

3.1 Understanding the landscape

Summary of theme

This theme provides an overview of the geology, landscape and climate of the City of Ballarat, which has shaped the human use and occupation of the area. The landscape has some distinctive topographical features such as Mount Buninyong and Mount Warrenheip, and numerous other smaller volcanic hills. There are also several large lagoons or lakes formed by volcanic activity, including Lake Wendouree, Lake Burrumbeet and Lake Learmonth. The Yarrowee River and Coghill’s Creek are the main waterways. The formation of the ancient landscape enabled the settlement of Ballarat and district, by providing gold-bearing reefs, rich volcanic soils for farming, and a reliable water supply.

Consideration of this theme in relation to the HUL approach

The foundational landscape of the City of Ballarat has been shaped by natural forces for hundreds of millions of years. The form of the land, including its underlying geology and the topography, as well as the waterways and lagoons, have influenced and sustained human occupation for over 60,000 years, and subsequently shaped the patterns of colonial settlement.

Every place within the municipality, whether a township, mining area or farmland, exists within a much older landscape that holds language, culture and stories and is associated with social and cultural life.

Consideration of this theme relative to First Nations history

Deep Time	<p>First Nations people understand that the Ancestors occupied Country from time immemorial.</p> <p>Consideration of the absence of a western concept of time. The notion of time for First Nations people is considered as a continuum or as a whole.</p>
A changing landscape	<p>For tens of thousands of years First Nations people lived in a changing landscape and adapted with resilience and ingenuity to significant changes, including volcanic eruptions.</p>
Climate change	<p>First Nations people have adapted and shown resilience to the changing climate over millennia</p>
Environmental change	<p>First Nations people have adapted and shown resilience to the changing environment over millennia</p>

3.1.1 Accounts of Creation

The Kulin people understand that Country, which represents all life, is infused with cultural and spiritual meaning. This includes the creation and form of the land and water; the existence of plants and animals, and the wider cosmos. Many physical elements in the landscape—rocks, mountains, caves, springs, waterways, lagoons and waterholes, waterfalls, and long-established trees—were directly connected to the Ancestors through Dreaming stories and cultural practices.

The Wadawurrung people understand that their Country was created by Bundjil. The following Wadawurrung account of Creation is taken from a book titled *The Wadawurrung People: Did you know?*

Bundjil the Wedge-tail Eagle is the sacred Totem of the Wadawurrung. The creator of the Kulin land and its people was the work of the great Ancestor spirit, Bundjil...

Bundjil summoned six young men to assist him in the creation of the land, the people and all living things and to pass on his teachings and knowledge to all men and women. The six young men were:

Turnung	Feather tailed glider
Tadjeri	Brush tailed phascogale
Yukope	Great Parakeet (King parrot)
Porrgil	Rainbow lorikeet
Kalwerrk	Nankeen kestrel
Thara	Black shouldered kite

All were capable of mighty deeds, all in the name of Bundjil.

After he made all the country and all the living things in it, Bundjil taught the people how to make and use their tools and the rules of social behaviour.

When he had finished, Bundjil gathered his wives, one of whom was Kunuwarra the black swan, and the children, one of whom was Birn bial the rainbow, and instructed Bellin-Bellin the musk crow, who is in charge of the ins, to open his bag and let out some wind.

Bellin-Bellin opened his bag and released a wind so strong that it carried big trees into the air, roots and all. Bundjil wanted more wind so Bellin-Bellin opened all his bags and released so great that it carried Bundjil and his family to Tharangalk, the heavens, where they now live as stars looking down on the world.²

The Dja Dja Wurrung also have their own account of the making of the land.

² Jo Whitehead, *The Wadawurrung People: Did you know?*, reprinted 2021, no page numbers.

Bundjil is revered by the five language groups of the Kulin people, which are Wadawurrung, Dja Dja Wurrung, Wurundjeri Woi-wurrung, Bunurong and Taungurung. For the Wadawurrung, like the other Kulin people, Bunjil was considered the supreme being and was represented by the large and powerful Wedge-tailed Eagle. Not far from Ballarat, there are two important places associated with Bunjil: Lal Lal Falls and Kireep Bireet. Although both places are outside the City of Ballarat municipal area, they have great significance across the wider Ballarat area and to all Kulin people. The Lal Lal Falls holds great cultural and spiritual significance for Wadawurrung people as a place that is directly associated with Bunjil. The waterfall sits above a deep pool of water that was formed by the collapse of a volcanic tunnel thousands of years ago. Historian Ian D. Clark notes that Lal Lal represents one of a small number of living sites of Bundjil and is one of the most significant Aboriginal cultural sites in Victoria.³

Some of this meaning resides in the placenames that have survived. According to oral tradition, for example, Mount Buninyong threw out fire in the distant past. Plants and animals also had specific cultural meanings and were integral to spiritual beliefs. Ancestor beings often took the form of a bird or animal.

