New Zealand Wildfire Summary

2020/21 Wildfire Season Update

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WHAKARATONGA IWI
FIRE EMERGENCY
NEW ZEALAND

Introduction

This report summarises the 2020/21 wildfire season for New Zealand. It includes an evaluation of climatic conditions and incident statistics (over an annular timeframe of 1 July 2020 - 27 June 2021). The purpose of this document is to provide a summary of the past year, in terms of overall conditions and incidents notified. It is to aid discussions in each district around operational reduction and readiness measures, and opportunities for continual improvement.

Trends in the number of wildfires, area burnt, and fire causes have been identified using data from the Fire and Emergency New Zealand (FENZ) fire incident reporting database. This report also summarises New Zealand's fire weather and climatology information from the Fire Weather System. The findings are broken down into national and previous Rural Fire regional/district boundaries (found in the Appendix).

Note: This document includes revised figures since the 2019/20 wildfire season summary report, due to the completion of missing incident reports and full annual years of statistics (dating back to 2018). Therefore, there will be differences if comparing the 2019/20 report to this summary. This summary is the most up-to date and contains data within figures to compare 2019/20 and 2020/21 seasons.

Summary

The 2020/21 wildfire season was not as significant compared to last season (2019/20). Several significant fires (larger in size than normal) occurred prior to or immediately upon the start of the fire season. This was due to winter frost curing and below normal rainfall over winter leading into spring. This resulted in a lack of soil and vegetation moisture recovery over winter. Fortunately, there was a relative lack of fires of much significance for the rest of the fire season.

New Zealand's weather was largely governed by a non-traditional La Niña and high-pressure systems positioned over the country and towards the Chatham Islands. New Zealand experienced largely northerly winds, and significant rainfall events for some locations. Northern districts experienced dry to extremely dry conditions early in the season (November), which receded by early January. Eastern locations around the country experienced widespread dry conditions (as opposed to drought) which extended out into June (Figure 1, 8 & Appendix A4).

Districts that appear to have had an increase of fire incidences and area burnt during the 2020/21 wildfire season include:

- West Coast (Appendix A2).

Districts that experienced a decrease in the number of wildfires, but an increase in the total area burnt include:

- Northland, Auckland, Bay of Plenty, Manawatu-Whanganui, Wairarapa, Wellington, Canterbury, Mid-South Canterbury, and Otago (Appendix A2).

Districts that experienced a decrease in both the number of wildfires and total area burnt were:

- Waikato, Hawke's Bay, Taranaki, Nelson/Tasman and Marlborough, and Southland (Appendix A2).

This season, no districts recorded an increase in the number of wildfires combined with a reduction in the total area burnt. However, Gisborne recorded no change in the area burnt (Appendix A2).

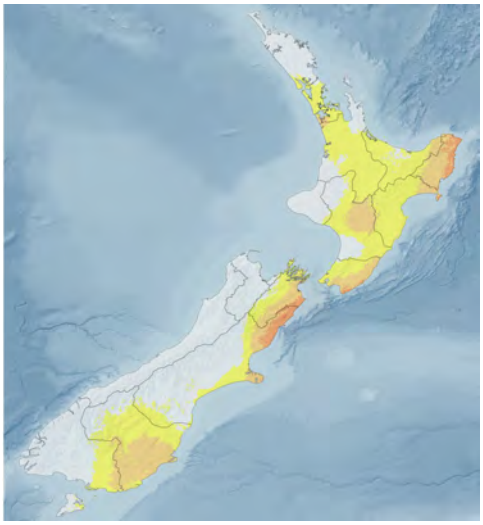


Figure 1. NIWA's New Zealand Drought Index (NZDI) map for 29 March 2021, which highlights locations experiencing drought or dry conditions during the height of the wildfire season. Red indicates severe drought conditions; orange indicates drought; light orange indicates very dry to extremely dry conditions; yellow indicates dry conditions.

Wildfire statistics

National number of wildfires and area burnt

At a national scale, the total number of wildfires decreased (blue line), and area burnt increased (orange bars) when comparing the 2020/21 fire season with the previous 2019/20 season (Figure 2).

The drop in the total number of wildfires could be attributed to the less extreme fire weather conditions (fuel availability recorded in the appendix), Covid-19 restrictions and improved public education on preventing wildfires.

The increase in the total area burnt is attributed to several large-scale wildfires in the Mid-South Canterbury and Otago districts. The 2020/21 wildfire season is considered the second most significant season in the last 36 years of wildfire records in terms of area burnt and loss of houses. The 1998/99 season remains the worst on record (in terms of area burnt). However, the largest wildfire recorded in NZ's history occurred in Taupo (1946) with approximately 30,738 Ha burned.

- There were 4,586 fires and 13,348 ha burnt between 1 July 2020 and 27 June 2021.
- The total area burnt is well above the 2019/20 season, and well above the 5- and 10-year averages. Over the historical record (1985/86 - 2020/21) the average area burnt was 5,754 ha per year.
- The last 5-year average for total number of wildfires was 4,398 and the average area burnt was 7,703 ha.
- The last 10-year average for total number of wildfires was 4,245 and the average area burnt was 5,562 ha.

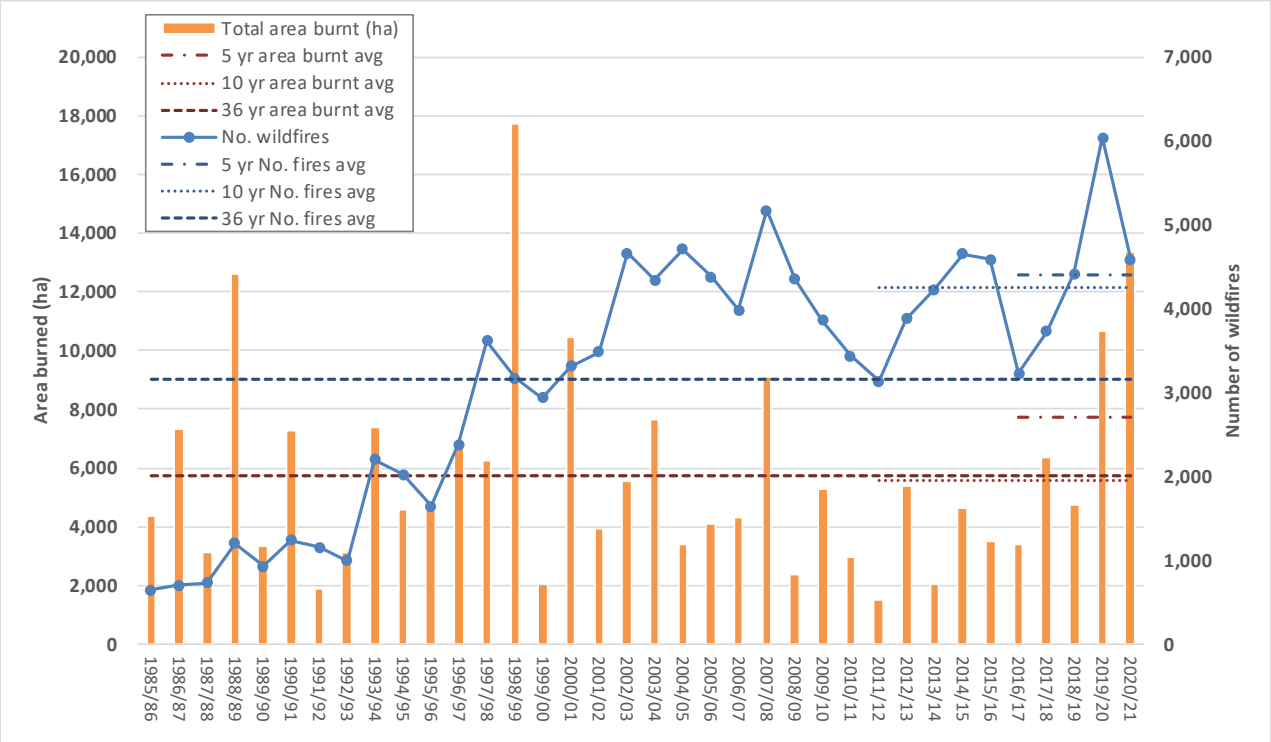


Figure 2. Total number of wildfires (blue line) and area burnt (orange bars) for the last 36 years of wildfire records. Note: this dataset does not include vegetation fire non-responses or false alarms that required no action.

Number of wildfires and area burnt

- This season (2020/21), the North Island accounted for two thirds of the country's wildfires (67%) (Figure 3). This is above normal, compared to the 30-year historical average.
- The South Island accounted for a much greater portion of the area burnt (88%) (Figure 4). This is above normal, compared to the 30-year historical average.
- For the last two wildfire seasons, for both the North Island and whole country, Auckland accounted for the highest number of wildfires (Figure 3); Canterbury had the highest number in the South Island.
- Mid-South Canterbury and Otago districts experienced the greatest area burnt in the country during the 2020/21 season (Figure 4). This was mainly due to very large individual wildfire events occurring in each of these districts (Pukaki (2226 ha), Ōhau (5,033 ha), Ben Lomond (760 ha), Macraes (816 ha) and Livingstone (611 ha)). Manawatu-Whanganui also had two large fires (450 ha and 255 ha).
- This season, all districts experienced a decrease in the total number of wildfires, except the West Coast (that experienced an increase from 27 to 45 wildfire incidents).
- Districts that experienced an increase in area burnt were Northland, Auckland, Bay of Plenty, Manawatu-Whanganui, Wairarapa, Wellington, Canterbury, Mid-South Canterbury, West Coast and Otago.
- Districts that experienced a decrease in area burnt include Waikato, Hawke's Bay, Taranaki, Nelson/Tasman & Marlborough, and Southland. Remaining districts had no change (Gisborne).
- District breakdowns for area burnt and the total number of wildfires are detailed in the Appendices.

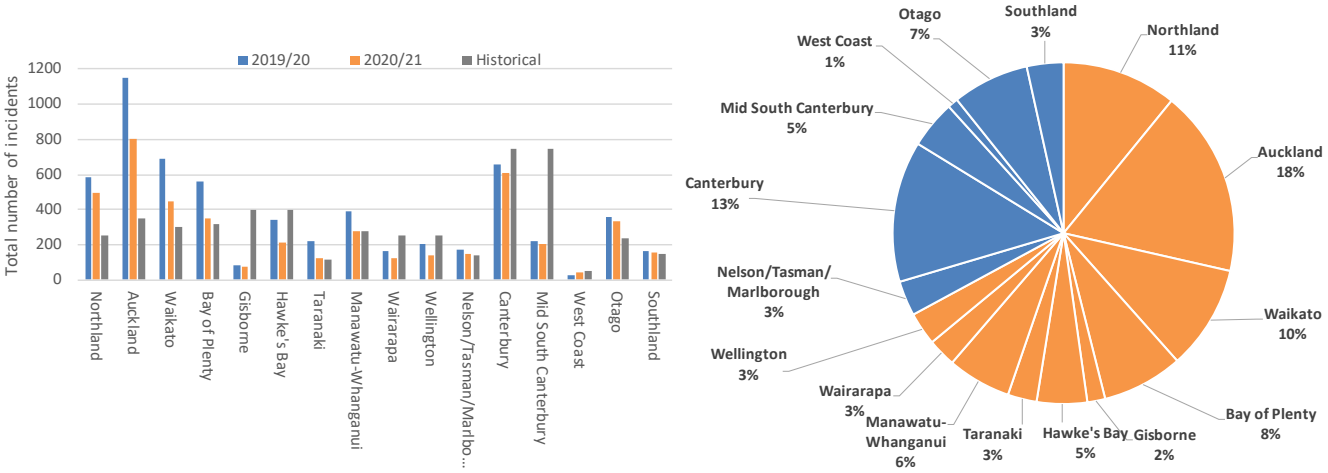


Figure 3. Total number of wildfires by district, for the last 2 seasons and the 30-year historical average (left); proportionally for 2020/21 season (right), where blue represents the South Island and orange the North Island.

