Fire Season Prediction for Canada, 2014

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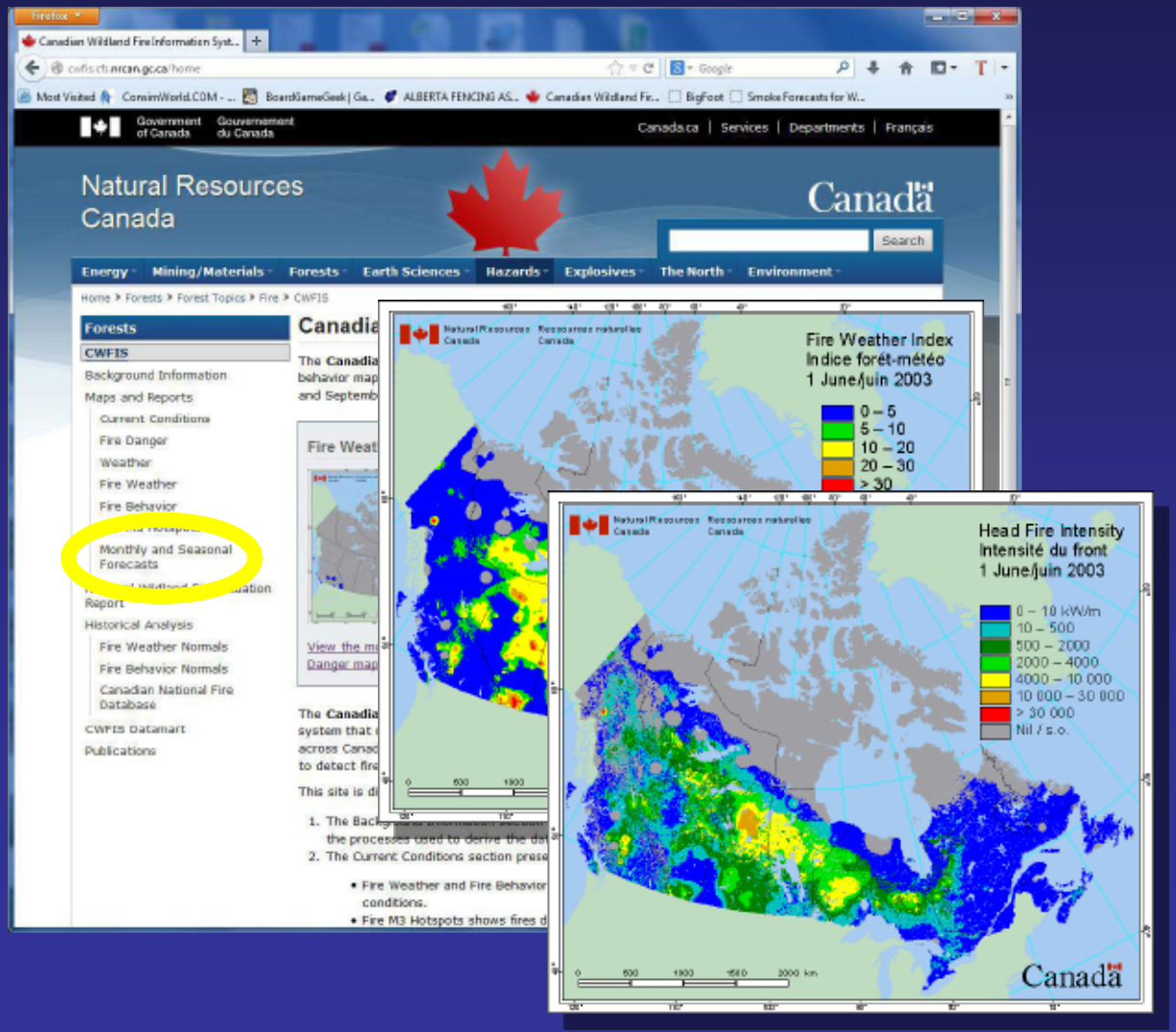
Introduction

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 2014 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,

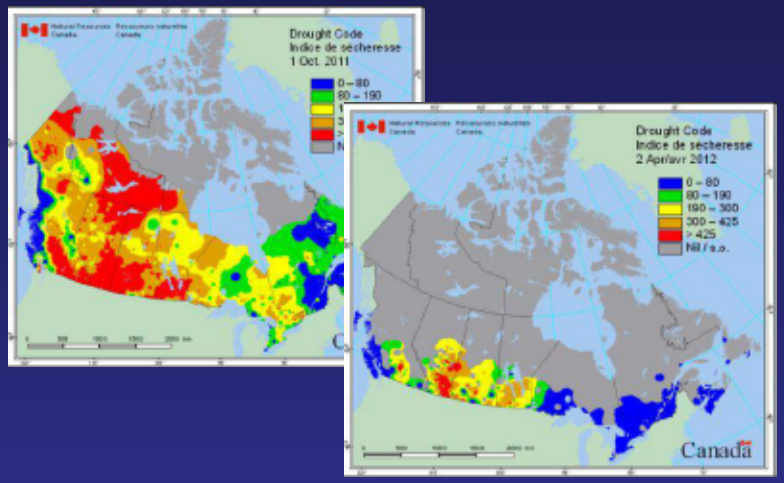
2. Calculate average daily weather for weather stations across country,

3. Incorporate Environment Canada's seasonal predictions,

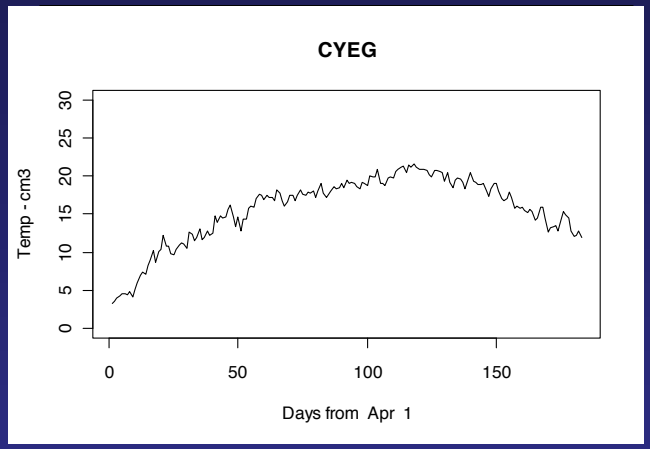
4. Determine the fire severity based on the ratio of forecasted over average monthly severity rating (MSR).

Methodology

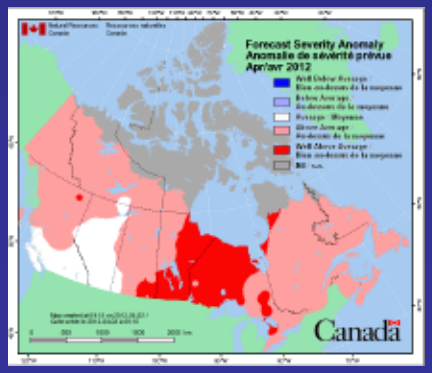
1. Fall conditions to Spring startup



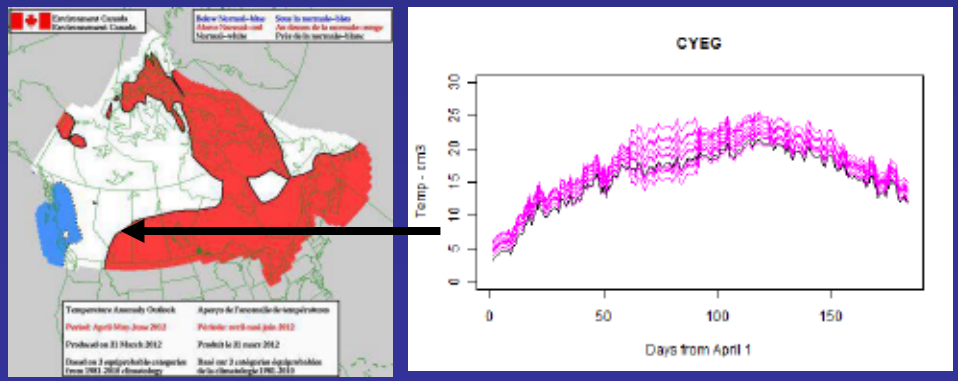
2. Calculate average daily weather



4. Calculate fire weather anomaly



3. Apply seasonal predictions



Ensemble Forecasts

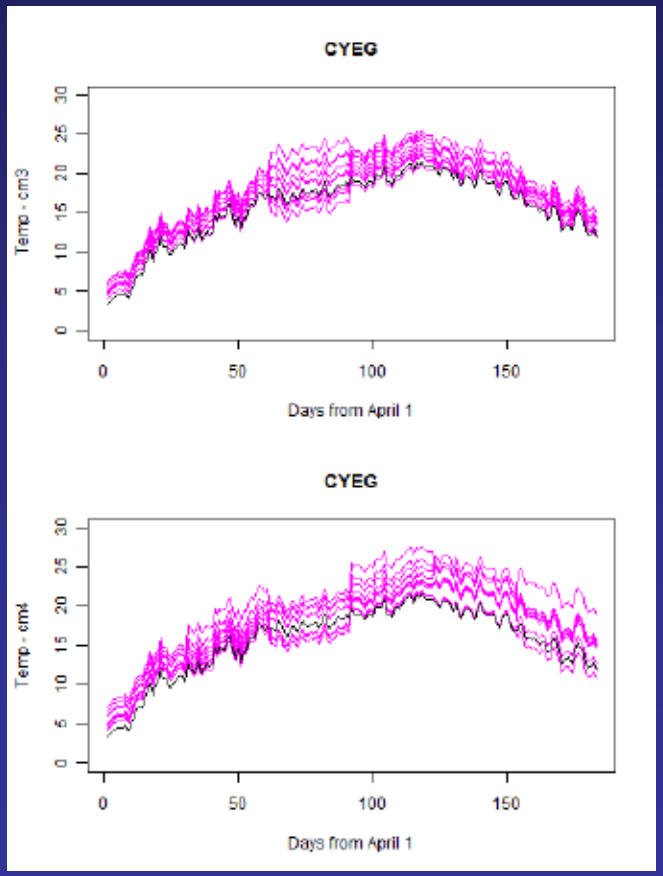
The Canadian Meteorological Centre (CMC) of Environment Canada has been providing temperature and precipitation probabilistic forecasts based on an ensemble of ten integrations of two climate models developed by Canadian Center for Climate modeling and analysis (CCCma)

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))

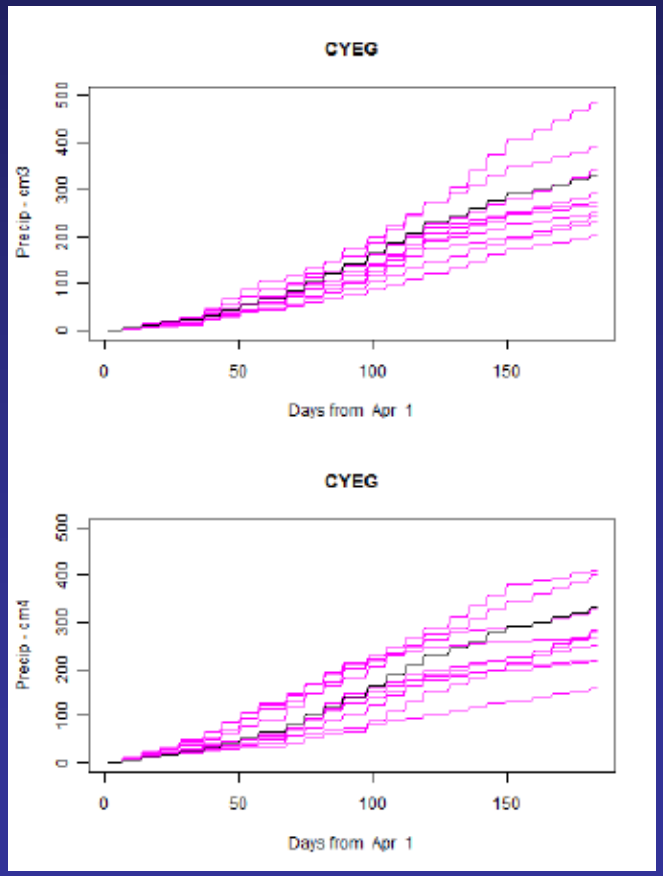
Forecasts are provided for the next twelve months.

Ensemble Forecasts

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

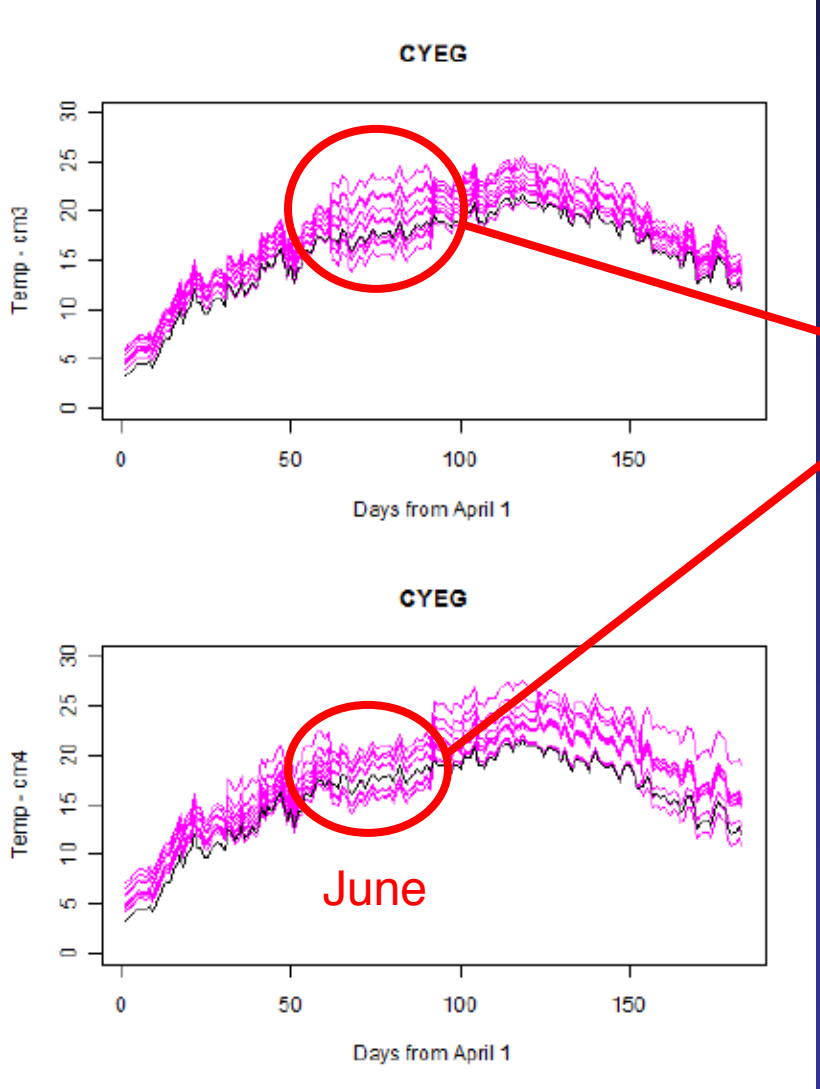


Temperature



Precipitation

Ensemble Forecasts

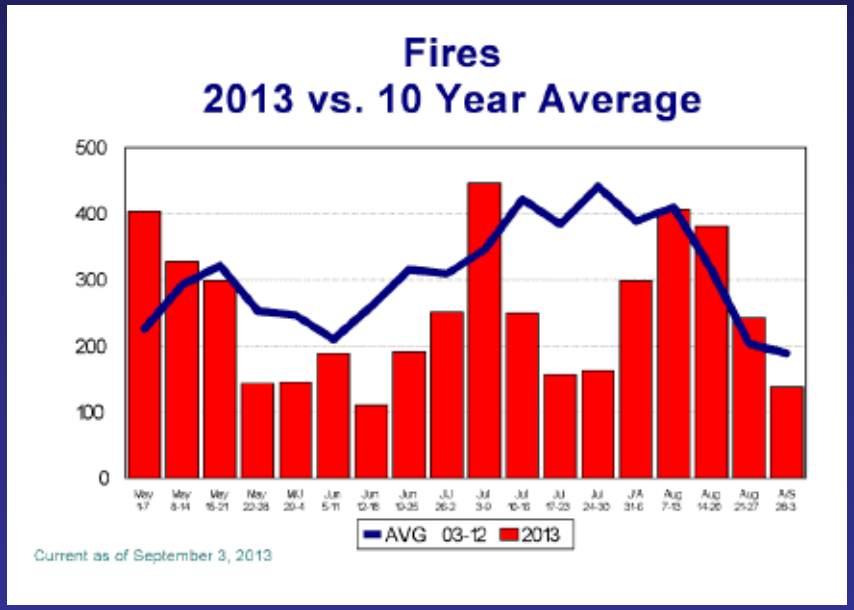


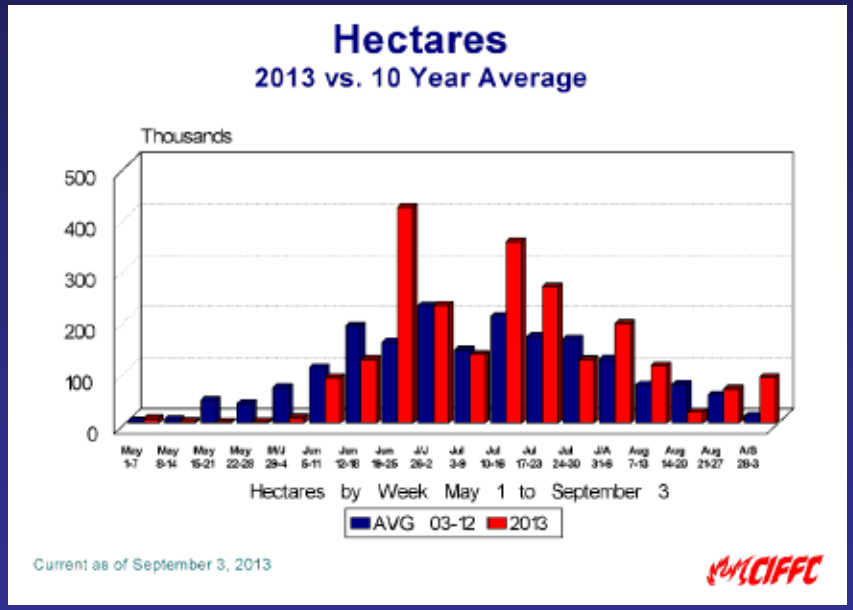
The ensemble approach provides a measure of confidence indicated by the spread of the ensemble members.

