Vegetation within the Tasmanian World Heritage Area

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Abstract

The conservation status of the vegetation within the World Heritage Area (WHA) is assessed. The WHA covers almost 20 per cent of Tasmania and is therefore important for flora conservation. The vegetation type best reserved in the WHA is subalpine and alpine vegetation (70% of this vegetation type). The community least reserved is native grassland (four per cent of this vegetation type). Of the 20 Tasmanian endemic genera, only two are not represented within the WHA.

The communities are affected to varying degrees by fire, the spread of plant diseases, the presence of exotic plants, trampling and effluent pollution.

Introduction

The varied geology, soil, topographic relief and fire frequency have given rise to the diverse flora in the World Heritage Area (WHA). Such is the size and heterogeneity in the landscape of the WHA, that it harbours a wealth of habitats supporting many unusual plant taxa and communities. The location of the WHA in the coolest and wettest region of the Australian continent contributes, in part, to its distinctive flora. Two-thirds of Tasmania's endemic higher plant taxa are present in the area; about half of these being dependent on the area for most of their distribution. The area contains numerous vascular (higher) plant species (many endemic to Tasmania) listed as rare or threatened. It is also likely to be correspondingly important for the conservation of lower plant species, although knowledge of these species is as yet only fragmentary. This paper reviews the vegetation types within the WHA and provides a summary of the information available in the Resources and Issues document for the World Heritage Management Plan (Department of Parks, Wildlife and Heritage 1991).

Table 1 presents the areas of each vegetation type in Tasmania, within the WHA, and for State Reserves and other reserves with a nature conservation function outside the WHA.

Alpine and subalpine treeless vegetation

The alpine zone occupies the higher peaks and plateaux above the climatic treeline. The treeless plant communities of the alpine zone extend below the climatic treeline into areas with impeded drainage and high wind exposure where factors other than temperature prevent tree growth. The climatic treeline varies from approximately 800 m near the coast, as on the Ironbound Range, to 1200 m in the more inland regions, such as the King William Range (Kirkpatrick 1982). It corresponds with the altitude at which the mean summer temperature is 10°C.

Alpine vegetation is the best reserved of any vegetation type in Tasmania, with 70 per cent occurring within the WHA (Table 1). The area of alpine and subalpine vegetation in Tasmania is estimated at 202 350 ha (Table 1). An almost complete range of floristic assemblages within the alpine zone across Tasmania is represented in the WHA. Forty-two of the 43 alpine communities identified in Tasmania (Kirkpatrick 1986) are known to occur within the WHA. The alpine zone is

Table 1. Vegetation types and status as at 1990 (source : Kirkpatrick and Dickinson 1984).*

Vegetation type (1)	Area of each vegetation type (1) in						Contribution of WHA to conservation status	Proportion of of vegetation types (1) in WHA
	Tasmania		State reserves outside the WHA	Other types of nature reserves outside the WHA (2)	WHA			
	ha	%	ha	ha	ha	%	%	%
	a		b	c	d		d x 100/(b+c+d)	d x 100/a
i) Cool temperate rainforest								
• Rainforest	708 680	11	2 690	5 540	325 060	24	98	46
• Recently burnt rainforest	56 360	1	1 130	11 260	8 730	< 1	42	16
ii) Sclerophyll forest and woodland								
• Wet sclerophyll and mixed forest	1 319 270	27	26 520	28 230	183 920	14	77	14
• Dry sclerophyll and woodland	1 750 510	20	49 690	32 230	82 200	6	50	5
iii) Western moorland and scrub	1 145 940	17	6 960	92 520	573 240	42	85	50
iv) Subalpine and alpine vegetation	202 350	3	15 200	7 530	142 540	11	86	70
v) Coastal vegetation (3)	222 510	3	12 730	18 380	1 040	<< 1	3	< 1
vi) Native grassland	58 700	1	70	440	2 490	<< 1	83	4
OTHER (including cleared areas, wetlands etc.)	1 195 140	17	690	7 630	35 090	3	–	
TOTAL	6 788 730	100	115 920	203 760	1 354 510	100	81	20