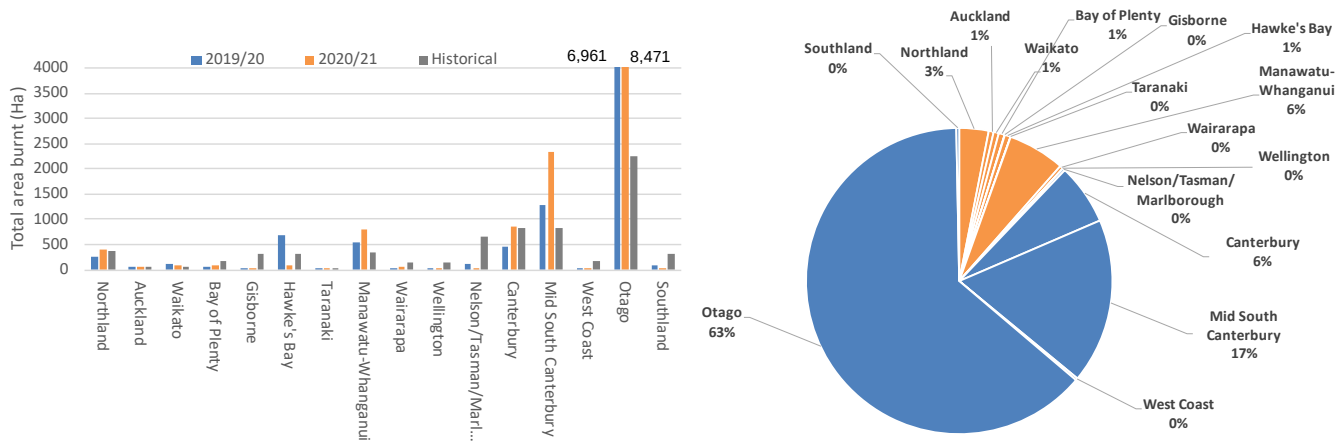


Figure 4. Total area burnt by District, for the last 2 seasons and the 30-year historical average (left); proportionally for 2020/21 season (right), where blue represents the South Island and orange the North Island.

Wildfire impacts on land use classes

- During the 2020/21 wildfire season, Meat/Wool land area was significantly impacted by wildfires (43% of the total area burnt across the country) followed by conservation land (27%) (Figure 5).
- Meat/Wool, Forestry and Dairy land use areas increased compared to the 2019/20 season.
- Conservation, Other and Arable land areas decreased when compared to the 2019/20 season. Horticulture also decreased but the area burnt was minimal.
- The high proportion of area burnt in Conservation, and the Meat/Wool land use classes is largely due to several very large wildfires during in the season (Pukaki downs, Ōhau, Livingstone, Macraes, Ben Lomond, Broken River, and Goose Flat Hut)
- Area burnt by land use categories has been broken down further for each of the Districts (Table 1, and in the Appendices).

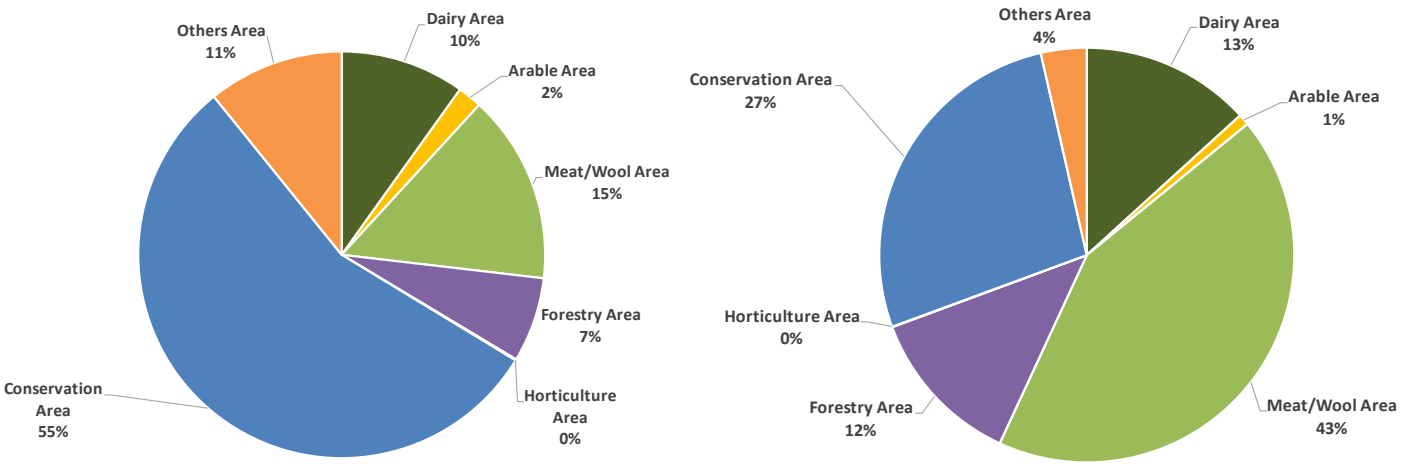


Figure 5. Area burnt by land use, for the 2019/20 season (left) and 2020/21 season (right).

Table 1. Area burnt (ha) by District and by land use type for the 2019/20 fire season and 2020/21 fire season.

District	Dairy Area		Arable Area		Meat/Wool Area		Forestry Area		Horticulture Area		Conservation Area		Others Area	
	19/20	20/21	19/20	20/21	19/20	20/21	19/20	20/21	19/20	20/21	19/20	20/21	19/20	20/21
Northland	56	59	0	0	8	3	22	226	0	2	138	114	29	11
Auckland	26	18	0	0	0	6	6	22	0	0	8	8	8	15
Waikato	47	46	1	1	5	4	30	8	0	0	17	12	6	2
Bay of Plenty	28	22	3	1	1	0	16	44	2	1	13	3	7	13
Gisborne	3	2	0	0	0	0	0	1	0	0	1	0	0	2
Taranaki	25	3	0	0	4	0	3	0	0	0	4	0	1	0
Manawatu-Whanganui	187	30	19	0	36	2	57	61	1	0	192	660	50	52
Hawke's Bay	150	58	6	0	42	10	454	10	1	1	22	1	10	1
Wairarapa	9	9	4	0	3	21	2	13	1	0	0	1	3	3
Wellington	0	0	0	0	0	0	1	0	0	0	0	2	1	1
Nelson/Marlborough	80	19	0	0	0	2	4	6	4	0	14	4	2	2
West Coast	0	1	0	0	0	0	0	1	0	0	4	28	1	1
Canterbury	130	126	37	76	165	212	28	38	1	0	93	348	7	58
Mid South Canterbury	175	84	135	32	721	979	43	1013	0	0	203	184	2	38
Otago	74	1264	2	0	615	4471	50	213	1	0	5192	2247	1027	277
Southland	65	28	0	5	4	1	5	6	0	0	16	0	0	0
Chatham Island *														
Total	1,055	1,767	205	116	1,604	5,711	720	1,663	10	4	5,919	3,611	1,154	476

* Chatham Islands statistics are currently reported under Hawke's Bay in the database and unable to separate out.

Cause categories

There are 51 individual heat source categories currently used in the fire incident reporting database for this seasonal analysis. These were merged and grouped into 11 broad cause categories to simplify illustration of the data. Data were collated according to the following broad causes: Cigarettes, Matches and Candles; Cooking and heating; Equipment; Explosives & Fire Works; Industry; Natural Sources; Pile burns; Prescribed burns; Re-ignition; Spontaneous combustion; and Unclassified (Table 2).

- This season (2020/21), like the 2019/20 season, the three top broad causes contributing to the total number of wildfires include: Pile burns followed by Cigarettes, matches and candles and Unclassified (Figure 6).
- The area burnt by cause was significantly different between the two fire seasons (Figure 7).
    - An increase in the area burnt for cooking & heating, explosives, industry, natural sources, prescribed burns and unclassified (Figure 7).
    - A reduction in the area burnt was observed for cigarettes etc, equipment, pile burns, re-ignitions and spontaneous combustion (Figure 7).
    - The three top broad causes contributing to the total area burnt by wildfires include: Industry followed by cooking and heating, then prescribed burns (Figure 7). A high proportion of area burnt contributing to Industry is largely due to the Ōhau wildfire. Whereas, a high proportion contributing to Cooking and heating is attributed to the Pukaki wildfire.
- Cause statistics by Districts are summarised in the Appendices.

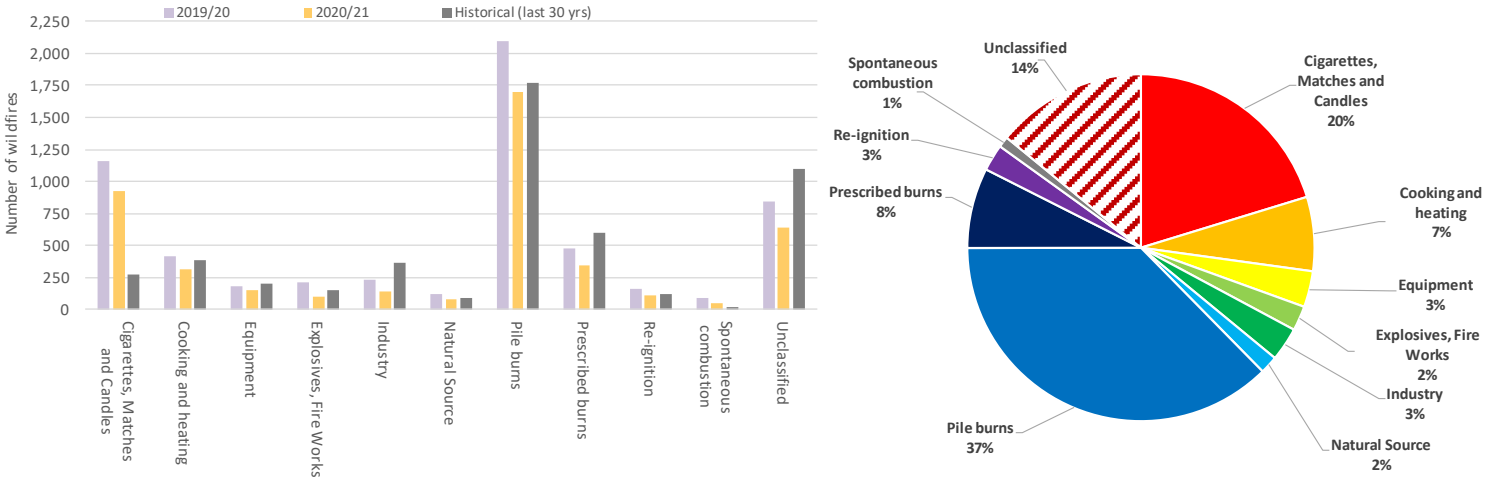


Figure 6. Total number of wildfires by cause, for the last two wildfire seasons compared to the 30-year historical average (left); and proportionally for the 2020/21 season (right).

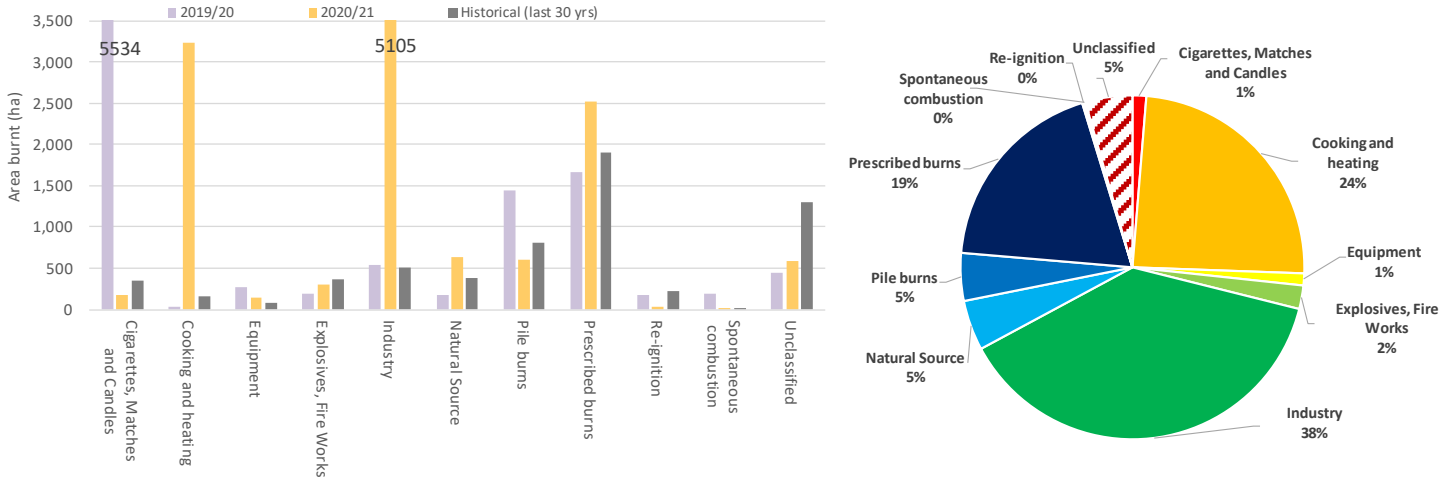


Figure 7. Area burnt by cause, for the last two wildfire seasons compared to the 30-year historical average (left); and proportionally for the 2020/21 season (right).

Table 2: List of broad wildfire cause categories and the underlying individual heat source categories used for analysis of the 2020/21 and 2019/20 incident statistics.

