2021

# STATEMENT OF THE ENVIRONMENT REPORT 2021

HOTHAM
RESORT MANAGEMENT

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# INTRODUCTION

Mount Hotham Alpine Resort is one of five alpine resorts in Victoria, located toward the southern end of the Great Dividing Range. The resort comprises of primarily crown land with a small proportion of free hold land. The resort covers an area of approximately 3,450 hectares bound by Alpine National Park on all sides. Approximately 11% of the total resort area is utilised for ski field area. The resort comprises of sharp and slightly rounded peaks connected by ridgelines and steep gullies, with the highest peak being Mount Hotham at an elevation of 1861 meters asl. The resort sits at the headwaters of four major river catchments: the Kiewa, Mitta Mitta, Dargo (Mitchell) and Ovens.

The Mount Hotham Alpine Resort Management Board (RMB) established under the Alpine Resorts (Management) Act 1997 is the crown land manger acting as a Committee of Management Under the Crown Land (Reserves) Act 1978. As land mangers RMB have a responsibility to protect and enhance the natural environment within the resort, whilst providing essential services to support the local community and snow tourism industry.

The resort has high biodiversity and conservation values with several threatened species known to occur within the resort. Provision of services and snow tourism industry places pressure on the sensitive alpine and sub-alpine environment within the resort. Combined with the impending impacts of climate change, the RMB has a responsibility to ensure land is managed in a sustainable manner which is compatible with the alpine environment. This Statement of the Environment (SoE) report has been developed to assist RMB in the development of an Environmental Management Plan (EMP) which highlights key focus areas to assist in reducing environmental impacts due to resort operations and identify management actions to mitigate threats to native flora and fauna.

# DRIVING FORCES

## LEGISLATIVE FACTORS

The following is a short review of key Federal and State legislation that guides and has implications on planning, environmental, cultural heritage and fire management within the resort.

**Aboriginal Heritage Act 2006 and Aboriginal Heritage Regulations 2018**

The Aboriginal Heritage Act 2006 governs the protection and management of Victorian's Aboriginal heritage. The Aboriginal Heritage Act 2006 includes the establishment of Cultural Heritage Management Plans and Cultural Heritage Permit processes to manage activities that may harm Aboriginal cultural heritage. The act enabled establishment of a Victorian Aboriginal Heritage Council to provide a state-wide voice for Aboriginal people and to advise the Minister for Aboriginal Affairs on issues relating to the management of cultural heritage. It has initiated the introduction and management of a system of Registered Aboriginal Parties that allow for Aboriginal groups with connection to country to be involved in decision making processes around cultural heritage and a system of cultural heritage agreements to support the development of partnerships around the

protection and management of Aboriginal cultural heritage. The Act has strengthened provisions relating to enforcement of the Act, including Aboriginal Heritage Protection Declarations and stop orders. There are also clearer powers for Inspectors and increased fees and penalties for breaches of the Act.

The primary goal of the Aboriginal Heritage Act 2006 is to protect Aboriginal cultural heritage, making it an offence under the Act to undertake any form of activity that causes harm, or has the potential to cause harm to Aboriginal Cultural Heritage unless an appropriate Cultural Heritage Permit or Cultural Heritage Management Plan has been approved.

The Aboriginal Heritage Regulations 2018 are related to the Aboriginal Heritage Act 2006. The Regulations set out the circumstances in which a Cultural Heritage Management Plan (CHMP) is required to be prepared and the standards for the preparation of a CHMP. The Regulations stipulate two key triggers for the development of a CHMP. Specifically, a CHMP is required if (a) all or part of the activity area for the activity is an area of cultural heritage sensitivity; and (b) all or part of the activity is a high impact activity.

**Climate Change Act 2017**

The Climate Change Act was commenced operation in 2017 to manage climate change risks and outline strategies and targets for adapting to climate change. The act sets a pathway with the aims of achieving net zero emissions for the state by 2050. The Act is reflected in the Victorian Government initiatives of Victoria's Climate Change Framework, Victoria's Climate Change Adaptation Plan 2017-2020 and Victoria's Renewable Energy Action Plan. The Act and related initiatives create a foundation for government, community and businesses to adapt to climate change.

**Catchment and Land Protection Act 1994**

The Catchment and Land Protection Act 1994 contains provisions relating to land management and noxious weeds. The Act states that land managers must take all reasonable steps to avoid causing or contributing to land degradation that causes or may cause damage to land of another landowner, and must take all reasonable steps to conserve soil. The Act also addresses environmental management on a catchment scale to enhance long-term land productivity and conservation of the environment. It contains provisions relating to catchment planning and land management. The Act sets out the responsibilities of land managers (public and private), including the MHARMB, stating that they must take all reasonable steps to protect water resources, eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds and prevent the spread of and where possible, eradicate, established pest animals (See Appendix V).

**Conservation Forests and Lands Act 1987**

The Conservation Forests and Lands Act 1987 provides that public authorities (e.g. Alpine Resort Management Boards) must submit a plan of works prior to the commencement of works involving soil or vegetation disturbance above 1220m asl; the construction of dams, weirs, or other structures, in or across waterways and the carrying out of developments within a habitat which has been determined to be a critical habitat under the Flora and Fauna Guarantee Act 1988.

**Country Fire Authority Act 1958**

The Country Fire Authority Act 1958 establishes the Country Fire Authority (CFA) whose role is to provide for the effective control, prevention and suppression of fires in regional Victoria (i.e. outside the Metropolitan Fire District). The duty of the CFA is to prevent and suppress fires for the protection of life and property. This is to be undertaken in conjunction with other relevant public agencies (e.g. DELWP).

**Environmental Protection Act 1970 and Environment Protection Act 2017, Climate Change and Environmental Protection (Amendment) Act 2012 and regulations**

The Environment Protection Act 1970 requires premises which have the potential for significant environmental impact to be subject to works approvals (for construction or modification of facilities or processes) and/or licenses (for operating conditions, discharge limits, monitoring and reporting requirements). The Victorian government is currently reforming the Environment Protection Act legislation in two phases. The Environmental Protection Act 2017 came into effect on 1st July 2021, and the second phase introduces the Environmental Protection Amendment Act 2018. This Amendment Act was delayed during 2020 due to Covid-19 and is expected to commence on 1 July 2021.

The 2017 Act is to be read as an extension part of the 1970 Act, and includes updates regarding governance and objectives to protect human health and the environment from the harmful effects of pollution and waste. This Bill proposes greater penalties for environmental offences.

The Climate Change and Environment Protection Amendment Act 2012 incorporates changes arising from a review of the Climate Change Act 2010 and makes amendments to the Environmental Protection Act 1970 by extending on noise abatement directions, increased penalties for litter and repeals some service fees. The Environment Protection (Scheduled Premises) Regulations 2017 prescribe premises that are subject to works approval and/or licensing by EPA, and provides for exemptions in certain circumstances.

The Environmental Protection Act 1970 and 2017 functions to prevent pollution and environmental damage by setting quality objectives. Pollution, waste, litter, noise, motor vehicles, hazardous chemicals and environmental audits are addressed within the Act. The Environment Protection Agency (EPA) administers the Act and any regulations including State Environment Protection Policies and Waste Management Policies. Duties and functions under the Act include works approvals and licenses. Under Victoria's Environment Protection Act 1970, littering is illegal, the Act authorises the EPA, local government, police and other litter enforcement agencies to take action against offenders.

**The Environment Protection (Fees) Regulations 2012**

The Environment Protection (Fees) Regulations 2012 came into force from 28 October 2012. The Regulations prescribe fees for the majority of EPA-administered licences and approvals under the Environment Protection Act 1970 (the Act), including works approvals fees, licence fees, waste transport permit fees and environmental audit fees.

**Environment Protection (Environment and Resource Efficiency Plans) Regulations 2007**

Under the Environment Protection (Environment and Resource Efficiency Plans) Regulations 2007, all commercial and industrial sites in Victoria that use more than 100 terajoules (TJ) of energy and/or 120 megalitres (ML) of water in a financial year need to prepare a plan that identifies actions to reduce energy and water use and waste generation.

**Emergency Management Act 1986 & 2013**

The Emergency Management Act 2013 establishes Emergency Management Victoria (EMV) and gives the Emergency Services Commissioner (ESC) the role of coordinating the response to major emergencies and the Chief Executive of management Victoria the role of planning and daily operations. The 2013 Act operates concurrently with the Emergency Management Act 1986. This Act also addresses recovery planning and management and includes specific responsibilities and obligations on the MHARMB to plan for emergencies that may occur within their jurisdiction.

**Environmental Protection and Biodiversity Conservation Act 1999 (EPBC)**

The Environment Protection and Biodiversity Conservation Act 1999 covers matters of national environmental significance and provides protection for listed flora and fauna species and ecological communities. The Victorian Assessment Bilateral agreement commenced on December 26, 2014. The bilateral agreement between the Commonwealth of Australia and Victoria relating to environmental assessment (the bilateral agreement) allows the Commonwealth Minister for the Environment to rely on specified environmental impact assessment processes of Victoria in assessing actions under the EPBC Act.

**Flora and Fauna Guarantee Act 1988, Flora and Fauna Guarantee Amendment Act 2019 and regulations**

The Flora and Fauna Guarantee Act 1988 and its associated regulations provides for the management of threatened and potentially threatened flora and fauna species and communities and provides opportunity for listing of threatening processes. The FFG Act also provides for the listing of flora taxa and the flora of listed communities on a list of Protected Flora. A permit is required (from DELWP) for any collection of indigenous flora, or works or activities on public land that may kill, injure or disturb protected flora or fauna species. The Flora and Fauna Guarantee Act has been recently amended to provide a contemporary and strengthened framework. The Flora and Fauna Guarantee Amendment Act 2019 came into effect on June 1st 2020. This amendment modernises the FFG act and includes stronger penalties, consideration of the rights and interests of Traditional Owners, impacts of climate change and principals to guide implementation.

**Forest Act 1958 and Forest (Fire Protection) Regulations 2014**

The Forests Act 1958 and Forest Regulations 2014 provides for fire prevention to be undertaken in state forest, national parks and protected public land. It also restricts the lighting of fires on these lands without authority and may include some land that is within 1.5 kilometres of fire protected areas. The Forest Act also relates to licenced occupations occurring within state forests, such as beekeeping.

**Heritage Act 2017 and Heritage Register and Inventory**

The Victorian Heritage Act 2017, which replaced the Heritage Act 1995, details the statutory requirements for protecting historic buildings and gardens, historic places and objects, historical archaeological sites, and historic shipwrecks. Heritage Victoria administers the Heritage Act 2017 and works alongside the Heritage Council of Victoria to make decisions regarding non-indigenous cultural heritage issues.

The Victorian Heritage Database is managed by the Heritage Council of Victoria and includes listings on the Victorian Heritage Register and Victorian Heritage Inventory. The Victorian Heritage Register was established under Section 18 of the Heritage Act 1995. Heritage places on the Heritage Register are assessed as having State-level cultural heritage significance. A permit may be required for particular works or activities associated with a registered place or object. Consultation about the Heritage Inventory and historical archaeological sites should be conducted with an archaeology officer from the Heritage Council of Victoria. Spargo's Hut within the resort is listed on the Victorian Heritage Register for its architectural and historical significance.

**Heritage Rivers Act 1992 and Heritage Rivers (Further Protection) Act 2006**

The Heritage Rivers Act 1992, and the Heritage Rivers (Further Protection) Act 2006 amendment provides for the protection of public land in particular parts of rivers or river catchment areas which have significant recreation, nature conservation, scenic or cultural heritage attributes. The Act prohibits some land and water-related activities in heritage river areas, including the construction of artificial barriers and structures which may impact on the passage of water fauna or significantly impair the area's recreation, nature conservation, scenic or cultural heritage attributes. The Mitta Mitta and Ovens Rivers, whose headwaters are located in the Resort, are listed as Heritage Rivers.

**Planning and Environment Act 1987**

The Planning and Environment Act 1987 establishes a framework for planning use, development and protection of land in Victoria. The Act provides for the creation of the Victorian Planning Provisions that contain Zones, Overlays, State Planning Policy Framework and Local Planning Policies.

The Mount Hotham Alpine Resort is within the Alpine Resort Planning Scheme and is also encompassed by an Erosion Management Overlay (EMO), Bushfire Management Overlay (BMO), along with some areas by an Environmental Significance Overlay (ESO) and Heritage Management Overlay (HO). The BMO is the planning control to implement State policy aim to strengthen community resilience to bushfires. In October 2017 the BMO had mapping updated under amendment GC13. In March 2014, Amendment C22 was adopted and approved introducing a schedule to the BMO that modifies most standards in Clause 52.47 subject to the implementation of emergency management arrangements to prioritise the protection of life at each of the Alpine Resorts.

In December 2017 Amendment VC138 was incorporated into the Planning Scheme with the purpose of 'avoiding and minimising the removal of native vegetation' (DELWP, 2017). A new incorporated document titled Guidelines for the removal, destruction or lopping of native vegetation, replaced the previous Permitted clearing of native vegetation – Biodiversity Assessment Guidelines. The amendment added additional biodiversity values of native vegetation to those included in the

previous document and outlined new assessment pathways based on the amount, location and type of vegetation proposed for removal (DELWP, 2017).

**Safe Drinking Water Act 2003**

The Safe Drinking Water Act 2003 requires water supplies to prepare and implement plans to manage risks in relation to drinking water and to ensure that the drinking water supplied meets quality standards specified in the Safe Drinking Water Regulations 2015. MHARMB is a water supplier as defined under the Act.

**State Environmental Protection Policy (SEPP) Waters 2018**

The SEPP Waters 2018 replaces two previous SEPPs for water in Victoria, the State Environment Protection Policy (Waters of Victoria) and the State Environment Protection Policy (Groundwaters of Victoria). The SEPP provides agreed environmental outcomes and strategic directions for protecting Victoria's water. It establishes beneficial uses of waterways that require protection within the Highlands segment of Victoria. Those relevant to the Resort include; Aquatic Ecosystems, Water for industrial and commercial use, Water for human consumption after appropriate treatment. Impacts to surface water quality must not exceed water quality objectives specified to protect beneficial uses. Relevant clauses must be adhered to.

**Water Act 1989**

The Water Act 1989 outlines the law relating to water in Victoria. It provides for the integrated management of all elements of the terrestrial phase of the water cycle and the protection of catchment conditions.

**Wildlife Act 1975**

The Wildlife Act 1975 is the primary legislation in Victoria for the protection and management of vertebrate wildlife (except fish). The Act aims to protect and conserve wildlife, to prevent their extinction and to regulate activities such as trading in legally held species and hunting. Wildlife habitat is protected by the Wildlife (Regulations) 2013.

VISITOR STATISTICS

As a leading tourism destination visitor impacts on the resort are substantial. Several environmental impacts correlate to the number of visitors, including potable water consumption, waste generation and wastewater discharge volumes.

**Winter Visitation**

Visitor statistics are collected via gate entry and seasonal pass holders throughout the declared winter season by the Alpine Resorts Coordinating Council (ARCC). Visitor information is collected on a weekly basis. Throughout the season an estimate of season pass visitation is used. At the end of the winter season this figure is corrected using the 'returns of season pass holder' survey forms to create a final 'end of season visitor result'. Visitor days are calculated from a *visitor x average length of stay* calculation. Visitor days are variable throughout the season and between years (Figure 1). Weekly variation is closely linked to the occurrence of school holidays and seasonal visitation is strongly influenced by snow depth and duration.

This report will comment on both 2019 and 2020 data due to limited visitation in 2020 due to COVID-19 restrictions and the termination of lift operations. In 2020 Mount Hotham recorded 39, 149 Visitor Days between week one and ten of the winter season. During the 2019 winter season Mount Hotham recorded 367,045 visitor days, slightly down from 2018, yet above the 10-year average (Table 1).

