

Edition 2 *From Forest to Fjaeldmark*

The Vegetation Communities

Highland treeless vegetation



Richea scoparia

Naomi Lawrence

Highland treeless vegetation

Community (Code)	Page
Alpine coniferous heathland (HCH)	4
Cushion moorland (HCM)	6
Eastern alpine heathland (HHE)	8
Eastern alpine sedgeland (HSE)	10
Eastern alpine vegetation (undifferentiated) (HUE)	12
Western alpine heathland (HHW)	13
Western alpine sedgeland/herbland (HSW)	15

General description

Highland treeless vegetation communities occur within the alpine zone where the growth of trees is impeded by climatic factors. The altitude above which trees cannot survive varies between approximately 700 m in the south-west to over 1 400 m in the north-east highlands; its exact location depends on a number of factors. In many parts of Tasmania the boundary is not well defined. Sometimes tree lines are inverted due to exposure or frost hollows.

There are seven specific highland heathland, sedgeland and moorland mapping communities, including one undifferentiated class. Other highland treeless vegetation such as grasslands, herbfields, grassy sedgelands and wetlands are described in other sections. When peatland pool complexes occur within highland treeless vegetation and these water bodies are too small to map, they are mapped as the unit appropriate to the surrounding vegetation rather than Water (OAQ). Alpine vegetation is generally treeless, although there may be some widely scattered trees, generally less than two metres high. Several types of vegetation dominated by small trees, particularly conifers or shrubs, may occur in sheltered areas in the alpine zone. Prolonged snow-lie and extreme winds may give rise to distinctive facies within several highland treeless vegetation units.

These communities are dealt with in the section appropriate to the vegetation structure, for example,

Rainforest and related scrub, Dry eucalypt forest and woodland, Scrub, heathland and coastal complexes. Likewise, some non-forest communities with wide environmental amplitudes, such as wetlands, may be found in alpine areas.

The boundaries between alpine vegetation communities are usually well defined, but communities may occur in a tight mosaic. In these situations, mapping community boundaries at 1:25 000 may not be feasible. This is particularly the problem in the eastern highlands; the class Eastern alpine vegetation (undifferentiated) (HUE) is used in those areas where remote sensing does not provide sufficient resolution.

A minor revision in 2017 added information on the occurrence of peatland pool complexes, and described distinctive 'prolonged snow lie facies' within relevant mapping units. The Cushion moorland (HCM) unit was substantially revised to reflect better information.

General management issues

Fire is, at present, the most serious threat to Highland treeless vegetation in Tasmania. Very few of the plant communities in this section can recover after firing. Some take hundreds to thousands of years to recover, if they recover at all (Balmer 1991). Historically, large areas of the Tasmanian alpine zone have been burnt and are now vegetated with comparatively species-poor heaths.

A serious but localised issue is the pressure put on alpine vegetation by bushwalkers and, in some areas, horses. Where trampling is heavy, such as around campsites and on ever-widening alpine tracks, species diversity and cover are considerably reduced. This impact is particularly heavy in wet or waterlogged areas (Gibson 1984, Balmer 1991, Whinam & Comfort 1996, Whinam & Chilcott 1999), with Cushion moorland (HCM) particularly susceptible. Pug marks left on the surface of the plants may take up to a decade to grow out, and can produce erosion (Balmer 1991).

Livestock grazing is an issue in some areas, as it removes palatable species of herbs, grasses and heaths, changing the species composition to predominantly unpalatable species (Kirkpatrick et al. 1988).

References and further reading

- Balmer, J. (1991) Alpine Vegetation. In: *Tasmanian Native Bush: A Management Handbook*. (ed. Kirkpatrick, J.B.), pp. 117–127. Tasmanian Environment Centre Inc., Hobart.
- Brown, M.J. (1988) Distribution and conservation of King Billy Pine. Tasmanian Forestry Commission. Hobart.
- Corbett, S. (1995) The Vegetation of the Central Plateau–Tasmanian Wilderness World Heritage Area. *Wildlife Report 95/3*, Parks and Wildlife Service, Department of Environment and Land Management.
- Crowden, R.K. (1999) Alpine Vegetation. In: *Vegetation of Tasmania, Flora Of Australia Supplementary Series No. 8* (eds. Reid, J.B., Hill, R.S., Brown, M.J. & Hovenden, M.J.), pp. 333–356. Australian Biological Resources Study.
- Cullen, P. (1991) Rainforest. In: *Tasmanian Native Bush: A Management Handbook* (ed. J.B. Kirkpatrick). pp. 24–34. Tasmanian Environment Centre Inc., Hobart.
- Davies, J.B. & Davies, M.J. (1989) Plant communities of the Ben Lomond Plateau. *Occasional Paper no. 1*. Queen Victoria Museum and Art Gallery. Launceston.
- Duncan, A.M.R. (1991) Management of Rainforest in Reserves. *Tasmanian NRCP Technical Report No. 5*. Forestry Commission, Tasmania and the Department of Arts, Sport, the Environment, Tourism and Territories, Canberra.
- Forest Practices Authority (2005) *Forest Botany Manual*. Forest Practices Authority, Hobart. Tasmania.
- Gibson, N., (1984) Impacts of Trampling on Bolster Heath Communities of Mt. Field National Park. *Papers and Proceedings of the Royal Society of Tasmania*. **118**, 47–52.
- Gilfedder, L. (1988) Factors influencing the maintenance of an inverted *Eucalyptus coccifera* treeline on the Mount Wellington plateau, Tasmania. *Australian Journal of Ecology*. **13**, 495–503.
- Jarman, S.J., Brown, M.J., & Kantvillas, G. (1984) Rainforest in Tasmania. National Parks and Wildlife Service. Hobart.
- Jarman, S.J., Brown, M.J., & Kantvillas, G. (1991) Floristic and ecological studies in Tasmanian Rainforest, *Tasmanian National Rainforest Conservation Program Report No. 3*. Hobart.
- Kirkpatrick, J.B. & Balmer, J. (1991) The Vegetation and Higher Plant Flora of the Cradle Mountain–Pencil Pine Area, Northern Tasmania. In: *Aspects of Tasmanian Botany: A Tribute to Winnifred Curtis* (eds. Banks et al.), pp. 119–148. Royal Society of Tasmania.
- Kirkpatrick, J.B. & Brown, M.J. (1987) The nature of the transition from sedgeland to alpine vegetation in Southwest Tasmania. I. Altitudinal vegetation change in four mountains. *Journal of Biogeography*. **14**, 539–550.
- Kirkpatrick, J.B. & Duncan, F. (1987) Tasmanian high altitude grassy vegetation; its distribution, community composition and conservation status. *Australian Journal of Ecology*. **12**, 73–86.
- Kirkpatrick, J.B. & Harwood, C.E. (1980) Vegetation of an infrequently burned Tasmanian mountain region. *Proceedings of the Royal Society of Victoria*. **91**, 71–107.
- Kirkpatrick, J.B. (1986) Conservation of alpine plant species alliances and associations of the treeless high country of Tasmania. *Biological Conservation*. **37**, 43–57.
- Kirkpatrick, J.B. (1997) *Alpine Tasmania, an illustrated guide to the flora and vegetation*. Oxford University Press. Melbourne.
- Kirkpatrick, J.B., Gilfedder, L.A. & Fensham, R.J. (1988) *City Parks and Cemeteries: Tasmania's remnant grasslands and grassy woodlands*. Tasmanian Conservation Trust. Hobart.
- Parry, J., Kirkpatrick, J.B. and Marsden-Smedley, J. (2016) Explaining the distribution, structure and species composition of snow patch vegetation in Tasmania, Australia. *Australian Journal of Botany*, **64**, 484–491
- Whinam, J. & Comfort, M. (1996) The impact of commercial horse riding on sub-alpine environments at Cradle Mountain, Tasmania, Australia. *Journal of Environmental Management*. **47**, 61–70.
- Whinam, J. & Chilcott, N. (1999) Impacts of trampling on alpine environments in central Tasmania. *Journal of Environmental Management*. **57**, 205–220.

