



**FIRE
EMERGENCY**

NEW ZEALAND

FIRES IN THE RURAL ENVIRONMENT






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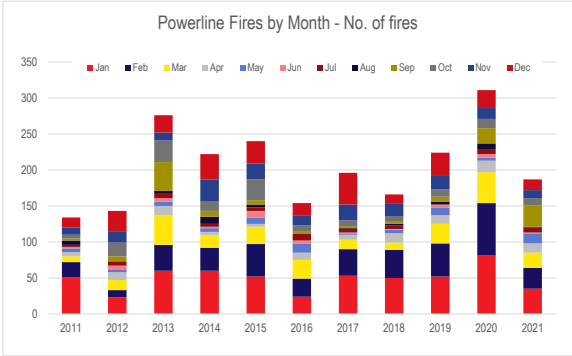


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POWERLINE FIRES BY YEAR & MONTH

Summer months (Jan, Feb, Dec & Mar) most common for powerline fires



Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011	40	30	20	10	10	10	10	10	10	10	10	10
2012	30	20	10	10	10	10	10	10	10	10	10	10
2013	50	40	30	20	10	10	10	10	10	10	10	10
2014	40	30	20	10	10	10	10	10	10	10	10	10
2015	50	40	30	20	10	10	10	10	10	10	10	10
2016	40	30	20	10	10	10	10	10	10	10	10	10
2017	50	40	30	20	10	10	10	10	10	10	10	10
2018	40	30	20	10	10	10	10	10	10	10	10	10
2019	50	40	30	20	10	10	10	10	10	10	10	10
2020	60	50	40	30	20	10	10	10	10	10	10	10
2021	40	30	20	10	10	10	10	10	10	10	10	10

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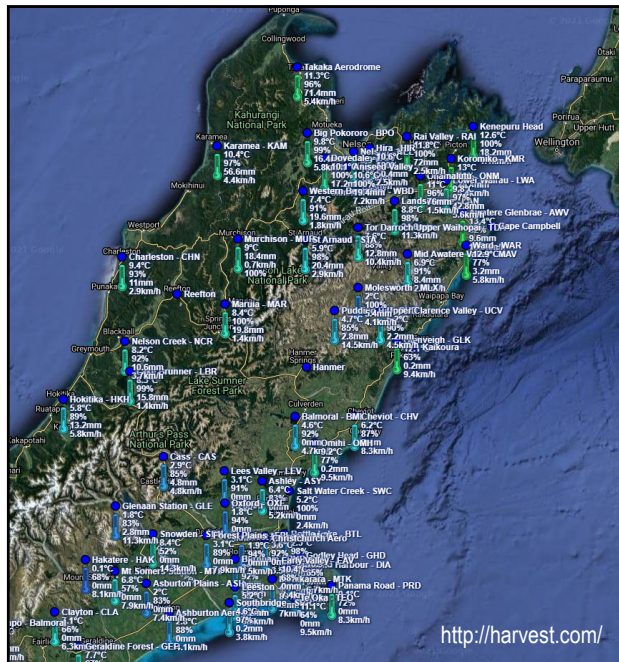
Powerline fires by fire season status

- Most fires in Restricted

Fire Incidents by Fire Season and Cause



Hectares Burnt by Fire Season and Cause



Remote Automatic Weather Stations (RAWS)