3.1.2 The natural landscape

Across the large of Wadawurrung Country that covers much of the area known as the City of Ballarat and into the Dja Dja Country in the north, the municipality of Ballarat is made up of many landscapes. Ballarat occupies undulating country that is fertile and well-watered. The main watercourse, the Yarrowee River, flows through Ballarat proper and becomes the Leigh River further downstream (to the south). The river is fed by numerous creeks, including the Burrumbeet Creek and Coghill's Creek. The country is punctuated with volcanic hills. In the vicinity of Ballarat, the two dominant hills are Mount Warrenheip and Mount Buninyong further to the south.

Different areas within the City of Ballarat have different characteristics. A large expanse to the north is defined by lakes and volcanic hills, with a total of 29 such hills between Ballarat and Ararat.⁴ Lakes, swamps and lagoons were also formed by volcanic activity. Lake Burrumbeet is the largest of these and is brackish (salt). There are granite

³ Ian D. Clark, 'The Ebb and Flow of Tourism at Lal Lal Falls, Victoria: A tourism history of a sacred Aboriginal site', *Australian Aboriginal Studies*, No. 2, 2002, pp. 45–53.

⁴ Information from Learmonth community meeting, 19 April 2023.

outcrops, especially on the hilltops and sweet spring water is a feature of the volcanic hills.⁵

Historical maps and plans and descriptions from the 1840s and 1850s provide some indication of the vegetation at the time of early British settlement. The vegetation varied according to the different character of the landscape, with areas of mature timber as well as grasslands and tea-tree swamps. A predominant type of timber was stringybark; the stretch of land between Balara and Buninyong was marked in 1853 as 'Quartz Ranges Thickly with Stringybark'.⁶ Early settlers noted the dense forested areas atop the volcanic forms of Mount Buninyong and Mount Warrenheep. The lofty Black Hill was also timbered.⁷ The characteristics of the natural landscape at the time of settlement can be understood through the explanation shown in Figure 3.3.

Parts of the municipality that are now primarily pastoral areas retain pockets of original vegetation.

The nature of the soil and rock and the patterns of waterflow in the study area, and the changes that have occurred since Deep Time, can be read in the landscape. Geological investigations in the area since the mid-nineteenth century have improved understandings of its natural history. In the c.1860s, for example, the bones of an extinct kangaroo were found while digging below the basalt layer in the Great Buninyong Estate Company mine, indicating that kangaroos were present at the time of volcanic activity.⁸

The natural landscape of the Ballarat area has provided the foundational layer and the resources to enable human-derived changes, which have fundamentally shaped the cultural landscapes of both First Nations people and of colonial settlement. This has involved the use of fire, the availability of local timber and stone for tool-making and construction, the discovery of gold (and the potential for its extraction using industrial processes), the availability of clay for brick-making, and the appreciation of the volcanic landscape for tourism purposes.

⁵ There were springs at Mount Buninyong, Mount Learmonth and Mount Warrenheep; Samuel Sidney noted the 'delicious mineral springs' at 'Warren Neep' in the late 1850s (Samuel Sidney, *The Three Colonies of Australia: New South Wales, Victoria, South Australia*, C.M. Paxton, New York, 1859, p. 389).

⁶ Plan of proposed new road from Buninyong to Ballarat, [1853?] (SLNSW).

⁷ Sidney, 1859, p. 389.

⁸ A.W. Howitt, *The Native Tribes of South-East Australia*, London, 1904, p. 18.