Cigarettes, Matches, Candles: • Cigarette, Cigar or Smoking materials • Lighters • Matchers or Lighters (Suspicious)	**Prescribed burns:** • Agricultural fire or burn off • Broadcast slash burn • Crop burn • Scrub and tussock burn	**Re-ignition:** • Re-ignition, Rekindle from previous fire
Cooking and heating: • BBQ • Embers, Ashes • Outside fire for warmth / Campfire • Umu / Hangi • Wood-fired pizza ovens	**Pile burns:** • Debris burning • Outside bonfire • Refuse burning • Windrow / slash pile	**Spontaneous combustion:** • Bark or sawdust spontaneous ignition • Hay/silage spontaneous ignition • Skid site spontaneous ignition • Spontaneous ignition; organic - hay, linseed oil etc
Equipment: • Exhaust heat / Spark • Malfunction • Motorbike, Truck or Car • Mowers and slashers • Welding, grinding, cutting	**Unclassified:** • Exposure Fire - unable to classify • Information not recorded/Unknown • Outside fire - unable to classify	**Explosives, Fireworks:** • Fireworks / Pyrotechnics • Flare: Warning, Safety, Boat • Incendiary devices, Molotov cocktail • Lantern • Sky / Chinese lanterns • Tracer ammunition
Industry: • Bee-Keeping smoking tool • Chainsaws • Clashing / Arching power lines • Earthwork or forestry machinery • Electrical Fence • Farm machinery • Frost pots • Maintenance crews • Oil and gas exploration • Ropes / binding	**Natural sources:** • Animals • Geothermal Activity • Lightning discharge • Solar heat: Sun (magnified through glass etc) • Static electrical discharge • Trees	

Review of the climate and weather for the 2020/21 season

Winter 2020

Winter of 2020 was warmer than average for many locations. Driven largely by high pressure over the country, with more warm north easterly winds than normal and warm sea surface temperatures (which drives land air temperatures). The nationwide average air temperature was 9.6ºC (1.1°C above the average from NIWA's 7 station long-term record). Soil moisture levels were near normal by the end of winter for much of the North Island, except for parts of Manawatu-Whanganui and Greater Wellington. In the South Island, soil moisture was near normal, except for eastern parts of South Canterbury and North Otago.

Spring 2020

It was NZ's 5th warmest spring on record, with an average national air temperature of 12.9 ºC **(**0.9°C above the long-term average). Average to above average air temperatures were experienced for much of the North and South islands. Soil moisture levels were lower than normal for much of Northland, Auckland to northern Waikato, and the southern half of the South Island. Again, this was driven by higher than normal pressure over the country and warm sea surface temperatures surrounding NZ. Unfortunately, a wet season occurred along the eastern and lower North Island, with a large rain event resulting in a state of emergency declared in Napier due to widespread flooding.

Summer 2020-2021

Last summer, wind patterns were influenced by a non-traditional La Niña, with more south west airflows experienced by most of New Zealand. Typically, NZ experiences more north easterly winds during La Niña summers.

It was a dry summer for much of the country. The exceptions being eastern parts of Central and North Otago, were heavy rainfall in January resulted in widespread flooding. Below normal summer rainfall occurred for the majority of the North Island and the northern half of the South Island. Soil moisture levels were below normal as a reflection of the lack of rainfall for many areas. By the end of summer, soil moisture levels were below normal across the country. Summer air temperatures were near average for the country. The nationwide average air temperature was 16.9ºC **(**0.5°C above the long-term average). Some locations recorded exceptionally hot maximum temperatures on January 26th, including 39.3ºC in Ashburton (the 11th hottest temperature on record). In the eastern South Island, 11 other stations also recorded temperatures exceeding 37ºC on that date.

Autumn 2021

Autumn 2021 was characterised by long dry spells and warmth, interspersed with bursts of heavy rainfall. This was a result of the transition from La Niña into neutral conditions in March. Several notable rain events occurred, resulting in a flooding event for Canterbury by the end of May.

It was the 10th warmest autumn on record, with national temperatures averaging 14.0ºC (0.7ºC above the long-term average). Summer like heat still lingered into Autumn, with parts of Canterbury and Hawke's Bay observing several days of hot temperatures (above 30ºC). The warmth lingered into May with 29 locations recording near record daily highs temperatures for May. By the end of the season, soil moisture levels were drier than normal for Northland, Auckland, parts of Waikato, southern Hawke's Bay, Tararua, Wairarapa, and much of South Canterbury and Otago. Wetter than normal soils were experienced in Nelson, Marlborough and eastern Canterbury.

Winter 2021

Winter 2021 was the warmest winter on record, surpassing the record set by winter 2020 just last year. This was largely due to high

pressure above and to the east of NZ, with warm northerly wind flows and warmer than normal sea temperatures. The nationwide average air temperature was 9.7ºC (1.3°C above the long-term average).

There were several atmospheric rivers that affected NZ, resulting in extreme rainfall in some Districts. By the end of winter, soil moisture levels were near normal for much of the country. The exception being lower than normal levels for Napier south to southern Hawke's Bay. Above normal soil moisture levels were observed in eastern Marlborough and northern Canterbury.

Fuel moisture status and Fire Danger

Background

Weather is the most powerful factor driving vegetation fire behaviour. Weather factors (temperature, relative humidity, windspeed and rainfall) directly affect vegetation fuel conditions and whether a fire will start and spread. Areas that experience below normal soil and fuel moisture dryness are at an increased risk of having a higher number of fires and larger area burnt.

The Drought Code (DC) and Build-up Index (BUI) are useful indicators of seasonal drought effects and the amount of fuel available for combustion. The higher the rating, the drier the subsurface fuels, medium and heavy fuels are, and therefore, the more difficult and extended fire control will be. District summaries on how dry conditions were during this fire season are highlighted in the Appendices.

Graphs are also available on the Scion website for those who are interested in comparing how individual weather stations are tracking for BUI, DC and Cumulative Daily Severity Ratings (CDSR) over the current and previous fire season and against historical averages: https://www.scionresearch.com/rural-fire-research/tools/trends

North Island

Across the North Island, fuel and soil moisture conditions were dry for Northland, Auckland and along the east Coast during 2020/21.

- Most eastern stations across the North Island recorded elevated DC (Figure 8) and BUI values above the historical average.
- DC (Figure 9, Table A4) and BUI values typically began to elevate from January, peaking by April, and only dropping to low levels by June.
- Many North Island stations were well above their historical trend lines for DC and these extended late into the 2020/21 season (until early June, Figure 9). Fortunately, these locations didn't observe the record-breaking DC and BUI values as observed in 2019/20.
- On average, Northland and east coast districts had very high to extreme fire potential, especially during December 2020 to March 2021 (page A3).

South Island

Across the South Island, fuel and soil moisture conditions were dry in eastern locations during spring of 2020. This dryness extended into summer and beyond late April.

- Most eastern stations in Nelson/Tasman, Marlborough, Canterbury and Otago had elevated DC and BUI values above the historical average. The remaining stations followed the general historical average (Figure 10).
- DC and BUI values typically began to elevate later in the season for eastern locations. Values began to elevate around January/February and peaked by April, with values remaining high until the end of May (Figure 10, Table A4). The previous season (2019/20) saw fire indices elevating in spring as opposed to late summer.
- On average, eastern South Island Districts had very high to extreme fire potential, during spring (October 2020) and summer (2021) until May 2021 (Table A3).
- Interestingly, many stations in the northern and eastern Districts (Marlborough, Canterbury and Otago) observed DC values well above the historical average trend during the winter months of 2020 (Figure 10). The lack of rainfall and moisture recovery is a likely contributor to the large-scale wildfires that occurred early in the season. This graphically illustrates the importance of why New Zealand does not reset the fire weather indices following winter (compared to North America).

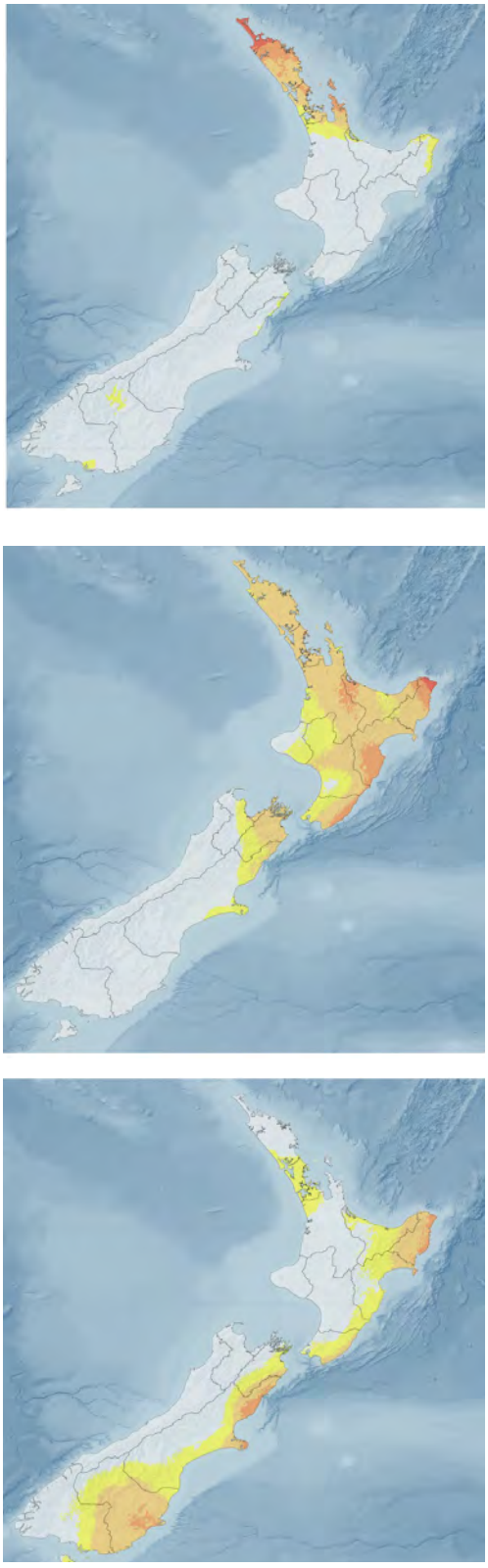


Figure 8. NIWA's New Zealand Drought Index (NZDI) maps, which highlights locations experiencing drought or dry conditions throughout the wildfire season (top image: 08/01/2021, middle: 23/02/2021, bottom: 07/04/2021). Red indicates severe drought conditions; orange indicates drought; light orange indicates very dry to extremely dry conditions; yellow indicates dry conditions.

