Department of Sustainability and Environment

Action Statement

Flora and Fauna Guarantee Act 1988 No. 238

Cool Temperate Rainforest

Dry Rainforest (Limestone)

Warm Temperate Rainforest (Coastal East Gippsland)

Warm Temperate Rainforest (Cool Temperate Overlap, Howe Range)

Warm Temperate Rainforest (East Gippsland Alluvial Terraces)

Warm Temperate Rainforest (Far East Gippsland)

Human activity which results in artificially elevated or epidemic levels of Myrtle Wilt within *Nothofagus*-dominated Cool Temperate Rainforest.

Preamble

This Action Statement has been prepared under the authority of Peter Harris, Secretary, Department of Sustainability and Environment in accordance with Section 19 of the *Flora and Fauna Guarantee Act 1988*.

This Action Statement covers all Victorian rainforest communities listed as threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act). It also deals with the potentially threatening process *Human activity which results in artificially elevated or epidemic levels of Myrtle Wilt within* Nothofagus*-dominated Cool Temperate Rainforest* which is also listed under the FFG Act.

The decision to address all of these items in a single Action Statement was taken to achieve greater efficiency in planning and implementation and in recognition that rainforest communities face many common threats.

The Action Statement is divided into three sections: the first section provides information on the nature and extent of the communities and the potentially threatening process; the second section provides brief discussion of the relevant management issues, previous management action and existing protection measures. The third section presents the management actions that the Victorian Government intends to undertake to conserve the communities and manage the potentially threatening process.

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Section I – Description of the items

Cool Temperate Rainforest

Description and Distribution

The following description of Cool Temperate Rainforest is from the Final Recommendation of the Scientific Advisory Committee (SAC 1992) in regard to Nomination Number 207 which forms the basis for the listing under the FFG Act.

The community is dominated by combinations of *Nothofagus cunninghamii* (Myrtle Beech), *Atherosperma moschatum* (Southern Sassafras), *Elaeocarpus holopetalus* (Black Olive-berry) and *Acacia melanoxylon* (Blackwood). The understorey is dominated by *Olearia argophylla* (Musk Daisy-bush), *Hedycarya angustifolia* (Austral Mulberry) and tree-ferns, with a ground stratum dominated by ferns. Epiphytes are abundant on the trunks of trees and tree-ferns.

In undisturbed conditions, Cool Temperate Rainforest has a closed canopy. It is sensitive to fire and can regenerate in the absence of fire. In the opinion of the Scientific Advisory Committee, Cool Temperate Rainforest can be defined in accordance with the definition of rainforest provided by the Rainforest Technical Committee (1986): 'Rainforest is defined ecologically as closed (>70% projective foliage cover) broad-leaved forest vegetation with a continuous rainforest tree canopy of variable height, and with a characteristic diversity of species and life forms. Rainforest includes closed transitional and seral communities, with emergent eucalypts, that are of similar botanical composition to mature rainforests in which eucalypts are absent. Rainforest canopy species are defined as shade tolerant tree species which are able to establish below an undisturbed canopy, or in small canopy gaps resulting from locally recurring minor disturbances, such as isolated windthrow or lightning strike, which are part of the rainforest ecosystem. Such species are not dependent on fire for their regeneration.'

In montane environments, the overstorey may be shorter and more open, with *Leptospermum grandifolium* (Mountain Tea-Tree) often co-dominant. The understorey lacks broad-leaved shrubs and includes Epacrid species such as *Leucopogon* species (Beard-heaths). Ferns and epiphytes are less common and forbs more abundant.

Cool Temperate Rainforest occurs in the Otway Ranges, Central Highlands, South Gippsland and East Gippsland. The East Gippsland stands have affinities with stands in southern New South Wales, while the remaining occurrences dominated by Myrtle Beech are referable to the more extensive Cool Temperate Rainforests in Tasmania (Peel 1999).

Habitat

Cool Temperate Rainforest is found in the wettest, most climatically fire-protected niches and is almost entirely restricted to deeply dissected foothills, gully systems of mountain ranges and montane plateaus. These are primarily along south facing gullies, creeks and on south-east facing slopes, where insolation is low. It can occur on river flats where rainfall is at its maximum. Cool Temperate Rainforest is found from 10 m elevation in the Otway Ranges up to a maximum of 1440 m in the Central Highlands. In East Gippsland, this ecological vegetation class does not occur below 600 m because of the warm climate of the lowlands in this region. This rainforest type requires a high to very high annual rainfall of 1200 – 2000 mm, and is largely restricted to environments where severe fire occurs at intervals greater than 400 years.

Decline and Threats

In formulating their final recommendation, the Scientific Advisory Committee stated that:

The community is in a demonstrable state of decline likely to result in extinction.

- The community has undergone a gross geographical decline, particularly in the Otways and Strzeleckis, as a result of land clearing and the effects of fire and timber harvesting.
- The community is threatened by fires of high intensity and frequency, which eliminate *Nothofagus* and other overstorey species, allowing light-dependent sclerophyll species to colonise, and if there are repeated fires, to replace the rainforest species.

The community is significantly prone to future threats which are likely to result in extinction.

- The community is also found only in small pockets where it does occur and is therefore susceptible to edge effects. It is threatened by disturbance from logging practices in adjoining forest areas.
- Road building alone can divide rainforests and cause a large barrier between stands because of influx of eucalypts into roadsides. Removal of mature wet sclerophyll forest from the rainforest margins opens the rainforest up to disturbance.
- Protected rainforest vegetation adjacent to logging coupes is frequently burnt by hot regeneration fires, and that streamside reserves and buffer strips are frequently logged or damaged.
- The community is also threatened by Myrtle Wilt disease which may be a more serious problem than originally believed. The disease may be spread by Platypus Beetle.

- Almost everywhere the community occurs it is susceptible to these threats. The only adequately protected area is in the Upper Yarra catchment, and its security depends on continued appropriate management.
- The community is not very rare in terms of distribution, but it is found only in small pockets where it does occur and has a small total area.
- The data presented on distribution and abundance are not the result of comprehensive surveys but do cover a broad enough sample of the community's known habitat to indicate strongly that the community is rare in terms of abundance and distribution.

Warm Temperate Rainforest (Coastal East Gippsland)

The following description is from the Final Recommendation of the Scientific Advisory Committee (SAC 1996a) in regard to Nomination Number 362 which forms the basis for the listing under the FFG Act.

Description and Distribution

The Warm Temperate Rainforest (Coastal East Gippsland) Community is relatively simple structurally when compared with most other warm temperate rainforest communities in East Gippsland. The community is floristically depauperate averaging only 32 species per quadrat, with few species of ground ferns and usually no epiphytic ferns, vascular epiphytes or tree-ferns. This composition indicates that the climate is relatively dry for warm temperate rainforest. The dryness of its habitat is also indicated by the common ferns in this rainforest type. The drought tolerant species *Pellaea falcata* (Sickle Fern), *Asplenium flabellifolium* (Necklace Fern), *Pteris tremula* (Tender Brake), *Doodia aspera* subsp. *australis* (Common Rasp Fern) and *Pteridium esculentum* (Bracken) are also common species of the adjacent sclerophyll forests. The coastal floristic elements in this community are represented by the trees *Banksia integrifolia* var. *integrifolia* (Coast Banksia), the only Banksia known from Victorian rainforest, and *Myoporum insulare* (Boobialla), the scramblers *Rhagodia candolleana* (Seaberry Saltbush) and *Tetragonia implexicoma* (Bower Spinach), the herb *T. tetragonioides* (New Zealand Spinach), and the shrub *Olearia viscosa* (Sticky Daisy-bush).

The community is species-rich in some life form categories and these can dominate some strata; the canopy can have up to seven species, lianes up to fourteen species and herbs up to eleven species. The canopy of any given stand may have the following species represented: *Acronychia oblongifolia* (Yellow-wood), *Acmena smithii* (Lilly Pilly), *Acacia melanoxylon* (Blackwood), *Pittosporum undulatum* (Sweet Pittosporum), *Elaeocarpus reticulatus* (Blue Olive-berry), *Rapanea howittiana* (Muttonwood) and *Myoporum insulare* (Boobialla). It is the only Victorian rainforest community in which the coastal species Boobialla and the biogeographically disjunct species Yellow-wood are consistently represented and where Coast Banksia can be quite common in some stands.