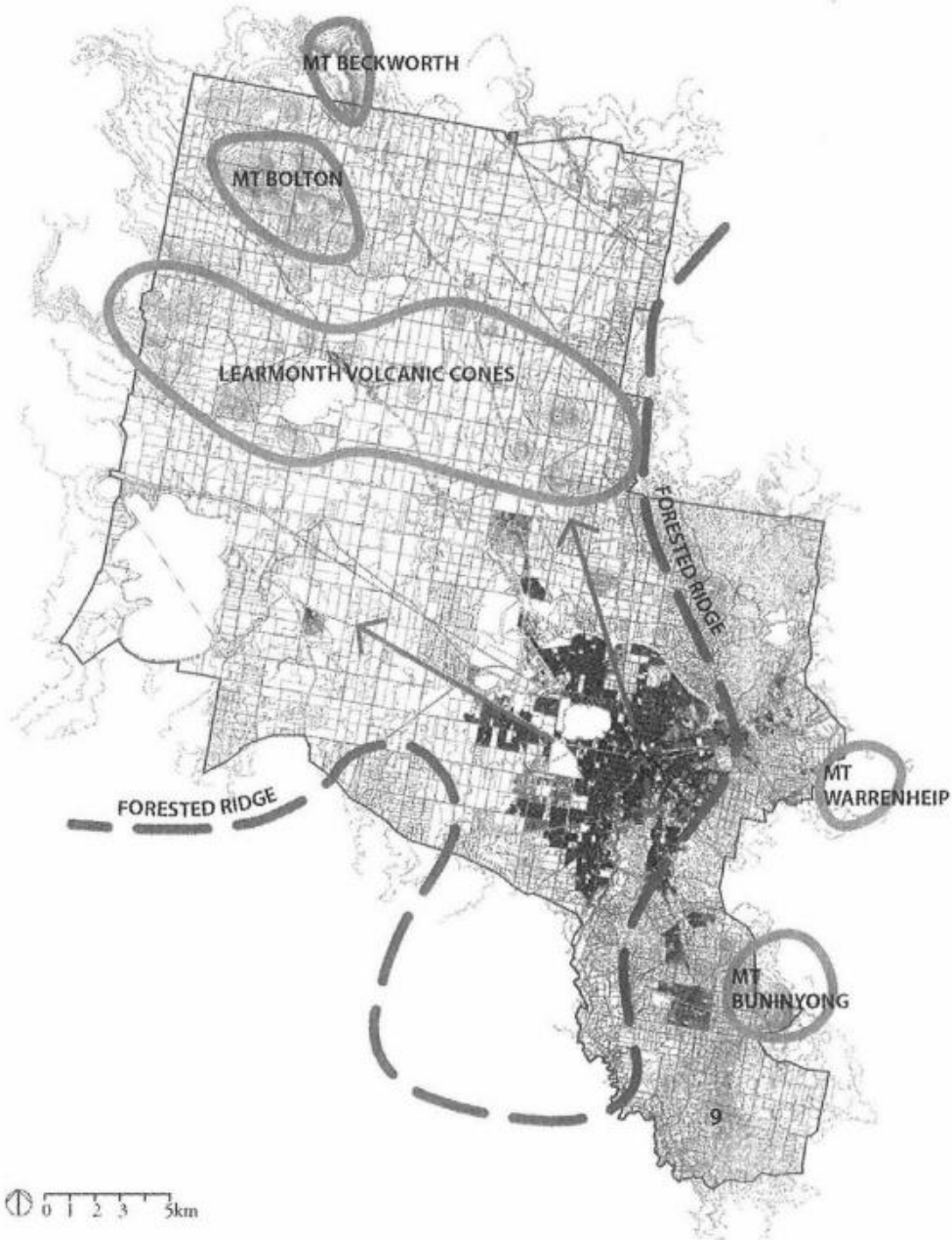


Figure 6.4 Map showing the outcomes of the landscape characterisation analysis conducted by Context Pty Ltd in Stage I of the HUL process.

Source: Context Pty Ltd 2013: 53; City of Ballarat.

Figure 3.3 Map showing landscape characterisation of the Ballarat municipality. (Source: City of Ballarat and Context 2013)

3.1.3 Geological and geomorphological formation

The area that is now Victoria, situated in southeast Australia, began to take shape hundreds of millions of years ago. This area is part of the extensive basalt plains of western Victoria. These comprise Older Volcanics but with some Newer Volcanics. The basalt was formed during an extended period of volcanic activity, between approximately 200,000 and 20,000 years ago, when molten lava was exuded from deep in the earth to form volcanic eruptions on the earth’s surface. The lava flow on the surface of the earth hardened to form basalt. The points of eruption became volcanic cones, many of which remain prominent in the landscape, including Mount Warrenheip, Mount Bolton and Mount Buninyong. Volcanic activity also led to the formation of lagoons and waterholes, many of which exist within the City of Ballarat, as well as fresh-water springs and waterfalls. The larger lagoons have been adapted as recreational lakes, including Lake Wendouree, Lake Burrumbeet and Lake Learmonth. Air bubbles in the lava created caves, as at Black Hill. Granite boulders are scattered across the tops of many of these volcanic hills, for example on the hill behind the Learmonth Cemetery (FIGURE 3.5). This granite is millions of years old, much older than the basalt, and appears to have been disturbed by the more recent volcanic activity and possibly thrust up from beneath the earth in the course of volcanic eruption.