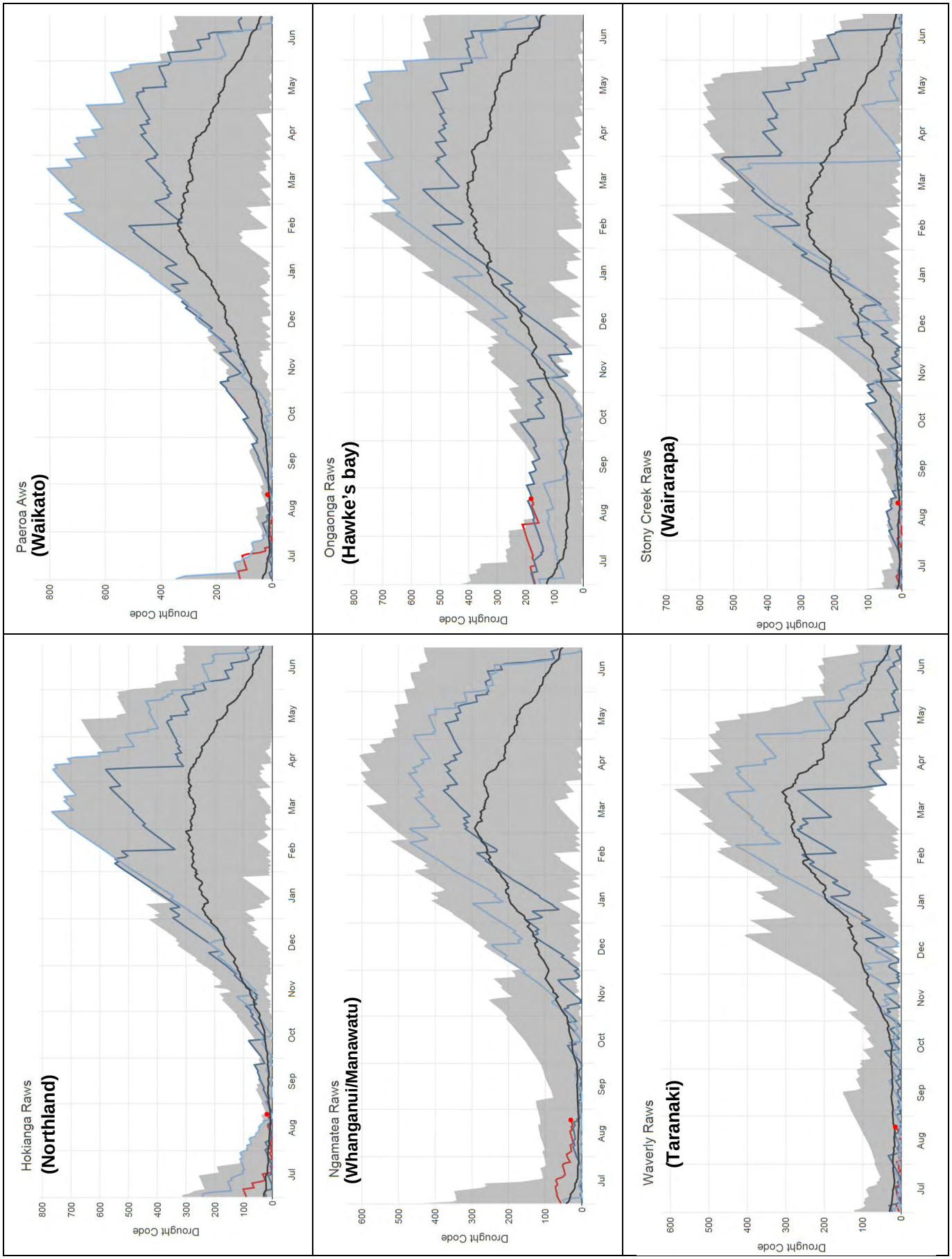
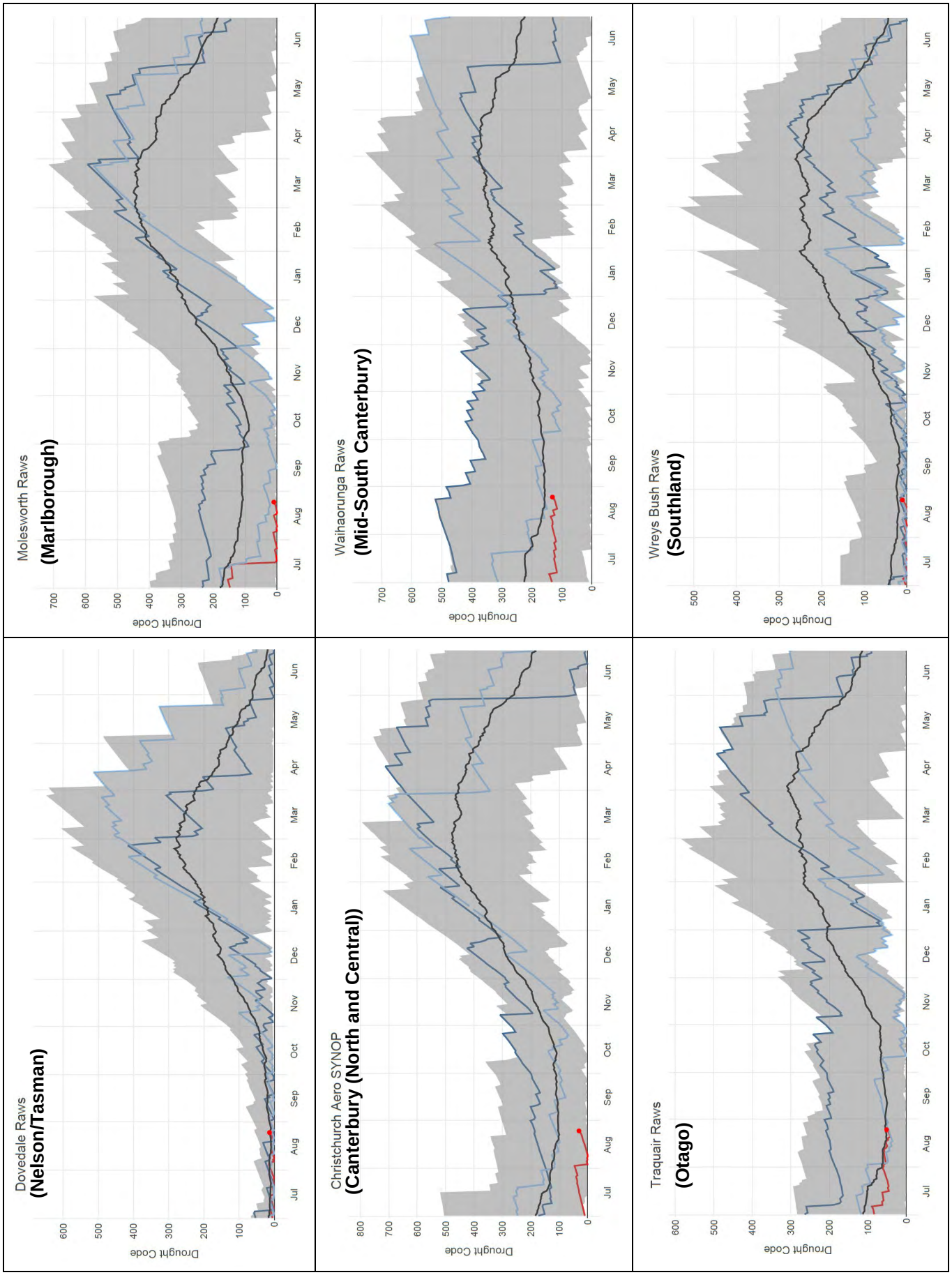


Figure 9. Daily Drought Code (DC) trends for a selection of stations across the North Island. The 2020/21 fire season is represented by the dark blue line, the previous fire season (2019/20) by the light blue line, the historical average is represented by the black line, the current fire season (2021/22) to Aug 2021 is represented by the red line, and the grey shaded area represents the historical min/max values over the length of the entire weather station record.



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Appendix Contents

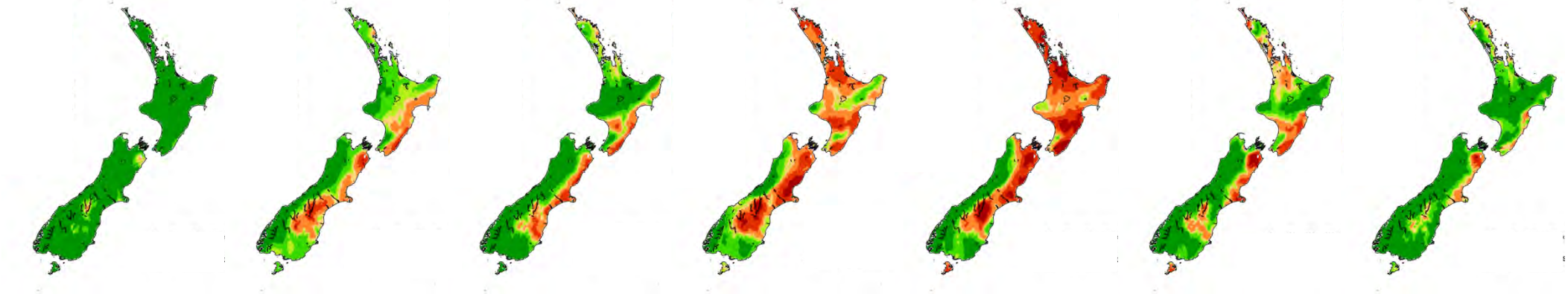
Table A2. Summary table of the 2020/21 wildfire statistics and soil/fuel moisture status. Orange cells indicate exceptional situations.

District	Number of wildfires		Increase/decrease in number of fires (compared to last season)	Top causes impacting number of fires	Area burnt		Increase / decrease in area burnt (compared to last season)	Top causes impacting total area burnt	Land use impacted (this season)	Fire climate severity (above/below normal)	Experienced drought (soil moisture)	DC (above/below normal fuel moisture)
	(count)	(%)			(ha)	(%)						
Northland	496	11	Decreased	Pile burns, Cigarettes etc, Unclassified	**414**	3	Increased	Pile burns, Cigarettes etc	Forestry & Conservation	Mix of well above or on trend.	Yes.	On trend.
Auckland	806	18	Decreased	Pile burns, Cigarettes etc, Unclassified	**69**	1	Increased	Pile burns, Cooking/heating, Equipment	Forestry & Dairy	Variable, mix of above and below normal.	Dry conditions only.	Generally, on trend, some above.
Waikato	450	10	Decreased	Pile burns, Cigarettes etc, Unclassified	**73**	1	Decreased	Pile burns, Unclassified, Prescribed burns.	Dairy & Conservation	Generally below average.	Very dry conditions.	Generally, on trend, some above or below.
Bay of Plenty	349	8	Decreased	Pile burns, Cigarettes etc, Unclassified	**83**	1	Increased	Cooking/Heating, Pile burns	Forestry & Dairy	Below or well below generally.	Extremely dry conditions.	Variable, mix of above or below normal.
Gisborne	77	2	Decreased	Unclassified, Pile burns.	**5**	<1	No change	Unclassified, Cooking/Heating, Cigarettes etc.	Minimal	Variable, mix of above and below normal.	Yes.	A mix of above or on trend.
Taranaki	125	3	Decreased	Pile burns, Cigarettes etc, Prescribed burns	**3**	<1	Decreased	Prescribed burns, Pile burns	Minimal	Below average.	No.	Below average.
Manawatu-Whanganui	275	6	Decreased	Pile burns, Unclassified, Cigarettes etc.	**804**	6	Increased	Unclassified, Explosives etc, Cigarettes etc.	Conservation & Forestry	Below average or on trend.	Dry to very dry conditions.	Variable, mix of above and below normal.
Hawke's Bay	217	5	Decreased	Pile burns, Cigarettes etc, Unclassified	**81**	1	Decreased	Industry, Pile burns, Cooking/Heating	Dairy, Meat/Wool & Forestry	Generally below average.	Extremely dry conditions.	Generally above average.
Wairarapa	122	3	Decreased	Pile burns, Unclassified,	**48**	<1	Increased	Cooking/Heating, Pile burns,	Meat/Wool & Forestry	Variable, mix of above or below.	Extremely dry conditions.	Generally, above.
Wellington	142	3	Decreased	Cigarettes etc, Pile burns, Unclassified.	**3**	<1	Increased	Explosives etc, Equipment.	Minimal	Below average.	Dry conditions.	Variable, mix of above, on trend or below normal.
Nelson/Tasman/ Marlborough	151	3	Decreased	Pile burns, Unclassified, Cooking/Heating	**33**	<1	Decreased	Unclassified, Prescribed burns	Dairy & Forestry	Generally below average.	Dry to very dry conditions.	Variable. Mix of above, below and on trend. Some Marlb. stations had above over winter.
West Coast	45	1	Increased	Pile burns, Cigarettes etc, Cooking/Heating	**31**	<1	Increased	Cooking/Heating, Cigarettes	Minimal	Variable, mix of above and below normal.	No.	Generally, below average.
Canterbury	609	13	Decreased	Pile burns, Cigarettes etc, Unclassified	**858**	6	Increased	Cooking/Heating, Pile burns, Unclassified	Conservation & Meat/Wool	Variable, mix of above or below.	Dry to extremely dry conditions.	Generally, above or well above average. Some locations above average over winter.
Mid-South Canterbury	206	4	Decreased	Pile burns, Cigarettes etc. Unclassified,	**2,330**	17	Increased	Cooking/Heating Explosives etc.	Forestry, Meat/wool & Other	Variable, mix of above and below normal.	Dry conditions in including winter/spring.	Generally above average. Including over winter and summer.
Otago	331	7	Decreased	Pile burns, Unclassified, Cigarettes.	**8,472**	64	Increased	Industry Prescribed burns, Natural source.	Meat/wool & Conservation	Variable, mix of above or below.	Dry to very dry conditions.	Variable mix of above or below. Including above normal over winter/spring.
Southland	158	3	Decreased	Pile burns, Cigarettes etc, Prescribed burns	**40**	<1	Decreased	Prescribed burns, Equipment, Pile burns.	Dairy	Below average.	Dry to very dry conditions.	Variable, mix of above and below normal.
Chatham Island	-	-	-	-	-	-	-	-	-	Below average.		Variable, on trend or below average.
Region unclassified	27	0	-	-	1	0	-	-	-	-	-	-
Total	4586	100	-	-	13348	100	-	-	-	-	-	-

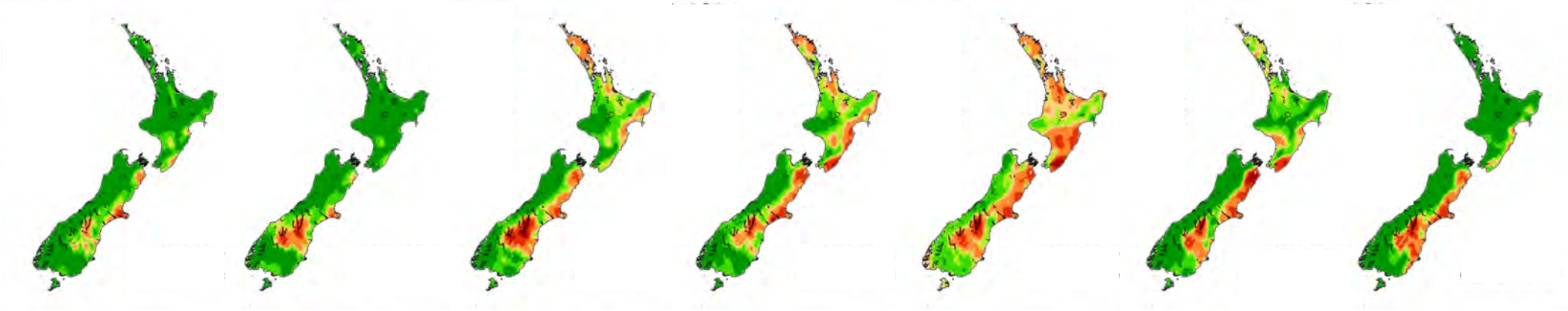
Table A3. Average Monthly Fire Season Severity Ratings (MSR *) for the 2019/20 and 2020/21 wildfire seasons. Severity values of less than 1 (green) equate to low fire behaviour potential, 1-3 moderate fire potential (yellow), 3-7 high to very high fire potential (orange), and above 7 indicates extreme fire behaviour potential (red).