(1) See Duncan 1986 for definition of types.
(2) Land tenures included are Aboriginal sites, coastal, Crown, forest, game, lakeside, nature and river reserves, protected area and state recreation area.
(3) Due to the inability to map discrete coastal vegetation this type is under-represented.
<< = much less than
* Land tenure correct as at December 1990.

the single most important habitat for the endemic Tasmanian vascular flora, with approximately half of these 300 plants being found within this zone (Kirkpatrick and Brown 1984). Up to 60 per cent of the species present in the alpine flora are endemic to Tasmania. A high proportion of alpine species is from the relict Gondwanan flora, giving the alpine flora additional importance. Whilst few alpine plants are obligate to the alpine zone most are much less common below it.

The cold conditions and short growing seasons coupled with heavy snowfalls and strong ice-bearing winds make plant growth extremely slow in alpine areas (Billings 1974). Within this generally harsh environment in Tasmania's WHA is a great range of environmental niches. Each of these niches is occupied by a particular structural formation. Kirkpatrick (1983) identifies these as: deciduous heath (dominated by *Nothofagus gunnii*); coniferous heath (dominated by native conifer species including *Podocarpus lawrencei, Microstrobos niphophilus, Microcachrys tetragona* and *Diselma archeri*); bolster heath (dominated by the cushion-forming shrubs *Dracophyllum minimum, Abrotanella forsteroides, Phyllachne collensoi* and *Donatia novae-zelandiae*); alpine heath (shrub-dominated vegetation typical of skeletal soils and rocky ground); fjaeldmark (dominated by prostrate shrubs and recognised by the large area of exposed pebble cover resulting from extreme exposure to wind); fen (wetland or mire vegetation on soils which may be more nutrient rich and basic than other peatland habitats); bog (wetland or mire vegetation in which acidic peatland communities develop, e.g. *Sphagnum* mires); short alpine herbfield (dominated by a diversity of small herb species, occurring in areas of prolonged snow-lie); tall alpine herbfield (dominated by hard-leaved graminoids, such as the lillies *Milligania* and *Astelia*, and forbs, often occurring in places flushed with nutrients); and tussock grassland (dominated by the grass genus *Poa* and typical of areas with well-developed soils). Alpine heath is probably the most extensive vegetation type within the alpine zone in Tasmania.

Fire, trampling and past grazing have resulted in the most damage to the alpine areas of the WHA. Fire is particularly deleterious to alpine vegetation due to the slow growth rates of plants in this environment. In the 20 years between 1960 and 1980, 16 per cent of the alpine zone was burnt (Brown *et al.* 1983). Alpine gymnosperms and deciduous beech may be completely eliminated by a single fire event while most other shrubs suffer from a substantial reduction in cover (Kirkpatrick and Dickinson 1984). Trampling by walkers and subsequent erosion is also a serious threat to these communities (Calais and Kirkpatrick 1986). Those communities particularly at risk include the more poorly drained communities, with *Sphagnum* bogs being possibly the vegetation most sensitive to trampling. The Central Plateau area has been subjected to sheep grazing in the past, which resulted in rapid degradation of the landscape (Banks 1973).

Subalpine tree-dominated vegetation

Subalpine tree-dominated vegetation occurs in high altitude areas which commonly receive snow in winter but which are below the climatic treeline. Cold temperatures, strong winds, frost and snow limit tree growth, with a consequence that the tree-dominated vegetation ranges from open forests through woodland to open scrub.

Within the WHA, the species dominant in this vegetation include the trees *Eucryphia milliganii, Nothofagus cunninghamii, N. gunnii,* the conifers *Athrotaxis selaginoides, Diselma archeri, Phyllocladus aspleniifolius,* and the eucalypts *E. amygdalina, E. archeri, E. coccifera, E. dalrympleana, E. delegatensis, E. gunnii, E. nitida, E. pauciflora, E. rodwayi, E. rubida, E. subcrenulata* and *E. vernicosa*. The understoreys within these communities are most commonly composed of sclerophyll shrubs. The eucalypts may be able to

regenerate in the absence of fire at these altitudes when light is not limited, for example by the presence of rainforest elements in the vegetation. Where fires have occurred too frequently within the subalpine zone, trees are eliminated and the vegetation degenerates to moorland scrub communities.