Key to Highland treeless vegetation

	Page
I Woody species dominant, cushion plants may be present.	
2 > 50% cover of cushion species – any of <i>Abrotanella forsteroides</i> , <i>Pterygopappus lawrencei</i> , <i>Donatia tasmanica</i> , <i>Dracophyllum minimum</i> , <i>Phyllachne colensoi</i>	Cushion moorland (HCM) 6
2 Heath on rocky siliceous sites – any of <i>Eucryphia milliganii</i> , <i>Agastachys odorata</i> , <i>Cenarrhenes nitida</i> , <i>Leptospermum nitidum</i> , <i>Orites milliganii</i> , <i>Dracophyllum milliganii</i> will be present	Western alpine heathland (HHW) 13
2 Heath typically on dolerite with – <i>Orites acicularis</i> , <i>O. revoluta</i> , <i>Richea sprengeioides</i> , <i>Leptospermum rupestre</i> , <i>Pentachondra pumila</i> , <i>Ozothamnus backhousei</i> , <i>Boronia citriodora</i> , <i>Baeckea gunniana</i>	Eastern alpine heathland (HHE) 8
2 Heath dominated or co-dominated by dwarf conifers – any of <i>Diselma archeri</i> , <i>Microcachrys tetragona</i> , <i>Microstrobos niphophilus</i> , <i>Podocarpus alpina</i>	Alpine coniferous heathland (HCH) 4
I Graminoid and/or herbaceous species dominant	
2 Sedgeland/rushland on organic soils, generally on siliceous substrates – some or all of <i>Dracophyllum milliganii</i> , <i>Isophysis tasmanica</i> , <i>Carpha alpina</i> , <i>Oreobolus</i> spp., <i>Epacris serpyllifolia</i> . (Generally > 850 m altitude)	Western alpine sedgeland/herbland (HSW) 15
2 Sedgeland, rushland or fernland dominated by one of <i>Baloskion australe</i> , <i>Astelia alpina</i> , <i>Gleichenia alpina</i> . Sometimes emergent <i>Richea scoparia</i> . <i>Athrotaxis cupressoides</i> absent or very sparse. (Generally > 700 m altitude)	Eastern alpine sedgeland (HSE) 10
2 <i>Athrotaxis cupressoides</i> scattered over any of sedgeland, fernland, <i>Sphagnum</i> , with/without mosaic Eastern alpine heathland (HSE) or Alpine coniferous heathland (HCH) See Rainforest and related scrub (<i>Athrotaxis cupressoides</i> open woodland (RPW))	
2 Sedgeland/grassland dominated by <i>Lepidosperma filiforme</i> (generally ~600–900 m altitude) See Moorland, sedgeland, rushland and peatland (Highland grassy sedgeland (MGH))	
2 Grassland and grassy herbland dominated by <i>Poa</i> spp., with a rich herb component and a few emergent shrubs. (Generally > 600 m altitude) See Native grasslands (Highland <i>Poa</i> grassland (GPH))	

Alpine coniferous heathland (HCH)

General description

This community is a long-unburnt alpine heathland containing a significant cover of dwarf conifers, with other alpine heathland and graminoid species. There may be scattered emergent alpine *Eucalyptus* species and/or *Athrotaxis* species.



Eastern slopes of Mt Ossa, north of Mt Doris. Sib Corbett.

Example localities

Northern Travellers Rest Range; upslope from the ski huts on Mount Field.

Distinguishing features and similar communities

Alpine coniferous heathland is distinguished from Eastern (HHE) and Western alpine heathland (HHW) by the large numbers of any of the dwarf conifers: *Microcachrys tetragona*, *Microstrobos niphophilus*, *Diselma archeri* and *Podocarpus lawrencei*. HCH typically has many species in common with adjacent heathlands, which do not have significant numbers of dwarf conifers. *Athrotaxis selaginoides* subalpine scrub (RKS) may occur in the same areas as HCH (often on steep slopes), with dense *Athrotaxis selaginoides* to 2–4 m, potentially low *Athrotaxis cupressoides* and a great diversity of shrubs (sometimes with mats of *Microcachrys tetragona* on the fringes). HCH can be distinguished from RKS by its heathland form and few *A. selaginoides* plants.

In one facies of HCH, *Podocarpus lawrencei* sprawls across block streams (usually dolerite) where few other species can survive. This facies of HCH is distinct from fjaeldmark areas where loose rock

plates spread across gravel with sparse vegetation cover. These communities are mapped as Western alpine heathland (HHW) or Eastern alpine heathland (HHE) unless conifers predominate.

RFA mapping unit

Not covered by RFA mapping.

Distribution

HCH is confined to areas generally above about 900 m on eastern and western mountains. It occurs extensively on unburnt parts of the western Central Plateau, in Cradle Mountain–Lake Saint Clair National Park, the southern ranges, south-west mountains, West Coast Range and the Tyndall Range.