2019/20 wildfire season (Previous season)

October	November	December	January	February	March	April



2020/21 wildfire season (Current season)

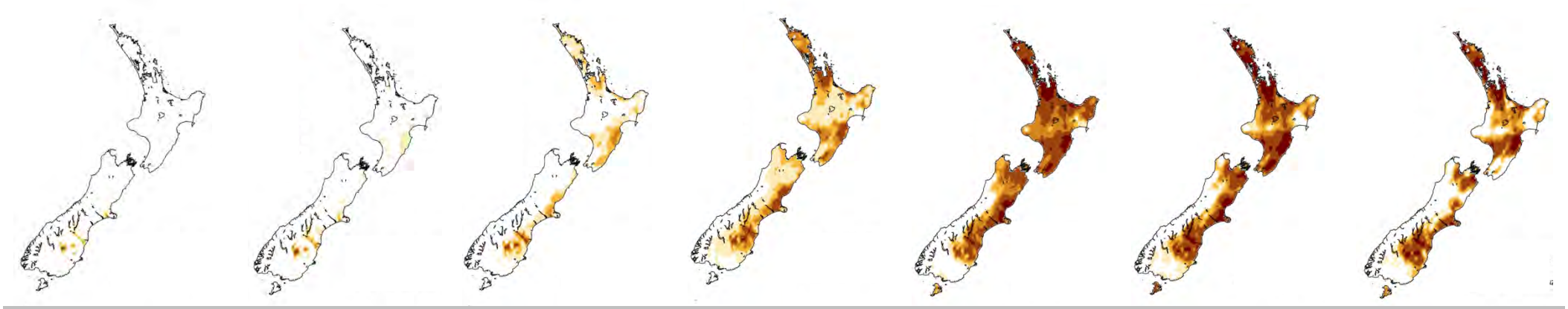


* Monthly Severity Rating (MSR) is the monthly average of the Daily Severity Rating (DSR) values from the Fire Weather Index System. DSR is a function of the FWI value, developed for use in comparing different years and weather stations. DSR and MSR capture the effects of both wind and fuel dryness of potential fire intensity, and therefore control difficulty and the amount of work required to supress a fire. It allows researchers to compare the severity of fire weather in one year to another.

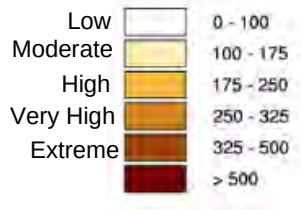
Table A4. Average Monthly Drought Code (DC *) values for the 2019/20 and 2020/21 wildfire seasons.

2019/20 wildfire season (Previous season)

October	November	December	January	February	March	April



2020/21 wildfire season (Current season)



* The DC is a rating of the average moisture content of deep, compact, organic soil layers. It is a useful indicator of the dryness of large woody material, seasonal drought effects on forest fuels and the amount of smouldering in deep duff layers and large logs. Little mop-up needs happen with low values (white), whereas mop-up will be difficult and extensive with values over 300 points (dark brown colouration).

A5. NORTHLAND

Wildfire Statistics

- During the 2020/21 wildfire season, Northland accounted for 11% of the total number of wildfires in the country and 3% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total:
  - number of vegetation fires decreased (Table A5.1); the total number of wildfires for 20/21 significantly exceeds the historical average (footnote).
  - area burnt (ha) increased; the area burnt for 20/21 is slightly above the historical average (footnote).
- Forestry and Conservation land area experienced the largest impact in the 2020/21 wildfire season (Table A5.2).
- Pile burns, followed by Cigarettes, matches and candles were the major causes contributing to the total number of wildfires and area burnt during the 2020/21 season (Table A5.3).

Soil and fuel moisture status

- Northland began experiencing dry soils by early November 2020. By early January 2021, the Far North was experiencing drought conditions, with remaining locations having extremely dry conditions. Dry conditions persisted until the end of March 2021.
- In general, Drought Code (DC) values were below the historical average this season during spring, before elevating from November 2020, peaking by April 2021, and dropping by May (Table A5.4). No new max values were observed.
- Build-up Index (BUI) values for all stations typically followed the historical trend, but were above the historical average, peaking twice (during December 2020 and again in February 2021) before returning to normal levels by March.
- Fire climate severity during 2020/21 was generally on trend during spring, and above the historical average by January 2021.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A5.1. Total number of wildfires and area burnt in the Northland District for the 2019/20 and 2020/21 wildfire seasons.

Zones	2019/20 Number of fires	2020/21 Number of fires	2019/20 Area burnt (ha)	2020/21 Area burnt (ha)
Far North District	277	256	192	326
Kaipara District	99	83	28	64
Whangarei District	208	157	34	24
*Northland (total) **	584	496	254	414

** On average, Northland experiences approximately 250 wildfires annually, and a total area burnt of approx. 380 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A5.2. Area burnt in Northland by land use category for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	56	0	8	22	0	138	29
2020/21	59	0	3	226	2	114	11

Table A5.3. Number of wildfires and area burnt (ha) in Northland by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	84	93	15	26	244	57	17	23	12	8	5
Number	**2020/21**	60	73	7	29	237	42	18	11	12	2	5
Area	**2019/20**	152	23	5	4	32	16	2	15	4	1	0
Area	**2020/21**	4	75	0	13	286	7	10	2	5	10	1

Table A5.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on values averaged across all Northland District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

				Spring			Summer			Autumn			
		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	74	58	74	130	192	416	504	549	566	580	367	243
Max DC	**Historic**	320	335	355	400	511	617	630	718	798	791	708	484
Mean DC	**2020/21**	10	10	31	59	74	221	291	327	288	192	149	40
Mean DC	**Historic**	16	13	18	39	99	166	235	274	262	229	142	48

A6. AUCKLAND

Wildfire Statistics

- During the 2020/21 wildfire season, Auckland accounted for 18% of the total number of wildfires in the country and 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased for Auckland (Table A6.1); the total number of wildfires for 20/21 significantly exceeds the historical average (footnote).
  - area burnt (ha) increased; the area burnt for 20/21 is around the historical average (footnote).
- Forestry and Dairy land experienced the greatest impact from wildfires in the 2020/21 wildfire seasons (Table A6.2).
- Pile burns and Cigarettes, matches and candles, then Unclassified were the major causes contributing to the total number of wildfires, with Pile burns contributing to the greater area burnt during the 2020/21 season (Table A6.3).

Soil and fuel moisture status

- Auckland began to experience dry conditions by early November 2020, and extremely dry conditions by early January 2021. These dry conditions persisted into May before reducing by June 2021.
- In general, Drought Code (DC) values were below the historical average during spring, elevating to above average by December 2020, peaked by February 2021 and dropped by May (Table A6.4). No new max values were observed.
- Build-up Index (BUI) values were typically on trend with the historical average this season. BUI values reached a peak by February 2021, before reducing to below average conditions by April.
- Fire climate severity for 2020/21 season was generally on trend with the historical average.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A6.1. Total number of wildfires and area burnt in the Auckland District for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	Number of fires	Number of fires	Area burnt (ha)	Area burnt (ha)
Auckland	1151	806	47	69
*Auckland (total) **	1151	806	47	69

** On average, Auckland experiences approximately 350 wildfires annually, and a total area burnt of approx. 60 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A6.2. Area burnt by land use category in the Auckland District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	26	0	0	6	0	8	8
2020/21	18	0	6	22	0	8	15

Table A6.3. Number of wildfires and area burnt (ha) in the Auckland District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	145	383	71	66	320	90	20	20	8	13	15
Number	**2020/21**	111	250	36	44	258	51	21	17	6	4	8
Area	**2019/20**	7	6	2	0	16	6	6	3	0	0	0
Area	**2020/21**	7	1	0	10	39	2	10	0	0	0	0

Table A6.4. Drought Code values (max and mean) for the current fire season (2020/21) versus the historical average, based on values averaged across all Auckland District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

				Spring			Summer			Autumn			
		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	23	36	62	146	167	341	414	478	438	377	311	297
Max DC	**Historic**	555	601	550	307	310	410	599	752	796	812	773	707
Mean DC	**2020/21**	7	10	22	51	74	173	269	337	290	238	151	66
Mean DC	**Historic**	29	22	21	35	82	139	212	275	267	226	131	54

A7. WAIKATO

Wildfire Statistics

- During the 2020/21 wildfire season, Waikato accounted for 10% of the total number of wildfires in the country and 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased for Waikato; the total number of wildfires for 20/21 exceeds the historical average (footnote).
  - area burnt (ha) also decreased (Table A7.1); the area burnt for 20/21 is slightly above the historical average (footnote).
- Dairy and Conservation lands experienced the greatest impact from wildfires during the 2020/21 season (Table A7.2).
- Pile burns, then Cigarettes, matches and candles, and Unclassified were the major causes contributing to the total number of wildfires in 2020/21. Pile burns was the major factor contributing to the area burnt (Table A7.3).

Soil and fuel moisture status

- By early January 2021, northern Waikato began experiencing dry conditions, with extremely dry conditions being widespread across Waikato by late February, conditions remained dry until early April.
- In general, Drought Code (DC) values were on trend with the historical average over spring, before elevating to above average levels by December 2020, reaching a peak by February 2021, and falling to normal levels by June (Table A7.4). No new max DCs were observed this season.
- Build-up Index (BUI) values for the 2020/21 season were generally on trend with the historical average.
- Fire climate severity was typically below the historical average this season.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A7.1. Total number of wildfires and area burnt in Waikato for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	**Number of fires**	**Number of fires**	**Area burnt (ha)**	**Area burnt (ha)**
Hamilton City	71	68	3	0
Hauraki District	45	22	1	6
Matamata-Piako District	72	51	2	5
Otorohanga District	22	28	3	9
South Waikato District	37	30	1	2
Thames-Coromandel District	83	51	9	17
Waikato District	251	146	56	27
Waipa District	78	41	5	4
Waitomo District	33	13	27	3
*Waikato (total) **	692	450	107	73

** On average, Waikato experiences approximately 310 wildfires annually, and a total area burnt of approx. 60 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A7.2. Area burnt by land use category in the Waikato District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	*47*	*1*	*5*	*30*	*0*	*17*	*6*
2020/21	*46*	*1*	*4*	*8*	*0*	*12*	*2*

Table A7.3. Number of wildfires and area burnt (ha) in the Waikato District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	79	100	16	40	317	49	16	29	18	15	13
Number	**2020/21**	70	72	9	20	182	44	12	16	12	3	10
Area	**2019/20**	41	1	0	1	21	8	5	1	3	26	0
Area	**2020/21**	15	5	1	0	29	13	2	2	1	0	5

Table A7.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on values averaged across all Waikato District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	142	61	85	209	228	343	437	516	491	474	488	374
Max DC	**Historic**	347	141	151	259	319	359	579	747	809	812	667	421
Mean DC	**2020/21**	10	10	22	50	64	124	214	295	253	185	142	60
Mean DC	**Historic**	12	11	15	29	66	108	176	238	235	183	103	34

A8. BAY OF PLENTY

Wildfire Statistics

- During the 2020/21 wildfire season, the Bay of Plenty District accounted for 8% of the total number of wildfires in the country and 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased; the total number of wildfires for 20/21 slightly exceeds the historical average (footnote).
  - area burnt (ha) increased (Table A8.1); area burnt for 20/21 is below the historical average (footnote).
- Forestry and Dairy lands experienced the greatest impacts by wildfires during the 220/21 wildfire season (Table A8.2).
- During 2020/21 season, Pile burns, then Cigarettes, matches and candles, and Unclassified were the major causes contributing to the total number of wildfires. Cooking and heating along with Pile burns were the major causes contributing to area burnt (Table A8.3).

Soil and fuel moisture status

- By early November 2020, costal Bay of Plenty began experiencing dry conditions, which retreated by early December. The district then experienced a stronger resurgence of very dry to extreme conditions by February 2021, which withdrew by May.
- In general, Drought Code (DC) values were on trend with the average during spring, and began to elevate by December 2020, peak by February 2021, before dropping to normal levels by June (Table A8.4). No new max DCs were observed.
- Build-up Index (BUI) values for the 2020/21 season were generally on trend with the historical average.
- Fire climate severity was typically below the historical average this season, reaching a peak in April 2021.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A8.1. Total number of wildfires and area burnt in the Bay of Plenty District for the 2019/20 and 2020/21 wildfire seasons.

