

## Dryness persists for much of the North Island

<b>Rainfall</b>	<p>Well below normal rainfall (less than 50% of March normal) occurred for a sizeable part of the North Island between the Manawatu-Wanganui and Auckland regions. In fact, numerous locations recorded at least their third-driest March on record. Isolated areas of above normal rainfall (120-149% of normal) or well above normal rainfall (more than 149% of March normal) occurred on the hills around the Coromandel Peninsula. On the South Island, much of the West Coast, Fiordland and Stewart Island recorded below normal rainfall (50-79% of March normal) or well below normal rainfall. Conversely, above normal or well above normal rainfall accumulated for eastern areas of the Canterbury and Otago regions with Christchurch (Riccarton) enduring its wettest March on record.</p>
<b>Soil moisture</b>	<p>As of 1 April 2014, drier than normal soils were present across much of the North Island. Soil moisture levels were much drier than normal across some western areas of Northland and Auckland, central and western Waikato, Taranaki, Wanganui-Manawatu and eastern Bay of Plenty regions of the North Island. For the South Island, soil moisture levels were driest for much of the Tasman and northern parts of the West Coast regions. Soils on Stewart Island were drier than normal for the time of year as well. Wetter than normal soils for the time of year on the South Island were confined to coastal areas of the Canterbury and Otago regions, especially about Banks Peninsula.</p>
<b>Temperature</b>	<p>Temperatures for much of New Zealand were near average (within 0.5°C of March average). Notable exceptions include pockets of below average temperatures (0.5-1.2°C below March average) for coastal areas from the southern Gisborne, northern Hawke's Bay and far southeast coastal Manawatu-Wanganui regions. The March temperature regime for South Island was not too dissimilar to that of the North Island with near average values for the start of autumn. One exception, however, was a stretch of coastline from Marlborough region south through to the northern Otago region where below average temperatures were observed. Within this zone there were spotty areas of well below normal temperatures (at least 1.2°C below the March average) especially in and around the Banks Peninsula.</p>
<b>Sunshine</b>	<p>Above normal sunshine (110-124% of March normal) was recorded for much of the North Island from the Auckland region south through much of the interior and eastern portions of the North Island. It was an especially bright start to autumn for the Waikato region where well above normal sunshine (more than 125% of March normal) occurred. For the South Island, near normal sunshine occurred (within 10% of March normal) for most areas. Exceptions include Dunedin and north-central portions of the South Island where sunshine was above normal.</p>

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## Overview

March 2014 was characterised by anomalously high pressure over much of New Zealand, and in particular, over the South Island. In spite of the overall surface pressure regime being abnormally high, there were periods of lower pressure, which contributed to the occurrence of a few moderate-to-heavy rainfall events during the month.

For the most part, with regards to rainfall on the North Island, March picked up where February ended as abnormally dry conditions were experienced for the start of autumn. Well below normal rainfall (less than 50% of March normal) occurred for a sizeable part of the North Island between the Manawatu-Wanganui and Auckland regions. In fact, numerous locations placed in their top three for driest March on record. This includes Hamilton, which experienced its second driest March on record with only 6 mm of rain accumulating for the month (records go back to 1935). There were patches of near normal (within 20% of normal) rainfall on the North Island including the Wellington and eastern Hawke's Bay regions. Isolated areas of above rainfall (120-149% of normal) or well above normal rainfall (more than 149% of March normal) occurred on the hills around the Coromandel Peninsula, largely due to the impacts of ex-tropical cyclone Lusi during the middle part of the month.

On the South Island, the vast majority of the West Coast, Fiordland and Stewart Island recorded below normal rainfall (50-79% of March normal) or well below normal rainfall. Conversely, above normal to well above normal rainfall was experienced for eastern areas of the Canterbury and Otago regions, where Christchurch and Dunedin reported well above March rainfall. In fact, Christchurch (Riccarton) endured its wettest March on record (records go back to 1863). Additionally, of the 200mm that fell during the month at Christchurch (Riccarton), 123mm accumulated in one day (4 March), which is now the greatest one day March rainfall on record for the city. Otherwise, near normal rainfall was the theme for much of the central portion of the South Island.