The lianes *Celastrus australis* (Staff Climber), *Marsdenia rostrata* (White Milk Vine) and *Pandorea pandorana* (Wonga Vine) are the most evident at the canopy level with the wiry climbers *Geitonoplesium cymosum* (Shepherd's Delight), *Eustrephus latifolius* (Wombat Berry) and *Smilax australis* (Austral Sarsparilla) more conspicuous in the understorey. Two herbaceous climbers are also found in this community; *Tylophora barbata* (Bearded Tylophora) is characteristic of this rainforest type and *Sicyos australis* (Austral Star Cucumber) although rare today is thought to once have been common in this community. The common herbs are *Dichondra repens* (Kidney Weed), *Urtica incisa* (Forest Nettle) and *Sambucus gaudichaudiana* (White Elderberry). Shrubs are a conspicuous feature of these stands often as a result of rainforest gaps that have arisen from the incursion of fire, landslips or the windthrow of overstorey eucalypts or rainforest canopy trees.

The edaphically and climatically dry habitat of the community, along with the lack of epiphytes and dominance of drought tolerant ferns would seem to indicate that this community represents a floristic and structural intermediate between warm temperate rainforest and dry rainforest in Victoria. There is a range of species across several life form categories which are common to both rainforest types but are either structurally subordinate or uncommon in other rainforest communities. In particularly dry sites associated with Warm Temperate Rainforest (Coastal East Gippsland) Community, Dry Rainforest (Limestone) occasionally develops.

This community occurs on or near the Gippsland Lakes (especially Lakes King and Tyers) and at the mouth of the Snowy River near Marlo.

Habitat

This community occurs on relatively dry, coastal sites, usually in shallow gullies and on abandoned sea cliffs. Elevations range from sea level to 65 m. Soils vary from sandy clays to clay loams derived from tertiary limestone. Occasionally the community occurs on deep aeolian sands on dunes at Marlo. Mean annual rainfall is 750-850 mm and is distributed evenly throughout the year.

Decline and Threats

In formulating their final recommendation, the Scientific Advisory Committee stated that:

The community is in a demonstrable state of decline likely to result in extinction.

- The area and distribution of the community has been severely depleted since European settlement as a result of land clearing for agriculture and grazing. Without active management and revegetation, remnants of the community continue to decline in area and integrity as the result of ongoing weed invasion.

The community is significantly prone to future threats which are likely to result in extinction

- The community is threatened by weed invasion which in part arises from exposure to wind disturbance due to the loss of ecotones surrounding the remaining stands, and in part from the proximity to urban development. Urban development and associated engineering earthworks provide a threat from landslip on unstable landforms particularly to those remnants on cliff habitats or those with habitats on steep slopes.
- As with many rainforest communities throughout Victoria, the Warm Temperate Rainforest (Coastal East Gippsland) Community is threatened by fires of high intensity and frequency.

Warm Temperate Rainforest (Cool Temperate Overlap, Howe Range)

The following description is from the Final Recommendation of the Scientific Advisory Committee (SAC 1996b) in regard to Nomination Number 363 which forms the basis for the listing under the FFG Act.

Description and Distribution

Warm Temperate Rainforest (Cool Temperate Overlap, Howe Range) is primarily warm temperate in its floristic composition although it does have some cool temperate characteristics which are evident in both the floristics and structure of the community. Structurally the community has a poorly developed vine component, a characteristic which is associated with Cool Temperate Rainforest in Victoria (Cameron 1992). Species usually associated with Cool Temperate Rainforest which occur in this community include *Asplenium flaccidum* subsp. *flaccidum* (Weeping Spleenwort), *Correa lawrenciana* (Mountain Correa), *Cyathea cunninghamii* (Slender Tree-fern), *Eucryphia moorei* (Eastern Leatherwood), *Hedycarya angustifolia* (Austral Mulberry), *Grammitis billardierei* (Common Finger-fern), *Hymenophyllum australe* (Austral Filmy Fern), *Persoonia silvatica* (Forest Geebung), *Polyscias sambucifolia* subsp. A (Broad-leaf Panax) and *Sticherus lobatus* (Spreading Fan-fern).

This is the only rainforest community in Victoria that has Eastern Leatherwood as a character species; in some stands it may be the only canopy species present. *Acmena smithii* (Lilly Pilly), *Pittosporum undulatum* (Sweet Pittosporum) and *Rapanea howittiana* (Muttonwood) are other important canopy species. The community is notable for its poor liane structural development and its high fern diversity, with 20 species represented. All but one of the state's tree-ferns occur within the community. Vascular epiphytes are diverse with several species that are threatened, including *Tmesipteris ovata* (Oval Fork-fern) and *Plectorrhiza tridentata* (Tangle Orchid).

Warm Temperate Rainforest (Cool Temperate Overlap, Howe Range) occurs in a small (5 km2) area on the south-western side of the Howe Range in far East Gippsland and occurs entirely within the Croajingolong National Park.

Habitat

This community occurs on deep, fertile soils at an elevation of 280 – 400 m. Rainfall exceeds 1000 mm per annum. Peel (1999) suggests that the topography and the prevailing weather conditions result in a less insolated environmental niche which might explain the affinities with Cool Temperate Rainforest.

Decline and Threats

In formulating their final recommendation, the Scientific Advisory Committee stated that:

The community is significantly prone to future threats which are likely to result in extinction

- The community is limited to the unique climatic overlap between temperate and sub-tropical climatic zones in the gully systems which run south westward to Mallacoota Inlet from Howe Range. It has been recorded from only a few localities.

Warm Temperate Rainforest (East Gippsland Alluvial Terraces)

The following description is from the Final Recommendation of the Scientific Advisory Committee (SAC 1995) in regard to Nomination Number 274 which forms the basis for the listing under the FFG Act.

Description and Distribution

The Warm Temperate Rainforest (East Gippsland Alluvial Terraces) is the most diverse rainforest community in the State with a low to moderate density of canopy species (additional expert opinion). The canopy is usually dominated by *Acmena smithii* (Lilly Pilly), with *Rapanea*

howittiana (Muttonwood) less dominant but often present. The most common emergent in margins or in gaps is *Acacia melanoxylon* (Blackwood), with *Coprosma quadrifida* (Prickly Currant-bush) usually present. A high diversity of lianes (vines) is present with robust, wiry, cane-like and herbaceous climbers common and usually very conspicuous. Understoreys are dominated by tree ferns, with abundant, conspicuous and diverse ground fern flora, with several vascular epiphytes common.

Stands of Warm Temperate Rainforest (East Gippsland Alluvial Terraces) can be tall and well developed on smaller streams, although on larger streams the canopy tends to be uneven in height and patchy in distribution. This probably reflects the effects of canopy opening due to flood debris collecting in lianes and dragging understorey trees over. The gaps which are produced are rapidly filled by resprouting lianes and numerous secondary species (additional expert opinion).

Habitat

The Warm Temperate Rainforest (East Gippsland Alluvial Terraces) is restricted to lowlands below 470m, where it grows on fertile alluvial flats of ephemeral creeks and the floodplains of permanent streams. This habitat is regularly flooded. The community occurs from the Mitchell River east to Mallacoota, with an isolated and disjunct occurrence in the Strzelecki Ranges at Morwell National Park.

Decline and Threats

In formulating their final recommendation, the Scientific Advisory Committee stated that:

The community is in a demonstrable state of decline likely to result in extinction.

- The area and distribution of Warm Temperate Rainforest (East Gippsland Alluvial Terraces) Community has been significantly depleted since European settlement as a result of land clearing for agriculture and grazing. The community was once more extensive on the Cann, Snowy and Brodribb Rivers and possibly also on the Tambo River. All of the surviving river flat stands on Dowell Creek, Cann, Snowy and Brodribb Rivers have been reduced and most are small and declining.
- Although there has been no clearing of stands over the last 50 years, their integrity and extent continues to decline.

The community is significantly prone to future threats which are likely to result in extinction

- Weed invasion represents the most serious ongoing threat to the community. The community is particularly susceptible to weed invasion because of the small size and linear nature of remaining stands, the replacement of fringing ecotones by farmland and the continued disturbance which is an inherent feature of floodplain landforms. Farming and logging occur within the catchments where remnants of the community exist.
- As with many rainforest communities throughout Victoria, the Warm Temperate Rainforest (East Gippsland Alluvial Terraces) Community is threatened by fires of high intensity and frequency.

Warm Temperate Rainforest (Far East Gippsland)

The following description is from the Final Recommendation of the Scientific Advisory Committee (SAC 1996c) in regard to Nomination Number 364 which forms the basis for the listing under the FFG Act.