273 Stations (NZ)

19 Portables

Data Calculation
12:00hrs NZST


10 Minute updates

FIRE DANGER TODAY




<http://harvest.com/>

		Daily (observed)											Mon			
		Today (forecast)	Thu	Fri	Sat	Sun										
REGION	STATION NAME	FOREST	SCRUB	GRASS	FFMC	DMC	DC	ISI	BUI	FWI	TEMP	RH	DIR	WSP	RN24	GC%
	Rai Valley				51.3	3.5	26.7	0.2	5.3	0.1	7.2	83	298	5	3	20
	Hira	L	L	L	49.4	0.3	1.8	0.2	0.5	0	3.4	92	149	1.8	0	40
	Koromiko	L	L	L	57.1	1.6	6	0.7	1.9	0.2	4.3	100	87	13.3	0.2	20
	Aniseed Valley	L	L	L	58.1	0.5	5	0.4	0.8	0.1	7.9	83	251	1.1	0.2	50
	Onamalutu	L	L	L	33.5	0.4	128.9	0	0.9	0	3.6	99	211	8.3	0.2	50
	Lower Wairau	L	L	L	72.8	1.5	64	1.6	2.9	0.6	5.7	79	251	16.6	0	65
	Landsdowne	L	V	M	49.1	0.7	336.1	0.2	1.3	0.1	2.5	92	301	5.8	0.2	65
Marlborough Kaikoura	Awatere Valley	L	L	L												
	Tor Darroch				0.5		14.1		1							65
	St Arnaud	L	L	L	59.8	1	4	0.5	1.2	0.1	-2.1	97	38	5	0	20
	Ward	L	H	M	63.2	0.4	263.9	0.6	0.8	0.2	7.6	64	237	5.4	0	70
	Mid Awatere Valley	L	H	M	68.5	0.6	236.3	1.1	1.2	0.3	1.6	85	264	12.2	0.2	65
	Molesworth				0.3		226.9		0.6							40
	Upper Clarence	L	L	L	32.6	0.2	218.5	0	0.3	0	1	95	263	6.5	1.4	70
	Pudding Hill	L	L	L	20.5	0	136	0	0	0	3.3	67	242	3.6	5.2	65
	Glenveigh Kaikoura	L	L	L	23.7	0.1	1.3	0	0.1	0	5.7	86	277	18.4	0	65




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Fire Causes



- Structure
- Vehicles
- Spontaneous combustion
- Lightning
- Extra-Low / Low Voltage Electrical supplies – over loaded power points, faulty appliances, Lithium ion batteries
- People, Youth, smoking, incendiary (arson)
- Camping – cooking activities, open fires
- Stolen vehicles
- Rail
- Glass
- Fireworks
- Permitted burns escaping
- Hunters - tracer rounds
- On farm activities
 - Mowing, Scrub Bars, Chain saws, welding, hot exhausts

High Voltage power lines, conductor failure, clashing lines, insulator failure, clashing, trees/branches, wildlife





Tracking the Origin to find a Cause

Fire Directional Indicators

- Protection
- Grass Stem
- Foliage Freeze
- Angle of Char
- Spalling
- Curling
- Sooting
- Staining
- White Ash
- Cupping
- V/U Patterns



Overhead Power Lines

Overhead Power Lines may start fires due to:

- Arcing of lines
 - Contact with vegetation
 - Insulator failure
 - Conductor breakage
 - Transformer failure
 - Structure failure (cross arm, pylon, pole)
 - Animal contact (birds / opossums)
 - Other
- **Lines are not always at fault but tend to be the ignition source (heat)**



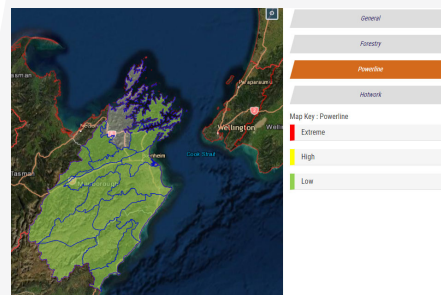
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Working with Lines Companies

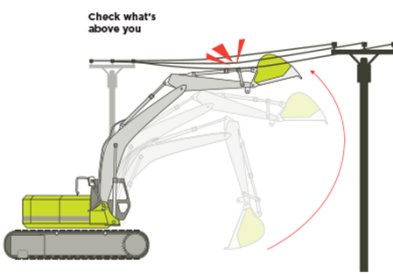
- Monitoring Fire Danger
- Ability to send email notifications
- Advisory for elevated fire danger
- Works on wind speed
- Support tool only
- Company decision to take any mitigation measures



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Check what's above you

Clarence RAWS
WS > 40
1 condition.
1 recipient.

Kenepuru RAWS
WS > 40
1 condition.
1 recipient.

Koromiko RAWS
WS > 40
1 condition.
1 recipient.

Auto Recloser

SMS message: Mid Awatere RAWS Auto Reclosure Alarm Triggered

copy from name copy from description

Email message: Wind Conditions in the the Mid Awatere Valley are such they have reached the trigger point to consider turning off the Auto Reclosure

copy from name copy from description

include triggering data in email message.

Expire alerts after : 30 minutes.

Temporarily suppress checking of this alert for a period after it has been triggered.
For: 120 minutes.

