



# New Zealand Seasonal Fire Danger Outlook 2017/18



**ISSUE:** North Island, October 2017

## Current fire danger situation & outlook:

Low fire climate severities currently exist in most areas of the North Island (Figure 1), the exception being the Hawkes Bay region which is experiencing moderate fire climate severity. The current FWI System codes and indices indicate that fuel dryness is low, and at similar levels to the same time last year (Figures 5-6 & 7-8). These low fire dangers across the North Island are the result of the significant rainfalls that have occurred over the past few months. The exception being the East Coast (in particular, Gisborne and Hawkes Bay), which is experiencing, on average, moderate fire danger levels. Generally, a fire would likely start, but have difficulty spreading and be relatively easy to suppress.

September was an unsettled and wet month for most regions, except for the Hawkes Bay. Low pressure systems dominated the weather map and frequent north-westerly winds affected the North Island. This resulted in extremely wet conditions and, as a result, soil moisture levels across much of the North Island are currently at or near capacity for this time of the year (Figure 3). The exceptions again being the East Coast (Gisborne and Hawkes Bay) that are about 50% capacity. Soil moisture levels are considered normal for most parts of the North Island (Figure 4). Hawkes Bay is experiencing slightly drier than normal soils for this time of the year.

The El Niño–Southern Oscillation (ENSO) still remains neutral; however international guidance is split between La Niña and neutral conditions approaching the end of 2017 and into March 2018. MetService and NIWA climatologists are continuing to monitor climate indicators in the tropical Pacific Ocean for any significant developments. La Niña conditions can impact our summer weather. Typically a developing La Niña brings a wetter and cooler spring/summer for many. More north-

easterly winds and sub-tropical lows frequent New Zealand, and can result in heavy rain and flooding. Northern and eastern parts of New Zealand are wetter than normal, and the south and west of the country tend to be drier.

The outlook for October is for more settled weather, with high pressure systems forecast to return to New Zealand. A drier than normal October is predicted for the south and west of the North Island. Northern and eastern regions will have closer to normal October rainfall. Temperatures are expected to be warmer than normal across New Zealand. However, cold southerly changes and cooler mornings will still make the odd appearance.

Fire dangers and severity for October are expected to be low for most of the North Island (Figures 1 & 9). Spring has brought plenty of wet and windy weather. As we approach the summer months, the weeks ahead will become drier and warmer for many, and fire dangers will typically creep up in October and November, especially in eastern areas. However, major rain events will keep the fire danger and severity generally low. The fire season years of 2008/09 and 2013/14 are potentially good indicators for what to expect this coming fire season (Figure 9). There are no specific areas of the Island to watch this month for very high to extreme fire potential. However, eastern areas will be ones to watch in November.

Note: Detailed analyses of fire dangers for individual regions have not been shown due to the current low fire dangers across the country. As fire dangers increase, more detailed regional outlooks will recommence.