Cool temperate rainforest

This is defined by Jarman and Brown (1983) as forest vegetation (trees taller than 8 m) dominated by species of *Nothofagus, Eucryphia, Atherosperma, Athrotaxis, Phyllocladus, Lagarostrobos* and *Diselma*. This vegetation type occupies 765 040 ha or 11.3 per cent of Tasmania. A total of 44 per cent of this vegetation type (including recently burnt rainforest) is found in the WHA.

Although nearly all the WHA below the treeline is climatically suitable for the growth of temperate rainforest (Jackson 1968), the formation covers less than 25 per cent of this area. This has been attributed to the sensitivity of rainforest to firing (Jackson 1968). It has been estimated that seven per cent of Tasmania's rainforests have been burnt in the last 30 years (Kirkpatrick and Dickinson 1984).

Jarman *et al.* (1984) recognised four major classificatory groups of rainforest. These are callidendrous, thamnic, implicate and open montane. A fifth minor group has also been recognised and is referred to as gallery rainforest. All groups are well represented in the WHA. These classificatory groups have been further separated into vegetation communities. Of the 34 Tasmanian temperate rainforest communities described by Jarman *et al.* (1984), 32 have been identified in the WHA.

Callidendrous rainforest refers to well-formed trees in forest dominated by *Nothofagus cunninghamii* and *Atherosperma moschatum*, with an open ferny understorey. It is often associated with nutrient rich soils and is the least well-reserved rainforest type. Thamnic rainforest has a well-developed shrub layer in the understorey and *Eucryphia lucida* is often present. Implicate rainforest communities have a dense tangled understorey which is continuous with the low broken canopy. Open montane rainforests form low open forests dominated by *Athrotaxis cupressoides*. The understorey forms a distinct layer well below the canopy with *Nothofagus gunnii* and *Diselma archeri* often present. Gallery rainforest refers to communities occurring along the margins of water bodies, such as rivers, creeks and lakes (Jarman *et al.* 1984). The characteristics of gallery rainforest often reflect the abutting vegetation or hinterland.

Rainforest is self-perpetuating in the absence of disturbance and is very fire sensitive and slow to recover. Limited seed dispersal mechanisms in many of the dominant taxa may prevent post-fire regeneration of communities isolated from seed sources. Particularly vulnerable are the gymnosperms (with the exception of celery-top pine) and deciduous beech communities which rarely recover after fire. The native plant disease myrtle wilt causes dieback in rainforest and is a serious management problem in areas of disturbed rainforest and mixed forest (Packham 1991). Other plant diseases which may become management problems for rainforest include dieback in King Billy pines associated with drought stress (A. Mills, pers. comm.); and *Phytophthora cinnamomi* which can infect rainforest soils and may slow down or inhibit regeneration after fire due to the susceptibility of many rainforest species to the disease (Podger and Brown 1989).

Sclerophyllous forests

Sclerophyllous forests of the WHA include wet eucalypt forests (including mixed forest), dry eucalypt forests, swamp forests and tea-tree forests. Only 19 per cent of Tasmania's sclerophyllous forests and woodlands are within the WHA but this represents 66 per cent of the area of these communities in protective land tenures.

Wet eucalypt forests have at least one subordinate stratum dominated either singly or in a mixture by rainforest trees (*sensu* Jarman and Brown 1983), broad-leaved shrubs or ferns (excluding bracken and resurrection plants) (Kirkpatrick *et al.* 1988b). The sclerophyll element of the understorey is often single aged and dense, preventing the eucalypts and other shade-intolerant species from regenerating in the absence of fire. Wet eucalypt forests may contain a population of eucalypts of a single age or may contain multiple-age eucalypts, depending on the severity of the last fire. In hot fire conditions, eucalypts may be killed but under other conditions are often able to survive. Wildfires tend to eliminate the understorey. At least 31 of the 65 wet eucalypt forest communities of Kirkpatrick *et al.* (1988b) are known to occur within the WHA.