Recipients:

John Foley

Via Email: controller@linesmarl.co.nz

Via Mobile (SMS):

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When things go wrong

First Priority - Crew Safety especially in the dark

- Generally High Voltage
- Access
- High Fuel Loading
- Downed Lines, not always known
- Working under or around lines always has an element of risk




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Fuse link can drop out of the fuse holder onto dry vegetation below.

North America - Fire mitigation fuses

<https://youtu.be/ATEWXsMawMg>

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Arcing



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Wildlife





Response Issues – Access & Water



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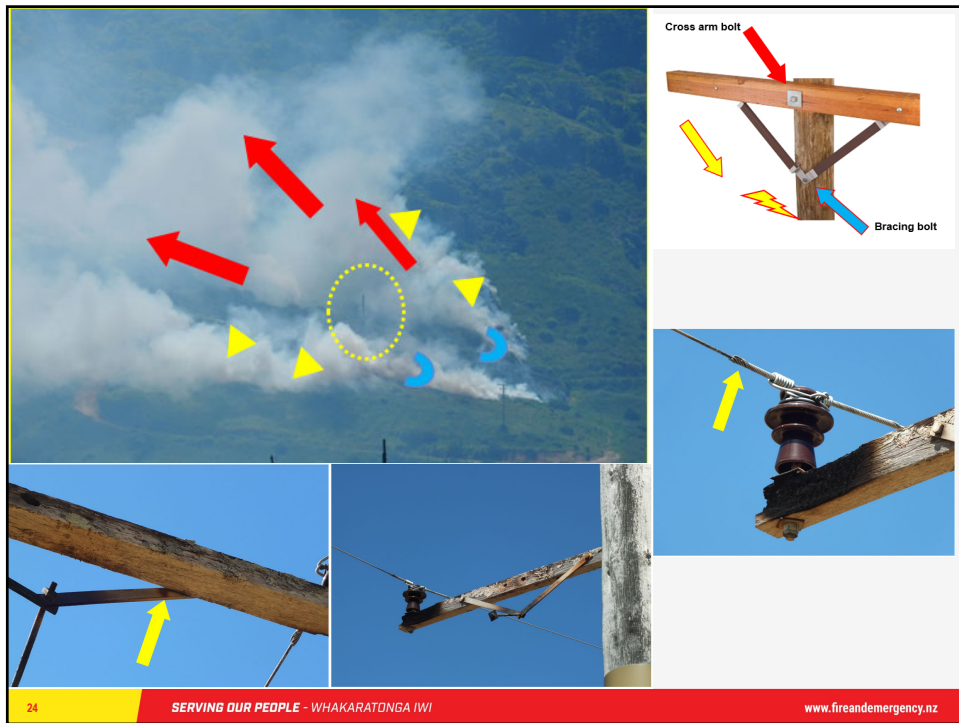
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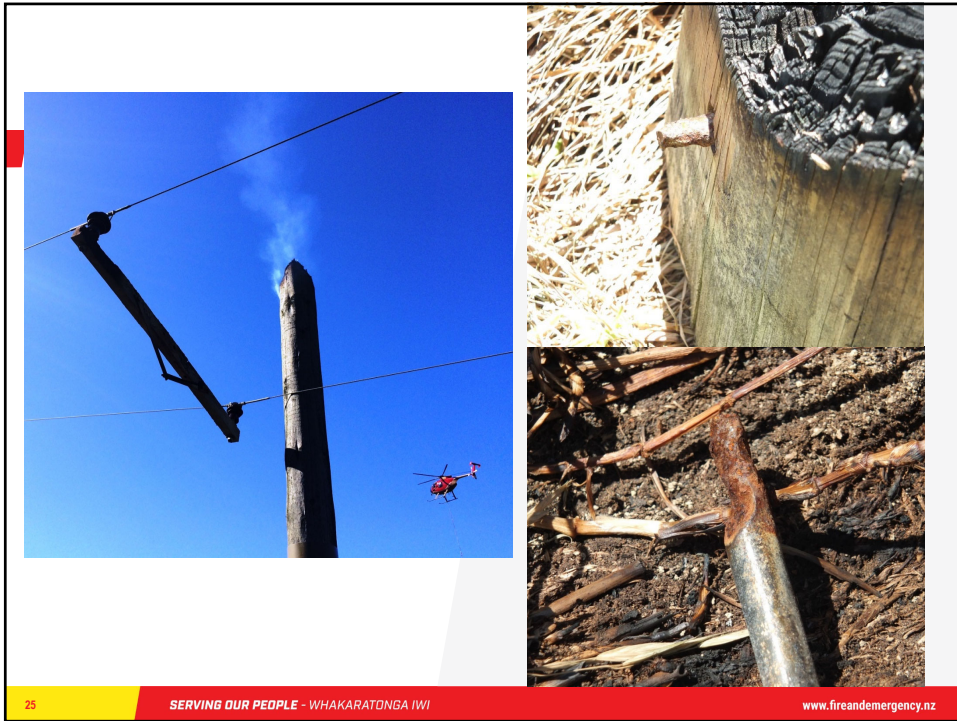