2013 Fire Season

2013 Prediction

The 2013 fire season was a relatively normal year with below-average number of fires and an above-average area burned.





5,897 fires

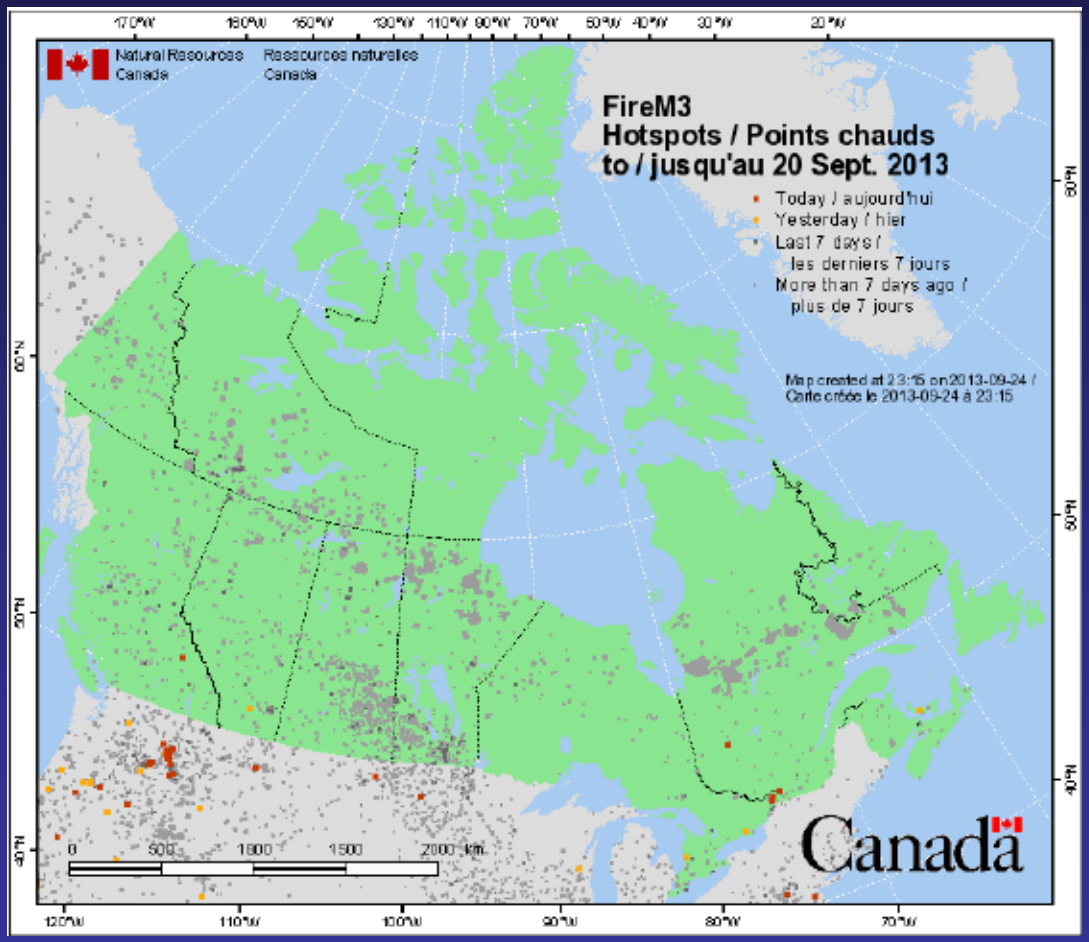
(avg: 7,389)

3,798,205 ha

(avg 1,647,438 ha)

Numbers based on September 11, 2013 situation report

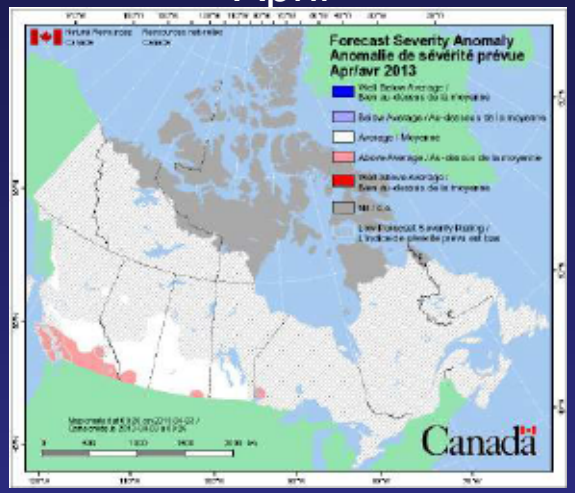
2013 Prediction



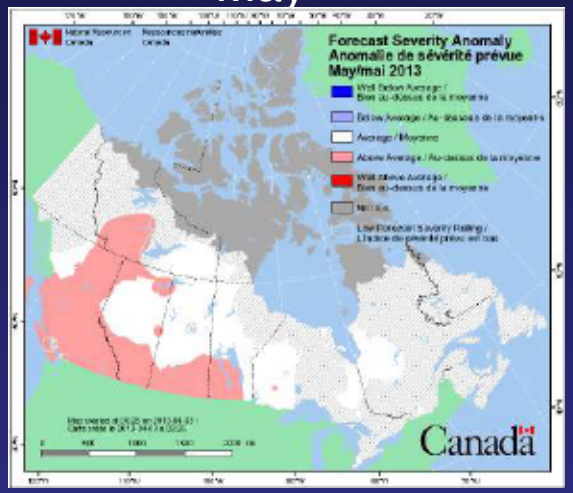
Most of the activity and area burned occurred in Manitoba and Quebec in June-July; and Saskatchewan and Southern NWT in July-August.

2013 Prediction

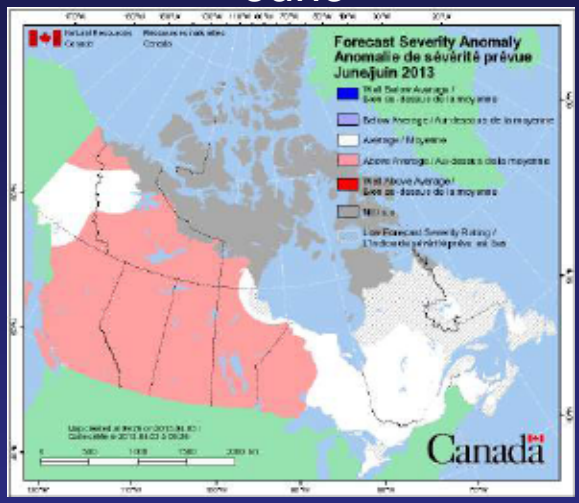
April



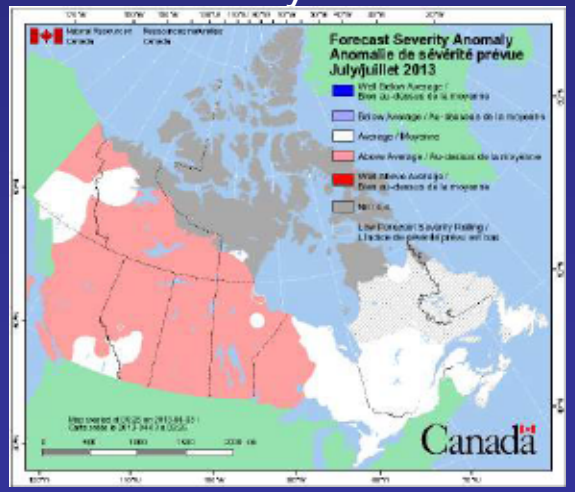
May



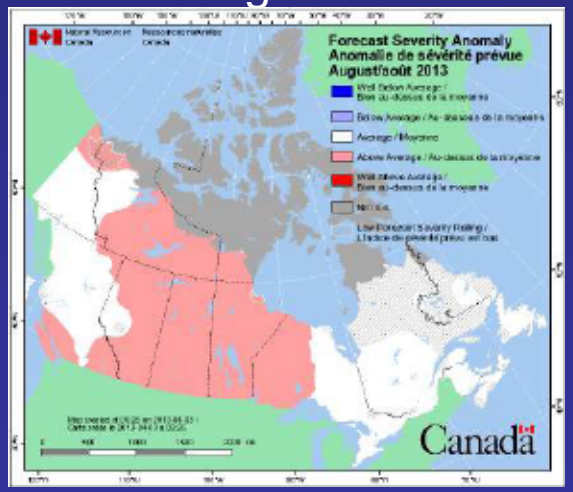
June



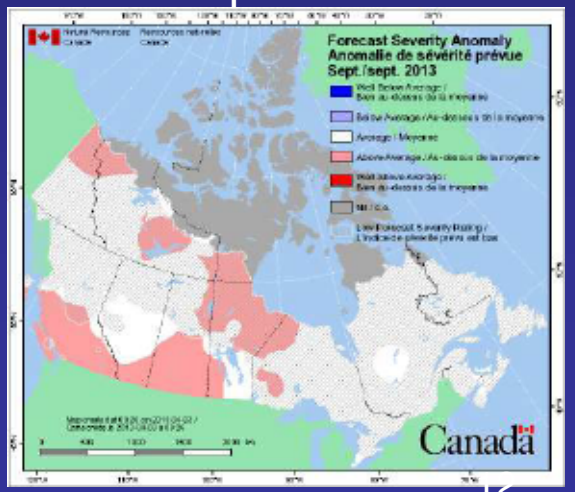
July



August

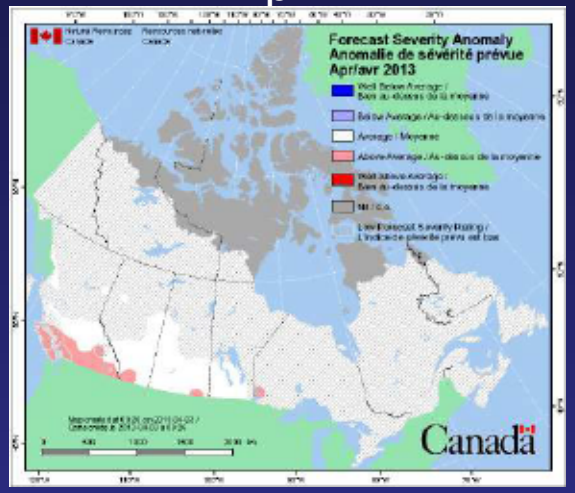


September

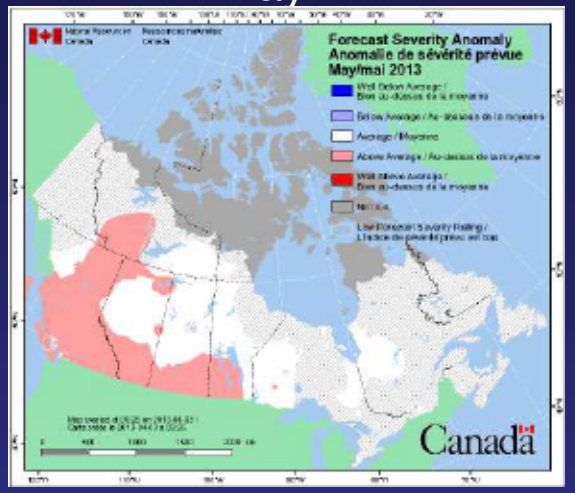


2013 Fire Activity

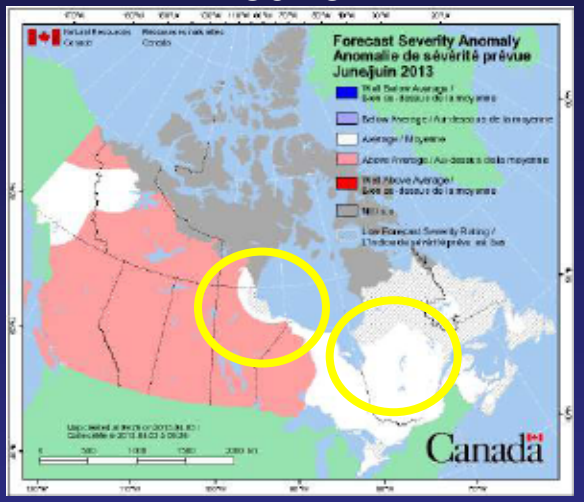
April



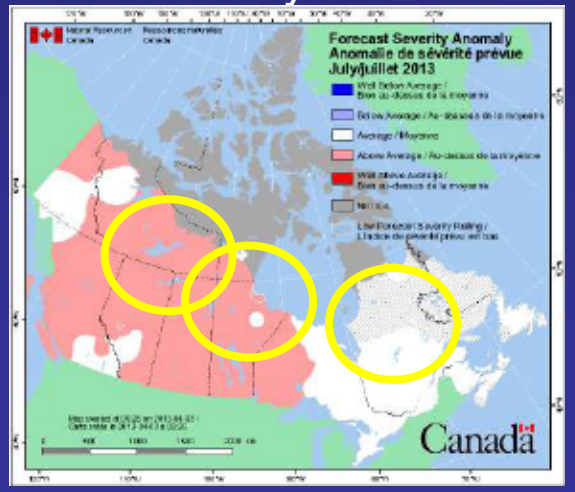
May



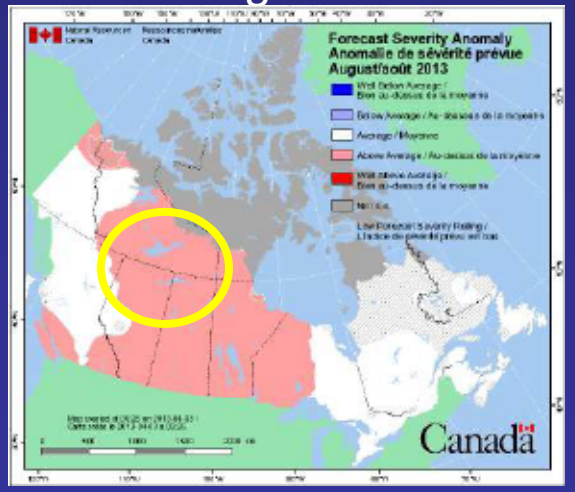
June



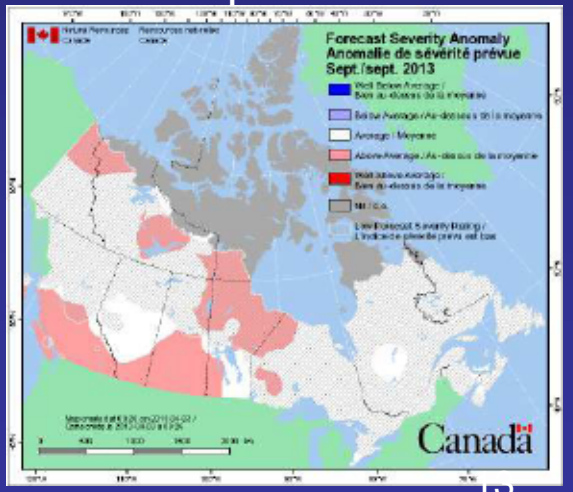
July



August



September



North American Seasonal Assessment

The forecast included Quebec as an area of concern in the North American Seasonal Assessment.

2013 Prediction

In summary, the forecast captured the fire activity in Northern Prairies and southern NWT.

While the prediction did not capture the activity in Quebec, input from other seasonal forecast models indicated this as an area of concern.

All in all, this was not a dramatic year for fire in Canada and the model indicated such.

2014 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.

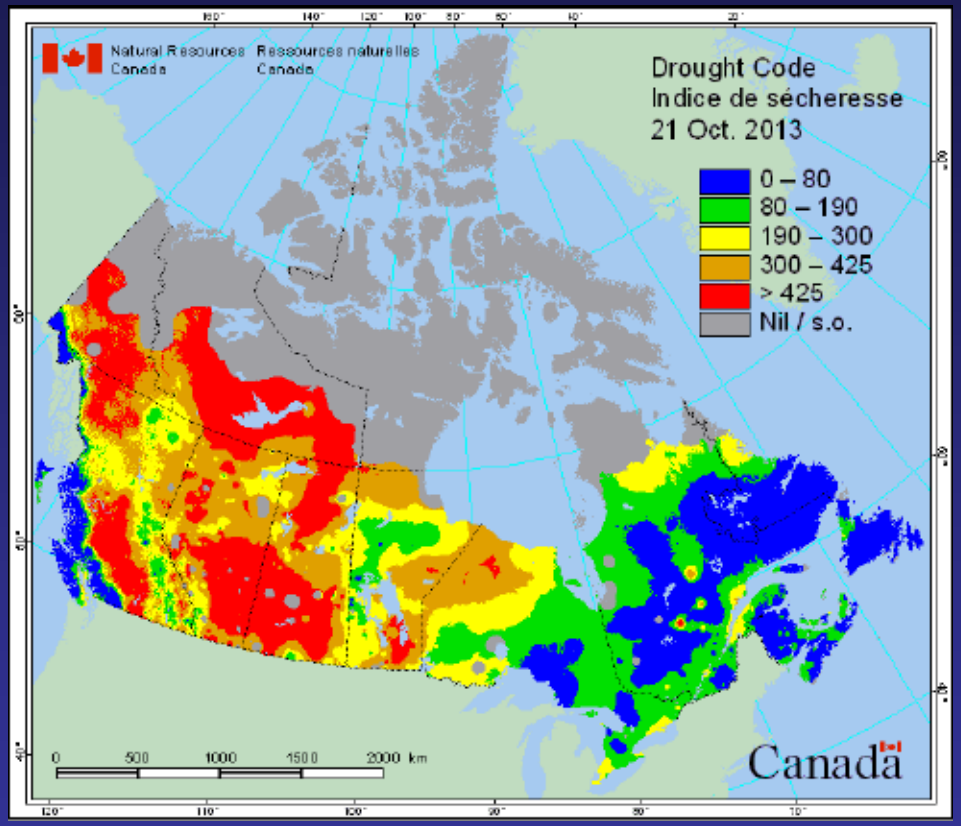
This is handled by the Drought Code (DC) (similar to the 1000 hour moisture code).

