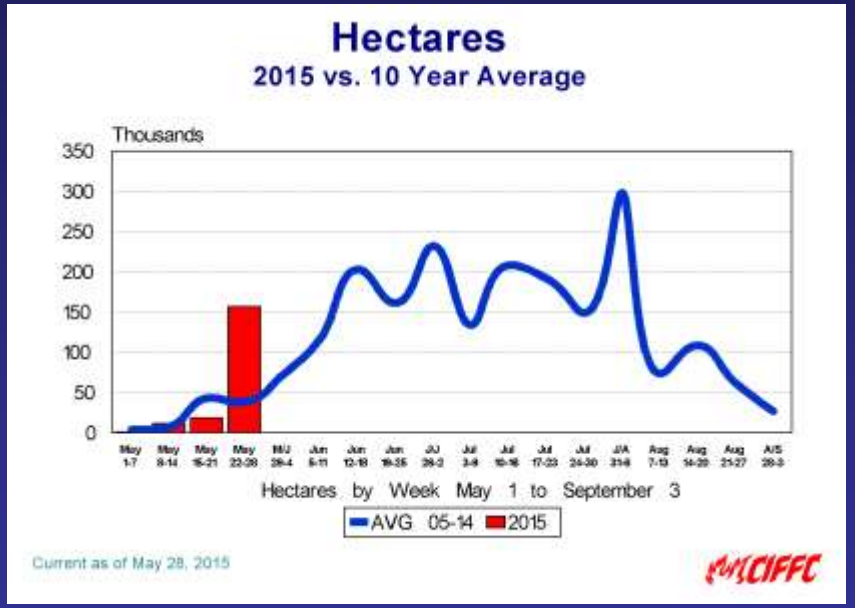
So far, NWT has experienced 65,011 ha burned (an amount typically not seen until July).



Current Situation

The 2015 fire season was an extreme year with below-average number of fires and an well above-average area burned.





2,549 fires

(avg: 1,929)

263,201 ha

(avg 122,472 ha)

Numbers based May 28 totals in CIFFC Situation Report

2015 Seasonal Prediction

ENSO Pattern

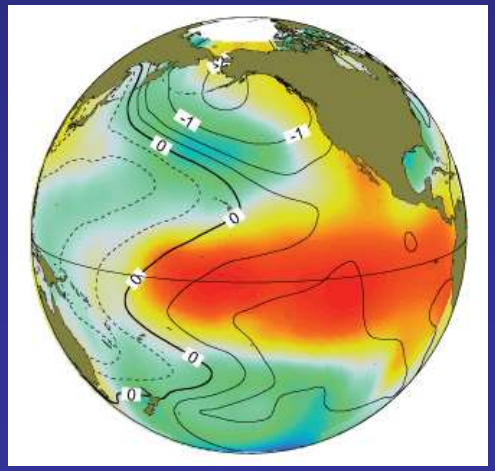
ENSO Pattern

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.

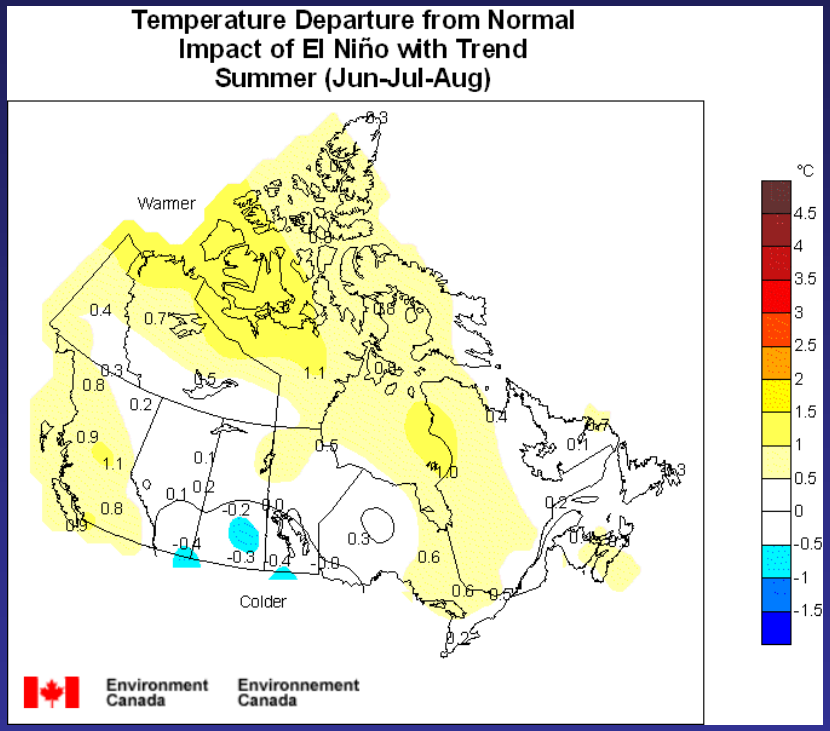
El Niño and La Nina events tend to develop during the period Apr-Jun and they

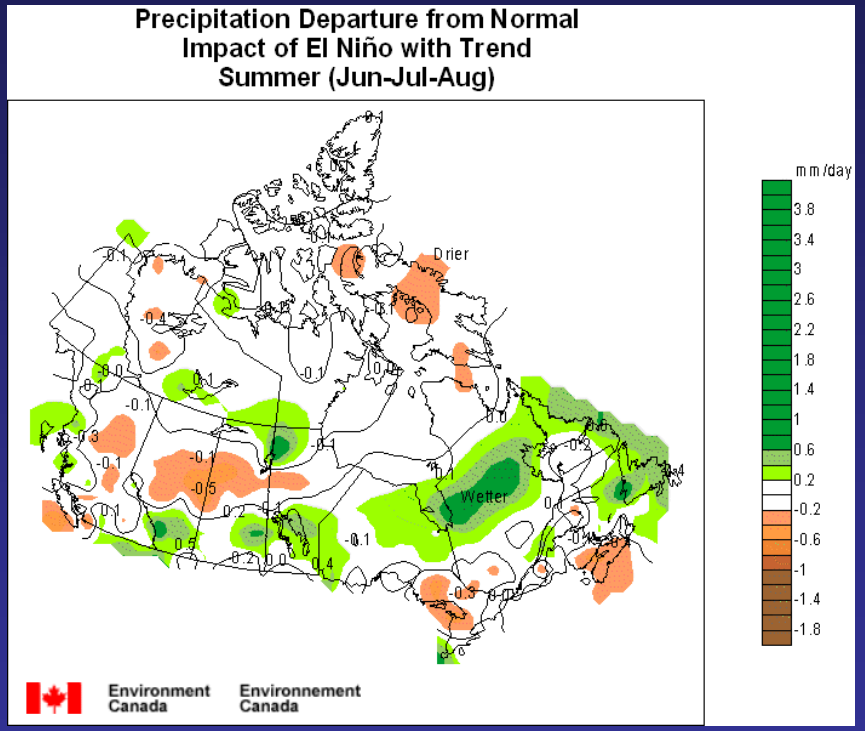
- Tend to reach their maximum strength during Dec-Feb
- Typically persist for 9-12 months, though occasionally persisting for up to 2 years
- Typically recur every 2 to 7 years



El Niño Effects

Summer





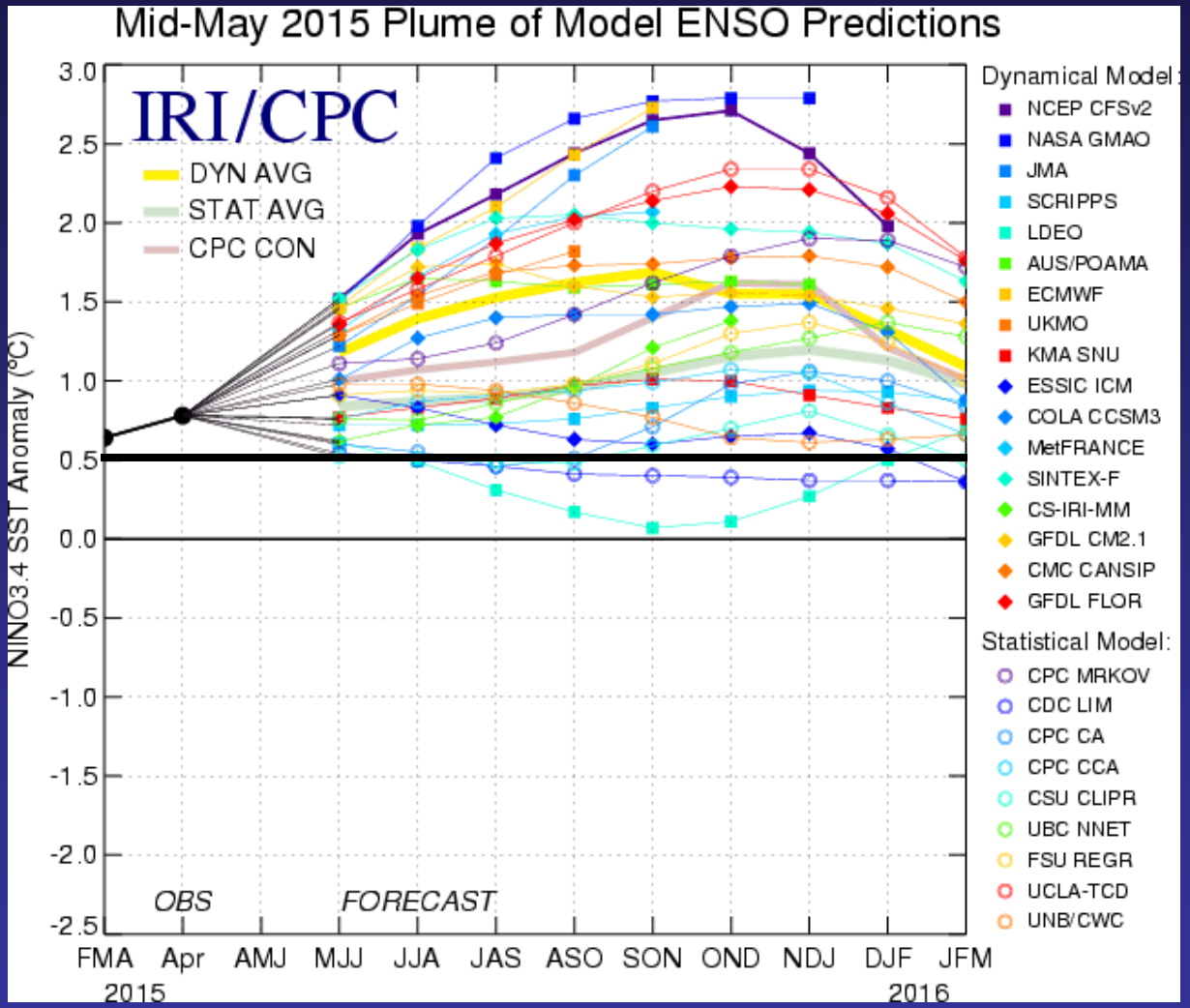
Temperature

Precipitation

El Niño leads to below-average precipitation in central Alberta and Saskatchewan, southern Ontario and Nova Scotia