As of 1 April 2014, soil moisture levels were well below normal across western areas of the Northland, the Waikato, inland Wanganui-Manawatu and eastern Bay of Plenty Regions of the North Island. Areas of central Northland have normal to slightly wetter than normal soils for this time of year. For the South Island, soil moisture levels are driest in much of the Tasman and northern parts of the West Coast regions. Soils on Stewart Island are drier than normal for this time of year as well. Wetter than normal soils for this time of year on the South Island are confined to coastal areas of the Canterbury and Otago regions, in particular about Banks Peninsula, reflecting where excessive rainfall occurred during the month.

Temperatures during the first month of autumn in New Zealand were near average (within 0.5°C of March average) for a large part of the country. Notable exceptions include pockets of below average temperatures (0.5-1.2°C below March average) for coastal areas from the southern Gisborne, northern Hawke's Bay and far southeast coastal Manawatu-Wanganui regions. The March temperature regime for South Island was comparable to the North Island with near average values

for March. One exception, however, was a sizeable area of below average temperatures along coastal sections of the South Island from the Marlborough region south through to the northern Otago region. Within this zone there were even spotty areas of well below normal temperatures (greater than 1.2°C below March average) particularly in and around the Banks Peninsula. The nation-wide average temperature in March 2014 was 15.3°C (0.5°C below the 1971-2000 March average from NIWA's seven station temperature series which begins in 1909).

The lack of rainfall for much of the North Island was combined with an abundance of early autumn sunshine for much of the island. In fact, above normal sunshine (110-124% of March normal) was recorded from the Auckland region south through much of interior and eastern portions of the North Island. It was an especially bright start to autumn for the Waikato region where well above normal sunshine (more than 125% of March normal) occurred. Slightly below normal sunshine was experienced in Wellington. For the South Island, near normal sunshine occurred (within 10% of March normal) for most areas. Outliers include Dunedin and north-central portions of the South Island where sunshine was above normal.

#### **Further Highlights:**

- The highest temperature was 30.8°C, observed at Wallaceville (Upper Hutt) on 16 March.
- The lowest temperature was -3.3°C, observed at Pukaki Airport on 25 March.
- The highest 1-day rainfall was 153 mm, recorded at Lyttelton on 4 March.
- The highest wind gust was 167 km/hr, observed at Cape Turnagain on 17 March.
- Of the six main centres, Auckland was the warmest, Dunedin the coolest and cloudiest, Hamilton was the driest, Christchurch was wettest, and Tauranga was the sunniest.
- Of the available, regularly reporting sunshine observation sites, the sunniest four centres so far in 2014 (January to March) are: Whakatane (873 hours), Takaka (771 hours), Tauranga (770 hours) and Appleby (near Nelson, 766 hours).

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### **Rainfall: Widespread dryness for much of the North Island, but quite wet for eastern areas of the South Island**

Unfortunately, the change of season did not include a change in rainfall for much of the North Island as the abnormally dry weather in February persisted through March. Of note is a large area of well below normal rainfall (less than 50% of March normal) that extends from parts of the Northland region south, and engulfing much of the island, to just about the Wellington region. The table below reflects the dryness as several locations have experienced either their driest or nearly their driest March on record. The month was particularly dry for western and central parts of the North Island, from the Waikato, Taranaki and Manawatu-Wanganui regions, with several localities reporting either their driest or second driest March on record.

The dryness continued across the Cook Strait and into much of the western portions of the South Island where Westport was subjected to its driest March on record. Rainfall deficits continued right the way through the western portions of the Southland region. On the other side of the spectrum, rainfall was plentiful and even excessive along much of the east coast of the South Island in the coastal Canterbury to Otago regions. It was an especially wet month for areas in and around the Coromandel Peninsula where as much as two to four times normal rainfall for March accumulated.

As of 1 April 2014, soil moisture levels are well below normal across western areas of the Northland, the Waikato, inland Wanganui-Manawatu and eastern Bay of Plenty Regions of the North Island. Areas of central Northland have normal to slightly wetter than normal soils for this time of year. For the South Island, soil moisture levels are driest for much of the Tasman and northern parts of the West Coast regions. Soils on Stewart Island are drier than normal for this time of year as well. Wetter than normal soils for this time of year on the South Island are confined to coastal areas of the Canterbury and Otago regions, in particular about Banks Peninsula.