Description and Distribution

The Warm Temperate Rainforest (Far East Gippsland) Community is structurally complex with emergent species including *Acacia melanoxylon* (Blackwood) and occasionally *Eucalyptus cypellocarpa* (Mountain Grey-gum) over a closed canopy of trees and lianes beneath which there is a dense layer of tree-ferns, a discontinuous stratum of shrubs, then ground-ferns and herbs. The canopy species are invariably *Acmena smithii* (Lilly Pilly) and *Pittosporum undulatum* (Sweet Pittosporum) which are dominants with *Rapanea howittiana* (Muttonwood) as an occasional member of the canopy. There is a plethora of lianes and scrambling species which densely clothe the tree canopy and fill the gaps. The most common and dominant of these lianes in the canopy include *Cissus hypoglauca* (Jungle Grape), *Marsdenia rostrata* (Milk Vine), *Pandorea pandorana* (Wonga Vine) and *Morinda jasminoides* (Jasmine Morinda). There is also the usual suite of Warm Temperate Rainforest wiry lianes *Eustrephus latifolius* (Wombat Berry) and *Smilax australis* (Austral Sarsaparilla) that are very shade tolerate but can also be very prolific in gaps.

There are a number of character species which are secondary species, such as *Pomaderris aspera* (Hazel Pomaderris), *Bedfordia arborescens* (Blanket-leaf), *Prostanthera lasianthos* (Victorian Christmas Bush), *Hibbertia dentata* (Trailing Guinea-flower), *Tetrarrhena juncea* (Forest Wire-grass) and *Calystegia marginata* (Forest Bindweed) which are indicative of disturbance. This may indicate disturbance due to an incursion by fire, tree fall or land slip creating a gap or flooding disturbance associated with stream margins. Gaps are filled with these secondary species, as well as rampant thickets of *Cissus hypoglauca* (Jungle Grape) and *Rubus hillii* (Queensland Bramble). It is within these gaps that the large variety of herbs recorded

for this community become the most abundant, with lesser numbers persevering beneath the canopy's full shade. The understorey shrubs of this community, *Notelaea venosa* (Large Mock-olive), *Hedycarya angustifolia* (Austral Mulberry), *Tasmannia lanceolata* (Mountain Pepper), *Coprosma quadrifida* (Prickly Currant-bush) are usually shade tolerant species and bird-dispersed, generally reaching a height of 1-3 m although *Elaeocarpus reticulatus* (Blue Oliveberry) can eventually attain a height of 8 m or more and participate in the canopy. Tree-ferns like *Dicksonia antarctica* (Soft Tree-fern) and *Cyathea australis* (Rough Tree-fern) are the most common and structurally dominant tree-ferns in the community although three other, rarer species may also be encountered.

The ground layer is dominated by ground-ferns, the most abundant of which are *Blechnum cartilagineum* (Gristle-fern), *B. nudum* (Fishbone Water-fern), *Polystichum proliferum* (Mother Shield-fern), *Lastreopsis microsora* (Creeping Shield-fern) and *L. acuminata* (Shiny Shield-fern). Vascular epiphytes are common with the most diverse group being the ferns and fern allies such as *Asplenium flaccidum* subsp. *flaccidum* (Weeping Spleenwort), *Macroglena caudata* (Jungle Bristle-fern), *Polyphlebium venosum* (Veined Bristle-fern), *Hymenophyllum cupressiforme* (Common Filmy-fern), *Tmesipteris parva* (Small Fork-fern) and the flowering plants *Fieldia australis* (Fieldia) and *Sarcochilis australis* (Butterfly Orchid).

This community occurs in coastal hills east of Cann River, with the rainforest on the south-eastern side of Mt Drummer, in the Alfred National Park being a prominent example. It extends northwards and eastwards to the area near Tilba Tilba.

Habitat

Warm Temperate Rainforest (Far East Gippsland) Community occupies gullies, gully-heads and adjoining slopes on south-easterly aspects, from near sea level to 500 m in altitude. Soils are deep and rich in humus and are generally derived from granodiorites of sedimentary geology.

Decline and Threats

In formulating their final recommendation, the Scientific Advisory Committee stated that:

The community is significantly prone to future threats which are likely to result in extinction

- The community is very rare in terms of total area and is geographically restricted in distribution to a small area on the coastal hills and plains east of Cann River township.

Dry Rainforest (Limestone)

The following description is from the Final Recommendation of the Scientific Advisory Committee (SAC 1996d) in regard to Nomination Number 387 which forms the basis for the listing under the FFG Act.

Description and Distribution

Dry Rainforests are strictly limited to the most fireproof niches, such as deep rocky gorges, cliff bases and elevated scree slopes, in isolated rainshadow valleys in the foothills of East Gippsland, with a pronounced and extended hot, dry, summer season (Cameron 1992, Peel pers. comm.). Dry Rainforest (Limestone) Community grows exclusively on the limestone riverine cliffs, colluvial rock screes which collect at the bases of these cliffs, in collapsed caves (dolines) and on the shores of lakes where this geology is also exposed. It occurs from sea level to 240m. Structurally, many stands of Dry Rainforest (Limestone) Community are based around several very old emergent *Brachychiton populneus* (Kurrajong) although not as consistently as in Dry Rainforest (Gorges) Community, with the sites on Tertiary Limestone generally not having this species present. Universally however, there is a continuous closed canopy of *Pittosporum undulatum* (Sweet Pittosporum) with occasional individuals of *Allocasuarina verticillata* (Drooping Sheoak) which is also a fire-sensitive tree able to regenerate in the absence of fire. *Rapanea howittiana* (Muttonwood), although not recorded from quadrat data, is often present and can be present as a canopy species, and *Acacia implexa* (Lightwood) is also capable of population maintenance by root suckering in the absence of fire in this community. Less commonly *Acacia mearnsii* (Black Wattle) and occasionally the bird-dispersed *Myoporum insulare* (Common Boobialla) have been noted in these stands.

The canopy vine flora is not always well developed structurally, although *Celastrus australis* (Staff Climber) and *Marsdenia rostrata* (Milk-vine) and less commonly *Pandorea pandorana* (Wonga Vine) and *Clematis aristata* (Mountain Clematis) are present. The sub-canopy vine flora is dominated by *Eustrephus latifolius* (Wombat Berry), *Geitonoplesium cymosum* (Scrambling Lily) and *Smilax australis* (Austral Sarsparilla). The understorey is very open with a few scattered spiny bushes such as *Coprosma quadrifida* (Prickly Currant-bush) the only regular sub-canopy species, or *Solanum pungetium* (Eastern Nightshade) and *Hymenanthera dentata* (Tree Violet) usually present but most often restricted to the margins of the stands. Significantly there is often scattered individuals of *Pomaderris oraria* subsp. *calcicola* (Limestone Pomaderris) which is the main structurally dominant shrub of the adjacent

Limestone Pomaderris Shrublands. There is strong evidence to suggest that Dry Rainforest is the climax successional stage for some communities of this ecological vegetation class (Peel 1999).

The fern flora is rich compared to Dry Rainforest (Gorges) Community, being represented by mainly lithophytes species such as *Asplenium trichomanes* subsp. *quadrivalens* (Common Spleenwort), *Cheilanthes austrotenuifolia* (Green Rock Fern), *C. distans* (Bristly Cloak-fern), *C. sieberi* subsp. *sieberi* (Narrow Rock Fern), *Pleurosorus rutifolius* (Blanket Fern) and *Pteris vittata* (Chinese Brake). The other common ferns are the usual drought-tolerant species to be expected of this vegetation class, with *Pellaea falcata* (Sickle Fern), *Pteris tremula* (Tender Brake) and the *Asplenium flabellifolium* (Necklace Fern) being the most common. Tree ferns and other moisture dependent fern taxa are consistently absent.

Herbs and grasses particularly can be abundant with both life forms quite diverse on Devonian Limestone, but much less so on Tertiary Limestone. The majority of grasses found in this community are not found in Dry Rainforest (Gorges) Community. Unless otherwise indicated these species consistently occur beneath the canopy, and include *Cymbopogon refractus* (Barb-wire Grass) (gaps only), *Microlaena stipoides* (Weeping Grass), *Poa sieberiana* (Grey Tussock-grass) (mostly gaps), *Elymus scaber* (Common Wheat-grass), *Themeda triandra* (Kangaroo Grass) (gaps only), and the highly shade tolerant species *Australopyrum retrofractum* (Feathery Wheat-grass). *Notodanthonia longifolia* (Long-leaf Walla)by-grass) is the only species consistently and commonly found in both Dry Rainforest floristic communities. The common herbs in Dry Rainforest (Limestone) Community are also drought tolerant species. Those found primarily in gaps are *Nicotiana suaveolens* (Austral Tobacco) (Devonian Limestone), *Crassula sieberiana* (Australian Stonecrop), *Cynoglossum australe* (Australian Hound's-tongue). Beneath the canopy where shade tolerance is needed, species such as *Dichondra repens* (Kidney-weed, *Einadia hastata* (Saloop Saltbush), *E. nutans* (Nodding Saltbush), *Plectranthus parviflorus* (Cockspur Flower), *Parietaria debilis* (Shade Pellitory) and *Urtica incisa* (Scrub Nettle) are found.

