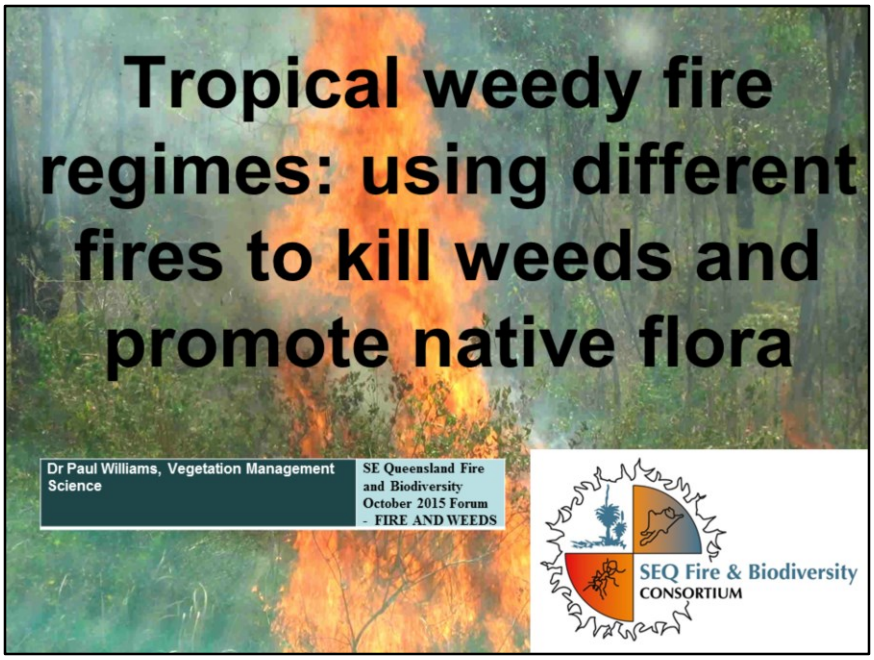


The presentations today highlight the role of fire in managing a variety of weeds and argue for better links between fire and weed management.

In this talk I look at the role of fire in managing a range of tropical and subtropical weeds. Often the weeds within a management area respond differently to fire. I think progress lies in
implementing different types of fires in the same area to manage different weeds and promote native flora.

I also would like to suggest we should keep an eye on what fires promote native plants over weeds

Tropical weedy fire regimes
Dr Paul Williams, Vegetation Management Science -
http://www.vegetationscience.com.au/

SE Queensland Fire and Biodiversity October 2015 Forum - FIRE AND WEEDS
http://www.fireandbiodiversity.org.au/pastConferences.html

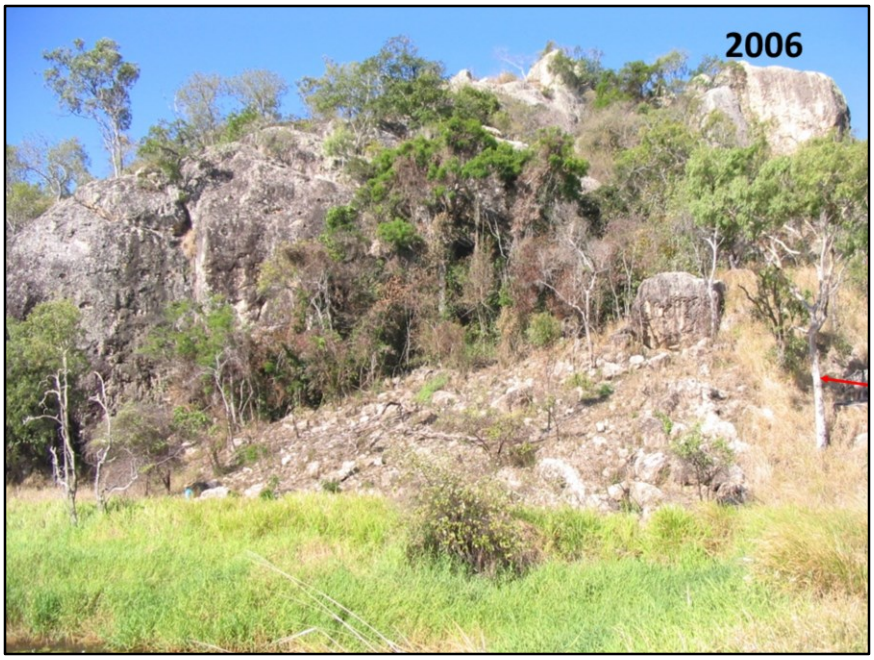
Lantana smothered vegetation: The main impacts of weeds are their high biomass that smothers native flora and their role in increasing fire intensity

Fire photo: Problem fire regimes promote dense weed germination and increases in weed biomass

Para killed paperbarks Common: 1 of 2 :Weeds can affect fire regimes, by altering fuel characteristics. Fire intensity & frequency can be increased by high biomass grass weeds. These photos show paperbark trees killed by high intensity fire fuelled by Para grass.

