Towards a plant flammability list for the Port Hills and Banks Peninsula

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Te Whare Wānanga o Tāmaki Makaurau

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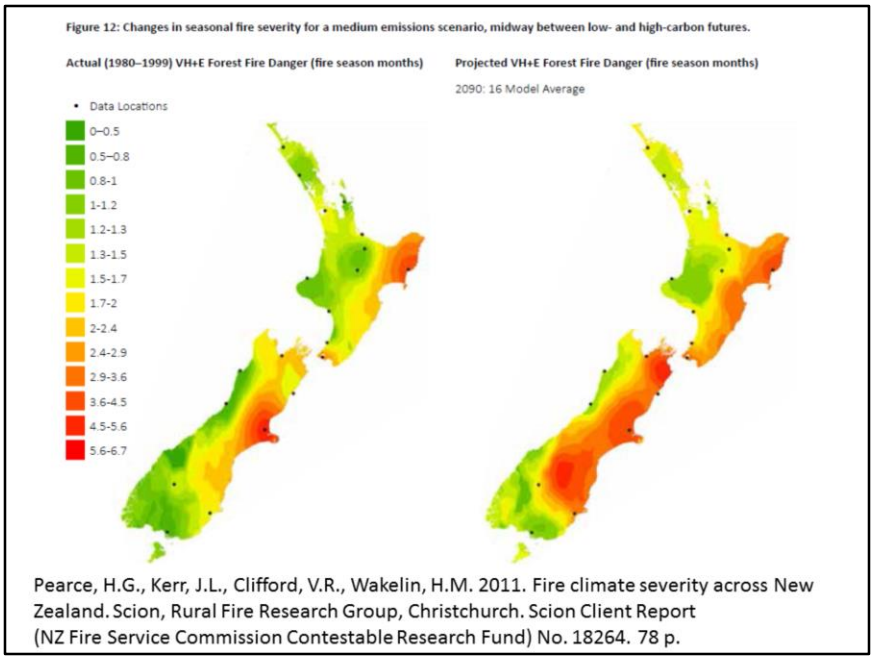
Wildfires in NZ

- 3000 wildfires occur in New Zealand each year, burning around 5900 ha of rural land

Anderson, S.A.J., Doherty, J.J. & Pearce, H.G. (2008) Wildfires in New Zealand from 1991 to 2007. New Zealand Journal of Forestry, 53, 19–22



In NZ forest fire danger predicted to worsen by the end of the century due to climate change, particularly along east coasts, especially Marlborough and Central Otago

Fuel is a key determinant of fire behaviour

- In wildfires the main fuel is plants
- Biomass, arrangement, and flammability of plants determines fire behaviour

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- In wildfires the main fuel is plants
- Biomass, arrangement, and flammability of plants determines fire behaviour
- Fuel is main component that humans can manipulate to manage fires

One tool for managing fuel is green firebreaks: strips of vegetation of species with low flammability which reduce fire spread across the landscape. Green firebreaks are being deployed in places like Porirua and Wellington City Councils at the wildland-urban interface.

Belmont Regional Park

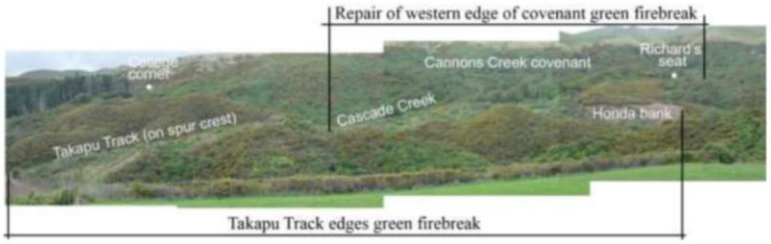
Cannons Creek Forest Restoration Plan

June 2013

Prepared by Greater Wellington Regional Council and Friends of Maara Roa

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Two green firebreaks through eight year old gorse scrub



Green firebreaks have also been used in restoration: Cannon Ck Restoration. Here green firebreaks have been planted to protect parts of the reserve from flammable vegetation dominated by gorse, and along public paths to protect against ignitions

Which species should we use for green firebreaks?