Dry Rainforest (Limestone) Community also has a reasonable complement of graminoids, other than the grasses already mentioned, which regularly include *Carex breviculmis* (Short-stem Sedge) and *Gahnia melanocarpa* (Black-fruit Saw-sedge), with the sedge-like drought-tolerant *Dianella revoluta* (Black-anther Flax-lily) also common. There are no vascular epiphytes recorded from this community.

Habitat

Dry Rainforest grows in a narrow altitudinal range of 0-240 m, and in one of the most fire-protected habitats in Victoria. The great majority of stands occur on otherwise unvegetated rock screes or cliffs in association with a major river. Adjacent vegetation often acts as a fire-retardant as does open water occasionally. Dry Rainforest occurs in zones of moderate mean annual rainfall in the range of 716 - 994 mm which is evenly distributed throughout the year.

Decline and Threats

In formulating their final recommendation, the Scientific Advisory Committee stated that:

The community is significantly prone to future threats which are likely to result in extinction

- The community is threatened by grazing by domestic stock, fragmentation and loss of fringing ecotones and weed invasion.
- The community occurs at three sites in the Murrindal River valley and one disjunct stand in the Lake Tyers State Park.

Human activity which results in artificially elevated or epidemic levels of Myrtle Wilt within *Nothofagus*-dominated Cool Temperate Rainforest.

The following description is from the Final Recommendation of the Scientific Advisory Committee (SAC 1998) in regard to Nomination Number 453 which forms the basis for the listing under the FFG Act.

Description and Distribution

Myrtle Wilt is a fatal disease of *Nothofagus cunninghamii* (Myrtle Beech) caused by the fungal pathogen *Chalara australis*. The disease develops initially in a stand of Myrtle Beech through the infection of stem or root wounds via air or water-borne inoculum. The most prominent disease symptom is wilting of the tree crown. Infection of wounds will first cause wilt symptoms and ultimately lead to the death of the whole tree. Infected trees take between six months and 3 years to die.

Following infection trees become susceptible to attack by the Mountain Pinhole Borer (*Platypus subgranosus*), the less common of two species of ambrosia beetles known to occur in Victorian eucalypt forests. The activity of this beetle has the potential to assist in the spread of inoculum through the liberation of contaminated larval excrement.

Because fungal spores are wind dispersed, human activity is likely to elevate disease incidence rates above the natural background levels experienced in undisturbed forest. Most new sites of infection are

believed to result from stem and branch wounds, hence any human activity in *Nothofagus* forest which causes wounds has the potential to artificially elevate the incidence of Myrtle Wilt.

Eligibility for listing as a potentially threatening process

The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of a range of flora or fauna.

- Myrtle Wilt has the potential to significantly limit both the abundance and distribution of a range of flora and fauna primarily dependent upon *Nothofagus* Cool Temperate Rainforest by removing the dominant tree species of this community.

The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of two or more taxa.

- Myrtle Wilt has the potential to pose a significant threat to a number of species which are reliant on the habitat types only found in Cool Temperate Rainforest including: Pink Robin (*Petroica rodinogaster*), Leadbeater's Possum (*Gymnobelideus leadbeateri*), *Astelia australiana* (Tall Astelia), *Cyathea cunninghamii* (Slender Tree-fern), *Lastreopsis hispida* (Bristly Shield-fern), *Tmesipteris elongata* (Slender Fork-fern), *Cyathea marcescens* (Skirted Tree-fern and *Pteris comans* (Netted Brake).

The potentially threatening process, in the absence of appropriate management, poses or has the potential to pose a significant threat to the survival of a community.

- Epidemic levels of *Chalara* infection not only pose a threat to pure stands of *Nothofagus* but also to all mature or advanced secondary *Nothofagus* stands. Myrtle Wilt also poses a significant threat to an entire community of dependent taxa of vascular and non-vascular epiphytes, and a range of terrestrial or lithophytic understorey taxa for which *Nothofagus cunninghamii* provides the physical stratum and necessary microclimatic and microhabitat requirements.

The potentially threatening process poses or has the potential to pose a significant threat to the evolutionary development of a range of flora and fauna.

- Human activity resulting in artificially elevated or epidemic levels of Myrtle Wilt poses a significant threat to the evolutionary development of the species and communities mentioned above, as the disease threatens the dominant species of the Cool Temperate Rainforest Community, and therefore the structural integrity and survival of the community.

Section II: General Management Issues

The following section refers to rainforest generally, not just to the FFG-listed rainforest communities. It deals with key aspects of rainforest ecology, potentially threatening processes and management responses.

Ecological issues

Origins of rainforest in Victoria

The floristic origins of Victorian rainforests can be traced back to between the late Cretaceous Period (100 million years ago) and the early Tertiary Period (65 million years ago). At this time Australia was part of the southern super-continent Gondwana, which is believed to have had a much wetter climate than that which dominates Victoria today. The high proportion of rainforest species that have either strong taxonomic links dating back to the Cretaceous, or primitive characteristics dating from the Tertiary, is not matched by any other vegetation type in Victoria (White 1994).

Eighty-four species of the approximately 175 species making up the Victorian rainforest vascular flora are dependent on rainforest stands and their ecotones, since they rarely occur outside these habitats. This obligate rainforest flora consists of 36 ferns, 16 trees, 12 climbers, eight forbs, seven graminoids and five shrubs.

Ecologically, it is the relative absence of fire rather than the abundance of rainfall which characterises the environmental niches occupied by rainforest. However, these factors are clearly linked and rainfall and rainforest distribution are correlated. Microclimatic conditions within rainforests are often markedly different from surrounding vegetation.

Myrtle Wilt

Myrtle Wilt, first described by Howard (1973) is a fatal fungal disease that infects and kills mature Myrtle Beech trees in Cool Temperate Rainforests in Victoria. Although other species such as Southern Sassafras have been artificially inoculated with the Myrtle Wilt fungus, *Nothofagus cunninghamii* is considered the only natural host of Myrtle Wilt (Kile 1989). The death of Myrtle

Beech is significant to Cool Temperate Rainforest due to its importance as a primary canopy species. As a result, it plays a crucial role in the structure, age and microclimate of the forest ecosystem (Burgman and Ferguson 1995, Cameron and Turner 1996). Studies by Packham (1992) and Cameron and Turner (1996) have demonstrated that the pathogen is widespread in Myrtle Beech-dominated Cool Temperate Rainforest in the Central Highlands and Otway Ranges and, to a lesser degree, in the Strzelecki Ranges.

Following infection, Myrtle Beech trees undergo wilting of the crown followed by leaf death. Subsequently, the crown foliage develops a distinctive orange colour (chlorosis) persisting until the following season when it turns brown and falls from the tree (Kile *et al.* 1989, Cameron and Turner 1996). Further symptoms include a radial wood stain found inside stems and branches and the development of a mycelial felt (sporulating fungal tissue) on the trunk (Cameron and Turner 1996). Tree death occurs anywhere between 6 months to 3 years post infection as a result of necrosis of the tissues of the root and outer stem (Packham 1992).

Inoculum can be spread on both a landscape and local scale via water or through the air as spores (Cameron and Turner 1996). Infection enters the mature plant when the limbs or stem are wounded (Packham 1994). Once infected, the pathogen can be transferred from the original Myrtle Beech individual to others in the stand via underground root grafts (Packham 1994).

After infection Myrtle Beech becomes susceptible to attack by the Mountain Pinhole Borer (*Platypus subgranosus*) (Kile *et al.* 1992). Results from work undertaken by Kile *et al.* (1992) demonstrated that infection of Myrtle Beech by Myrtle Wilt was strongly correlated with the susceptibility of individuals to vigorous attacks from the borer. Thus mountain pinhole borer does not infect Myrtle Beech (Kile and Hall 1988). However, once airborne, the infected frass produced by the borer may spread the pathogen over a wider area (Kile 1989). Activity by the mountain pinhole borer may also facilitate the movement of the fungus throughout the infected individual (Kile *et al.* 1989).

The following variables outlined by Packham (1994), Elliott *et al.* (1987) and Cameron and Turner (1996) operate to influence the susceptibility of Myrtle Beech in undisturbed stands to Myrtle Wilt infection:

Myrtle Beech-dominated forest will be more susceptible to infection in:

- pure stands of Myrtle Beech, such as the Otway Ranges where other canopy species are absent.
- mature stands of Myrtle Beech, such as the Otways Ranges.

