FLORA & FAUNA GUARANTEE

FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE

FINAL RECOMMENDATION ON A NOMINATION FOR LISTING

Warm Temperate Rainforest Community

DOCID107-417469679-742

Date of receipt of nomination: 12 March 2021

Date of preliminary recommendation: 17 July 2023

Date of final recommendation decision: 22 November 2023

Validity: The nomination is for a valid item.

Prescribed Information: The prescribed information was provided.

Name of the Nominator is adequately provided.

Name of the Item is adequately provided.

The nominated community is accepted by the Scientific Advisory Committee (SAC) as a valid community because it is adequately defined and described according to accepted practice.

Current conservation status

There are currently five Warm Temperate Rainforest communities listed as threatened in Victoria under the *Flora and Fauna Guarantee Act 1988* (FFG Act):

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)
Strzeleckis Warm Temperate Rainforest

The SAC final recommendation reports for the currently listed Warm Temperate Rainforest communities are available at: https://www.environment.vic.gov.au/conserving-threatened-species/threatened-species-data/reports

This nomination is for the state-wide distribution of Warm Temperate Rainforest that includes the five listed sub-communities and currently unlisted areas of the community within Victoria.

Eligibility for listing as a community under the Flora and Fauna Guarantee Act 1988

The SAC has assessed the eligibility of this nomination in accordance with Section 16C of the (FFG Act) and the criteria for determining eligibility for listing prescribed in the Flora and Fauna Guarantee Regulations 2020 (FFG Regulations).

Community information

Description

Warm Temperate Rainforest (WTR) is structurally complex and is defined as a closed (>70% foliage projective cover) forest to 25 m tall and dominated by a range of non-eucalypt canopy species above an understorey of smaller trees and shrubs and

usually visually dominated by ferns and climbers (State of Victoria 2004). In relatively undisturbed WTR, the characteristic canopy species on wetter sites is Lilly Pilly (*Syzygium smithii*) in association with, on edaphically drier sites, Sweet Pittosporum (*Pittosporum undulatum*). One or more other canopy species including Mutton-wood (*Myrsine howittiana*), Yellow-wood (*Acronychia oblongifolia*), Eastern Leatherwood (*Eucryphia moorei*), Blue Olive-berry (*Elaeocarpus reticulatus*) or Kanooka (*Tristaniopsis laurina*) may also be present or locally dominant (State of Victoria 2004, Cameron 2011). The mid-storey of WTR consists of a small tree and shrub layer with numerous vines. In most stands, woody vines such as Water Grape (*Cissus hypoglauca*) contribute significant biomass to the dominant closed canopy. In the Strzeleckis, White Elderberry (*Sambucus gaudichaudiana*), Hazel Pomaderris (*Pomaderris aspera*) and Blanket Leaf (*Bedfordia arborescens*) may be present, whilst in East Gippsland Large Mock-olive (*Notelaea venosa*), Jungle Grape (*Cissus hypoglauca*) or Milk Vine (*Leichhardtia rostrata*) occur. The ground layer is dominated by numerous species of ferns, including Mother Shield-fern (*Polystichum proliferum*), Sickle Fern (*Pellaea falcata*), Shiny Shield-fern (*Lastreopsis acuminata*), Kangaroo Fern (*Microsorum pustulatum*), Soft Tree-fern (*Dicksonia antarctica*), Veined Bristle-fern (*Polyphlebium venosum*), or Hard Water-fern (*Blechnum wattsii*). WTR typically occurs at lower elevation and warmer average temperature than Cool Temperate Rainforest from which it is distinguished by its characteristic composition and relatively few climbers.

Distribution

Rainforest in Victoria is naturally rare (covering just 0.14% of the land surface of Victoria) as it can only arise in environmentally stable settings where high intensity fire has been absent for extended periods (State of Victoria 2019a, White et al. 2019). WTR is a sub-formation of rainforest and is largely restricted to East Gippsland, east of the Mitchell River, with outliers at Wilson's Promontory and in the Strzelecki Ranges. WTR is largely restricted to warm, wet, topographic fire refuges but may occur in more exposed sites if rainfall exceeds 1000 mm. Parent geologies of WTR are primarily relatively fertile, regionally metamorphosed marine sediments or alluviums, sometimes granodiorites and rarely limestones where WTR is replaced by Dry Rainforest. Rarely, WTR may be found on infertile sand dunes where they are protected from fire by water bodies or topography. WTR occurs on a variety of landforms, including stream banks, drainage lines and gullies, humid lowland river valleys, flood plains, the hinterlands of estuaries and occasionally on sea cliffs or sand dunes (Peel 1999).