Para killed paperbarks Common: 2 of 2 Weeds can affect fire regimes, by altering fuel characteristics. Fire intensity & frequency can be increased by high biomass grass weeds. These photos show paperbark trees killed by high intensity fire fuelled by Para grass.

Dry Rain Forest (DRF) before and after fires: 1 of 3 Exotic grasses draw fire into fire sensitive vegetation
These photos show a fire damaged dry rainforest patch as a result of guinea grass invasion



Dry Rain Forest (DRF) before and after fires: 2 of 3 Exotic grasses draw fire into fire sensitive vegetation
These photos show a fire damaged dry rainforest patch as a result of guinea grass invasion

Dry Rain Forest (DRF) before and after fires: 3 of 3 Exotic grasses draw fire into fire sensitive vegetation
These photos show a fire damaged dry rainforest patch as a result of guinea grass invasion

Lion’s tail (*Leonotis nepe*tifolia): If a weed's dominance is due to germination of massive numbers of plants, then fire is likely to promote its impact. Post fire herbicide can be useful.
http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Leonotis_nepetifolia.htm

Lantana camara: If the weed's dominance is due to massive -sized plants, temporary reduction in its biomass can benefit native flora

Praxelis clematidea:

Short lived weed with massive germination

Regular fire promotes Praxelis density and its a negative impact on native flora

Praxelis : The difference in weed ecology and fire influence can be seen in two related weeds - Praxelis and Siam weed. The smaller, mass germinating short lived Praxelis forms a mat of many plants to smother out natives. Regular fire promotes its density and impact, if not herbicided.
https://www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/praxelis

Siam weed:

Long lived weed with moderate germination but continuous biomass growth

Regular fire can reduce impact on native flora

Siam weed (*Chromolaena odorata*) : Siam weed forms large thickets like lantana. Fire can reduce Siam weed impact by reducing the biomass and killing small plants https://www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/siam-weed

Rubbervine (*Cryptostegia grandiflora*) before & after: 1 of 3
Some woody weeds, eg rubbervine are very fire sensitive. Fire can kill reduce these while promoting native flora
https://www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/rubber-vine

Rubbervine (Cryptostegia grandiflora) before & after: 2 of 3
Some woody weeds, eg rubbervine are very fire sensitive. Fire can kill reduce these while promoting native flora
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Rubbervine (Cryptostegia grandiflora) before & after: 3 of 3
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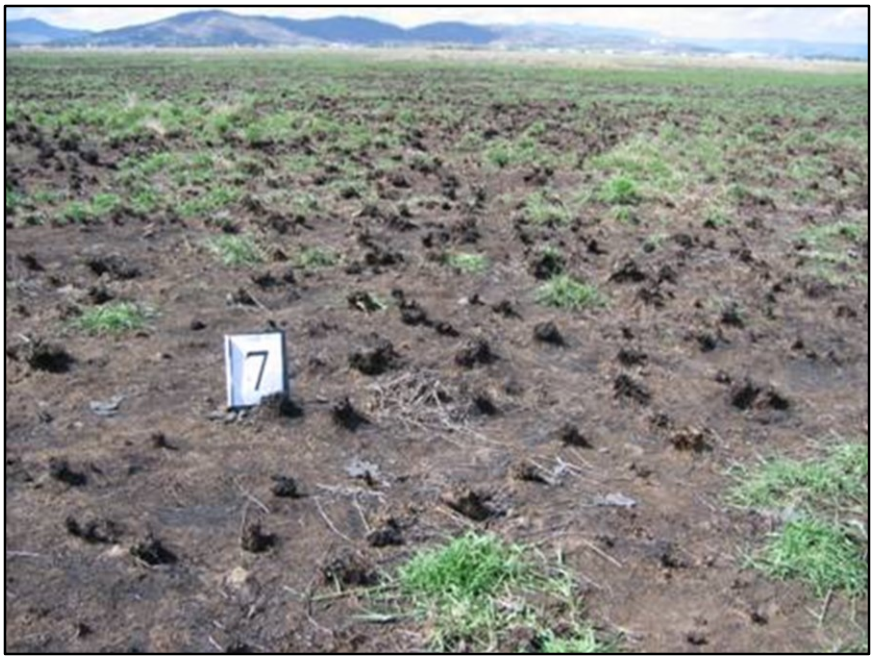
4WD in Para Grass (*Urochloa mutica*): For weeds that dominate by a steady increase in plant biomass, burning provides temporary removal of that biomass. https://www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/para-grass

Common Para grass (*Urochloa mutica*) trial, Gavin Blackman in Bulkuru in 1970. Para grass is a severe problem to wetlands throughout eastern QLD. In the Townsville floodplain it smothered a diverse seasonal floodplain of sedges and native grasses and herbs. Photo 1 of 2
https://www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/para-grass

Para grass (*Urochloa mutica*) same area 2006 photo 2 of 2.