ENSO Pattern

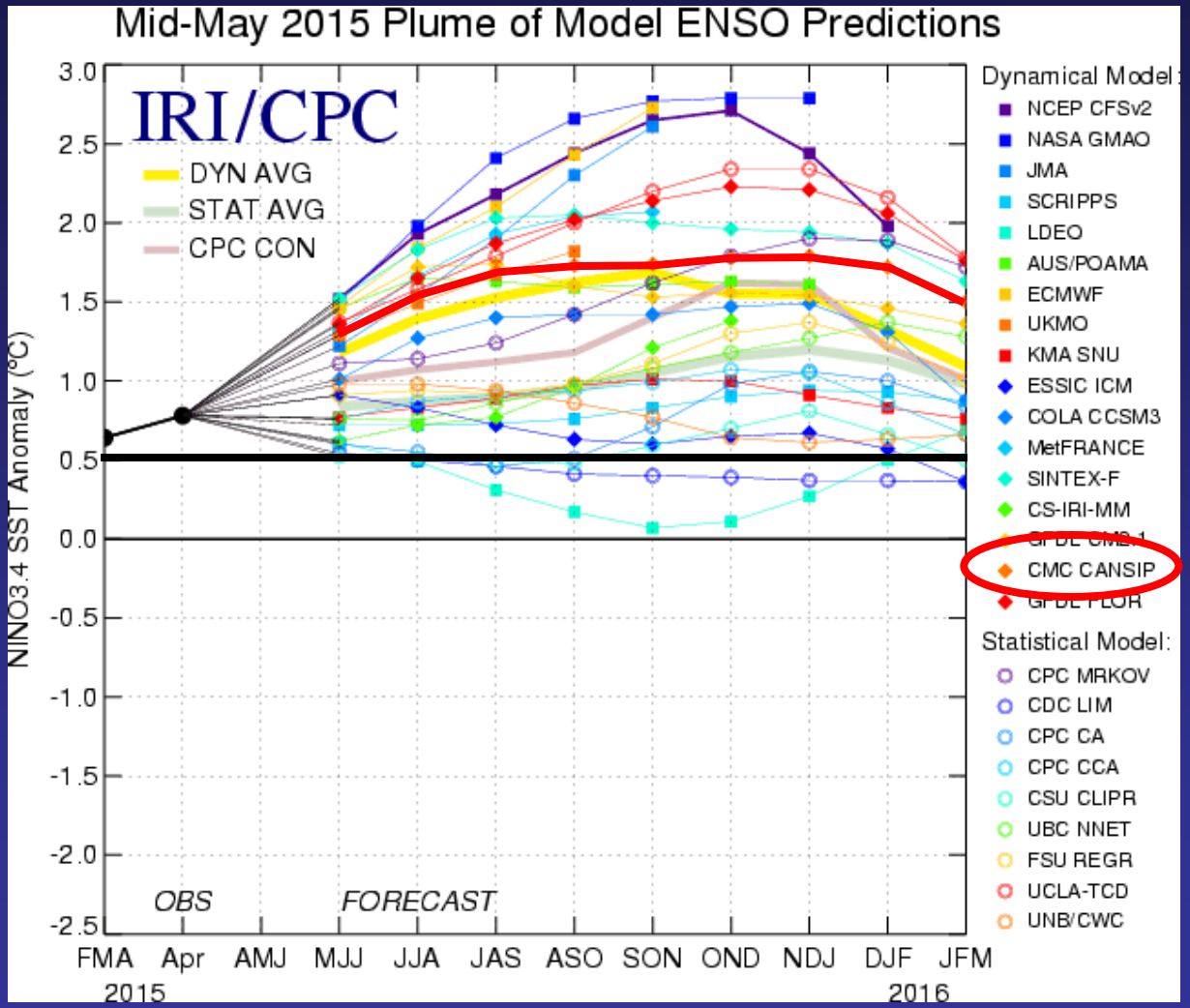
Most models indicate the buildup of El Niño conditions this summer (though there is much variation among the models).



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

ENSO Pattern

The Canadian CMC CANSIP model is predicting higher conditions.



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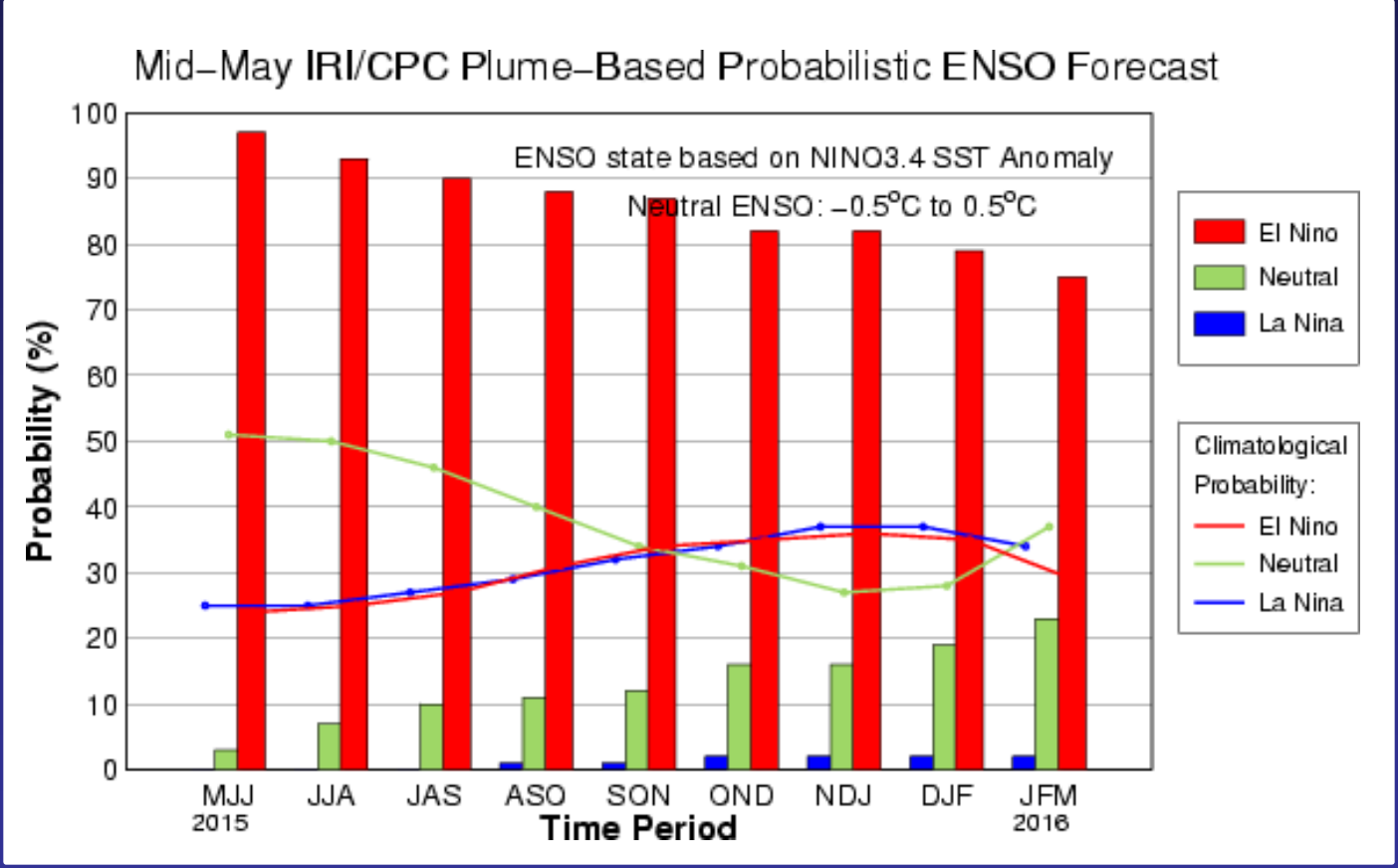
ENSO Pattern



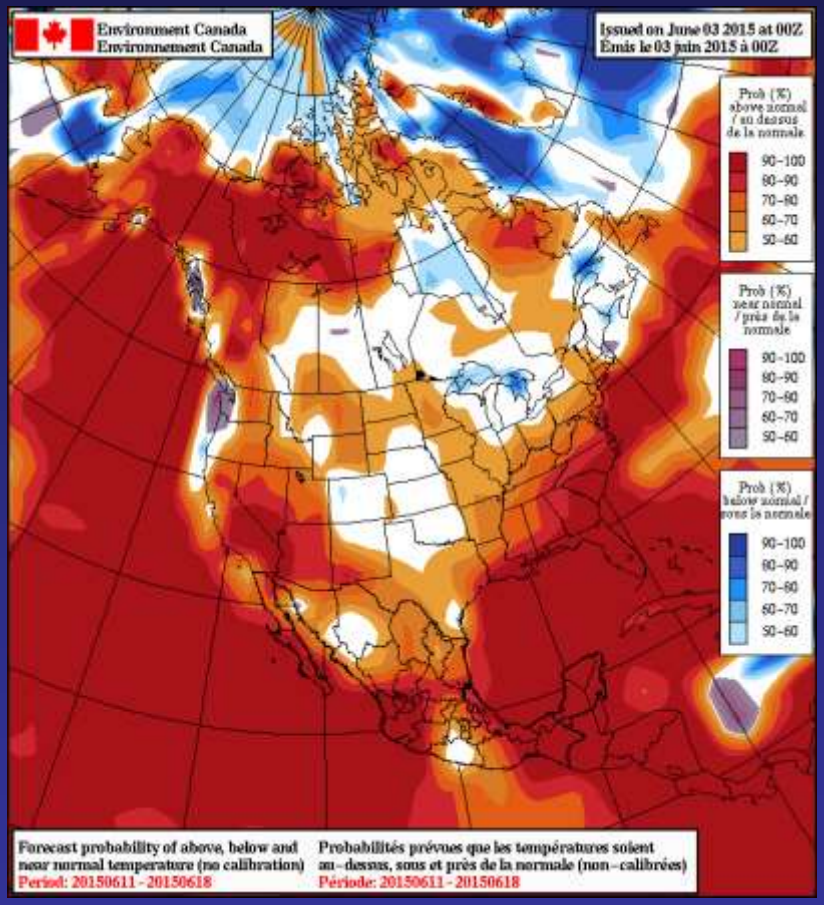
The El Niño conditions are further illustrated by the consensus of the models.