Zones	2019/20 Number of fires	2020/21 Number of fires	2019/20 Area burnt (ha)	2020/21 Area burnt (ha)
Kawerau District	8	10	1	5
Opotiki District	71	39	6	10
Rotorua District	115	57	5	2
Taupo District	86	38	30	11
Tauranga City	83	58	8	4
Western Bay of Plenty District	129	89	11	47
Whakatane District	67	58	9	4
*Bay of Plenty (total) **	559	349	70	83

** On average, the Central North Island experiences approximately 320 wildfires annually, and a total area burnt of approx. 150 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A8.2. Area burnt by land use category in the Bay of Plenty for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	*28*	*3*	*1*	*16*	*2*	*13*	*7*
2020/21	*22*	*1*	*0*	*44*	*1*	*3*	*13*

Table A8.3. Number of wildfires and area burnt (ha) in the Bay of Plenty by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	79	98	21	34	232	39	9	14	12	15	6
Number	**2020/21**	66	67	12	22	123	31	7	5	5	7	4
Area	**2019/20**	20	10	1	2	23	6	1	6	1	0	0
Area	**2020/21**	8	7	1	38	21	5	0	0	1	2	0

Table A8.4. Drought code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Bay of Plenty District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	109	42	74	155	248	476	523	532	470	458	532	538
Max DC	**Historic**	412	168	87	156	259	391	573	734	758	762	644	406
Mean DC	**2020/21**	9	11	34	72	72	140	218	277	258	215	142	41
Mean DC	**Historic**	14	13	17	36	91	145	200	252	223	173	90	33

A9. GISBORNE

Wildfire Statistics

- During the 2020/21 wildfire season, Gisborne accounted for 2% of the total number of wildfires in the country and less than 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased; the combined Eastern North Island total number of wildfires for 20/21 (77 + 217 = 294) is below the historical average (footnote).
  - area burnt (ha) had no change (Table A9.1); the combined Eastern North Island total area burnt for 20/21 (5 + 81 = 86 ha) is well below the historical average (footnote).
- Dairy lands and Other areas experienced the greatest impact by wildfires during the 2020/21 wildfire seasons (although very minimal in area burnt) (Table A9.2).
- During the 2020/21 season, Unclassified and Pile burns were the major causes contributing to the total number of wildfires, with a wide range of classes contributing to area burnt (Table A9.3).

Soil and fuel moisture status

- By early November 2020, northern Gisborne was experiencing extremely dry conditions. By late February 2021, the District was experiencing extremely dry to drought conditions, which persisted until May.
- In general, Drought Code (DC) values were either on trend or above average for this fire season. Peak values were reached in February (Table A9.4). No new max DC values were observed this season.
- Build-up Index (BUI) values were typically on trend with the average during spring but were above average during December 2020 to March 2021.
- Fire climate severity was generally below the historical average throughout the 2020/21 season.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A9.1. Total number of wildfires and area burnt in the Gisborne District for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	Number of fires	Number of fires	Area burnt (ha)	Area burnt (ha)
Gisborne District	81	77	5	5
*Gisborne (total) **	81	77	5	5

** On average, Eastern North Island (Gisborne & Hawke's Bay) experiences approximately 400 wildfires annually, and a total area burnt of approx. 300 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A9.2. Area burnt by land use category in the Gisborne District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	*3*	*0*	*0*	*0*	*0*	*1*	*0*
2020/21	*2*	*0*	*0*	*1*	*0*	*0*	*2*

Table A9.3. Number of wildfires and area burnt (ha) in the Gisborne District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	21	12	3	7	23	7	1	2	3	0	2
Number	**2020/21**	26	9	0	8	16	6	2	1	1	4	4
Area	**2019/20**	0	0	0	1	2	1	0	0	0	0	0
Area	**2020/21**	1	1	0	1	0	0	0	0	0	1	1

Table A9.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Gisborne District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	42	43	80	133	182	343	534	565	470	494	330	142
Max DC	**Historic**	357	363	407	213	385	610	866	910	769	831	695	614
Mean DC	**2020/21**	7	13	25	64	70	141	280	328	249	250	139	28
Mean DC	**Historic**	31	21	26	49	99	161	230	276	225	165	118	62

A10. TARANAKI

Wildfire Statistics

- During the 2020/21 wildfire season, Taranaki accounted for 3% of the total number of wildfires in the country and less than 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires in Taranaki decreased; the total number of wildfires for 20/21 is on trend with the historical average (footnote).
  - area burnt (ha) also decreased (Table A10.1); the area burnt is significantly below the historical average (footnote).
- Dairy lands experienced the greatest impact by wildfires in the 2020/21 wildfire season (although minimal in size) (Table A10.2).
- Pile burns, then Cigarettes, matches and candles were the major causes contributing to the total number of wildfires during the 2020/21 season. However, minimal land area burnt was impacted (Table A10.3).

Soil and fuel moisture status

- By mid-February, conditions were dry across Taranaki, which retreated by the end of March. Dry conditions were no longer found by April.
- Drought Code (DC) values were below the historical average during 2020/21. DC values peaked during March and no new max values were observed for the season (Table A10.4).
- Build-up Index (BUI) values were generally on trend with the historical average, again peaking in February.
- Fire climate severity was generally below the long-term average this season.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A10.1. Total number of wildfires and area burnt in the Taranaki District for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	Number of fires	Number of fires	Area burnt (ha)	Area burnt (ha)
New Plymouth District	108	62	5	1
South Taranaki District	100	41	31	1
Stratford District	14	22	1	1
*Taranaki (total) **	222	125	37	3

** On average, Taranaki experiences approximately 120 wildfires annually, and a total area burnt of approx. 40 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A10.2. Area burnt by land use category in the Taranaki District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	25	0	4	3	0	4	1
2020/21	3	0	0	0	0	0	0

Table A10.3. Number of wildfires and area burnt (ha) for the Taranaki District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	17	35	6	12	98	30	3	8	10	1	2
Number	**2020/21**	9	26	1	6	58	16	1	5	3	0	0
Area	**2019/20**	1	2	0	1	26	7	0	0	0	0	0
Area	**2020/21**	0	0	0	0	1	2	0	0	0	0	0

Table A10.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Taranaki District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	71	33	22	51	64	96	211	302	320	286	309	183
Max DC	**Historic**	125	134	152	107	222	425	536	589	689	692	527	269
Mean DC	**2020/21**	8	9	6	20	21	38	102	178	158	63	52	22
Mean DC	**Historic**	12	12	15	22	58	103	163	230	238	166	86	26

A11. MANAWATU AND WHANGANUI

Wildfire Statistics

- During the 2020/21 wildfire season, Manawatu-Whanganui accounted for 6% of the total number of wildfires in the country and 6% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased; the total number of wildfires for 20/21 is on trend with the historical average (footnote).
  - area burnt (ha) increased (Table A11.1); the area burnt for 20/21 significantly exceeds the historical average (footnote).
- Conservation, then Forestry lands experienced the greatest impact by wildfires in the 2020/21 season (Table A11.2).
- Pile burns, then Unclassified, and Cigarettes, matches and candles, were the major causes contributing to the total number of wildfires in 2020/21. Unclassified and Explosives had the greatest impact on area burnt (Table A11.3).

Soil and fuel moisture status

- By late February 2021, conditions were dry to very dry across the Manawatu-Whanganui Districts. Dry conditions remained until early April.
- In general, Drought Codes (DC) were on trend or below the historical average. Values were above average during February, March, May and June. No new max values were observed for the 2020/21 season (Table A11.4).
- BUIs were also generally on trend or below the long-term average, peaking by February.
- Fire climate severity was generally on trend or below the long-term average across this District.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A11.1. Total number of wildfires and area burnt in Manawatu-Whanganui for the 2019/20 and 2020/21 wildfire season.

	2019/20	2020/21	2019/20	2020/21
Zones	Number of fires	Number of fires	Area burnt (ha)	Area burnt (ha)
Horowhenua District	36	30	5	0
Manawatu District	94	61	19	71
Palmerston North City	44	46	3	0
Rangitikei District	69	53	254	16
Ruapehu District	70	35	229	712
Whanganui District	80	50	31	5
*Manawatu-Whanganui (total) **	393	275	541	804

** On average, Whanganui/Manawatu experiences approximately 280 wildfires annually, and a total area burnt of approx. 350 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A11.2. Area burnt by land use category in the Whanganui/Manawatu District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	187	19	36	57	1	192	50
2020/21	30	0	2	61	0	660	52

Table A11.3. Number of wildfires and area burnt (ha) for Whanganui/Manawatu by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	69	52	11	24	143	35	7	19	16	10	7
Number	**2020/21**	46	40	6	17	116	24	7	6	6	3	4
Area	**2019/20**	75	13	184	12	15	54	0	4	16	162	5
Area	**2020/21**	454	55	257	0	15	14	0	0	7	0	1

Table A11.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Whanganui/Manawatu District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	301	300	217	100	182	191	390	518	548	512	504	403
Max DC	**Historic**	433	284	315	390	502	620	765	951	1077	915	757	561
Mean DC	**2020/21**	52	54	24	28	45	62	143	273	296	223	206	142
Mean DC	**Historic**	30	21	25	34	77	132	202	268	287	231	153	70

A12. HAWKE'S BAY

Wildfire Statistics

- During the 2020/21 wildfire season, Hawke's Bay accounted for 5% of the total number of wildfires in the country and 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased; the combined Eastern North Island total number of wildfires for 20/21 (217 + 77 = 294) is below the historical average (footnote).
  - area burnt (ha) decreased significantly (Table A12.1); the combined Eastern North Island total area burnt for 20/21 (81 + 5 = 86 ha) is well below the historical average (footnote).
- Dairy lands experienced the greatest impact by wildfires during the 2020/21 wildfire season (Table A12.2).
- During the 2020/21 season, Pile burns, then Cigarettes, matches and candles were the major causes contributing to the total number of wildfires, whereas Industry and Pile burn causes had the greatest impact on area burnt (Table A12.3).

Soil and fuel moisture status

- In early February 2021, coastal locations were experiencing dry to very dry conditions. By late February 2021, the District was experiencing widespread very dry to extremely dry conditions. Dry conditions remained until June.
- In general, Drought Code (DC) values were above the historical average during spring and remained above average throughout the season. Values peaked twice, once in February and again in April. No new max DC values were observed this season (Table A12.4).
- Build-up Index (BUI) values were also above the historical average throughout the season.
- Fire climate severity across the fire season was generally below the long-term average.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A12.1. Total number of wildfires and area burnt in the Hawke's Bay for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	Number of fires	Number of fires	Area burnt (ha)	Area burnt (ha)
Central Hawke's Bay District	62	46	90	44
Hastings District	183	107	592	24
Napier City	76	41	1	1
Wairoa District	19	23	1	12
*Hawke's Bay (total) **	340	217	684	81

** On average, Eastern North Island (Gisborne & Hawke's Bay) experiences approximately 400 wildfires annually, and a total area burnt of approx. 300 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A12.2. Area burnt by land use category in the Hawke's Bay District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	*150*	*6*	*42*	*454*	*1*	*22*	*10*
2020/21	*58*	*0*	*10*	*10*	*1*	*1*	*1*

Table A12.3. Number of wildfires and area burnt (ha) in the Hawke's Bay District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	47	51	9	53	94	18	18	26	9	1	14
Number	**2020/21**	29	44	1	27	80	14	5	7	5	1	4
Area	**2019/20**	14	3	2	1	42	1	135	411	1	0	75
Area	**2020/21**	6	4	0	12	17	5	0	35	1	0	1

Table A12.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Hawke's Bay District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	364	386	391	379	277	335	514	622	586	613	647	561
Max DC	**Historic**	668	422	429	325	424	559	760	896	1005	892	900	813
Mean DC	**2020/21**	62	66	63	86	61	125	244	317	295	343	318	175
Mean DC	**Historic**	46	32	36	58	121	179	250	296	280	224	180	105

A13. WAIRARAPA

Wildfire Statistics

- During the 2020/21 wildfire season, Wairarapa accounted for 3% of the total number of wildfires in the country and less than 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased; the combined Greater Wellington total number of wildfires for 20/21 (122 + 142 = 264) is around the historical average (footnote).
  - area burnt (ha) increased (Table A13.1); the combined Greater Wellington total area burnt for 20/21 (48 + 3 = 51 ha) is well below the historical average (footnote).
- Meat/Wool and Forestry land areas experienced the greatest impact by wildfires during 2020/21 wildfire season (Table A13.2).
- During the 2020/21 season, Pile burns and Unclassified were the major causes contributing to the total number of wildfires, whereas Cooking and heating sources had the greatest impact on area burnt (Table A13.3).

