New Zealand Seasonal Fire Danger Outlook 2017/18

ISSUE: South Island, October 2017

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Current fire danger situation & outlook:

Low fire climate severities currently exist in most areas of the South Island (Figure 1). The current FWI System codes and indices indicate that fuel dryness is low, and at similar levels to the same time last year and during the 2008/09 fire season (Figures 5-6 & 7-8). These low fire dangers across the South Island are the result of the significant rainfalls that have occurred over the past few months. The exception being Central Otago, which is experiencing on average, high to very high BUI, DC, DMC & FFMC values. This indicates that a fire could start easily and there could be some difficulty in suppression (in terms of mop-up). However areas of low grass curing (green) would help suppression efforts by slowing or stopping a spreading fire.

September was an unsettled and wet month for most regions, except for Southland. Low pressure systems dominated the weather map. This resulted in extremely wet conditions for the eastern South Island. As a result, soil moisture levels are currently at or close to capacity for the South Island (Figure 3). The exceptions again being Central Otago and the Waitaki valley that are about 50% capacity. Soil moistures for much of the Island are normal for this time of the year (Figure 4). The exceptions are the east coast of the South Island (Marlborough, North and South Canterbury, and coastal Otago) where they are wetter than normal. Central Otago is slightly drier than normal.

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 tends to be drier.

The outlook for October is for more settled weather, with high pressure systems forecast to return to New Zealand. Temperatures are expected to be warmer than normal. However, cold southerly changes and cooler mornings will still make the odd appearance. A drier than usual October is predicted for the South, except for Marlborough, where closer to normal totals are expected.

Fire dangers and severity for October are expected to be low for most of the South Island (Figures 1 & 9). The fire season years of 2008/09 and 2013/14 are potentially good indicators for what to expect this coming fire season (Figure 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, especially in eastern coastal and inland basin areas. However, major rain events will keep the fire danger and severity generally low. The area to watch this month is currently Central Otago, which is experiencing, on average, high fire severities (based on Monthly Severity Rating, MSR) and high to very high DC and BUI levels.

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.