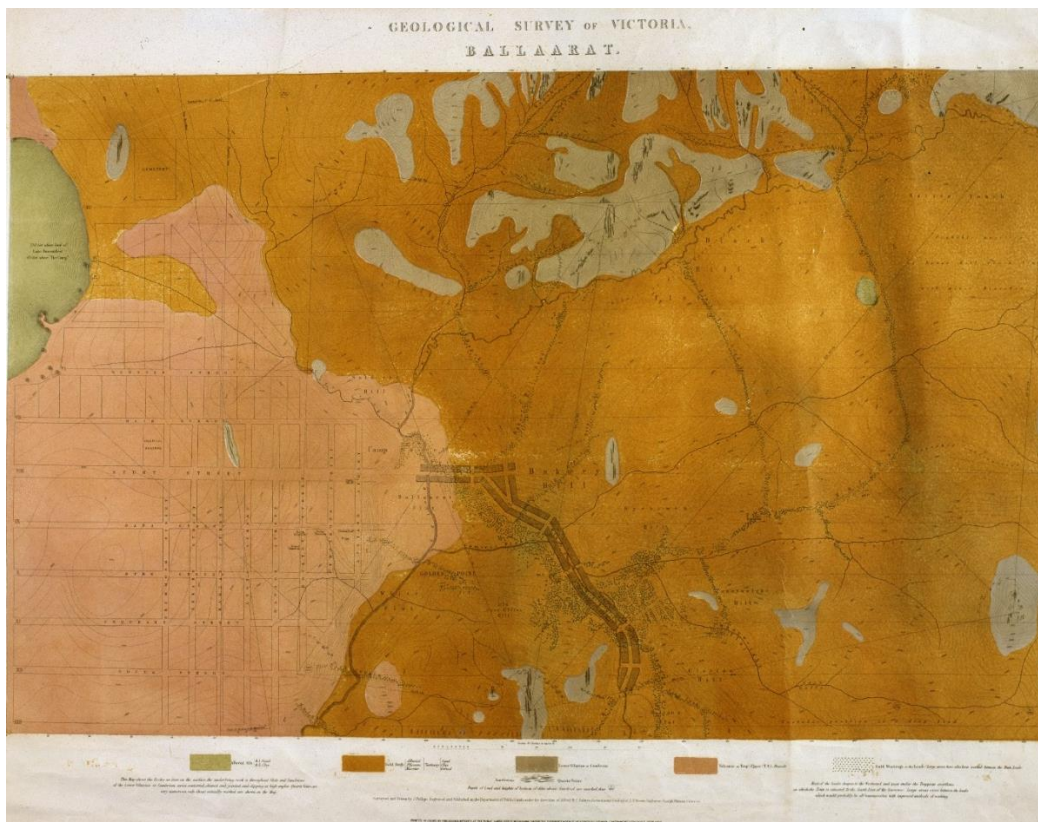


Figure 3.4 *Geological Survey of Victoria, Ballaarat*, surveyed and drawn by J. Phillips under the direction of Alfred R.W. Selwyn, 1858. This shows an extensive area of 'gold drift'. (Source: University of Melbourne Map Collection)

Gold is a precious metal that has been present in the bedrock of the Ballarat area since the formation of the earth 3.9 billion years ago. Most of the gold lies beneath and within the volcanic basalt layer. It tends to follow ancient waterways that are deep beneath the ground, which are known as leads. Alluvial gold can also be present in this landscape in the surface waterways.