Soil and fuel moisture status

- By late October 2020, small pockets along the coast were experiencing dry conditions, before retreating again by late November. The dryness reappeared by early February 2021, with widespread dry to very dry conditions across the District until declining in June.
- Drought Codes (DC) over the fire season were above the historical average between January 2021 and June. No new maximum values were observed during the 2020/21 season (Table A13.4).
- The Build-up Index (BUI) values were generally on track with the historical average, and above during the months of January to May, with values peaking in February.
- Fire climate severity across the fire season was generally on trend with the long-term average, and above the average during March 2021 to June.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table 13.1. Total number of wildfires and area burnt in the Wairarapa District for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	**Number of fires**	**Number of fires**	**Area burnt (ha)**	**Area burnt (ha)**
Carterton District	18	14	1	0
Masterton District	62	35	15	15
South Wairarapa District	38	38	5	27
Tararua District	47	35	2	6
*Wairarapa (total) **	165	122	23	48

** On average, Greater Wellington (Wairarapa and Wellington) experiences approximately 260 wildfires annually, and a total area burnt of approx. 130 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table 13.2. Area burnt by land use category in the Wairarapa District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	*9*	*4*	*3*	*2*	*1*	*0*	*3*
2020/21	*9*	*0*	*21*	*13*	*0*	*1*	*3*

Table 13.3. Number of wildfires and area burnt (ha) for the Wairarapa District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	18	26	2	8	53	8	14	14	12	2	8
Number	**2020/21**	11	7	1	9	55	6	6	9	9	4	5
Area	**2019/20**	0	0	0	2	2	1	14	2	1	0	1
Area	**2020/21**	2	3	0	35	4	3	0	1	0	0	0

Table 13.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Wairarapa District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	44	115	99	112	131	194	414	514	582	453	467	362
Max DC	**Historic**	554	552	426	434	475	636	643	766	805	862	867	648
Mean DC	**2020/21**	10	46	19	57	48	85	243	361	396	305	315	166
Mean DC	**Historic**	39	26	30	39	88	161	240	314	305	223	154	78

A14. WELLINGTON

Wildfire Statistics

- During the 2020/21 wildfire season, Wellington accounted for 3% of the total number of wildfires in the country and less than 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased; the combined Greater Wellington total number of wildfires for 20/21 (142 + 122 = 264) is around the historical average (footnote).
  - area burnt (ha) remaining about the same in Wellington (Table A14.1); the combined Greater Wellington total area burnt for 20/21 (3 + 48 = 51 ha) is well below the historical average (footnote).
- Minimal land area was impacted by wildfires during the 2020/21 season (Table A14.2).
- Cigarettes, matches and candles, then Pile burns were the major causes contributing to the total number of wildfires during the 2020/21 season. Minimal impact on area burnt was observed (Table A14.3).

Soil and fuel moisture status

- Wellington experienced widespread dry conditions by late February 2021, which remained until early April.
- In general, Drought Codes (DC) were below or on trend throughout the fire season. DC values peaked by March, but no new max values were observed during the season (Table A14.4).
- The Build-up Index (BUI) was also generally below the average this season, peaking by March.
- Fire climate severity was well below the long-term average this season.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A14.1. Total number of wildfires and area burnt in the Wellington District for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	Number of fires	Number of fires	Area burnt (ha)	Area burnt (ha)
Kapiti Coast District	58	38	1	1
Lower Hutt City	45	25	0	0
Porirua City	39	24	0	0
Upper Hutt City	24	15	0	0
Wellington City	43	40	1	2
*Wellington (total) **	209	142	2	3

** On average, Greater Wellington (Wairarapa and Wellington) experiences approximately 260 wildfires annually, and a total area burnt of approx. 130 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A14.2. Area burnt by land use category in the Wellington District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	*0*	*0*	*0*	*1*	*0*	*0*	*1*
2020/21	*0*	*0*	*0*	*0*	*0*	*2*	*1*

Table A14.3. Number of wildfires and area burnt (ha) for the Wellington District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	32	60	12	18	63	12	0	8	0	3	1
Number	**2020/21**	18	45	3	15	42	7	7	2	1	2	0
Area	**2019/20**	1	0	1	0	0	0	0	0	0	0	0
Area	**2020/21**	0	0	2	0	0	0	1	0	0	0	0

Table A14.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Wellington District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	23	61	43	55	54	98	240	324	425	322	346	153
Max DC	**Historic**	537	592	622	368	420	516	539	680	700	742	749	587
Mean DC	**2020/21**	7	31	8	23	22	40	129	230	281	198	182	51
Mean DC	**Historic**	33	25	29	34	81	151	213	281	289	238	146	70

A15. NELSON/TASMAN AND MARLBOROUGH

Wildfire Statistics

- During the 2020/21 wildfire season, the Nelson/Tasman and Marlborough Districts combined accounted for 3% of the total number of wildfires in the country and less than 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires decreased; the total number of wildfires for 20/21 is slightly above the historical average (footnote).
  - area burnt (ha) decreased (Table A15.1); the area burnt for 20/21 is well below the historical average (footnote).
- Dairy lands experienced the greatest impact by wildfires in 2020/21 (Table A15.2).
- Pile burns and Unclassified were the major causes contributing to the total number of wildfires in 2020/21. Unclassified had the greatest impact on area burnt (Table A15.3).

Soil and fuel moisture status

- Marlborough experienced dry conditions early February 2021, with widespread very dry conditions by end of the month. Very dry conditions persisted until June. Nelson experienced dry conditions early February, which extended into Tasman by late February. Dry conditions eased by late March.
- Drought Codes (DC) were variable across the two Districts. Marlborough stations followed the historical average during spring, but were above average over summer, and peaked by March. Nelson stations were below the historical average during spring and summer, with DC values peaking in February (Table A15.4). Surprisingly, some Marlborough locations experienced higher than normal DC values over winter/spring (Landsdowne, Lower Wairau, Mid Awatere Valley, Molesworth, Pudding Hill, Tor Darroch, Upper Clarence and Ward). No new max values were observed for 2020/21.
- BUIs in Nelson and Marlborough typically followed the historical average during the 2020/21 season.
- Fire climate severity for both Districts also were on trend or below the historical average.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A15.1. Total number of wildfires and area burnt in the Nelson/Marlborough Districts for the 2019/20 and 2020/21 wildfire seasons.

Zones	2019/20 Number of fires	2020/21 Number of fires	2019/20 Area burnt (ha)	2020/21 Area burnt (ha)
Marlborough District	73	70	101	24
Nelson City	27	27	0	0
Tasman District	71	54	3	9
*Nelson/Tasman and Marlborough (total) **	171	151	104	33

** On average, Nelson/Marlborough experiences approximately 140 wildfires annually, and a total area burnt of approx. 650 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A15.2: Area burnt by land use category in the Nelson/Marlborough Districts for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	80	0	0	4	4	14	2
2020/21	19	0	2	6	0	4	2

Table A15.3. Number of wildfires and area burnt (ha) for the Nelson/Marlborough Districts by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	30	17	5	28	48	6	8	6	5	5	13
Number	**2020/21**	23	12	1	18	60	13	7	8	6	1	2
Area	**2019/20**	6	64	0	0	1	1	1	27	0	0	5
Area	**2020/21**	20	0	0	0	1	7	3	0	1	0	1

Table A15.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Nelson and Marlborough District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

Nelson		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	221	170	70	96	95	130	317	420	350	212	181	53
Max DC	**Historic**	301	187	138	169	314	501	575	658	703	711	594	467
Mean DC	**2020/21**	36	29	14	27	30	59	147	257	193	93	62	8
Mean DC	**Historic**	16	13	17	29	75	131	171	238	241	172	93	36

Marlborough		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	327	326	327	242	241	350	525	653	777	635	665	372
Max DC	**Historic**	628	541	562	590	521	708	922	1120	1186	1167	1089	933
Mean DC	**2020/21**	98	101	76	80	90	150	273	397	474	331	304	109
Mean DC	**Historic**	95	71	71	77	131	205	272	348	349	287	219	144

A16. WEST COAST

Wildfire Statistics

- During the 2020/21 wildfire season, the West Coast accounted for 1% of the total number of wildfires in the country and less than 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires increased for the West Coast District; the total number of wildfires for 20/21 is below the historical average (footnote).
  - area burnt (ha) increased also (Table A16.1); the area burnt for 20/21 is well below the historical average (footnote).
- The area burnt by land use category is low in this District, except for Conservation areas during the 2020/21 season (Table A16.2).
- Pile burns followed by Cigarettes, matches and candles were the major causes contributing to the total number of wildfires during the 2020/21 season. Cooking and heating, along with Cigarettes, matches and candles had the greatest impact on area burnt (Table A16.3).

Soil and fuel moisture status

- The West Coast District did not experience very dry or drought conditions during 2020/21. Drier than normal soils were observed during November and December between Franz Josef and Mt Aspiring National Park, which recovered by early January 2021. Buller began to experience drier than normal soils in early January, which expanded towards Franz Josef by March. Soils were about normal by mid-March 2021.
- Drought Codes (DC) over the fire season were generally on trend or below the historical average (Table A16.4). No new max values were observed for 2020/21.
- BUIs also were on trend with the historical average this season. The exception is Haast, being above the average.
- Fire climate severity was also generally on trend with the historical average.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A16.1. Total number of wildfires and area burnt on the West Coast for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	**Number of fires**	**Number of fires**	**Area burnt (ha)**	**Area burnt (ha)**
Buller District	*12*	*19*	*0*	*2*
Grey District	*13*	*17*	*3*	*0*
Westland District	*2*	*9*	*2*	*29*
*West Coast (total) **	*27*	*45*	*5*	*31*

** On average, the West Coast experiences approximately 60 wildfires annually, and a total area burnt of approx. 170 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A16.2. Area burnt by land use category in the West Coast District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	0	0	0	0	0	4	1
2020/21	1	0	0	1	0	28	1

Table A16.3. Number of wildfires and area burnt (ha) for the West Coast District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	7	3	1	2	10	3	0	0	0	0	1
Number	**2020/21**	4	11	0	5	18	3	2	1	1	0	0
Area	**2019/20**	2	0	0	0	0	3	0	0	0	0	0
Area	**2020/21**	0	13	0	15	2	0	0	0	0	0	0

Table A16.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all West Coast District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	30	27	17	34	96	90	150	157	163	81	33	22
Max DC	**Historic**	87	64	120	193	204	316	371	427	422	310	214	57
Mean DC	**2020/21**	5	7	4	8	28	24	43	70	35	12	8	5
Mean DC	**Historic**	7	6	9	13	33	53	65	85	72	35	11	6

A17. CANTERBURY

Wildfire Statistics

- During the 2020/21 wildfire season, Canterbury (north and central) accounted for 13% of the total number of wildfires in the country and 6% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires has slightly decreased; the combined Canterbury and Mid-South Canterbury total number of wildfires for 20/21 (609 + 206 = 815) is above the historical average (footnote).
  - area burnt (ha) has increased significantly (Table A17.1); the combined Canterbury and Mid-South Canterbury total area burnt for 20/21 (858 + 2,330 = 3,188 ha) is well above the historical average (footnote).
- Conservation, then Meat/Wool land use areas experienced the greatest impact by wildfires in 2020/21 (Table A17.2).
- During the 2020/21 season, Pile burns and Cigarettes, matches and candles were the major causes contributing to the total number of wildfires. Cooking and heating and Pile burns had the greatest impact on area burnt (Table A17.3).