Objective: to rank flammability of common NZ plant species to provide guidelines for fire managers and landholders

So we can see that green firebreaks can be useful, but how do we identify the species to use? To do that we need to rank plant flammability.

With funding from the National Rural Fire Authority we are measuring the flammability for a wide range of native, weedy and garden plants.

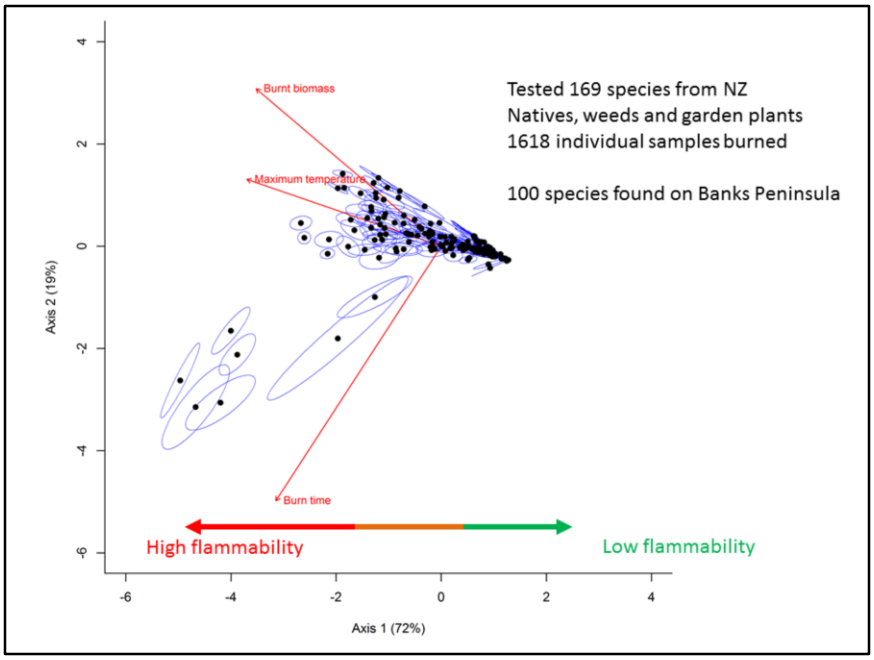
Measuring shoot flammability on the BBQ

70 cm shoots

Measure:
- max. temp
- burn time
- % biomass lost

Wyse et al. (2016) *International Journal of Wildland Fire* 25: 466–477 (free to download)
http://www.publish.csiro.au/WF/WF15047

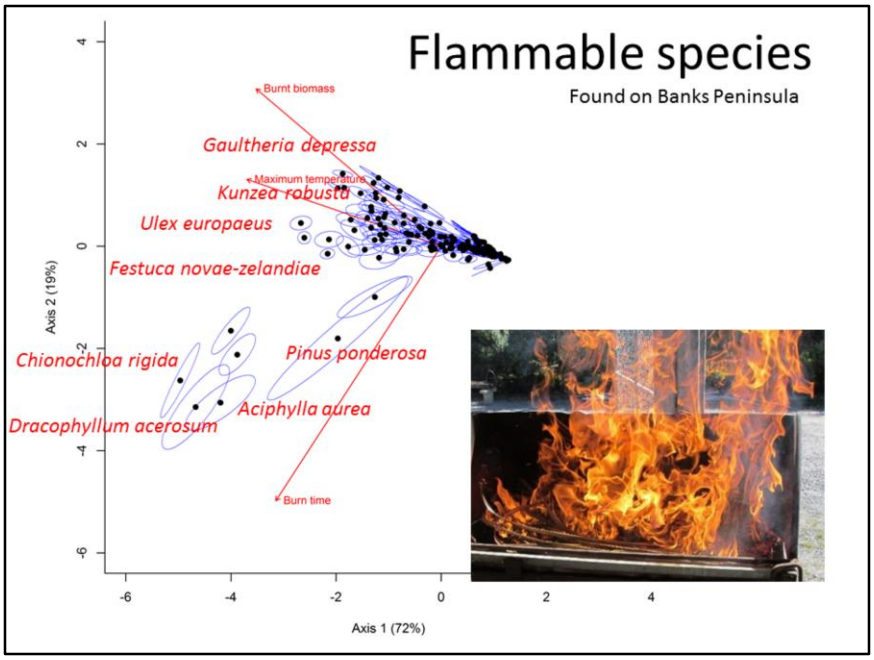
To measure flammability we collected 70 cm long shoots, air-dried them for 24 h, placed them on our 'plant BBQ' and measured several variables.