Myrtle Beech-dominated forest will be less susceptible to infection in:

- stands that also support Southern Sassafras and/or Blackwood, such as the Central Highlands and Strzelecki Ranges.
- immature stands with trunk diameters less than 12 cm at breast height over bark (DBHOB), except if limbs are damaged.

Potentially Threatening Processes

Historic clearing

Clearing of native vegetation, including rainforests, associated with the expansion of agriculture occurred in the nineteenth and early twentieth centuries. This clearing had the greatest impact in South Gippsland hills and in the river flats of the Snowy and Brodribb Rivers in East Gippsland. Little if any permanent clearing of rainforests is permitted today.

Fire

Elevated fire frequency, relative to pre-European levels, is likely to have led to the contraction, fragmentation or elimination of rainforest stands throughout their range in Victoria. There is evidence that the major fires in the Central Highlands in 1926, 1939 and, to a lesser extent, 1983 have reduced the extent of Cool Temperate Rainforest, for example, in the Toorongo Plateau, the Powelltown area and in the Upper Yarra River catchment (Burgman and Ferguson 1995). McMahon (1987) documented the impacts of the 1982/3 fires on, among other things, important Warm Temperate Rainforest stands in East Gippsland.

The February 2009 bushfires affected important stands of Cool Temperate Rainforest in the Central Highlands. The impact of these bushfires has yet to be fully assessed and documented but work is currently underway to assess fire severity generally and initial assessments of some stands have been done. It is likely that significant impact has occurred in several sites of significance for rainforest, including sites of state significance (such as Taggerty, Federation Range, Mt Disappointment, Upper Bunyip and Cumberland) and nationally significant sites (such as Acheron, Watts and O'Shannassy). Actions have been included in this Action Statement to assess the impacts and where necessary, to plan and implement rehabilitation and monitoring activities as appropriate.

Climate change

Climate cycles have influenced the ebb and flow in the distribution of rainforests in Victoria over millions of years. The critical factors appear to be

rainfall and its association with fire frequency (Peel 1999). Human-induced climate change, due to increases in the emission of greenhouse gases, is predicted to lead to an increase in mean temperatures generally and, in south-eastern Australia, a reduction in rainfall. Together, these trends are likely to further elevate the frequency and intensity of fire.

Timber harvesting and associated roads

Where rainforests occur in State forest or on private land, they may be affected by timber harvesting and the construction and maintenance of forest roads. Rainforest stands are excluded for timber harvesting in State forest in Victoria. Timber harvesting adjacent to rainforest stands is associated with a number of potential environmental risks, including changes to the rainforest microclimate, physical damage from tree felling or windthrow, spread of weeds and/or disease, altered hydrology, sedimentation and erosion. Regeneration fires may also impact on rainforest stands and surrounding vegetation. Forest roads also occur within or adjacent to many rainforest stands. Roads, especially permanent roads, are also associated with the risks listed above.

In response to these potential risks, DSE and its predecessors have instituted a management regime for timber harvesting and roads in the vicinity of rainforest. This is described in more detail in the 'Previous management action and existing conservation measures' section below.

Pest plants and animals

Most environmental weeds occurring in the vicinity of rainforests in Victoria are unable to flourish in the low light conditions under the rainforest canopy. However, where canopy gaps occur, through fire, windthrow, roading or disease, environmental weeds may become established and spread. Environmental weeds cited as threats by Peel (1999) include Blackberry (*Rubus fruticosus* spp. agg.), Blue Periwinkle (*Vinca major*) and Wandering Jew (*Tradescantia* spp.).

Browsing, trampling and bark removal by goats, Sambar deer and domestic stock may pose a significant threat to some rainforest stands.

Myrtle Wilt

Myrtle Wilt disease, caused by the fungus *Chalara australis*, is the most significant disease affecting rainforests in Victoria. Part B of this document (page 8) provides more detail. Other fungal pathogens that have the potential to affect rainforest species include *Armillaria* and *Phytophthora* species, although there is no clear evidence of significant impacts at this stage.

The death of a stand of Myrtle Beech, generally by infection via underground root grafts, is commonly referred to as "gap creation". Gap creation within Cool Temperate Rainforest can lead to the modification of the structure and floristic composition of the community as the change in canopy cover increases light reaching the understorey (Cameron and Turner 1996). Furthermore, the loss of Myrtle Beech alters the microclimate on which other rainforest plant species depend (Peel 1999). Myrtle Beech also provides a substrate for rainforest plants such as epiphytes and bryophytes. In addition to this, Myrtle Beech may occupy an ecological niche where other species, some of which may be more tolerant to disturbance, may dominate in their absence (Burgman and Ferguson 1995, Cameron and Turner 1996).

Myrtle Beech-dominated Cool Temperate Rainforest supports a number of rare vascular plants. These include Tall Astelia *Astelia australiana*, Slender Tree-fern *Cyathea cunninghamii*, Beech Finger-fern *Grammitis magellanica* subsp. *nothafageti* and Long Clubmoss *Huperzia varia* (Peel 1999). Bryophytes are well represented within Cool Temperate Rainforest and rare liverworts restricted to this community include *Riccardia eriocaula* and *Pedinophyllum monoicum*. The composition of bryophytes alters when Myrtle Beech stands are infected with Myrtle Wilt. Cameron and Turner (1996) have used bryophyte composition to measure the level of community degradation resulting from Myrtle Wilt infection.

Anthropogenic (human) disturbance and Myrtle Wilt

Myrtle Wilt is considered to be indigenous to Australia and is likely to have co-evolved with its host *Nothofagus cunninghamii* (Cameron and Turner 1996). Kile and Walker (1987) demonstrated that artificial wounding of Myrtle Beech significantly increased the rate of Myrtle Wilt infection. The presence of anthropogenic disturbance in Tasmanian Myrtle Beech forests was later shown to be strongly correlated with elevated infection rates.

Monitoring and survey of rainforest stands in Tasmania by Packham (1994) confirmed that high levels of Myrtle Wilt infection could occur occasionally in remote areas that had not been subjected to anthropogenic disturbance. In the same study however, Packham demonstrated that a significantly elevated incidence of Myrtle Wilt infection above background levels was found in all sites in the study where disturbance such as logging and thinning had occurred. In addition, Neyland and Brown (1994) examined the effect of disturbance on Cool Temperate Rainforest in

eastern Tasmania. Results from this study showed that increased levels of Myrtle Wilt were highly correlated with the incidence of artificial disturbance to these communities.

Regeneration of Myrtle Beech after a stand becomes infected may occur providing that propagules are present (Cameron and Turner 1996). Recolonisation, however, may not be successful when additional pressures are placed on the community. Cameron and Turner (1996) suggest that regeneration of wilt gaps by Myrtle Beech may be jeopardised if the stand experiences fire whilst it is significantly immature.

Burgman and Ferguson (1995) suggest that further research is required to determine the relationship between Myrtle Wilt and disturbance, both natural and human-induced. Further information on the natural, historic levels of the disease would also be beneficial.

Preventative measures

On a local level, management actions that aim to prevent local infection, such as the application of antifungal sealants to wounds may be worthwhile, although the feasibility of general use needs to be evaluated. As general rule, most effort should be directed towards careful planning of harvesting, roading and other works to avoid or minimise wounding of Myrtle Beech.

Knowledge gaps

The key knowledge gaps that constrain the conservation of rainforests in Victoria are:

- Lack of comprehensive, accurate mapping of rainforests at an operational scale (e.g. 1:25,000 or better). Some of the existing mapping is based on aerial photo interpretation only and was mapped at 1:100,000. This tends to exaggerate the extent of linear stands of rainforests. Conversely, many smaller stands and stands with emergent eucalypts may have been overlooked;
- Up to date information on the condition of important rainforest stands.
- The disturbance history of important rainforest stands, including fire and disease. This, together information on current condition, would allow inferences to be drawn about the resilience of rainforests in response to disturbance and would further inform judgements regarding, for example, effective buffer widths.

Existing conservation measures on public land

Rainforest is protected throughout public land in Victoria, either by inclusion in the formal conservation reserve system (National Parks and other reserves) or by a range of measures, including zoning and prescriptions, within State forest.

Conservation reserves

FFG-listed rainforest communities occur variously in the following formal conservation reserves: Baw Baw National Park, Bunyip State Park, Cathedral Range State Park, Coopracambra National Park, Croajingolong National Park, Dandenong Ranges National Park, Errinundra National Park, Great Otway National Park, Lind and Alfred National Parks, Mitchell River National Park, Morwell National Park, Tarra-Bulga National Park, Wilson's Promontory National Park and Yarra Ranges National Park.

Each of these reserves is managed by Parks Victoria in line with a management plan that recognises and provides for rainforest conservation.