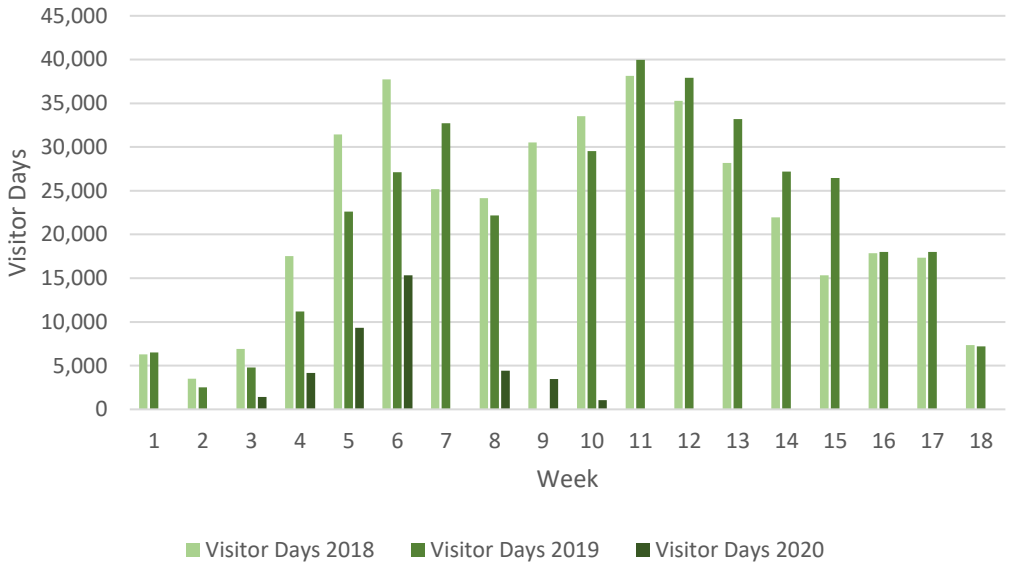


**Figure 1**. Comparison of weekly winter visitor days within the Mount Hotham Alpine Resort between 2018 and 2020. 2020 visitation levels are greatly reduced due to Coivd-19 restrictions. 2020 visitor days are only provided from week 1 to 10. Data source: ARCC.

**Table 1.** Total winter season visitors and visitor days recorded within the Mount Hotham Alpine Resort between 2015 and 2020, and 10-year average. 2020 visitation levels are greatly reduced due to Coivd-19 restrictions. 2020 visitor days are only provided from week 1-10. Data source: ARCC.

| Reporting Year | Visitors | Visitor Days |
|---|---|---|
| 2015 | 117,777 | 313,341 |
| 2016 | 120,508 | 328,602 |
| 2017 | 149,826 | 368,313 |
| 2018 | 148,576 | 398,125 |
| 2019 | 138,753 | 367,045 |
| 2020 | 12,997 | 39,149* |
| 10-Year Average | 133,974 | 350,582 |

**Summer Visitation**

Summer visitation has been increasing up until 2019, with the 2018/19 summer season well above the 10-year average for both total summer vehicle counts and annual summer visitors (Table 2). Similarly, to winter statistics, 2019-20 summer visitation was impacted by Covid-19 restrictions. Additionally, bushfire activity in the region during the 2019-20 summer also reduced visitation with the resort being closed to visitors for 2 weeks.

It should be noted that Mount Hotham is located on the Great Alpine Road, a major north-south highway, and thus it is likely some of these summer visitors are travelling through the resort without spending a significant time within the resort.

**Table 2.** Total summer vehicle counts and annual summer visitors (November-April for each season) between 2017/18 and 2019/20, and 10-year average. 2019/20 count period finished on 5 April 2020, due to COVID-19 restrictions. Data source: ARCC.

| Reporting Year | Total Summer Vehicle Counts | Annual Summer Visitors |
|---|---|---|
| 2014/15 | 66,642 | 98,475 |
| 2015/16 | 85,116 | 148,317 |
| 2016/17 | 85,263 | 144,871 |
| 2017/18 | 86,940 | 142,612 |
| 2018/19 | 96,669 | 171,373 |
| 2019/20 | 61,305 | 97,693 |
| 10-Year Average | 73, 921 | 120, 714 |

# PRODUCTION, WASTE AND CONSUMPTION

## ENERGY GENERATION AND CONSUMPTION

The data presented within this section is RMB consumption only and thus is not a collation of resort wide consumption. Data is taken from electricity accounts with AGL, Energy Australia, Origin Energy and Shell Energy. Currently RMB does not generate electricity.

**Electricity**

As of December 2020, RMB has 26 electricity accounts. RMB electricity usage has been declining since 2015 (Figure 2). 2020 consumption was particularity low as operations were reduced due to COVID-19 restrictions. In 2020 RMB consumed 636912.11 kWh at a cost of $190,399.91. In comparison RMB consumed 830491.88 kWh in 2019 at a cost of $241,008.84. The four largest consumers are the LP Gas Plant, Admin Building, Sewerage Treatment Plant and Pumpstation HV. These account for 57% of consumption and 54% of annual cost (See Appendix I).

Dannys Shed had a significant increase in electricity usage in 2020 compared to 2019, rising from 38810.40 to 63746.73 kWh. This is likely due to additional heating and installation of new processing equipment including a sorting station and glass pulveriser, both of which require electricity to run. Further investigation is required to determine the largest contributor to this increase and where saving can be made. The Pumphouse HV and Sewerage Treatment Plant are essential services and thus minimising electricity usage is challenging. High electricity usage within the Admin building is due to inefficiencies in heating and cooling, and the footpath heating component which is linked to this account. Opportunities to retrofit the Admin Building have been explored in the past however as the end life of the building unknown determining cost-effectiveness is difficult.

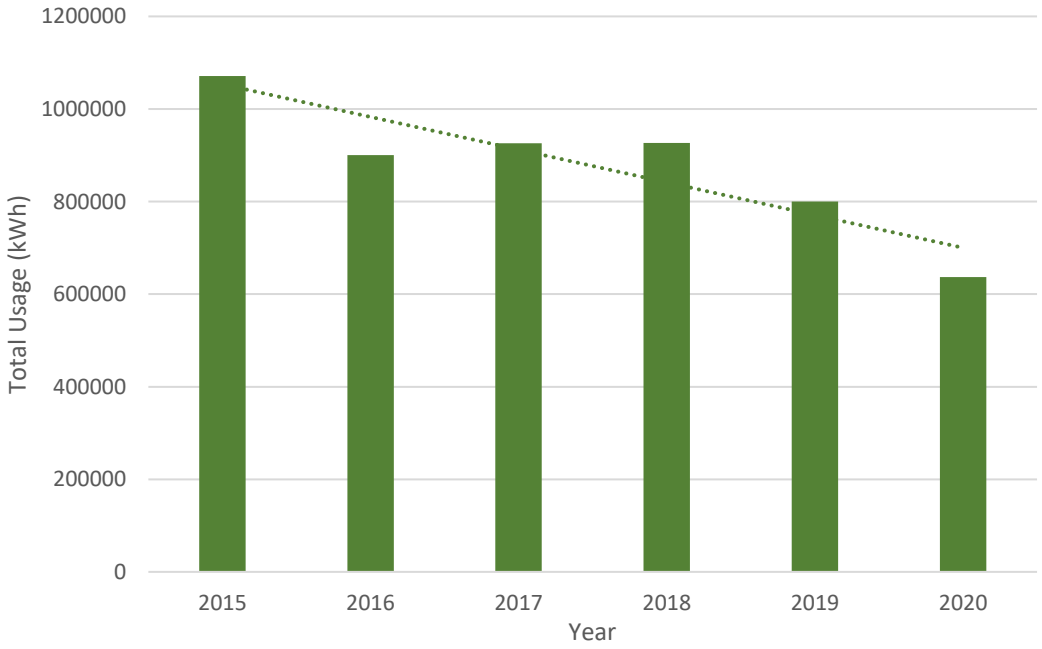


**Figure 2.** Comparison of annual MHARMB electricity usage (kWh) from 2015 to 2020.

**LP GAS Consumption**

RMB has two Liquid Petroleum Gas (LPG) tanks stored at the RMB workshop area. LPG is distributed throughout the resort via a reticulation system and is purchased by customers from the RMB. A supply agreement is held with Origin Energy. As a gas supplier RMB has obligations and reporting requirements under the Gas Safety Act.

As of December 2020, RMB manages 273 gas meters across the resort, 9 of which are associated with RMB operational points. LPG consumption at RMB operated facilities has been variable over the last six years, however, has significantly reduced from 2014/15 (Table 2, Figure 3). In 2020 consumption was at a six-year low, at 2832341 GJ due to reduced operations due to Covid-19 restrictions (Table 2, Figure 3). The greatest contributors are the Workshop, Vaporiser Gas Boiler and Sewerage Treatment Plant.

**Table 2.** Total annual LP Gas consumption at RMB operated facilities between 2015 and 2020.

| Reporting Year | LP Gas consumption (GL) |
|---|---|
| 2015 | 26,771 |
| 2016 | 24,803 |
| 2017 | 22,835 |
| 2018 | 25,422 |
| 2019 | 23,944 |
| 2020 | 20,557 |

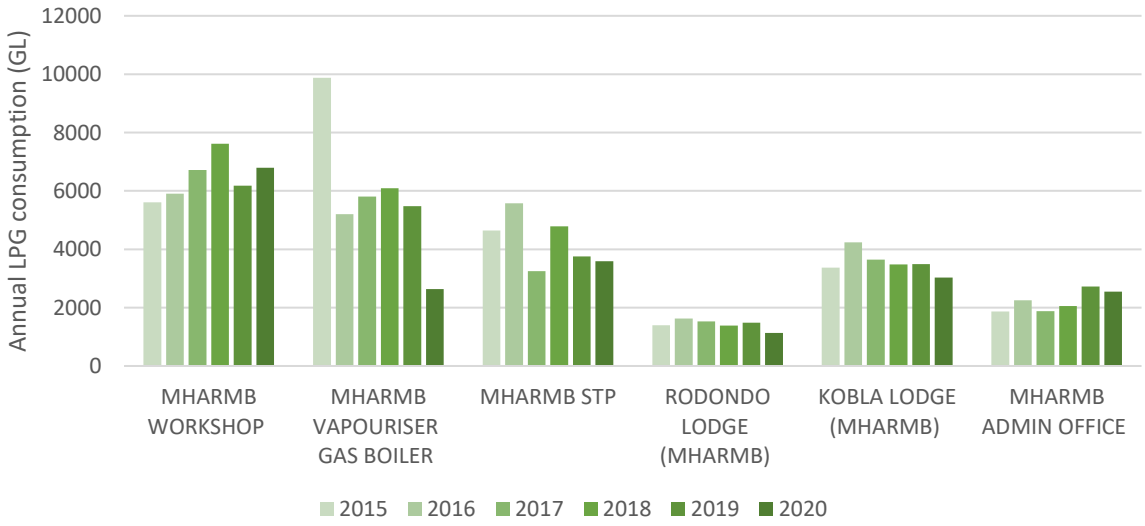


**Figure 3.** Comparison of annual LP Gas consumption by major contributing RMB operated facilities from 2015 to 2020. Moritz 14 and 15 have not been included due to very minimal consumption at these sites. Slaty Shed has not been included as gas consumption begun in 2019 and is very minimal.

**Fuel**

RMB operates three underground fuel tanks and pumps, one unleaded and one diesel store at the RMB Workshop and one diesel store at Slatey Shed. These stores are utilised for refuelling of plant equipment and fleet vehicles. RMB also has corporate accounts for refuelling vehicles outside the resort. Corporate accounts are maintained by Finance.

The consumption of diesel has been variable since 2015, with a substantial decrease in 2020 due to reduced operations due to Covid -19 restrictions. 2019 diesel consumption was at the higher end of the six-year spectrum, only slightly below 2018 levels. Consumption of unleaded fuel has remained relatively consistent since 2015, with a similar decrease in consumption to that of diesel in 2020 due to reduced operations.

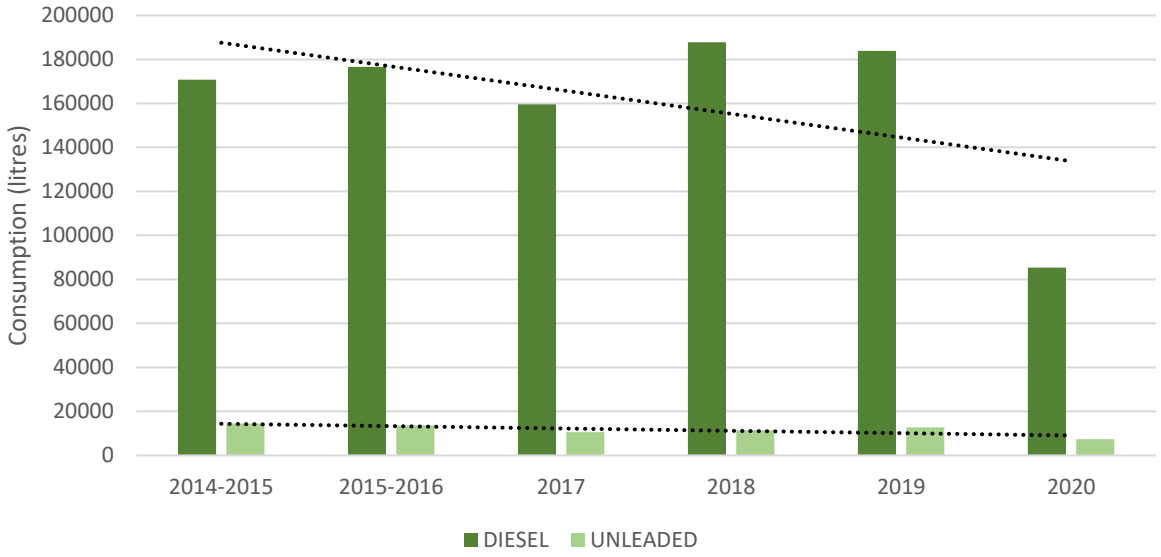


**Figure 4.** Comparison of diesel and unleaded fuel consumption by RMB from 2014/15 to 2020. 2014/15 and 2015/16 is reported for December-November. 2017 to 2020 is reported for the January-December.

## WASTE GENERATION, DISPOSAL AND RECLAIMATION

**Cobungra Landfill**

Cobungra Landfill Site is located 30 km east of the Mount Hotham Resort on the Great Alpine Road. The site is approximately 2 hectares and is surrounded by State Forest. The site was commissioned in the early 1980's. The site comprises of 5 closed landfill cells and one open landfill cell and receives all landfill waste produced from Mount Hotham Resort. The site also houses an organics processing shed for processing organic waste collected through the Living Bin Program and an area for receiving bio-solids from Sewerage Treatment Plant operations. The site is closed to the public.

Environmental impacts associated with landfill operations include greenhouse gas emissions, leachates, and contaminated liquids entering groundwater or surface water as waste decomposes. As RMB is deemed a "municipal council" under the *Alpine Resorts (Management) Act* and services a

population of less than 5,000, the Cobungra landfill is deemed an unscheduled premise by the EPA and is exempt from the landfill levy. In April 2014, EPA Victoria published the *Landfills Exempt from Licencing* (LEFL) guidelines which has implications for the ongoing management of the Cobungra site. Implications of these guidelines for ongoing management of Cobungra primarily relate to groundwater and surface water sensitivity, and future cells will require construction using an engineered liner and leachate management.

The organics processing facility at Cobungra Landfill Site was established at the end of the 2016 winter season as a trial. Since then, the facility has been made permanent by creating a concrete processing stage with a three-sided enclosed shed in the summer of 2016-17. The first batch of processed compost was tested in February 2018 by SESL Australia. The compost had a satisfactory carbon:nitrogen ratio (with no viable plant propagules detected and requirements met for pathogen control). The moisture content of this batch was slightly elevated and currently RMB intend to use the compost to add to the capping material to be used for capping the current landfill cell.

The most recent environmental risk assessment of Cobungra Landfill site was conducted by ERM Australia in 2017. Details of this assessment can be found in the 2018 Statement of the Environment Report.

The most recent gas emissions assessment was completed in 2012. Gas emissions were assessed as low risk for the site. Elevated levels of methane gas were recorded moving through the soil, however lower levels of gas concentration were recorded directly above the surface. Further details can be found in previous Statement of the Environment Reports.

The most recent ground and surface water quality monitoring was conducted in January 2021. Surface water sampling was undertaken at the Leachate Pond. The Leachate Pond sample reported Mercury levels above ANZECC 95% Freshwater Guidelines. Groundwater monitoring was undertaken at Bore Hole 5 (BH5). Bore Hole 6 was checked and was dry. Ground water was found at 15.95 metres in BH5. The BH5 sample reported Nitrate, Mercury and Zinc levels above ANZECC 95% freshwater Guidelines (Ventia 2021).