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.

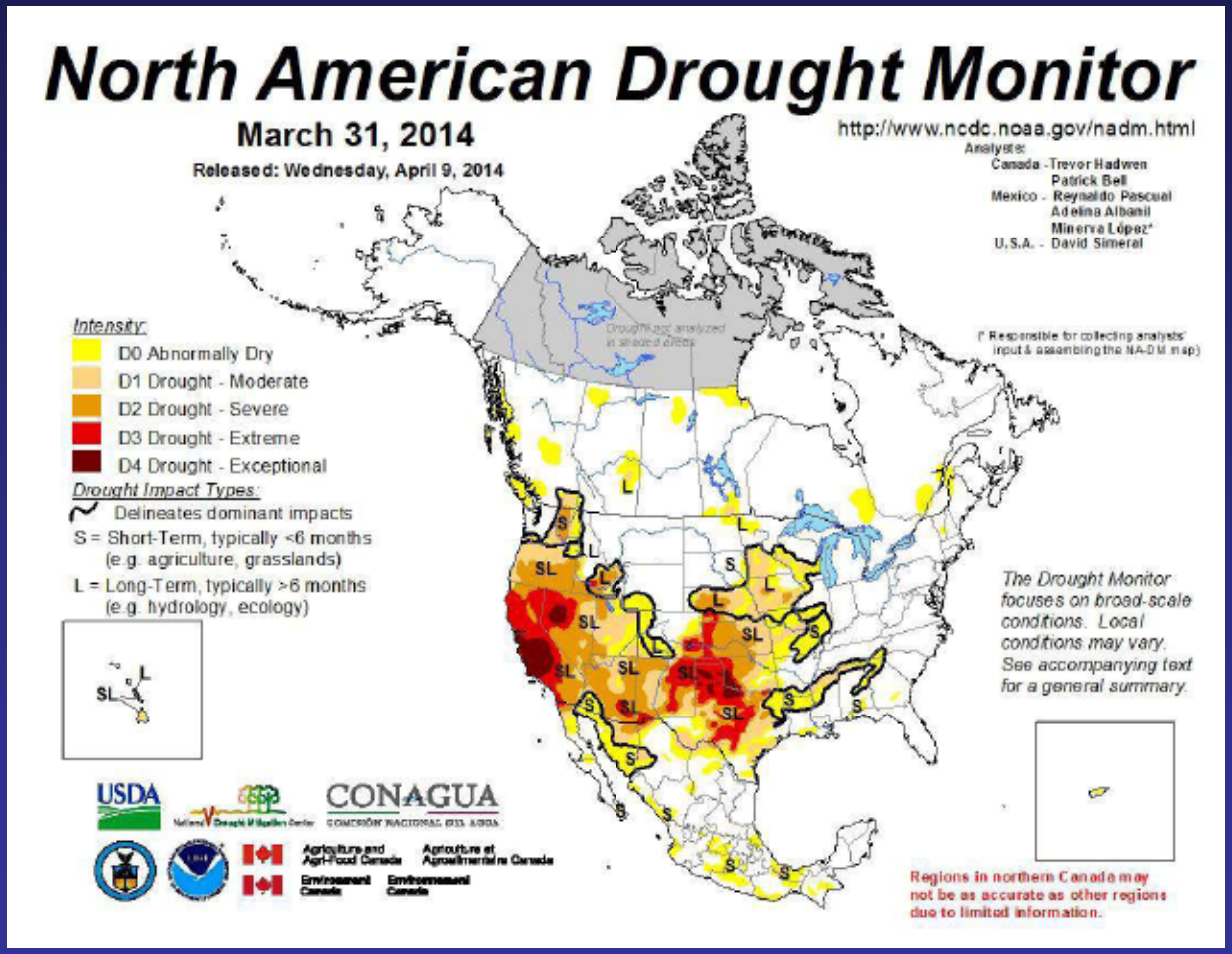
Most of the snow fell in November and December in western Canada.



Oct 21, 2013

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

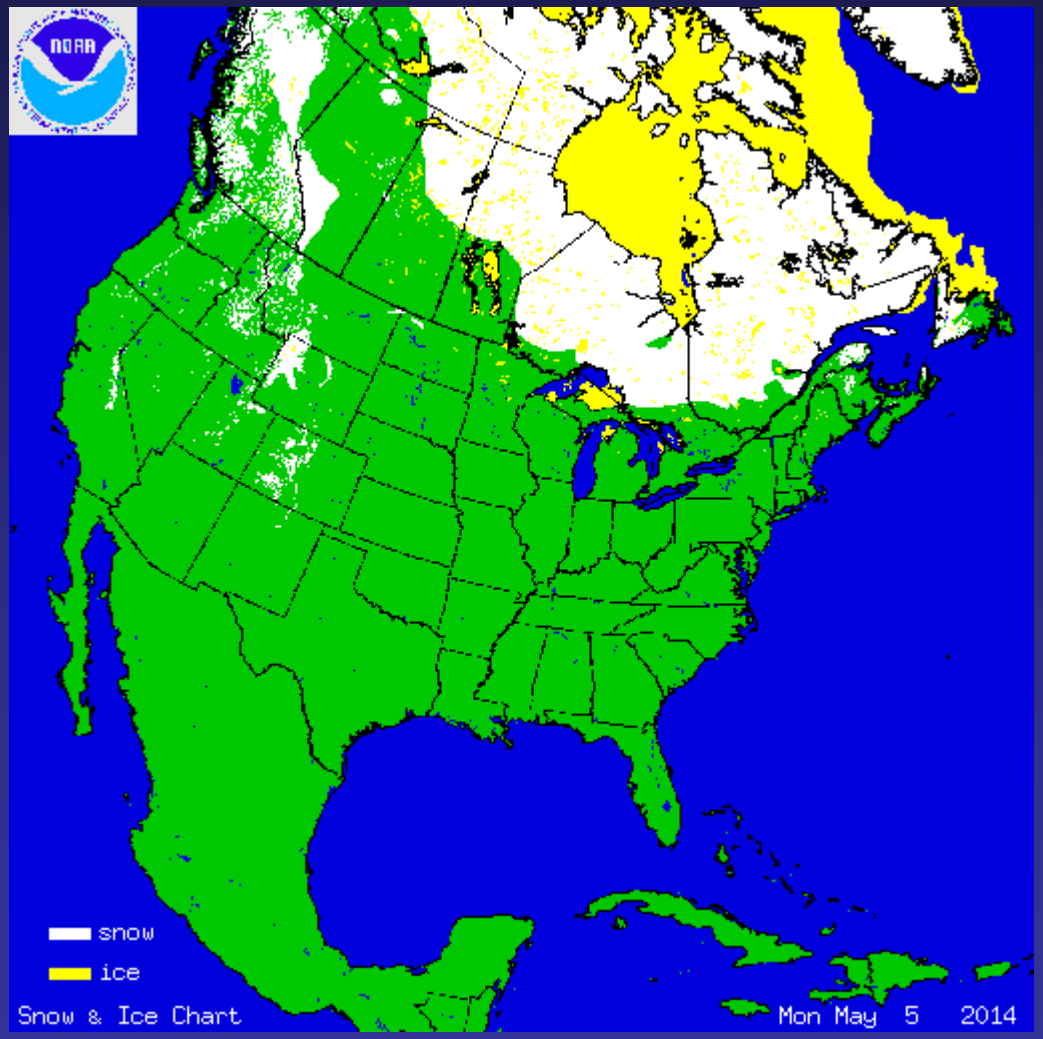
Spring Start-up Conditions



North American Drought Monitor indicates a relatively normal pattern across all of Canada.

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

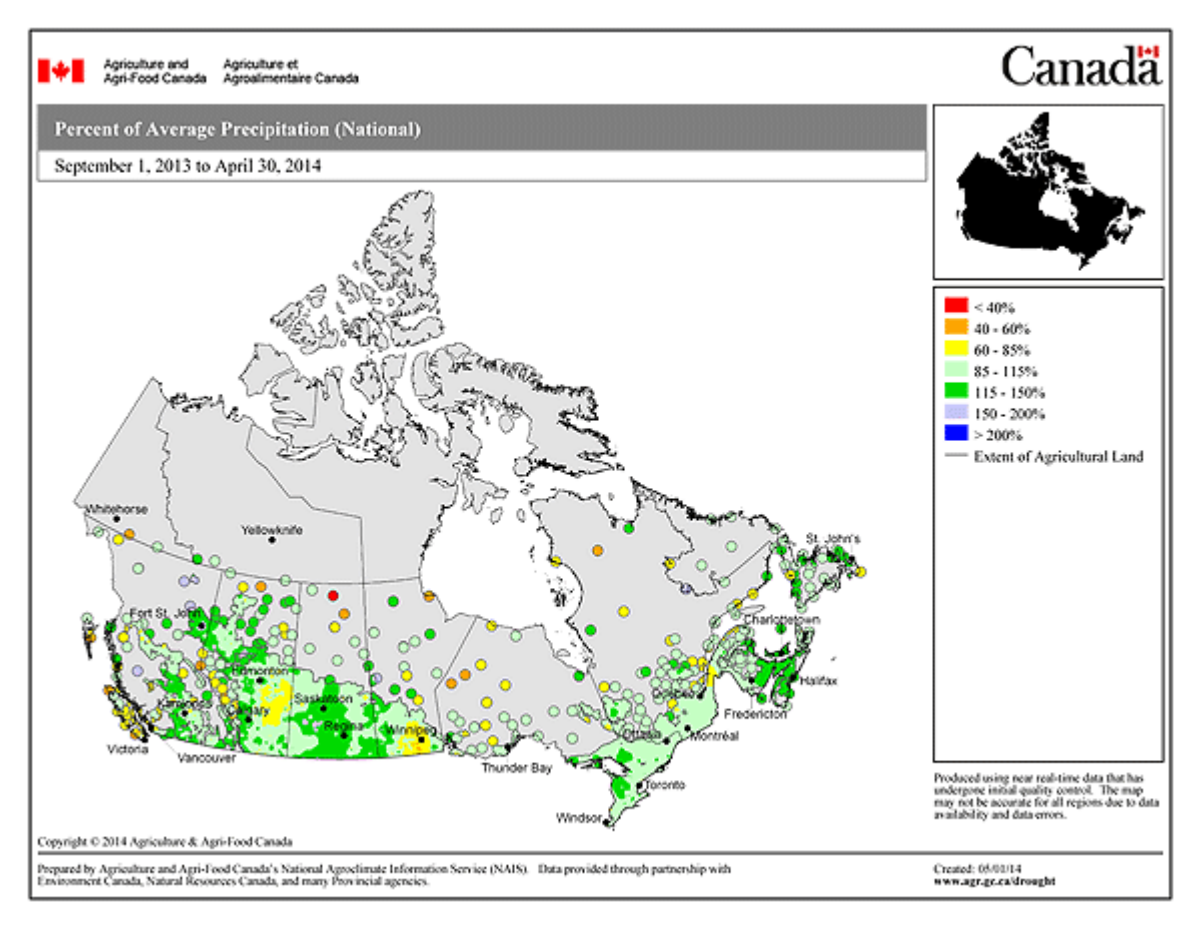
Overwinter Snowfall



Much of Canada was under snow cover until May, thus Canada experienced a late start to the fire season.

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

Overwinter Snowfall

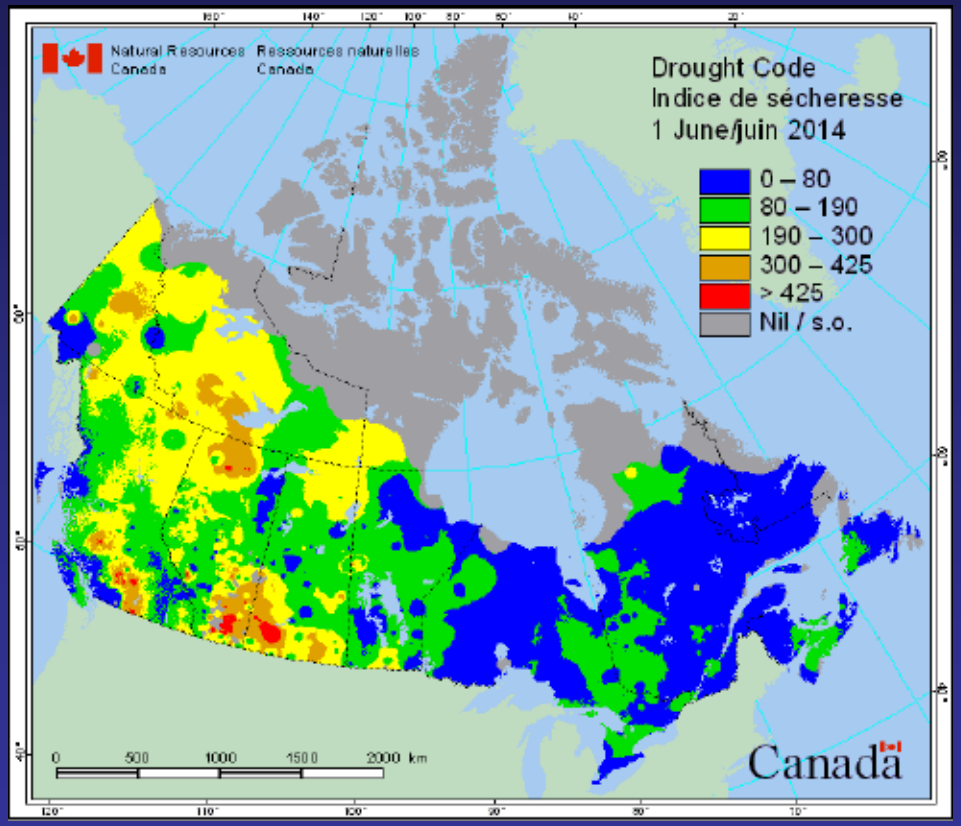


Snow amounts ranged from 60% to 150% of normal in Canada.

There are spots in Northern Saskatchewan/ Manitoba and in northwestern Ontario suggesting below average conditions.