Cattle in paddocks: Ten years ago we did a trial jointly by QPWS and CSIRO looking at fire and grazing for control. Cattle grazing just mowed the para grass (*Urochloa mutica*) to low plants.
https://www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/para-grass
Photo 1 of 6.



But, fire removed the thatch layer & killed some clumps. Photo 2 of 6.

Helicopter photo of burnt area: photo 3 of 6. Fire also reopened some channels.

Aerial showing water in channel. Photo 4 of 6.

Fire was essential for promoting a range of native flora. eg Wild rice (*Orzya meridionalis*). Wild rice was not known to occur on the Town Common until it appeared in gaps in para grass created by burning. Photo 5 of 6.

The role of fire in germinating Wild Rice (*Oryza meridionalis*), an annual grass of northern Australian wetlands threatened by exotic grass invasion

Source: Ecological Management and Restoration, Vol 12/1 April 2011

Author/s: Paul Williams, Eleanor Collins, Anthony Grice, Mike Nicholas and Justin Perry

"*Para Grass (Urochloa mutica (Forssk.) Nguyen) has invaded large areas of north Australian wetlands, out-competing native flora. Post-fire observations indicated that the native grass, Wild Rice (Oryza meridionalis Ng), re-established where gaps in Para grass mats had been created by burning. We tested whether it was fire itself or simply the removal of Para Grass that promoted Wild Rice, by subjecting comparable buried seed batches to one of three treatments: fire (at two intensities) and no fire. Subsequent germination tests confirmed current laboratory research that suggests post-fire promotion of Wild Rice is not a function of fire per se (neither heat or smoke) but is likely to be due to the removal of the smothering grass layer, even though fire is a efficient way of removing Para Grass.*"

Read more: http://onlinelibrary.wiley.com/doi/10.1111/j.1442-

8903.2011.00564.x/abstract

Magpie Goose (*Anseranas semipalmata*) Nest within the wild rice (*Orzya meridionalis*)
The Magpie Goose is a specialized feeder with wild rice, Oryza, Paspalum, Panicum and spike-rush, Eleocharis, forming the bulk of its diet. - See more at: http://australianmuseum.net.au/magpie-goose#sthash.PbH8WRnS.dpuf

Photo 6 of 6.

Molasses grass (*Melinis minutiflora*). Photo 1 of 3.
Molasses grass appears to have an interesting fire ecology for a grass - it often is fire killed with massive germination that takes 2 years to mature. This means there is a year of native grass dominance and a follow up fire or herbicide treatment can reduce the population.
But it does not appear to be consistent, as it has been observed several times in Cairns & Townsville areas being fire killed, but after a wildfire at Keperra (SE Queensland) it's dense plants were presumably not killed & set seed the next year. It would be good to closely watch the response of Molasses grass following a rage of fires.

https://www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/molasses-grass

Molasses grass (*Melinis minutiflora*). Photo 2 of 3.

Molasses grass (*Melinis minutiflora*). Photo 3 of 3.

Grader grass (*Themeda quadrivalvis) Photo 1 of 2:* Grader grass is an annual with massive germination after disturbance including fire. Burning every few years promote it. Keeping fire out for at least 3 or 4 year leads to a reduction in plant numbers and soil seed bank.

https://www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds/photo-guide-to-weeds/grader-grass

Grader grass (Themeda quadrivalvis) Photo 2 of 2. So the crux of the matter is that different fire regimes are needed to manage different weeds that grow in the same area.

This means that where weed management criteria is high and it is possible to do so, we will sometimes need to implement a mixture of fire regimes within the same fire areas.

To achieve this we need to focus on how we implement the fires. Timing, weather conditions and ignition pattern.

Patchy spot ignition: I suggest it probably includes greater use of early boundary or patchy burns, to contain later weed control fires and protect some area from fire.

Line ignition: Ongoing refinements in ignition technique, so that we successfully use spot ignition to maintain patchy fires, and longer line ignition for faster fire spread where needed

Aerial ignition: Aerial ignition is very useful for reducing the solid burnt out areas near tracks and for burning around key features

Fire regimes will need to be flexible to respond to weed and native species interactions. Several fires in a row, linked with herbicide spraying and followed by a longer fire interval may be necessary to address the complex interactions between weeds, native species and fire.

In Summary

- Use different fire regimes to manage different weeds
- Typically, if a weed's dominance is due to germination of massive plant numbers, then fire is likely to promote its impact (but post-fire herbicide good)
- If the weed's dominance is due to large plants, burning can benefit native flora

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- To manage multiple weeds in the one area requires skilful implementation of fire
- Early burnt breaks can allow later fires to target a specific area
- Aerial ignition or air guns can reduce the amount of track edge burnt

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