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Literature Review

Several highly relevant publications from Australia and USA, also South Africa:

- Power line failures and catastrophic wildfires under extreme weather conditions (Mitchell, 2013)
- Probability of bushfire ignition from electric arc faults (HRL report, 2010)
- New technology to cut Victoria's powerline fire risk (Marxsen, 2016)
- California Power Line Fire Prevention Field Guide (2021 edition)

Excellent reviews of:

- powerline fire causes, especially arcing and weather/environmental factors
- new technologies
- fire prevention mitigations

Power line failures and catastrophic wildfires under extreme weather conditions
Joseph W. Mitchell

ABSTRACT
Catastrophic wildfires have occurred under extreme weather conditions due to power line system failures. Under conditions of extreme fire weather, multiple ignitions that do not burn down a broad geographic area can occur under conditions prevailing upstream from power line towers. This has been observed in the US state of California in 2010 and 2017. Several power line events have been identified. These include the North Ridge incident that involved power line tower failures, a variety of failure modes in the large area of power line towers and distribution and transmission networks and their neighboring communities. These failures led to one general category however clearly expression of other and independent or overlapping effects such as fire, lightning, electrical system and human safety, environmental and associated impacts. Both failures show a strong dependence on extreme wind speed, low moisture and the above downwelling path of these categories. Clearly comprising three phases of wind dependence in the region.

New technology to cut Victoria's powerline fire risk

Abstract
Vegetation management is critical in prevention of powerline fires. In Victoria's most extreme fire risk areas, new technology is planned that will change the response of powerlines to vegetation fuels to further reduce the risk. A new performance specification for powerline networks has been developed from five years of ground breaking research by the Victorian Government. This specification will be several years. This performance spec...

HRL
Engineering and Materials

Prepared for
Energy Safe Victoria

Probability of Bushfire Ignition from Electric Arc Faults
Final Report

Report No. HRC-2010-155
December 2010
CONFIDENTIAL - CLIENT USE ONLY

California Power Line Fire Prevention Field Guide
2021 EDITION

Each of these states has had substantial program funding over the past few years. In fact, California has had the largest program put in place to direct vegetation clearing associated technical action needed to be reviewed and then...

Mitigations

Considerations:

Increased extreme weather events during elevated fire danger

Line clashing/arcing

- span length and line tension
- shorter spans/more poles in high wind areas
- allowance for line expansion (with temperature, age)
- line spacers

Tree contact – branches & falling trees

- cleared vegetation corridors along lines
- setback of 1½ x mature tree height
- regular trimming of branches & hedges (avoidance better)
- regular maintenance to clear regrowth within corridor
- greater care during tree trimming & felling operations



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Mitigations

Animals

- bird spikes on poles & cross-arms
- metal bands around poles to prevent climbing

Machinery hitting lines

- greater line clearance near gateways
- more planning/operational care by contractors, especially during tree/hedge trimming operations

Line breakage (with wind, snow)

- wind mitigations (span length, line spacers, etc.)
- change to single re-close, or switch-off of auto-reclosure systems during elevated winds (as per current wind risk triggers)
- underground lines in high risk areas



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Mitigations

Pole failure

- use of reinforced concrete vs wooden poles
- type of pole used in high vehicle usage areas (best for MVAs?)
- use of non-wooden cross-arms
- regular maintenance to check poles, cross-arm bolts, etc.

Electrical hardware faults

- upgrades to more modern equipment (higher spec fuses, insulators, etc.)
- short circuit/surge protection (e.g. ground earthing systems?)
- regular equipment maintenance/checks – maintenance programs based on identification of high risk areas?
- vegetation clearance around poles
- ground-earth vs auto-reclosure systems
- shutting off of power supply during high risk periods (as now in California)



New fire-safe dropout fuses