http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_plume

2015 Seasonal Prediction

CMC Forecasts

Ensemble Forecasts



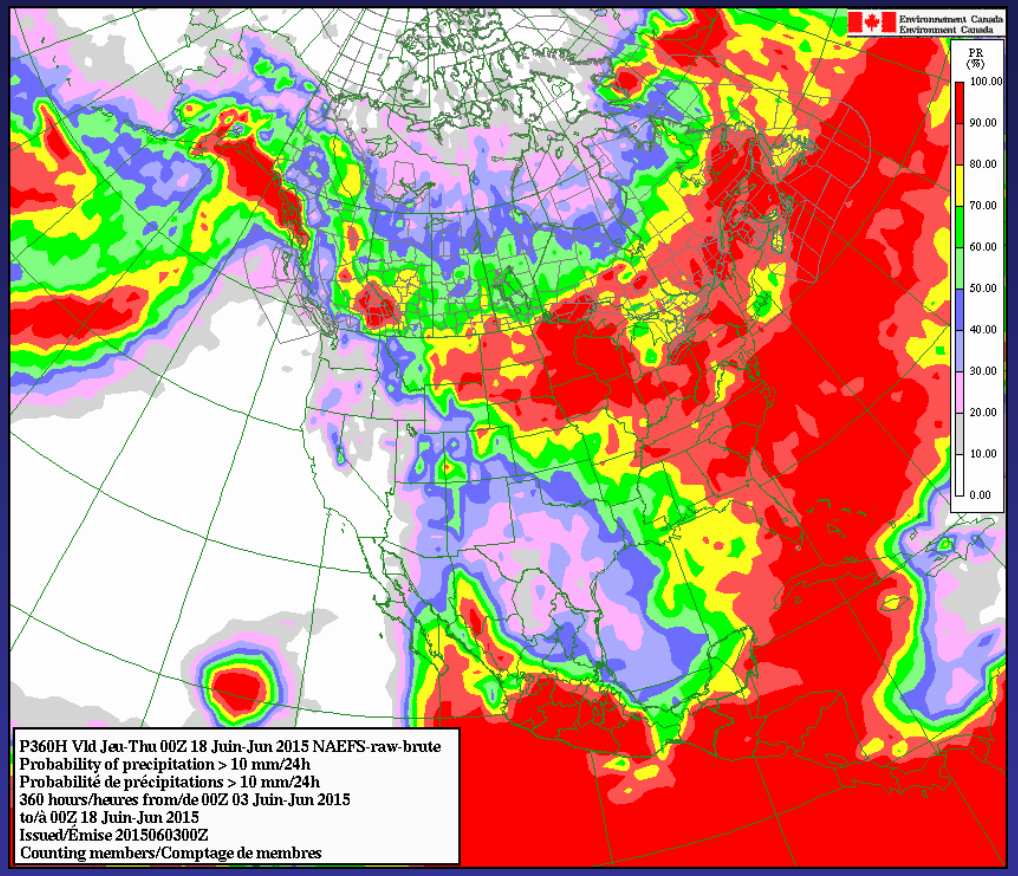
June 11-18

Recent medium-range predictions based on the North American Ensemble Forecast System (NAEFS) Indicate above average temperature will dominate western Canada.

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

Ensemble Forecasts

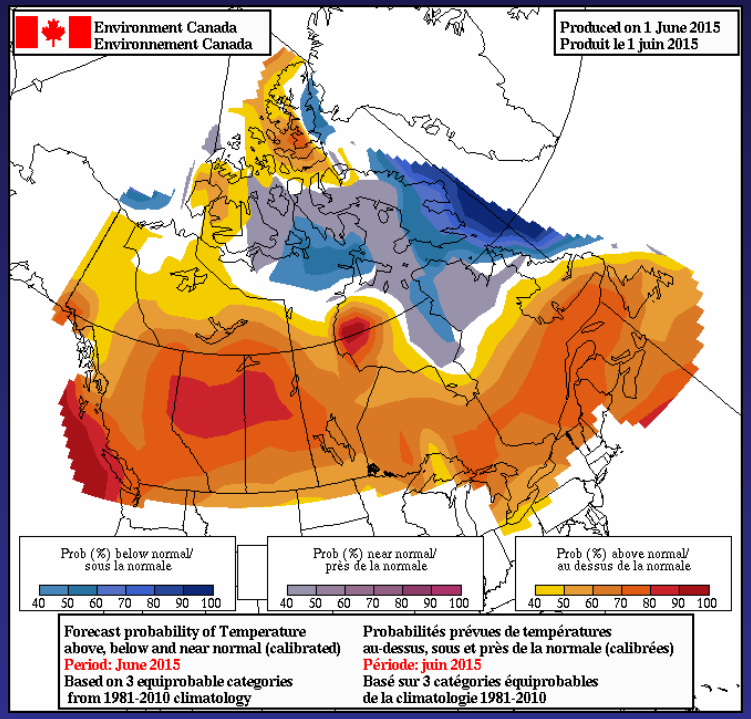
The probability of precipitation over 10 mm at least one day over the next two weeks is low for all but southern BC and eastern Canada.

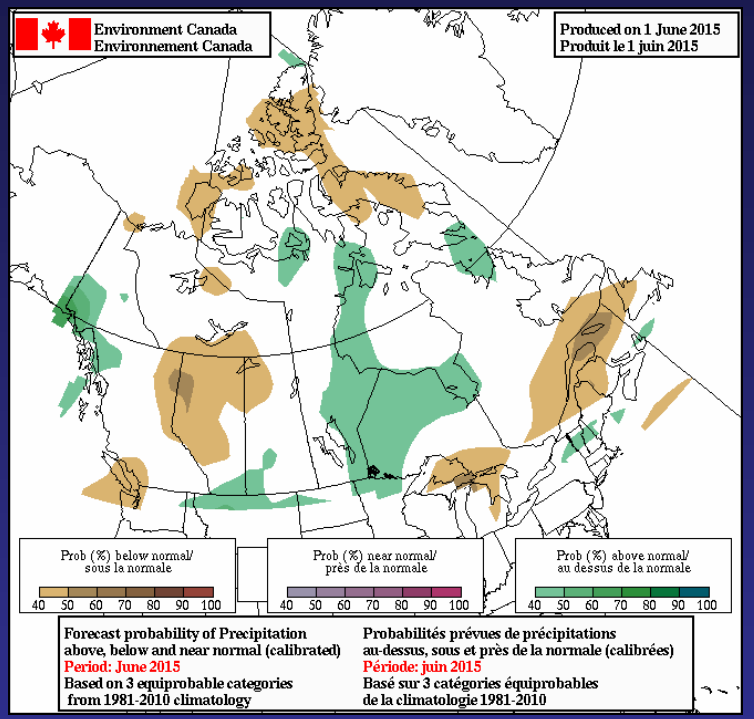


June 3-18

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

Seasonal Forecasts



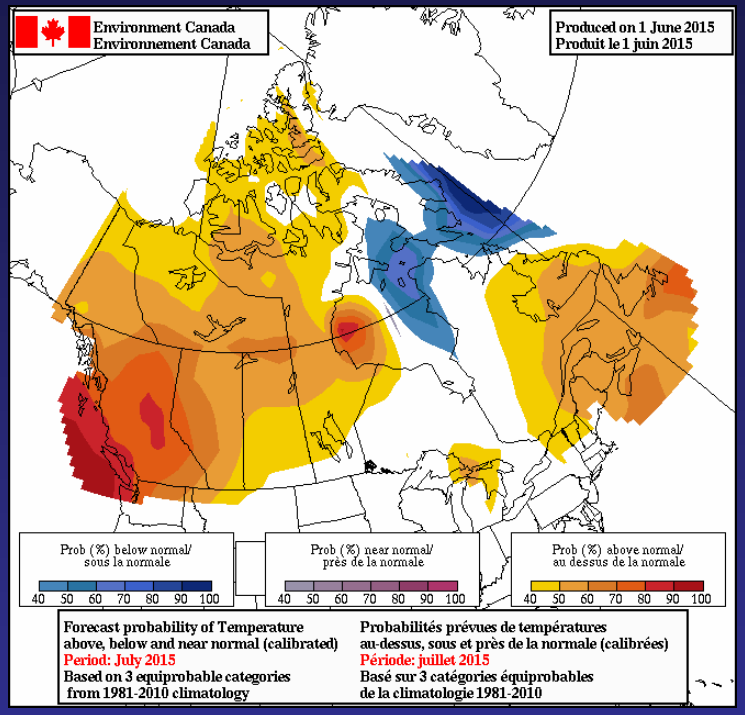


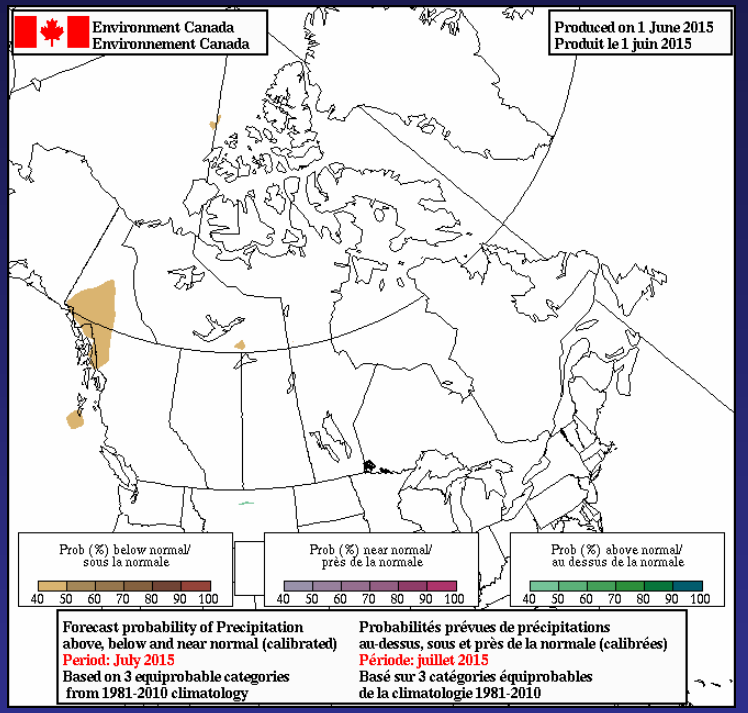
June

June temperature anomalies are high for all but the Arctic, with the highest anomalies centered on in Alberta.