Bioregional occurrence

TCH, TNS, TSR, TWE.

Site characteristics, habitat and ecology

Alpine coniferous heathland (HCH) occurs on exposed, well-drained, gentle slopes in high rainfall areas. On dolerite mountains, its situation varies from highly exposed to moderately sheltered and can include some area of prolonged snow-lie. Coniferous heathland is found only in unburnt, high-altitude areas.

HCH generally occurs in a mosaic with Eastern alpine heathland (HHE), Western alpine heathland (HHW), Eastern alpine sedgeland (HSE), Cushion moorland (HCM) or Western alpine sedgeland/herbland (HSW).

Vegetation composition and structure

Low-growing conifers dominate the heathland, which is generally treeless, although there may be a sparse occurrence of small *Eucalyptus* species or copses or scattered single trees of *Athrotaxis* species and/or *Nothofagus gunnii*.

Dwarf conifers associated with this community include one or more of, *Microcachrys tetragona*, *Microstrobos niphophilus*, *Diselma archeri* and *Podocarpus lawrencei*. *Microcachrys tetragona* is the most common conifer, forming prostrate mats between other low growing shrubs, herbs and grass. *Diselma archeri* may form scattered emergents. *Microstrobos niphophilus* is confined to a few small areas on dolerite plateaus, usually in association with *Diselma archeri* and *Microcachrys tetragona*. *Podocarpus lawrencei* may also be present. In some areas *Diselma archeri* may form a closed canopy. This is an uncommon community, known from areas that have infrequent fires.

On siliceous western mountains the common associated species are *Isophysis tasmanica*, *Oreobolus* species, *Carpha alpina*, *Dracophyllum milliganii*, *Sprengelia incarnata* var. *montana* and *Epacris serpyllifolia*. *Donatia novae-zelandiae* and *Dracophyllum minimum* are also often present.

Coniferous heathlands in the eastern highlands (generally on dolerite) are dominated by dwarf conifers. The associated species commonly include *Orites acicularis*, *Leptocophylla juniperina*, *Planocarpa petiolaris*, *Richea sprengelioides*, *Pentachondra pumila*, *Leptospermum rupestre*, *Boronia citriodora* and *Poa gunnii*. In situations of prolonged snow-lie *Microcachrys tetragona* may co-dominate with *Ozothamnus rodwayi* and *Montitega dealbata*.

Floristic communities known to occur in this mapping unit

Alpine vegetation:

- 15 *Diselma archeri*–*Poa gunnii* grassy coniferous heath
- 22 *Microstrobos niphophilus*–*Abrotanella forsteroides* coniferous heath
- 23 *Diselma archeri*–*Richea sprengelioides* coniferous heath
- 28 *Microcachrys tetragona*–*Helichrysum milliganii* coniferous heath
- 37 *Diselma archeri*–*Trochocarpa cunninghamii* coniferous heath
- 42 *Podocarpus lawrencei*–*Ozothamnus rodwayi* coniferous heath

Explaining the distribution, structure and species composition of snow patch vegetation in Tasmania, Australia (Parry et al. 2016)

Snow patch vegetation:

- 2: *Ozothamnus rodwayi*–*Montitega dealbata*–*Microcachrys tetragona* alpine heath

Cushion moorland (HCM)

General description

Cushion moorland is alpine vegetation in which > 50% of the ground is covered by cushion plants composed of at least one of the five main bolster heath species. The associated vegetation varies, depending on the location and geology of the site. Many pure cushion plant beds that are too small to be mapped separately occur within alpine mosaics.



Mount Anne. Louise Gilfedder.

Example localities

Sarah Jane Plateau; Mount Field West Plateau.

Distinguishing features and similar communities

Broad, exposed slopes dominated by cushion-forming species, with only minor overgrowths, are easily distinguished from other plant communities. On eastern mountains cushion plants may be scattered in wet patches within alpine heathland, but rarely dominate and are usually mapped as part of the surrounding Eastern alpine sedgeland (HSE).

One variant of Eastern alpine sedgeland (HSE) mapped on the Central Plateau has *Abrotanella forsteroides* heavily overgrown by *Richea scoparia* and *R. gunnii*, with *Baloskion australe*, *Carpha alpina*, *Empodisma minus*, *Epacris gunnii* and herbs. This and similar communities, where cushions were once abundant but are now suppressed, are not included

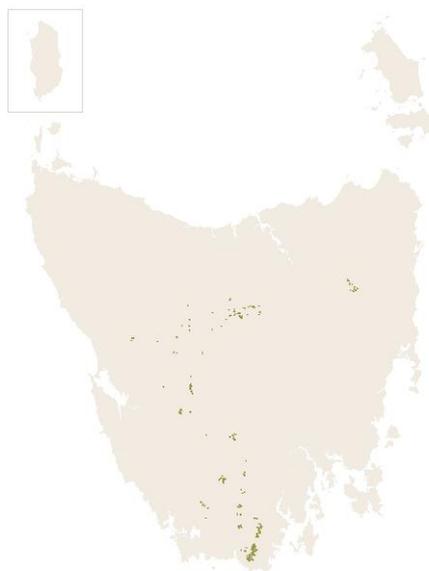
in HCM. On western mountains, there may be continuous variation from cushion moorland with > 50% cushion species to Western alpine sedgeland/herbland (HSW) with scattered cushions.

RFA mapping unit

Not covered by RFA mapping.

Distribution

Cushion moorland generally occurs in small patches on mountains.



Bioregional occurrence

BEL, TCH, TSR, TWE.

Site characteristics, habitat and ecology

Cushion moorland is generally found in high-rainfall, poorly-drained areas above about 1 000 m, although small areas of cushions are known in wet areas down to about 800 m. HCM can occur on a range of substrates, in very exposed situations or in areas of prolonged snow-lie. HCM occupies poorly-drained, often peaty soils on all substrates. Ponds and disrupted drainage caused by cushion plant growth modify the topography at Newdegate Pass (Mount Field National Park), Walled Mountain and the eastern slopes of Mount Sarah Jane.

These are examples of peatland pool complexes, also referred to as string bogs. Pond walls may be entirely cushion species or partly *Empodisma minus* and herbs or *Milligania densiflora*. Unless pools are sufficiently large to map as Water (OAQ), they are mapped as HCM.

Some cushion species, notably *Abrotanella forsteroides*, recover strongly after fires (for example on the eastern Central Plateau, Mount Field and Mount Wellington), but other species develop best if unburnt for long periods. On the eastern Central Plateau above about 1100 m the cushion moorland has regrown since extensive fires in 1962. Elsewhere HCM is a climax community, long unburnt.