State forest

Significant areas of the FFG-listed rainforest communities occur within State forest. The existing conservation measures focus on timber harvesting. However, altered fire regimes, tourism development and the spread of environmental weeds also pose risks to these communities in State forest.

In relation to timber harvesting, the protection of FFG-listed rainforest communities and the management of Myrtle Wilt in State forest is achieved by the following key mechanisms:

- The Code of Practice for Timber Production 2007 (the Code).
- Forest Management Plans, including the establishment of Special Protection Zones (SPZs) and the specification of prescriptions for harvesting and road construction and maintenance.
- The Flora and Fauna Guarantee (Forest Produce Harvesting) Order.
- Allocation Orders and Timber Release Plans.

Code of Practice for Timber Production

The first *Code of Practice for Timber Production* (the Code) was ratified by the Victorian Parliament in 1989, and has been revised in 1996 and 2007. The Code is a statutory code of practice prepared under Part 5 of the *Conservation, Forests and Lands Act 1987*. Its purpose is to 'ensure that commercial timber growing and timber harvesting operations are carried out on both public and private land in such a way that permits an economically viable, internationally competitive, sustainable timber industry; is compatible with the conservation of the wide range of environmental, social and cultural values associated with timber production forests; provides for the ecologically

sustainable management of native forests proposed for continuous timber production; and enhances public confidence in the management of Victoria's forests and plantations for timber production' (DSE 2007).

The first and second versions included prescriptions for rainforest protection. The 2007 version does not: rather, it requires adherence to the conservation measures specified in approved Flora and Fauna Guarantee Action Statements and Flora and Fauna Guarantee Orders on public land.

Specifically, the Code of Practice for Timber Production (2007) requires that:

- in public forests, forest management planning and all forestry operations must comply with measures specified in relevant Flora and Fauna Guarantee Action Statements and Flora and Fauna Guarantee Orders; and
- in public and private native forests, rainforest communities in Victoria must not be harvested. Rainforest communities must be protected from the impacts of harvesting through the use of appropriate buffers to maintain microclimatic conditions and protect from disease and other disturbance.

Forest Management Plans

- Forest Management Plans have been prepared for Otways (1991), East Gippsland (1995), Central Highlands (1998) and Gippsland (2004) Forest Management Areas.
- Each Forest Management Plan includes a zoning plan which indicates areas that are included within Special Protection Zones (SPZs), Special Management Zones (SMZs) and the General Management Zone (GMZ). No timber harvesting is permitted within Special Protection Zones. Modified harvesting may occur within Special Management Zones: specific prescriptions for such zones are contained within SMZ Plans.
- Each Forest Management Plan also includes specific prescriptions for rainforest protection within the General Management Zone (GMZ). These plans are available on the DSE website.
- Central Highlands Forest Management Plan states that forest management and utilisation operations in State forest aim to prevent or minimise the spread of Myrtle Wilt. This includes preventing the wounding of Myrtle Beech which is essential to minimise fungal infection.

Flora and Fauna Guarantee (Forest Produce Harvesting) Order

The Flora and Fauna Guarantee (Forest Produce Harvesting) Order is an order made under the Flora and Fauna Guarantee Act in regard to protected flora. The flora of all listed communities is included in the definition of protected flora. The Order seeks to guarantee that taxa and communities of native flora and fauna can survive, flourish and retain their potential for evolutionary development in the wild and to ensure that, across each forest management area, the protected flora that is taken is maintained in a state that is no less viable than it was before the taking occurred.

The Order authorises the taking of protected flora incidental to timber harvesting operations that are authorised operations under the *Sustainable Forests (Timber) Act 2004* or the *Forests Act 1958* provided that the taking of the protected flora is planned, executed and followed by regeneration work that is carried out in such a way that it is reasonable to expect that the conservation objectives will be achieved.

Allocation Orders and Timber Release Plans

The *Sustainable Forests (Timber) Act 2004* establishes the process for providing access to timber resources on public land in eastern Victoria to VicForests. VicForests is a Victorian state-owned enterprise and is responsible for the sustainable harvest of timber from allocated forest areas. VicForests is also responsible for regenerating harvested forests and for marketing the harvested timber.

The Minister for Environment and Climate Change allocates areas of State forest to VicForests via an allocation order. The Allocation Order is made for a period of 15 years but must be reviewed every five years. Coupes and associated access roads are then planned and scheduled in a five year Timber Release Plan, prepared by VicForests.

Forest Audits

Annual audits to measure compliance with the Code and Forest Management Plan prescriptions have been conducted since 1994, initially by DSE and its predecessors. In 2002, the Victorian government released the "Our Forests Our Future" policy with a commitment to make the application of the Code more transparent. To deliver on this commitment, the Minister for the Environment asked the Environment Protection Authority (EPA) to engage an independent environmental auditor to assess compliance on public land with the code. The EPA's forest audits have been completed for five years from 2003 to 2007 inclusive. Reports on the forest audits are publicly available on the EPA's website, www.epa.vic.gov.au. The methods applied by the EPA include a scoring system for each of the focus areas, including rainforest. An independent review of the annual Forest Audit Program was undertaken in 2007 and recommended that the program be expanded and that key features such

as independence, stakeholder participation and public reporting be retained. The Forest Audit Program will continue to ensure that timber production practices on public land are open and transparent.

Fire management

Regional Fire Protection Plans

East Gippsland Forest Management Plan requires that as fire plans are reviewed, sub-catchments managed for rainforest conservation should be zoned as Priority 4 burning zones. That means that fuel-reduction burning and other fire management activities would only occur after consideration of ecological factors.

Central Highlands Forest Management Plan states that fuel reduction burning operations are to be reviewed in areas containing fire sensitive biological values when Regional Fire Protection Plans are revised.

Existing conservation measures on private land

Native vegetation policy

The primary mechanisms for conserving native vegetation (including rainforest) on private land are the 2002 policy document *Victoria's Native Vegetation Management: A Framework for Action* (the Framework) and the *Victorian Planning Provisions.*

The Framework established the goal of a 'net gain' in native vegetation, in terms of its extent and/or condition. A further policy announcement, *Native Vegetation – Sustaining a Living Landscape*, was made in March 2006. This new, strategic approach to delivering the net gain policy included a package of initiative such as amendments to the Victorian Planning Provisions and guidelines for the assessment of native vegetation clearing applications.

Timber Production

The 2007 Code states that 'Rainforest should be protected by reserving both the rainforest and a surrounding buffer from timber harvesting.' In private native forests and plantations, the Code recommends the application of protection measures specified in relevant Flora and Fauna Guarantee Act Actions Statements, as applicable to private land.

Where a landholder intends to harvest timber from their land, the planning scheme requires adherence to the Code. The Code in turn requires that:

- Rainforest communities in Victoria must not be harvested.
- Rainforest communities must be protected from the impacts of harvesting through the use of appropriate buffers to maintain microclimatic conditions and protect from disease and other disturbance.
- a Timber Harvesting Plan be prepared and submitted to council.
- The Timber Harvesting Plan must address methods to minimise impacts on biodiversity and must include a map showing exclusion zones within the coupe boundary, including areas reserved or specifically managed for biodiversity conservation

Commercial tree-fern harvesting

- Commercial harvesting of tree-ferns on private land usually requires a planning permit and a Flora and Fauna Guarantee Permit under the protected flora controls. DSE staff inspect all sites subject to the permit application. Where permission is granted, rainforest is excluded from harvesting.

Previous management action

Reservation

- Over the past 30 years, areas supporting the FFG-listed rainforest communities have been incorporated into the formal conservation reserve system. Notable examples include the Errinundra National Park, Great Otway National Park, Croajingolong National Park and Yarra Ranges National Park.
- The preparation of Forest Management Plans and Regional Forest Agreements (Commonwealth of Australia and State of Victoria, 1997, 1998, 2000, 2001) has also led to the protection in Special Protection Zones (SPZs) of further areas supporting FFG-listed rainforest communities.
- In November 2006, the Victorian Government announced that certain areas of old-growth forest in East Gippsland would be permanently excluded from timber harvesting. These areas include all sites of national significance for rainforest in the area. As a result of this announcement, all sites of national significance for rainforest in Victoria will be protected within the comprehensive, adequate and representative reserve system.
- Timber harvesting on public land ceased in the Otway Ranges in mid 2008. All significant rainforest sites are now protected within the Great Otway National Park.

Inventory / Mapping

- Statewide analysis and comprehensive descriptions of all rainforest Ecological Vegetation Classes (EVCs) and floristic communities have been documented in Peel (1999).
- Statewide EVC mapping has been done at 1:100,000 scale, and is stored on DSE's

corporate GIS. However, linear strips of rainforest mapped at this scale are likely to be inaccurate. Some areas have been mapped at 1:25,000.