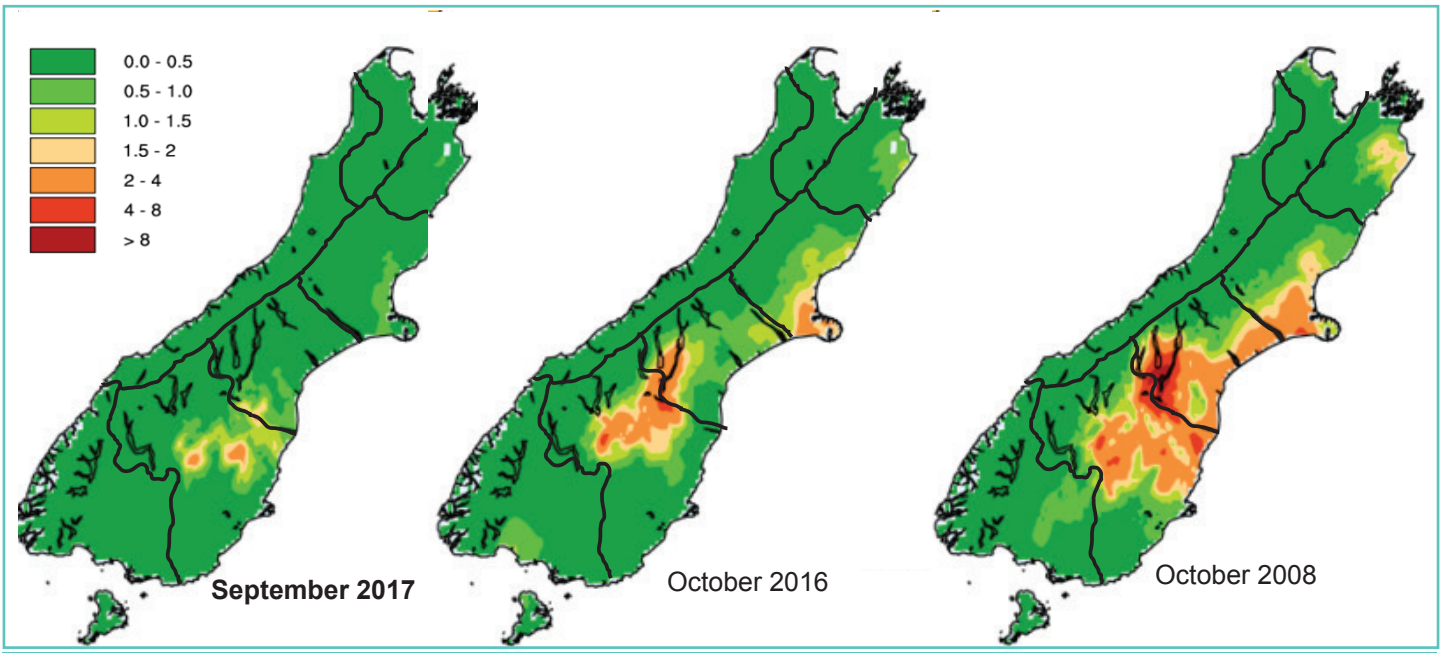

Figure 1. Monthly average Severity Rating for: current (left), last year (middle), and the 2008/09 Neutral year (right).

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). In the short-term, high pressure systems will affect October weather patterns for New Zealand.

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.

This month: October 2017

Highs are signalled to return to New Zealand during October and favour both Islands equally. Fronts and lows will be less frequent than usual. A warmer than usual October is predicted right across the country. However, expect to still see the odd cold southerly change and some cooler mornings.

A drier than normal October is forecast for the South Island (excluding Marlborough). Marlborough is forecasted to have normal October rainfall.

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 pressure 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.

Normal or above normal rainfall is expected for the west and south of the South Island. The eastern coast of the South Island is expected to experience near normal or below normal rainfall, with the rest of the Island experiencing normal rainfall. Soil moisture levels are likely to be near normal for the South Island.

Temperatures are forecasted to be above average for all of New Zealand. However, frosts and cool snaps are still possible during spring, and cannot been ruled out.

Breakdown (Figure 2):

Temperatures are most likely to be:

- above average (60% chance) for Tasman, Nelson, Marlborough, Buller, West Coast, Alps and foothills, inland Otago & Southland.
- above average (55% chance) for coastal Canterbury & east Otago.

Rainfall totals are most likely to be:

- near normal (45% chance) for Tasman, Nelson, Marlborough & Buller.
- near normal range (45-50% chance) for West Coast, Alps and foothills, inland Otago & Southland.
- near normal (40% chance) or below normal (40%) for coastal Canterbury & east Otago.

Soil moisture levels are most likely to be:

- near normal (40% chance) for Tasman, Nelson, Marlborough & Buller.
- near normal range (45-50% chance) for West Coast, Alps and foothills, inland Otago, Southland, Coastal Canterbury & eastern Otago.

Last month: September 2017

So far, the country has had an unusual number of wet easterly events during early 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, especially the eastern South Island. Numerous wet north-westerlies that spread across the Alps resulted in many regions receiving more than their usual amount of rain. The eastern South Island recorded between 115 and 230 percent of normal September rainfall. Christchurch and Ashburton received more rain in 2017 (in 9 months), than is typically received across an entire year.

Spring temperatures have been close to average, but there have been wide ranges between warm and cool periods during September. Cooler temperatures were present for the first three weeks of the month over the inland South Island, before extreme warmth moved in for the last part of the month. Temperatures across coastal South Island overall were generally average to above average.