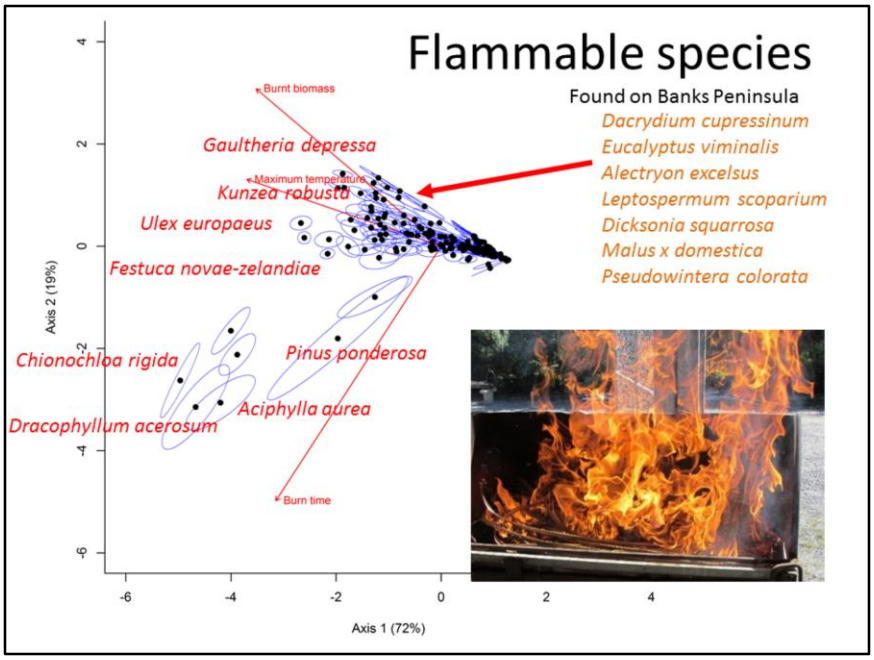
We used a statistical procedure known as principal components analysis to reduce our three variables down to one major axis (Axis 1). Species on the left of the figure are highly flammable, species on the right have low flammability.
These analyses are hot off the press.