Cultural and community significance

The cultural, customary and spiritual significance of native species and the ecological communities they form are diverse and varied for Indigenous Australians and their stewardship of Country. This section acknowledges this significance but is not intended to be comprehensive or applicable to, or speak for, Indigenous Australians. Such knowledge may be held by Indigenous Australians who are the custodians of this knowledge and have the rights to decide how this knowledge is shared and used. WTR occurs on the Country of the Kurnai, Woiwurrung, Boonwurrung and Tungerung peoples (AIATIS 2023), and it is likely that it contains many food items, medicines, objects, values and places of cultural significance to Indigenous Australians.

Decline

Extensive clearing of rainforest for agriculture and grazing occurred in the 19th and 20th centuries and remaining stands are susceptible to the direct and indirect effects of disturbances such as fire, timber harvesting, weed invasion and disease (State of Victoria 2009, White et al. 2019). Elevated fire frequency, relative to pre-European levels, has led to the contraction, fragmentation or elimination of rainforest stands throughout their range in Victoria (State of Victoria 2009). For example, the Ash Wednesday fire of 1983 caused the extirpation of significant tracts of WTR in east Gippsland. Using repeat aerial photography in 1982 (one year before) and in 2007 & 2010 (24 and 27 years after), Zammit (2015) determined this single fire event caused a reduction of 42% (9.7 km2 to 5.6 km2) in total areal extent across a 338 km2 study area. The decline in extent and composition of WTR is expected to continue given the predicted ongoing nature of current threats, especially fire.

Threats

Climate Change

Climate modelling indicates that Victoria's future climate will become warmer and drier, and rainfall will decrease across the state. There will be a decline in cool season rainfall and likely extended periods of drought. Weather extremes are predicted to increase as a result of climate change. (State of Victoria 2019b). Climate change is predicted to lead to increased frequency, intensity and landscape scale of wildfire resulting in eucalypt invasion of severely burnt rainforest. WTR species are less drought resistant, less tolerant of increased fire regimes, and less likely to recover in a warming climate than other types of forest species (Melick 1990, Williams et al. 2009, Abram et al. 2021). Climate driven hydrological changes within catchments are likely to affect WTR. A warmer and drier climate will change the hydrology of catchments and affect the sustainability of wet sites

capable of supporting WTR. In addition, whilst timber harvesting of rainforest is specifically prohibited by the Code of Practice for Timber Production (State of Victoria 2022), timber harvesting within catchments containing rainforest has been permitted. Rapid regeneration of surrounding forest uses more water than a mature forest (Bren 2010, Cornish 1993). This additional uptake of water from within a catchment could exacerbate the impacts of decreased rainfall and would further affect hydrological regimes. All these factors will have severe negative consequences for the persistence of WTR in the landscape. The planned changes to forestry practices in Victoria (including the cessation of native timber harvesting from January 2024) may partly reduce the impact on hydrological regimes within catchments where WTR occurs.

Bushfire / Changed fire regimes

In the context of a warmer, drier climate, there will be longer fire seasons with up to 60% more very high fire danger days (State of Victoria 2019b, Abram et al. 2021). In recent years there has been a significant increase in large-scale bushfires in Victoria and the 2019-20 Victorian bushfires burnt over 1.5 million hectares. Fire extent mapping following these bushfires showed that 78% of WTR was impacted by fire, with 33% impacted by high severity fire. Furthermore, 12% of WTR within Victoria has been impacted by bushfires twice within the last 20 years (State of Victoria 2020a), which has significant implications for this fire sensitive and slow-to-recover community.

The effects of fire disturbance on rainforest are complex with some species showing a level of resilience whilst others are killed by fire (Melick & Ashton 1991, Baker 2012). However, the overall, long-term effect of recurring, intense fire is that it promotes eucalypt forest at the expense of rainforest (Ashton 2000, Baker 2012, Cameron 1992, Kershaw et al. 2002). Recruitment of eucalypts into rainforest stands can lead to long-term changes in forest structure, including reduction or loss of some WTR stands. For example, Shaw (2008) showed that the Ash Wednesday fire reduced what was the largest single stand of WTR in Victoria at Jones Creek by 36.5%. This site was burnt a second time in the Black Summer fire of early 2020, and resurvey in 2023 has shown the stand is now almost totally lost, being converted to a mosaic of eucalypt forest and shrub-dominated, postfire ephemeral communities (Fritchley 2023). Hence, altered fire regimes with more frequent and extensive fire, as seen in 2019-20 and as predicted by climate change analyses, is a highly significant threat to the integrity, extent and persistence of WTR which is already in decline (State of Victoria 2009).

