FIRE and THE ENDEMIC FLORA OF THE STIRLING RANGE AND PORONGURUP NATIONAL PARKS

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INTRODUCTION

The endemics of the two parks and their fire responses are detailed seperately under each park.

STIRLING RANGE

Flora and Vegetation

Because of its geographic location, geology and topography the Stirling Range has even by Western Australian standards, a rich and varied flora and a diversity of plant communities. The total flora list currently stands at 1,517 taxa (Keighery,1993). The Range is the centre of diversity for the typical southern Western Australian families, the Proteaceae and Epacridaceae, and contains approximately 37% of the known flora of southern Western Australia within its boundaries, including 82 endemics!

Five major plant communities were distinguished by Beard (1979) and Keighery and Beard (1993) in the Park. They are thicket, mallee-heath, woodlands, wetlands and salt lake communities.

1) Thicket

This community is usually dominated by *Kunzea montana* (mountain kunzea), *Dryandra* species, *Nemcia* species, *Adenanthos filifolia* (Stirling Range woolybush), *Banksia solandri* (Stirling Range banksia) and *Banksia brownii* (feather leaved banksia). Thicket occurs on the upper levels of all major peaks, and some lower minor hills, including the Hamilla Hills. Composition varies from the drier, lower western peaks to the wetter eastern peaks. Mallee shrubs become a dominant feature of thicket on Mondurup Peak.

2) Mallee Heath

Mallee heath is the common plant community of the Range, varying greatly in composition. It can, however, be subdivided into two major types based on the dominant emergent mallee.
One is dominated by Mallee Jarrah (*Eucalyptus marginata*), and is found on mountain tops and slopes. This community merges into the thicket.
The other is dominated by tallerack (*Eucalyptus tetragona*) mallee. Within this widespread community local areas may be dominated by apple mallee (*Eucalyptus buprestium*), Talyuberup mallee (*Eucalyptus*

talyuberup) or mixed combinations of these and slender mallee (*E. decurva*).
The sand ridges and dunes around Lake Quarderwardup support true Mallee shrublands of *E.angulosa*, *E.decipiens* and *E.tetragona* , which do not have a heath understory.

3) Woodlands

Low Woodland
Between the mallee heath communities and the woodlands of the valley floors are low Jarrah-Marri (*E.calophylla*) woodlands, which line the deep valleys of the peaks. These have a rich and diverse understory of shrubs.
On the wetter eastern peaks, the high valleys often contain low woodlands of bullich (*E.megacarpa*) and karri oak (*Allocasuarina decussata*).
On the plains and valley floors on sandy soils are low woodlands of *Banksia attenuata*, and in the western half of the park low woodlands of *E.decipiens* also occur on sandy soils.
The few granite rocks, present near Lake Quarderwardup have a low woodland of rock sheoak (*Allocasuarina huegeliana*) around their base.
The salt lakes and swamps are margined by low woodlands of *Melaleuca cuticularis* or *Melaleuca rhaphiophylla* over sedges.(usually *Gahnia trifida*) and Grasses (usually *Stipa teretifolia*).

Woodland
The common woodland communities present in the Range are jarrah, marri and wandoo(*E.wandoo*). Rarer communities include flat-topped yate (*E. occidentalis*), flooded gum (*E.rudis*) and yate (*E.cornuta*). Jarrah-marri woodlands are normally found on sandy or lateritic soils, with marri or wandoo predominating on heavier soils. Flat topped yate occurs on winter wet swampy clay soils, while yate and flooded gum occur along creek lines. Whilst these communities normally occur in the valleys downslope of the low woodlands, there are patches of jarrah-marri woodland on the Bluff Knoll Plateau. Understories are very variable depending on soil type, aspect, soil depth and altitude.

4) Sedge Swamps
The only large unwooded freshwater swamp present in the Range is Pillenorup Swamp. This has a sedgeland of *Baumea articulata* at the centre, surrounded by low woodlands of paperbarks over sedges, which is the normal condition in other brackish swamps.

5) Samphire Communities

These low shrublands fringe the salt lakes present along the south-eastern margin of the park. The stem succulent shrubs of this community are largely species of *Halosarcia*, *Sarcocornia*, *Disphyma* and rarely *Tegicornia*. Normally associated with this community are sedges of *Gahnia trifida* and scattered trees of *Melaleuca cuticularis*.

This is the only community which does not readily carry a fire, all the other vegetation types, potentially will burn within 5-6 years after a preceding fire.

Endemics and Flora of Special Status

There are 101 taxa of flowering plants endemic to the Stirling Range (82 confined to the park, and another 19 endemic to the range), brief notes about their biology are contained in Keighery,1993. All of

these species, and nine others that are nearly confined to the park are listed in five categories below.

Category one (7 species)
Taxa that are subject to severe threat by dieback (*Phytophthora* species) disease, occurring in susceptible habitats and with a very restricted range. Require urgent management intervention.
All of these species are killed by fire.