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

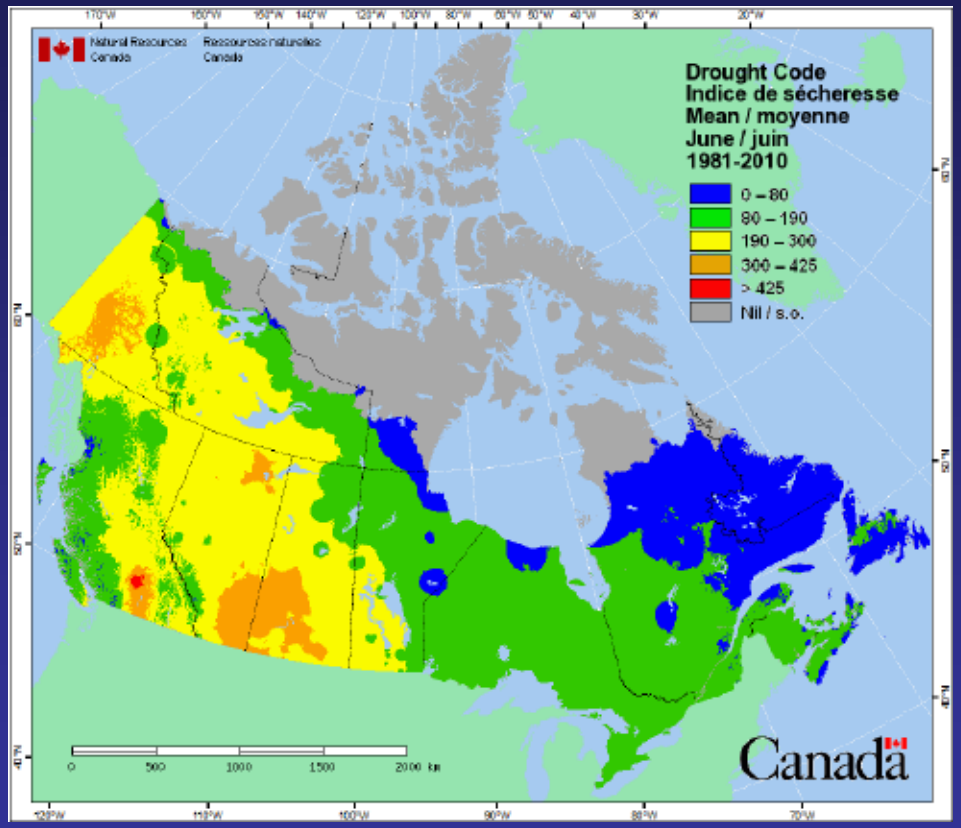
Spring Start-up Conditions



As spring has passed and the snow melted, we can see the Drought Code conditions across Canada.

http://cwfis.cfs.nrcan.gc.ca/maps/fw?type=dc&year=2014&month=6&day=1

Spring Start-up Conditions

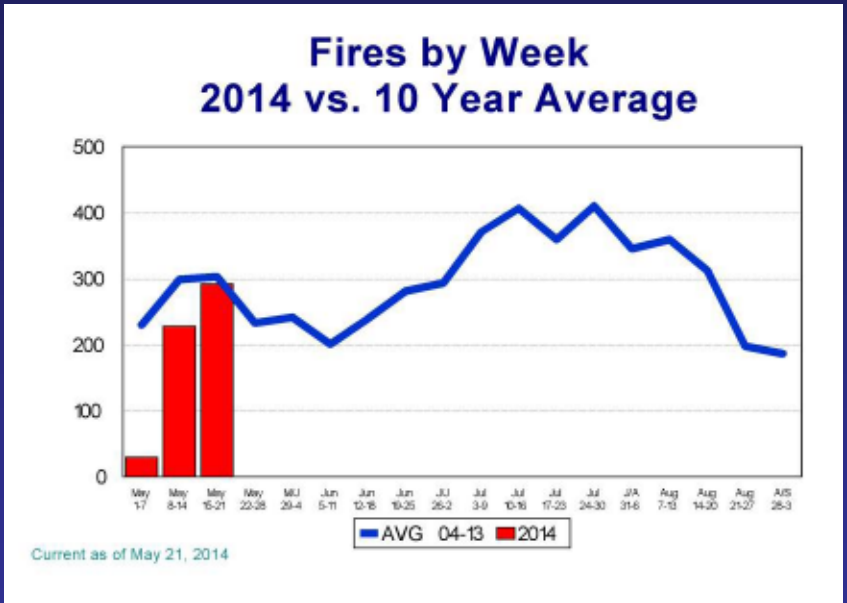


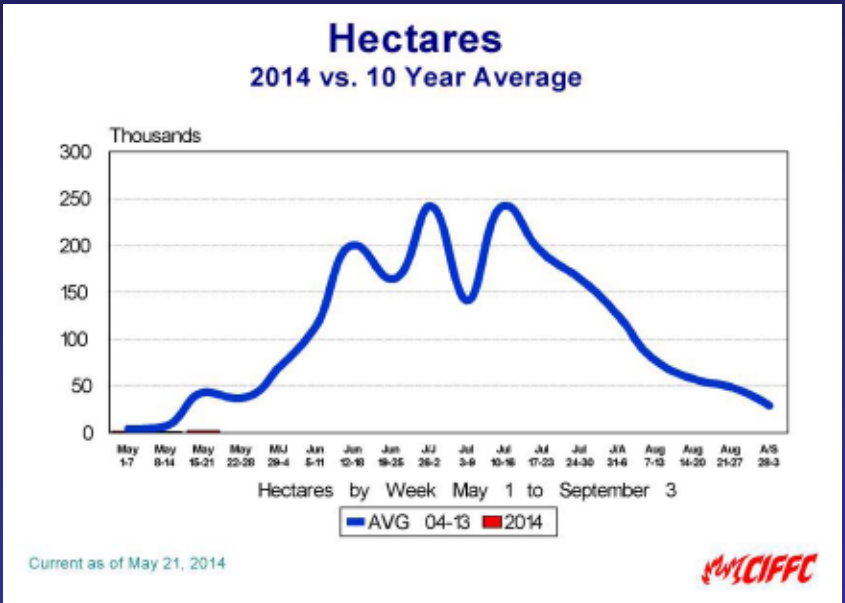
Compared with mean June conditions, the only area of above-average appears to be the Alberta/NWT boundary.

http://cwfis.cfs.nrcan.gc.ca/ha/fwnormals?type=dc&month=6

2014 Conditions

The 2014 fire season is off to a slow start with below average number of fires and an area burned far below normal.





1,195 fires

(10-yr avg: 1,968)

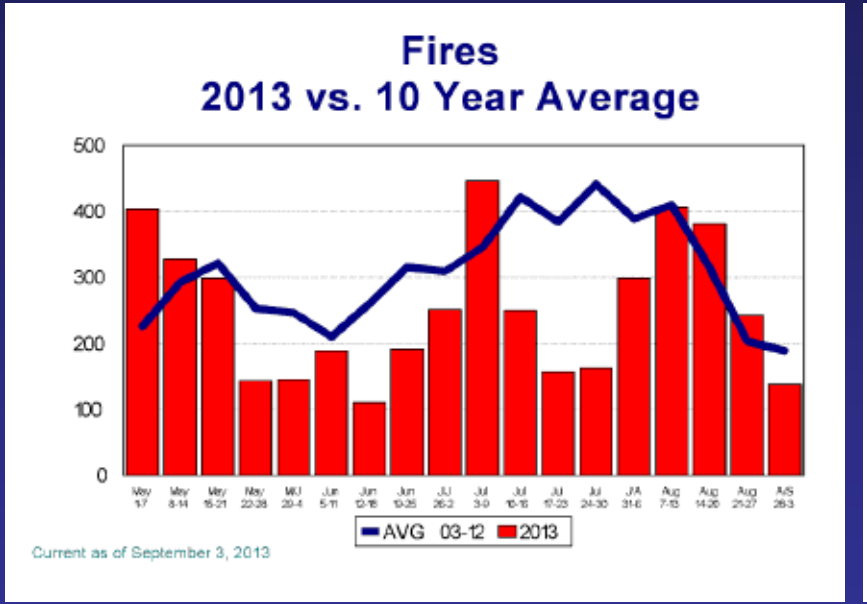
25,865 ha

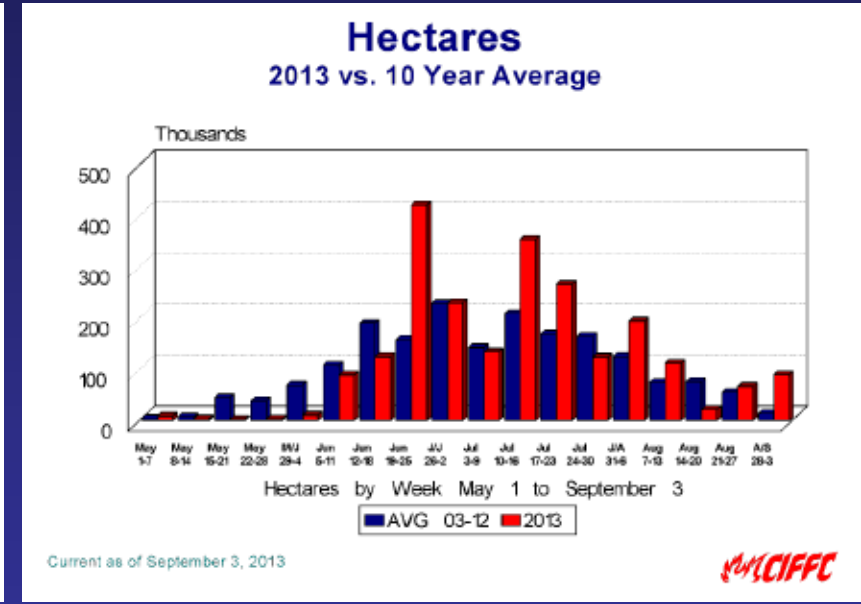
(10-yr avg 120,843 ha)

Numbers based on June 1, 2014 situation report

2013 Condition

The 2013 data is shown here again for comparison.





5,897 fires

(avg: 7,389)

3,798,205 ha

(avg 1,647,438 ha)

Numbers based on September 11, 2013 situation report

2014 Seasonal Prediction

ENSO Pattern

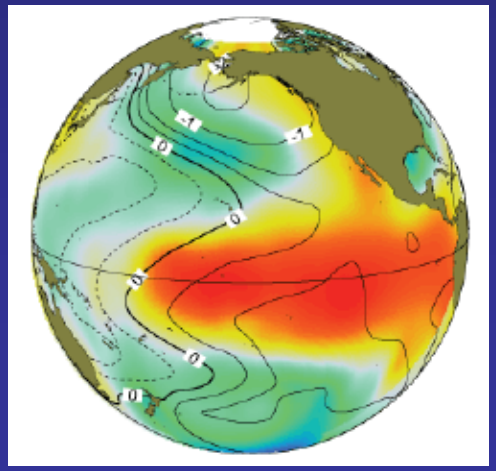
ENSO Pattern

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.

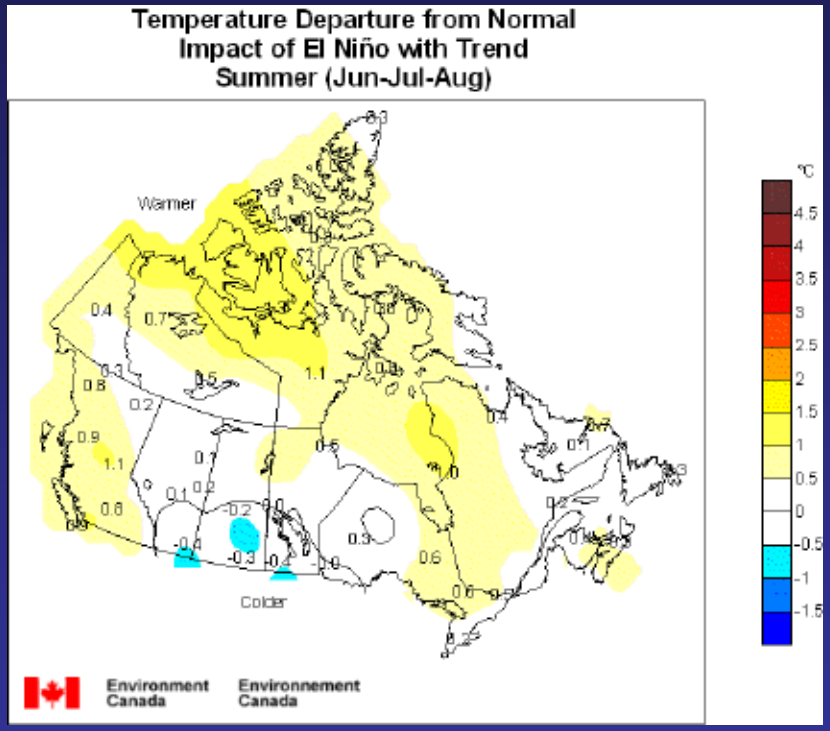
El Niño and La Nina events tend to develop during the period Apr-Jun and they

- 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

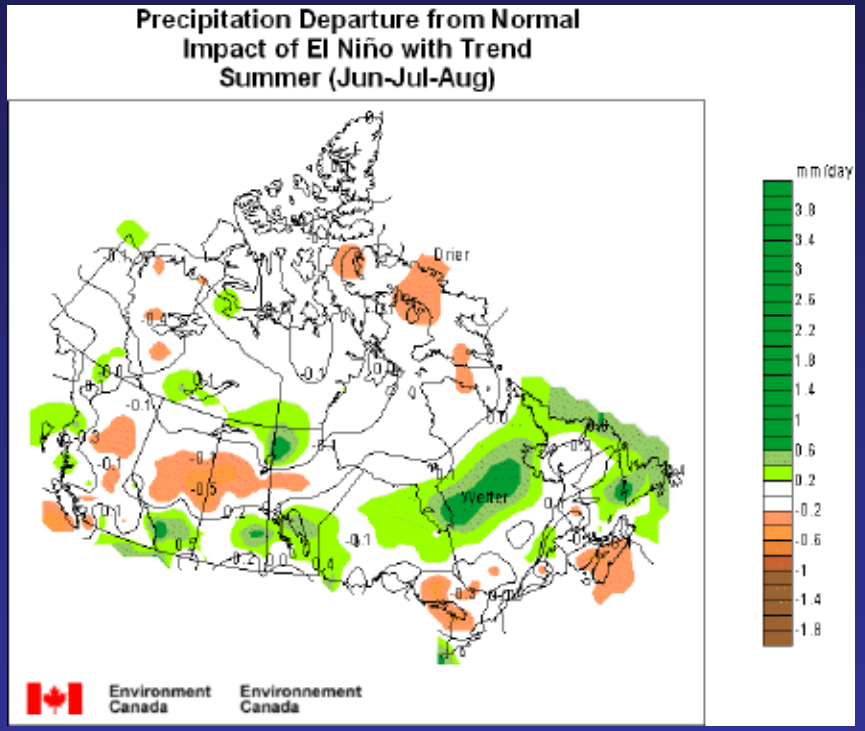


El Niño Effects

Summer



Temperature



Precipitation

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

ENSO Pattern

Most models indicate neutral ENSO conditions moving into an El Niño later this summer.

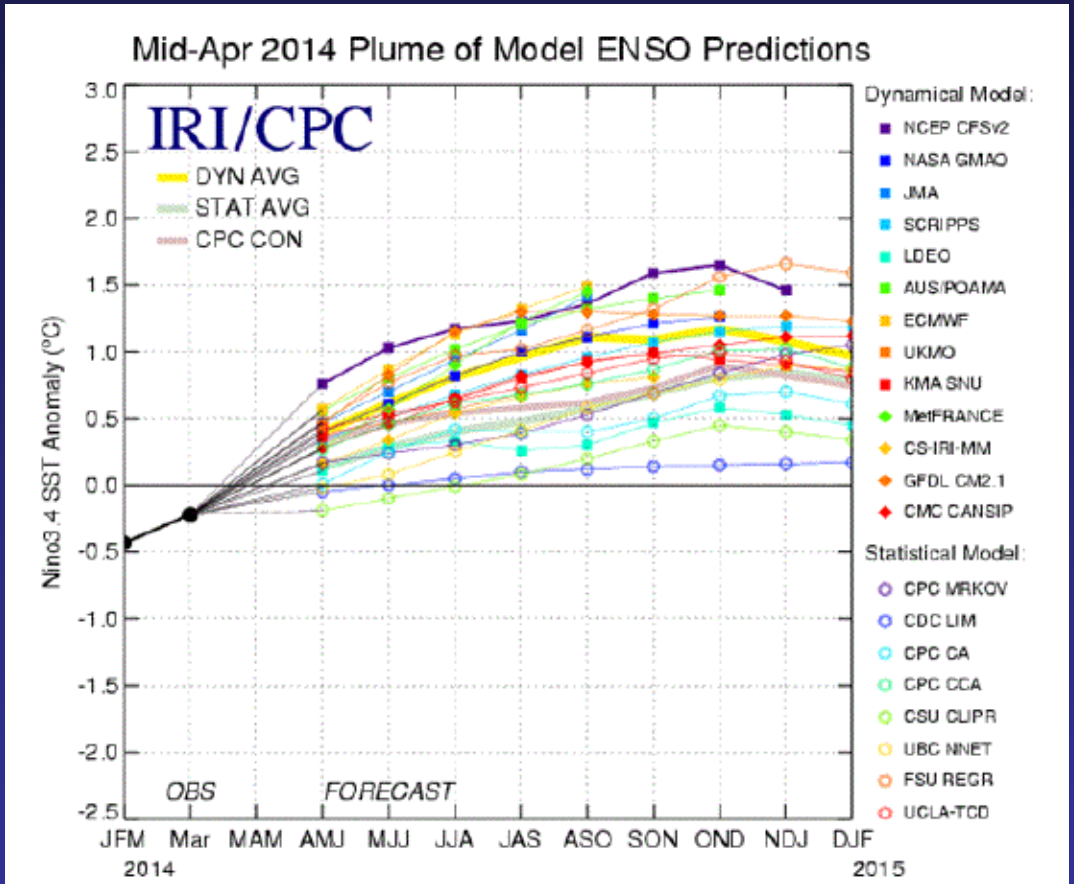


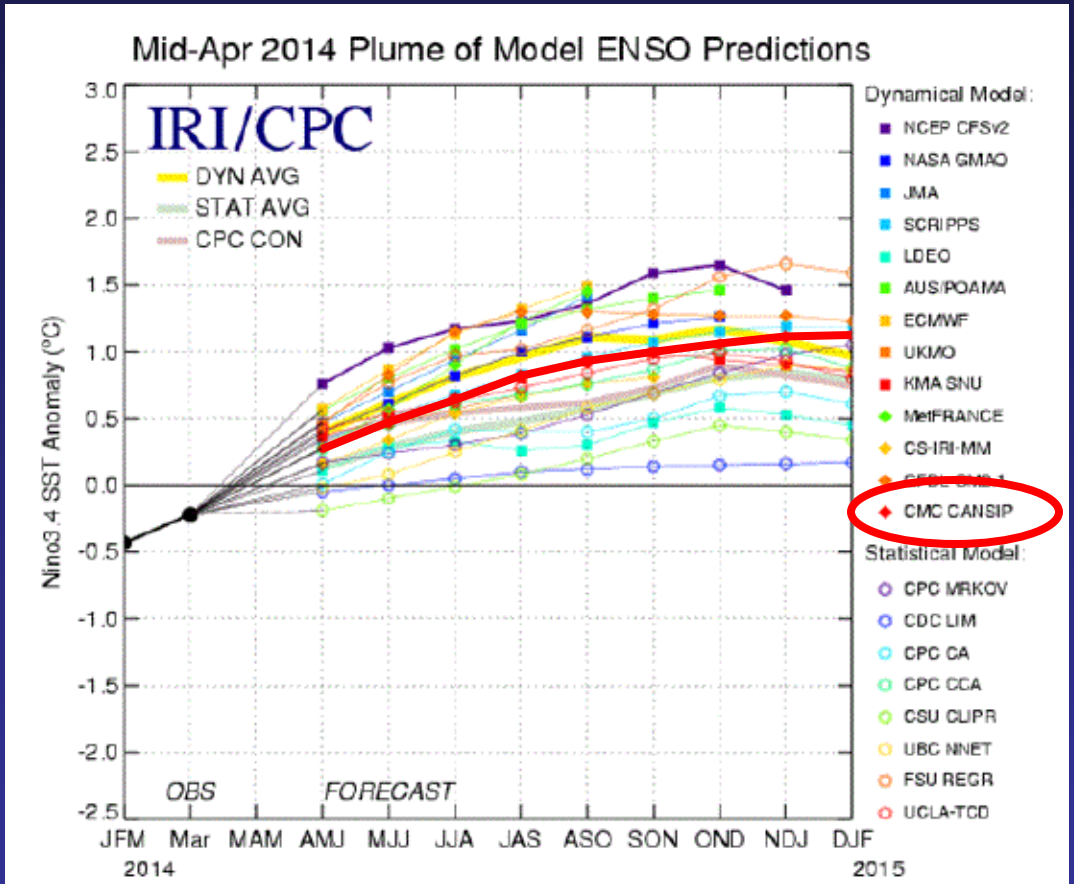
Figure 6. Forecasts of sea surface temperature (SST) anomalies for the Niño 3.4 region (5°N-5°S, 120°W-170°W). Figure updated 16 April 2014.

