Fire as an opportunity for weed management

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2006 trial of perennial veld control with Greening Australia and City of Wanneroo following February 2006 wildfire. Sprayed 100g/L quizalofop-p-ethyl (Tiger™) for two years.

Quizalofop very effective in controlling number and density of perennial veld

<table>
<thead>
<tr>
<th>Ehrharta</th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>0.080</td>
<td>3.42x10^(-2)</td>
<td></td>
</tr>
<tr>
<td>Seedling</td>
<td>0.071</td>
<td>1.80x10^(-4)</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>0.0012</td>
<td>0.062</td>
<td></td>
</tr>
</tbody>
</table>
The only layer that showed significant differences between the control and treatment was the weedy grass layer.

<table>
<thead>
<tr>
<th>Veg. Class</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Treatment</td>
</tr>
<tr>
<td>trees&lt;10m</td>
<td>0.13</td>
</tr>
<tr>
<td>shrubs1-2m</td>
<td>0.46</td>
</tr>
<tr>
<td>shrubs&lt;1m</td>
<td>0.87</td>
</tr>
<tr>
<td>herbs</td>
<td>0.71</td>
</tr>
<tr>
<td>grasses</td>
<td>0.58</td>
</tr>
<tr>
<td>sedges</td>
<td>0.16</td>
</tr>
<tr>
<td>weed herbs</td>
<td>0.79</td>
</tr>
<tr>
<td>weed grasses</td>
<td>0.04</td>
</tr>
</tbody>
</table>
Shirley Balla Swamp

Slide courtesy Vanda Longman

3 February 2014
devastation – hot summer burn

9 days later

Slide courtesy Vanda Longman
Perennial veld: resprouting and reseeding

early April 2014

August 2014

Slide courtesy Vanda Longman
Recovery of vegetation: treatment

Dec 2012
pre-fire, pre-spray

Oct 2013
pre-fire, one-spray

March 2014
44 days post-fire

Sep 2016
956 days post-fire

Nov 2014
281 days post-fire

May 2017
1194 days post-fire

Modified slide courtesy Vanda Longman
Recovery of vegetation: control

- **Before Fire**
  - July 2013
  - March 2014

- **44 days post-fire**
  - March 2014

- **39 months**
  - May 2017

- **29 months**
  - June 2016

- **281 days**
  - Nov 2014
visual estimates of understorey cover

B. Unsprayed
- Weed (non-grass)
- Weed (grass)
- Native (grass)
- Native (non-grass)

A. Sprayed
- Weed (non-grass)
- Weed (grass)
- Native (grass)
- Native (non-grass)

Month post-fire

Estimated cover (%)
Paganoni Swamp

Unburnt for >30 years, autumn prescribed burn in May 2011. 30 plots were established across a burn boundary immediately before the prescribed fire. Species richness and cover were measured two plus years after fire in spring 2013.

Brown K, Paczkowska G and Gibson N (2016) Mitigating impacts of weeds and kangaroo grazing following prescribed fire in a Banksia woodland Ecological Management & Restoration 17(2), 133-139
Three winters after the prescribed burn the average total overlapping cover of weeds across burnt plots in good condition bushland was 40.8%, significantly higher (p=0.011) than in unburnt plots at 23.3%.

The species that made the highest contribution to the increased abundance in the burnt sites were Hypochaeris glabra, Ursinia anthemoides and Annual Veldt Grass.

Pigface (Carpobrotus edulis), was present in 60% of burnt sites and was totally absent from unburnt sites.

Pigface has been successfully controlled.

Friends of Paganoni Swamp followed up extensively for the next few years and are still vigilant.

One overlooked population was discovered 2018, since removed.
The Spectacles

2012 weed mapping recorded 0.11ha pigface.

2014 Friends of the Spectacles and Parks and Wildlife began an annual hand removal program.

2015 hot summer wildfire

2015 – 16 annual control

2017 weed mapping records 18.35ha pigface an increase of greater than 160 times (16,682%).

We continue to plug away.
Port Kennedy

- 2005 established five 50m transects and measured all plants using point intercept
- Euphorbia terracina was sprayed with triasulfuron 12.5g/L for 4 years with transects scored prior to spraying
- Unplanned fire February 2008 with no weed seedling recruitment. Surprise! We expected mass germination. Does triasulfuron have a residual effect on soil stored weed seed? Native plant cover had an increasing trend before the fire.

![Euphorbia terracina mean cover](image)

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover</td>
<td>19.2%</td>
<td>1.2%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>