- Initial assessments of the impacts of the 2009 bushfires on Cool Temperate Rainforest stands in the O'Shannassy catchment were undertaken immediately following the fires.

Sites of Significance

- Sites of Significance for Rainforest have been delineated, described and rated (Peel 1999, Cameron 1990 unpubl.), and contribute towards the design of reserve systems within all Forest Management Plans. These have been assessed by considering the following attributes: ecological integrity and viability, floristic composition, biogeography, and representation. They have been ranked according to their national, state, regional or local significance. Core zones, which contain major rainforest stands, have been identified.

Training

- Training in rainforest identification for field staff has been undertaken for DSE and VicForests staff in the Otways, Central Highlands, South Gippsland and East Gippsland.

Management / Restoration

- An important remnant of Dry Rainforest (Limestone) has been purchased by DSE, and is being fenced.
- *East Gippsland Coastal* Warm Temperate Rainforest: community groups, Landcare groups and Green Corps are involved in weed control and re-vegetation works at Kalimna Gully, Lakes Entrance and along the Snowy River flats. A large restoration project is occurring at Maringa Creek in Nyerimilang Heritage Park.
- Otways: small amount of blackberry control work.
- Strzelecki Ranges: Landcare groups have done some fencing of rainforest gullies.

Monitoring / Research

- Cameron and Turner (1996) undertook a base-line survey and monitoring project for Myrtle Wilt within Cool Temperate Rainforest in Victoria.
- Parks Victoria funded two undergraduate Myrtle Wilt-related Honours projects through their Research Partners Program. The projects looked at developing a computer model that would predict the spread of Myrtle Wilt in Mait's Rest in the Otway Ranges and a cost-accuracy analysis of two survey techniques for monitoring Myrtle Wilt (Graham 2000, Weddall 2001).
- The University of Melbourne's School of Forest and Ecosystem Science is currently monitoring infected Myrtle Beech stands in the Otways and Central Highlands to determine the current rate of spread of Myrtle Wilt.
- A baseline has been established for Myrtle Wilt monitoring in the Otways and Central Highlands (Cameron and Turner 1996). This project mapped the extent and impact of Myrtle Wilt using aerial survey and air photo interpretation (API). Monitoring plots were established to investigate disease gap dynamics and rates of disease development. Vascular and non-vascular plants were recorded in paired plots, one affected by Myrtle Wilt and the other free of the disease. [Part B]
- Myrtle Wilt is currently being monitored by the University of Melbourne School of Forest and Ecosystem Science in the Central Highlands and is planned for the Otways. Plots are centred on Myrtle Beech trees recently killed by Myrtle Wilt, and mortality of Myrtle Beech in the surrounding 100 metres is being recorded to track the spread of the disease.
- A baseline has been established for the monitoring of regrowth after 1983 wildfires in rainforest at Jones Creek (Chesterfield *et al.* 1990).
- A study on "Abiotic edge effects in Wet Sclerophyll Forest in the Central Highlands of Victoria" was undertaken by Brooke Parry, a Master of Science candidate at the University of Melbourne during 1996 and 1997. The study quantified the edge width in terms of radiation, atmospheric temperature and ambient vapour pressure across the first 100 m of edge environment within otherwise uniform Wet Sclerophyll Forest. The results can be used to assess the effectiveness of buffers of various widths in protecting stands of Cool Temperate Rainforest.

Section III: Conservation Objectives and Intended Management Actions

Note: The intended management actions listed below are further elaborated in DSE's Actions for Biodiversity Conservation (ABC) system. Detailed information about the actions and locations, including priorities, is held in this system and will be provided annually to land managers and other authorities. The targets listed below are intended to be achieved within the five year timeframe of this Action Statement.

Objective I **To map, document and report on the extent and condition of FFG-listed rainforest communities and the incidence of Myrtle Wilt in Victoria.**

Action	Targets	Responsible
1. Map community. Progressively upgrade mapping of FFG-listed rainforest communities. This will include improving accuracy of boundaries, mapping of floristic communities and reconciliation with related mapping.	▪ Accurate mapping of FFG-listed rainforest communities throughout Victoria completed at 1:25,000 scale.	DSE
2. Compile, maintain and assess information. In conjunction with public land reporting frameworks, report on the extent and condition of FFG-listed rainforest communities in State forest and parks and reserves, and evaluate the effectiveness of management regimes in their conservation.	▪ Condition assessments completed for all major stands. ▪ Regular public reporting on extent and condition of FFG-listed rainforest communities.	DSE Parks Victoria
3. Undertake threat monitoring. Progressively map and monitor on a periodic basis the extent of Myrtle Wilt throughout the range of Myrtle Beech, using the methods of Cameron and Turner (1996). Examine the impact of Myrtle Wilt on the floristics of Myrtle Beech-dominated forest as part of this project.	▪ Incidence of Myrtle Wilt mapped and monitored periodically.	DSE
4. Undertake habitat monitoring. Establish monitoring programs at representative sites affected by the 2009 bushfires to track fire recovery.	▪ Monitoring programs established and data collected annually.	DSE Parks Victoria

Objective II **To plan and undertake activities on public land to avoid impacts on FFG-listed rainforest communities.**

Action	Targets	Responsible
5. Implement prescriptions. For timber harvesting and associated roading within State forest, apply the definitions, minimum area rules, guidelines for recognition and minimum prescriptions set out in Appendix 1. Where higher levels of protection are provided in Forest Management Plans, the higher levels shall continue to apply.	▪ Compliance with the timber harvesting and road construction and maintenance prescriptions.	VicForests DSE
6. Monitor compliance with codes, prescriptions and agreements. Continue to undertake annual Code of Practice audits. Where rainforest is a prominent feature within the Forest Management Area, ensure that the audits focus on rainforest protection issues and that action is taken where breaches are confirmed.	▪ Annual audits completed and results publicised.	EPA DSE
7. Prevent habitat fragmentation. Avoid road construction through rainforest stands or their buffers, wherever possible. Where there is no alternative, ensure that roads are designed and constructed to minimise impacts on rainforest stands. Where roads already exist in rainforest stands or their buffers, consider closure or re-alignment. If neither is feasible, ensure that maintenance works minimise impacts on rainforest stands.	▪ No significant impacts on FFG-listed rainforest communities arising from road construction.	VicForests DSE Parks Victoria VicRoads local gov't authorities
8. Develop, provide input to or implement park,	▪ No significant impacts on FFG-	Parks

	reserve or land management plan. Plan and implement measures to protect FFG-listed rainforest communities in parks and reserves, including siting, designing and constructing roads, walking tracks and other visitor facilities to avoid or minimise disturbance to rainforest stands or surrounding vegetation.	listed rainforest communities arising from new developments within parks and reserves.	Victoria
9.	Provide training. Provide further training for staff of Department of Sustainability and Environment, VicForests, Parks Victoria and other relevant organisations, such as private forestry companies, in the identification and management of FFG-listed rainforest communities and the prevention of Myrtle Wilt.	▪ Training needs assessed. ▪ Training materials and programs developed. ▪ Training provided to all relevant staff.	DSE VicForests Parks Victoria

Objective III To plan and undertake activities on private land to avoid impacts on FFG-listed rainforest communities.

Action	Targets	Responsible
10. Liaise with private landholders. Encourage private land managers to develop and implement land management procedures which are likely to achieve the relevant objectives of this Action Statement.	▪ net gain[1] achieved for FFG-listed rainforest communities on private land.	DSE local gov't authorities
11. Provide information and advice to local government authorities for inclusion in planning processes. Provide information and advice to local government authorities and Catchment Management Authorities regarding the location and conservation significance of FFG-listed rainforest communities.	▪ Information needs determined for key agencies. ▪ Information provided to all key agencies. ▪ Ongoing liaison maintained.	DSE

Objective IV To mitigate the impact of processes which threaten rainforests

Action	Targets	Responsible
12. Compile, maintain and assess information. Maintain information on sites of significance for FFG-listed rainforest communities and, for each site, identify key threats, management objectives and priority actions and recorded these in the Actions for Biodiversity Conservation (ABC) system.	▪ Maps and text information stored for all sites of significance for rainforest. ▪ Management priorities and results recorded for all sites of significance for rainforest.	DSE
13. Assess impacts of bushfires. Assess the impacts of the 2009 bushfires on FFG-listed rainforest communities.	▪ All significant sites assessed as part of fire recovery projects	DSE
14. Facilitate bushfire recovery. Plan and implement rehabilitation of stands of FFG-listed rainforest communities where necessary.	▪ Rehabilitation planned and implemented for all significant sites assessed as requiring action.	DSE
15. Protect habitat from fire. Assess the feasibility and likely effectiveness of providing landscape level protection from fire for sites of significance for FFG-listed rainforest communities.	▪ Fire protection options identified and assessed.	DSE
16. Restore habitat. Determine priority areas for restoration of rainforest.	▪ Priority areas for restoration identified.	DSE
17. Manage plant pathogens. Avoid road construction and maintenance activities that result in wounding of Myrtle Beech	▪ A measurable reduction in the incidence of wounding of myrtle beech as a result of human	VicForests DSE Parks