**Waste Collection**

Municipal solid waste is collected from rubbish hutches around the resort by RMB staff weekly during the summer months (more frequently during busy holiday periods) and daily during the winter. In 2010 RMB initiated an organics collection trial (Living Bin) to divert food waste from the landfill stream. The Living Bin program has now been running for 11 years across Mount Hotham, Falls Creek and Mount Buller Resorts. In 2011 a new recycling program led to waste being sorted into three categories: organics, cardboard and comingled recycling, at the newly constructed Danny's Shed. Colour coded collection bags are supplied by the RMB; red for general waste, clear for recycling and compostable for Living Bin waste. Rubbish is collected by hand and transported to Danny's Shed for sorting and processing. Problems associated with collection include occupational health and safety due to manual handling, incorrect disposal of waste and general litter around hutches due to poorly tied bags and tampering by birds, namely ravens.

RMB has made serval upgrades to Dannys Shed in recent years. RMB now collects e-waste, following a shed extension in 2019 through Sustainability Victoria's E-waste Infrastructure Grant funding

program. RMB currently bales cardboard and plastic bags (used to collect co-mingled recycling). This enables more efficient use of storage space in the shed before being sent offsite for recycling. Polystyrene is collected within the resort, stored in bulka bags and is sent to a local processing facility for recycling. Cooking oil is collected from commercial operators and is recycled by an independent operator. In 2020 a sorting station and glass pulveriser was installed at Dannys Shed. The sorting station has enabled more efficient and safer sorting of recycling and has led to greater recovery of recyclable materials from the general waste stream. Glass is now separated from the co-mingled recycling stream through the sorting station and is crushed on site by the glass pulveriser. This eliminates the need to transport glass off the mountain for recycling, thus reducing greenhouse gas emissions associated with transport. Crushed glass is a valuable resource and will be used for road and verge sealing, civil construction and road grit within the resort in years to come. It is estimated that 60 to 70 tonnes of glass is currently collected annually. During 2020 due to reduced operations and visitation 15 tonnes was collection between May and December.

**Waste Generation**

Tonnages of landfill waste is recorded via a truck log based on a maximum weight allowance for the compactor truck. The compactor truck weighed, and a full load measured as 9.7 tonnes of waste at 100% capacity and 7.3 tonnes at 75% capacity. Staff record each time a compactor truck is send to Cobungra landfill and provide an estimate of percentage capacity of the load if the compactor or only partially full. Tonnage of co-mingled recycling and cardboard is calculated upon collection by Tambo Waste via a weighbridge and compost tonnage is estimated based on the number of skips emptied each year.

Waste data prior to 2017 is not presented due to changes in reporting periods in previous years. Landfill, organics and cardboard quantities have been increasing since 2017, with a slight reduction in comingled recycling in 2019 compared to 2017 and 2018. 2020 waste volumes were substantially lower due to reduced visitation, however high landfill diversion rates were still maintained with 66% of waste diverted from landfill (Table 3, Figure 5).

**Table 3.** Waste generation (kg) within the Mount Hotham Alpine Resort between 2017 to 2020. *2020 visitor days are only provided from week 1-10

| | Annual waste to landfill (tonnes) | Winter waste to landfill (tonnes) | Winter Visitor Days | Winter waste to landfill/visitor days (kg) |
|---|---|---|---|---|
| 2017 | 165.87 | 125.6 | 368,313 | 0.34 |
| 2018 | 170.24 | 136.3 | 398,125 | 0.34 |
| 2019 | 171.69 | 132.9 | 367,045 | 0.36 |
| 2020 | 18 | NA | 39,149* | NA |

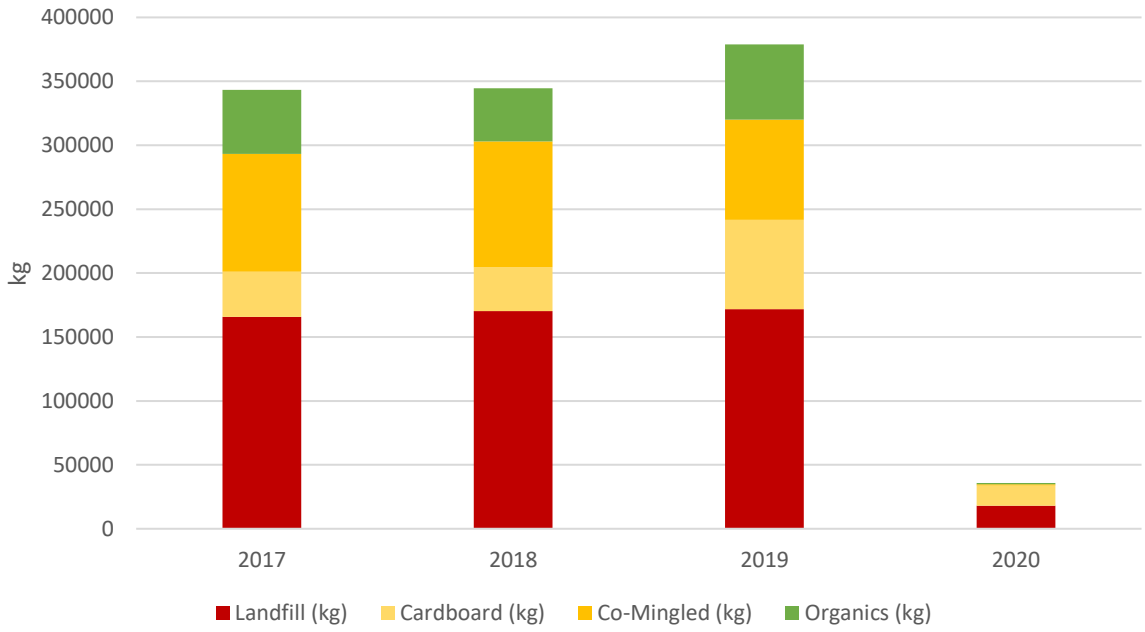


**Figure 5.** Comparison of annual waste generation by category within Mount Hotham Alpine Resort from 2017 to 2020.

## WATER USAGE, RECLAIMATION AND DISCHARGE

### Licensing

RMB currently holds a licence from Goulburn Murray Water to divert up to 175 ML of water annually from Swindlers Creek for the supply of potable water for commercial and residential purposes within the resort. Mount Hotham Ski Company (Vail) holds a water diversion licence from Goulburn Murray Water for up to 500 ML of water annually from Swindlers Creek for snowmaking.

### Potable Water Supply

RMB is responsible for potable water supply and sewerage within Mount Hotham Resort under the *Alpine Resorts (Management) Act*. Water is sourced from upper Swindlers Creek, a catchment of approximately 180 hectares.

Water is collected at the Swindlers Inlet headwall and raw water is gravity fed to the pump station on Swindlers Trail. From here it is pumped through a 150 mm steel cement lined pressure rising main to storage tanks located at the summit of Mount Higginbotham. From the storage tanks, the raw water flows to the ultraviolet (UV) units 1 and 2 where it is disinfected immediately prior to its distribution to customers through the village water reticulation system. Potable water consumption data is taken from SCADA monitoring of flows at points within the two UV facilities. There are no separate metred water supply consumer points; water supply is a component of the annual service charges payable by head lessee stakeholders within the resort based on calculations of their fully enclosed area of a rated building.

Two of the old water storage tanks have reached the end of their economic life. These are now decommissioned and preliminary planning for replacement of the tanks is underway. Staged replacement of the rising main is currently underway, with Stage 1 replacement works in the vicinity of Sun Run are complete with Stage 2 for the Lower Playground section currently underway.

**Potable Water Consumption**

In May 2011, RMB commissioned the SCADA system which allows for real-time and historical access to data monitoring including the potable water system. The SCADA system is linked to nodes at Swindlers Weir, the pump house, Mount Higginbotham water storage tanks and the UV 1 and UV 2 facilities (including the emergency backup generator and chlorine dosing systems).

Annual consumption data shows a decline since 2017, with some variability over the last six years (Figure 6). Winter consumption has remained relatively consistent between 2014-15 and 2019 (Figure 6). There was a significant drop in 2020 due to reduced visitation due to Covid-19 restrictions. Additionally, bushfire activity in the vicinity of the resort in the 2019/2020 summer, lead to resort closure for 2 weeks and thus reduced visitation during this time. Water was drawn from Swindlers Creek to fill Loch Dam for firefighting purposes in March, November and December 2017, March and December 2019 and January 2021.

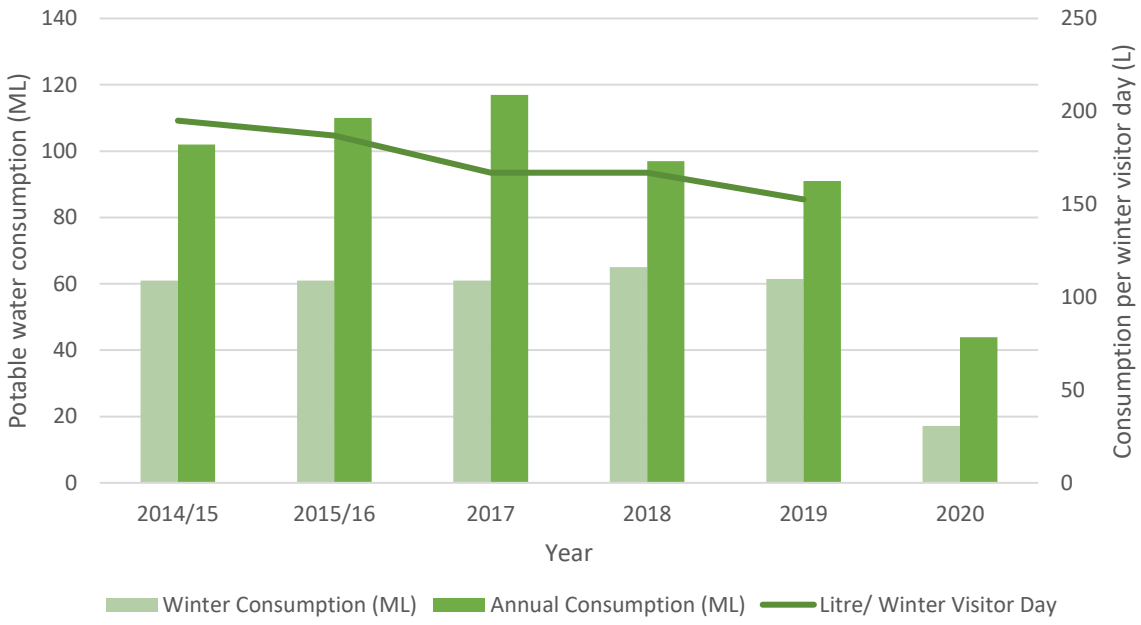


**Figure 6.** Comparison of annual and winter consumption of potable water within the Mount Hotham Alpine Resort against litres per winter visitor day between 2014/15 and 2020. 2020 visitor day data is unavailable. 2014/15 and 2015/16 data is presented for November- October. 2017 data is presented for 14 months from November 2016 to December 2017.

**Potable Water Quality**

RMB are required to report annually to the Department of Human Services under the *Safe Water Drinking Act*. The most recent Report was submitted in July 2020 for the reporting period of July 2019 to June 2020. Mount Hotham is fortunate to have high quality raw water usually treated with only ultraviolet radiation prior to distribution. Chlorine dosing is used in times of low water quality or as an alternative back up treatment to the UV facility. RMB has maintained compliance with standards for E.coli and turbidity over the last six reporting periods (Table 4).

**Table 4.** Comparison of water quality testing results for *E. coli* and turbidity from 2014-15 to 2020 from the potable water reticulation system within the Mount Hotham Alpine Resort.

| | ***E. coli*** | | **Turbidity** | | |
|---|---|---|---|---|---|
| Year | No of samples containing *E.coli* | % of samples with no *E.coli* | Max NTU | 95$^{th}$ percentile | Compliance with standards? |
| 2014-15 | 0 | 100 | 0.5 | N/A | Yes |
| 2015-16 | 0 | 100 | 0.3 | 0.2 | Yes |
| 2016-17 | 0 | 100 | 0.7 | 0.7 | Yes |
| 2017-18 | 0 | 100 | 0.6 | 0.3 | Yes |
| 2018-19 | 0 | 100 | 0.3 | 0.2 | Yes |
| 2019-20 | 0 | 100 | 0.3 | 0.2 | Yes |

**Wastewater Treatment, Discharge and Recycling**

The Mount Hotham Sewerage Treatment Plant (STP) operates within two key areas; firstly raw inflows are treated within a secondary treatment process through a biological nutrient removal process and ultra violet disinfection. From here secondary effluent or Class B (as characterized by EPA Victoria) recycled water is either discharged to No Name Creek (Dargo River) or preferably is further treated by the tertiary treatment phase constructed as part of the Water Recycling Project in 2008. This involved the construction of a water recycling plant to produce Class A recycled water by membrane ultrafiltration, disinfection from high dose UV and chlorination. Class A treated water is then pumped along a 3.5km pipeline to Loch Dam where it is used for supply of water for snowmaking. The tertiary treatment plant operates within an EPA approved HACCP and Environmental Management Plan.

The sewerage treatment plant treated 63.94 ML of wastewater from Hotham Village in 2020. A total of 35. 98 ML was discharged to No Name Creek (Dargo River). No Class A recycled water was pumped to Loch Dam during winter of 2019 (due to replacement of the UV unit within the Class A plant nor during winter 2020 due to low flows associated with reduced visitation from COVID-19.

**Discharge Quality Monitoring**

RMB are required under the EPA license to implement a monitoring program that demonstrates the quality of the water discharged from the STP is within license requirements. Parameters monitored include biochemical oxygen demand, suspended solids, *E. coli*, residual chlorine, phosphorus and nitrogen. Sampling is taken from the discharge point (DP1) for secondary effluent at No name creek on a monthly basis (12 samples annually). Sampling for discharge point (DP2) for Class A water is

conducted in the holding tank before the recycled water is pumped to Loch Dam on a weekly basis during operation of the tertiary treatment plant. For the 2019-20 reporting period 12 samples were collected. During the July 2019 to June 2020 reporting period, all parameters were within the licence limits from discharge point 1 at No Name Creek (Table 5). All parameters have met EPA licence limits for DP1 over the last six years. No Class A water was produced in 2019-20. Class A water was most recently produced in 2018-19. All EPA parameters except total phosphorous were met (Table 6).

**Table 5.** Results from laboratory testing of wastewater discharged to No Name Creek (DP1) during the July 2019 to June 2020 reporting period.

| Parameter | EPA licence limit | 2019-20 result |
|---|---|---|
| Biological Oxygen Demand (Max) | 20 | 16 |
| Biological Oxygen Demand (Median) | 10 | 3.5 |
| Suspended Solids (Max) | 30 | 8 |
| Suspended Solids (Median) | 15 | 4.5 |
| *E.coli* (Max) | 1000 | 50 |
| *E.coli* (Median) | 200 | 0 |

**Table 6.** Results from laboratory testing of Class A water during the July 2018 to June 2019 reporting period.

| Parameter | EPA licence limit | 2019-20 result |
|---|---|---|
| BOD Max (mg/L) | 5 | 2 |
| E. coli Max (orgs/ml) | 10 | 0 |
| SS Max (mg/L) | 1 | 1 |
| Total dissolved solids Max (mg/L) | 500 | 290 |
| Total N annual median (mg/L) | 5 | 4.05 |
| Total P annual median (mg/L) | 0.05 | 0.055 |

# ATMOSPHERE

## CLIMATIC VARIABILITY

The El Nino- Southern Oscillation (ENSO), encompassing El Niño and La Niña cycles, is a major driver of yearly climate variability in Australia. Their effects include changes in rainfall along the eastern seaboard of Australia including the Victorian Alps. Additional circulatory patterns and ocean temperatures within the Southern and Indian oceans also affects climate within this region. Australian snow depths are typically less during years of El Niño or positive Sothern Annular Mode (SAM) and significant changes in spring snow cover is related to the state of the Indian Ocean Dipole (Pepler et al. 2015).

The climate within the Mount Hotham Resort is determined by its elevation, topography and orientation. A weather station is located at the summit of Mount Hotham and comprehensive current and historical weather data can be found at the Bureau of Meteorology. The current station, number 083085, began operation in 1990. Additional data from station number 083081 provides data from 1977 to 1990. Several stations have operated within the resort with various climate data available back until 1885.