**Record<sup>1</sup> or near-record March rainfall totals were recorded at:**

Location	Rainfall total (mm)	Percentage of normal	Year records began	Comments
<b>High records or near-records</b>				
Christchurch (Riccarton)	200	437	1863	Highest
<b>Low records or near-records</b>				
Te Puke	43	30	1973	3rd-lowest
Motu	16	13	1990	Lowest
Hamilton	6	7	1935	2nd-lowest
Te Kuiti	11	12	1950	2nd-lowest
Turangi	20	18	1968	4th-lowest
Masterton	33	56	1992	4th-lowest
Waione	35	62	1991	Equal 4th-lowest
Palmerston North	9	14	1928	Lowest
Stratford	35	25	1960	4th-lowest
Hawera	18	22	1977	2nd-lowest
Wanganui	9	18	1890	2nd-lowest
Westport	25	18	1944	Lowest
Hokitika	84	45	1866	3rd-lowest
Greymouth	68	38	1947	4th-lowest
Haast	106	29	1941	Equal 3rd-lowest
Secretary Island	169	49	1985	Lowest
Wanaka	11	26	1927	3rd-lowest
Tiwai Point	35	34	1970	3rd-lowest
Campbell Island	66	53	1992	2nd-lowest

<sup>1</sup> The rankings (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>.etc) in all Tables in this summary are relative to climate data from a *group* of nearby stations, some of which may no longer be operating. The current climate value is compared against all values from any member of the group, without any regard for homogeneity between one station's record, and another. This approach is used due to the practical limitations of performing homogeneity checks in real-time.

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## Temperature: Near average for most, but unusually cool mornings for some

Although temperatures, as a whole for the month, were near average (within 0.5°C of March average) for most of New Zealand, there were numerous locations that experienced near record to record low mean minimum air temperatures as noted on the table below. Many of these sites are located in areas where rainfall and soil moisture was low and there was little significant cloud cover. With the increasing night-length in autumn this created ideal conditions for colder-than-normal night time and early morning temperatures. Also of note is Motu, which not only recorded its highest mean maximum temperature, but also observed the second lowest mean minimum air temperature for March.

The nation-wide average temperature in March 2014 was 15.3°C (0.5°C below the 1971-2000 March average from NIWA's seven station temperature series which begins in 1909)<sup>2</sup>.

### Record or near-record mean air temperatures for March were recorded at:

Location	Mean air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Campbell Island	9.6	1.0	1991	Highest

### Record or near-record mean maximum air temperatures for March were recorded at:

Location	Mean maximum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
Motu	21.6	3.0	1990	Highest
Hamilton	24.6	1.7	1946	4th-highest
Campbell Island	11.6	1.2	1991	2nd-highest
Low records or near-records				
Cape Campbell	16.6	-1.6	1953	Lowest

### Record or near-record mean minimum air temperatures for March were recorded at:

Location	Mean minimum air temp. (°C)	Departure from normal (°C)	Year records began	Comments
High records or near-records				
South West Cape	10.6	0.9	1991	3rd-highest
Campbell Island	7.8	1.4	1991	Highest

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<sup>2</sup> Interim value

Low records or near-records				
Kaitaia	12.4	-2.0	1967	4th-lowest
Motu	7.0	-2.1	1990	2nd-lowest
Hamilton	9.0	-2.0	1946	4th-lowest
Te Kuiti	9.2	-1.7	1959	4th-lowest
Taumarunui	7.1	-2.8	1947	Lowest
Turangi	6.7	-2.6	1968	Lowest
Dannevirke	8.9	-1.7	1951	4th-lowest
Wairoa	10.5	-1.7	1964	4th-lowest
Appleby	8.2	-2.3	1932	3rd-lowest
Hanmer Forest	4.2	-2.3	1906	2nd-lowest
Waiau	7.7	-0.6	1974	4th-lowest
Winchmore	6.7	-2.1	1928	4th-lowest

## Sunshine: Near normal or above normal for much of the country

Above normal sunshine (110-124% of March normal) was recorded for much of the North Island from the southern Northland region south through much of interior and eastern portions of the North Island. Of note is Auckland which had its second sunniest March on record. For the South Island, near normal sunshine occurred (within 10% of March normal) for most areas. Exceptions include Dunedin and north-central portions of the South Island where sunshine was above normal. Of note on the table below are the numerous locations, including Auckland, which received the second highest amount of March sunshine on record.