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/figure6.gif

ENSO Pattern

Most models indicate neutral ENSO conditions moving into an El Niño later this summer.

The Canadian CMC CANSIP model is producing a median prediction among these models.



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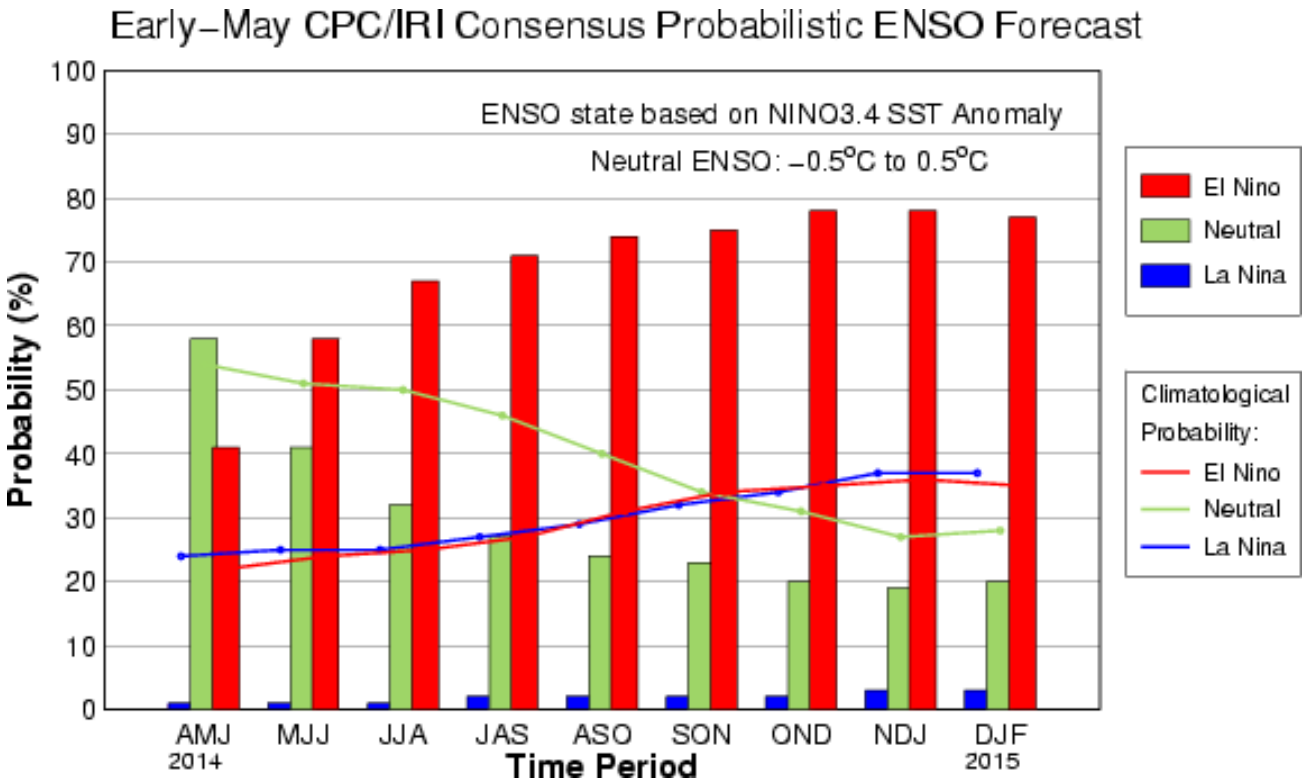
ENSO Pattern



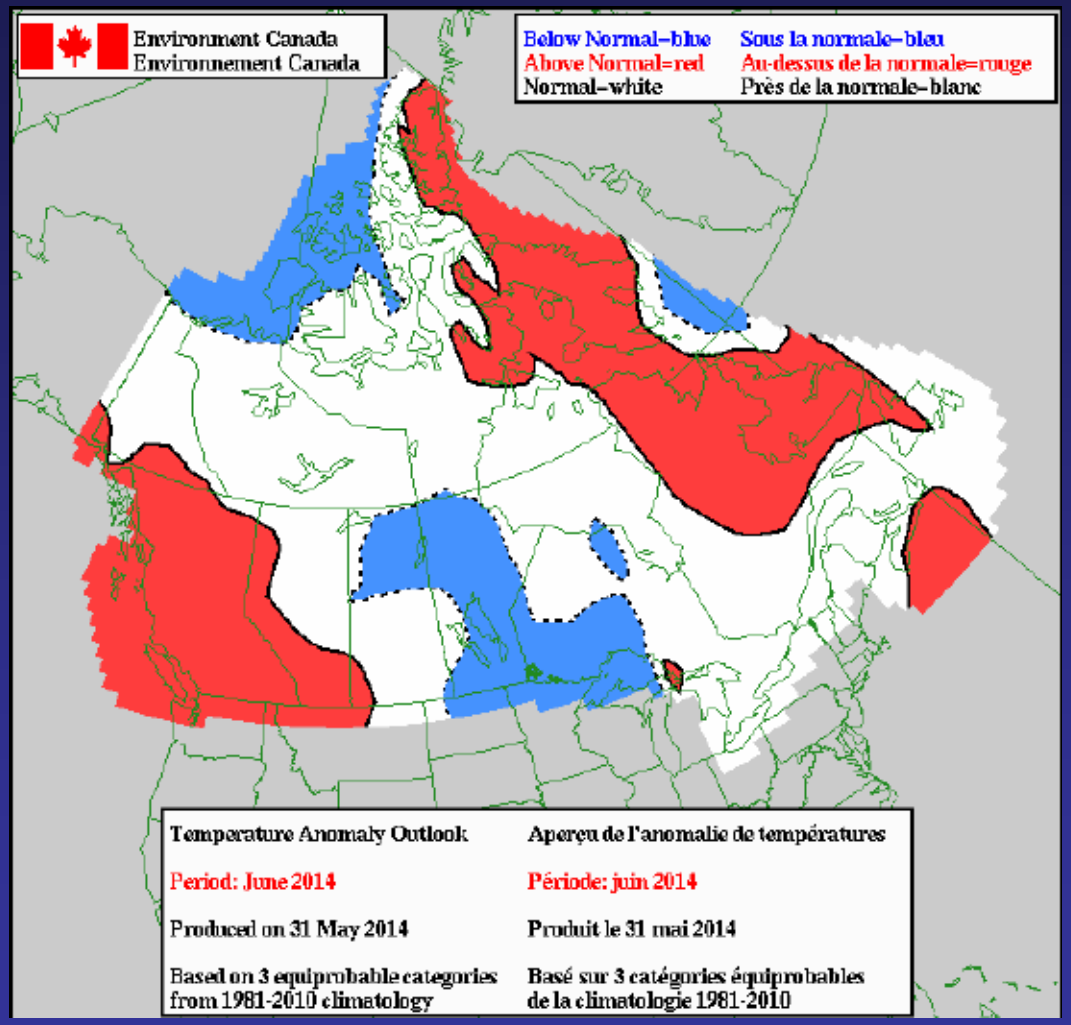
A move into El Niño conditions this summer is illustrated by the consensus of models.

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

2014 Seasonal Prediction

CMC Forecasts

Seasonal Forecasts

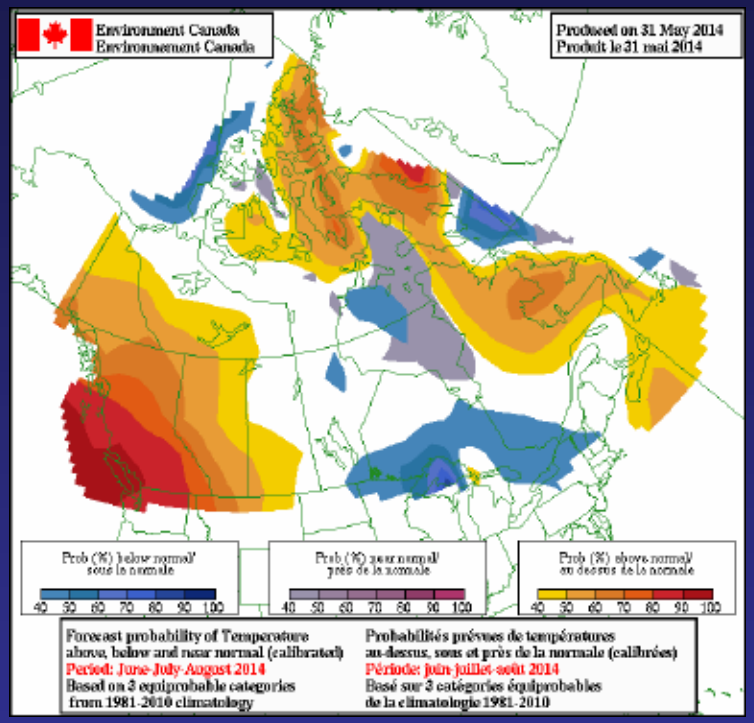


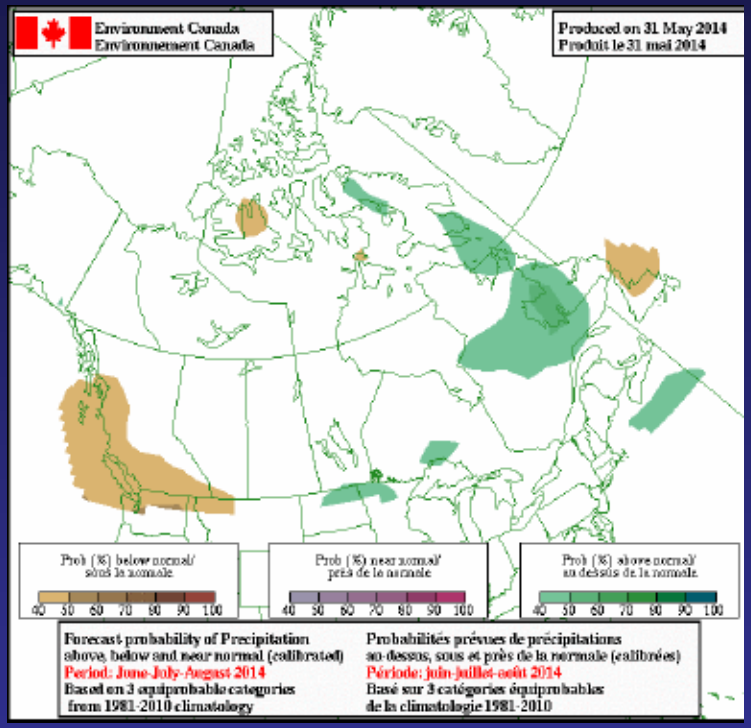
June

June temperature anomalies are above-average for BC and parts of Alberta and Yukon. Also northern Quebec, Labrador and Nova Scotia.

Below-average conditions are expected to persist in central Canada.

Seasonal Forecasts



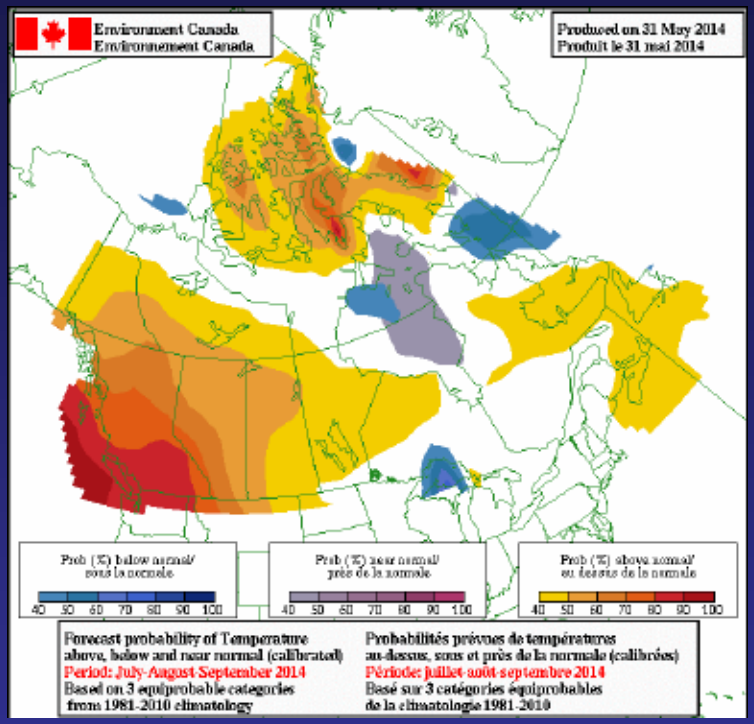


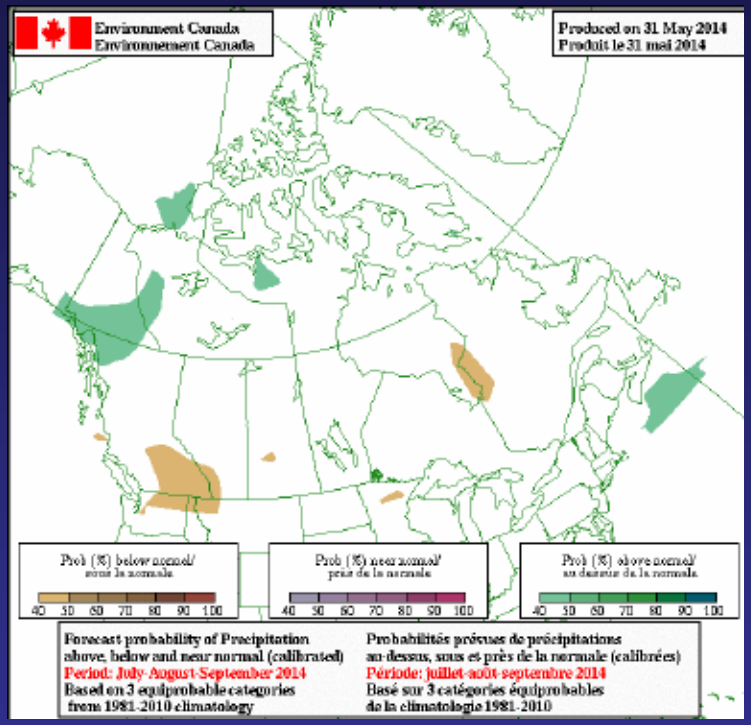
June-Jul-Aug

Early summer temperatures continue to be above-average in western Canada and the Atlantic, while low in Ontario and Manitoba.

Precipitation anomalies are low for southwestern BC, while high for the Atlantic regions affected by the above-average temperature conditions

Seasonal Forecasts



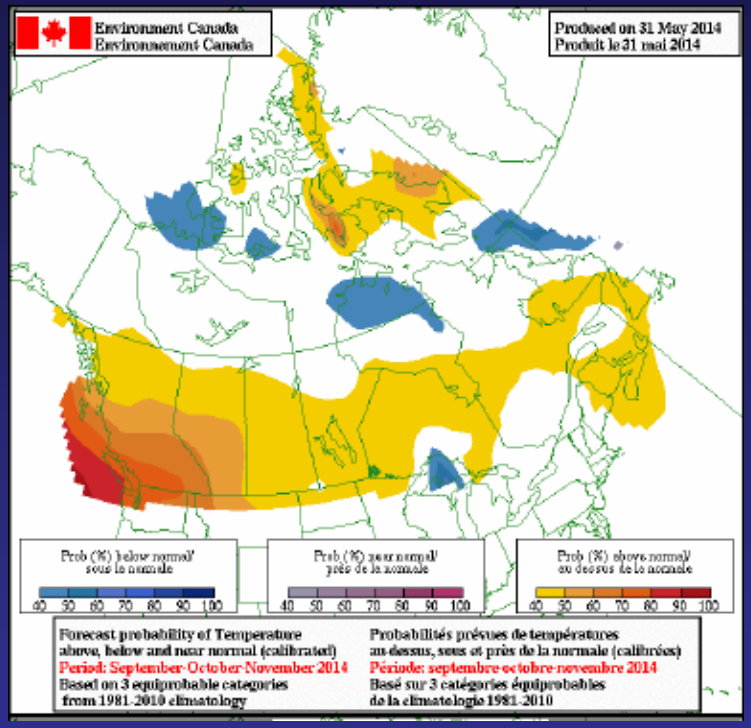


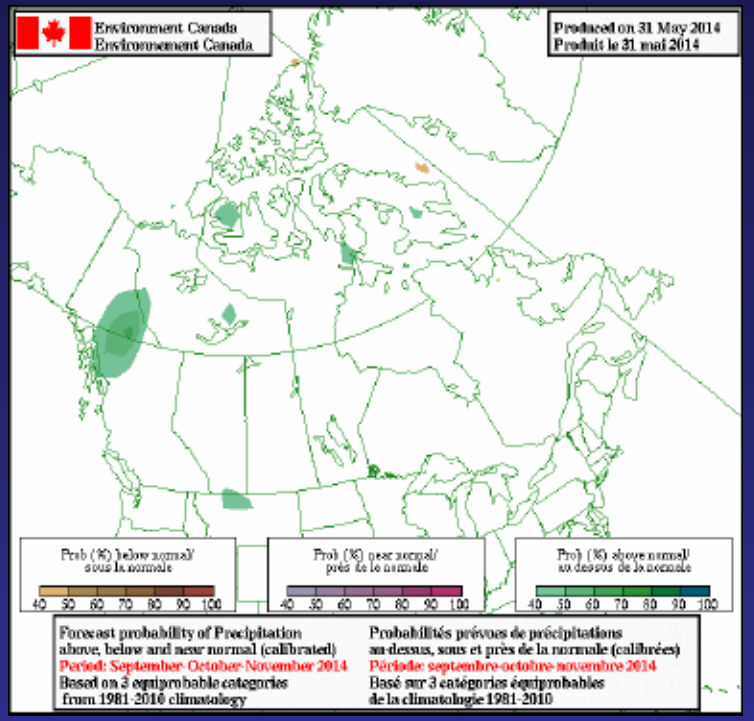
Jul-Aug-Sep

Late summer sees the above-average temperature spread across most of western Canada and into Ontario.