Vegetation composition and structure

HCM is treeless vegetation dominated by up to five species of cushion plants, which cover 50% or more of the ground surface. Species common to HCM across its range include *Drosera arcturi*, *Oreobolus pumilio*, *Astelia alpina* and *Carpha alpina*.

On the eastern Central Plateau and other eastern dolerite mountains between 900 m and 1200 m elevation, *Abrotanella forsteroides* is the principal cushion species, with minor internal mosaics of *Pterygopappus lawrencei*. Epiphytic herbs, including *Plantago gunnii*, *Gentianella diemensis* and *Euphrasia* species may colonise the cushions. Graminoids such as *Poa* spp., *Empodisma minus* and *Baloskion australis* are common components of inter-cushion spaces.

On the higher mountains, particularly in areas of prolonged snow-lie, cushion moorland may comprise pure patches of *Phyllachne colensoi* or *Dracophyllum minimum*, or these species mixed with *Donatia novae-zelandiae*. Other common species are *Poa* spp., *Pterygopappus lawrencei*, *Celmisia asteliifolia* and *C. saxifraga*.

In the central and western mountains at lower elevations (Walls of Jerusalem and further west), *Donatia novae-zelandiae* is the principal cushion dominant, sometimes occurring with *Dracophyllum minimum* or sometimes even *Abrotanella forsteroides*, often in association with species such as *Schizacme* spp., *Sprengelia montana*, *Erigeron stellatus*, *Empodisma minus*, *Tasmannia lanceolata* and *Helichrysum milliganii*. *Pterygopappus lawrencei* is also common in all but the most western mountains.

The cushions can either occur as a scatter of rounded hummocks with marginal invasion by small herbs, or as more extensive mats.

In the far west mountains, including areas of persistent snow-lie, HCM is dominated by *Donatia novae-zelandiae*, with *Dracophyllum milliganii* and *Isophysis tasmanica* also usually present.

HCM often forms small mosaic patches within Western alpine sedgeland/herbland (HSW) or Western alpine heathland (HHW) where conditions are favourable.

Floristic communities known to occur in this mapping unit

Alpine vegetation:

- 7 *Abrotanella forsteroides*–*Baloskion australis* bolster heath
- 20 *Phyllachne colensoi*–*Aciphylla procumbens* bolster heath
- 21 *Donatia novae-zelandiae*–*Dracophyllum minimum* bolster heath
- 26 *Gleichenia alpina*–*Abrotanella forsteroides* fernland/bolster heath; also occurs in HSE
- 29 *Donatia novae-zelandiae*–*Actinotus suffocata* bolster heath
- 31 *Dracophyllum minimum*–*Empodisma minus* bolster heath
- 32 *Donatia novae-zelandiae*–*Milligania* bolster heath

Explaining the distribution, structure and species composition of snow patch vegetation in Tasmania, Australia (Parry et al. 2016)

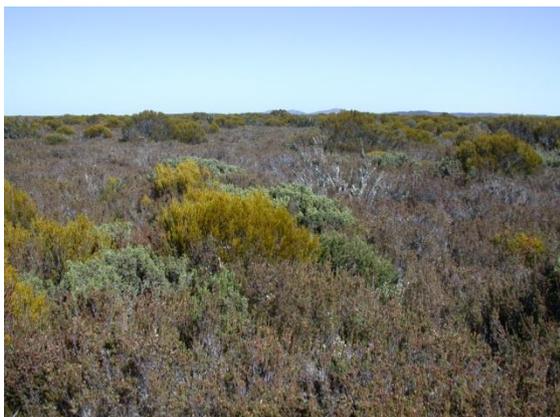
Snow patch vegetation:

- 3 *Dracophyllum minimum* – *Pterygopappus lawrencei* bolster heath
- 5 *Isophysis tasmanica* -*Dracophyllum milliganii* western alpine sedgeland

Eastern alpine heathland (HHE)

General description

A floristically variable heathland usually dominated by *Orites* species with *Richea sprengelioides*, *Leptospermum rupestre* and *Pentachondra pumila*, and grasses prominent. Emergent *Eucalyptus coccifera* is common.



Central Plateau west of Liawenee. Stephen Harris.

Example localities

Eastern Central Plateau; north of Clemes Tam in Mount Field National Park.

Distinguishing features and similar communities

Eastern alpine heathland (**HHE**) may be confused with Western alpine heathland (**HHW**) in some situations but can be distinguished by the markedly different floristics. **HHE** usually has one or both of *Orites revoluta* and *O. acicularis* often with *Richea sprengelioides*, *Leptospermum rupestre*, *Pentachondra pumila*, *Poa gunnii*, and emergent *Eucalyptus coccifera*. In contrast **HHW** may contain some *Orites revoluta* but rarely *O. acicularis* and the *Leptospermum* species is usually *L. nitidum* rather than *L. rupestre* as in **HHE**. *Poa gunnii* and *Pentachondra pumila* occur only on the driest open ground in **HHW** and *Eucalyptus coccifera* is absent. *Richea scoparia* is nearly always found in **HHW** but is not always in **HHE**. **HHE** includes fjaeldmark, which differs from **HHW** in that it lacks *Dracophyllum milliganii* and *Isophysis tasmanica* and is poor in *Empodisma minus* and *Carpha alpina*.

Alpine coniferous heathland (**HCH**) shares many species with **HHE**, but differs by having dwarf conifers.

Subalpine heathland (**SHS**) rarely occurs without emergent eucalypts (e.g. *Eucalyptus delegatensis*) and has prickly and broad-leaf shrubs usually *Leptospermum lanigerum*, Proteaceae and Epacridaceae species – but little grass. On very rocky ground **SHS** may be dominated by *Leptecophylla juniperina*, with a few mid-storey *Hakea lissosperma*.

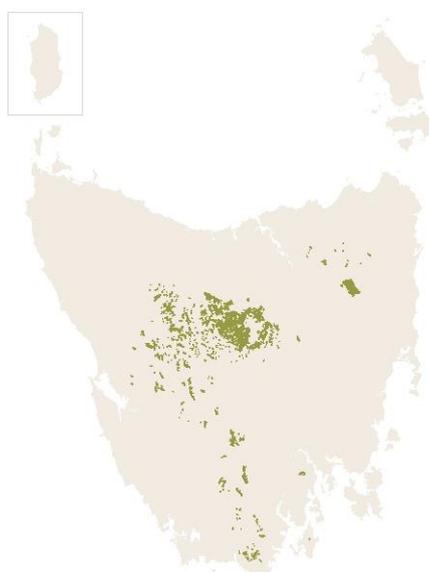
Eastern alpine vegetation (undifferentiated) (**HUE**) includes **HHE**.