Mixed forests were defined by Gilbert (1959) as forest vegetation with a rainforest understorey and an emergent eucalypt canopy. The study of Tasmanian wet eucalypt forests by Kirkpatrick *et al.* (1988b) included mixed forests but did not include a comparison of the rainforest strata found in these forests with the classification of Tasmanian rainforests by Jarman *et al.* (1984). However, it is likely that most rainforest types may be present in the range of mixed forests. Those unlikely to be included are the rainforest communities containing the fire sensitive conifers - Huon pine *(Lagarostrobos franklinii)*, King Billy pine *(Athrotaxis selaginoides)* and pencil pine *(Athrotaxis cupressoides)* - or deciduous beech *(Nothofagus gunnii)*.

Stringybark (*Eucalyptus obliqua*) and Smithton peppermint (*E. nitida*) are found as emergents over much of the mixed forests in the WHA (Forestry Commission 1988). Stringybark is found on the better soils in the east, and Smithton peppermint on the poorer soils mainly in the west. The other eucalypts which are common in the WHA include *E. regnans* (the world's tallest flowering plant), *E. delegatensis, E. coccifera, E. brookeriana* and *E. subcrenulata*. Eucalypts are unable to regenerate beneath a closed rainforest understorey and so require a fire at least once in 400 years for their regeneration (Gilbert 1959; Jackson 1968).

Tall eucalypt forest is defined as forest vegetation greater than 30 m tall (Specht 1972). The tall forests of the WHA are mostly mixed forest dominated by the ash species *Eucalyptus obliqua, E. regnans* and *E. delegatensis*. They represent the culmination of a remarkable evolution of the component species and communities. In order for these tall eucalypts to regenerate, the rainforest understorey must be killed by wildfire which may be hot enough to kill the standing eucalypts and any seeds which they have shed. It is only the seeds held in the small seed capsules at the time of the fire which can survive the heat.

Individuals of these species, particularly *E. regnans*, are relatively sensitive to fire and exemplify the apparent paradox that for their genetic material to survive they often are destroyed by the fires. This 'hot fire paradox' has its greatest expression in the high rainfall regions of the WHA. The tall forest ecosystems of the area are dynamic evolutionary products which are critically dependent on, and sensitive to, the intensity and frequency of fires. This is particularly true in this environment where the climax vegetation is rainforest.

Dry sclerophyll forests and woodlands of the WHA are dominated by a multi-aged eucalypt canopy and have a multi-aged understorey dominated by xerophytic hard-leaved shrubs (Duncan 1985). The ground layer may be composed of bracken, grasses or sclerophyllous monocotyledons (saggs) (Duncan 1985). In the WHA, dry sclerophyll communities are largely found at high altitudes. At least 15 of the 35 dry sclerophyll communities described by Duncan and Brown (1985) occur within the WHA.

Blackwood swamp forests dominated by *Acacia melanoxylon* are largely restricted to the north-west of Tasmania. However, small

pockets of rainforests with an emergent canopy of *Acacia melanoxylon* do occur within the WHA along the major south-western river systems, such as the Franklin and lower Gordon Rivers. In addition to these, tea-tree dominated swamp forests occur in these riparian habitats. An ecological study of swamp forests in Tasmania has recently commenced.