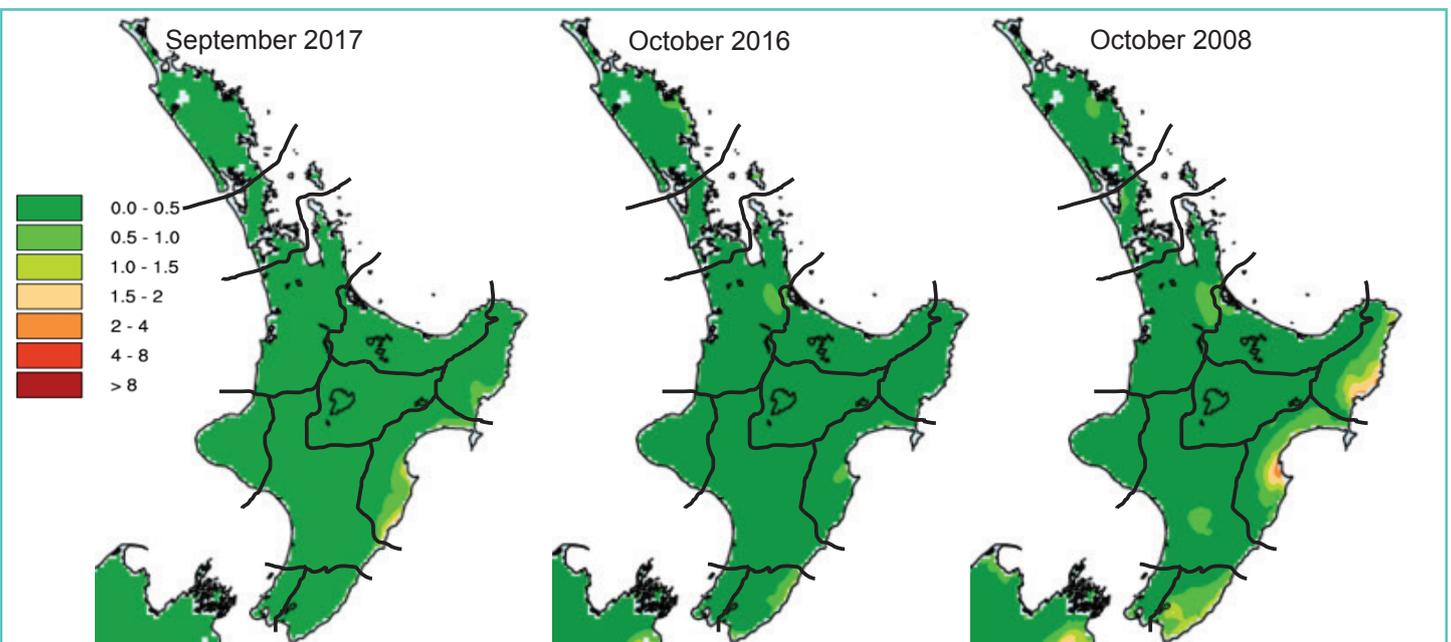


Figure 1. Monthly average Severity Rating for: current (left), last year (middle), and the 2008/09 Neutral year (right).

## EXPECTED CLIMATE OUTLOOK:

The ENSO (El Niño–Southern Oscillation) still remains neutral. However climatologists observed La Niña-like signals in sea surface temperatures in the tropical Pacific Ocean during September 2017. Other indicators of ENSO (Southern Oscillation Index (SOI), trade winds and atmospheric anomalies in the tropical Pacific) are also leaning towards the La Niña side of neutral.

International climate models are split between La Niña and neutral conditions forecasted from now to March 2018. There is very little chance of an El Niño developing through this period. If a La Niña does occur, it is likely to be short-lived (easing during the first quarter of 2018).

Coastal waters remain generally warmer than average around the country, and are warmer than average around the Chatham Islands and south of New Zealand. These warmer than average seas are likely to persist during October – December. In the short-term, high pressure systems will affect October weather patterns for New Zealand.

### This month: October 2017

A warmer than usual October is predicted right across the country. Highs are signalled to return to New Zealand and favour both Islands equally. Fronts and lows will be less frequent than usual. A drier than normal October is forecast for the south and west of the North Island. Northern and eastern areas will have closer to normal October rainfall.

October temperatures are forecast to be warmer than normal across New Zealand. Expect to see the odd cold southerly changes and some cooler mornings.

### Further ahead: October 2017 - December 2017

For the next three months (October – December), we are expecting continuation of more lower pressure systems than normal for the north-west of New Zealand, and higher pressures than normal for the south and east of the country. This will typically result in more north-easterly winds, bringing subtropical moisture towards New Zealand and possible heavy rainfall.

We expect to see near normal or above normal rainfall for the northern North Island, and normal rainfall elsewhere. Soil moisture levels are predicted to be normal or above normal for the North Island.

Above normal temperature are forecasted for the entire country. Nevertheless, frosts and cool snaps are still possible during spring.

### Breakdown (Figure 2):

**Temperatures** are most likely to be:

- above average (60% chance) for Northland, Auckland, Waikato, Bay of Plenty, Central North Island, Taranaki, Whanganui, Manawatu, Wellington, Gisborne, Hawkes Bay & Wairarapa.

**Rainfall** is most likely to be:

- above normal (40% chance) or near normal (35% chance) for Northland, Auckland, Waikato & Bay of Plenty.
- near normal (45% chance) for Central North Island, Taranaki, Whanganui, Manawatu, Wellington, Gisborne, Hawkes Bay & Wairarapa.

**Soil moistures** are most likely to be:

- above normal (40% chance) or near normal (35% chance) for Northland, Auckland, Waikato, Bay of Plenty, Central North Island, Taranaki, Whanganui, Manawatu & Wellington.
- near normal (45% chance) for Gisborne, Hawkes Bay & Wairarapa.