RFA mapping unit

Not covered by RFA mapping.

Distribution

HHE is found throughout alpine areas. Its strongholds are in the Tasmanian Central Highlands, Tasmanian Southern Ranges and Ben Lomond Bioregions. **HHE** has a localised distribution in the Tasmanian South East Bioregion on Mt Wellington.



Bioregional occurrence

BEL, TCH, TNS, TSE, TSR, TWE.

Site characteristics, habitat and ecology

The community occurs on rocky, well-drained, gently to steeply sloping ground on either dolerite or sedimentary rocks. **HHE** can extend into areas of persistent snow-lie. In Mount Field National Park there is a zone between about 700 m and 1 050 m in which both **HHE** and **SHS** can occur, depending largely on the degree of shelter.

Vegetation composition and structure

Drainage, exposure and fire history determine the dominant species. *Orites revoluta* is often the most prominent shrub on well-drained slopes, with *O. acicularis* prominent in some well-watered areas but slow to recover from fire in others. Other species include *Grevillea australis*, *Leptecophylla juniperina*, *Cyathodes straminea*, *Boronia citriodora*, *Leptospermum rupestre*, *Baeckea gunniana*, *Monotoca empetrifolia* and *Epacris serpyllifolia*. Very rocky areas are often dominated by *Richea sprengeloides*, with *Exocarpos humifusus*, *Olearia erubescens*, *Leucopogon montanus*, *Coprosma nitida* and *Planocarpa petiolaris*. Many species are common to both these facies. Open ground is generally covered by prostrate Epacridaceae species (e.g. *Pentachondra pumila*, *Cyathodes dealbata*), short *Poa gunnii* and herbs. As drainage decreases, *Richea scoparia* may be prominent where heathland is replaced by sedgeland.

HHE in all but the wettest areas can have sparse emergent *Eucalyptus coccifera*.

HHE may occur less commonly in areas of persistent snow-lie, where it is usually dominated by *Ozothamnus rodwayi*, and includes *Montitega dealbata* and *Microcachrys tetragona*. Other shrubs include *Microcachrys tetragona*, *Planocarpa petiolaris* and *Orites acicularis*. Herbs commonly present include *Celmisia asteliifolia* and *Dichosciadium ranunculaceum*.

Fjaeldmark heathland occurs among unstable rock plates and rarely in snow patches. On the northern mountains it usually includes the shrubs *Bellenden montana* and *Acrothamnus montanus* and the herbs *Oxalis magellanica*, *Diplaspis cordifolia* and *Poa* spp. and patches of *Milligania* species on wet rocky slopes.

Floristic communities known to occur in this mapping unit

Alpine vegetation:

- 9 *Leptospermum rupestre*–*Senecio gunnii* heath; also occurs in **HHW**
- 10 *Ozothamnus hookeri*–*Grevillea australis* heath
- 11 *Richea acerosa*–*Exocarpos nanus* heath; also occurs in **GPH & HSE**
- 12 *Orites acicularis*–*Poa gunnii* grassy heath
- 13 *Richea sprengeloides*–*Pentachondra pumila* heath
- 14 *Epacris serpyllifolia*–*Ozothamnus rodwayi* heath; also occurs in **HHW**
- 16 *Ozothamnus hookeri*–*Richea scoparia* heath
- 17 *Orites revoluta*–*Helichrysum rutidolepis* heath
- 19 *Ozothamnus rodwayi*–*Gaultheria depressa* heath; also occurs in **HHW**
- 24 *Orites revoluta*–*Olearia ledifolia* heath
- 25 *Orites acicularis*–*Pimelea sericea* heath
- 27 *Richea scoparia*–*Orites acicularis* heath
- 28 *Richea acerosa*–*Coprosma pumila* grassy shrubland; also occurs in **GPH & HSC**
- 30 *Poa gunnii*–*Drapetes tasmanicus* tussock grassland; also occurs in **GPH**
- 34 *Richea gunnii*–*R. acerosa*–*Ranunculus* grassy shrubland; also occurs in **GPH & MGH**
- 41 *Richea sprengeloides*–*Olearia pinifolia* heath
- 43 *Richea sprengeloides*–*Monotoca empetrifolia* heath

Grassland:

- 32 *Poa*–*Isolepis* tussock grassland; also occurs in **GPH & HSE**

Riparian communities (Daley & Kirkpatrick 2004)

- 1 *Orites acicularis*–*Baeckea gunniana*–*Richea acerosa*–*Hierochloa redolens*–*Poa costiniana* grassy heath; also occurs in **HSE**

Explaining the distribution, structure and species composition of snow patch vegetation in Tasmania, Australia (Parry et al. 2016)

Snow patch vegetation:

- 2 *Ozothamnus rodwayi*–*Montitega dealbata*–*Microcachrys tetragona*

Eastern alpine sedgeland (HSE)

General description

Eastern alpine sedgeland are usually dominated by *Baloskion australe* or *Astelia alpina*. Sedgelands are either treeless or have scattered small emergent *Eucalyptus gunnii*. Fernfield facies show a carpet of *Gleichenia alpina*, with a few tall shrubs and scattered trees in some areas. Facies dominated by forbs are a minor component of this unit. Sedgelands are commonly found in mosaics with alpine heathland or fringing *Athrotaxis cupressoides* woodland.



Wombat Moor, Mount Field National Park. Andrew Crane.

Example localities

Upper Pencil Pine River (*Gleichenia alpina*); Lake Ball (*Astelia alpina*); Balmoral Moor near Lake MacKenzie (*Baloskion australe*); Hartz Plateau (diverse sedgelands).

Distinguishing features and similar communities

Eastern alpine sedgeland (HSE) is distinguished from Western sedgeland/herbland (HSW) by its occurrence in plateau depressions, shelves and valleys (HSE) rather than on rounded ridgetops (HSW), as well as by the prominence of *Gleichenia alpina* and the absence of *Isophysis tasmanica* and *Dracophyllum milliganii*. Both HSE and HSW may be rich in *Empodisma minus*. The presence of *Gleichenia alpina* and paucity of *Lepidosperma filliforme* and grasses in HSE separates it from Highland grassy sedgeland (MGH).