In addition to the direct impacts, WTR sites are at high risk of future indirect impacts of bushfire such as soil erosion, exposure, weed invasion, eucalypt invasion/encroachment and elevated levels of feral herbivore browsing (State of Victoria 2020a).

Logging

Although logging in rainforest has been prohibited for decades and has not been a recent direct driver of rainforest loss, it is possible that logging in adjacent sclerophyll forest has increased the risk posed by wildfires to WTR. Lindenmayer et al. (2020) argued that the 2020 Black Summer wildfires in south-eastern Australia were made worse by logging and associated forest management, arguing among other things that even aged, densely stocked regenerating stands of eucalypts promote the severity and spatial contagion of fire because they lack key mesic elements and architectural characteristics. On the other hand, Bowman et al. (2021) argued the most important variables determining severe canopy damage were broad spatial factors (mostly topographic) and fire weather, with the effect of logging being relatively minor. Under this model, logging does not exacerbate the underlying threat to WTR of a warming climate. Native timber harvesting in Victoria's state forests is due to cease in January 2024.

Deer

Feral deer are emerging as one of Australia's most serious environmental threats and Victoria has possibly the largest deer population in Australia, estimated at more than a million animals (State of Victoria 2020b). The deer population is expanding rapidly and invading new areas. With a lack of predators, widespread occurrence in vast and remote areas and having great habitat flexibility, deer are set to become one of Victoria's and ultimately Australia's most damaging pest animal invaders (Invasive Species Council 2023). Deer populations can significantly reduce the health of natural ecosystems. Deer herbivory contributes to shrub and ground layer disturbance, plant and habitat destruction through antler rubbing and browsing, localised soil compaction, pugging and erosion, degradation of waterways and the spread of weeds into new areas. This is likely to be exacerbated in fire-effected areas, where the presence of feral deer has impeded regrowth and regeneration. These impacts collectively disrupt the overall viability and function of ecosystems and landscapes in which deer are present (Invasive Species Council 2022).

At some rainforest sites in Victoria, feral deer threaten key structural species, such as Yellow-wood and Mutton-wood (Bilney 2013). Reduction in these individual plants implies a much broader environmental impact. Seedlings and plants with new shoots are particularly attractive to feral deer, and their reduction will result in changed vegetation structures and reduced

species diversity (Invasive Species Council 2022). There is well documented (Bilney 2013, Peel et al. 2005, SAC 2007) and anecdotal (ABC 2021) evidence for the impacts of deer on WTR, particularly from browsing and antler rubbing. Bilney (2013) surveyed WTR gullies of East Gippsland and found that 51% of Yellow-wood stems were subject to severe antler rubbing from Sambar (*Cervus unicolor*), with a mortality rate of just over 30%. Sambar represent a major threat to the long-term persistence of Yellow-wood and rainforest communities in East Gippsland.

Edge effects, fragmentation and weed invasion

Most WTR stands are linear and narrow, so each isolated patch has a large edge-to-area ratio. This exposes WTR patches to edge disturbances from the surrounding landscape, particularly where fringing ecotones have been replaced by farmland or logging coupes (SAC 1995). Many small stands are heavily invaded by weeds such as Blackberry (*Rubus fruticosus* spp. agg.), Blue Periwinkle (*Vinca major*) and Tradescantia (*Tradescantia fluminensis*), and these threaten the survival of understorey species (State of Victoria 2009). This is likely to result in long-term alteration of the understory composition (SAC 2014). Zammit (2015) showed that wildfire further fragments WTR and probably exacerbates these edge effects; the Ash Wednesday fire of 1983 increased the number of discrete WTR patches in a 338km2 study area from 152 to 274, caused a reduction in mean patch size, and almost doubled the edge-area ratio.

Pests and diseases

Dieback caused by the oomycete genus *Phytophthora* presents a significant risk to WTR communities. The current risk caused by Phytophthora dieback is amplified by the recently described genetic diversity of the genus, with potential hybrid swarms increasing the host range and damage (Burgess et al. 2010). Climate predictions in WTR communities on the New South Wales South Coast and in East Gippsland indicate greater dieback impacts on communities stressed by extreme weather (McDougall & Liew 2020).