Buttongrass moorlands and scrub

About 40 per cent of the WHA is covered by moorland vegetation dominated by buttongrass *(Gymnoschoenus sphaerocephalus)*. Buttongrass moorlands are associated with the poorest soils and bad drainage in western Tasmania where fires are frequent. Where fire frequencies are high, moorlands extend up ridges and onto plateaux. This vegetation is considered to be a primary fire sere in the succession of vegetation to rainforest, the climax vegetation for the area (Jackson 1968). Buttongrass may be found in a mixture with other sedges, rushes, tea-trees, paperbarks and heaths, or it can form pure communities in which the sedge forms large hummocks. Buttongrass moorland has been divided into two groups - blanket moorland (typical of western Tasmania) and eastern moorland (Jarman *et al.* 1988). Blanket moorland is better represented in the WHA than the eastern moorland communities. The WHA contains half of Tasmania's moorland vegetation and includes at least 20 of the 25 buttongrass moorland communities described by Jarman *et al.* (1988).

There are also substantial areas of scrub and heath communities dominated by tea-trees (*Leptospermum* spp.) and paperbarks (*Melaleuca* spp.). These typically occur around the margins of buttongrass plains, on poorly drained sites and where fire frequencies are high. The low light levels that penetrate through the canopy of these communities are sufficient to support a tangled growth of cutting grass *(Gahnia grandis)* and bauera *(Bauera rubioides)*.

Some of the moorland and associated scrub/heath communities are restricted to the WHA. Of particular interest, and concern for management of rare species, are the communities found on the alkaline pans in the Hardwood, Olga, Maxwell and Davey River valleys. These alkaline pans result from the outcropping of limestone and support several rare plant species including the Tasmanian endemic *Milligania johnstonii* (Brown *et al.* 1982).

Buttongrass moorland communities and to a lesser extent scrub are susceptible to the plant disease *Phytophthora cinnamomi* (Podger *et al.* 1990). This disease is now widespread along roadsides and along track routes in south-western Tasmania and causes the death of many species within moorland communities. The effects of the disease when combined with fire are not well understood but may be more severe.

Moorlands, being waterlogged for much of the year, are also sensitive to trampling. However, except where very serious peat erosion has taken place, the vegetation is able to recover relatively quickly. Moorland communities are typically dominated by heaths and monocotyledons adapted to low nutrient conditions. They are therefore very susceptible to changes in nutrient conditions. Management of sewage effluent is therefore important in these communities as is the use of phosphorus-based foam fire retardants. Fire management of moorlands and scrub is a serious issue in the WHA due to the presence of many fire-sensitive communities juxtaposed to the moorlands and the flammability of the moorlands.

Grassland

The WHA reserves only four per cent of the total area of native grassland. However, it contains a substantial area of Tasmania's high altitude native grassland, including ten of the 37 grassland and grassy woodland communities, some of which are the product of firing of rainforest (Ellis 1985) and some of

which are probably edaphic/climatic in origin (Kirkpatrick *et al.* 1988a). Furthermore, grasslands are very poorly reserved with only another 510 ha of the type occurring on land tenures set aside for nature conservation outside the WHA.

The Central Plateau area offers perhaps the best examples of native grassy vegetation in the WHA, although much has been subject to pressures from summer sheep and cattle grazing in the past. Firing for improved grazing has resulted in the reduction of grass dominance in favour of shrubs despite the short-term increase in the proportion of palatable plant growth. The latter effect has caused increased rabbit populations which have in turn added to the grazing pressures and resultant erosion problems. Fire management of grasslands to maintain and enhance floristic diversity has yet to be determined. Similarly, other management issues such as the impact of horse riding, are yet to be determined.

Grassy communities are described in detail in Kirkpatrick and Duncan (1987) and Kirkpatrick *et al.* (1988a), while grazing impacts on the Central Plateau are discussed in Gibson and Kirkpatrick (1989).

Coastal vegetation

Vegetation in the coastal environment has a high exposure to strong salt-bearing winds. The vegetation changes rapidly from the sea edge along a salt spray gradient, and is strongly affected by the geomorphology (sand dunes, cliffs etc.). The vegetation continuum within this environment ranges from open herbfields just above the high tide level to closed scrub communities with or without an emergent eucalypt stratum (Moscal 1979). Although no systematic classification of the Tasmanian coastal environment has thus far been produced, localised studies and general accounts exist (Moscal 1979; Kirkpatrick 1977; Kirkpatrick and Brown 1984). However, a statewide survey is now in progress (J.B. Kirkpatrick, pers. comm).