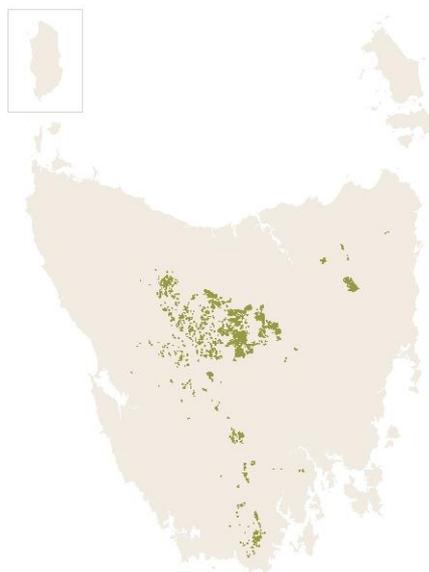
Restionaceae rushland (MRR) in eastern areas is similar to HSE but has *Sprengelia incarnata* and usually some *Gymnoschoenus sphaerocephalus*, but may lack *Gleichenia alpina*, and does not extend above about 750 m. HSE may share shrubby species, particularly *Richea scoparia*, with Eastern alpine heathland (HHE), but shrubs never dominate in HSE. Cushion plants extensively overgrown by *Gleichenia alpina* and *Empodisma minus* may be mapped as HSE on the Central Plateau. *Sphagnum* may occur in HSE, but the community is distinguished from *Sphagnum* peatland (MSP) by having less than 30% ground cover.

RFA mapping unit

Not covered by RFA mapping.

Distribution

Found in alpine areas throughout the dolerite and sedimentary bedrock alpine areas of central, eastern and southern Tasmania. Not found on the highly siliceous rocks of the south-west and west.



Bioregional occurrence

BEL, TCH, TNS, TSR, TWE.

Site characteristics, habitat and ecology

Eastern alpine sedgeland on dolerite and Permian sediments occurs in exposed sites between about 700 m and 1 200 m on poorly–drained flats and plateaus, where frost as well as poor–drainage may limit tree growth. **HSE** can also dominate areas with persistent snow-lie.

Ponds may be well developed in these poorly drained landscapes, where pool walls are formed by sedges. The pools within these peatland pool complexes are generally too small to map separately as Water (**OAQ**), and are usually mapped as part of **HSE**.

Vegetation composition and structure

Eastern alpine sedgeland in any one area is fairly uniform, dense and up to one metre high, depending on the dominant species. Any of *Gleichenia alpina*, *Astelia alpina* or *Baloskion australe* variously dominate any particular site. *Empodisma minus* is present at most sites. Emergent shrubs are uncommon, but can include *Baeckea gunniana* and *Richea scoparia*. One form of sedgeland consists of an open canopy of *R. scoparia* with *Eurychorda complanata* and *Empodisma minus* between the clumps. Cushion plants and/or *Baloskion australe* reed beds may occur in the lowest parts of **HSE**, the edges dominated by *Gleichenia alpina*, sometimes with *Richea acerosa*. There may be sparse (often very short) *Poa gunnii*, while prostrate Epacridaceae such as *Pentachondra pumila* or *Cyathodes dealbata* may cover the ground, increasing as drainage improves. There are scattered shrubs of *Orites* species, *Ozothamnus* species, *Richea scoparia* and *R. acerosa* – these two *Richea* species appear at both the wet and dry ends of the sedgeland spectrum.

HSE may be treeless or have heathy thickets centred on small *Eucalyptus* species growing on mounds where drainage is good. Where drainage is poor, there may be scattered, often stunted, *Eucalyptus gunnii*. These small trees have predominantly juvenile foliage, even at an advanced age. *E. coccifera*, or in other situations and lower altitudes *E. rodwayi*, may occur on the margins.

Gleichenia alpina is the dominant component of the fernfield facies of **HSE**. *Richea scoparia* and *R. acerosa* and any of the sedges *Lepidosperma filiforme*, *Eurychorda complanata*, *Sporadanthus tasmanicus* and *Leptocarpus tenax* may be

prominent. The wettest parts have *Sphagnum* spp., often overgrown by *Richea gunnii* or *R. scoparia* and *Baloskion australe*. *Athrotaxis cupressoides* may occur as small open stands at the centres of these bogs, sometimes with *Diselma archeri*.

Facies of **HSE** associated with Snow patches may be dominated by sedges or forbs such as *Astelia alpina*, *Empodisma minus*, *Carpha alpina*, *C. rodwayi*, *Oxalis magellanica*, *Diplaspis cordifolia*, *Milligania* spp., and *Oreomyrrhis ciliata*. Associated grasses can include *Poa* spp., *Pentapogon quadrifidus* and *Rytidosperma australe*. Scattered cushions of *Dracophyllum minimum* and *Pterygopappus lawrencei* may occur within **HSE**.

Floristic communities known to occur in this mapping unit

Grasslands and grassy woodlands:

- 28 *Richea acerosa*–*Coprosma pumila* grassy shrubland; also occurs in **GPH** & **HHE**
- 32 *Poa*–*Isolepis* tussock grassland; also in **GPH** & **HHE**
- 34 *Richea gunnii*–*R. acerosa*–*Ranunculus* grassy shrubland

Alpine vegetation:

- 8 *Gleichenia alpina*–*Empodisma minus* fernland
- 11 *Richea acerosa*–*Exocarpos nanus* heath; also occurs in **HHE** & **GPH**
- 18 *Carpha rodwayi*–*Mitrasacme archeri* alpine sedgeland; also occurs in **HSW**
- 26 *Gleichenia alpina*–*Abrotanella forsteroides* fernland/bolster heath; also occurs in **HCM**

Peatlands with Sphagnum:

- 2 Subalpine coniferous mires; also occurs in **RPW**
- 4 *Richea*–*Sphagnum* bogs; also occurs in **MSP**
- 5 *Richea pandanifolia*–*Sphagnum* mires; also in **MSP**

Riparian communities (Daley & Kirkpatrick 2004)

- 1 *Orites acicularis*–*Baeckea gunniana*–*Richea acerosa*–*Hierochloa redolens*–*Poa costiniana* grassy heath

Explaining the distribution, structure and species composition of snow patch vegetation in Tasmania, Australia (Parry et al. 2016)

Snow patch vegetation:

- 1 *Oxalis magellanica*–*Poa* spp.–*Diplaspis cordifolia*
- 4 Community 4: *Astelia alpina*–*Acaena montana*–*Donatia novae-zelandiae*

Eastern alpine vegetation (undifferentiated) (HUE)

General description

Eastern alpine vegetation (undifferentiated) (HUE) is a generic mapping unit that has been used to map a number of eastern alpine vegetation communities (including Eastern alpine heathland (HHE), Eastern alpine sedgeland (HSE), Alpine coniferous heathland (HCH) and Cushion moorland (HCM)) on the eastern mountains of Tasmania.