Soil and fuel moisture status

- Pockets of dry conditions appeared along the coast in Selwyn district by spring, which elevated to very dry conditions by the end of November 2020, before recovering by early January 2021. Dry conditions returned in coastal locations in Selwyn and North Canterbury by early February, with dry to extremely dry conditions remaining until June.
- Drought Codes (DC) over the fire season were typically above the historical average. Interestingly, DC values remained high over winter/spring with little recovery for most stations. DC values peaked late into the season, by April 2021 (Table A17.4). No new max values were observed for 2020/21.
- BUIs were generally on track with the historical average but were well above the average during the months of March to May 2021.
- Fire climate severity across the District was above or well above the historical average during winter/spring 2020 and remained above average over summer 2021.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A17.1. Total number of wildfires and area burnt in Canterbury for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	Number of fires	Number of fires	Area burnt (ha)	Area burnt (ha)
Christchurch City	217	257	4	25
Hurunui District	82	75	53	233
Kaikoura District	25	17	1	267
Selwyn District	182	145	368	321
Waimakariri District	148	115	34	12
*Canterbury (total) **	654	609	460	858

** On average, Canterbury (Canterbury and Mid-South Canterbury) experiences approximately 750 wildfires annually, and a total area burnt of approx. 830 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A17.2. Area burnt by land use category in the Canterbury District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	130	37	165	28	1	93	7
2020/21	126	76	212	38	0	348	58

Table A17.3. Number of wildfires and area burnt (ha) for Canterbury by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	106	153	27	42	180	44	39	22	25	6	10
Number	**2020/21**	84	175	21	40	176	30	27	17	19	8	12
Area	**2019/20**	8	270	0	1	8	46	69	53	4	1	1
Area	**2020/21**	54	3	9	612	141	19	12	8	1	0	1

Table A17.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Canterbury District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	358	354	366	462	432	568	639	675	767	833	747	299
Max DC	**Historic**	622	425	453	479	536	640	781	862	891	853	826	704
Mean DC	**2020/21**	113	143	134	174	177	250	303	397	487	539	475	81
Mean DC	**Historic**	97	67	68	82	134	215	293	368	364	315	239	146

A18. MID-SOUTH CANTERBURY

Wildfire Statistics

- During the 2020/21 wildfire season, the Mid-South District accounted for 4% of the total number of wildfires in the country and 17% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires slightly decreased for Mid-South Canterbury; the combined Mid-South Canterbury and Canterbury total number of wildfires for 20/21 (206 + 609 = 815) is slightly above the historical average (footnote).
  - area burnt (ha) has increased significantly (mainly due to the Pukaki wildfire (2,227 ha) (Table A18.1); the combined Mid-South Canterbury and Canterbury total area burnt for 20/21 (2,330 + 858 = 3,188 ha) is well above the historical average (footnote).
- Forestry and Meat/Wool land use areas experienced the greatest impact by wildfires during 2020/21 season (Table A18.2).
- Pile burns, Unclassified, and Cigarettes, matches and candles were the major causes contributing to the total number of wildfires during 2020/21. Cooking and heating had the greatest impact on area burnt (Table A18.3).

Soil and fuel moisture status

- During the winter months and early spring (by August 2020), Mackenzie, Waimate and Waitaki locations were experiencing dry conditions, with soil moisture levels recovering by late October. However, by October coastal locations were experiencing dry to very dry conditions, that recovered by early January 2021.
- Drought Codes (DC) over the fire season were above the historical average during 2020/21.Interestingly, DC values were well above the average during winter/spring (for most stations), and typically peaking in April (Table A18.4). No new max values were observed for 2020/21.
- BUIs were generally on trend with the historical average during the 2020/21 season.
- Fire climate severity was generally above average during winter/spring 2020, and then below average over summer/autumn 2021.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A18.1. Total number of wildfires and area burnt in Mid-South Canterbury for the 2019/20 and 2020/21 wildfire seasons.

	2019/20	2020/21	2019/20	2020/21
Zones	Number of fires	Number of fires	Area burnt (ha)	Area burnt (ha)
Ashburton District	*86*	*88*	*87*	*32*
Mackenzie District	*26*	*22*	*87*	*2,267*
Timaru District	*76*	*64*	*102*	*18*
Waimate District	*32*	*32*	*1,001*	*13*
*Mid-South Canterbury (total) **	*220*	*206*	*1,277*	*2,330*

** On average, Canterbury (Canterbury and Mid-South Canterbury) experiences approximately 750 wildfires annually, and a total area burnt of approx. 830 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A18.2. Area burnt by land use category in the Mid-South Canterbury District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	175	135	721	43	0	203	2
2020/21	84	32	979	1,013	0	184	38

Table A18.3. Number of wildfires and area burnt (ha) for the Mid-South Canterbury District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	29	17	4	19	66	35	11	9	15	4	11
Number	**2020/21**	26	25	3	17	73	15	9	19	8	2	9
Area	**2019/20**	54	1	0	1	14	1,116	3	3	4	0	82
Area	**2020/21**	14	3	25	2,227	15	9	2	21	8	0	5

Table A18.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Mid-South Canterbury District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	485	521	443	477	463	498	454	531	560	629	643	278
Max DC	**Historic**	617	406	390	423	464	598	771	890	958	778	700	670
Mean DC	**2020/21**	171	188	149	163	171	209	186	266	316	351	324	78
Mean DC	**Historic**	122	90	91	104	140	196	253	300	307	284	223	160

A19. OTAGO

Wildfire Statistics

- During the 2020/21 wildfire season, Otago accounted for 7% of the total number of wildfires in the country and 64% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires slightly decreased in the Otago District; the total number of wildfires for 20/21 is well above the historical average (footnote).
  - area burnt (ha) has increased (mainly due to the Ōhau (5,033 ha), Ben Lomond (760 ha), Macraes (816 ha), and Livingstone (611 ha) wildfires) (Table A19.1). The area burnt for 20/21 is significantly above the historical average.
- Meat/Wool lands, Conservation and Dairy land use aeras experienced the greatest impact by wildfires (Table A19.2).
- Pile burns, Unclassified, and Cigarettes, matches and candles were the major causes contributing to the total number of wildfires during 2020/21. Industry and Prescribed burns had the greatest impact on area burnt (Table A19.3).

Soil and fuel moisture status

- By early December 2020, dry conditions were occurring in Central Otago and Oamaru. The dryness was short lived and receded by early February 2021. Dry to very dry conditions were widespread across Otago during March and April until June.
- This season, Drought Codes (DC) were unusually above the historical average over winter/spring, until a reduction over January to March. The codes again elevated to above average over the months of April to June, with some weather stations above the trend for this winter/spring 2021 (Table A20.4). No new max values were observed this season.
- BUIs were above the historical average for 2020/21.
- Fire climate severity was variable across the District, most stations were above the long-term average over winter/spring 2020, and on trend over summer 2021.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A19.1. Total number of wildfires and area burnt in the Otago District for the 2019/20 and 2020/21 wildfire seasons.

Zones	2019/20 Number of fires	2020/21 Number of fires	2019/20 Area burnt (ha)	2020/21 Area burnt (ha)
Central Otago District	*66*	*52*	*202*	*24*
Clutha District	*43*	*50*	*37*	*88*
Dunedin City	*120*	*110*	*5,162*	*285*
Queenstown-Lakes District	*47*	*52*	*1,331*	*790*
Waitaki District	*85*	*67*	*229*	*7,285*
*Otago (total) **	*361*	*331*	*6,961*	*8,472*

** On average, Otago experiences approximately 240 wildfires annually, and a total area burnt of approx. 2,240 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A19.2. Area burnt by land use category in the Otago District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	74	2	615	50	1	5,192	1,027
2020/21	1,264	0	4,471	213	0	2,247	277

Table A19.3. Number of wildfires and area burnt (ha) for the Otago District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	58	31	9	27	133	34	19	22	7	8	13
Number	**2020/21**	48	42	2	26	134	26	19	9	16	4	5
Area	**2019/20**	73	5,139	0	2	1,181	396	28	18	114	5	5
Area	**2020/21**	5	2	0	270	21	2,424	99	5,035	1	2	613

Table A19.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Otago District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	520	576	541	621	662	642	540	535	654	715	730	569
Max DC	**Historic**	573	571	591	611	665	810	1017	922	891	865	855	692
Mean DC	**2020/21**	240	255	212	222	254	304	158	265	377	430	382	242
Mean DC	**Historic**	158	127	129	141	180	252	308	343	358	356	281	201

A20. SOUTHLAND

Wildfire Statistics

- During the 2020/21 wildfire season, Southland accounted for 3% of the total number of wildfires in the country and less than 1% of the total area burnt (Table A2, and Figures 3&4).
- Comparing last wildfire season (2019/20) with this season (2020/21), the total
  - number of vegetation fires slightly decreased; the total number of wildfires for 20/21 is slightly above the historical average (footnote).
  - area burnt (ha) has decreased (Table A20.1); the area burnt for 20/21 is significantly below the historical average (footnote).
- Dairy land use areas experienced the greatest impact by wildfires in 2020/21 (Table A20.2).
- Pile burns, and Cigarettes, matches and candles were the major causes contributing to the total number of wildfires during 2020/21. Prescribed burns and Equipment causes had the greatest impact on area burnt (Table A20.3).

Soil and fuel moisture status

- Dry conditions were observed in Stewart Island by August 2020, soil moistures then recovered by October. Gore then experienced dry to very dry conditions by mid-March 2021, that didn't recover until June.
- This season, Drought Codes (DC) were generally below the long-term average. Some stations peaked in April and remained above the average until June (Table A20.4). No new max DC values were recorded during 2020/21.
- BUIs were either on trend or below the long-term average.
- Fire climate severity was well the long-term average during 2020/21.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Table A20.1. Total number of wildfires and area burnt in Southland for the 2019/20 and 2020/21 wildfire seasons.

Zones	2019/20 Number of fires	2020/21 Number of fires	2019/20 Area burnt (ha)	2020/21 Area burnt (ha)
Gore District	*18*	*30*	*27*	*0*
Invercargill City	*64*	*49*	*1*	*0*
Southland District	*86*	*79*	*62*	*40*
*Southland (total) **	*168*	*158*	*89*	*40*

** On average, Southland experiences approximately 150 wildfires annually, and a total area burnt of approx. 300 ha (based on 30 years of historical records, 1991/92 – 2020/21).*

Table A20.2. Area burnt by land use category in the Southland District for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	65	0	4	5	0	16	0
2020/21	28	5	1	6	0	0	0

Table A20.3. Number of wildfires and area burnt (ha) for the Southland District by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	**2019/20**	19	28	0	11	74	14	4	6	6	2	4
Number	**2020/21**	10	26	2	12	74	13	3	10	3	1	4
Area	**2019/20**	1	0	0	0	56	4	0	0	28	0	0
Area	**2020/21**	4	0	0	0	7	16	11	2	0	0	0

Table A20.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Southland District weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	**2020/21**	74	36	17	52	113	169	200	284	334	340	300	160
Max DC	**Historic**	261	195	179	191	251	334	502	533	514	488	444	310
Mean DC	**2020/21**	8	12	4	13	46	82	64	114	170	190	107	31
Mean DC	**Historic**	15	13	15	24	55	110	158	183	179	156	87	33

A21. CHATHAM ISLANDS

Soil and fuel moisture status

- Drought Code (DC) values over winter/spring were above the average until December 2020 (Chatham Island Aero and Kaiwhata stations). DC values over summer/autumn 2021 were either on trend or below the historical average. Values reached a peak by end of February. No new max values were recorded (Table A21.4).
- In general, Build-up Index ((BUI) values were below or followed the historical average trend.
- Fire climate severity was on trend over winter/spring 2020, and well below the historical average during summer/autumn 2021.
- To view individual station trends, visit: https://www.scionresearch.com/rural-fire-research/tools/trends

Wildfire Statistics

- Currently, fire statistics for the Chatham Islands have not been separated out as their own location in the FENZ cause database. Last year it was merged within the Wellington District statistics, this fire season it has moved to Hawke's Bay.
- Historically, the Chatham Island has experienced about 5 wildfires annually, and 100 hectares burnt (based on 25 years of historical records captured by the NRFA). To target useful campaigns on public education and reduce the number of wildfires and impacts (area burnt) there is a need to capture vegetation incidents separately to the mainland.

Table A21.1. Total number of wildfires and area burnt on the Chatham Islands for the 2019/20 and 2020/21 wildfire seasons.

Zones	2019/20 Number of fires	2020/21 Number of fires	2019/20 Area burnt (ha)	2020/21 Area burnt (ha)
	-	-	-	-
	-	-	-	-
	-	-	-	-
*(total) **	-	-	-	-

**The Chatham Island experiences about 5 wildfires annually and approximately 70 ha is burnt (based on 25 years of historical records, 1991/92 – 2015/16).*

Table A21.2. Area burnt by land use category on the Chatham Islands for all vegetation fires.

Fire season	Dairy Area (Ha)	Arable Area (Ha)	Meat/Wool Area (Ha)	Forestry Area (Ha)	Horticulture Area (Ha)	Conservation Area (Ha)	Others Area (Ha)
2019/20	-	-	-	-	-	-	-
2020/21	-	-	-	-	-	-	-

Table A22.3. Number of wildfires and area burnt (ha) on the Chatham Islands by broad cause categories.

	Fire season	Unclassified	Cigarettes, etc	Explosives etc	Cooking and heating	Pile burns	Prescribed burns	Equipment	Industry	Re-ignitions	Spontaneous combustion	Natural causes
Number	2019/20	-	-	-	-	-	-	-	-	-	-	-
Number	2020/21	-	-	-	-	-	-	-	-	-	-	-
Area	2019/20	-	-	-	-	-	-	-	-	-	-	-
Area	2020/21	-	-	-	-	-	-	-	-	-	-	-

Table A21.4. Drought Code (DC) values (max and mean) for the current fire season (2020/21) versus the historical average, based on the average across all Chatham Islands weather stations. The colour scale is a visual indicator of high (red and yellow) and low (green and blue) DC values.

		July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Max DC	2020/21	212	183	153	186	269	260	429	478	454	337	323	207
Max DC	Historic	371	275	261	254	303	445	657	583	638	641	418	382
Mean DC	2020/21	129	122	89	106	158	200	312	359	304	278	219	156
Mean DC	Historic	74	36	30	59	126	217	311	372	381	297	232	127