Erosion is the most serious management problem for this vegetation type due to the general instability of the sandy substrate. Fire, trampling and other forms of vegetation clearance may result in an increase in erosion rates. Coastal areas are subjected to frequent firing due to the strong winds and frequent ignition sources. The relationships between fire and vegetation within this environment have not been clearly established.

A major walking track (the South Coast track) and other popular routes extend along parts of the coastal region within the south-western part of the WHA. These provide the greatest threat to the integrity of this vegetation due to clearance for campsites within dune swales and the location of track routes along the dunes themselves.

Coastal vegetation occupies only about 1040 ha of the WHA. The total number of coastal plant communities within the WHA is not known. A major study of the coastal vegetation of Tasmania is currently in progress but is not yet complete.

Other specialised habitats

Specialised communities occur in more restricted habitats. Of particular note is the wide range of aquatic ecosystems. Owing to their unusual hydrological properties, Lake Sydney and Lake Timk, beneath Mount Bobs and Mount Anne respectively, have developed interesting marginal herbland communities while the Snowy Range contains examples of the dynamic string bog systems involving bolster plants. The meromictic (stratified) lakes and coastal lagoons with their unusual micro-organisms are two other examples of important wetland habitats. Such habitats offer specialised niches for rare and restricted endemic plants. Limestone and dolomite substrates, whether on lowland plains, riverine cliffs or at high altitude, are also important habitats for restricted and rare

plant species. *Sphagnum* peatland communities are rare in Tasmania, but few higher plant species are restricted to this habitat (Whinam *et al.* 1989).

Endemic, rare and threatened species and communities

The WHA is rich in habitats containing rare and endemic plant taxa. It contains approximately 240 Tasmanian endemic higher plant species, of which about half have most of their distribution within the WHA. Of the 20 Tasmanian endemic genera, only two are not represented within the WHA. Most of the species in genera with a Gondwanan distribution are present.

The WHA contains populations of approximately 50 threatened species including *Centrolepis pedderensis, Lomatia tasmanica, Milligania johnstonii, M. longifolia* and *Oreomyrrhis gunnii.*

In general within the WHA, the rainforests, alpine and riparian communities are the richest in rare and endemic plant taxa. The moorlands of the far south-west are also important habitats for restricted endemic taxa including species such as *Winifredia sola* and *Haemodorum distichophyllum.*

Several rare Tasmanian endemic species are now known only from alkaline habitats of the south-west. These include *Milligania johnstonii,* occurring in alkaline pans, and *Centrolepis paludicola* on sandy shores of alpine tarns. Riparian limestone cliffs of the Franklin and lower Gordon Rivers are the habitat for *Milligania longifolia* and *Oreomyrrhis gunnii,* while the high altitude dolomite outcrops in the karst country of Mount Anne are the only known locality of *Oreoporanthera petalifera* and *Sagina* sp. nov. Several Tasmanian endemics are largely confined to coastal vegetation including *Cyathodes abietina, Westringia brevifolia* and *Gnaphalium* sp. nov.

Lower plants in the WHA are less well known than the vascular flora. This non-vascular flora represents a significant proportion of the plant species diversity in some areas; for example, lichens and bryophytes outnumber higher plants by two to one on Mount Sprent (Kantvilas and Jarman 1991). The percentage of endemic species in the non-vascular flora is likely to be lower than for the higher plant taxa due to the generally lower rate of endemism exhibited by this flora on a world-wide basis (Kantvilas *et al.* 1985). However, some rare and endangered lichen species have been recorded in the WHA (Kantvilas 1988, 1989; Kantvilas and Jarman 1991). Similarly, some endemic bryophytes have been recorded in the WHA (Kantvilas and Jarman 1991).