Various studies have discussed the impacts and threats of climate change on the Australian alpine regions and include predicted increases in temperature, decreases in precipitation and snow depth, and increases of high intensity rainfall events (Hennessy et al. 2008).

## TEMPERATURE

Temperature data is compared between 1992 to 2020. Data prior to 1992 is not analysed due to a change in location of the weather station from the saddle to the summit, which due to great fluctuation in temperature between microclimates would not represent a fair comparison.

Annual mean maximum and mean minimum temperature has risen since 1992 (Figure 7). With annual mean maximum temperature, the highest within the 29 years in 2020, and mean minimum temperature the highest in 2000 (Figure 7). Comparison of mean minimum and maximum temperatures per month shows that temperatures are lowest in August and highest in January (Figure 8). 2020 experienced a warmer than average winter and a slightly cooler than average summer, compared to the 25-year average (1992 to 2016) (Figure 8).

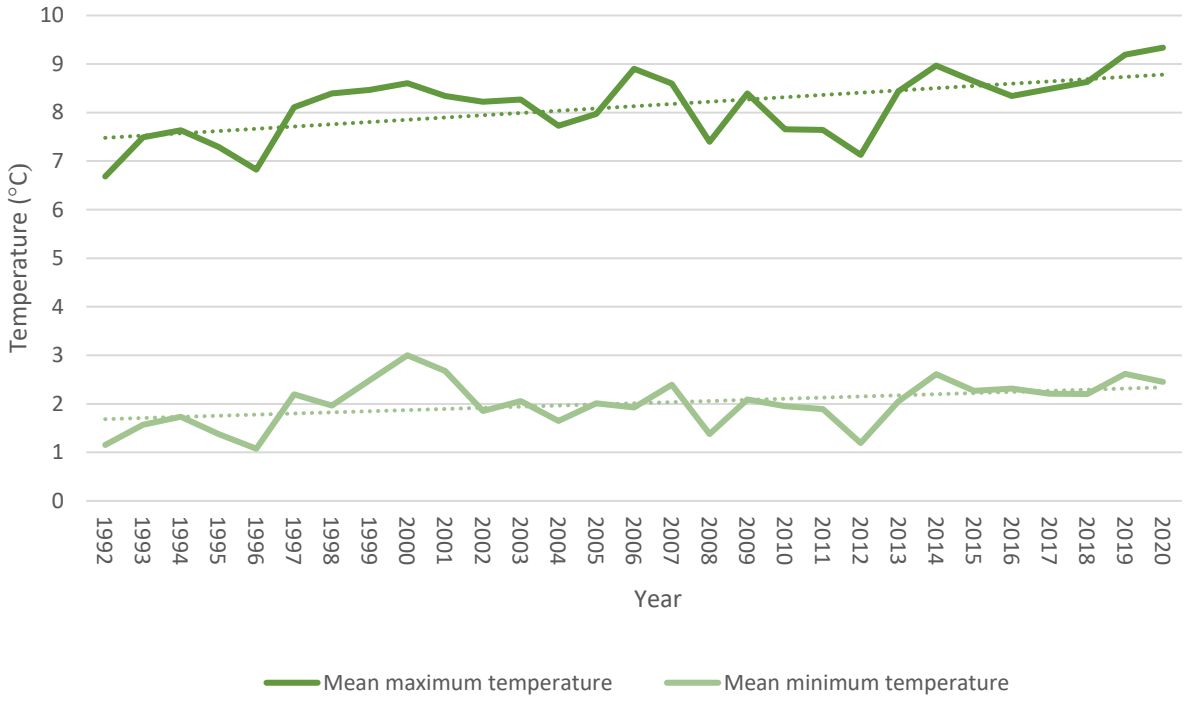


**Figure 7.** Mean annual minimum and maximum temperature (C°) recorded at Mount Hotham station no. 083085 between 1992 to 2020. Source: Bureau of Meteorology.


**Figure 8.** Mean annual maximum (A) and minimum (B) temperature (C°) recorded per month at Mount Hotham station no. 083085 between 1992 to 2020. Source: Bureau of Meteorology.

## PRECIPITATION

The high variability in precipitation between years in Australian alpine regions makes it difficult to detect changes in trends (Hennessy et al. 2008). On average Mount Hotham Alpine Resort receives an annual precipitation of 1453.8 mm (Bureau of Meteorology). Thunderstorms with high intensity rainfall occur in summer. Snowfalls can occur during summer however snowfalls that form a more consistent snow cover occur from June to September. Bureau of Meteorology data is missing for a number of years and as such it is difficult to derive a trend in precipitation over time. Generally, precipitation is variable year to year (Figure 9). Over the past 20 years November has been the wettest month with an average of 148 mm of precipitation recorded, and January has been the driest month with an average of 99.6 mm (Figure 10).

High intensity rainfall events can pose a threat to the resort in regard to soil erosion and impacts on operations at the sewerage treatment plant. Over the last three years, high intensity rainfall events have occurred in 2016 with 114.2 mm on the 10th of May and 158.6 mm on the 30th of December, and in 2019 with 116 mm of rainfall on the 2nd of March (Bureau of Meteorology).


**Figure 9.** Total annual precipitation (mm) recorded within the Mount Hotham Alpine Resort since 1995. Light coloured bars indicate missing data during that year. Source: Bureau of Meteorology.

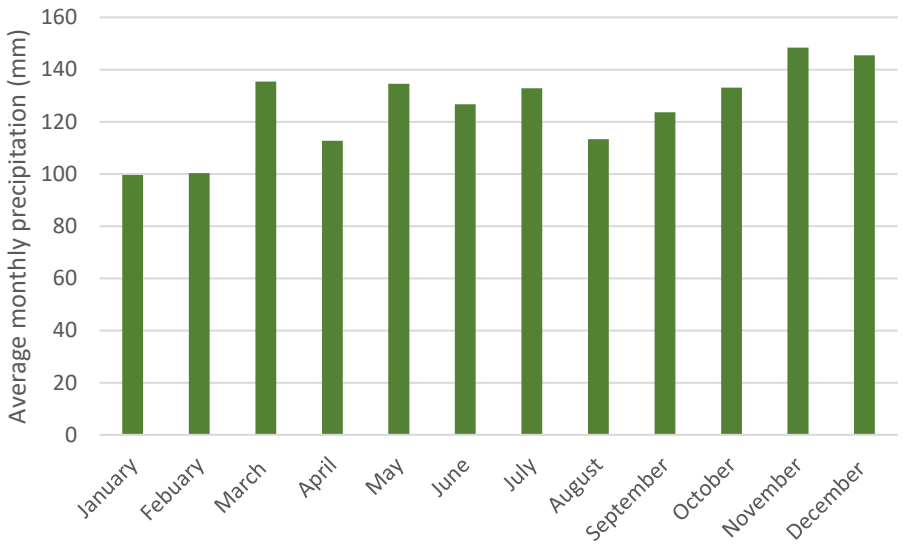


**Figure 10**. 20-year average (2000 to 2019) of monthly precipitation (mm) recorded within the Mount Hotham Alpine Resort. Missing data from May to December. Source: Bureau of Meteorology.

## SNOW DEPTH AND DURATION OF COVER

The snowline for Mount Hotham is approximately 1400 meters asl. Snowfalls that create and maintain a persistent snow cover usually begin around mid-June and continue intermittently until early September. Data for snow cover for the resort outside the declared snow season is not available. Snow depth is measured daily during the declared winter snow season by Ski Patrol. Snow depth is determined by averaging snow depth across three locations within the resort. Snow depth data is available from 1990 to present.

In 2020 snow depth was considerably lower than the six years prior and the 10-year averages 2001-2010 and 2011-2020. In 2020 snow depth reached a peak of 80.33 cm on the of 24$^{th}$ August (Figure 11).

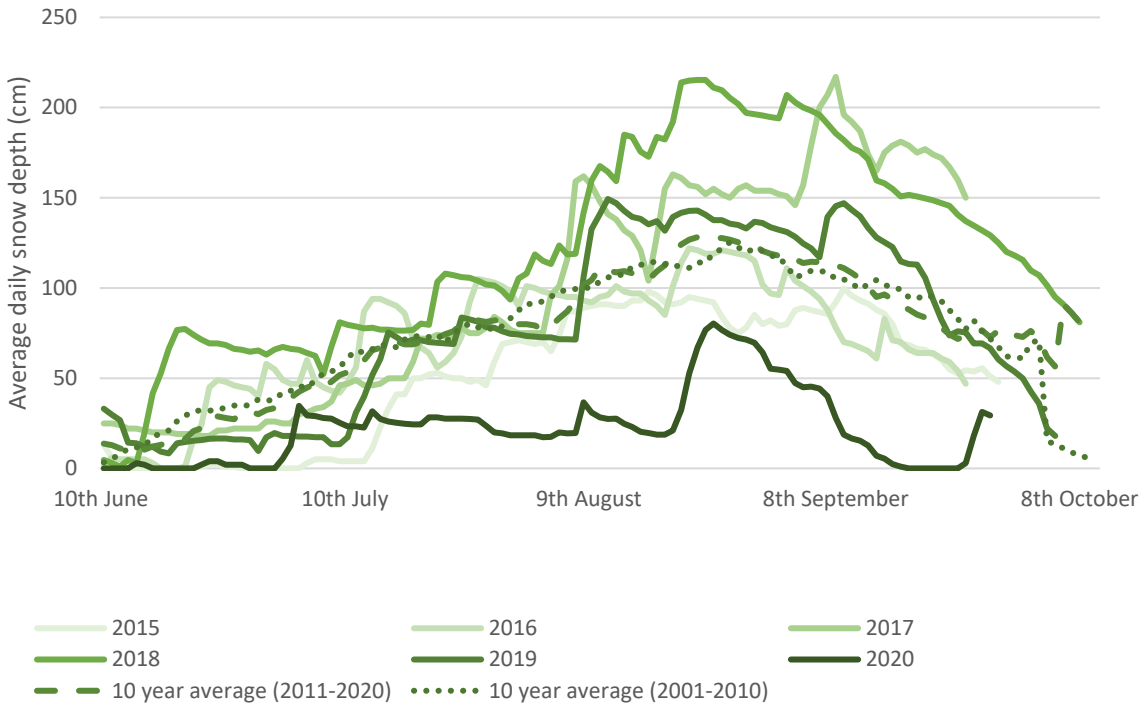


**Figure 11.** Comparison of snow depths from 2015 to 2020 against 10-year averages (2001-2010 and 2011-2020) within the Mount Hotham Alpine Resort.

## GREENHOUSE GAS EMISSIONS

In 2010, the then Department of Sustainability and Environment via the Alpine Resorts Coordinating Council provided the Alpine Resort Management Boards with a $CO^2$ emissions calculator as a template for greenhouse gas emission reporting. The data presented below was derived from this template. It includes data collated from RMB operations that consume electricity, fuel and LP Gas as outlined in previous sections of this report. It does not include calculations related to operations at the wastewater treatment plant and landfill.

Greenhouse gas emissions have been declining since 2015/16 (Figure 12). There was a substantial decline in 2020 due to reduced operations due to Covid-19 restrictions. The decline in total greenhouse gas emissions up until 2019 has primarily been due to a reduction in electricity usage. A detailed breakdown of 2019 emissions shows that electricity is the greatest contributor to RMB greenhouse gas emissions (57%), followed by diesel (29%) (Figure 12).

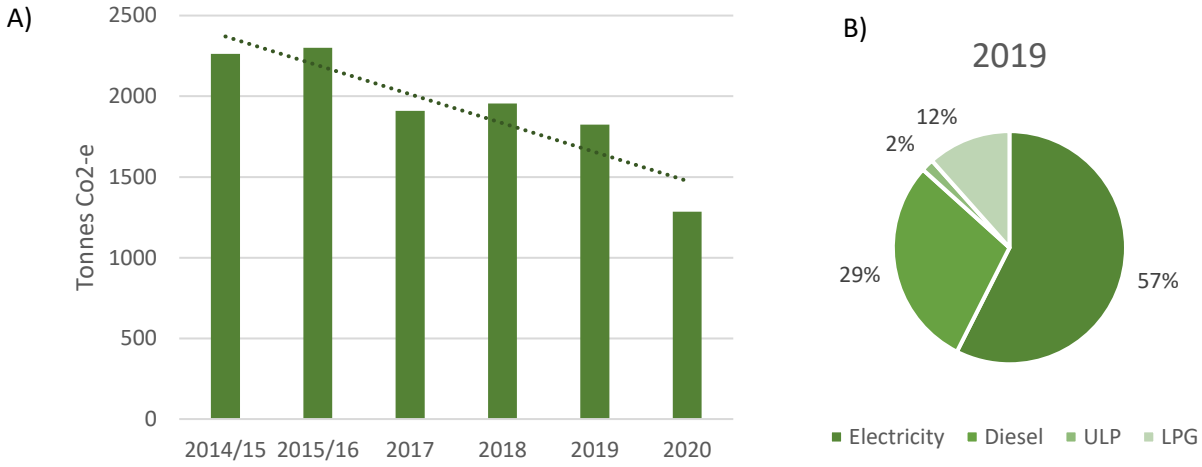


**Figure 12.** A) Comparison of greenhouse gas emission from 2014/15 to 2020. * 2014/15 and 2015/16 is recorded for December-November and 2017 to 2020 is recorded for the calendar year. B) Breakdown of greenhouse gas emissions across each category during 2019.

# LAND

## GEOLOGICAL FEATURES

The following is an excerpt from Rosengren et al. (1993). Mount Hotham Natural Resources Survey.

*"The Mount Hotham area is separated from the Bogong High Plains by the north-south trending West Kiewa Thrust Fault Zone. East of the fault zone the geology is complex but on the Mount Hotham side there is less geological variation and no high grade metamorphic rocks. The bedrock of the Resort area is low-grade metasediments – slatey mudstones, phyllites and orthoquartzite of Middle to Upper Ordovician age referred to as the Hotham Slates by Beavis (1962). The slates are apparently unfossiliferous. Beds are generally thin or have close cleavage. Dips and cleavage angles are steep with a dominant north westerly orientation. There is extensive bedrock exposure of steeps slopes of Australia Drift and above the Diamantina River with lesser outcrops in the valley of Swindlers Creek. Closely spaced bedding, laminations, weak foliation and strong cleavage of many beds make these rocks susceptible to shattering. Indurated sandstones and thicker slate beds crop out as prominent ribs, minor ridges, benches and escarpments.*

*Overlying the Ordovician rocks are remnants of once extensive basalt lava flows of the Older Volcanics. These form the flat topped summits of Mount Loch, Mount Higginbotham and Little Higginbotham, two smaller cappings on Golden Point and the broad crest of the Dargo-Cobungra divide extending south east to Dinner Plain and Paw Paw Plain. The rocks are dominantly olivine basalts and geochemically are grouped with the Bogong Older Volcanics Province (Day, 1983). They are dated as Oligocene. There are at least four flows in the Mount Hotham-Mount Loch area, the lower most being deeply weathered as exposed in cuttings on the Great Alpine Road. "*

The Bogong High Plains, including Mount Hotham, unlike alpine areas of New South Wales and Tasmania, did not undergo a period of glaciation. Instead, they experienced and continue to experience periglacial activity of varying degrees. Active periglacial features include the movement of soil and vegetation by the growth of needle ice; rock scratching, movement and cracking; limited sorting of coarse and fine debris on bare ground and solifluction below long lasting snow patches where soil and stone moves down slope *en masse.* Active periglacial features such as rock cracking, scratching and movement have been recorded within the Resort (Rosengren *et al*. 1993, Biosis 2011).

Fossil periglacial features include solifluction lobes or deposits, which are sheets of stony debris ranging from boulders to fine material. These deposits originated as slowly creeping layers of rocks but are now largely immobilised under soil and vegetation. These features have also been recorded throughout Mount Hotham particularly within and/or adjacent to snow patches (Biosis 2011).

Nivation hollows are another type of periglacial feature, described by Galloway *et al*. 1998 (in Biosis 2011) as a spoon shaped hollow with steep back walls a few metres high and fronted by an apron of transported debris which is usually soft and boggy in summer. Rosengren *et al*. (1993) recorded the presence of several small nivation hollows on the southern slopes of the Loch-Hotham ridge. These nivation hollows were described as bowl-shaped valley heads located at the head of several tributaries leading into Swindler's Creek. The broad basin below Derrick Col also has the form of a periglacial nivation hollow.