Of the available, regularly reporting sunshine observation sites, the sunniest four centres so far in 2014 (January to March) are: Whakatane (873 hours), Takaka (771 hours), Tauranga (770 hours) and Appleby (near Nelson, 766 hours).

### Record or near-record March sunshine hours were recorded at:

Location	Sunshine hours	Percentage of normal	Year records began	Comments
High records or near-records				
Auckland	239	125	1963	2nd-highest
Te Kuiti	238	140	1962	2nd-highest
Taumarunui	227	137	1947	2nd-highest
Turangi	243	131	1976	2nd-highest
Dannevirke	223	128	1963	3rd-highest
Takaka	238	109	1985	4th-highest
Greymouth	223	138	1947	4th-highest
Cheviot	213	119	1983	2nd-highest

## March climate in the six main centres

With the exception of below average temperatures at Christchurch, all the main centres recorded near average temperatures for the month of March. After its sixth-driest February on record, Hamilton recorded their second-driest March on record. All other main centres on the North Island experienced below normal or well below normal rainfall, whereas Christchurch and Dunedin received well above normal precipitation. All centres observed near normal or above normal sunshine hours. Of the main centres in March 2014, Auckland was the warmest, Dunedin the coolest and cloudiest, Hamilton was the driest, Christchurch was wettest, and Tauranga was the sunniest.

### March 2014 main centre climate statistics:

Temperature			
Location	Mean temp. (°C)	Departure from normal (°C)	Comments
Auckland <sup>a</sup>	18.5	0.0	Near average
Tauranga <sup>b</sup>	18.2	0.0	Near average
Hamilton <sup>c</sup>	16.8	-0.1	Near average
Wellington <sup>d</sup>	15.5	-0.3	Near average
Christchurch <sup>e</sup>	13.7	-1.2	Below average
Dunedin <sup>f</sup>	13.6	-0.1	Near average
Rainfall			
Location	Rainfall (mm)	% of normal	Comments
Auckland <sup>a</sup>	31	36%	Well below normal
Tauranga <sup>b</sup>	43	44%	Well below normal
Hamilton <sup>c</sup>	6	7%	2nd-driest March on record
Wellington <sup>d</sup>	63	74%	Below normal
Christchurch <sup>e</sup>	123	269%	Well above normal
Dunedin <sup>f</sup>	98	153%	Well above normal
Sunshine			
Location	Sunshine (hours)	% of normal	Comments
Auckland <sup>a</sup>	239	125%	Well above normal
Tauranga <sup>b</sup>	253	118%	Above normal
Hamilton <sup>g</sup>	244	132%	Well above normal
Wellington <sup>d</sup>	186	91%	Near normal
Christchurch <sup>e</sup>	192	100%	Near normal
Dunedin <sup>f</sup>	172	119%	Above normal

<sup>a</sup> Mangere <sup>b</sup> Tauranga Airport <sup>c</sup> Hamilton Airport <sup>d</sup> Kelburn <sup>e</sup> Christchurch Airport <sup>f</sup> Musselburgh <sup>g</sup> Ruakura

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## Highlights and extreme events

### Temperatures

The beginning of autumn was heralded by the passage of a cold front on 1 March, which left a fresh dusting of snow on many South Island mountains. The poor weather conditions nearly forced the suspension of play at the New Zealand Open (golf) being held near Arrowtown.

A further southerly outbreak brought unseasonably cold temperatures to the South Island and lower North Island on 3 March. Wellington was just 8.5°C at 4.50 p.m., with the cold air accompanied by a short period of steady rain, thunder and lightning there. Farther south, Queenstown was just 6.8°C at 4.50 p.m.