Precipitation anomalies are low for Alberta and southern NWT and Atlantic Canada, high for Manitoba and western Ontario.

Seasonal Forecasts



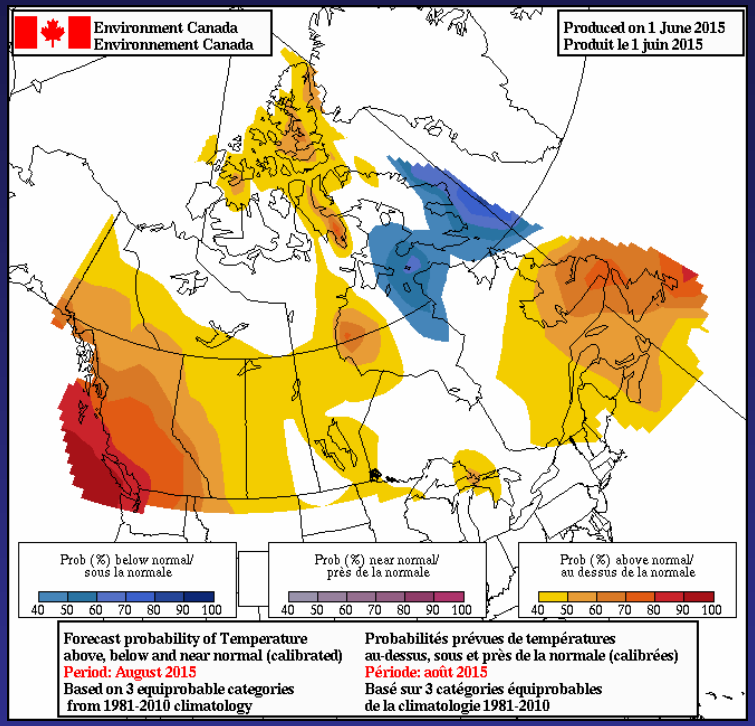


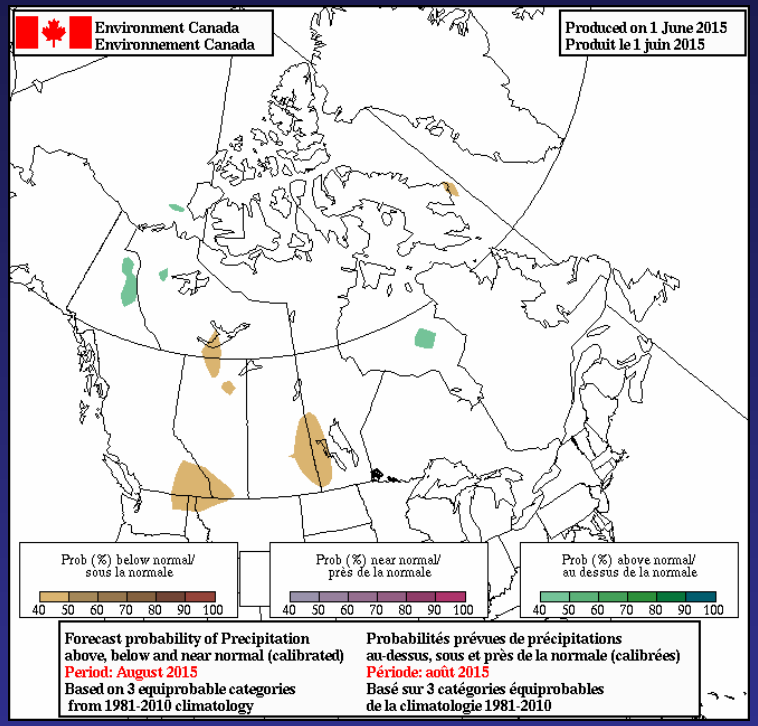
July

July will see much of the above average conditions subside with BC as the region still most affected.

Precipitation anomalies are negligible.

Seasonal Forecasts



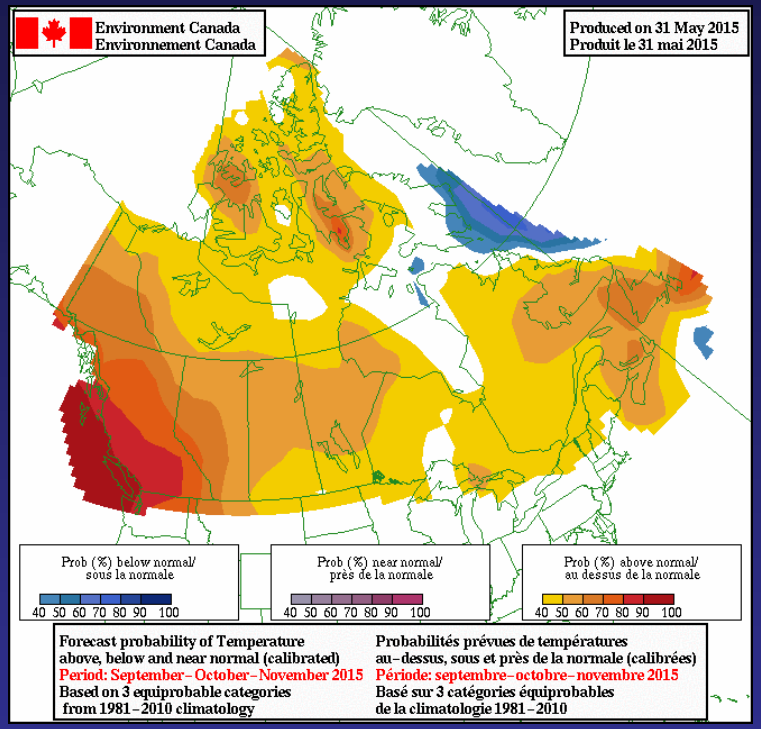


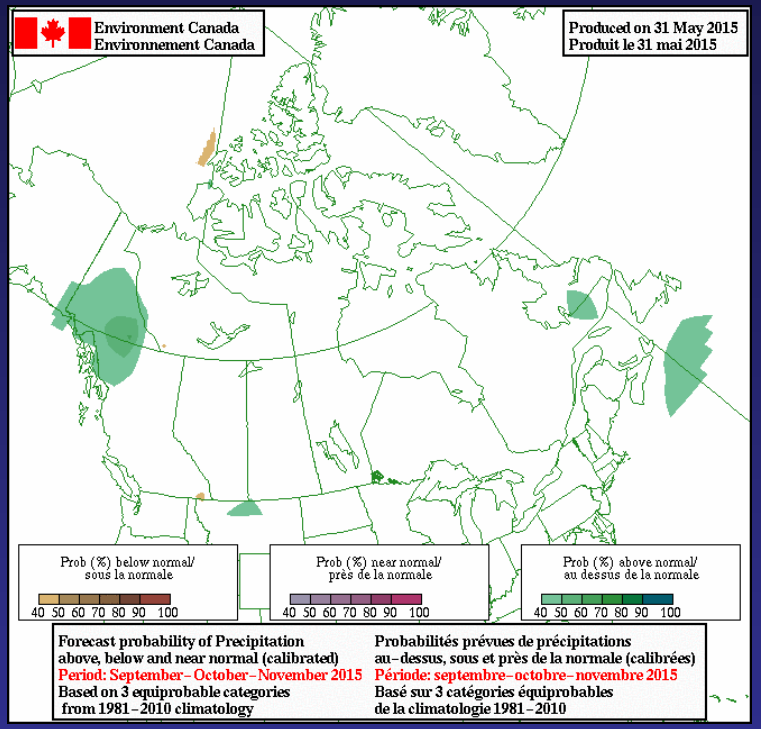
August

Above average temperatures continue to subside

Scattered patched of below average precipitation are seen in the Prairies and southeastern BC.

Seasonal Forecasts





September-October-November

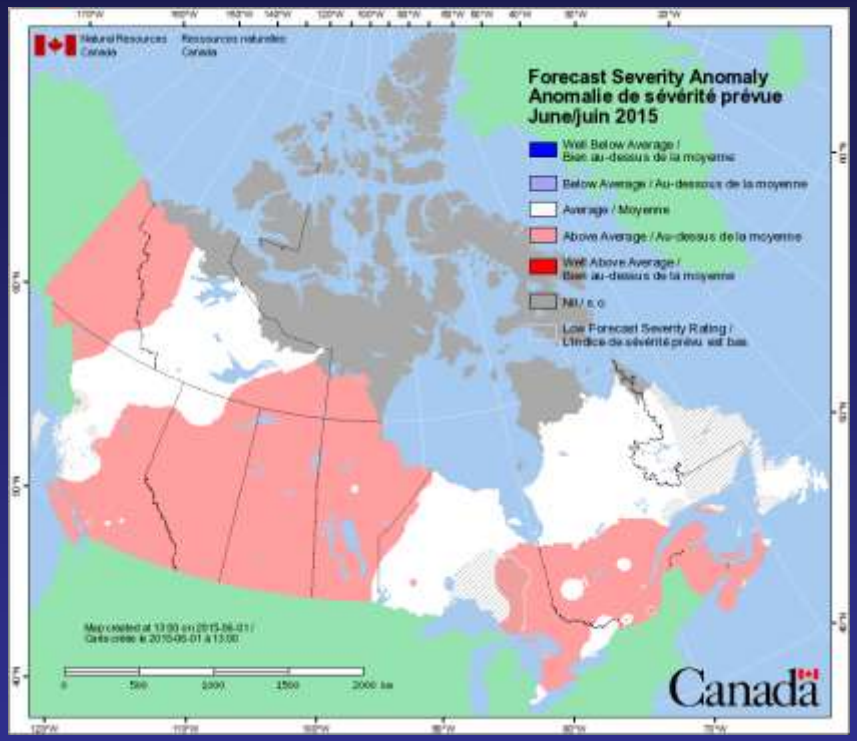
Above average temperatures will persist across Canada into the fall.

Above average precipitation is shown only in the Yukon.