Sites of geoscience significance within the Resort have been identified and include:

- Exposed sub-basaltic sediments overlying Ordovician basement rocks and a long basalt block stream at Mount Little Higginbotham;
- A broad nivation hollow below Derrick Col at the head of Swindler's Creek; and
- Solifluction lobes and terraces associated with alpine snowpatches throughout the Resort.

An additional site of significance is located in the Hotham Heights area on the southern side of the Great Alpine Road (36°59.65'S, 147°09.32'E, 1733 m asl). Early Cenozoic basalt, caps an Oligocene to Eocene surface that has preserved an infilled stream system containing fossiliferous sediments. These sediments contain abundant leaf impressions and mummified leaves, which are valuable for paleobotanical studies, as they preserve evidence that 50 million years ago the area supported subtropical rainforest and was at a substantially lower elevation than it is at today (Biosis 2011).

## SOIL

The soils of the Mount Hotham region are mainly derived from *in situ* material and are predominantly alpine humus soils with smaller areas of skeletal soil and isolated areas of alpine fen or bog peats (Rosengren *et al.* 1993, Biosis 2011). Alpine humus soils are highly organic and strongly acidic throughout the profile. They are characterised by dark humic upper horizons, gradational texture, good structure and an abundance of stones. Alpine humus soils can be up to one metre deep. These deeper soils are generally located on the lower parts and at the base of moderately steep slopes ~20%, they also occur on higher slopes with a northerly or westerly aspect. Skeletal soils are very shallow, varying in depth from several centimetres up to 30 centimetres. They are low in organic matter and contain a higher proportion of stones and gravel (Biosis 2011).

Soil erosion can detrimentally impact on; water quality (increased loads of sediment and nutrients), the chances of vegetation establishment and/or regeneration (through nutrient loss, seed loss, and seedling destruction) and the condition of critical habitat of threatened species, particularly the Alpine Tree Frog and Mountain Pygmy-possum. Creation of bare earth increases the likelihood of weed invasion and establishment, and minimises the chances of establishment of native vegetation due to frost heave. Compaction of soil increases the likelihood for runoff, and reduces establishment rates of native vegetation (e.g. reduction in ability for roots to penetrate soil).

## FIRE MANAGEMENT

There is evidence that within Australian alpine environments extensive fires occur occasionally during periods of extended regional drought and when severe local fire weather coincides with multiple ignitions in surrounding montane forest. Flora and fauna are generally resilient to infrequent, large, intense fires, such as those that occurred in 1939 and 2003 (Williams *et al.*, 2008). However, there still remains a high risk to some species from infrequent fires, particularly reptiles, frogs and invertebrates with localised populations. In general, species are less well adapted to high intensity, high frequency fires, such as those predicted with climate change.

Although fire is an uncommon event in alpine and sub-alpine environments it is part of a natural cycle of disturbance, which also includes insect attack, wind, frost and extreme climatic events. As such, some alpine and sub-alpine plant species have the capacity to respond to fire due to their capacity to reproduce vegetatively due to the presence of perennating buds close to the ground and ability to germinate from seed stocks in the soil. If, however fires become so frequent that species are unable to reach reproductive maturity and thus ensure there is a healthy soil seed bank, or the capacity of individuals to resprout is exhausted, significant changes to vegetation may occur, having implications for native fauna which rely on these ecosystems, as well as implications for hydrological systems and thus water resources.

The RMB is responsible for delivering a range of services with a significant role in emergency management. Bushfire management risk is complex within the resort due to its isolation, steep topography, climate, environmental significance, management arrangements and the vegetation in the surrounding Alpine National Park. Following the State government's Integrated Fire Management Planning Framework the RMB works to achieve effective fire management through an integrated planning approach. RMB has completed listings for the Victorian Risk Register and was involved in the development of the draft Hume Regional Strategic Fire Management Plan 2011-2021. The resort is included within the Mount Hotham Dinner Plain Township Protection Plan. The Mount Hotham Emergency Management Plan 2018-2021 is the most recent Plan, replacing the Mount Hotham Municipal Fire Management Plan 2016-2018.

In November 2011, the Victorian Government introduced permanent planning controls as part of implementing the recommendations of the Victorian Bushfire Royal Commission. Amendment VC83 introduced clause 52.48 into the Victoria Planning Provisions and all planning schemes on 18 November, 2011. Clause 52.48 allows the removal, destruction or lopping of vegetation to reduce the fuel load around existing buildings used for accommodation without requiring a planning permit. These permit exemptions only apply to buildings existing or approved before 10 September 2009.

Approval for vegetation removal in the Mount Hotham Alpine Resort, which is Crown land, must be obtained from the public land manager which is the Mount Hotham Alpine Resort Management Board ('Board'). The RMB has a standardised form for leaseholders wishing to clear native vegetation and staff are available to provide site specific advice.

## HERITAGE VALUES

Mount Hotham Resort has a rich indigenous and non-indigenous history. Principal indigenous groups within the Mount Hotham region include the Gunaikurnai, Dhudoroa and the Jaitmathang. It is believed that indigenous peoples gathered in large numbers in the high country, particularity during the spring and summer months. In October 2010, the Gunaikurnai people were recognised by the Federal Court as the native title holders over certain lands within the Resort. In 2012, an Indigenous Land Use Agreement was signed with the Gunaikurnai Land and Waters Aboriginal Corporation (GLAWAC) under the Federal Native Title Act to establish an amicable legal arrangement for recognising public works within the resort in a way that also preserves native title. Cultural Heritage Sensitivity areas are known to occur within in the resort. RMB acknowledges that the resort exists on

indigenous land that was never ceded and recognises the continuing connection to land and welcomes a growing and positive relationship with indigenous peoples within the Mount Hotham region.

Mount Hotham has a unique non-indigenous history ranging from grazing to gold and finally ski tourism. In the mid-1830s, European squatters looking for grazing lands began to move into the district. In 1851 gold was officially discovered in the region. In the 1880's ski tourism began and in 1920's Hotham Heights Chalet was established, and Hotham became a skiing destination. A number of heritage sites occur within the resort, including numerous huts utilised by cattle graziers and miners. Spargo's Hut is one of the oldest intact structures and is listed on the Victorian Heritage Register for its architectural and historical significance. A Condition Assessment & Conservation Works and Schedule Conservation Management Plan for Spargo's Hut was developed in 2018. Restoration works were carried out during the 2021 summer in collaboration with the Victorian Huts Association.

# BIODIVERSITY

The alpine and sub-alpine areas of Australia are geographically restricted covering approximately 0.15% of the Australian continent. Despite their restricted distribution they are biologically diverse with several endemic flora and fauna species. The combination of unique landforms, climate, and species mean the Alps have a disproportionately high level of biodiversity value for their size. Alpine environments are particularity sensitive to the threat of climate change with species having adapted to specific climatic conditions and unable to retreat to high elevations as the climate warms due to Australia's relatively restricted elevations. Additionally, increasing impacts from human recreation and feral animal and pest plant species are increasing pressures on native species.

A number of threatened species and communities persist within the Mount Hotham Resort. These species are protected by the *Flora and Fauna Guarantee Act* 1988 and *Commonwealth Environment Protection and Biodiversity Conservation Act* 1999. As the land mangers RMB have a responsibility to protect the unique biodiversity within Mount Hotham Alpine Resort and strives to mitigate threats to these species where possible.

## FLORA

**Indigenous Flora**

Mount Hotham Alpine Resort is located within the Victorian Alps Bioregion, identified as having a cool climate with winter snowfall, short summers and annual rainfall above 1000 metres. The Victorian Alps Bioregion is associated with alpine, subalpine and montane forests.

Ecological Vegetation Classes (EVC) are used as a standard classification unit in Victoria to define vegetation types. EVCs are based on examination of a combination of floristic, life form and ecological characteristics. Each EVC includes a collection of floristic communities that occur across a biogeographic range, and although differing in species, have similar habitat and ecological processes.

Mount Hotham Resort comprises at least 13 EVCs, one of which is listed as endangered and two of which are listed as vulnerable (Table 7, Appendix II). Up-to-date descriptions of EVCs are contained in

the Department of Environment, Land, Water and Planning (DELWP) 'benchmarks' for all Victorian bioregions.

**Table 7**. EVCs mapped within the Mount Hotham Resort as of 2018, including their conservation status and geographic occurrence. Source: DELWP.

| Vegetation class name | Bioregional Conservation Status | Geographic Occurrence |
|---|---|---|
| Alpine Coniferous Shrubland | Vulnerable | Rare |
| Alpine Crag Complex | Not Applicable | N/A |
| Alpine Damp Grassland | Rare | Rare |
| Alpine Grassland | Rare | Rare |
| Alpine Grassy Heathland | Rare | Rare |
| Alpine Rocky Outcrop Heathland/ Alpine Dwarf Heathland Mosaic | Rare | N/A |
| Montane Damp Forest | Least Concern | Common |
| Montane Dry Woodland | Least Concern | Common |
| Snowpatch Grassland | Vulnerable | Rare |
| Sub-alpine Shrubland | Rare | Rare |
| Sub-alpine Treeless Vegetation | Rare | N/A |
| Sub-alpine Wet Heathland/ Alpine Valley Peatland Mosaic | Endangered | N/A |
| Sub-alpine Woodland | Least Concern | Common |

Indigenous flora refers to plant species that have originated in a given area. 357 indigenous flora species persist within Mount Hotham Resort, as listed in the Atlas of Living Australia. Threatened species mapping from records on the Victorian Biodiversity Atlas (VBA) as of May 2021 list a total of 105 flora of state significance within the Resort (Appendix III). It should be noted that current records on the VBA rely on data records, as such areas where surveys have not been undertaken are missing and thus vastly undervalued. This has resulted in the Resort area where work has historically been undertaken receiving more attention than other more remote areas.

The Alpine Sphagnum Bogs and Associated Fens community occurs within the resort and is listed under the *Environment Protection and Biodiversity Conservation Act* as endangered. Four floristic communities occurring within the resort are listed under the *Flora and Fauna Guarantee Act*; the Alpine Bog community, Alpine Snowpatch community, *Psychrophila Introloba* Herbland community and Fen (Bog pool) community.

Plant community vegetation mapping by the Soil Conservation Authority during the 1980s is also available for much of the Mount Hotham resort area. This information was digitised and is available in .dwg format within RMB spatial database.

Snowgum (*Eucalyptus pauciflora*) dieback is an emerging threat to sub-alpine ecosystems within Victoria and New South Wales. Dieback is occurring due to infestation of wood-boring logicorn beetles (*Phoracantha* sp.). These beetles are native however disruptions to the natural balance of this system appears to be favouring the beetle. Research is currently underway by Australian National University (ANU) researchers. The exact cause of this extreme dieback is unknown however it is likely a

combination of drought and warmer than average temperatures. A citizen science campaign lead by ANU researchers is encouraging the public to get involved and assist in mapping snowgum dieback across the Alps through 'Save Our Snowgum'.

**Victorian Alps Nursery**

RMB took ownership of the Victorian Alps Nursery in 2005 to ensure an ongoing supply of alpine and sub-alpine indigenous species for rehabilitation and restoration purposes. The Nursery is a vital asset for revegetation, rehabilitation and restoration projects throughout north-east Victoria and mountain regions of mainland Australia. The Nursery supplies over 300 local provenance species for a broad range of clients including other Resort Management Boards in Victoria and New South Wales, Alpine Shire, New South Wales National Parks and Wildlife Service, Parks Victoria, Local Ovens and Omeo Valley Landcare, other independent land management groups and communities in North East Victoria. The Nursery also provides a valuable seed bank resource, with nursery and environment staff assisting in the collection of seed and cuttings across these regions. The Nursery is also a valuable source of information on revegetation practices, seed collection, germination and growth of indigenous species.

**Exotic Flora**

Historically, many exotic (weed) plants have been introduced to the Resort through livestock grazing and for soil stabilisation purposes (Figure 8). Combined with more recent disturbance during construction and development, as well as summer and winter recreation and tourism activities, there has been a steady increase in the number of exotic flora in the Resort. Additionally, the geographic position of the Resort with the Great Alpine Road, a major north-south highway, extending through the resort means weeds are easily introduced to the resort by passing traffic, of particular note is the prevalence of cattle and hay transport through the Resort during summer.

The majority of these species do not extend far into native vegetation however some species pose a serious threat. Willow *Salix* spp., English Broom *Cytisus scoparius,* Ox-Eye Daisy *Leucanthemum vulgare,* Yarrow *Achillea millefolium,* and Soft Rush *Juncus effusus* have been identified as serious threats to the biological diversity of the Resort. Willow is a weed of National Significance and has the potential to readily infest waterways. English Broom has a seedbank life span of up to 80 years and thus control of this species has long term management implications. Ox-Eye Daisy is a "garden escapee" from Dinner Plain and is a state declared weed. Ox-Eye Daisy is spreading at a rapid rate along the Great Alpine Road and has colonised significant areas between Dinner Plain and the Mount Hotham Resort. Yarrow is widely naturalised across Australia and readily establishes in disturbed areas. Soft rush is a state declared weed and is a wetland species that can outcompete native plants. Hawkweeds have not yet been recorded within the Mount Hotham Resort, however early detection and preventative treatments will reduce the risk of introduction.

RMB has an ongoing weed control program which targets weeds throughout the village area and those identified as serious threats. The status (including extent and viability) of exotic flora within the Resort is still to be accurately assessed, however work is being done to build a weed database for the Resort. Since 2012, MHARMB has mapped treated sites of invasive species, namely Willow and English Broom, using a handheld GPS. This provides a database of the extent of our long term weed control program,

however further recording of infestation sites that are yet to be treated is still required. Since 2016 Ox-Eye Daisy control has become a focus within the Resort and areas of control works have been added to the weed database. RMB has partnered with NSW Department of Primary Industries through the provision of an Ox-Eye Daisy study site to be used to gain understandings of the biology of the species in alpine areas, within the scope of investigating biological controls.

Weed control within the resort aims to be low impact, using minimal herbicides to reduced negative impacts on surrounding native vegetation and native fauna, and for the health and safety of employees. The RMB preferences manual removal (e.g., hand pulling) and the cut and pain method when using herbicides.

**Table 8.** Common weed species known to occur within Mount Hotham Alpine Resort.

| Common Name | Scientific Name |
|---|---|
| Blackberry | *Rubus fruticosus complex* |
| Cat's ear | *Hypochoeris radicata* |
| Clover | *Trifolium* |
| Common Apple | *Malus pumila* |
| Creeping Buttercup | *Ranunculus repens* |
| Dandelion | *Taraxacum officinale* |
| English Broom | *Cytisus scoparius* |
| Great Mullein | *Verbascum thapsus* |
| Greater Lotus | *Lotus uliginosus* |
| Grey Sallow | *Salix cinerea* |
| Musk Monkeyflower | *Mimulus moschatus* |
| Ox-Eye Daisy | *Leucanthemum vulgare* |
| Paterson's Curse | *Echium plantagineum* |
| Sorrel | *Acetosella vulgaris* |
| Spear Thistle | *Cirsium vulgare* |
| St John's Wort | *Hypericum perforatum* |
| Sweet Briar rose | *Rosa rubiginosa* |
| Timothy Grass | *Phleum pratense* |
| Twiggy Mullein | *Verbascum virgatum* |
| Varigated Thistle | *Silybum marianum* |
| Willow Herb | *Epilobium ciliatum* |
| Yarrow | *Achillea millefolium* |

## FAUNA

### Indigenous Fauna

257 native fauna species have been recorded within the resort on the Atlas of Living Australia. Threatened species mapping from records on the Victorian Biodiversity Atlas (VBA) list a total of 10 fauna species of state significance within the Resort (Appendix IV).

The distribution of indigenous fauna species throughout Mount Hotham Alpine Resort is largely related to the distribution of native vegetation. Vegetation provides foraging opportunities, shelter and breeding sites. Vegetation type is also a useful indicator of other variables such as topography, soil type and temperature regime which may also influence species distribution.