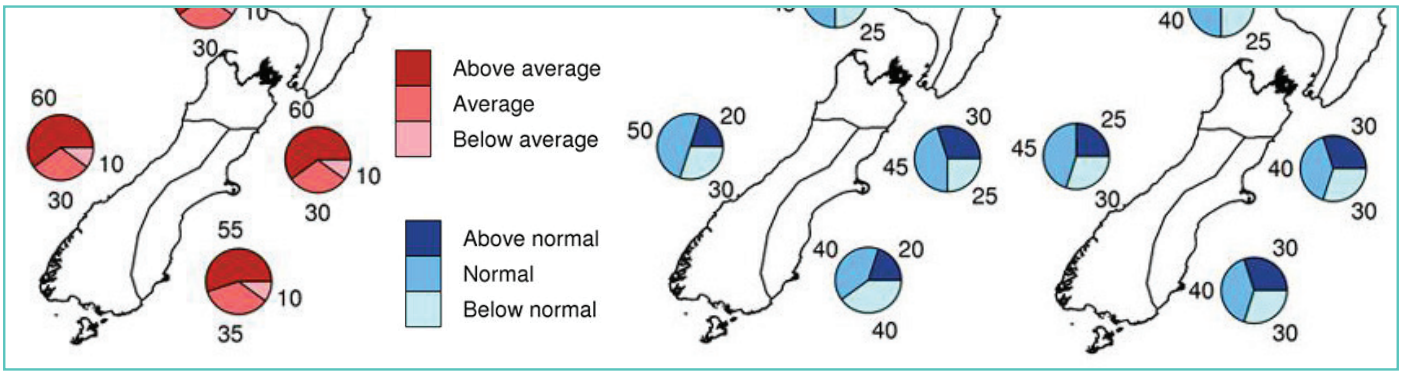

Figure 2. Outlook for Oct - Dec 2017: air temperature (left), rainfall (middle), available soil moisture (right). Source: NIWA.

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.

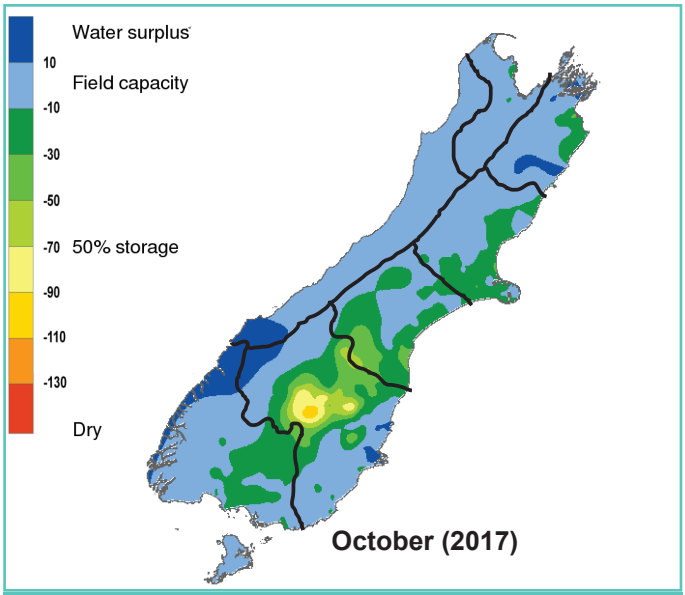

Figure 3. Soil moisture deficits as of 01/10/2017.
Source: NIWA.

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.

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

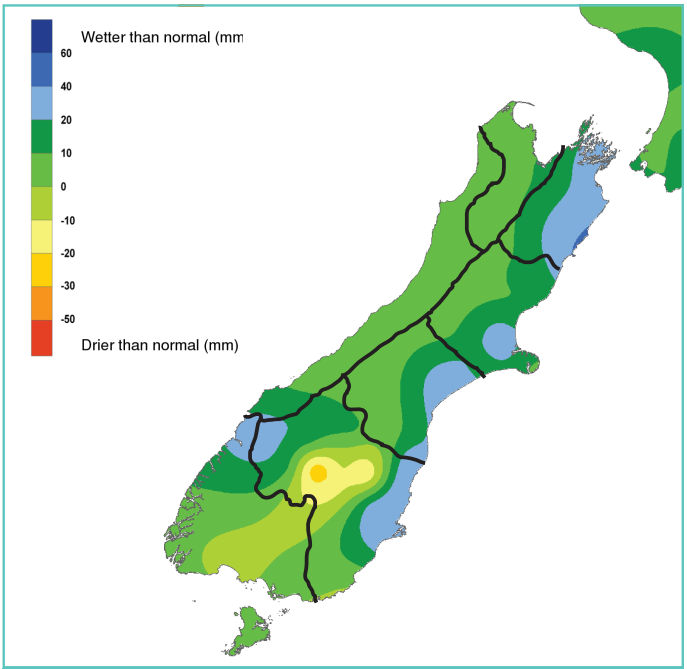

Figure 4. Soil moisture anomaly as of 01/10/2017.
Source: NIWA.

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.

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.