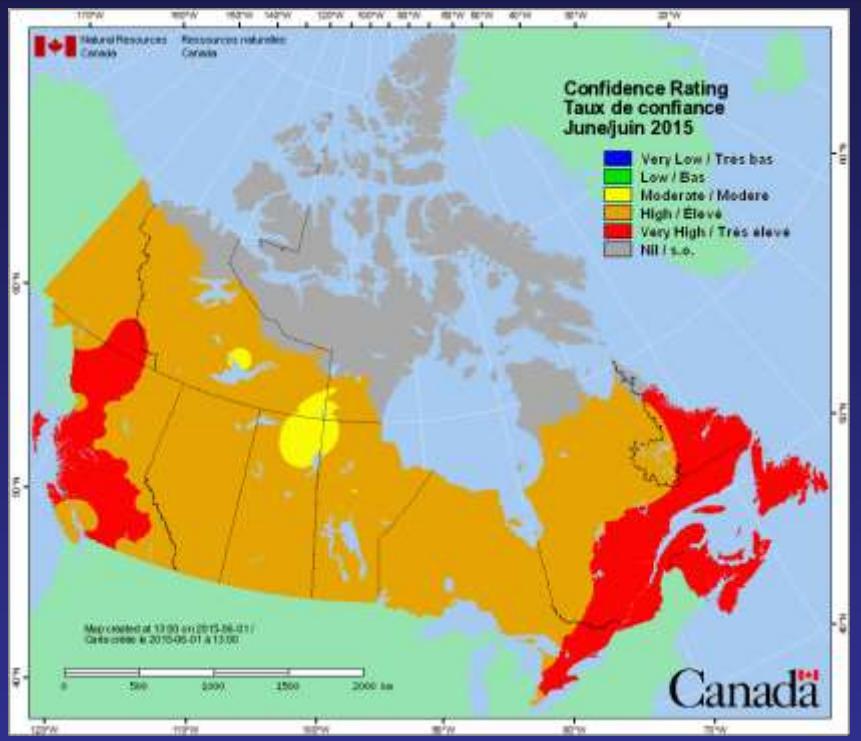
2015 Seasonal Prediction

Model Predictions

June 2015



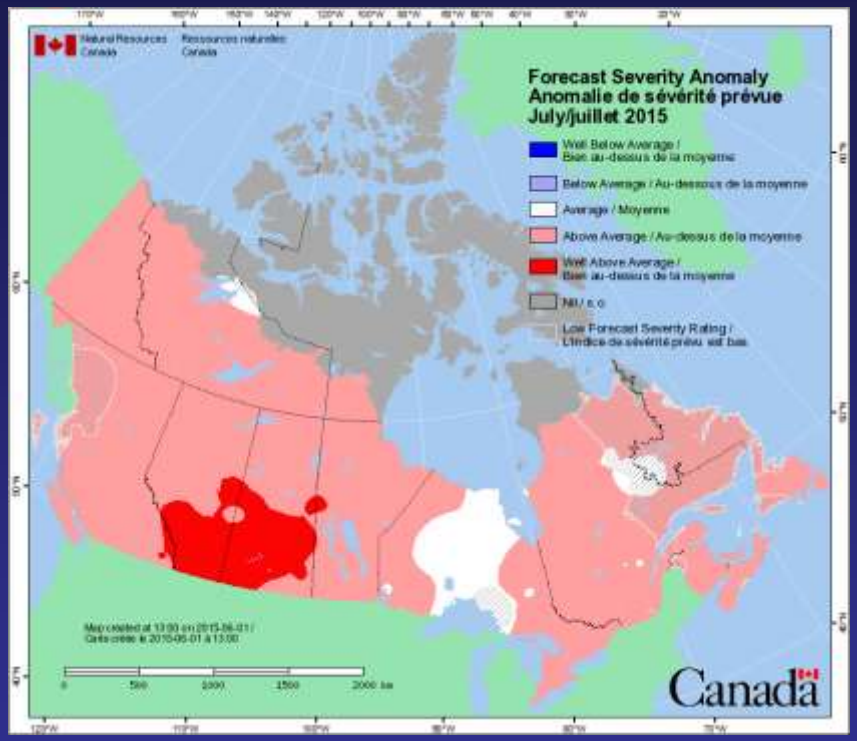
Prediction
(predicted values normalized against average weather)



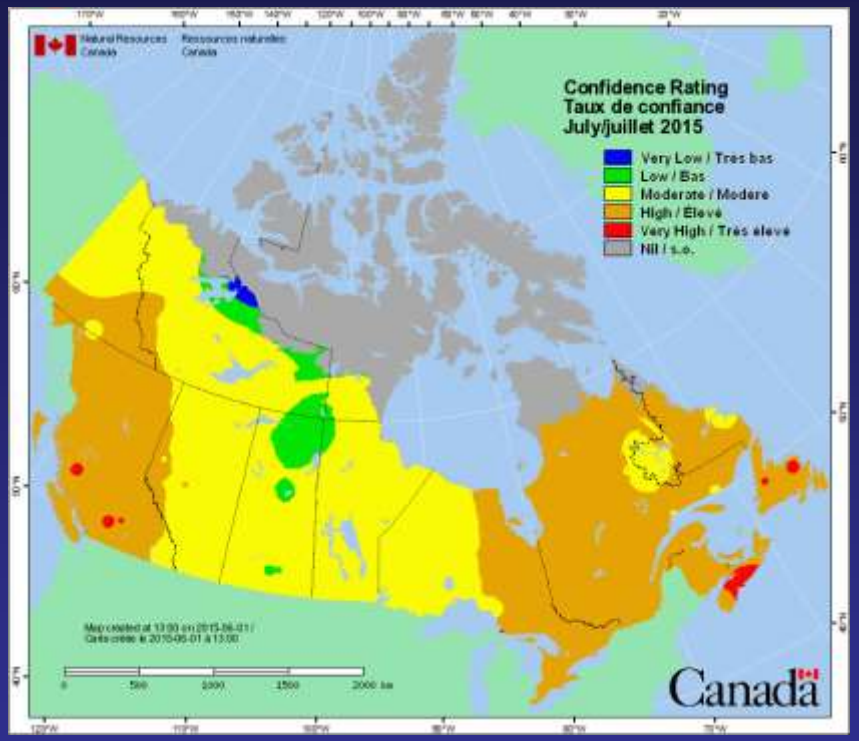
Confidence
(standard deviation normalized against average weather)

Above-average condition are present throughout most of Canada with the exception of parts of Ontario, Quebec and Newfoundland. Confidence is high.

July 2015



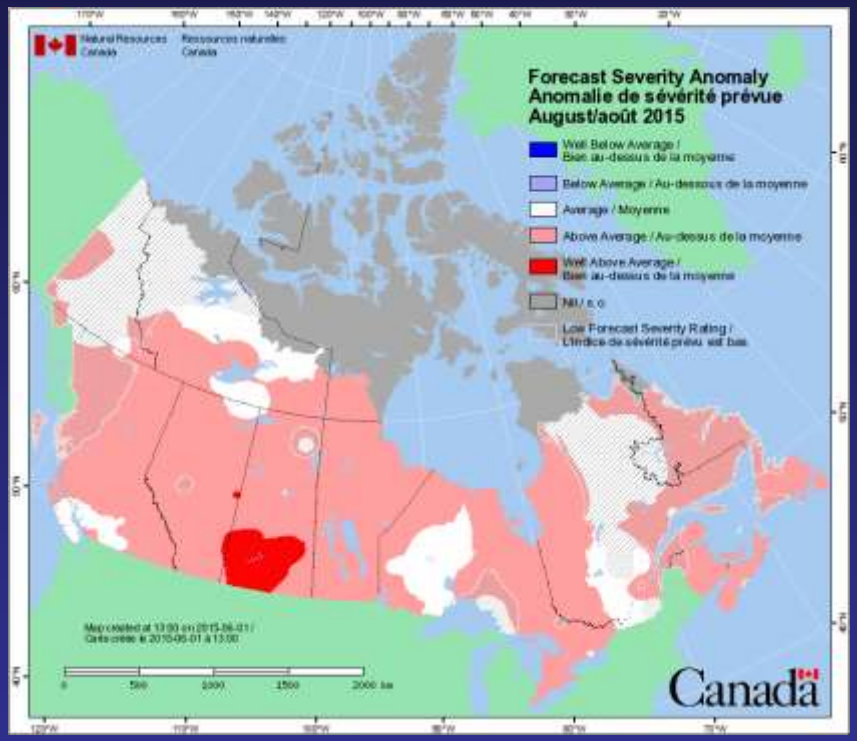
Prediction
(predicted values normalized against average weather)



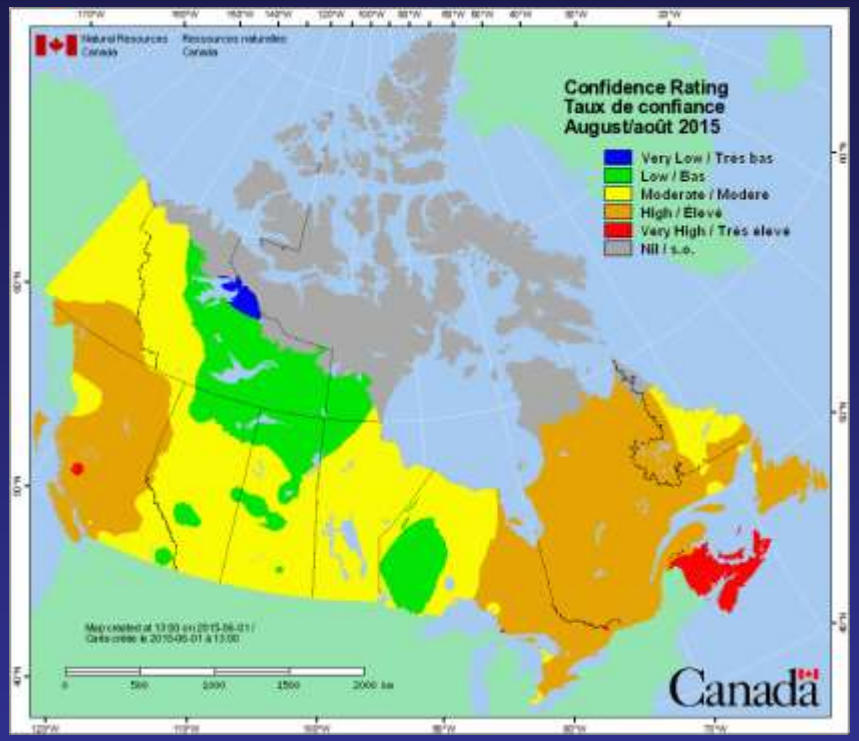
Confidence
(standard deviation normalized against average weather)

Above average conditions increase to cover nearly all of Canada though confidence is beginning to fall.