Flammable species

Found on Banks Peninsula

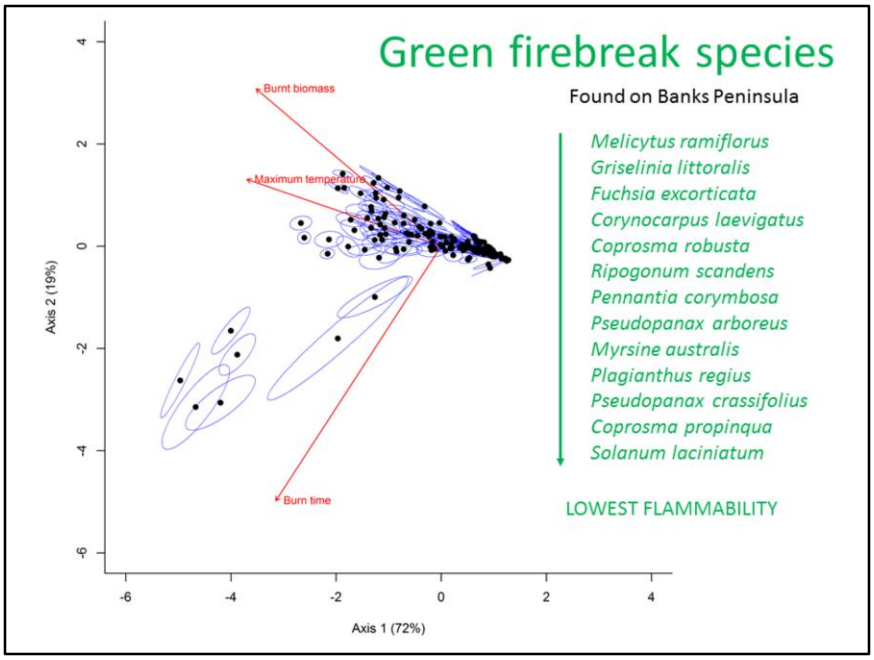


Flammable species



Found on Banks Peninsula

Dacrydium cupressinum
Eucalyptus viminalis
Alectryon excelsus
Leptospermum scoparium
Dicksonia squarrosa
Malus x domestica
Pseudowintera colorata


Green firebreak species
Found on Banks Peninsula
Melicytus ramiflorus
Griselinia littoralis
Fuchsia excorticata
Corynocarpus laevigatus
Coprosma robusta
Ripogonum scandens
Pennantia corymbosa
Pseudopanax arboreus
Myrsine australis
Plagianthus regius
Pseudopanax crassifolius
Coprosma propinqua
Solanum laciniatum
LOWEST FLAMMABILITY
Burnt biomass
Maximum temperature
Burn time
Axis 1 (72%)
Axis 2 (19%)
-6
-4
-2
0
2
4

Design principles for green firebreaks

Green Firebreaks

Working in Partnership with Porirua City Council

PORIRUA CITY COUNCIL

Slope of land	Recommended width of Green Firebreak*
Flat (0–10°)	5–7m wide
Slightly sloping (11°– 20°)	7–10m wide
Steeply sloping (21°– 45°)	10–15m wide
Almost vertical (46°– 90°)	25m wide

** The width of the green firebreak may vary depending on the vegetation bordering the break.*

See http://www.cfa.vic.gov.au/plan-prepare/landscaping/

Guidelines on preparing home for bushfires

Green firebreak width should reflect slope of adjoining land (fires are faster and more intense on steeper slopes) and flammability of adjacent vegetation. Steeper slopes and more flammable vegetation will require wider green firebreaks.

No such thing as a fire-proof plant

Cornwallis, Auckland. Photo: George Perry

So green firebreaks offer potential to help manage fire and, if natives used, improve biodiversity, but…there is no such thing as a fire-proof plant. Given the right conditions (e.g. extreme fire weather), any plant will burn.