The highest temperature was 30.8°C, observed at Wallaceville (Upper Hutt) on 16 March. The lowest temperature was -3.3°C, observed at Pukaki Airport on 25 March.

### Record or near-record daily maximum air temperatures for March were recorded at:

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
High records or near-records				
Motu	25.8	19th	1990	Highest
Paraparaumu	30.0	16th	1953	Highest
Palmerston North	29.8	16th	1918	2nd-highest
Levin	28.7	16th	1895	3rd-highest
Wallaceville (Upper Hutt)	30.8	16th	1939	Highest
Westport	27.2	16th	1937	3rd-highest

### Record or near-record daily minimum air temperatures for March were recorded at:

Location	Extreme minimum (°C)	Date of extreme temperature	Year records began	Comments
Low records or near-records				
Kaitiāia	4.7	17th	1967	Lowest
Rotorua	1.5	4th	1964	3rd-lowest
Taupo	-1.3	4th	1949	3rd-lowest
Motu	-2.7	4th	1990	Equal lowest
Masterton	0.8	28th	1992	4th-lowest
Hicks Bay	7.9	4th	1969	4th-lowest
Mahia	9.2	2nd	1990	Equal 4th-lowest
Motueka	1.1	4th	1956	2nd-lowest
Hanmer Forest	-2.7	23rd	1906	3rd-lowest
Masterton	0.8	28th	1992	4th-lowest
Hicks Bay	7.9	4th	1969	4th-lowest

## Rain and slips

The highest 1-day rainfall was 153 mm, recorded at Lyttelton on 4 March.

Heavy rain on 4 and 5 March caused considerable flooding throughout Christchurch and surrounding areas. On 5 March, a number of Christchurch schools were closed due to the flooding, whilst a slip closed a section of Dyers Pass Road. It was reported that at least 100 homes in Woolston, Richmond, St Albans and Mairehau had been inundated with water. Flooding caused a number of road closures, including SH75 from Little River to Barry's Bay. Residents of Akaroa and Sumner were temporarily isolated by flooding.

On the evening of 14 March, rain associated with former tropical cyclone *Lusi* began falling in the upper North Island. The low pressure system travelled south to the west of the North Island, before crossing the South Island and heading east to be clear of the country by midday 17 March. Highest daily rainfall totals associated with the storm were recorded in parts of Northland, Coromandel and coastal Bay of Plenty on 15 March, and around Nelson and the Kaikoura Coast on 16 March. Relatively high rainfall intensities were also observed at times. For example, Kaikoura recorded 21 mm of rain in one hour between 7 a.m. and 8 a.m. on 16 March. No significant flooding was reported as a result of the rainfall across New Zealand, however there were reports of minor surface flooding in Wellington, Christchurch and the Tasman district.

### Record or near record March extreme 1-day rainfall totals were recorded at:

Location	Extreme 1-day rainfall (mm)	Date of extreme rainfall	Year records began	Comments
Nelson	87	16th	1941	3rd-highest
Christchurch	123	4th	1873	Highest

## Wind

The highest wind gust was 167 km/hr, observed at Cape Turnagain on 17 March.

On 3 March, motorists were urged to be cautious on SH2 at the Rimutaka Hill due to strong northerly winds, which were strengthening ahead of an approaching cold front.

Strong southerly winds on 4 March cut power to more than 1000 homes near Christchurch and on Banks Peninsula, with Akaroa, Flea Bay and Stony Bay the worst affected areas. Roofs were lifted off and windows blown in at homes in Lyttelton, whilst a number of trees in the region were also downed by the winds. Some regional flights arriving in and departing out of Christchurch were cancelled. Motorists were warned to be cautious due to the strong winds on a number of roads, including SH1 from Dunedin to Balclutha, SH75 from Tai Tapu to Akaroa, SH1 from Clarence to Kaikoura, and SH74 on the approaches to Lyttelton Tunnel. Most of these cautions remained in place on 5 March.