August 2015



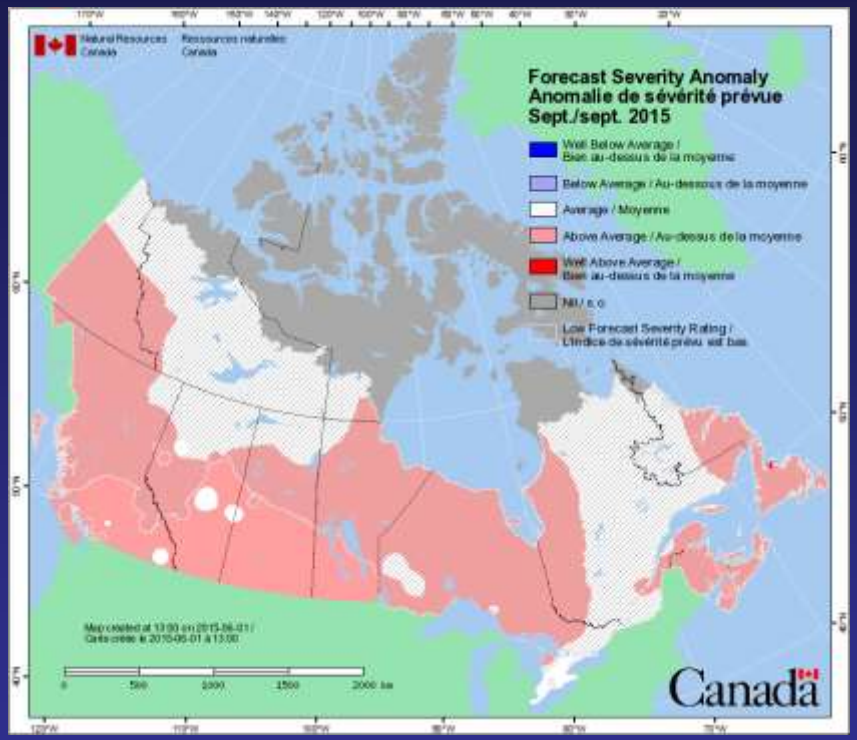
Prediction
(predicted values normalized against average weather)



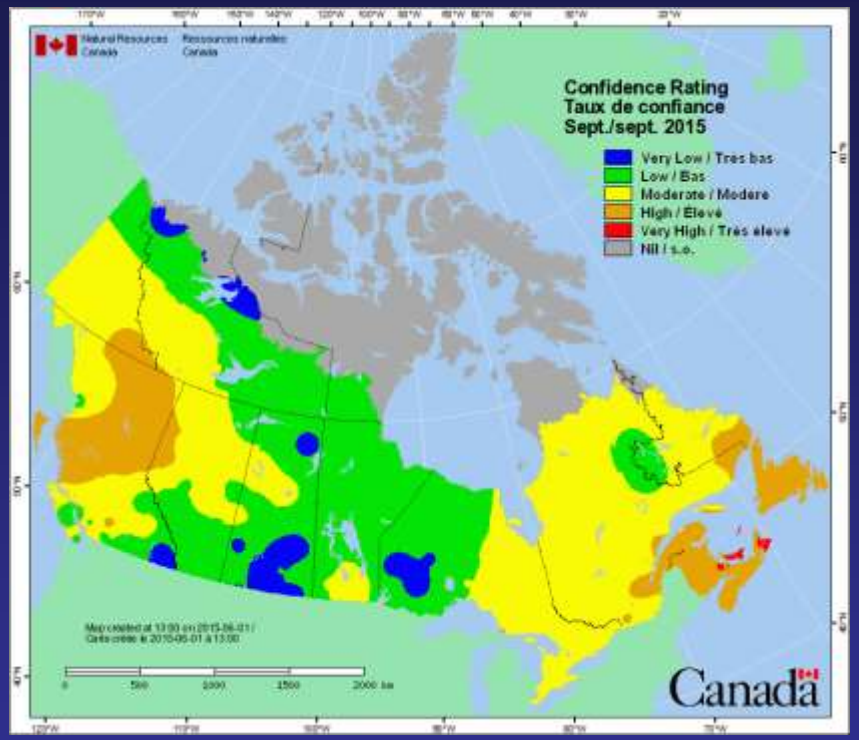
Confidence
(standard deviation normalized against average weather)

Conditions begin to subside with the exception of the southern Prairies.

September 2015



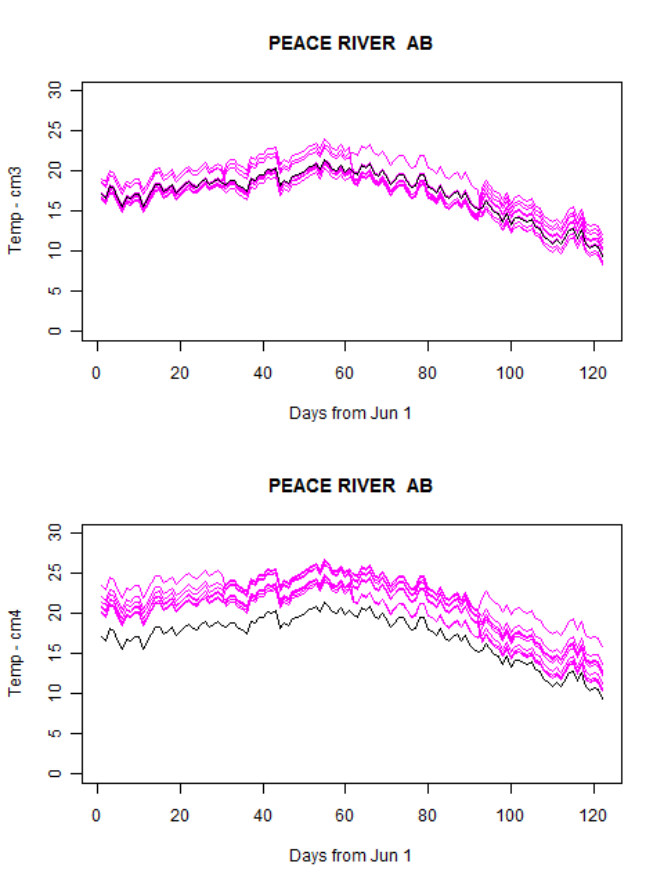
Prediction
(predicted values normalized against average weather)



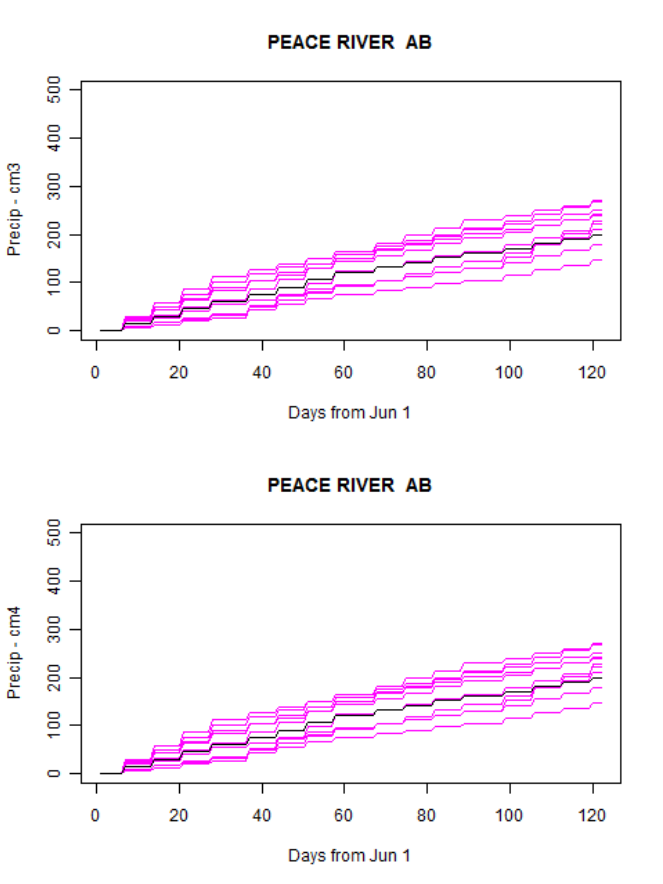
Confidence
(standard deviation normalized against average weather)

As fall takes hold, low forecast severity (hashed lines) is expected to cover most of the forest area (except southern BC).

Peace River 2015



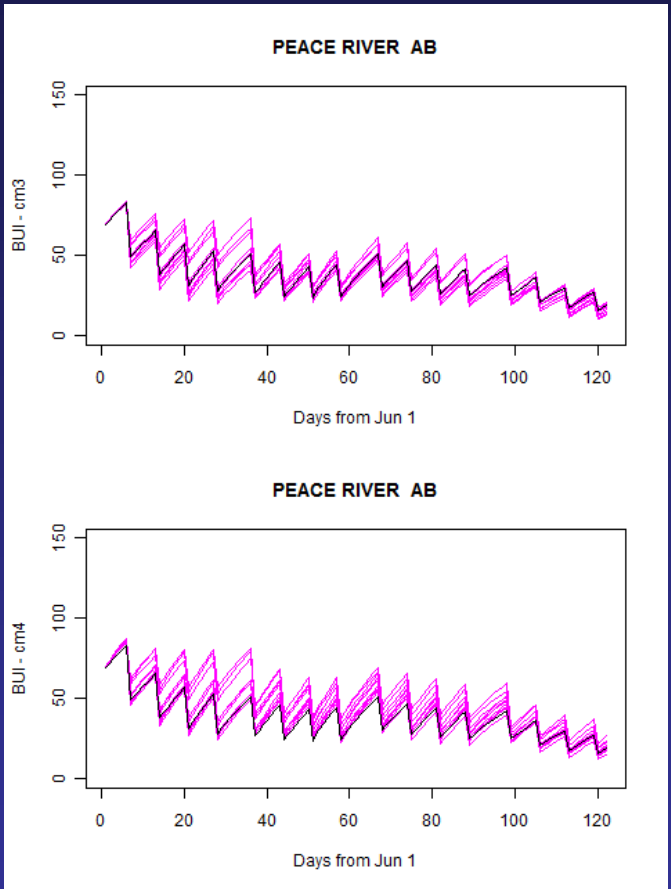
Temperature

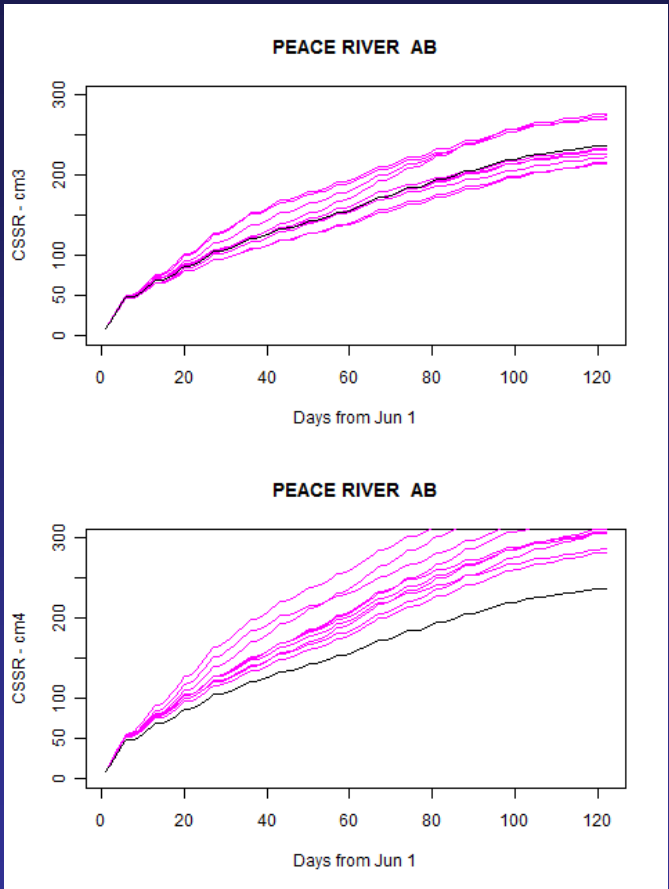


Precipitation

For Peace River and other northern Prairie stations (e.g. Prince Albert, The Pas), above average temperatures are driving the current elevated conditions