### Species that contributed to 90% of the significant change in cover and composition at Meelon Nature Reserve

<table>
<thead>
<tr>
<th>Species</th>
<th>2005 Average abundance</th>
<th>2011 Average abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Watsonia meriana var. bulbillifera</td>
<td>62.4</td>
<td>0.2</td>
</tr>
<tr>
<td>*Cyathochaeta avenacea</td>
<td>10.0</td>
<td>23.5</td>
</tr>
<tr>
<td>Chorizandra enodis</td>
<td>2.3</td>
<td>15.7</td>
</tr>
<tr>
<td>*Viminaria juncea</td>
<td>2.1</td>
<td>15.4</td>
</tr>
<tr>
<td>Caesia micrantha</td>
<td>2.6</td>
<td>2.7</td>
</tr>
<tr>
<td>*Briza spp</td>
<td>3.2</td>
<td>2.9</td>
</tr>
<tr>
<td>Eucalyptus wandoo</td>
<td>0.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Austrodanthonia acerosa</td>
<td>0.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Hypoxis occidentalis</td>
<td>0.0</td>
<td>1.9</td>
</tr>
<tr>
<td>Lepidosperma sp. WT2Q5</td>
<td>0.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Meeboldina sp.</td>
<td>0.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Dichopogon preissii</td>
<td>0.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Drosera rostulata</td>
<td>1.5</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Anosim comparing 2005 & 2011 (Global R): 0.6, P< 0.001
Bushfire account: Apply centrally with a bushfire rehabilitation plan – this covers restoring fire lines, infrastructure and weed management. Plans are approved by the Director of Regional and Fire Management Services (statewide pool) and funding is available for two consecutive years.

Prescribed Fire: Managers need to allocate some of the prescribed burning budget (salaries, contractors) for weed management. We are usually one season out and will manage weeds from previous year’s prescribed burn due to 1 July financial year.
**Euphorbia terracina** L. Geraldton Carnation Weed

Sp.Pl. edn 2, 1:654 (1762)

Conservation Code: Not threatened
Naturalised Status: Alien to Western Australia
Name Status: Current

**Brief Description**
Grzyna Paczkowska, Monday 2 September 1996

Erect or ascending perennial, herb, 0.1-0.5(1.2) m high. F. green-yellow, Aug to Dec. Sandy & calcareous soils. Disturbed coastal areas, swamps.

**Distribution**
Management Notes (for the Swan NRM Region)
Kate Brown and Karen Bettle, Thursday 21 December 2017

Alternative Names. False Caper, Geraldton Carnation Spurge, Terracina Spurge.


Notes. Most common on coastal sandy nutrient-poor calcareous soils, also capable of spreading into fertile inland soils, ephemeral wetlands and saline depressions. Invasion into natural areas is greatly enhanced by disturbance such as grazing, fire and soil movement. Once established is able to invade relatively undisturbed vegetation. Has allelopathic properties, can reduce germination of other plant species, form dense thickets and out compete native species for space, light and nutrients. Has rapid growth and prolific seed production in the first season. Can grow well or adapt to shade and high light conditions, tolerant of waterlogging and drought. Toxic sap deters native herbivores. Losses most of its leaves during summer. Germination may occur at any time of the year if there is adequate rainfall. If there is insufficient rainfall, depletion of the seed bank may be relatively slow. Plants from early cohorts produce greater numbers of seeds per plant than late cohorts. Disturbance that brings seeds to the soil surface should be avoided, as buried seed is far less likely to germinate. Mature plants have a deep root system and are able to resprout readily when cut, grazed or burnt. Similarly, seedlings are not easily killed through slashing or any physical means that do not remove the entire plant. Resprouting plants are often more robust and have greater seed output.

Additional Information. Origin. Mediterranean coast and islands, Canary Islands in the Atlantic, north of the Red Sea and the Black Sea to Georgia. History of use/introduction. The reasons for its introduction are uncertain, however many species of Euphorbia are used as ornamentals. Similar exotic species. E. peplus, E. paralias.

Suggested method of management and control. Logran® at 12.5 g/100L + the penetrant Pulse® is very effective on adults and juveniles with little off-target damage in coastal heathlands. Hand removal can stimulate germination of the soil seedbank. Ensure adequate personal protective clothing is worn to avoid contact with sap. Since seed production is highest from plants which emerge early, it is important to control early cohorts. If untreated when small these become increasingly tolerant to herbicides. Control of the late emergents before seed formation will prevent fresh seeds being added to the existing seed bank. Slash In November after seed production may result in no vegetative regeneration, due to lack of food reserves in the underground roots and stem - the remaining underground plant parts cannot withstand hot dry summer conditions. Undertake control after any fire event. Read the manufacturers' labels and material safety data sheets before using herbicides. For further information consult the Australian Pesticides and Veterinary Medicines Authority to determine the status of permits for your situation or state.

Management Calendar

<table>
<thead>
<tr>
<th>Calendar Type</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Dormant</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>O</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Active Growth</td>
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<td></td>
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<tr>
<td>Germination</td>
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<td>0</td>
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<td>Y</td>
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<td>O</td>
<td>O</td>
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<tr>
<td>Flowering</td>
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<td>O</td>
<td>O</td>
<td>Y</td>
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<tr>
<td>Fruiting</td>
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<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>Y</td>
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<tr>
<td>Manual Removal</td>
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<td>Herbicide Treatment</td>
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<td>O</td>
<td>O</td>
<td></td>
</tr>
</tbody>
</table>

Legend: Y = Yes, regularly, O = Occasionally, U = Uncertain, referred by others but not confirmed.
References

Opportunities

• Weeds can rapidly colonise the open spaces and use the available nutrients released by fire, outcompeting natives.

• Fire can provide an opportunity for control of invasive species by killing adult weeds, by providing physical access to sites for manual or herbicide control and by depleting the soil seed bank.

• Unplanned fire can be an agent that increases the pace of weed invasion or can be used as an opportunity to improve bushland condition by assisting the regeneration of native species through weed management.