### Last month: September 2017

So far, the country has had an unusual number of wet easterly events for spring. An active Tasman Sea produced deep low pressure systems that relocated onto New Zealand. This has resulted in extremely wet conditions for most regions, except for the Hawkes Bay. Numerous north-westerlies and wet easterlies have resulted in many regions receiving more than their usual amount of rain.

Rainfall records have been broken for a number of areas of the North Island (including Te Puke, Hamilton, Rotorua, & Taupo). Rainfalls in Northland, Auckland and Coromandel, and between New Plymouth and the Kapiti Coast, were 110 to 140 percent of normal monthly totals in these regions. Bay of Plenty, Waikato and the Gisborne region experienced at least 150 percent of normal rainfall. Hamilton and Tauranga both recorded around double normal September rainfall amounts. Pukekohe, Gisborne, Ohakune and the Manawatu were also extremely wet.

Spring temperatures across the North Island were generally average to above average, but there have been wide ranges of warm and cool periods during September.

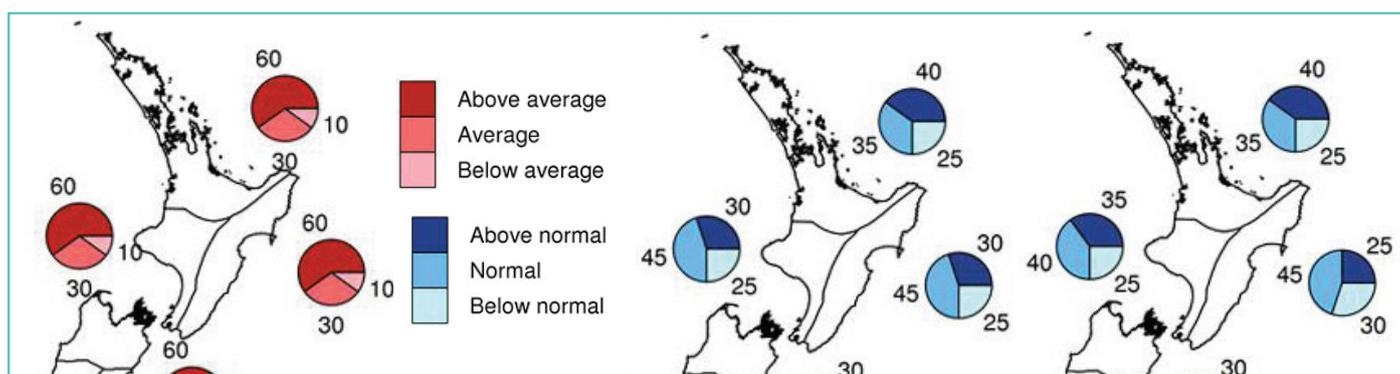


Figure 2. Outlook for Oct - Dec 2017: air temperature (left), rainfall (middle), available soil moisture (right). Source: NIWA.

## Grass growth:

Climatic conditions during early spring have favoured good grass growth (mild temperatures and high soil moistures), resulting in green lush landscapes for this time of the year. Normally, if a fire started in these fuels, fire spread would be difficult. Any burning will produce small flame heights and low intensities for easy suppression.

In some areas, the presence of dead matted material from the previous season's growth (thatch) can contribute to the ease of a fire starting and spreading. This material is often hidden underneath lush green grass that appears to have low curing (30 - 50%). However, thatch can increase the ability of grass fuels to carry and sustain a fire. These fires will typically produce small flame heights and spread in a patchy manner.

## What does Neutral mean for New Zealand?

The El Niño-Southern Oscillation (ENSO) is a key natural cycle influencing New Zealand's climate. It operates over the Pacific Ocean and beyond, and causes fluctuations in the prevailing trade winds and in the strength of the subtropical high-pressure belt. Although ENSO events have an important influence on New Zealand's climate, they still only account for less than 25% of the year to year variance in seasonal rainfall and temperature.

When neither El Niño nor La Niña are present, weather patterns are said to be in a "neutral" or normal state. Neutral conditions encourage far more variability in weather patterns for New Zealand, whereas El Niño or La Niña tend to have more predictable patterns.