Peace River 2015



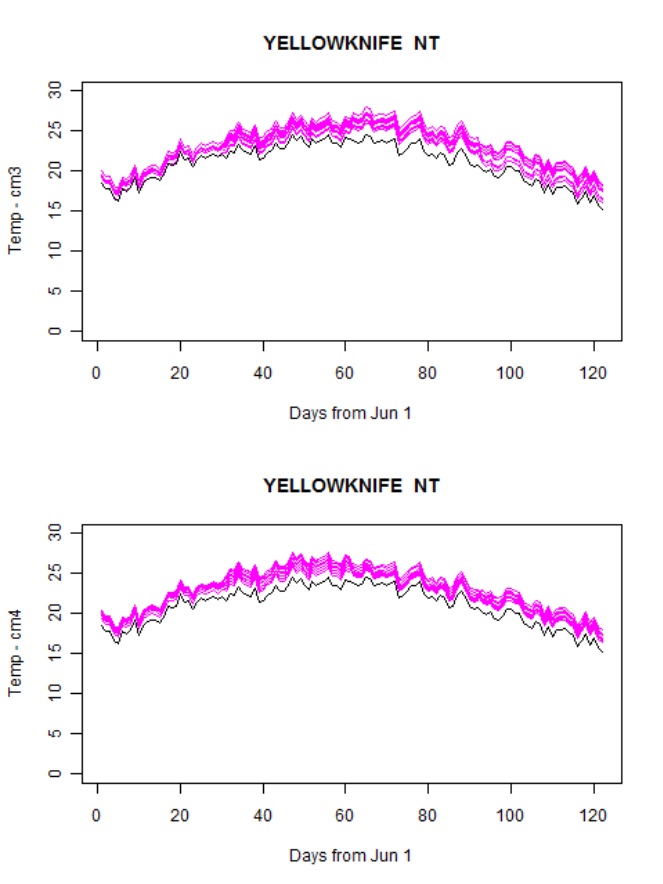


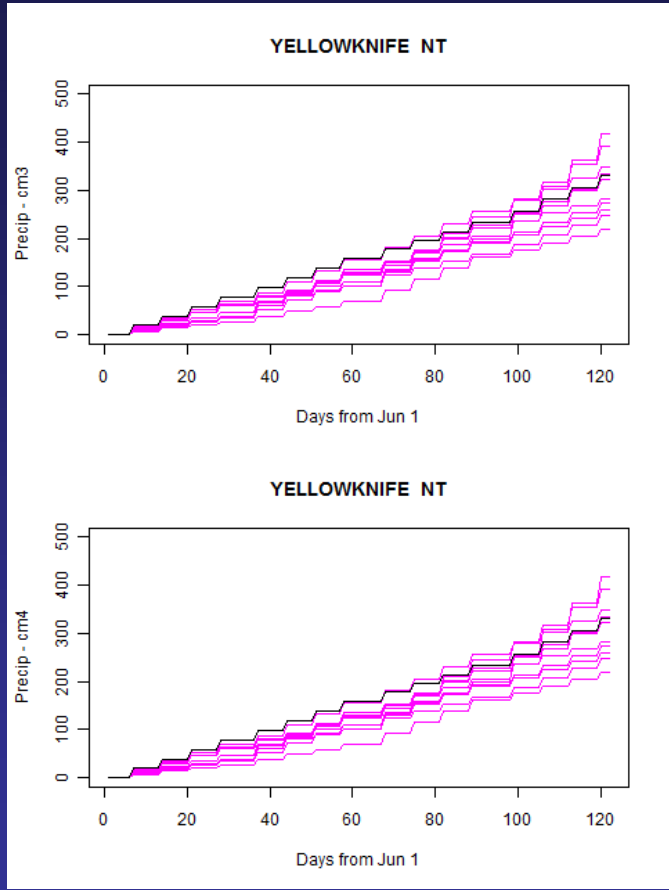
BUI

CSSR

Elevated BUI conditions in June could carry on high CSSR conditions into July and August.

Yellowknife 2015



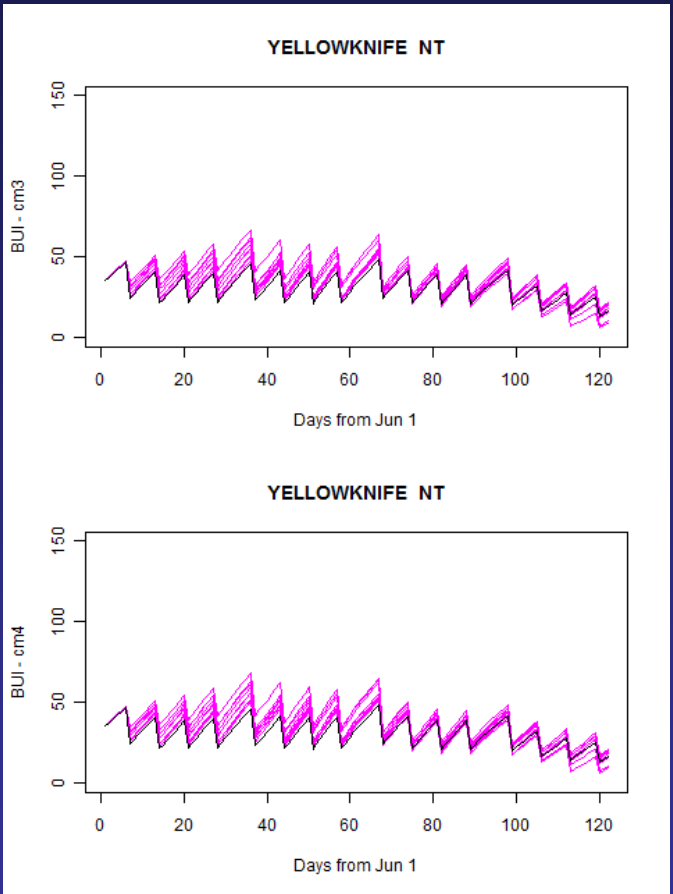


Temperature

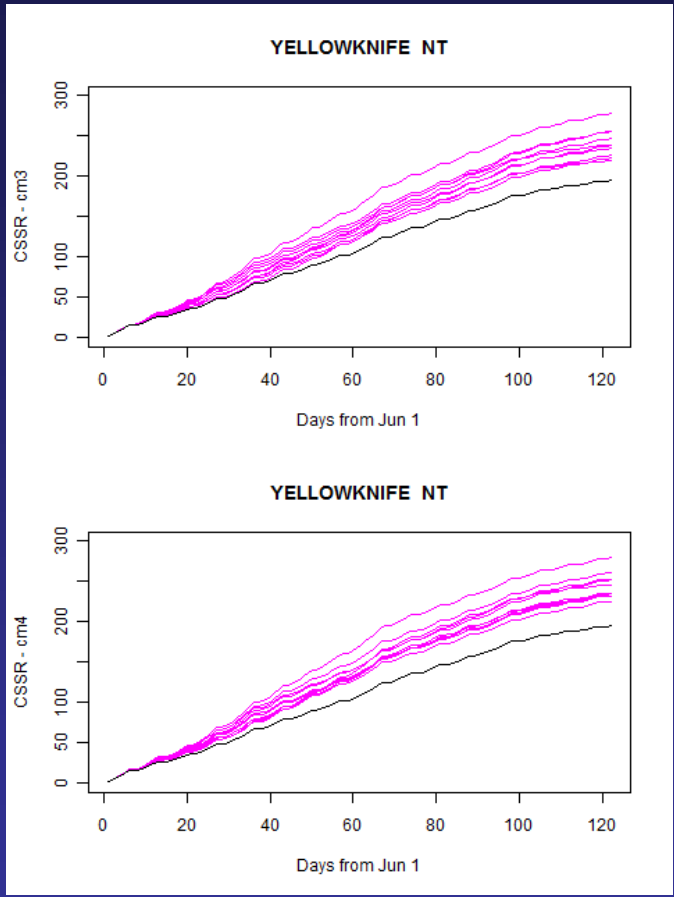
Precipitation

For Yellowknife, above average temperatures and below average precipitation continue to affect the region.