Figure 3.5 Stony Rises on Cemetery Hill, Learmonth, comprise large granite boulders. (Source: GML, 2023)



Figure 3.6 View of Mount Warrenheip, a volcanic hill, c.1890–1930. (Source: State Library Victoria, Accession No. H2013.223/70)



Figure 3.7 Lake Burrumbeet and rocky banks, photographed in 1899, compiled by O.E. Jager. (Source: State Library Victoria, Accession No. H2006.188/17)

3.1.4 Climate

At the time of the last ice age (or glacial period) around 20,000 years ago, the Earth was significantly colder and sea level was at a low point. Victoria was a lot warmer around 6000–8000 years ago when sea level was at a high point—when there were higher temperatures and as a result there was a lush range of vegetation—before subsiding to its current level. Being inland, the area around Ballarat was not subject to the dramatic impact of sea level rise that affected the coastal parts of Victoria following the end of the last ice age. Waterways and bodies of water in the Ballarat area, however, would have been subject to broader changes caused by climate change.

In the current period of human-induced climate change, the climate has been warming since the Industrial Revolution. It is projected that climate change will impact the natural and built environments of the City of Ballarat into the future, causing an increase in average temperatures and a greater frequency of extreme weather events.⁹

Being inland and elevated (441 metres), Ballarat has relatively cold temperatures in winter, and occasional snowfalls are not unusual. Climate projections for the future may see snowfalls in Ballarat becoming less common.

3.1.5 Plants and animals

There is much evidence that megafauna, including diprotodons and marsupial lions, occupied the central and western areas of Victoria many thousands of years ago. Over time, some of these animals evolved into some of the smaller species that inhabited the study area when British settlers first arrived. These included Grey Kangaroos, koalas, echidnas, wombats, possums, wallabies, emus, bandicoots and native cats (quolls). There was also a wide variety of bird life, with many varieties of waterbird being migratory to the area on account of the lakes. The lakes and waterways also provided a habitat for fish, eels, freshwater crayfish and freshwater mussels, as well as platypus and water rats. The area also supports a large range of reptiles and insect life.

The study area comprises distinct landscape areas, including forests and grasslands. Trees that grew in the area include Blackwood (*Acacia melanoxylon*), She-oak (*Casuarina* sp.) and Stringybark (*Eucalyptus* spp.), as well as River Red Gum (*Eucalyptus camaldulensis*) and the now less common Grass Tree (*Xanthorrhoea australis*). The plains were rich with native Australian grasses and the waterways supported water plants such as reeds and sedges. Sketches of the Ballarat area by visiting artist Eugene von

⁹ DELWP and CSIRO, Central Highlands Climate Projections 2019, 2020.

Guerard in 1853–54 provide a detailed record of the vegetation on the diggings at that time (FIGURES 3.8, 3.9, 3.11).



Figure 3.8 Sketch by Eugene von Guérard of the landscape of the Black Swamp (Lake Wendouree), 1853, showing the water plants that grew around its edges. (Source: State Library of NSW)



Figure 3.9 Sketch by Eugene von Guérard of the vegetation in the Eureka area, Ballarat East, 1853. (Source: State Library Victoria, Accession No. H12536)



Figure 3.10 Tree cover in the Ballarat area, 1867, detail from *Victoria: Distribution of Forest Trees*, prepared by Robert Brough Smyth, 1867. (Source: State Library Victoria)



Figure 2.11 Grass Tree (*Xanthorrhoea australis*), sketched by Eugene von Guérard, Ballarat, 1854. (Source: State Library Victoria, Accession No. H3813)

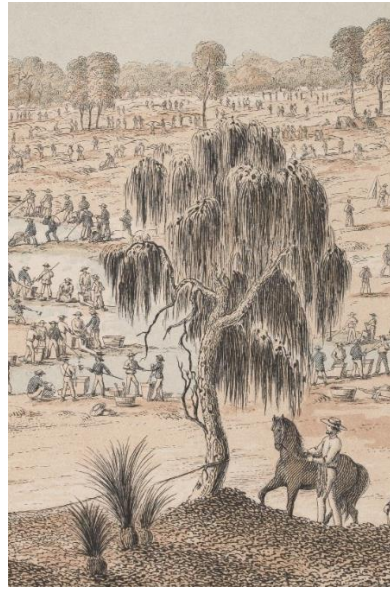


Figure 2.12 She-oak (*Casuarina* sp), detail from painting of *Golden Point* by Thomas Ham, 1851. The view is probably taken from Black Hill. (Source: State Library Victoria, Record ID 9916810793607636)

3.1.6 Natural disasters: fire and flood

Fire

Fire was a tool that was used seasonally by the Kulin to manage the vegetation and feed for grazing animals. Regular burning kept helped to avert the risk of large fires. Dispossession of the Kulin by British colonists made the landscape more vulnerable to catastrophic fires.