Neutral springs can lead to some extreme weather events for New Zealand, with snow storms one week followed by record-breaking warm temperatures, and floods the next. October can still provide frosts and random snow events. Then, typically by November, the weather patterns will switch to mild and drier conditions, with westerlies fading as we head towards summer

## What would La Niña mean for New Zealand?

La Niña tends to warm the ocean surrounding New Zealand, which encourages frequent lows and sub-tropical storms for the north, occasionally stretching down as far as Canterbury. During a La Niña, north-easterly and easterly winds are more frequent, resulting in the risk of heavy rain and flooding.

New Zealand is typically warmer than average during a La Niña, although there are regional and seasonal exceptions. La Niña typically brings more storms, clouds, humidity and rain to the north and east of New Zealand. The south and west of the country tends to dry out and have spectacular summers. Eastern areas are typically cloudier, cooler and wetter over spring and summer.

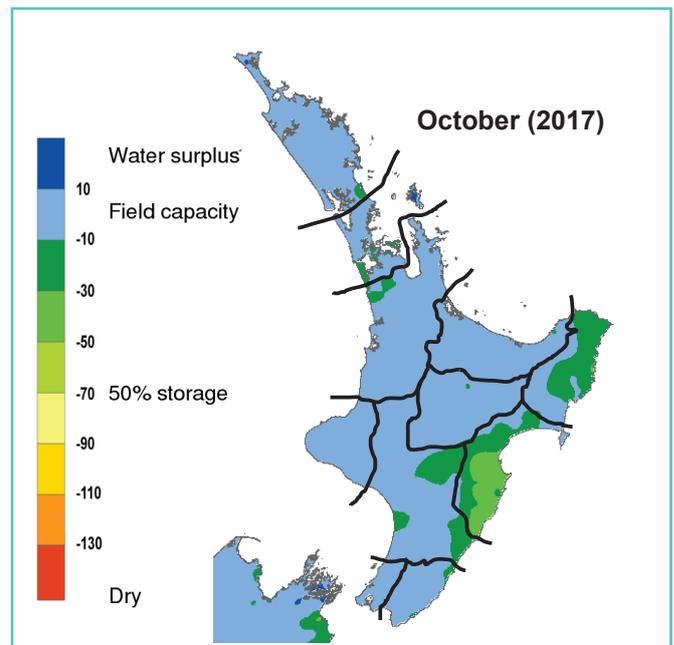


Figure 3. Soil moisture deficits as of 01/10/2017. Source: NIWA.

*Note: Soil moisture deficit means the amount of water needed to bring the soil moisture content back to field capacity, which is the maximum amount of water the soil can hold.*

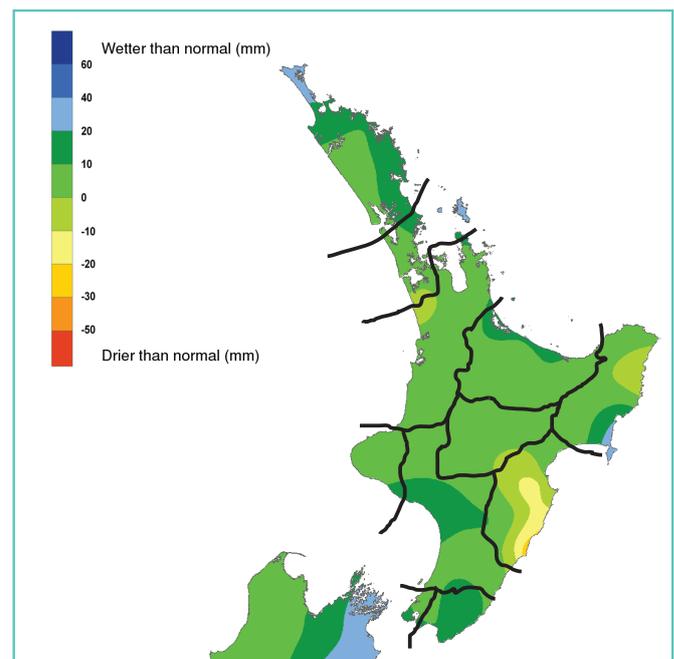


Figure 4. Soil moisture anomaly as of 01/10/2017. Source: NIWA.

*Note: Soil moisture anomaly means the difference between the historical normal soil moisture deficit (or surplus) for a given time of year and actual soil moisture deficits.*

The intention of these monthly outlooks is to provide a heads up on current and potential fire danger for the North and South Islands. This is not a detailed fire seasonal outlook for specific localities, nor does it summarise fire potential (which depends on weather, climate, fuel conditions (i.e. grass curing), risks of ignitions, recent fire history and fire management resources available in an area.