It is intended that vegetation mapped as HUE will be attributed to more specific eastern alpine units as mapping is revised. Continued use of HUE is discouraged and limited to use where field access is not possible and remote allocation to a more specific unit is not advised.

Example locality

Not applicable.

Distinguishing features and similar communities

Where possible, all areas mapped as HUE should be re-coded to a more specific eastern alpine ecological vegetation communities including, but not confined to, Eastern alpine heathland (HHE), Eastern alpine sedgeland (HSE), Alpine coniferous heathland (HCH) and Cushion moorland (HCM).

Distinguishing features and similar communities are detailed for specific eastern alpine ecological vegetation communities.

RFA mapping unit

Not covered by RFA mapping.

Distribution

As for HHE, HSE, HCH, HCM and other eastern alpine mapping units.



Bioregional occurrence

As for HHE, HSE, HCH, HCM and other eastern alpine mapping units.

Site characteristics, habitat and ecology

As for HHE, HSE, HCH, HCM and other relevant mapping units.

Vegetation composition and structure

As for HHE, HSE, HCH, HCM and other relevant mapping units.

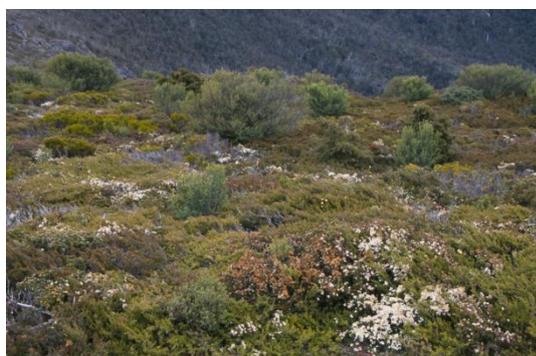
Floristic communities known to occur in this mapping unit

This is a generic mapping unit and may include any of the floristic communities in the eastern alpine areas.

Western alpine heathland (HHW)

General description

Western alpine heathland occurs on the western (quartzitic) mountains in places where rocks provide some shelter, better drainage and some accumulated soil. Similar heathland in very exposed rocky situations becomes fjaeldmark; the scattered plants are often small and deformed but nonetheless diverse. **HHW** includes rainforest species such as *Eucryphia milliganii*, *Cenarrhenes nitida* and *Agastachys odorata*, as well as *Leptospermum nitidum*.



Twisted Lakes, Cradle Mountain area. Sib Corbett.

Example localities

Western edge of Tyndall Range; Mount Norold fjaeldmark.

Distinguishing features and similar communities

Western alpine heathland (**HHW**) is generally treeless and confined to rocky heights, unlike Eastern alpine heathland (**HHE**), which commonly has sparse *Eucalyptus coccifera* emergents and occurs on broad alpine plateaus as well as peaks and cliffs. The two have a number of species in common, but **HHW** is distinguished by the presence of any of *Eucryphia milliganii*, *Agastachys odorata*, *Cenarrhenes nitida*, *Leptospermum nitidum*, *Richea milliganii*, *R. alpina*, *Orites milliganii* or *Dracophyllum milliganii*. *Richea scoparia* is variable in eastern alpine areas, where it is most often found associated with wet areas or sedgeland, but is also prominent in well-drained Western alpine heathland. Low Western alpine sedgeland/herbland (**HSW**) often forms close mosaics with **HHW** and is also floristically distinctive.

In sheltered areas **HHW** may grade in to *Athrotaxis selaginoides* subalpine scrub (**RKS**). Highland rainforest scrub with dead *Athrotaxis selaginoides* (**RKX**) has similarities with **HHW**, but extends to lower altitudes, grows on slopes that are less rocky and exposed, has dead (and rarely live) *Athrotaxis selaginoides* and a significant cover of *Leptospermum* species.

RFA mapping unit

Not covered by RFA mapping.

Distribution

The community is found only on siliceous substrates and is largely confined to rocky mountain tops in the west and south-west.



Bioregional occurrence

TCH, TNS, TSR, TWE.

Site characteristics, habitat and ecology

Western alpine heathland is found above about 900 m in rocky situations on quartzites, conglomerate and acid volcanics, on the mountains in south-west Tasmania and the West Coast Range. Shelter behind boulders or cliffs is important, but the excellent drainage offered by rocky sites appears to be critical for this community.

Exposed shrubs usually suffer severe wind-pruning. Fjaeldmark variants of **HHW** grow in areas of loose rock plates, often separated by gravelly deflation hollows; they consist of scattered shrubs and graminoids, which are often dwarfed, prostrate or deformed by exposure.

Vegetation composition and structure

Western alpine heathland is floristically diverse. *Richea scoparia* and *Epacris serpyllifolia* are nearly always present. The other species can include *Persoonia gunnii*, *Oxylobium ellipticum*, *Orites* spp., *Tasmannia lanceolata*, *Ozothamnus rodwayi*, *Trochocarpa cunninghamii*, *Monotoca submutica*, *Archeria serpyllifolia*, *Richea pandanifolia*, *R. milliganii*, *Bauera rubioides*, *Coprosma nitida*, *Leptecophylla juniperina*, *Podocarpus lawrencei*, *Orites revoluta*, *Exocarpos humifusus*, *Tetracarpaea tasmanica* and *Blandfordia punicea*. *Eucalyptus vernicosa*, *Agastachys odorata* and *Cenarrhenes nitida* may be present. Ground-layer species may include *Isophysis tasmanica*, *Empodisma minus*, *Senecio leptocarpus*, *Poa gunnii*, *Erigeron stellatus*, *Anemone crassifolia*, *Euphrasia hookeri*, *Celmisia saxifraga*, *Dracophyllum milliganii*, *Astelia alpina*, *Leucopogon milliganii* and sometimes *Pentachondra pumila* and cushion plants. Where significant shelter is available, dwarfed *Nothofagus cunninghamii* and *Eucryphia milliganii* may be present.