Yellowknife 2015



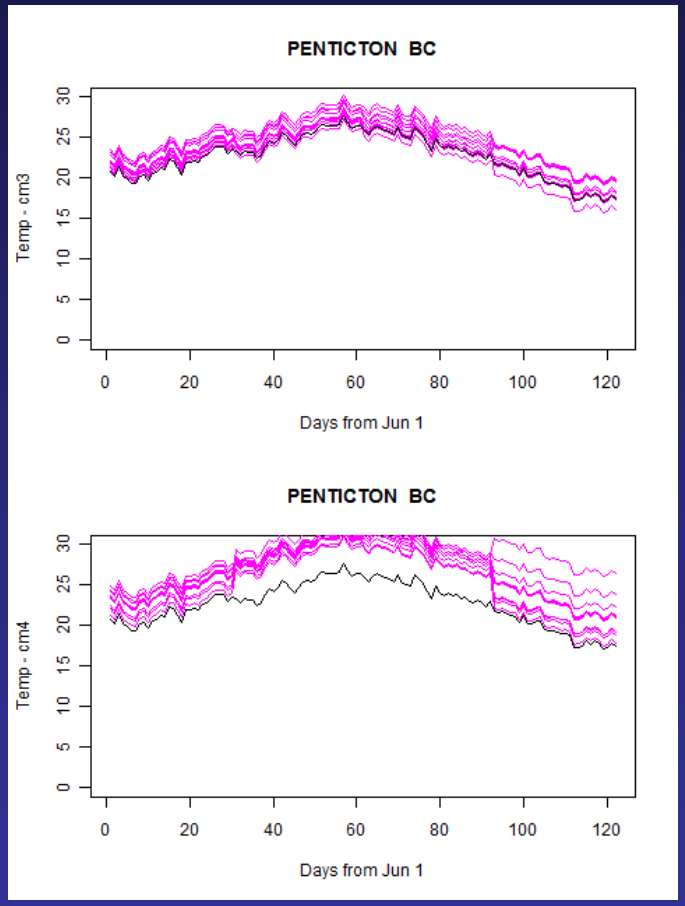
BUI



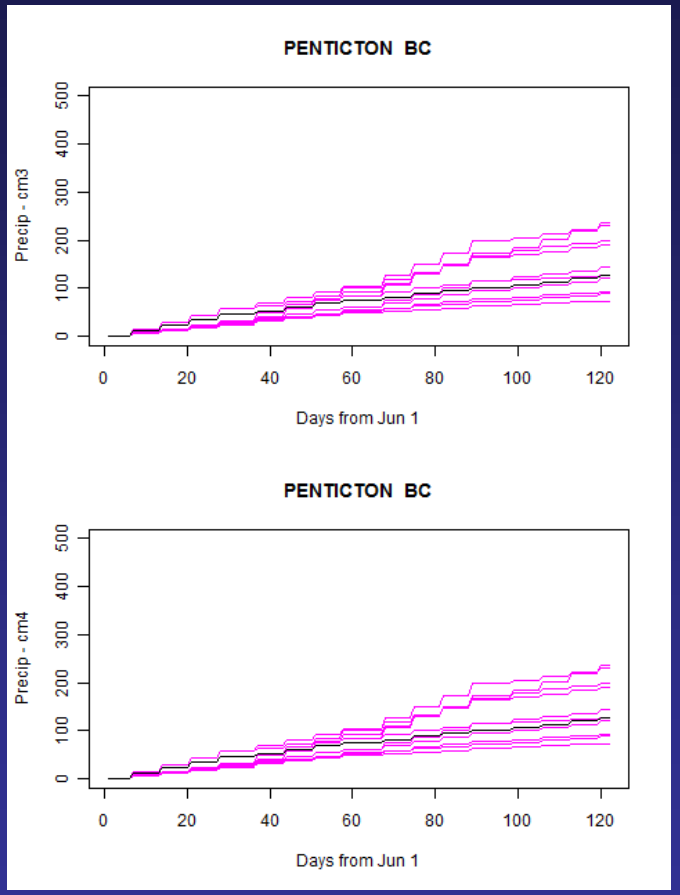
CSSR

Elevated BUI conditions continue into June and July but settle in August. CSSR conditions remain high.

Penticton 2015



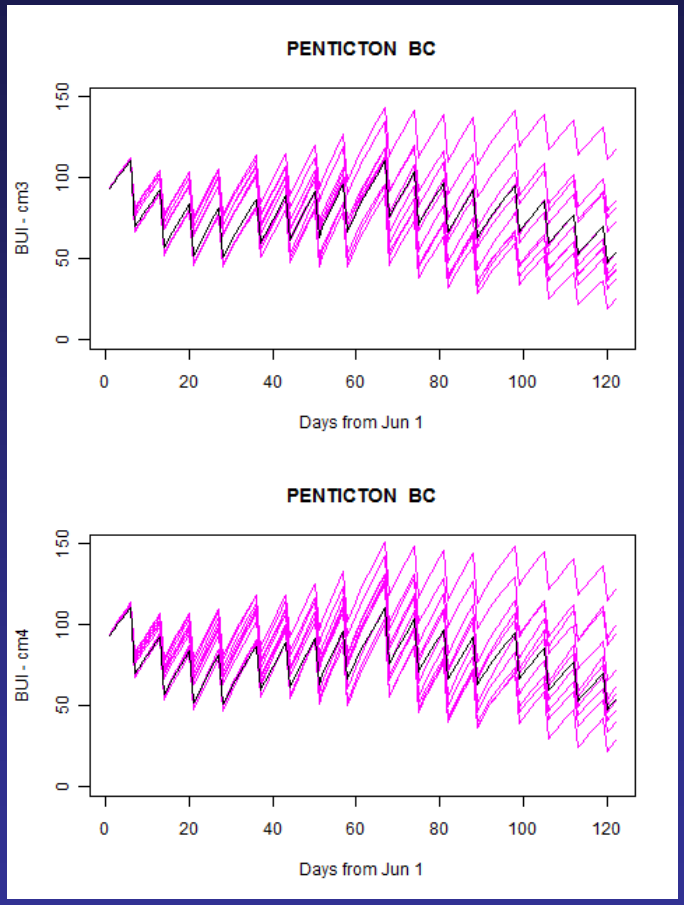
Temperature



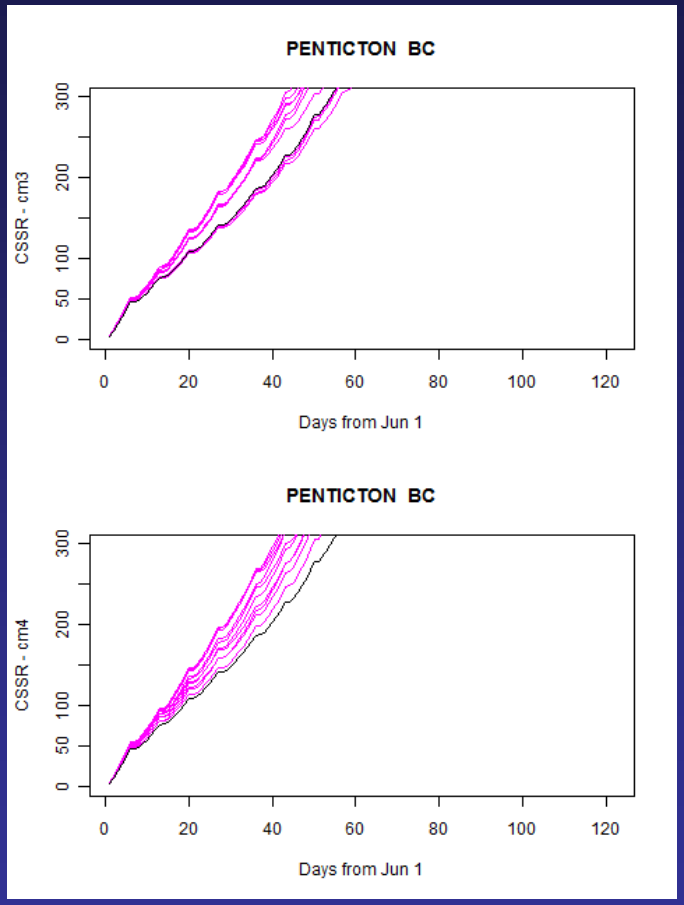
Precipitation

Southern BC may experience an extremely hot summer, but the models show a dichotomous predictions on precipitation.

Penticton 2015



BUI



CSSR

The highly variable precipitation forecasts result in low confidence in the fire danger forecast.

2015 Prediction

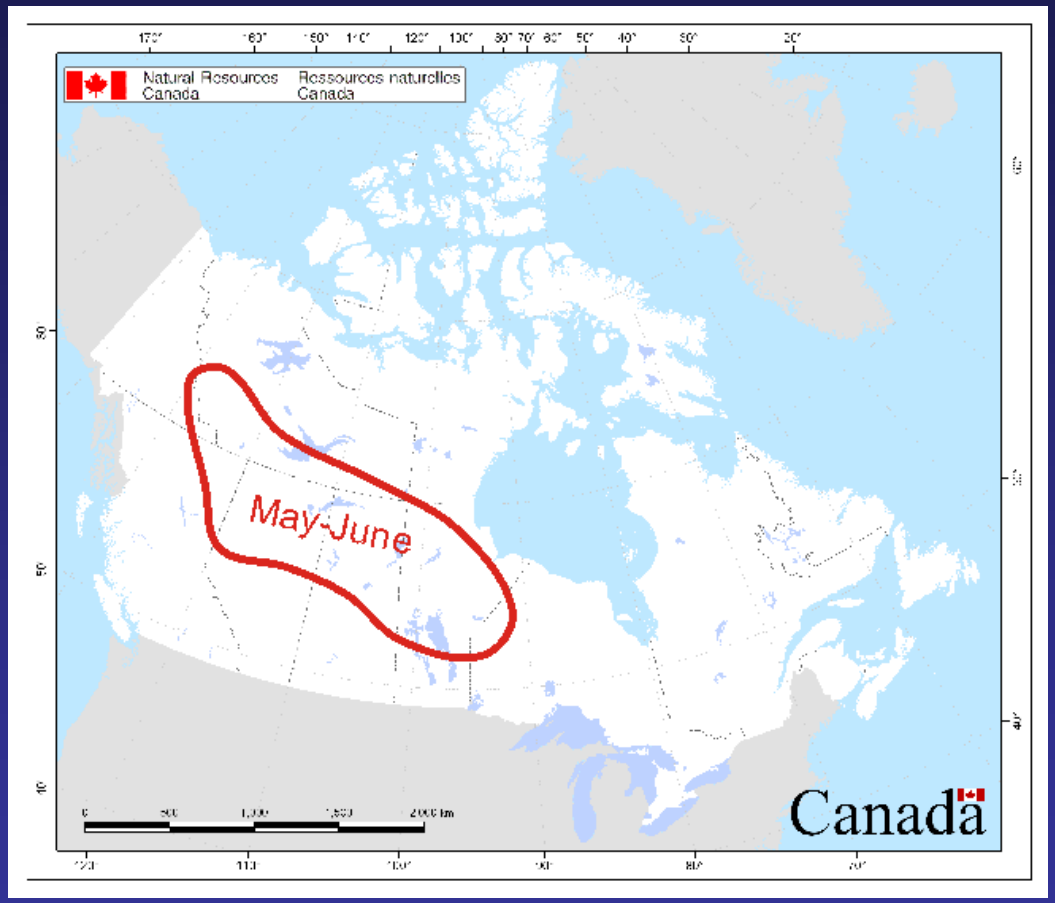
In April, it appeared that western Canada would see a early start to the fire season.

Elevated conditions are being seen in much of western Canada, especially across the northern prairies.

Conditions across western Canada could moderate later this summer, which could reduce fire danger.

This forecast appears to continue to hold true though elevated conditions may continue later into the summer.

North American Seasonal Assessment



A forecast produced in April included the northern Prairies and southern NWT as areas of concern in the North American Seasonal Assessment. This continue to be the case though it will likely continue into July.

The End