It should be used as a prompt for local and regional discussions/debates on fire potential, and where things are at, where it is heading, and to drive awareness about what this might mean in your patch and for your neighbours.

## Tracking trends in BUI, DC and CDSR:

Comparisons of fire dangers for individual indicator stations for different regions **are not shown overleaf due to the low fire danger and severity across the country. As fire dangers increase, more detailed regional outlooks will recommence highlighting where** Buildup Index (BUI), Drought Code (DC) and Cumulative Daily Severity Rating (CDSR) values sit in comparison with previous fire seasons.

### The graphs display:

- Bold red line is the current fire season
- Bold black line is the average
- Light grey shaded areas are historical max and mins
- We've also colour coded the 2008/09 Neutral year followed by a weak La Niña season in blue.
- Light orange line is the previous season if the 2008/09 year was not available

## Background info on FWI codes and indices:

### Fine Fuel Moisture Code (FFMC)

An indicator of the relevant ease of ignition and flammability of fine fuels.

0 - 74	Difficult
75 - 84	Moderately easy
85 - 88	Easy
89 - 91	Very easy
92 +	Extreme easy

**Duff Moisture Code (DMC)** A rating of the average moisture content of loosely compacted organic soil layers (duff/humus) of moderate depth, and medium-sized woody material

0 - 10	Little mopup needs
11 - 20	Moderate
21 - 30	Difficult
31 - 40	Difficult & extended
41 +	Difficult & extensive

**Drought Code (DC)** A rating of the average moisture content of deep, compact, organic soil layers, and a useful indicator of seasonal drought effects on forest fuels and amount of smouldering in deep duff layers and large logs.

0 - 100	Little mopup needs
101 - 175	Moderate
176 - 250	Difficult
251 - 300	Difficult & extended
301 +	Difficult & extensive

### Buildup Index (BUI)

Combines the DMC and DC, and represents the total amount of fuel available for combustion.

0 - 15	Easy control
16 - 30	Not difficult
31 - 45	Difficult
46 - 59	Very difficult
60 +	Extremely difficult

**Initial Spread Index (ISI)** Combines the effect of wind speed and the FFMC, providing a numerical rating of potential fire spread rate.

0 - 3	Slow rate of spread
4 - 7	Moderate fast
8 - 12	Fast
13 - 15	Very fast
16 +	Extremely fast

### Fire Weather Index (FWI)

Combines the ISI and BUI to indicate the potential head fire intensity of a spreading fire (on level terrain).

0 - 5	Low fire intensity
6 - 12	Moderate
13 - 20	High
21 - 29	Very High
30 +	Extreme

**Daily Severity Rating (DSR)** A numerical rating of the daily fire weather severity at a particular station, based on the FWI. It indicates the increasing amount of work and difficulty of controlling a fire as fire intensity increases. The DSR can be averaged over any period to provide monthly or seasonal severity ratings.

**Monthly Severity Rating (MSR)** is the average of the DSR values over the month. DSR and MSR captures the effects of both wind and fuel dryness on potential fire intensity, and therefore control difficulty and the amount of work required to suppress a fire. It allows for comparison of the severity of fire weather from one year to another.

0 - 1	Low fire behaviour potential
1 - 3	Moderate fire potential
3 - 7	High to very high fire potential
7 +	Extreme fire behaviour potential

## Acknowledgements:

Fire Danger interpretation was from information gathered from the Average Monthly Maps for: Severity Rating, FWI, BUI, ISI, DC, DMC, FFMC. These maps were obtained from the National Rural Fire Authority Fire Weather System powered by Eco Connect.

Information on the Expected Climate Outlook was gathered from:

- MetService, Rural Monthly outlooks:  
[www.metservice.com/rural/monthly-outlook](http://www.metservice.com/rural/monthly-outlook)
- NIWA, Seasonal Climate outlook:  
[www.niwa.co.nz/climate/sco](http://www.niwa.co.nz/climate/sco)
- Australian Bureau of Meteorology Climate outlooks  
<http://www.bom.gov.au/climate/ahead/?ref=fr>

### Front Cover Image:

2014 North Bank wildfire, Marlborough. (John Foley, Fire and Emergency New Zealand).

If you are keen to submit a weather and fire related photo that will appear on the front page, please email:

- a high resolution image(s)
- with details on the location and the photographer's name and organisation.
- to: [Veronica.Clifford@scionresearch.com](mailto:Veronica.Clifford@scionresearch.com)

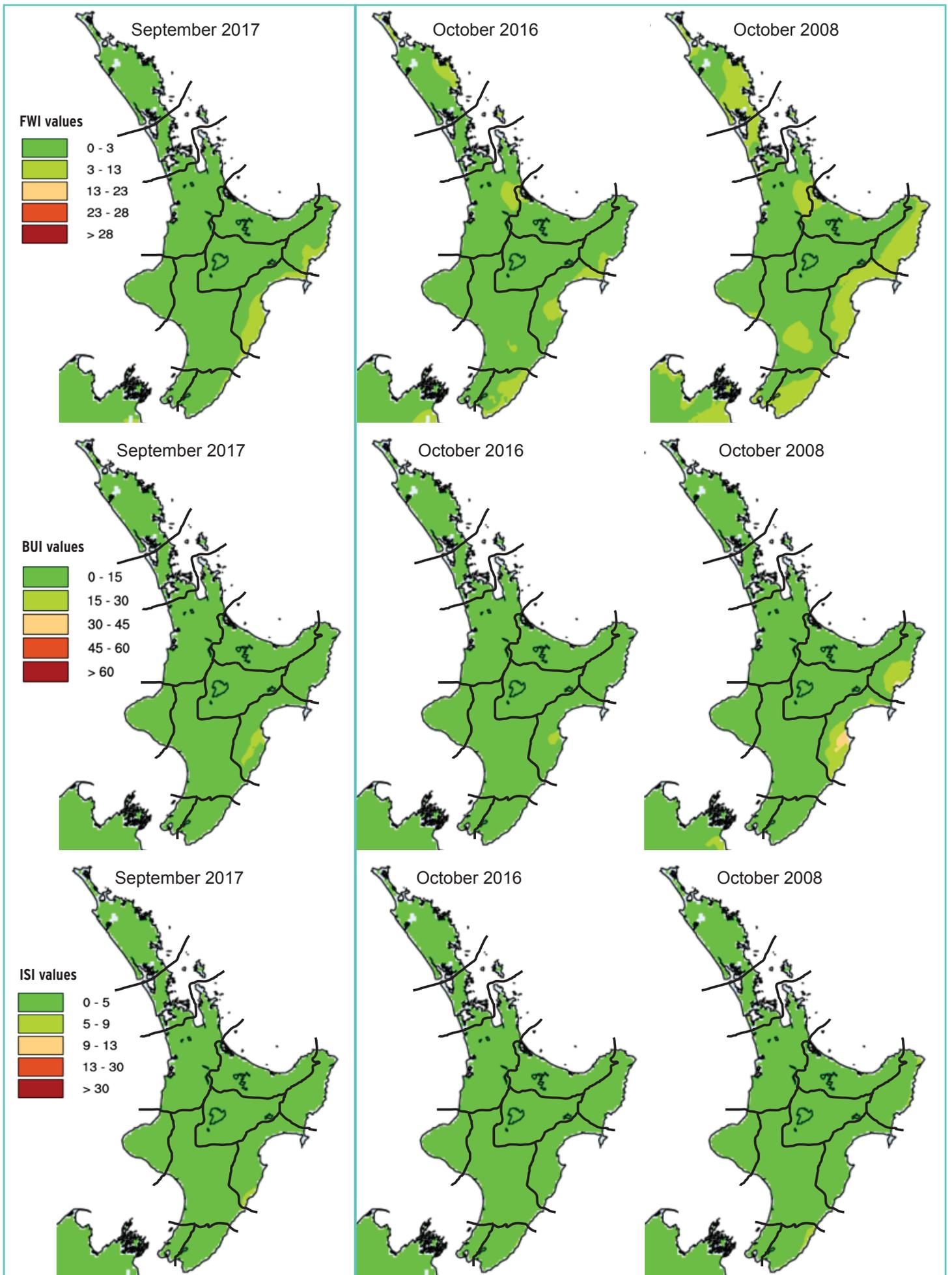


Figure 5. Current Monthly Average for the: Fire Weather Index (top), Buildup Index (middle) and Initial Spread Index (below).