Mammals found in alpine areas are often common in lower elevations, however two mammal species, the Mountain Pygmy Possum (*Burramys parvus)* and Broad-Tooth Rat (*Mastacomys fuscus)* are restricted to higher elevation and are known to exist within the resort. Mountain Brushtail possums (*Trichosurus cunninghamii)* and Common Ringtail possum (*Pseudocheirus peregrinus)* occur in snowgum woodland with a well-developed canopy; the Eastern Pygmy Possum (*Cercartetus nanus)* has been recorded within the resort and was identified within a cat gut sample analysis. Grey Kangaroos (*Macropus giganteus)* and Swamp Wallabys (*Wallabia bicolor)* are present in the snowgum habitats during summer. The Common Wombat can also be found. Dusky Antechinus (*Antechinus swainsonii)* and Agile Antechinus (*Antechinus agilis),* as well as Bush Rats (*Rattus fuscipes)* can be found to higher elevations and the Spotted Tail Quoll (*Dasyurus maculatus)* was recorded once in 1980. Primarily inhabiting forest habitat at lower elevations within the resort are the Greater Glider (*Petauroides Volans)* and Long-footed Potoroo (*Potorous longipes)*. Mammals inhabiting areas with persistent snow cover can be classed into two groups; those that hibernate over winter months and those that remain active (Rosengren *et al.*, 1993; Green & Osborne, 2012).

Birds are a conspicuous component of the fauna within the resort. Several are common within the higher areas at least on a seasonal basis and include the Flame Robin (*Petroica phoenicea)*, Australasian Pipit (*Anthus novaeseelandiae)* and Little Raven (*Corvus mellori).* Others include the Crimson Rosella (*Platycercus elegans*), Kookaburra (*Dacelo*), Superb Lyrebird (*Menura novaehollandiae*), Southern Boobook (*Ninox boobook*) and Currawong (*Strepera*) (Rosengren et al. 1993, Green & Osborne, 2012).

Only three families of reptiles occur in the Australian Alps; dragons (*Agamidae)*; skinks (*Scincidae*) and snakes (*Elapidae*). This is due to reptiles being ectothermic (i.e., reliant on external sources of heat to regulate their bodies and for key metabolic processes) and thus cold climates impose thermal restrictions on reptiles. Reptiles found in cold climates are heliotherms that gain warmth by basking in the sun. Two known threatened skinks occurring within the resort are the Alpine She-oak Skink (*Cyclodomorphus praealtus)* and the Alpine Bog Skink (*Pseudemoia cryodroma)*. The Mountain Dragon (*Rankinia diemensis)* has been recorded in the resort within rocky areas where vegetation is sparse, and the Southern Water Skink (*Eulamprus tympanum)* is found at stream sites (Rosengren *et al.* 1993). White-lipped Snakes (*Drysdalia coronoide*s) are small and can be found in a variety of habitats to high elevations (Green & Osborne, 2012). The Highlands Copperhead (*Austrelaps ramsayi)* is commonly sighted within MHAR, along with the Tiger Snake (*Notechis scutatus*).

The invertebrate fauna of the Resort is less well known, with the most comprehensive study of invertebrates conducted by Rosengren *et al*. (1993), in a survey of the Orchard ski field area. Twenty-five orders of invertebrates were recorded, of the specimens identified below order level (*Coleoptera, Orthoptera, Hymenoptera and Lepidoptera*), 28 families representing 49 genera and 85 taxa were found. *Coleoptera* was the most diverse order, with at least 13 families and 41 taxa. *Orthoptera* were the next diverse in terms of taxa, with 17 taxa found, represented by four families. Fifteen taxa of *Hymenoptera* were found and 12 taxa of *Lepidoptera*. The most well-known invertebrate species within the Resort is the Bogong Moth *Agrotis infusa*. The Bogong Moth migrates to the Victorian Alps and Snowy Mountains in spring from the inland plains of eastern Australia to aestivate in rock crevices and periglacial block streams. It forms an important protein source for many fauna (Green & Osbourne,2012).

**THREATENED SPECIES**

There are a number of threatened species that are known to occur within the Resort. Management actions intended to ensure the protection and enhancement of habitats and populations of these species are outlined in the RMBs Fauna Management Plan (2018). Other threatened species that persist near the resort include the Alpine Water Skink (*Eulamprus kosciuskoi*) and the Mountain Skink (*Liophlis montana*).

***Burramys parvus*, Mountain Pygmy-possum**

Listed as Endangered under both the national *Environmental Protection and Biodiversity Conservation Act* and Victorian *Flora and Fauna Guarantee Act*, the Mountain Pygmy-possum (*Burramys parvus*) is probably the most well-known threatened fauna species within the Resort. It is largely restricted to periglacial boulder and rock screes that have formed block streams, rock outcrops or rock accumulations. These areas support a variety of vegetation communities depending on the type of rock, aspect and depth of scree. The most common vegetation community is Alpine Coniferous Shrubland (formerly Podocarpus heathland) dominated by Mountain Plum Pine (*Podocarpus lawrencei)*. There are several forms of this vegetation community, ranging from exclusive Mountain Plum Pine over deep scree, to more diverse vegetation communities where soil and leaf litter has accumulated (Mansergh & Broome, 1994). In Victoria, the Mountain Pygmy-possum is restricted to four isolated populations: between Mount Loch and Mount Higginbotham, Mount Bogong, the Bogong High Plains and Mount Buller (Mansergh *et al*. 1989).

There are a range of potential factors that may contribute to the decline of the Mountain Pygmy-possum around the Resort, with the largest threat being the loss, degradation and fragmentation of habitat. The construction of the village area including roads, tracks and trails and ski field can disrupt movement of animals between primary habitats. Threats to the longevity of the species includes compaction of snow and associated noise generated by over snow vehicles (e.g. snowmobiles and snow groomers) that may disturb the species during hibernation and affect the insulating properties of snow, and increased predation risk by introduced predators (Green & Osborne, 1981; Heinze et al., 2004), alteration and sedimentation of drainage lines and associated vegetation communities (DELWP, 2016) and climate change (Green & Pickering, 2002).

Wildlife biologist Dean Heinze conducts annual surveys of the Mountain Pygmy Possum population within key areas of the Resort on behalf of the RMB. This is part of a Victoria-wide survey since the 2003 bushfires effected significant areas of habitat, prior to this Mountain Pygmy Possum population numbers at MHAR were monitored as part of ongoing research conducted by Ian Mansergh. In 2010 some of the lowest population numbers for the sites were recorded, with a slight recovery in following years. Estimated population in 2016 at Mount Higginbotham were lower than the 35-year average, whilst at Mount Little Higginbotham slightly above average population estimates (Heinze, 2016). Some of the high priority recommendations made as part of the 2016 annual survey (Heinze, 2016) have been adopted including the construction of a new connectivity tunnel under the GAR at Mt Little Higginbotham and the control of sedimentation entering Mountain Pygmy Possum habitat. The tunnel was competed in 2018 through a collaborative project with the RMB, DELWP and Zoos Victoria. Microchip readers and remote sensing cameras were included in the tunnel to monitor tunnel usage. As of May 2021, 34 individuals have used the tunnel, predominantly of which are female. This population will continue to be monitored until at least 2022.

A more recent concern has been the decline in Bogong Moth numbers migrating to the Alps. Bogong moths are a key food resource for the possums. Reduced moth numbers have been observed since 2017. The cause of this decline is still unknown however is likely related to a combination of drought and land use change. The RMB has begun moth monitoring during the 2020-21 summer and endeavours to continue monitoring in the coming years. The decline in Bogong Moth numbers coincides with high levels of Pouch Young Litter Loss (PYLL) in Mountain Pygmy-possums, in which joeys die in their mothers' pouch. This phenomenon has been closely monitored with additional monitoring carried out by Dean Heinz in recent years. Promisingly, 2020-21 monitoring showed few occurrences of PYLL.

An Environmental Significance Overlay (ESO schedule 1) covering Mountain Pygmy-possum habitat has been incorporated into the Alpine Resorts Planning Scheme for the Mount Hotham Resort. This is designed to: preserve and enhance habitat, prevent destruction and fragmentation of existing habitat, provide movement corridors and ensure development does not have an adverse impact upon Mountain Pygmy-possum habitat. A national recovery plan for the Mountain Pygmy Possum was released in 2016 (DELWP, 2016). A revised action statement under the *Flora and Fauna Guarantee Act* was approved by DELWP in May 2020.

***Cyclodomorphus praealtus,* Alpine She-oak Skink**

The Alpine She-oak Skink (*Cyclodomorphus praealtus)* is listed as Endangered under the national *Environmental Protection and Biodiversity Conservation Act* and Critically Endangered on Victoria's Advisory List of Threatened Vertebrate Fauna (DSE 2013). Alpine She-oak Skinks have been recorded in sub-alpine woodland, herbfields, low heathlands and grasslands above 1500m at Wellington Plains, Omeo Plain, Lankey Plain, Mount Hotham, the Bogong High Plains and Kosciuszko National Park (Green and Osborne 1994). They prefer grassy and low heath habitats between 1400 and 2100 metres without a high degree of Snow Gum (*Eucalyptus pauciflora*) canopy cover such as the areas of the Mount Hotham and Mount Higginbotham summits and Loch Ridge. Within the Resort they have been found in tussock grasslands and alpine heaths dominated by tussocks of Horny Snow Grass (*Poa fawcettiae*), basking on grass tussocks. It has also been recorded in disturbed areas (e.g. roadsides) that are dominated by exotic grasses usually adjoining relatively intact Poa tussock grasslands (Biosis 2011, Clemann et al. 2016).

A potential impact to populations of Alpine She-oak Skink within the Resort includes the loss, degradation or damage of habitat necessary to the survival of the species. Habitat clearing can occur from development, installation or maintenance of infrastructure, recreational activities such as walking or mountain biking and slashing of ski runs (Sato *et al.* 2014). Populations within the Resort are likely to be already vulnerable due to historic loss of habitat as the Resort was established and grew, and fragmented due to previous development within the Resort. For example, it is possible that Alpine She-oak Skinks persisting on Mt Higginbotham are now separated from those on Mt Hotham, and those on Mt Hotham may be isolated from those occurring on the Loch Ridge and around Mt Loch. These fragmented populations are particularly susceptible to threats ranging from fire and predation, to climate change and inbreeding. Development in recent years on the slopes of Mt Higginbotham just south of the main Resort carpark removed a large expanse of habitat occupied by Alpine She-oak Skinks.

***Pseudemoia cryodroma,* Alpine Bog Skink**

The Alpine Bog skink (*Pseudemoia cryodroma*) is listed as Threatened under the Flora and Fauna Guarantee Act, and as Endangered under the Advisory List of Threatened Vertebrate Fauna in Victoria (2013 list). This species is found in areas above 1000 metres, confined to alpine and subalpine areas in the Victorian Alps (Rosengren et al. 1993, Biosis 2011, Wilson and Swan 2013). Previous surveys have recorded them in sub-alpine grassland and heathland, Snow Gum (*Eucalyptus pauciflora*) woodland and boggy creeks, principally in wetter microhabitats. Like other species of *Pseudemoia*, females produce live young. The Alpine Bog Skink has been recorded within the Resort (Rosengren *et al.* 1993, Biosis 2011). Previous research has identified numerous threats including habitat loss due to ski resort operations, maintenance of resort areas for recreation, weed invasions, predation from feral animals (primarily cats and foxes), habitat degradation from feral herbivores, bushfires and climate change (Clemann 2002, Clemann et al. 2018). Further surveys are required to determine the current extent and specific threats to this species within Mount Hotham Resort.

***Litoria verreauxii alpina*, Alpine Tree Frog**

The Alpine Tree Frog (*Litoria verreauxii alpine*) is listed as Vulnerable under the Environment Protection and Biodiversity Conservation Act 1999, Threatened under the Victorian Flora and Fauna Guarantee Act 1988, and Critically Endangered by Department of Sustainability and Environment (2013). It is known to occur in alpine and sub-alpine habitats including woodland, heath, grassland and herb field (Department of the Environment 2018). They breed in a variety of natural and artificial waterbodies including dams, roadside ditches and reservoirs (Gillespie et al. 1995, Osborne et al. 1999). Alpine Tree Frogs have been recorded at a number of water bodies across the resort. The most recent sightings were a large numbers of metamorphosing individuals in drainage lines along the Poo Farm Track in March 2021.

The amphibian chytrid fungus, *Batrachochytrium dendrobatidis (Bd) has been identified as a significant threat to frogs globally (Skerratt et al 2007).* The disease is suspected to be the major cause of declines in the Alpine Tree Frog, with populations undergoing demographic shifts due to low adult survival (Brannelly et al. 2017, Scheele et al. 2016, TSCC 2014). The disease is present within the Alpine Tree Frog population at Mount Hotham (Clemann et al. 2009), but the population is currently persisting in the presence of the pathogen. The Common Eastern Froglet (*Crinia signifera*) is a reservoir host for chytrid fungus and occurs sympatrically with the Alpine Tree Frog in areas outside of the resort (Biosis 2008, Clemann 2016, Brannelly et al. 2017). It is possible that Common Eastern Froglets are present within the resort and acting as a reservoir host.

Additional threats to Alpine Tree Frogs include erosion and sedimentation that can build up in shallow drainage lines that provide breeding habitat for the frogs, invasion of weeds and pest animals in wet areas causing habitat loss and alteration, and impacts on habitat from recreation maintenance and development of recreation areas. Further threats are likely to come from climate change impacts including changes in rainfall and increased bushfire risk.

In December 2014, a targeted survey to determine the distribution and abundance of Alpine Tree Frogs in areas of potential habitat was conducted. Of the 23 surveyed sites, 13 were found to contain adult frogs and five contained Alpine Tree Frog tadpoles. These results indicated that Alpine Tree Frogs utilise natural and artificial waterbodies within the Resort area and breed within a smaller subset of

sites (Biosis 2015). The ability of the species to exploit artificial waterbodies means it is possible to create habitat which adherence to a few design principles. In 2019 a report was produced by Biosis outlining the design standards for artificial alpine tree frog habitat.

Research suggests that exposure to warm water can enable tadpoles and juveniles to avoid or clear Bd infection, prior to dispersing into terrestrial habitat (Scheele et al. 2014). As such design of artificial waterbodies to incorporate these finding may assist in reducing Bd infections. Furthermore, remnant populations more commonly persist in permanent ponds rather than ephemeral ponds and thus artificial water bodies should seek to ensure a permanent water source (Scheele et al. 2015). This report also highlighted the need for emergent vegetation and woody debris to be included in artificial water bodies to provide refuges and food sources via creating invertebrate habitat, and the need to reduce pollutant runoff.

***Mastacomny fuscus*, Broad Toothed Rat**

The Bord-toothed Rat (*Mastacomny fuscus*) is listed as Vulnerable under the *Environmental Protection and Biodiversity Conservation Act* 1999 and Vulnerable by DELWP 2020. This species has been recorded from a wide range of vegetation communities of alpine and sub-alpine environments including those found in sub-alpine Woodland (Green & Osborne 2003, Wallis et al. 1982). It is usually recorded along drainage lines where shrubs are absent or sparse and there is a dense cover of sedges, grasses, other herbs and mosses.

The Broad-toothed Rat is adapted to stable environments and has a conservative life-history strategy characterised by small litters, slow growth, low fecundity, low mortality and high adult and juvenile survival. Breeding occurs in spring and summer and females usually produce two litters of one to three young during each breeding season. The Broad-toothed Rat is a specialist herbivore that feeds on the stem and leaf tissue of a narrow range of plants, principally from the *Poaceae* (grasses) and *Cyperaceae* (sedges) families (Carron et al. 1990). It also eats small amounts of seeds and fungi. The Broad-toothed rat remains active under the snow during winter (Happold, 1998), and nests in dense undergrowth or under logs (Bubela & Happold, 1993). The species is mainly nocturnal but can be active during the day (Bubela et al. 1991). Broad-toothed rats have a seasonal variation in home range size which greatly decreases in size during winter (Bubela et al. 1991).

There are potential impacts on Broad-toothed Rat habitat including sedimentation arising through offsite/downstream runoff of any proposed development, habitat destruction and fragmentation, trampling and vegetation loss from feral herbivores, predation by feral cats and foxes, bushfires, climate change, and human persecution using poison baiting or tapping in private buildings (Biosis 2011). Furthermore, it has been identified that foxes preferentially feed on Broad-toothed rats over the more common bush rat (Green 2002), however this idea has been challenged (Menkhorst 1995). A 2020 survey by Arthur Rylah Institute confirmed Broad-tooth Rat records at four sites within the Resort, three of which were previously recorded in a 2017 survey by a Deakin Honours Student Study.