Precipitation anomalies are low in southern BC and minor elsewhere.

Seasonal Forecasts





Sep-Oct-Nov

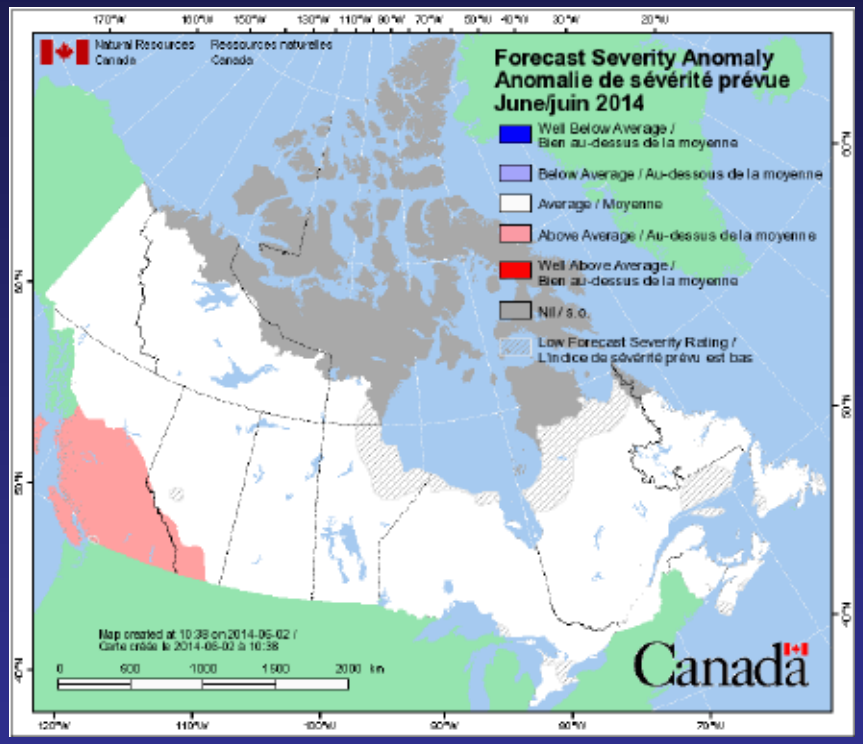
Fall could see above-average temperature anomalies for much of Canada south of 60° N.

Precipitation anomalies are negligible.

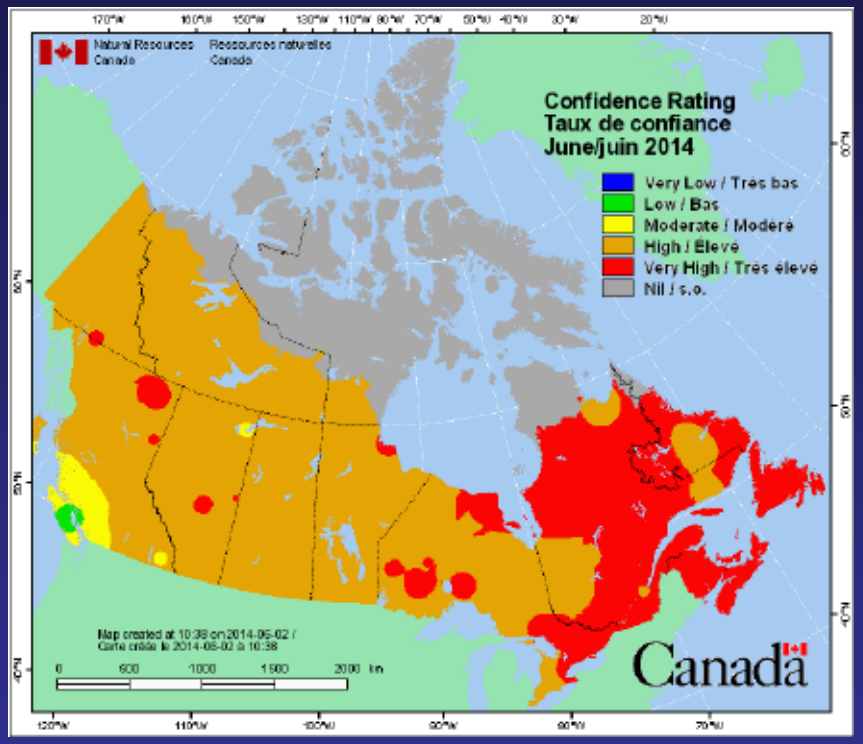
2014 Seasonal Prediction

Model Predictions

June 2014



Prediction
(predicted values normalized against average weather)

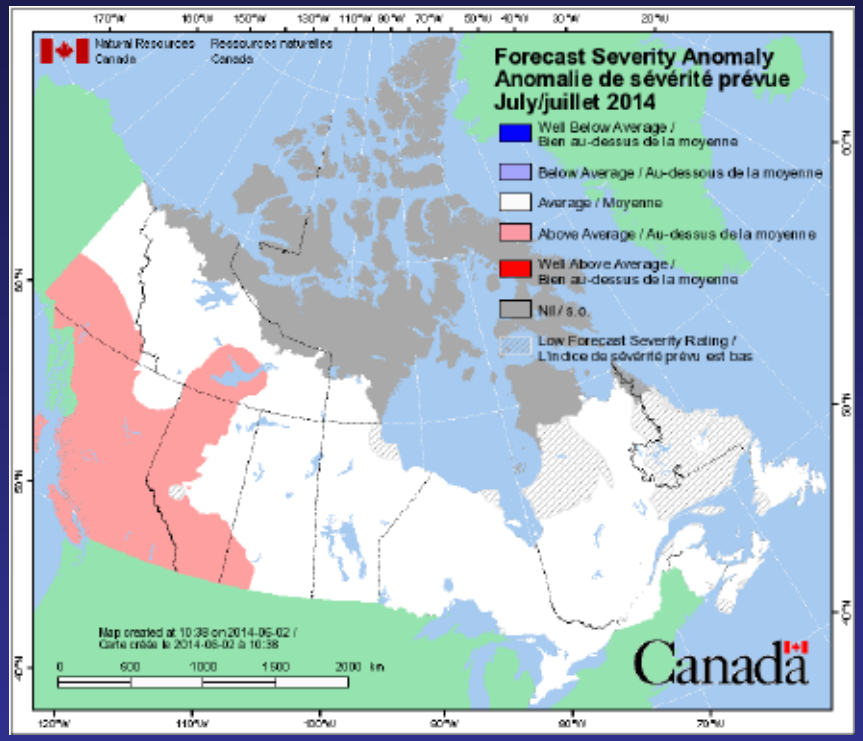


Confidence
(standard deviation normalized against average weather)

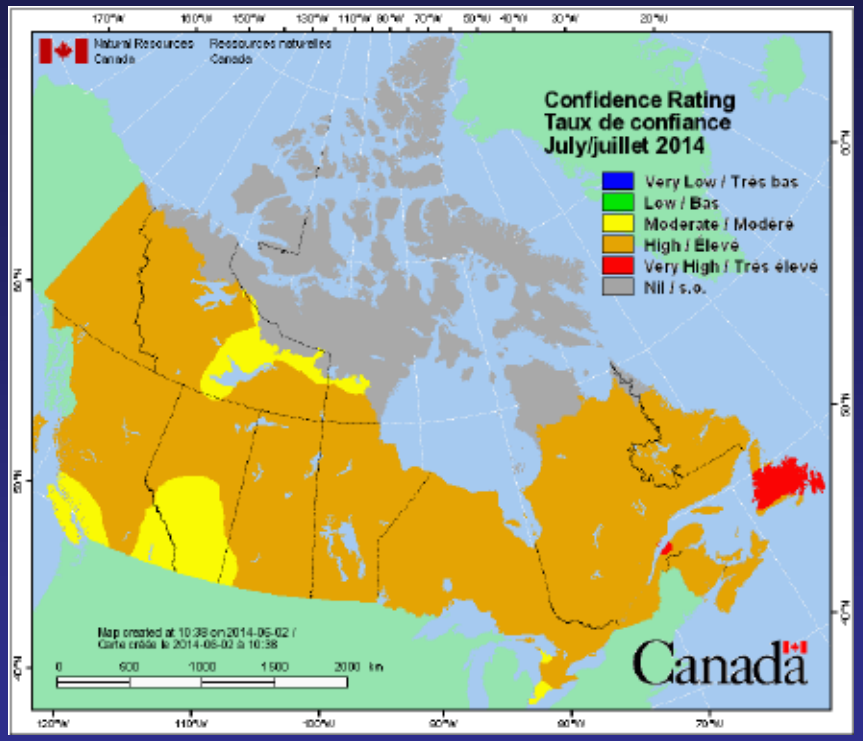
Above-average condition occur in southern BC.

Confidence is moderate-to-low in this area.

July 2014



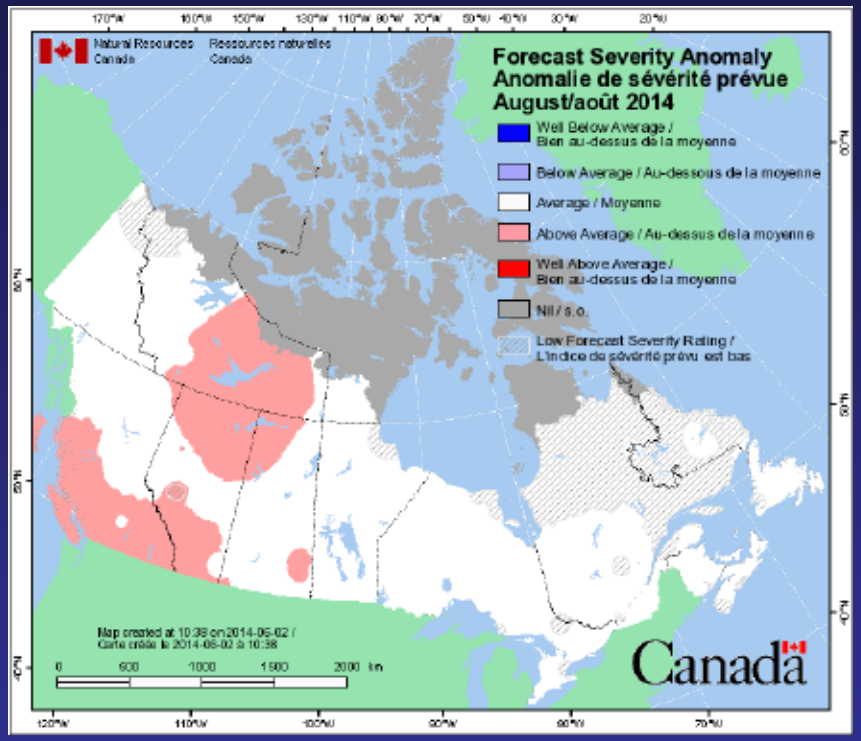
Prediction
(predicted values normalized against average weather)



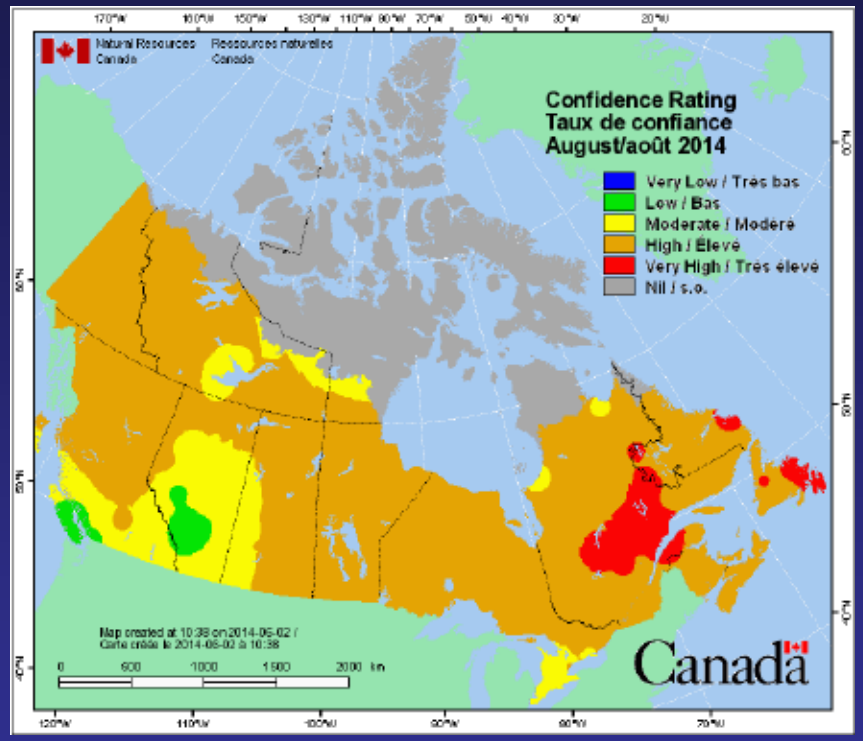
Confidence
(standard deviation normalized against average weather)

Above-average condition expand to cover most of BC as well as parts of Alberta, the Yukon and NWT.

August 2014



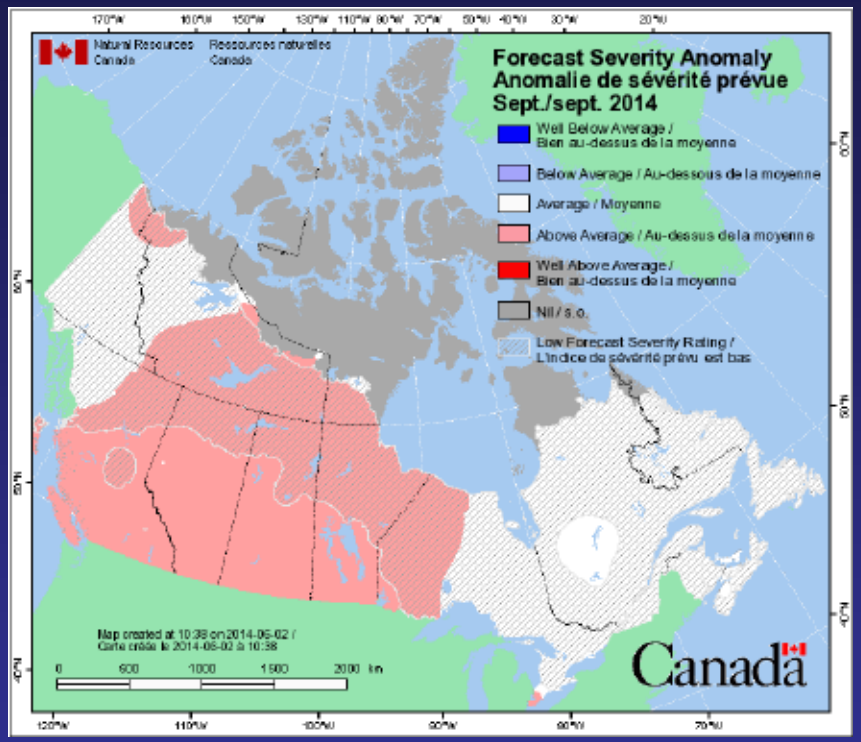
Prediction
(predicted values normalized against average weather)



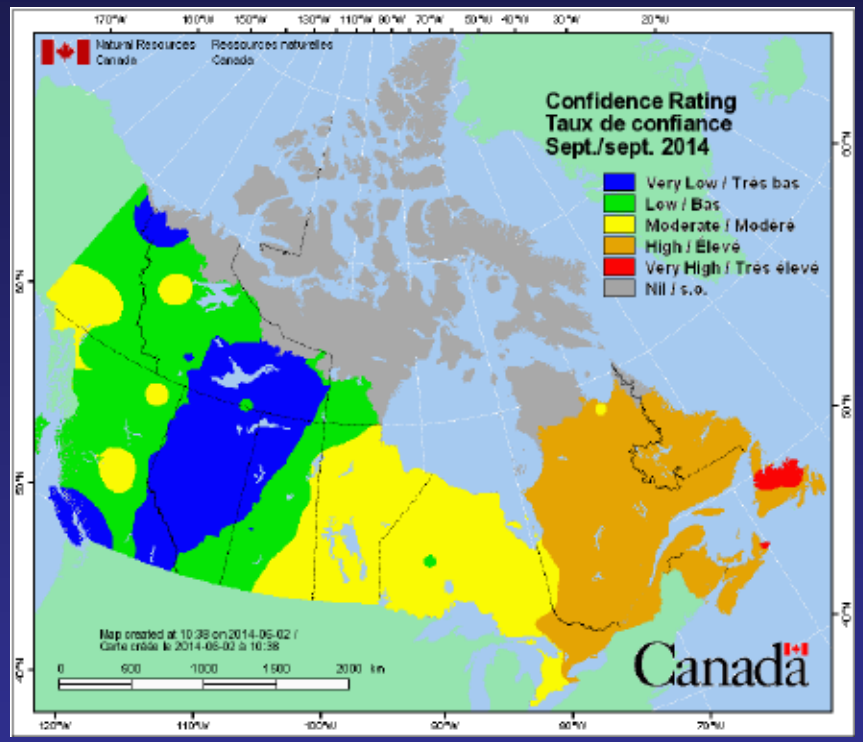
Confidence
(standard deviation normalized against average weather)

Above-average conditions continue in southern BC and Alberta while it expands to cover much of northern Alberta, central NWT and parts of Saskatchewan.