Andersonia axilliflora
Banksia brownii
Dryandra montana
Lambertia fairallii
Leucopogon bracteolaris
Leucopogon gnaphalioides
Persoonia micrantha

Category two (24 species)
Taxa that are subject to severe threat by dieback, occurring in susceptible habitats, but with a wider range. Require urgent monitoring.
All of these species are killed by fire.

Adenanthos filifolia
Adenanthos linearis
Andersonia echinocephala
Banksia aculeata
Banksia solandri
Conospermum caerulescens ssp. *dorrienii*
Conospermum spectabilis
Darwinia collina
Darwinia meeboldii
Darwinia oxylepis
Darwinia squarrosa
Darwinia wittwerorum
Darwinia sp. nov. (GK5732)
Dryandra aff. *armata*
Dryandra sp nov.
Isopogon latifolius
Leucopogon acicularis
Leucopogon corifolius
Leucopogon lasiophyllum
Leucopogon lasiostachys
Leucopogon aff.*lasiostachys* (Powell 1241)
Petrophile carduacea
Sphenotoma drummondii
Verticordia carinata

Category three (31 species)
Taxa that are potentially subject to threat by dieback, occurring in susceptible habitats, but often widespread. Require monitoring as susceptibility levels often not established.
Underlined species are not killed by fire, but resprout. A question mark indicates fire response is unknown. The remainder are killed by fire.

? *Aotus* aff. *genistoides* (GK1227)
? *Calothamnus affinis*
<u>*Calothamnus crassus*</u>
Darwinia hypericifolia
Darwinia lejostyla
Darwinia macrostegia

? *Daviesia glossantha*
? *Daviesia mesophylla*
Daviesia pseudaphylla
Hakea ambigua
Hibbertia selkii
Hypocalymma myrtifolium
Hypocalymma phillipsii
Hypocalymma speciosum
Kunzea montana
Kunzea recurva var *robusta*
Lambertia ericfolia
? *Latrobea* aff. *genistoides* (Strid 21563)
Nemcia crenulata
Nemcia leakeana
Nemcia formosa
Nemcia lehmanii
Nemcia pulchella
Nemcia pyramidale
Nemcia rubra
Nemcia vestita
Nemcia sp aff. *rubra* (GK 3446)
Nemcia sp. aff. *retusa* (GK 3379)
Petrophile anceps
Sphenotoma sp nov (Wilson 4235)
? *Verticordia brevifolia* ssp. *stirlingensis*

Category Four (26 species)
Taxa that are not subject to threat by dieback, endemic to the park, but often with a wide range . Require monitoring.

Underlined species are not killed by fire, resprout. A question mark indicates fire response is unknown. The remainder are killed by fire.

Acacia veronica
? *Agonis linearifolia* var *conspicua*
Caustis sp nov (GK 1127)
Gastrolobium aff. *velutinum* (GK 5407)
? *Gompholobium* aff. *burtonioides* (GK 3506)
Gonocarpus rudis
Gonocarpus aff. *diffusus* (GK1222)
? *Lasiopetalum dielsii*
Lepidosperma sp nov (GK 2316)
Lepidosperma sp nov (GK 2310)
? *Melaleuca propinqua*
? *Pultenaea* aff. *aspalanthoides* (Royce 6067)
? *Rinzia morisonii*
Schoenus sp nov (GK 3427)
Restio ornatus
Rumicastrum chaemacladum
Spyridium aff. *globosum* (GK 6193)
Stylidium keigheryi
Stylidium spinulosum ssp. *montana*
Stylidium verticillatum
Stylidium aff. *glaucum* (GK 1217)
Thomasia aff. *brachystachya*
Velleia exigua
Velleia foliosa
Xanthosia collina
Xanthosia rotundifolia var *hypoleuca*

Category Five (3 species)

Taxa that exist as very small populations in the park and are declared rare, because of their vulnerability to any form of disturbance.
Acacia awestoniana
Eucalyptus erectifolia
Xyris exilis, (not susceptible to dieback, but confined to a single population in an area where the surrounding vegetation is severely affected by dieback).

CONCLUSIONS: STIRLING RANGE

Seventy seven of the endemics are killed by fire, and are obligate re-seeders, 12 other species are unknown in their fire response and 12 are re-sprouters. However, the greatest threat to the endemics is dieback disease, and the seven species in category one are in danger of extinction from the disease. Management of this threat must be the highest priority, and attempts at a less machine interventionist fire policy are imperative.

All of the endemics have been mapped in detail to assist in restricting fire effects to a proportion of their populations, since most are killed by fire. Fire is an integral part of the life cycle of many of the endemics, mass seedling recruitment occurs the winter after the fire. These seedlings grow and thin until flowering commences in most species 4-5 years after the fire. Drought conditions can delay flowering by 1-2 years. Mature flowering plants of most species are found 7-10 years after fire, and these continue to flower prolifically for the next 7 -10 years. In the cases studied many of the endemics are overtopped by other species after 12-20 years and decline in vigour and abundance, often not being recorded after 25 fire free years.