**INTRODUCED ANIMALS**

Seventeen introduced vertebrate fauna species have been recorded within the Resort including ten mammals (Red Fox, Feral Cat, European Rabbit, Brown Hare, Black Rat, House Mouse, Feral Horse, Sambar Deer and Feral Cow), five birds (Skylark, Common Blackbird, Common Starling, European

Goldfinch and House Sparrow) and two fish (Brown Trout and Rainbow Trout) (Appendix V). The species posing the most significant threat to biodiversity within the Resort are the rabbit, hare, deer, fox and cat.

Deer, rabbits and hares are introduced herbivores that threaten indigenous vegetation. Deer can have significant negative impacts through forming wallows which alter hydrological regimes and trampling sensitive bog and riparian vegetation. Foxes and cats are introduced carnivorous predators that threaten native wildlife and are known to predate on Mountain Pygmy-possum, Broad-toothed Rat and potentially the Alpine She-oak Skink and Alpine Bog Skink. Predation by foxes and cats on native wildlife is listed as a threatening process under the *Flora and Fauna Guarantee Act* 1988. The introduced house mouse could also adversely affect Mountain Pygmy-possum populations by competing for food (Biosis 2011).

The RMB participates in an annual predator control program in conjunction with Parks Victoria and the Falls Creek Resort Management Board, under the Integrated Pest Management Plan. This program includes fox control using compound 1080 (sodium fluoroacetate) impregnated into Foxoff® baits following Fox Adaptive Experimental Management (AEM) standards, cage trapping for feral cats, and ground shooting targeting both feral cats and foxes. During 2012 MHARMB invested in 10 remote sensing cameras to monitor feral animal populations within the resort. Since then, the remote sensing camera morning has expanded to 20 cameras and is an integral to the success of our control program.

Domestic dogs are permitted within the Resort provided they are registered with the RMB. They are required to be on a lead at all times and are only permitted in designated areas within the Resort. No other domestic animals are permitted within the Resort. No domestic animals are permitted within the surrounding Alpine National Park.

# WATER

## RIVERS AND CATCHMENTS

The Resort is located at the headwaters of the Kiewa, Mitta Mitta (Upper Murray), Dargo (Mitchell) and Ovens River catchments. Two of these river systems, the Ovens and the Dargo, have Heritage River status within Victoria and are recognised as being special due to their regional contribution to the Murray River and the Gippsland Lakes, respectively.

The State Environment Protection Policy (SEPP) Waters of Victoria protects the environmental values, beneficial uses and associated social and economic values of the water environment for current and future generations. The Mount Hotham Alpine Resort is located within the Highlands segment and as such ecosystem protection is required to achieve a 99% largely unmodified aquatic ecosystem.

The Resort's unique location at the headwaters of four major river systems places it in a delicate environment, and therefore water quality, control of storm water runoff and effective catchment management must be carefully managed to ensure downstream water quality. The Resort is located within the boundaries of the East Gippsland and North East Catchment Management Authorities and therefore shares the management of major waterways with these authorities as well as the Department of Environment, Land, Water and Planning, Parks Victoria and Goulburn Murray Water.

The RMB undertakes an annual Catchment survey of the Upper Swindlers Catchment area. Each year a subset of the catchment area is surveyed, with the idea of surveying the entire area over a number of summers. The most recent survey in 2020 found the catchment to have excellent native vegetation cover, minimal rubbish, little soil disturbance, minimal weeds and minimal signs of feral animal activity. Future remedial works include removal of geofabric and conduit from underneath Mary's Slide Bridge, and further weed and pest control in the upper area of the catchment.

The RMB has undertaken stream flow gauging in Swindlers Creek since the 1990s. Currently, monitoring is carried out monthly by experienced contractors which provides daily flow data. There is high variability in discharge volumes between days, months and across years (Figure 13). Based on data over the last 10 years, September and October have the highest discharge volumes, likely due to snowmelt, and January and February have had the lowest discharge volumes.

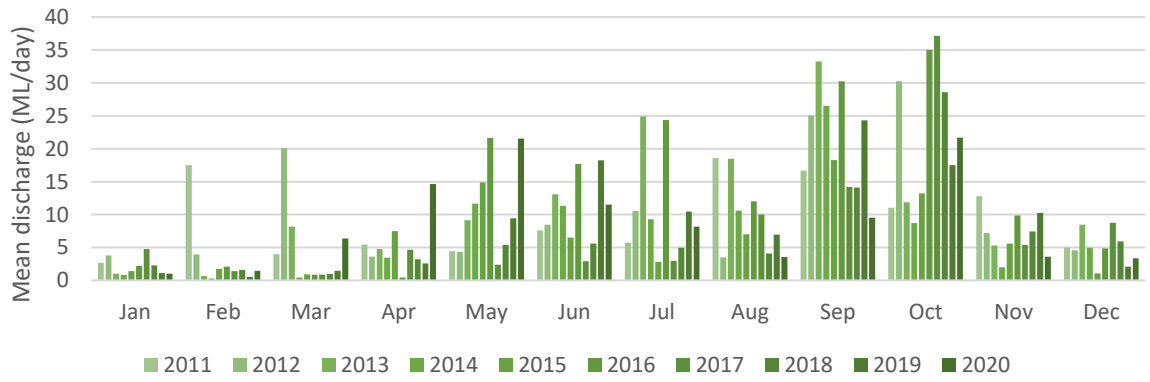


**Figure 13.** Comparison of mean discharge (ML/day) from Swindlers Creek for each month between 2011 and 2020.

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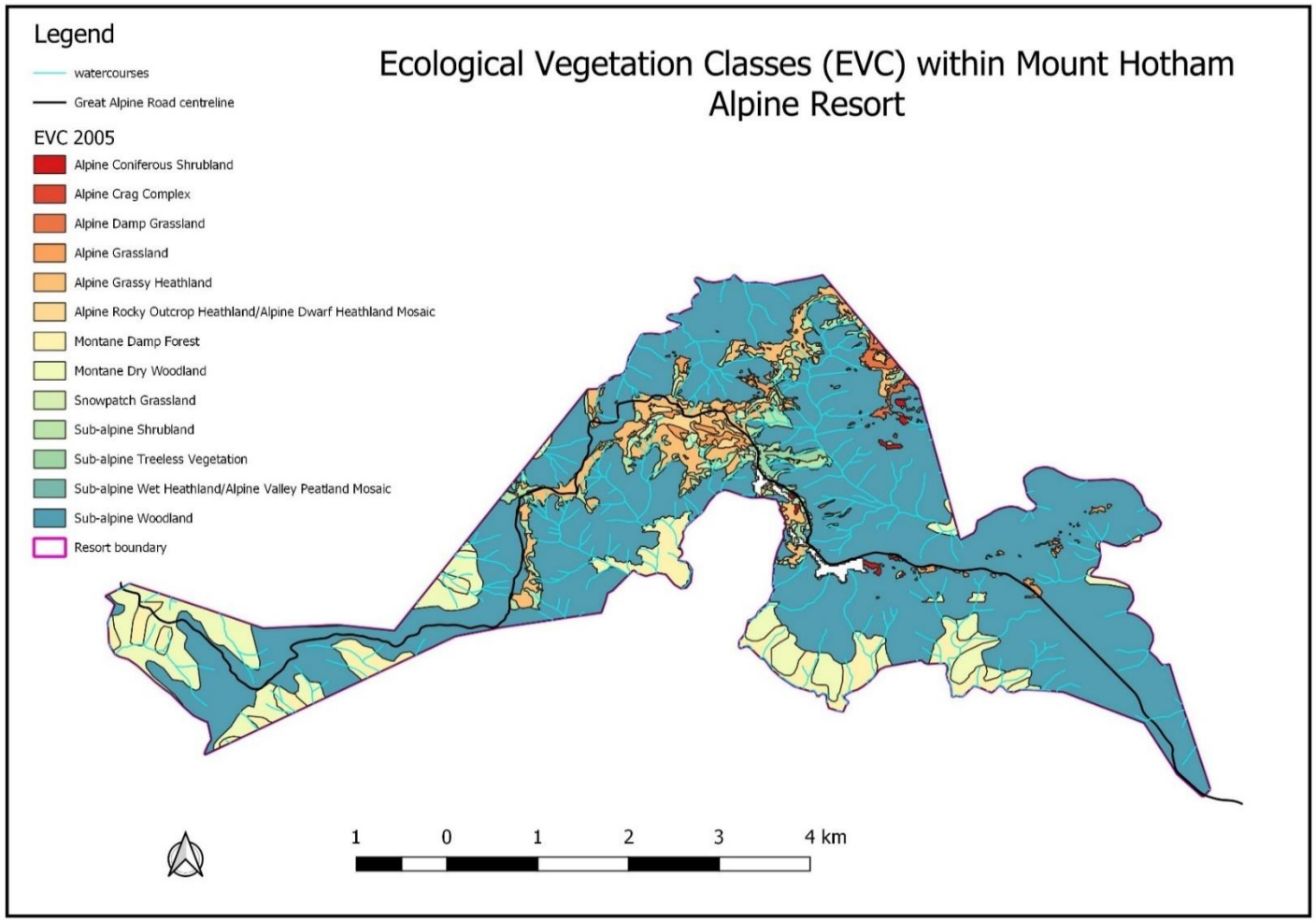
APPENDIX I. Comparison of annual MHARMB electricity accounts between 2015 to 2020 including usage (kWh) and cost ($). Red indicates data missing.

| | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Usage (kWh) | Total Cost ($) | Total Usage (kWh) | Total Cost ($) | Total Usage (kWh) | Total Cost ($) | Total Usage (kWh) | Total Cost ($) | Total Usage (kWh) | Total Cost ($) | Total Usage (kWh) | Total Cost ($) |
| Admin Building | 241200.2 | 33819.48 | 122582 | 26807.25 | 134186.1 | 27058.88 | 128158.6 | 32995.31 | 116092.3 | 33743.3 | 89927.82 | 25285.23 |
| Alpine Club of Vic Sewerpump | 41.9 | 523.12 | 67.414 | 397.03 | 60.015 | 352.08 | 637.9296 | 499.62 | 494.838 | 621.05 | 121.252 | 367.15 |
| Buckland House | 5764.31 | 1715 | 5321.47 | 1306.2 | 5183.394 | 1273.271 | 6223.291 | 1838.82 | 8591.378 | 2631.1 | 2121.169 | 895.21 |
| Buckland lights (formally tix box) | 5470.61 | 1713.64 | 4396.748 | 1219.225 | 501.4151 | 627.0584 | 5.027 | 439.81 | NA | 305.58 | 326.704 | 413.48 |
| Buckland Camera | NA | NA | NA | NA | NA | NA | 2938.922 | 1488.19 | 4078.152 | 1573.81 | 2352.041 | 872.15 |
| Dannys Shed | 3600.4 | 1731.49 | 14784.15 | 5635.14 | 33705.49 | 13789.66 | 25119.9 | 11582.47 | 38810.4 | 15276.83 | 63746.73 | 23683.57 |
| GAR Tunnel | 154608.6 | 34786.11 | 65286.65 | 14276.06 | 35758.56 | 7339.783 | 32355.5 | 7997.24 | 11511.69 | 3641.64 | 7201.898 | 2650.84 |
| GS Hut | NA | NA | 4290.582 | 1381.71 | 5330.191 | 2753.24 | 2393.736 | 1613.44 | 22208.36 | 5988.92 | 8281.352 | 2589.66 |
| Pumpstation HV | 195411.6 | 56099.06 | 197704.3 | 52797.72 | 191023.7 | 50915.77 | 224080.6 | 65715.88 | 176629.8 | 52679.4 | 90360.77 | 27149.88 |
| Kobla | 7277.54 | 2053.76 | 5625.76 | 1447.22 | 6695.172 | 1764.745 | 6308.59 | 1720.12 | 5911.077 | 1877.72 | 6067.11 | 1953.05 |
| Loch Dam Pumphut | 32216.24 | 4771.82 | 19712.39 | 3774.22 | 33974.98 | 6067.615 | 34731.7 | 8526.85 | 25196.16 | 6331.03 | 12689.53 | 3593.85 |
| LP Gas Plant | 19838.87 | 4318.75 | 71190.75 | 13716.08 | 80669.98 | 15858.24 | 75681.44 | 18327.04 | 77113.12 | 21208.88 | 70729.56 | 20516.96 |
| MJ lights (formally tix box) | 1554.336 | 677.12 | 1806.22 | 773.24 | NA | 552.8259 | NA | 434.53 | NA | 305.58 | 3657.145 | 1242 |
| Mortitz 14 | 6446.203 | 1618.27 | 7281.79 | 1606.45 | 8503.8 | 1803.295 | 9984.92 | 2415.32 | 10034.08 | 2818.38 | 5481.645 | 1543.8 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mortitz 15 | 9561.079 | 3299.97 | 10834.81 | 2276.91 | 10452.21 | 2092.641 | 7287.9 | 1823.3 | 8812.269 | 2447.74 | 9133.345 | 2611.7 |
| Old Police Station | 24,259.55 | 5,256.23 | 25582.27 | 5102.4 | 28790.81 | 5355.129 | 27698.56 | 6075.91 | 27766.5 | 10434.86 | 17199.12 | 4841.87 |
| Peninsula SWP | 765.71 | 641.18 | 811.41 | 602.71 | 779.1252 | 688.2737 | 855.361 | 605.74 | 1075.38 | 596.75 | 400.566 | 439.22 |
| Rodondo | 58881.49 | 11926.81 | 52946.28 | 9740.3 | 60849.15 | 10735.54 | 62616.21 | 14443.32 | 57448.32 | 14834.16 | 55421.84 | 15142.18 |
| Sewerage Treatment Plant | 178801.2 | 40387.82 | 200330.4 | 40833.95 | 202002.9 | 40886.19 | 189818 | 46078.82 | 150471.2 | 38866.5 | 112532.5 | 31420.3 |
| Tantani SPW | NA | NA | 619.934 | 447.72 | 1181.119 | 585.03 | 1094.704 | 750.38 | 405.262 | 423.06 | 178.713 | 382.3 |
| Tinogra SPW | 442.14 | 574.8 | 422.273 | 534.93 | 730.1286 | 676.2101 | 395.713 | 471.59 | 561.905 | 458.1 | 386.624 | 433.26 |
| UV 1 | 5384.13 | 1572.51 | 5941.06 | 1490.86 | 5332.912 | 1433.37 | 5647.09 | 1712.98 | 4285.219 | 1391.25 | 5058.192 | 1619.24 |
| UV 2 | 59293.75 | 12733.24 | 52343.3 | 10032.99 | 52042.79 | 9638.025 | 44328.76 | 9243.32 | 40966.19 | 11009.22 | 46160.94 | 12464.69 |
| Zirkys SPW | 409.94 | 573.89 | 281.63 | 508.62 | 332.7883 | 611.8424 | 418.841 | 548.72 | 452.294 | 433.43 | 449.023 | 456.74 |
| MJ Gate Entry | NA | NA | NA | NA | 2370.299 | 1069.14 | 3185.994 | 1388.98 | 4042.053 | 1319.57 | 3967.145 | 1312.78 |
| Workshop | 60120.55 | 14589.56 | 30404.74 | 6464.31 | 25312.9 | 4933.923 | 34576.51 | 8112.4 | 37533.94 | 9790.98 | 22959.41 | 6518.8 |
| **Annual Totals** | **1071350** | **235383.6** | **900568.3** | **203173.2** | **925769.8** | **208861.8** | **926543.8** | **246850.1** | **830491.9** | **241008.8** | **636912.1** | **190399.9** |

APPENDIX II. Map of Ecological Vegetation Classes (EVCs) within Mount Hotham Alpine Resort. Data source: Victorian Biodiversity Atlas.