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 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
- NIWA, Seasonal Climate outlook: www.niwa.co.nz/climate/sco
- Australian Bureau of Meteorology Climate outlooks http://www.bom.gov.au/climate/ahead/?ref=ftr

Front Cover Image:

Southern Lakes Helicopter attends an out of control burn off. Chief Fire Officer Graeme Moffat, Te Anau Volunteer Fire Brigade, 2017).

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

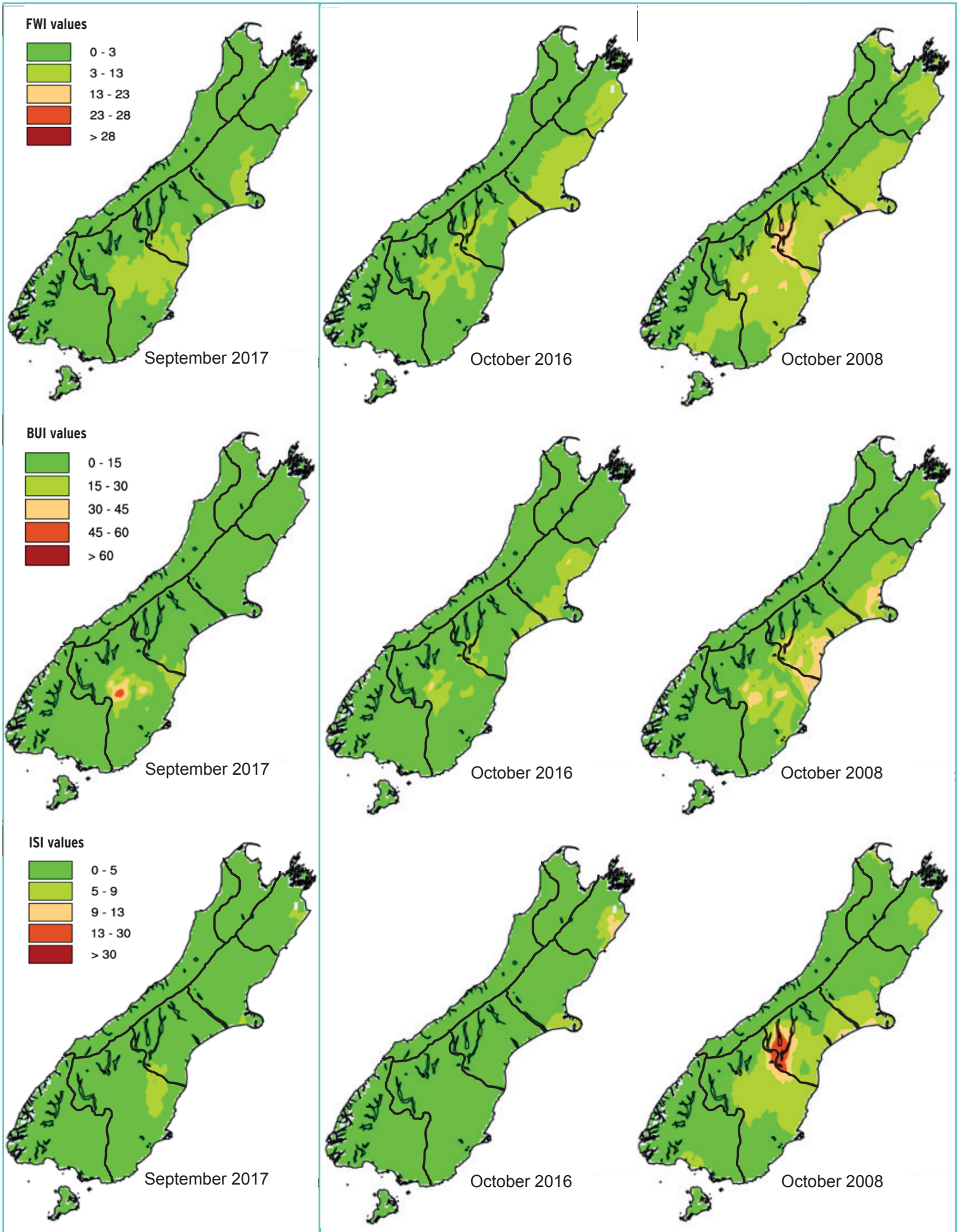

Figure 5. Current Monthly Average for the: Fire Weather Index (top), Buildup Index (middle) and Initial Spread Index (below).