Figure 6. Average Monthly values of: Fire Weather Index (top), Buildup Index (middle) and Initial Spread Index (below); for the previous year (left) and during the 2008/09 Neutral year followed by a weak La Niña year (right).

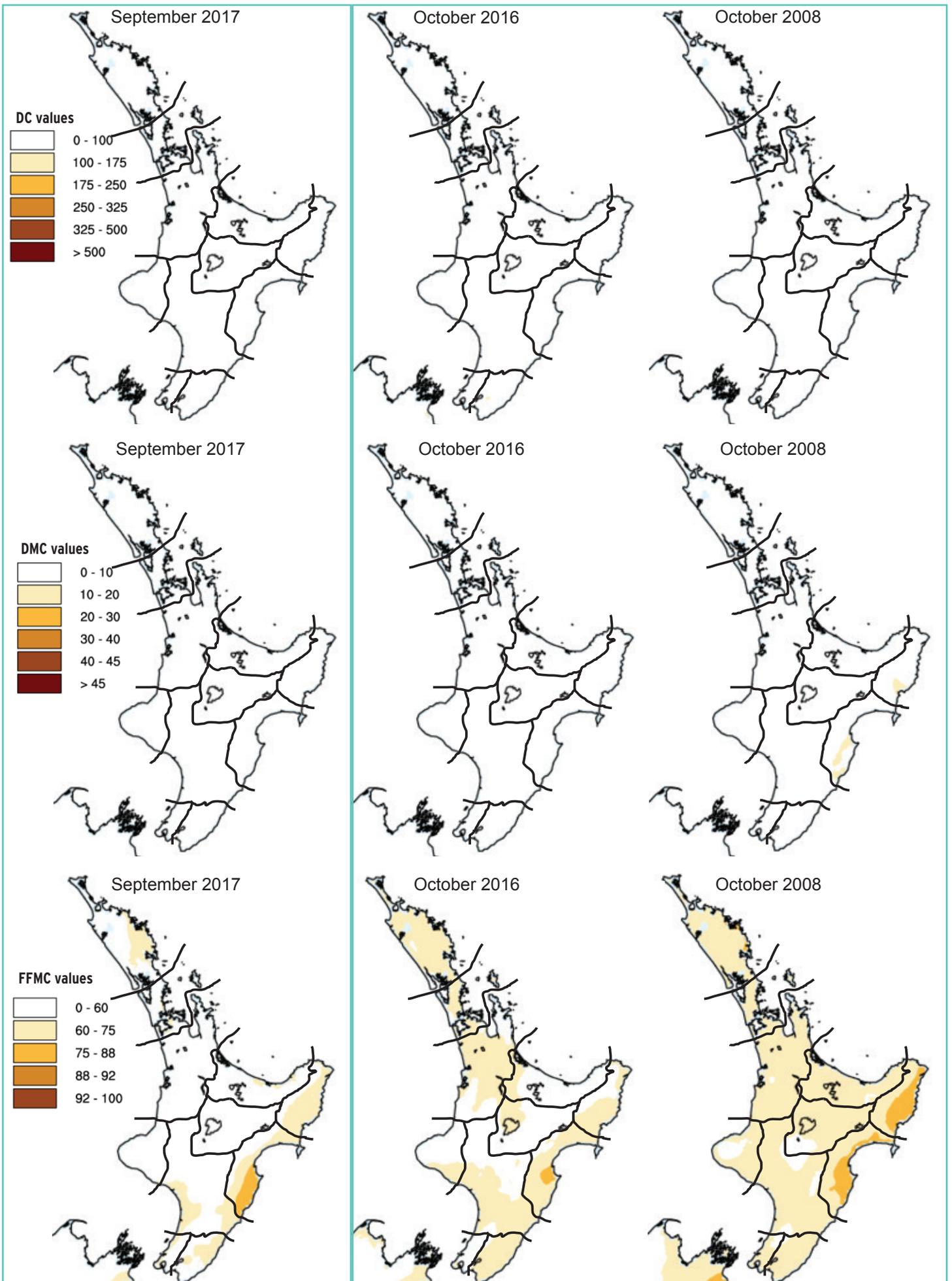
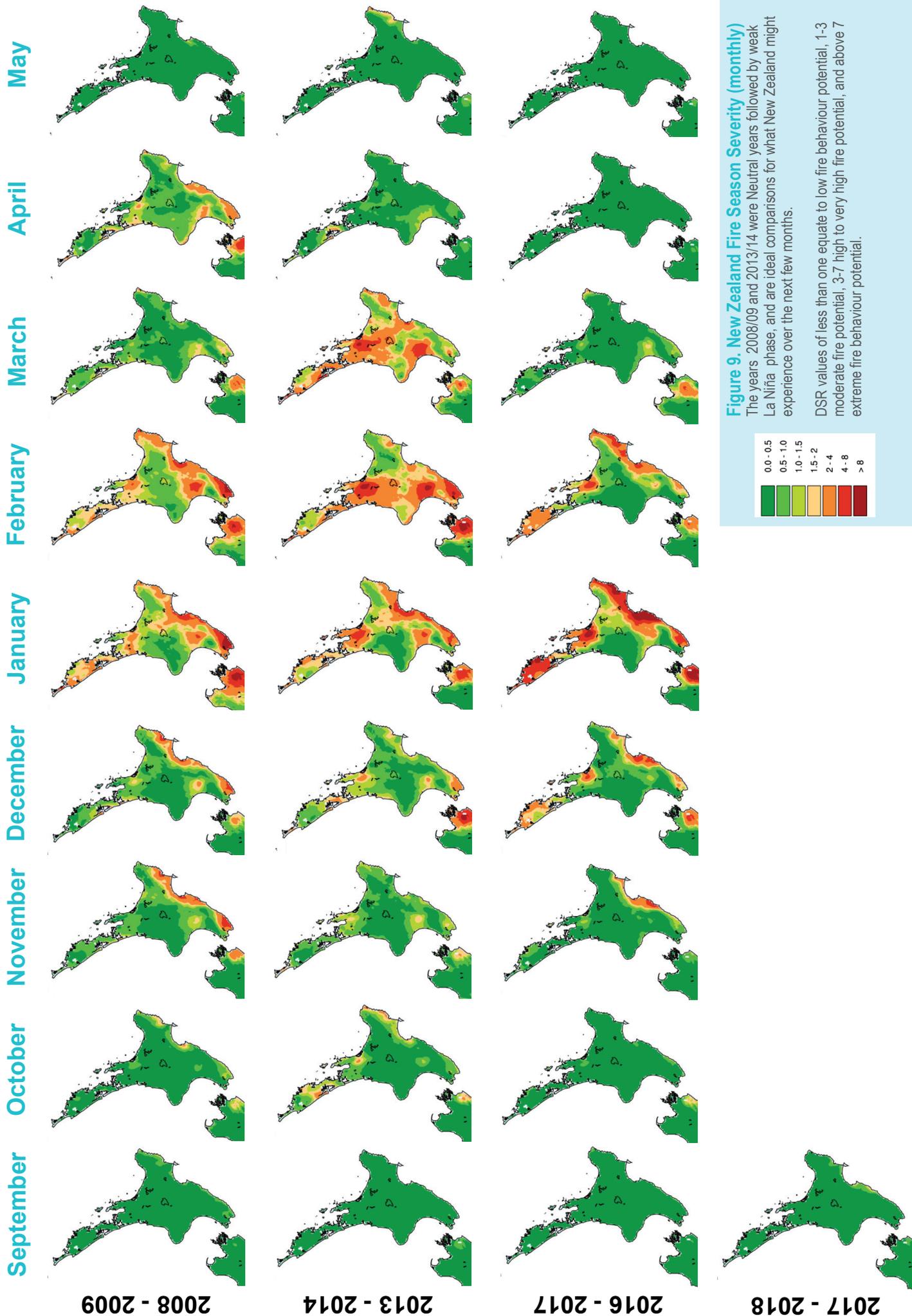


Figure 7. Current monthly average for the: Drought Code (top), Duff Moisture Code (middle) and the Fine Fuel Moisture Code (below).

Figure 8. Average monthly values of: Fire Weather Index (top), Buildup Index (middle) and Initial Spread Index (below); for the same time last year (left) and during the 2008/09 Neutral year followed by a weak La Niña year (right).



**Figure 9. New Zealand Fire Season Severity (monthly)**

The years 2008/09 and 2013/14 were Neutral years followed by weak La Niña phase, and are ideal comparisons for what New Zealand might experience over the next few months.

DSR values of less than one equate to low fire behaviour potential, 1-3 moderate fire potential, 3-7 high to very high fire potential, and above 7 extreme fire behaviour potential.