Collaborators and funding

- Azhar Alam
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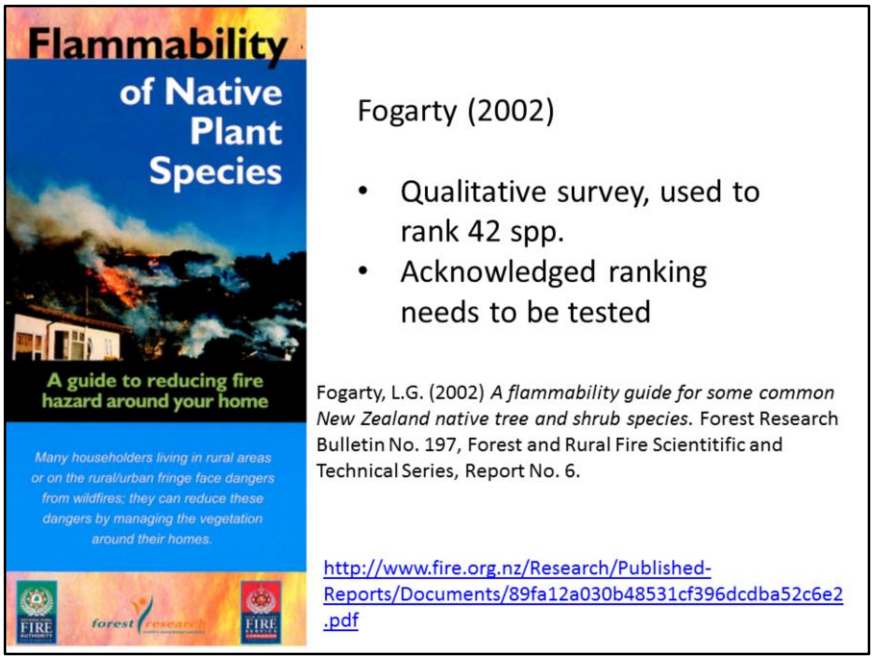
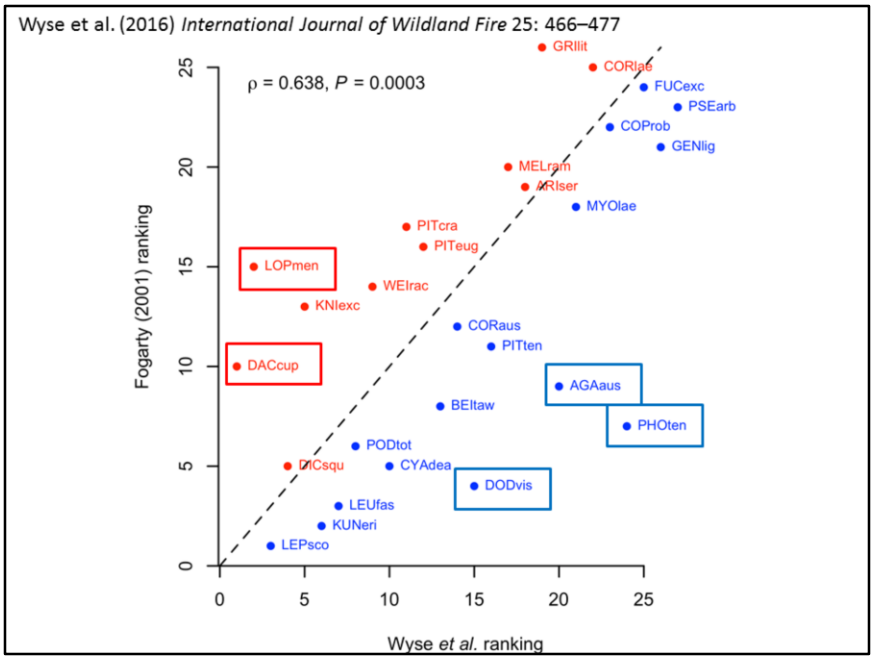
NATIONAL RURAL FIRE AUTHORITY
Te mana ahi manaha o te motu

Watch this space for the full updated list of plant flammability and brochure that we are preparing for the National Rural Fire Authority.



How have others ranked flammability in NZ? Liam Fogarty's research was used to produce this brochure.



We compared rankings from our shoot flammability measurements to Fogarty's ranking based on expert opinion. Species in blue denote those that had lower flammability ranking in our tests, red colours are those species that have higher flammability ranks in our tests. Boxes represent those species that differed considerably in ranking between the two studies.

Spearmans rank correlation found a significant positive relationship between our rankings and those of Fogarty, suggesting expert opinion is largely supported by our tests

There were, however, some important differences for certain species; e.g. rimu (DACcup) and silver beech (LOPmen) had considerably higher flammability in our tests, while flax (PHOten), kauri (AGAaus) and akeake (DODvis) had lower flammability