September 2014



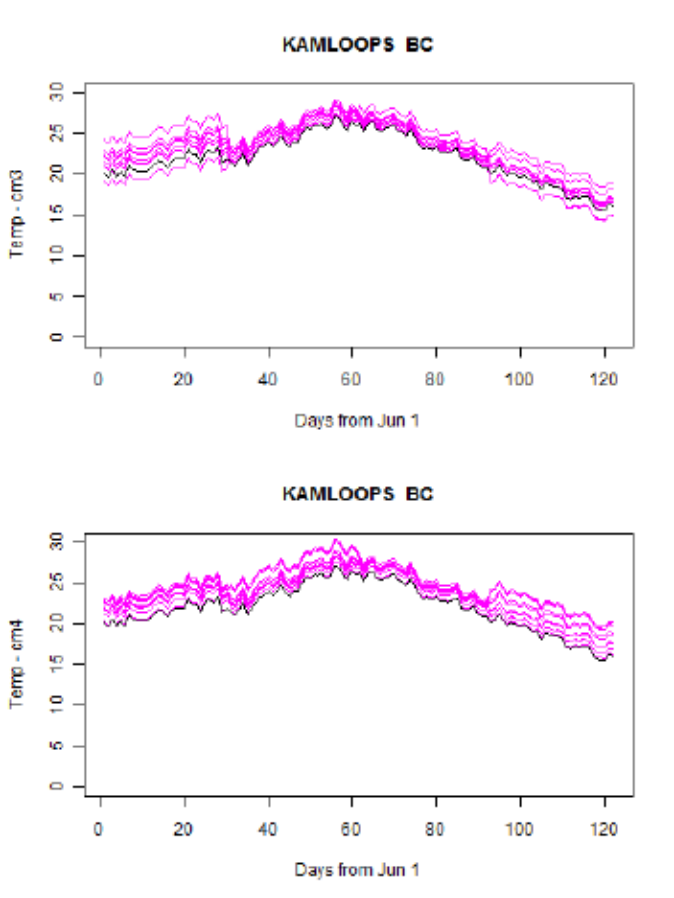
Prediction
(predicted values normalized against average weather)



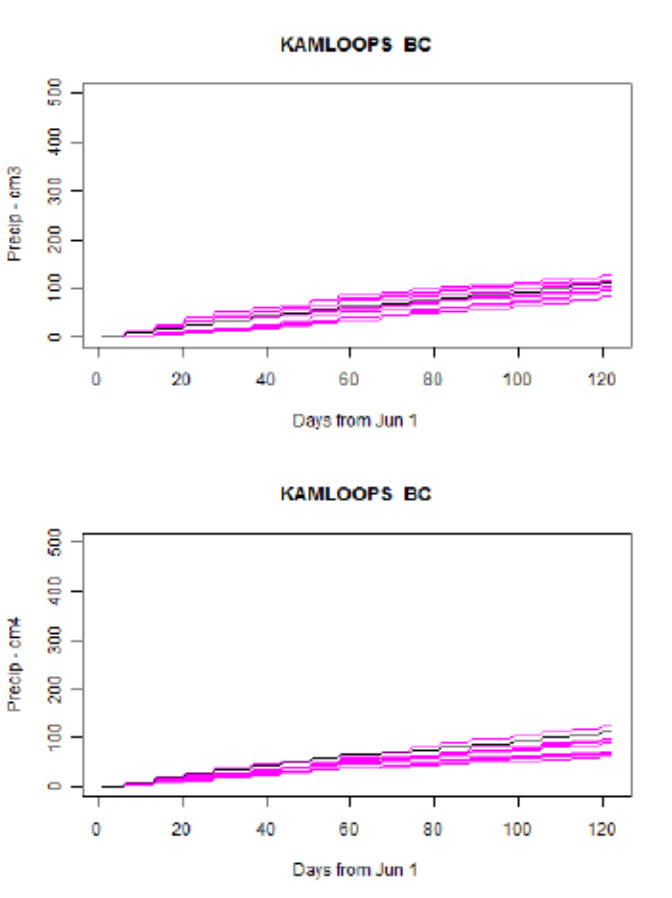
Confidence
(standard deviation normalized against average weather)

As fall takes hold, above-average severity expands to cover most of western Canada and western Ontario (though confidence is low).

Kamloops 2014



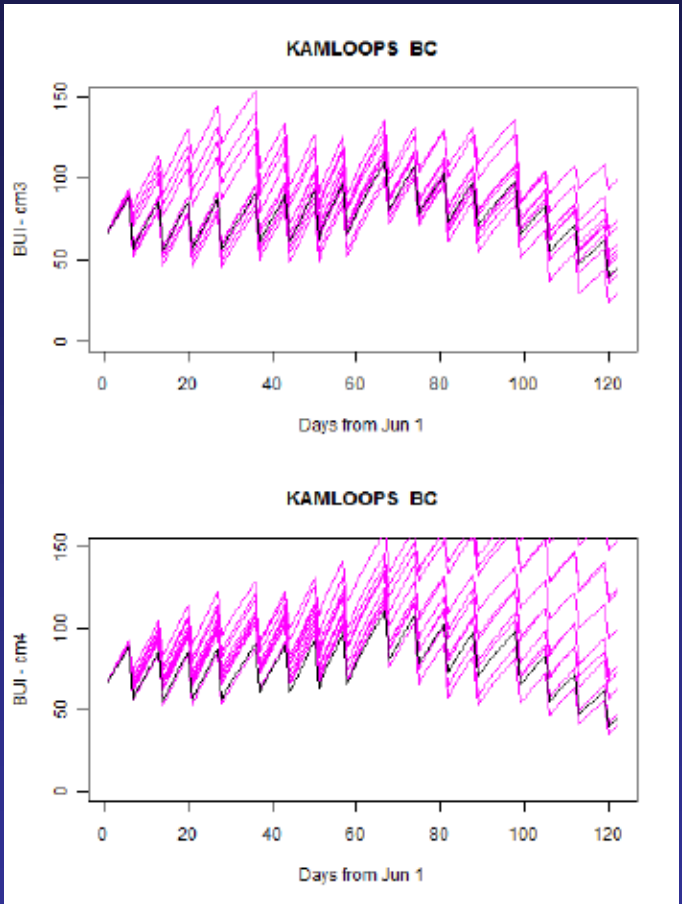
Temperature



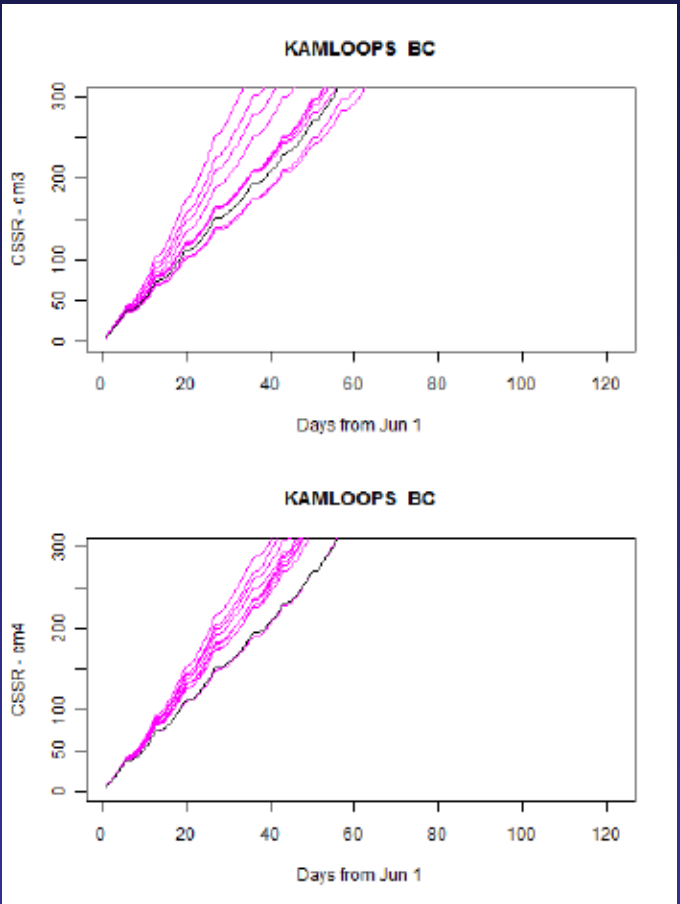
Precipitation

For Kamloops, entire summer is above-average temperature and below-average precipitation.

Kamloops 2014



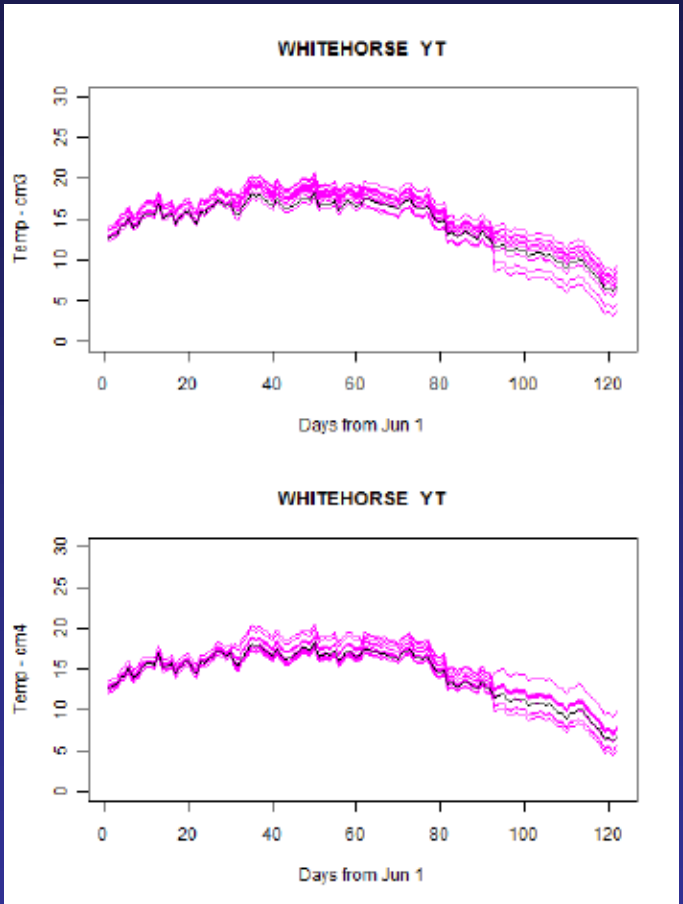
BUI



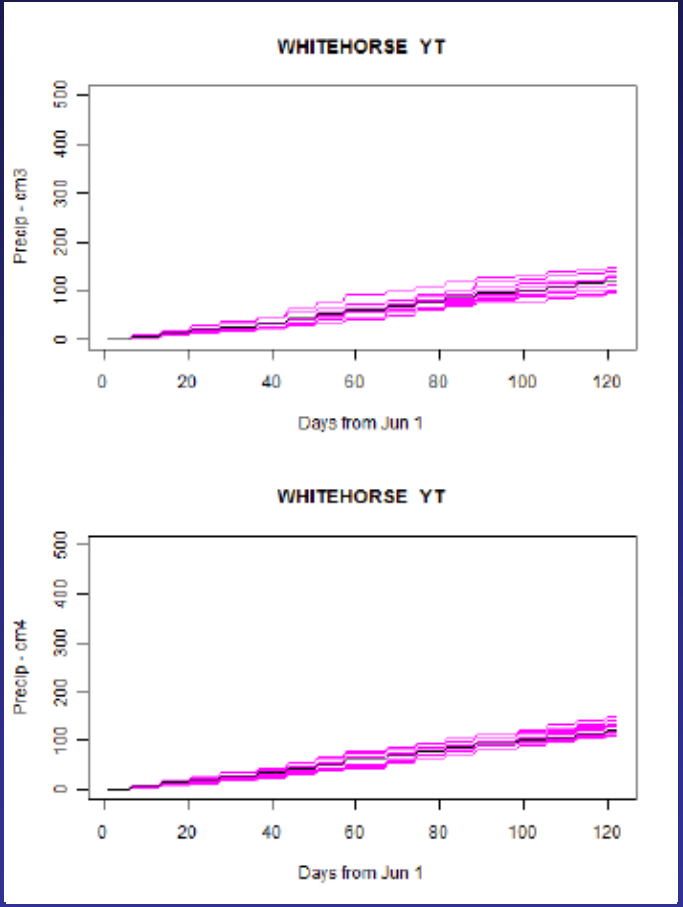
CSSR

Elevated (but erratic) BUI conditions during much of summer.
CSSR conditions will be high in July and August.

Whitehorse 2014



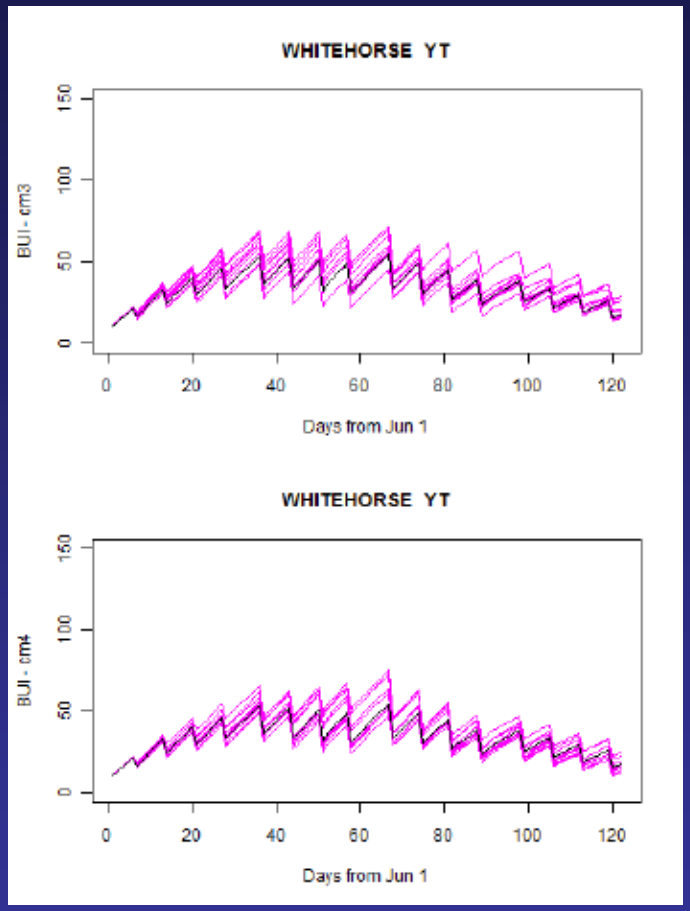
Temperature



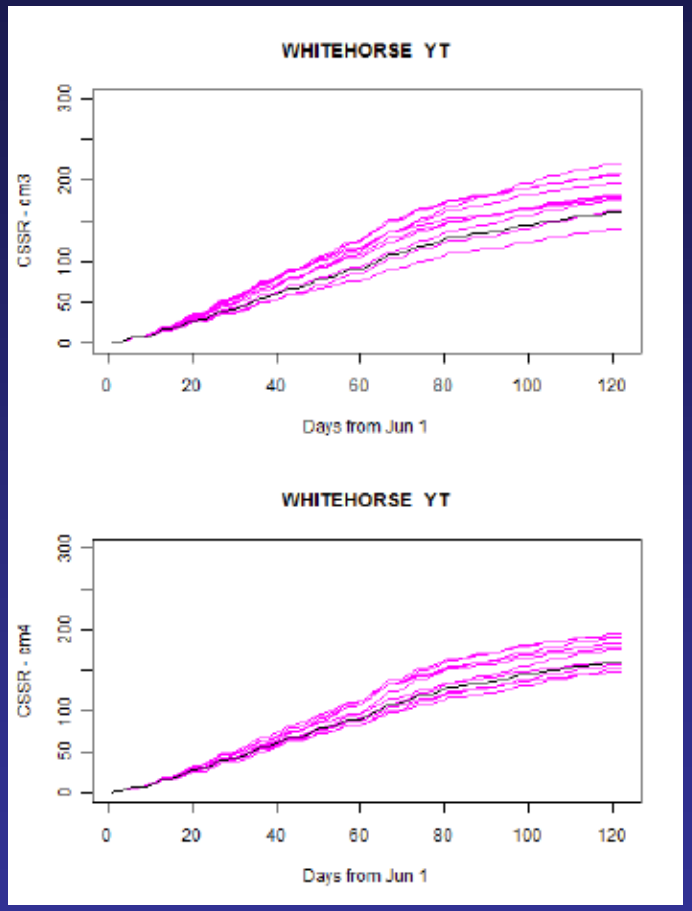
Precipitation

For Whitehorse, June through August may be 1-2ºC above normal with lower precipitation