Figure 6. Average Monthly values of: Fire Weather Index (top), Buildup Index (middle) and Initial Spread Index (below); for the previous year and during the 2011/12 weak La Niña year.

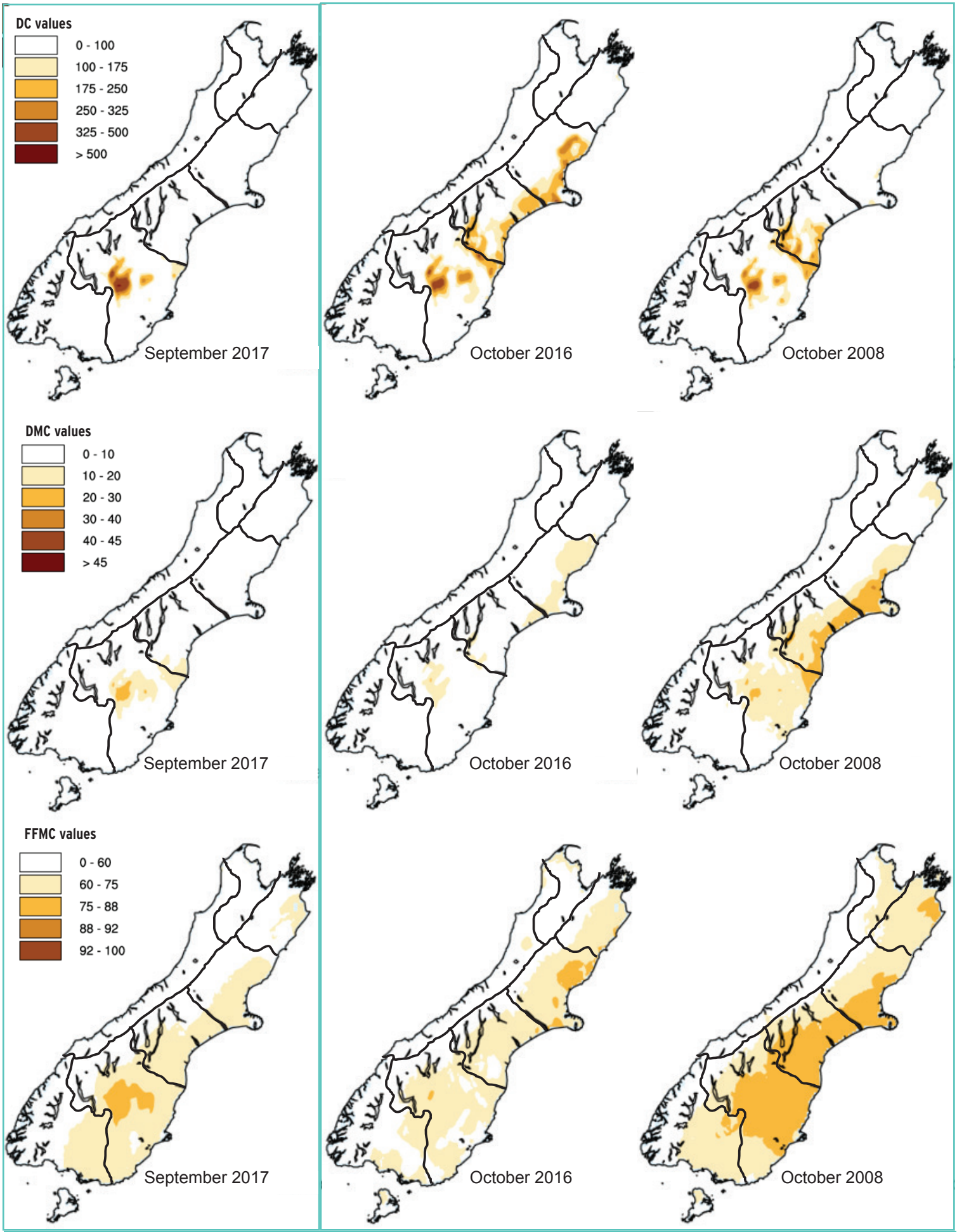

Figure 7. Current monthly average for the: Drought Code (top), Duff Moisture Code (middle) and the Fine Fuel Moisture Code (below).