Since 2010 myrtle rust caused by *Austropuccinia psidii* has been observed on 17% of native Myrtaceae, with the greatest incidence on flora on the East Coast, including WTR in East Gippsland (Mackinson et al. 2020). Infection causes reduced fecundity and tree death. The risk is compounded by fragmented habitat, fire, drought and weeds.

Ambrosia beetles are invasive burrowing beetles that vector fungal wilt pathogens in forests and urban environments. Polyphagous shot hole borer (*Euwallacia fornicatus*) has a host range of over 600 tree species and was recently detected in Western Australia. While not yet detected in Victoria, the beetle and associated Fusarium wilt pathogens present a risk to WTR trees (Mahoney et al. 2023, Agriculture Victoria 2023).

Identifying the threats that pests and diseases pose is a high priority for the management and conservation of WTR in Victoria.

Decision by the Scientific Advisory Committee

The eligibility of the nominated community to be specified in the Threatened List must be determined in accordance with the eligibility criteria prescribed for the purposes of Division 2 of Part 3 of the FFG Act. The relevant eligibility criteria are prescribed in Schedule 2 of the FFG Regulations, which provides that if a criterion is met, the community is eligible to be specified in the Threatened List.

Criterion 2.1

The community –

(a) is very rare in terms of total area it covers

Evidence:

Forest dominated by rainforest species in Victoria is extremely rare and comprises no more than 0.14% of the state's land surface (State of Victoria 2019a). WTR is a subset of rainforest and thus occupies an even smaller proportion of Victoria with approximately 16,600 ha remaining across the state (State of Victoria 2020). The area of occupation has declined since European settlement primarily as a result of clearing for agriculture (Peel 1999) and the impact of intense fire events.

Criterion 2.2

The threat is currently affecting the community and is expected to continue affecting the community in the future at a level which is likely to result in the extinction of the community.

Evidence:
The majority of threats listed above currently affecting WTR are not only expected to continue but are predicted to intensify. WTR is threatened by climate change leading to increased frequency and severity of fire (State of Victoria 2019b, Kershaw et al. 2002). The 2019-20 Victorian bushfires are an example of the level of threat with 78% of WTR impacted (State of Victoria 2020a). Historically, fire has played a significant role in reducing rainforest distribution in Victoria and restricting it to fire refugia (Peel 1999, Baker 2012). As exemplified by the fate of rainforest in the Jones Creek WTR Reference area, increased fire frequency, intensity and landscape scale are expected to continue this process of decline at an accelerated rate. A hotter, drier climate and catchment processes that reduce catchment hydrology further stress WTR (which is a rainfall and temperature dependent community). The deer population in Victoria has expanded dramatically in recent times (Invasive Species Council 2023) and although deer control programs are in place across the state, the deer population is expected to continue to expand into new areas in the future. This will lead to further damage to WTR, especially in burnt areas of regenerating rainforest (ABC 2021). While individual threats are significant in themselves, in combination (as is currently occurring and will continue to intensify in the future) they are an even greater concern.

Documentation

The published information provided to and sourced by the SAC has been assessed. To the best of their knowledge, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

Advertisement for public comment
In accordance with the requirements of Section 16D of the FFG Act, the preliminary recommendation was advertised for a period of at least 30 days.
The preliminary recommendation was advertised in:

- Victorian Government Gazette on 27 July 2023
- DELWP website
- DELWP social media

Public submissions closed on 27 August 2023

Additional Information considered by the Scientific Advisory Committee
Following publication of the preliminary recommendation, the SAC did not receive any public submissions. In formulating its Final Recommendation on this item, the SAC was not aware of any compelling evidence to warrant a change to the preliminary recommendation that the nominated community is eligible for listing.

Final Recommendation of the Scientific Advisory Committee

As outlined above, the nominated community satisfies at least one criterion of the set of criteria prepared and maintained under Division 2 of Part 3 of the FFG Act and stated in Schedule 2 of the FFG Regulations.

The SAC concludes that on the evidence available the nominated community is eligible for listing in Victoria because criteria 2.1 and 2.2 of the FFG Regulations have been satisfied.

The Scientific Advisory Committee therefore makes a final recommendation that the nominated community be supported for listing under the *Flora and Fauna Guarantee Act 1988*.

Endorsement by the Convenor of the Scientific Advisory Committee **Date**

Dr. Michelle T. Casanova **29 November 2023**
Convenor

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