Fjaeldmark has many dwarfed shrubs from the list above and may also have the prostrate alpine form of *Richea X curtisiae* and *Epacris navicularis* as well as *Milligania* species. It is usually rich in graminoid species such as *Dracophyllum milliganii*, *Isophysis tasmanica*, *Blandfordia punicea*, *Oreobolus* species and *Carpha alpina*. *Prionotes cerinthoides* may be abundant in quartzite boulder fields where shrubs and herbs find soil between the rocks.

Floristic communities known to occur in this mapping unit

Alpine vegetation:

- 9 *Leptospermum rupestre*–*Senecio gunnii* heath; also occurs in **HHE**
- 14 *Epacris serpyllifolia*–*Ozothamnus rodwayi* heath; also occurs in **HHE**
- 19 *Ozothamnus rodwayi*–*Gaultheria depressa* heath; also occurs in **HHE**
- 33 *Nothofagus cunninghamii*–*Eucryphia milliganii* heath; also occurs in **RSH**
- 35 *Eucalyptus vernicosa*–*Isophysis tasmanica* heath
- 38 *Nothofagus cunninghamii*–*Prionotes cerinthoides* heath; also occurs in **RSH** & **SSW**
- 39 *Richea scoparia*–*Carpha curvata* heath

Western alpine sedgeland/herbland (HSW)

General description

Western alpine sedgeland/herbland is characteristically low-growing vegetation dominated by graminoids and prostrate shrubs on exposed ridges and gentle slopes. Some cushion plants may also be present. The community typically occurs on peat soils on quartzite, sandstone or conglomerate in western Tasmania.



Ironbound Range, south-west Tasmania. Luke Temby.

Example locality

Mount Anne, Lake Shelf.

Distinguishing features and similar communities

Western alpine sedgeland/herbland (**HSW**) is a treeless alpine community, distinguished from Eastern alpine heathland (**HHE**) by a lack of shrubby species; a low, uniform structure; and a suite of definitive species. Cushion plants may be present in patches, but where they dominate over mappable areas the community is Cushion moorland (**HCM**). **HSW** may be similar in texture to Eastern alpine sedgeland (**HSE**), but differs in that **HSE** occurs on flat, poorly-drained sites and is dominated by any of *Gleichenia alpina*, *Baloskion australe* or *Astelia alpina* and can include *Richea scoparia*. While these species may be present in **HSW** they never dominate. There is often a smooth transition from **HSW** into *Melaleuca squamea* heathland (**SMM**) in which some or all the characteristic **HSW** species may occur in openings or in interstices between *Gymnoschoenus sphaerocephalus* tussocks and/or *Melaleuca squamea* and other shrub species. At lower altitudes in western areas, **HSW** grades into Western subalpine

scrub (**SMW**). Highland grassy sedgeland (**MGH**) is a treeless community occupying the same altitude range as **HSW**, but dominated by *Lepidosperma filiforme* and species of *Poa* and *Baloskion* – **HSW** and **MGH** have few species in common.

RFA mapping unit

Not covered by RFA mapping.

Distribution

Western alpine sedgeland/herbland occurs in western and south-west Tasmania, generally above 950 m but lower in the far south-west.



Bioregional occurrence

TCH, TSR, TWE.

Site characteristics, habitat and ecology

HSW occurs almost exclusively on peat soils in high-rainfall, very exposed sites overlying siliceous rocks on plateaus and gently rounded slopes and ridge tops, and can include some area of prolonged snow-lie. In rare instances, the same species assemblage is found on dolerite where formation of mineral soil has been impeded, possibly by glacial erosion, and poor-drainage has allowed peat soils to develop. Such sites usually lack any protection such as rock ridges.

Vegetation composition and structure

Western alpine sedgeland/rushland vegetation is dominated by *Isophysis tasmanica*, sedges (*Carpha alpina*, *Oreobolus* species and *Empodisma minus*), *Dracophyllum milliganii* and dwarfed or prostrate *Epacris serpyllifolia*, usually accompanied by *Sprengelia montana* and *Helichrysum pumilum*. There may be emergent *Eucalyptus vernicosa*. The cushion plants *Donatia novae-zelandiae* and *Dracophyllum minimum* may be present, usually in small patches. Less common are *Abrotanella forsteroides*, *Pterygopappus lawrencei* and *Phyllachne colensoi*. *Microcachrys tetragona* is scattered in long strips of unburnt sedgeland (for example parts of the Western Arthur Range).

Particularly rich **HSW** floras occur on massive sandstones and quartzites; for example on the Norold Range, which, in addition to the typical species, has *Euphrasia hookeri*, *E. gibbsiae*, *Anemone crassifolia*, *Richea alpina*, *Epacris navicularis*, *Leucopogon milliganii*, *Ewartia* species, *Milligania densiflora*, *Xyris* species and *Baeckea gunniana*. Wet flats within **HSW**, as in the centre of the Tyndall Range and parts of the Arthur Ranges, may be dominated by very short *Eurychorda complanata* with moss, single-floret cushions, *Oreobolus* species, *Empodisma minus*, *Xyris* species and *Isophysis tasmanica*. **HSW** at its lower altitude may contain *Sprengelia incarnata*, *Anemone crassifolia*, *Astelia alpina*, *Bauera rubioides*, *Eurychorda complanata*, *Erigeron stellatus*, *Gentianella* species, *Pentachondra pumila*, *Blandfordia punicea* and *Exocarpos humifusus*. Where shelter and drainage improve, species such as *Persoonia gunnii*, *Cenarrhenes nitida* and *Phyllocladus aspleniifolius* may form low mounds or there may be taller shrubby thickets or windrows often centred on *Athrotaxis selaginoides* and/or *Eucalyptus vernicosa* with dwarfed *Nothofagus cunninghamii* and *Eucryphia milliganii*.

HSW is one of the communities in south-west Tasmania that hosts mats of the rare fern *Gleichenia abscida*, and some western mountain snow patches may be dominated by *Isophysis tasmanica* sedgelands.

Floristic communities known to occur in this mapping unit

Alpine vegetation:

- 1 *Caltha phylloptera* short alpine herbfield
- 18 *Carpha rodwayi*-*Mitrasacme archeri* alpine sedgeland; also occurs in **HSE**
- 30 *Isophysis tasmanica*-*Dracophyllum milliganii* alpine sedgeland

Explaining the distribution, structure and species composition of snow patch vegetation in Tasmania, Australia (Parry et al. 2016)

Snow patch vegetation:

- 5 *Isophysis tasmanica* - *Dracophyllum milliganii* western alpine sedgeland