The lakes within the area are unique on a global scale and contain many endemic species of microflora (Bowling and Tyler 1984). The lakes and their biota change dramatically across the geologic line separating the fold structural province from the fault structural province. To the east, a 'green window' light regime dominates as opposed to the 'red window' light regime to the west. Some of the lakes in the Southern Forests area, such as those in the Denison Range, are a significant transition in terms of the east-west divide. These lakes contain endemic, possibly rare, species of algae such as *Thecadiniopsis tasmanica.*

The meromictic lakes of the lower Gordon River (thought to be the shallowest in the world) and other water bodies of the WHA such as coastal lagoons are of great importance for the conservation of a rich microflora and fauna (King and Tyler 1978).

Conservation

It can be seen from the above discussion that the WHA contains a good representation of many of the dominant vegetation types occurring within Tasmania, as well as many of the rarer communities and species. Alpine vegetation, buttongrass moorland and scrub communities are the best reserved vegetation types within the WHA. Several specialised

habitats, and rare and threatened species and communities are also well represented or totally reserved within the WHA. Other vegetation types remain poorly reserved but are presently best reserved within the WHA (e.g. grasslands).

Several factors and threats have, and will continue to have, implications for the integrity and conservation of flora within the WHA. The most serious of these include fire, the spread of plant diseases such as myrtle wilt and *Phytophthora cinnamomi*, the presence and spread of exotic plants from disturbed areas such as roadsides, quarries etc., trampling, and pollution from sewage effluent into communities adapted to nutrient poor conditions (e.g. *Sphagnum* communities). The severity of the threats to the floristic integrity varies in different communities.

One of the difficult issues for management of the flora of the WHA is fire. The aims for fire management of the flora of the WHA include:

- the protection of fire-sensitive vegetation from wildfire;
- the maintenance of appropriate fire regimes in fire-adapted and perpetuated communities; and
- the selective reduction of fuel loads in pyrogenic and fire-adapted communities by hazard reduction burning.

Three categories of vegetation requiring different fire management considerations can be identified within the WHA:

(a) Fire-sensitive vegetation which may be destroyed by even a single fire, including forests of King Billy pine, Huon pine, pencil pine and deciduous beech, and alpine communities containing dwarf pines and deciduous beech. Most alpine communities are extremely slow to recover from fire, some requiring time periods in the order of hundreds to thousands of years, and may be included in this extremely fire-sensitive category. The difficulty these communities have in recovering from fire is largely due to the absence of seed sources after fire. Consideration may be given in the future to the collection of seeds for aerial sowing after wildfire.

(b) Slow-growing communities which are slow to recover from fire, which may be destroyed by particularly hot or repeated fires, and which are not dependent on fire for their perpetuation, including most rainforest communities, *Sphagnum* peatlands and subalpine communities including eucalypt woodlands.

(c) Fire-adapted and perpetuated communities which require infrequent fire events (i.e. between 30 and 300 years) to facilitate the regeneration of the dominant or subdominant plant species and also to increase the species richness. Such communities include lowland wet and dry eucalypt forests, swamp forests and other sclerophyllous plant communities such as buttongrass moorlands including alkaline pans, scrub and coastal heaths. Grasslands may also fall into this category. Blackwood swamp forests may survive even longer fire-free intervals if the seed is able to remain viable for long periods in the soil.

At present the WHA is composed of a large number of plant communities represented across a wide range of fire ages so that there does not appear to be a need for planned burning in order to perpetuate any plant species. The only possible exception is an area of grassland in the Cradle Mountain area long unburnt and now relatively depauperate in forbs previously known to be present in abundance.

Fuel-reduction burning always carries the risk that the 'managed' fire will escape and become a wildfire. For this reason, the policy of the Department of Parks, Wildlife and Heritage is currently to restrict such burns to areas of known high fire risk, and areas

where the protection of assets from fire is particularly important. Areas of high fire risk include the Lyell Highway and the Scotts Peak Road, where arsonists have particularly easy access to the area. In addition, wood production areas bounding the WHA are a potential source of wildfire from escaped high intensity forest regeneration burns. Conversely, escaped wildfires from the WHA may also result in the extensive loss of commercial forests.

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