Figure 8. Average monthly values of: Fire Weather Index (top), Buildup Index (middle) and Initial Spread Index (below); for the previous year and during the 2011/12 weak La Niña year.

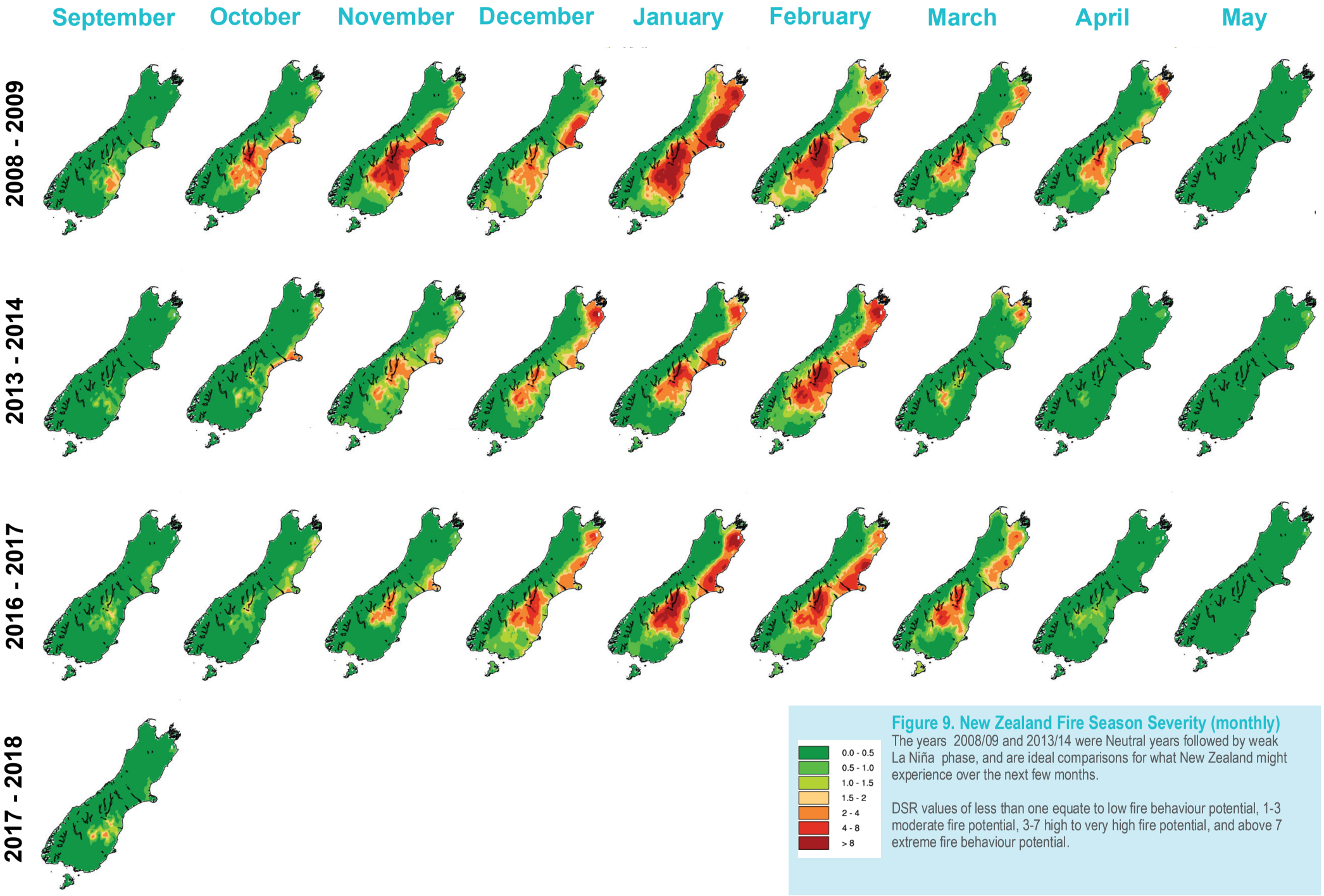

Figure 9. New Zealand Fire Season Severity (monthly)

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.