The first significant early bushfire was Black Thursday in 1851, which burnt through a large part of central Victoria, destroying people, stock and properties. There have been other significant bushfires recorded in the Ballarat area and there are ongoing threats of bushfire in the farming areas of the municipality. This is exacerbated during or after periods of drought. The year 1877 was a year of raging bushfires according to Evans.¹⁰

Fire was also a constant risk and a constant reality in the city and townships. Fire tore through Ballarat East on several occasions in the 1860s.

¹⁰ William Evans (ed.), *Diary of a Welsh Swagman 1869–1894* [by Joseph Jenkins], Sun, Sydney, 1999, chapter '1877'.

Flood

There have been a number of significant floods of the Yarrowee River, including in 1869 and in 1870, when the low-lying areas in Ballarat East were inundated. This caused devastation in low-lying areas that were intensely developed, for example in Bridge Street (FIGURE 3.13).¹¹ Another significant flood in Ballarat East occurred in 1895. The period flooding of the Yarrowee River caused not only inundation, but also enabled the movement of sludge and sand from high ground to the low-lying areas.



Figure 3.13 Sketch of the catastrophic flood in Bridge Street, Ballarat East, 1869. (Source: State Library Victoria, Accession No. IAN08/11/69/202)

3.1.7 Understanding and appreciating the natural environment

The Traditional Owners of the area that is now the City of Ballarat lived in harmony with the land, water and all lifeforms, in accordance with a philosophy of the importance of protecting resources for the future and a spiritual understanding of the interconnectedness of all life. From the 1830s, but particularly through the 1850s and 1860s, they witnessed the widespread destruction of their Country by settler colonists, through pastoral practices, mining and quarrying, industrial pollution, and the wilful use of the gun.

¹¹ *Herald*, 29 October 1870, p. 3; *Ballarat Star*, 10 December 1870, p. 2.

From an early period, many settlers had appreciated the beauty of the Ballarat area of Victoria, including its volcanic hills and lakes, but the process of 'settlement' caused enormous damage to the landscape. The area around Ballarat in particular underwent a dramatic transformation from the 1850s to the 1870s on account of the extensive physical impacts of deep lead mining and sluicing. The comprehensive destruction of the environment through mining did raise awareness of the damage that had been caused and encouraged efforts to remediate the land and the waterways. In the early 1900s, after the end of the goldmining period, areas of ravaged ground were planted with trees, generally Radiata Pine, to stabilise the ground. Plantations were established for example at Black Hill in the 1920s and at Canadian.

Areas of particular natural beauty received protection by being set aside as Crown land reserves for 'public purposes', including large areas of Mount Buninyong and Mount Warrenheip in 1860.¹² Timber and water reserves were also set aside by the from the 1860s, including Sugden's Spring at Mount Buninyong.¹³ This was essentially to enable the preservation of natural resources for future sustainability, however, rather than for the prime reason of protecting the natural environment.

The destruction of the natural environment extended to birds and animals which were shot and killed in large numbers, sometimes for food, but more often for sport or simply to eradicate particular species that were considered pests. This included dingos, native cats (quolls), kangaroos, wallabies, possums, ducks and other waterbirds. Other native animals declined in numbers as a consequence of the loss of their habitat. Fish received some protection through a ban on net fishing in the lakes in the Ballarat district in 1879, but this was more a measure to regulate fisheries as a valuable resource than to protect the ecology of the lake systems.¹⁴ The introduction of exotic fish such as salmon adversely impacted on native fish population.

From the late-nineteenth century, understanding of the natural environment was advanced by local enthusiasts, including nature writers. The affiliation of the Ballarat School of Mines with the University of Melbourne in the late 1880s saw excursions by geology students to places of geological interest in the area, including Lake Burrumbeet.¹⁵

The Ballarat Field Naturalists Club, established in 1952, is dedicated to investigating and raising awareness of the natural environment, and local species of birds, animals and plants.

¹² VGG, 26 October 1860, p. 2018.

¹³ VGG, 28 December 1863, p. 2850.

¹⁴ VGG, 18 April 1879 p. 1570.

¹⁵ See photograph of geology excursion to Lake Burrumbeet, State Library Victoria.