[1] Refer to *Victoria's Native Vegetation Management – A Framework for Action*. This document is available on the Department of Sustainability and Environment website, www.dse.vic.gov.au

trees wherever possible, but especially in stands of Cool Temperate Rainforest where Myrtle Beech makes up >20% of the rainforest canopy.	activities.	Victoria
18. Manage plant pathogens. Carefully plan, implement and monitor further development of recreation and tourism facilities in parks and reserves and in State forest where Myrtle Wilt is present or where there is a high risk of future infection.	▪ No increase in wounding of myrtle beech as a result new recreation and tourism development activities.	Parks Victoria, DSE
19. Manage plant pathogens. Review existing recreation and tourism facilities in parks and reserves and in State forest where Myrtle Wilt is present or where there is a high risk of future infection with a view to reducing the incidence of wounding of Myrtle Beech trees.	▪ Existing recreation and tourism facilities in parks and reserves and in State forest assessed for Myrtle Wilt risk. ▪ Remedial action taken where necessary.	Parks Victoria, DSE
20. Liaise with private landholders. Advise private landholders on the identification, management issues and recommended actions relating to Myrtle Wilt.	▪ Key properties identified. ▪ Landholders approached. ▪ Information provided as required.	DSE

Objective V To improve our knowledge of rainforest ecology and management

Action	Targets	Responsible
21. Identify research priorities and facilitate their implementation. Develop and implement a research strategy for FFG-listed rainforest communities which identifies and elaborates other key knowledge gaps and describes research priorities. The strategy should be developed in consultation with relevant experts and stakeholders.	▪ Research strategy prepared. ▪ Annual, independent review of progress completed.	DSE
22. Conduct priority research projects as specified. Design and implement a research program to determine the effects of timber harvesting and associated road construction on FFG-listed rainforest communities and the effectiveness of buffers in protecting these communities from changes in microclimate and physical disturbance.	▪ Program designed and implemented. ▪ Independent steering committee established. ▪ Program implemented and results published.	VicForests DSE
23. Conduct priority research projects as specified. Investigate the relationship between natural and human-induced disturbance, including fire, windthrow, roading and harvesting, and the incidence and rate of spread of Myrtle Wilt within Victorian Myrtle Beech-dominated forests.	▪ Relationship with human disturbance clarified through implementation of research projects.	DSE VicForests
24. Conduct priority research projects as specified. Evaluate the feasibility and effectiveness of various measures to prevent infection following wounding of Myrtle Beech.	▪ Trials undertaken and results publicised.	DSE VicForests

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Appendix 1

Guidelines and minimum prescriptions to protect FFG-listed rainforest communities during forestry operations on public land

Recognition of rainforest

Definition of rainforest

Rainforest is defined ecologically as closed (>70% projective foliage cover) broad-leaved forest vegetation with a continuous rainforest tree canopy of variable height, and with a characteristic diversity of species and life forms. Rainforest includes closed transitional and seral communities, with emergent eucalypts, that are of similar botanical composition to mature rainforests in which eucalypts are absent. Rainforest canopy species are defined as shade tolerant tree species which are able to establish below an undisturbed canopy, or in small canopy gaps resulting from locally recurring minor disturbances, such as isolated windthrow or lightning strike, which are part of the rainforest ecosystem. Such species are not dependent on fire for their regeneration.

Field recognition and delineation

Rainforest stands are identified in the field when the tree canopy species are present and conform to the definition described above. The boundary of the rainforest and the adjoining eucalypt forest is often clear in the field. However, in circumstances where further clarification is required, the boundary can be determined by using the "differential species approach" (DSE 2009). Using the differential species approach, the rainforest boundary is the point where the number of rainforest differential species exceeds the number of eucalypt forest differential species.

Note: Special care is required when assessing the presence and extent of rainforest where disturbance, such as fire, disease, windthrow, etc., has temporarily removed the rainforest canopy or has created temporary canopy gaps. In these cases, the differential species approach will be the best indicator of the long-term rainforest boundary.

Minimum area for recognition

The minimum area for recognition of a rainforest stand is 0.1 ha (e.g. 20 m by 50 m).

Note: Groupings of rainforest species that occur together in areas of less than 0.1 hectare are not recognised as rainforest stands. Edge effects, including elevated light, elevated temperature and reduced humidity, and an increased risk of frequent fire, means that the likely long term persistence of such grouping is very low.

Linear stands

Linear stands are defined as stands of rainforest which are elongated and which are between 20 m and 40 m wide. Linear stands of rainforest usually occur along drainage lines or small streams. Linear stands may be "overshadowed" by eucalypts from the adjoining eucalypt forest.

Aggregation of stands of rainforest

Stands of rainforest may be aggregated to form a larger stand where:

- each stand to be aggregated is at least 0.1 ha in area and,
- for linear stands, the gap between the stands is less than 50 m, or,
- for non-linear stands, the gaps between stands are smaller in area than the stands themselves.

Protection from timber harvesting and roading

Small stands

All viable rainforest (that is, of at least 0.1 ha in area) must be protected from timber harvesting using the following guidelines:

- non-linear stands that are at least 0.1 ha but less than 0.4 ha do not require a buffer but must be excluded from harvesting;
- linear stands that are at least 0.1 ha but are less than 0.2 ha do not require a buffer[2] but must be excluded from harvesting;
- linear stands that are at least 0.2 ha but less than 0.4 ha must be protected by a 20 m buffer; and

[2] On waterways, filter strips may be applied for water quality purposes. Refer to the *Code of Practice for Timber Production.*

- aggregated linear stands must be treated as linear stands.

Where a buffer is not required, the following measures must be applied to the stands:

- trees must not be felled from within the stand unless approval is given to permit selective removal of trees for safety purposes;
- machinery must not enter the rainforest stand, except for the construction and use of approved stream crossings;
- all possible attempts must be made to protect the stands from damage caused by trees felled in adjacent areas. Trees felled for safety purposes or accidentally felled into the rainforest stand may be removed if significant damage or disturbance to vegetation and soils can be avoided; and
- care must be exercised in the planning and operational stages to avoid regeneration burns entering the stand. Slash accumulation must be avoided around retained stands.

Any eucalypts within the stand may be counted as habitat and/or seed trees to be retained.

Larger stands

Rainforest stands (including linear stands) equal to or exceeding 0.4 ha must be protected by a vegetated buffer of a minimum width of 40 m. Aggregated stands must be treated as entire stands.

Sites of significance for rainforest

Sub-catchment protection[3] of rainforest stands must be provided in core areas[4] of National Sites of Significance for Rainforest (Peel 1999[5]), with buffers to the nearest watershed[6]. As part of detailed forest management planning, further protection has been considered for rainforest stands within sites of State or regional Significance, where the values of these stands warrant such protection.

Roading

Roads, including temporary access tracks and snig tracks, must not be constructed across areas of rainforest unless no feasible alternative exists. Where roads or tracks are to be constructed in rainforest, design and construction will avoid or minimise impacts to the maximum extent possible, with consideration given to retaining canopy closure, minimising the width and length of road or track within the stand, and utilising existing gaps.

Consideration should be given to closing or realigning roads that pass through rainforest stands, where there is a net environmental benefit from such action.

Land adjoining rainforest

Care must be taken to exclude regeneration burns from rainforest. Boundary tracks must be situated outside the rainforest buffer unless otherwise authorised by the Regional Director. Regeneration and fuel reduction burns may only be conducted when fuel moisture differentials indicate that fire will be unlikely to enter the rainforest or buffer. Construction of control lines is permitted if necessary. Application of pesticides and herbicides must not be undertaken where this may impact on rainforest values.

[3] Subcatchment protection is defined as protecting the intact catchment unit which encompasses land upstream or upslope of the rainforest stand.
[4] A core area is defined as an area delineated by DSE which includes the most significant rainforest stands within a site of significance for rainforest.
[5] Peel, B. (1999) *Rainforests and Cool Temperate Mixed Forests of Victoria*, Department of Natural Resources and Environment, East Melbourne.
[6] A watershed is defined as a ridge or spur of land which separates two adjacent river systems.