Whitehorse 2014



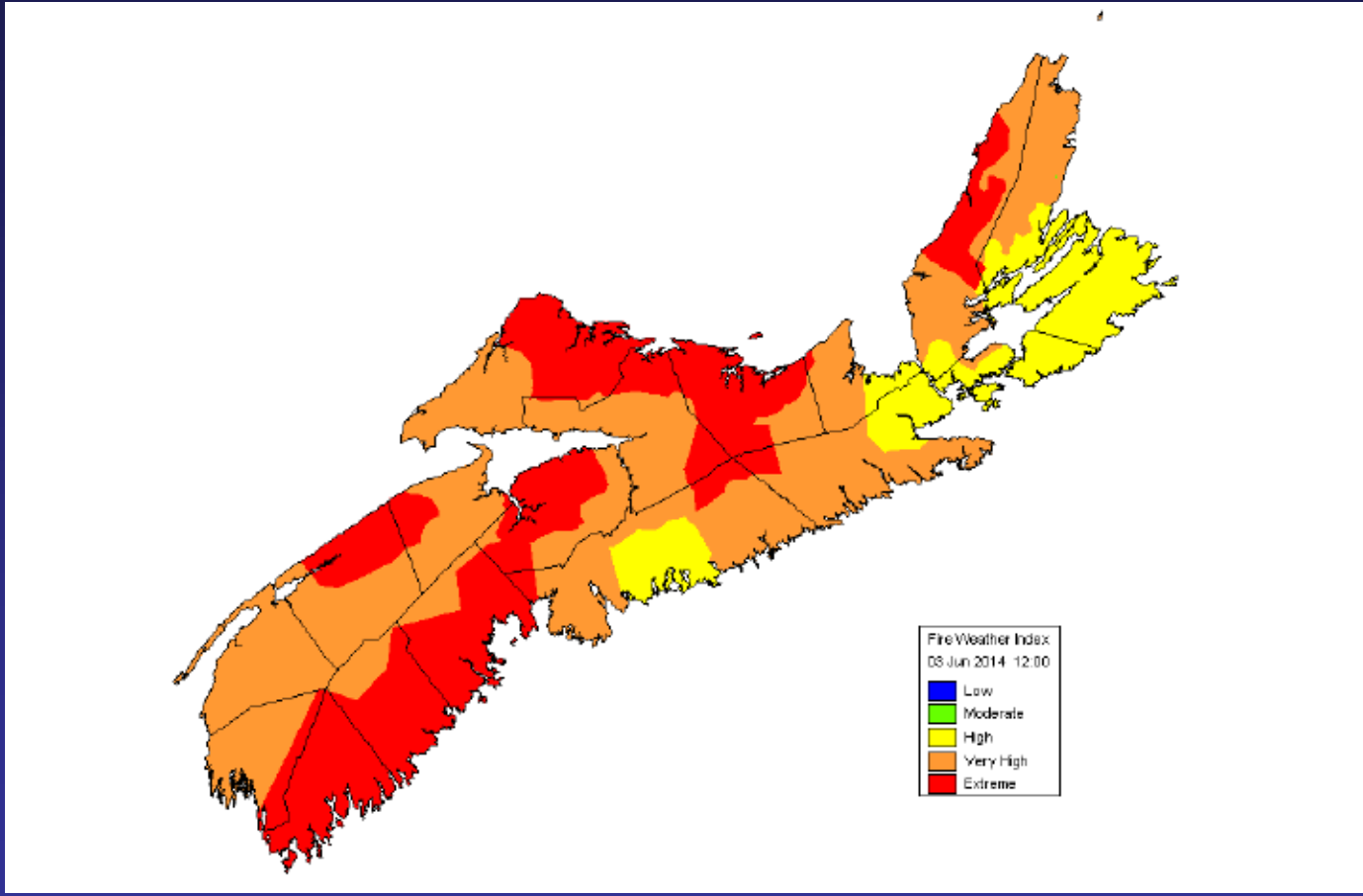
BUI



CSSR

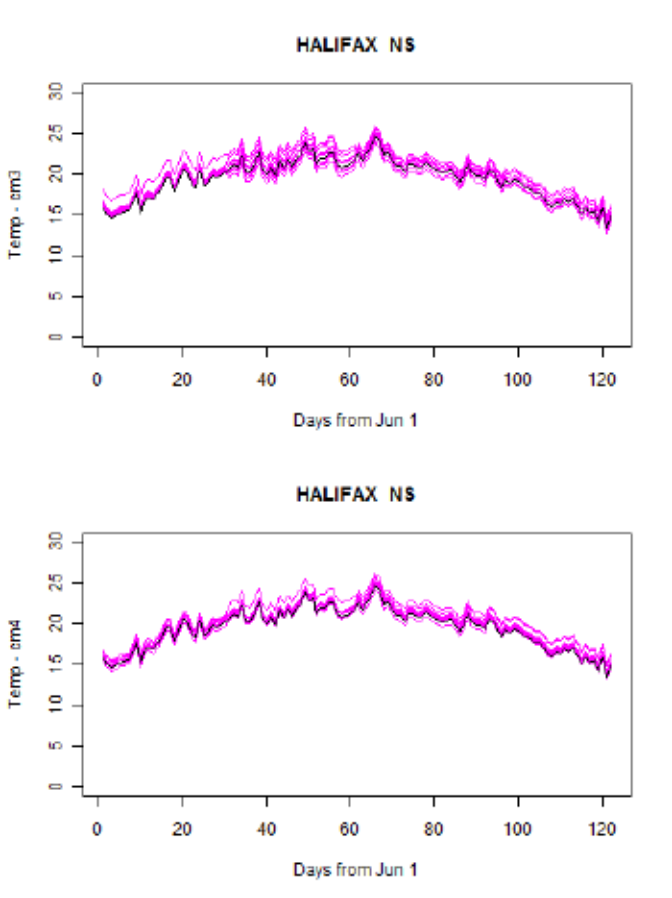
Elevated BUI conditions in June could carry on high CSSR conditions into July and August.

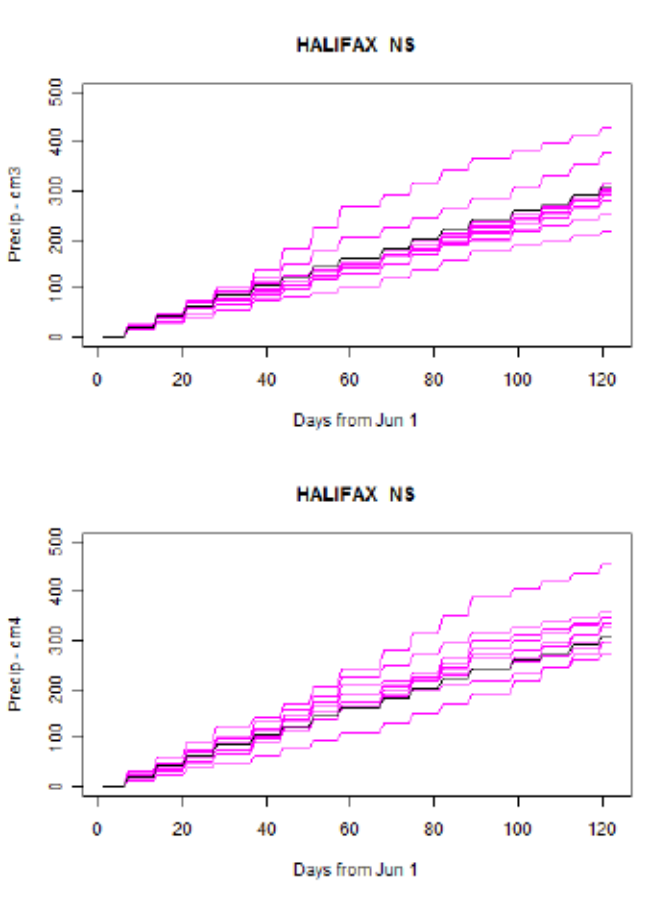
Current Conditions - Nova Scotia



Fire weather conditions in Nova Scotia are currently very high to extreme.

Halifax 2014



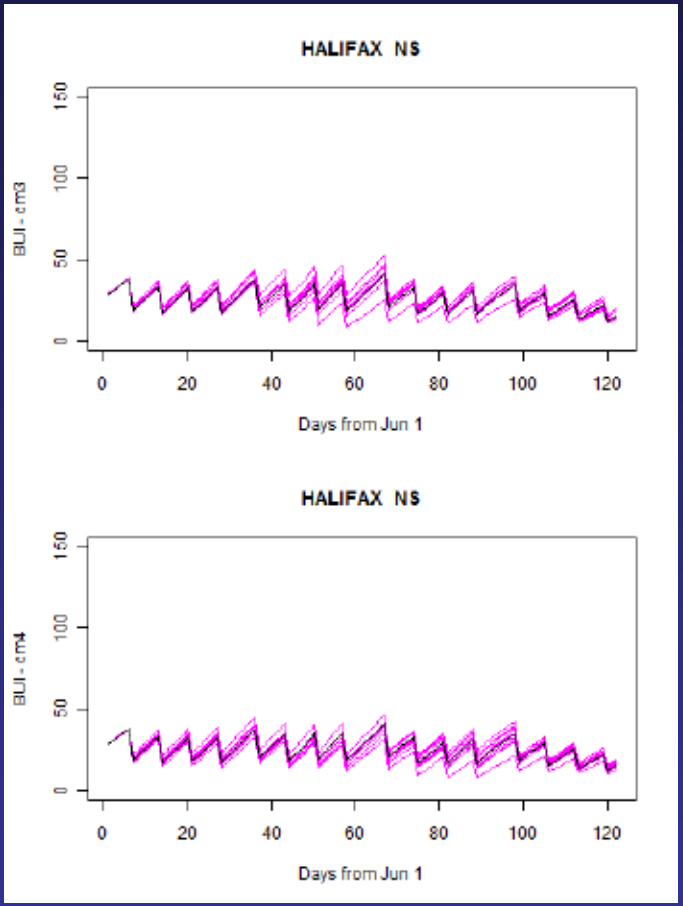


Temperature

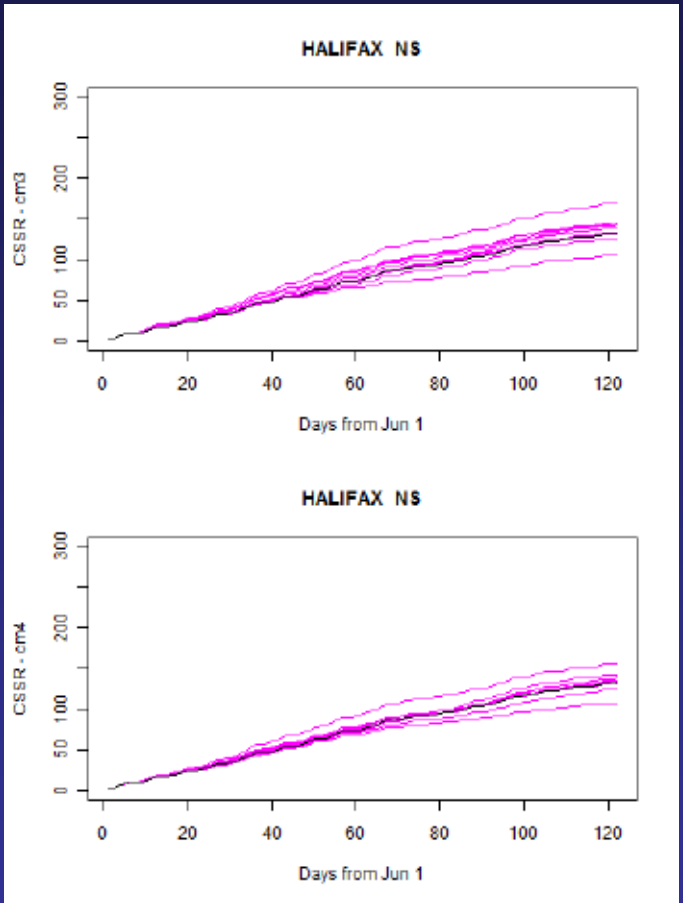
Precipitation

For Halifax, may continue to see above average conditions but these will likely subside in July.

Halifax 2014



BUI



CSSR

This is shown by average BUI and CSSR predictions for the remainder of the summer.

2014 Seasonal Prediction

Provincial Reports

(produced in April)

British Columbia

Considering the fall DC anomalies, the greatest potential for above normal weather station start-up codes is in the West Chilcotin and adjacent Coastal FC and the western NWFC. Other areas with that potential are in the lee of the southern Coast Mountains and some areas in the Upper Columbia basin.

Outlook through September is for an equal chance of above, near or below normal precipitation, most models checked show an increased probability of above normal temperatures, especially in western BC.

Should a significant El Nino develop this summer, warmer than normal conditions could extend further into the fall and through the winter.

Yukon

Season ending drought codes were generally high throughout Yukon and look to start the season in the moderate to high range in Northern Tutchone, Tatchun, Kluane and Southern Lakes.

Climate agencies are in agreement regarding a greater than 50% chance of El Nino conditions by fall 2014, but there is uncertainty regarding the precise timing. An El Nino has a statistically significant effect on Yukon weather, so depending on timing and strength we may see warmer than usual conditions in late summer or fall. There will be no effect during the core fire season.

Saskatchewan

This spring, the threat is somewhat present in sections of the Observation Zone and along the wildland-agricultural interface. If the coming months are dry, the area could increase within the southern half of the Full Response Zone.

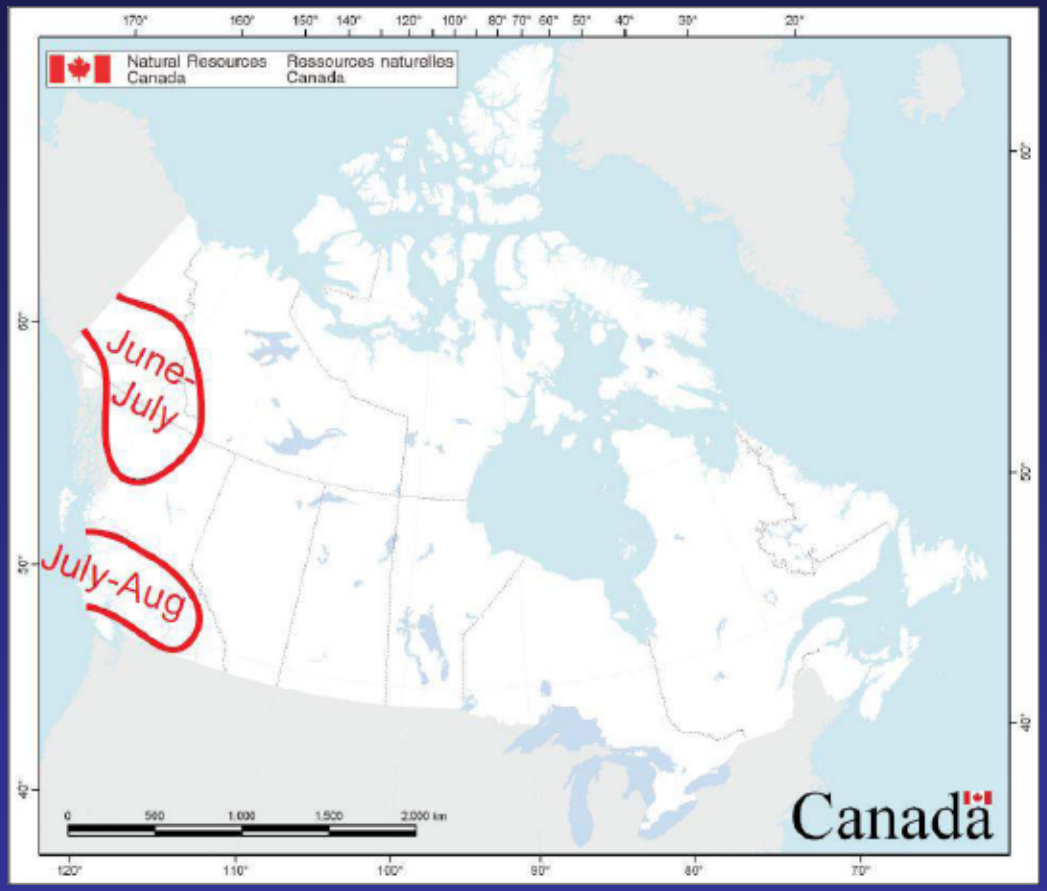
The potential severity of the fire season could increase in the Full Response Zone this spring if the current cold climatic regime shifts to a drier and warmer spring regime.

Environment Canada does suggest a transition to a warmer June-July-August regime while the US Experimental Climate Centre does suggest a very warm and drier regime for the summer months.

2014 Seasonal Prediction

Summary

North American Seasonal Assessment



The North American Seasonal Assessment is a joint US/Canadian/Mexican product. This map was constructed May 1 for Canada. It is likely a larger area of BC and possibly Alberta/NWT may see above-average fire activity.

2014 Prediction

In summary, Canada is experiencing a late start to the fire season.

As summer develops, above-average fire weather conditions will cover the Yukon and northern BC. This will expand later in the summer to cover much of BC as well as parts of Alberta and NWT.

No appreciable fire weather conditions in the rest of Canada.

All in all, this appears to be a mild fire season.

The End