## APPENDIX III. Threatened Flora occurring with Mount Hotham Alpine Resort.

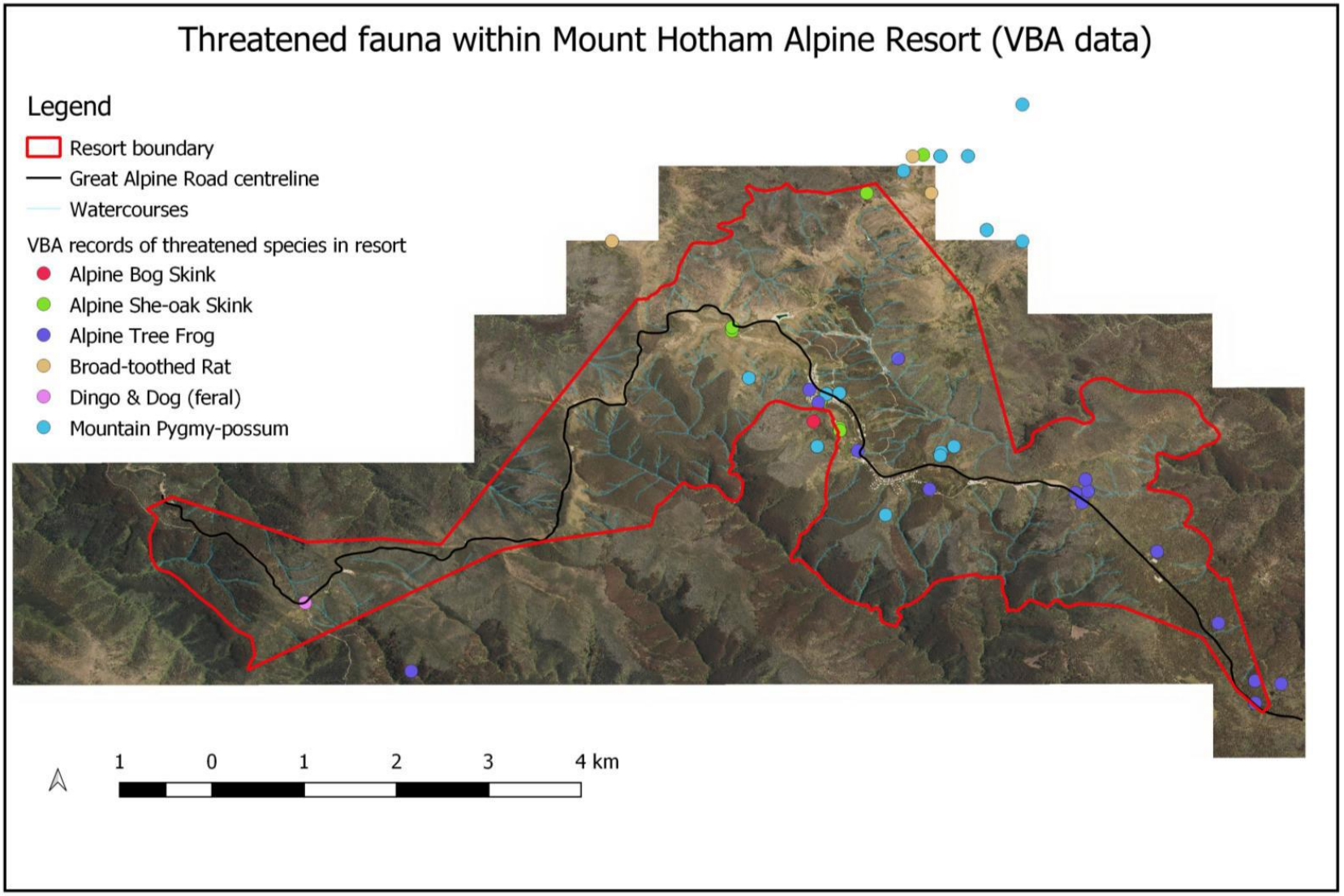
| Scientific Name | Common Name | Victorian Advisory List | FFG | Count of Sightings | Last Record |
|---|---|---|---|---|---|
| Austroaeschna (Austroaeschna) flavomaculata | Alpine Darner Dragonfly | Vulnerable | | 1 | 1957 |
| Ornithorhynchus anatinus | Platypus | Vulnerable | Listed | 1 | 1996 |
| Hieraaetus morphnoides | Little Eagle | Vulnerable | Listed | 1 | 2006 |
| Hirundapus caudacutus | White-throated Needletail | Vulnerable | Listed | 1 | 2000 |
| Burramys parvus | Mountain Pygmy-possum | Critically endangered | Listed | 69 | 2020 |
| Mastacomys fuscus mordicus | Broad-toothed Rat | Endangered | Listed | 14 | 2020 |
| Cyclodomorphus praealtus | Alpine She-oak Skink | Critically endangered | Listed | 48 | 2021 |
| Pseudemoia cryodroma | Alpine Bog Skink | Endangered | Listed | 3 | 2007 |
| Pseudemoia pagenstecheri | Tussock Skink | Vulnerable | | 7 | 2009 |
| Litoria verreauxii alpina | Alpine Tree Frog | Critically endangered | Listed | 91 | 2021 |
| Acacia alpina | Alpine Wattle | Rare | | 84 | 2020 |
| Aciphylla glacialis | Snow Aciphyll | Rare | | 100 | 2017 |
| Australopyrum velutinum | Mountain Wheat-grass | Rare | | 1 | 1980 |
| Lachnagrostis meionectes | Alpine Blown-grass | Rare | | 2 | 1998 |
| Agrostis muelleriana | Mueller's Bent | Rare | | 6 | 1997 |
| Alchemilla xanthochlora | Lady's Mantle | Rare | | 10 | 2012 |
| Barbarea grayi | Native Wintercress | Vulnerable | | 1 | 1997 |
| Boronia algida | Alpine Boronia | Rare | | 93 | 2020 |
| Bossiaea bracteosa | Mountain Leafless Bossiaea | Rare | | 12 | 1981 |
| Brachyscome foliosa | Mountain Daisy | Vulnerable | Listed | 10 | 1998 |
| Psychrophila introloba | Alpine Marsh-marigold | Rare | | 21 | 2016 |
| Carex archeri | Archer's Sedge | Vulnerable | | 1 | 1980 |
| Carex cephalotes | Wire-head Sedge | Vulnerable | Listed | 5 | 1996 |
| Carex canescens | Short Sedge | Rare | | 4 | 1997 |
| Carex jackiana | Carpet Sedge | Rare | | 2 | 2012 |
| Carex raleighii | Raleigh Sedge | Rare | | 2 | 1999 |

| | | | | | |
|---|---|---|---|---|---|
| Carpha nivicola | Broad-leaf Flower-rush | Rare | | 2 | 1997 |
| Celmisia sericophylla | Silky Snow-daisy | Vulnerable | Listed | 22 | 2016 |
| Colobanthus affinis | Alpine Colobanth | Rare | | 20 | 2006 |
| Coprosma nivalis | Snow Coprosma | Rare | | 3 | 2012 |
| Cystopteris tasmanica | Brittle Bladder-fern | Rare | | 2 | 2011 |
| Rytidosperma alpicola | Crag Wallaby-grass | Rare | | 39 | 2006 |
| Rytidosperma nivicola | Snow Wallaby-grass | Rare | | 3 | 2016 |
| Deyeuxia carinata | Keeled Bent-grass | Rare | | 3 | 2006 |
| Deyeuxia crassiuscula | Thick Bent-grass | Rare | | 2 | 2006 |
| Drosera arcturi | Alpine Sundew | Rare | | 3 | 2016 |
| Epacris glacialis | Reddish Bog-heath | Rare | | 5 | 2012 |
| Epacris petrophila | Snow Heath | Rare | | 1 | 1980 |
| Epilobium curtisiae | Bald-seeded Willow-herb | Rare | | 2 | 2012 |
| Epilobium sarmentaceum | Mountain Willow-herb | Rare | | 5 | 2011 |
| Pappochroma nitidum | Sticky Fleabane | Rare | | 13 | 2017 |
| Eucalyptus perriniana | Spinning Gum | Rare | | 4 | 1979 |
| Ewartia nubigena | Silver Ewartia | Rare | | 5 | 2006 |
| Geranium brevicaule | Alpine Crane's-bill | Rare | | 2 | 1983 |
| Euchiton traversii | Mat Cudweed | Rare | | 1 | 1979 |
| Euchiton umbricola | Cliff Cudweed | Rare | | 3 | 1979 |
| Notogrammitis crassior | Alpine Finger-fern | Rare | | 2 | 1992 |
| Grevillea willisii | Rock Grevillea | Rare | | 1 | 1979 |
| Hakea lissosperma | Mountain Needlewood | Rare | | 2 | 1980 |
| Ozothamnus alpinus | Alpine Everlasting | Rare | | 119 | 2020 |
| Ozothamnus stirlingii | Ovens Everlasting | Rare | | 4 | 1940 |
| Herpolirion novae-zelandiae | Sky Lily | Rare | | 3 | 1999 |
| Hierochloe submutica | Alpine Holy-grass | Vulnerable | | 3 | 1997 |
| Huperzia australiana | Fir Clubmoss | Rare | | 3 | 2006 |
| Juncus antarcticus | Cushion Rush | Vulnerable | Listed | 1 | 2016 |
| Juncus falcatus subsp. falcatus | Sickle-leaf Rush | Rare | | 4 | 2006 |

| | | | | | |
|---|---|---|---|---|---|
| Juncus phaeanthus | Dark-flower Rush | Rare | | 2 | 1999 |
| Acrothamnus montanus | Snow Beard-heath | Rare | | 74 | 2020 |
| Luzula acutifolia subsp. acutifolia | Sharp-leaf Woodrush | Rare | | 40 | 2011 |
| Luzula alpestris | Tussock Woodrush | Rare | | 2 | 1996 |
| Olearia frostii | Bogong Daisy-bush | Rare | | 137 | 2020 |
| Oreobolus pumilio subsp. pumilio | Alpine Tuft-rush | Rare | | 5 | 2016 |
| Oreomyrrhis brevipes | Branched Caraway | Vulnerable | | 1 | 1996 |
| Oreomyrrhis pulvinifica | Cushion Caraway | Endangered | | 1 | 1913 |
| Pentachondra pumila | Carpet Heath | Rare | | 4 | 2018 |
| Persoonia subvelutina | Velvety Geebung | Rare | | 2 | 1914 |
| Phebalium squamulosum subsp. ozothamnoides | Mountain Phebalium | Rare | | 2 | 1979 |
| Plantago alpestris | Veined Plantain | Rare | | 10 | 1979 |
| Saxipoa saxicola | Rock Poa | Vulnerable | Listed | 2 | 1993 |
| Podolepis hieracioides | Long Podolepis | Rare | | 1 | 1979 |
| Ranunculus eichlerianus | Eichler's Buttercup | Rare | | 62 | 2011 |
| Ranunculus gunnianus | Gunn's Alpine Buttercup | Rare | | 13 | 2006 |
| Ranunculus muelleri | Felted Buttercup | Vulnerable | | 4 | 2007 |
| Schizeilema fragoseum | Alpine Pennywort | Vulnerable | | 1 | 1979 |
| Scleranthus singuliflorus | Mossy Knawel | Rare | | 11 | 1997 |
| Senecio pectinatus var. major | Alpine Groundsel | Rare | | 31 | 2012 |
| Taraxacum aristum | Mountain Dandelion | Rare | | 3 | 1980 |
| Trochocarpa clarkei | Lilac Berry | Rare | | 2 | 1997 |
| Viola caleyana | Swamp Violet | Rare | | 1 | 1979 |
| Westringia senifolia | Alpine Westringia | Rare | | 1 | 1980 |
| Brachyscome tadgellii | Tadgell's Daisy | Rare | | 1 | 1997 |
| Ranunculus victoriensis | Victorian Buttercup | Rare | | 66 | 2020 |
| Euphrasia crassiuscula subsp. crassiuscula | Thick Eyebright | Rare | | 12 | 2012 |
| Euphrasia crassiuscula subsp. eglandulosa | Thick Eyebright | Rare | | 4 | 2017 |
| Leucochrysum alpinum | Alpine Sunray | Rare | | 6 | 1996 |
| Coronidium waddelliae | Snowy Everlasting | Rare | | 3 | 1984 |

| | | | | | |
|---|---|---|---|---|---|
| Epacris celata | Cryptic Heath | Rare | | 1 | 1940 |
| Celmisia tomentella | Silver Snow-daisy | Rare | | 53 | 2020 |
| Celmisia costiniana | Carpet Snow-daisy | Rare | | 33 | 2011 |
| Craspedia aurantia var. aurantia | Orange Billy-buttons | Rare | | 11 | 2017 |
| Craspedia canens | Grey Billy-buttons | Endangered | Listed | 1 | 2016 |
| Craspedia crocata | Crimson Billy-buttons | Rare | | 9 | 2005 |
| Craspedia aurantia var. jamesii | Green Billy-buttons | Rare | | 65 | 2012 |
| Craspedia adenophora | Sticky Billy-buttons | Rare | | 4 | 1996 |
| Stylidium montanum | Alpine Triggerplant | Rare | | 10 | 2018 |
| Eucalyptus pauciflora subsp. hedraia | Bogong Sally | Rare | | 1 | 2017 |
| Olearia phlogopappa subsp. flavescens | Dusty Daisy-bush | Rare | | 109 | 2020 |
| Olearia brevipedunculata | Rusty Daisy-bush | Rare | | 10 | 2016 |
| Brachyscome willisii | Narrow-wing Daisy | Rare | | 3 | 1997 |
| Picris squarrosa | Squat Picris | Rare | | 1 | 1980 |
| Pimelea axiflora subsp. alpina | Alpine Bootlace Bush | Rare | | 110 | 2020 |
| Pimelea ligustrina subsp. ciliata | Fringed Rice-flower | Rare | | 26 | 2020 |
| Rytidosperma oreophilum | Mountain Wallaby-grass | Rare | | 1 | 1973 |
| Trachymene humilis subsp. breviscapa | Alpine Trachymene | Rare | | 16 | 2009 |
| Cardamine astoniae | Spreading Bitter-cress | Vulnerable | | 1 | 1994 |
| Cardamine lilacina s.s. | Lilac Bitter-cress | Vulnerable | | 3 | 2011 |
| Carex austrocompacta | Compact Hook-sedge | Vulnerable | | 2 | 1993 |
| Viola fuscoviolacea | Dusky Violet | Rare | | 1 | 2006 |
| Senecio pinnatifolius var. alpinus | Snowfield Groundsel | Rare | | 26 | 2020 |
| Podolepis laciniata | High-plain Podolepis | Rare | | 2 | 2006 |
| Geranium potentilloides var. abditum | Soft Crane's-bill | Rare | | 29 | 2020 |
| Grevillea victoriae subsp. victoriae | Royal Grevillea | Rare | | 82 | 2011 |
| Leptorhynchos squamatus subsp. alpinus | Alpine Buttons | Rare | | 8 | 2012 |
| Craspedia lamicola | Bog Billy-buttons | Vulnerable | | 9 | 2007 |
| Craspedia maxgrayi s.s. | Woolly Billy-buttons | Vulnerable | | 6 | 2018 |

## APPENDIX IV. Threatened Fauna occurring with Mount Hotham Alpine Resort.



## APPENDIX V. Pest Animals occurring with Mount Hotham Alpine Resort.

The Catchment and Land Protection Act 1994 lists the declaration of certain animals to be prohibited pest animals, controlled pest animals, regulated pest animals or established pest animals. A full list is available from DELWP, however the relevant schedule 4 for MHARMB is included below for reference.

| **SCHEDULE 4A** | |
|---|---|
| **ESTABLISHED PEST ANIMALS** | |
| Scientific name | Common name/Description |
| **Class: Mammalia** | **Mammals** |
| **Order Carnivora** | |
| **Family Canidae** | |
| *Vulpes vulpes* | Red Fox |
| **Order Lagomorpha** | |
| **Family Leporidae** | |
| *Lepus europaeus* | European Hare |
| **SCHEDULE 4B** | |
| **ESTABLISHED PEST ANIMALS (feral or wild populations)** | |
| Scientific name | Common name/Description |
| **Class: Mammalia** | **Mammals** |
| **Order Artiodactyla** | |
| **Family Bovidae** | |
| *Capra hircus* | Goat |
| **Family Suidae** | |
| *Sus scrofa* | Pig |
| **Order Carnivora** | |
| **Family Canidae** | |
| *Canis lupus familiaris* | Dog |
| *Canis lupus dingo* x *Canis lupus familiaris* | Dingo-Dog hybrids |
| **Order Lagomorpha** | |
| **Family Leporidae** | |
| *Oryctolagus cuniculus* | European Rabbit |