On 5 March, strong southerly winds associated with a deep depression off the east coast of the South Island continued in Canterbury, Marlborough, Wellington and Wairarapa. The strong winds

contributed to especially heavy seas in the Cook Strait, which resulted in the cancellation of *Interislander* ferry services. The *East by West* ferry services in Wellington were also cancelled, whilst large waves washed debris over many roads along Wellington’s south coast. Strong winds meant caution was advised to motorists travelling on SH73 from Yaldhurst to Arthurs Pass.

Strong winds associated with former tropical cyclone *Lusi* caused a number of issues across New Zealand on 15 and 16 March. Electricity infrastructure faults caused by storm damage resulted in a loss of power to many parts of Banks Peninsula with power out for more than 12 hours in Lyttelton. Power outages were also experienced by 1400 households in the Bay of Plenty, 7000 customers in Auckland, and a further 3000 customers in Northland. In Nelson, the *Weet-Bix Kids Tryathlon* and the open day at the Brook Waimarama Sanctuary were cancelled, whilst in the Hawke’s Bay organisers of the *Triple Peaks Challenge* were forced to modify the course in the interests of participants’ safety. In central Paihia, high swells pushed seawater and debris onto a stretch of SH 11, forcing it to be temporarily closed. In addition, 35 Paihia businesses along the waterfront were expected to be closed for a few days to allow clean-up required due to broken windows and seawater infiltration.

**Record or near record March extreme wind gusts were recorded at:**

Location	Extreme wind gust (km/hr)	Date of extreme gust	Year records began	Comments
Cape Reinga	139	15th	1974	4th-highest
Kaikohe	78	15th	1986	Equal 2nd-highest
Paeroa	89	15th	1991	3rd-highest
Baring Head	135	4th	1991	Equal 4th-highest
Hawera	104	16th	1986	Highest
Wanganui	91	5th	1977	4th-highest
Farewell Spit	89	16th	1973	Equal 4th-highest
Cape Reinga	139	15th	1974	4th-highest
Kaikohe	78	15th	1986	Equal 2nd-highest

**Snow and ice**

A considerable snowfall for the time of year occurred on 3 and 4 March on many South Island mountains, with staff reporting 20 cm - 30 cm of snow at *The Remarkables* and 7 cm – 10 cm at *Coronet Peak* ski areas near Queenstown. Snow also settled on Mt Ruapehu in the central North Island. Poor weather and the forecast of snow in the mountains of Nelson Lakes National Park meant the search for a missing tramper was called off until conditions improved.

**Cloud and fog**

On 20 March, fog caused the delay of at least 10 flights due to depart or arrive at Christchurch airport.

**For further information, please contact:**

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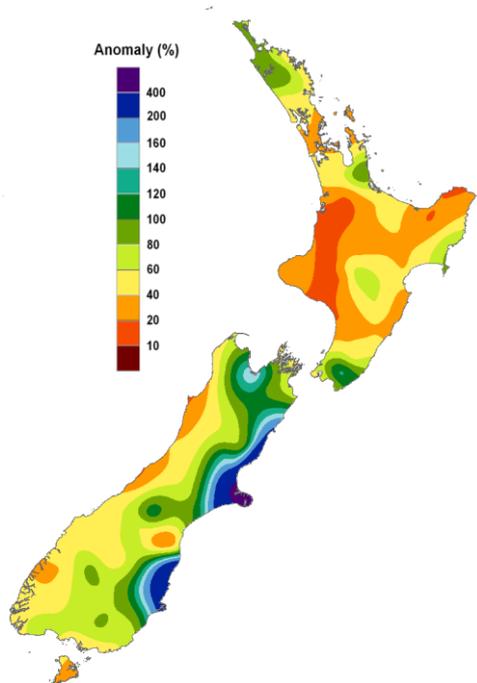
Tel. 04 386 0328

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Rainfall Anomaly,  
9am 01/03/2014 to 9am 31/03/2014

*March 2014 total rainfall expressed as a % of normal*

*Well below normal rainfall throughout western, central and East Cape regions of the North Island as well as much of the western part of the South Island (less than 50% of March normal rainfall - orange, red and brown shades).*

*Above normal to well above normal rainfall for most of the Canterbury and portions of the Otago regions (greater than 200% March rainfall - dark blue and purple shades).*

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