Obviously fires need to be at least 8-12 years (or greater) apart, with at least part of each species range being unburnt for 13-20 years. This would allow for post fire events such as drought to be incorporated in the fire plan.

PORONGURUP NATIONAL PARK

Vegetation and Flora

The Porongurup Range is the inland representative of the numerous granite monadnocks that line the coast of the Albany area. This combination of raised hills and granite soils allows a range of plant communities from tall Karri forest to low herblands to exist within the park. Approximately 700 species of vascular plants have been recorded within the park to date (Keighery,in prep). Of these 82 are weeds

At least 26 species occur here at the inland margins of their ranges, including Karri itself. This is the major feature of the flora of the range

Beard (1979) recognised the range as a separate vegetation system, the Porongurup System, characterised by the bare massive granite domes of the range encircled by karri forest. Four major plant communities occur within the park

1) Granite Outcrops
There are areas of moss fields on the open granite slopes, which support a rich herbfield of lichens, mosses and small flowering

plants. Along the rock rills, and glades, in deeper soils are shrublands of *Acacia heteroclita, Agonis linearifolia, Brachysema subcordatum* over sedges of *Lepidosperma? gladiatum* and herbs, such as *Stypandra grandiflora*. These areas contain most of the species endemic to the Range (in fact several are major components). Between this community and the karri forest are low woodlands of bullich or yate, often with the same understory as the rills.

2) Karri tall forest
Karri is centred on the creeklines and lower slopes of the range. This supports a variable dense understory of *Acacia urophylla, Trymalium floribundum, Hibbertia serrata, Pimelea sylvestris, Clematis pubescens, Kennedia coccinea* and *Senecio ramosissimus.* Several typical karri understory species are absent, including *Lasiopetalum floribundum, Chorilaena quercifolia* (karri oak) and *Acacia pentadenia* (karri wattle).
Many of the understory components are at their inland range limits (eg *Hibbertia serrata* and *Senecio ramossisimus*), as are more along the small creeklines in the forest (eg *Carex appressa, Rorripa dictyosperma* and *Gonocarpus diffusus*).

3) Jarrah, Marri forest to low woodland
On the lower slopes and poorer sandy, duplex or lateritised soils combinations of plant communities dominated by jarrah and/or marri occur. On the north west margin of the park jarrah occurs as low mallee trees on massive laterite.

4)Paperbark low open woodland
A small swamp dominated by *Melaleuca preissiana* occurs on the western margin of the park. This community extends outside the park.

Minor communities include mallee heath containing *Eucalyptus tetragona* and small areas of *Eucalyptus decipiens* mallee on along Millinup road. These communities previously occurred on cleared land south of the park.

The only community which does not readily carry a fire is the open granite outcrops (except the rock rills), all the other vegetation types, will burn within 5-6 years after a preceding fire.

Endemic Flora

Acacia heteroclita
ssp. *valida* Confined to rills and soil aprons of granite rocks. Killed by fire; begins to flower four years after fire.

Apium prostratum
ssp. *phillipii* Confined to creeklines; fire response unknown. Habitat invaded by the weed, forget-me-nots (*Myosotis sylvatica*)

Billardiera granulata Widespread in high elevation bullich and karri woodlands, and granite rock aprons. Killed by fire, but regenerates prolifically, flowering two years after the fire.

Brachysema subcordatum Confined to rills and soil aprons of granite rocks. Killed by fire; begins to flower four years after fire.

Conospermum caerulescens
ssp. *appressum* Restricted to one area of low woodland; probably killed by fire. Highly susceptible to dieback, its major threat.

Hibbertia bracteosa Confined to rills and soil aprons of granite rocks. Killed by fire (and the drought in 1986), but flowers within two years.

Stylidium corymbosum var *prolifera* Confined to moss swards and soil aprons of granite rocks. ?Killed by fire

Villarsia calthifolia Confined to rills, moss swards and soil aprons of granite rocks. Killed by fire, but regenerates prolifically, flowering two years after the fire.

Villarsia marchantii Widespread in high and low elevation creeks under bullich and karri woodlands, and granite rock rills. Killed by fire, but regenerates prolifically, flowering two years after the fire..

CONCLUSIONS: PORONGURUP NATIONAL PARK

These nine taxa, of which two are declared rare flora, are confined to the Porongurup Range. Most of these are killed by fire and regenerate from seed. However, many grow on the open granite rock slopes where fire is relatively uncommon. Massive seedling germination occured after a fire burnt some of the rock rills on Devils Slide. Time to flowering is rapid for the Porongurup endemics, usually 2-3 years after seedling germination, but reach maturity in 5-7 years.

GENERAL CONCLUSIONS

Both parks have vegetation that will carry fire after 5-6 years. Most of the endemic plants are killed by fire, and require more than this period to reach maturity. Dieback disease, narrow ranges and drought are added complications. The endemics require fire planning that incorporates these factors.

References

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