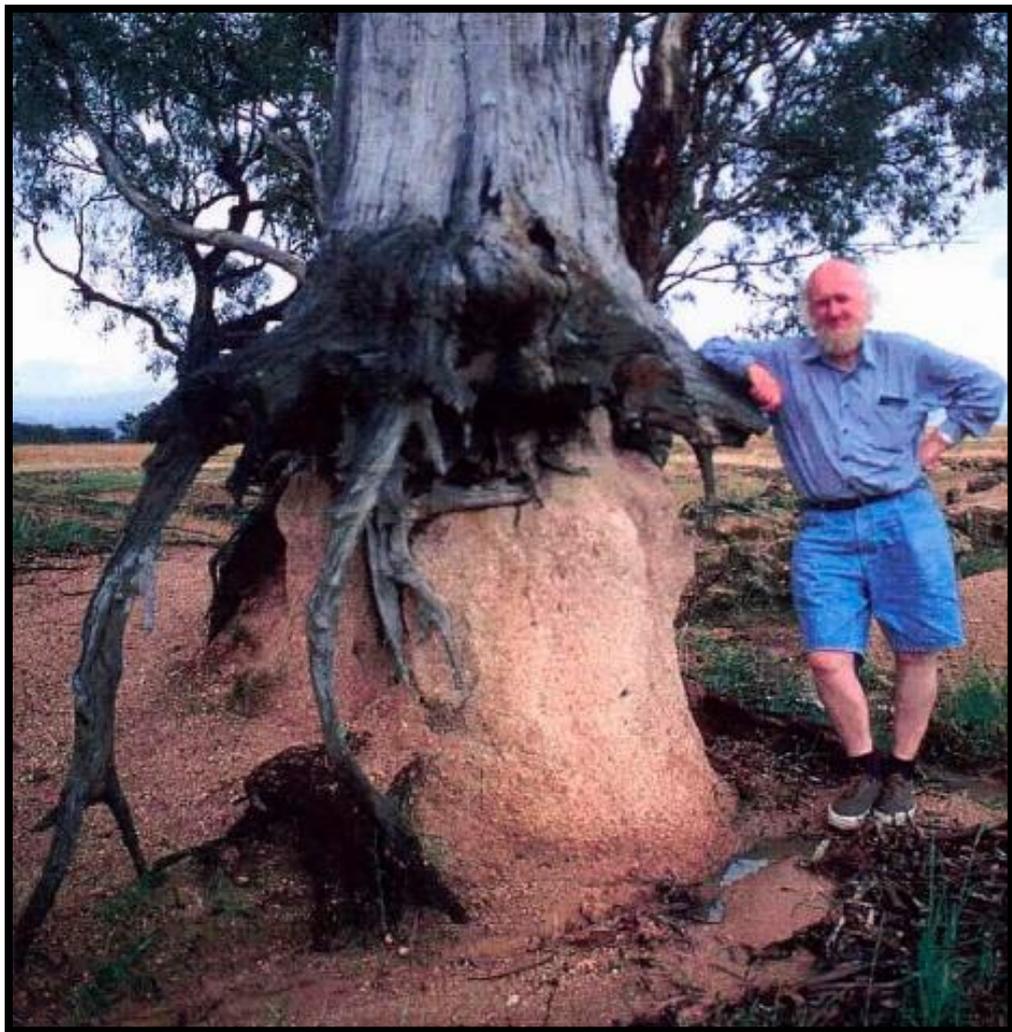




Greening Bathurst's Scenic and Natural History Tour 1 in the Bathurst Region



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Welcome to Greening Bathurst's Scenic and Natural History¹ Tour 1 of the Bathurst Region

This tour traverses a small part of Wiradjuri Country. Before European settlement, Country² was managed by the Wiradjuri people for over 22,000 years, mainly for the last 12,000 years (the Holocene).

This tour and others planned, will allow you to understand the Bathurst landscape, enjoy its scenery, and become familiar with the ecology, geomorphology, hydrology, and geology of this ancient landscape, as well as aspects of human history. The Three tours to date are designed somewhat like a jigsaw puzzle, each site contributing to a big picture.

This 19-site tour commences on Mount Panorama/Wahluu (**Figure 2**). It then proceeds via Boundary Road to the Mid-Western Highway and then to Hen and Chicken Lane. The route then moves along Evans Plains Road through to the Mitchell Highway, detours along Back Swamp Road, then to The Rocks area and the Beekeepers Inn at Vittoria. The route continues to Pretty Plains Road at Guyong, then doubles back to Cashens Lane at Macquarie Woods through to the Devils Marbles.

Period	Epoch	Age ¹
Quaternary	Recent	0.01
	Pleistocene	1.8
Tertiary	Pliocene	5.3
	Miocene	23.5
	Oligocene	36.7
	Eocene	58.0
	Palaeocene	66.4
Cretaceous		144
Jurassic		213
Triassic		248
Permian		286
Carboniferous		354
Devonian		410
Silurian		434
Ordovician		490
Cambrian		545

¹ Age: Millions of Years Ago (Ma)

Figure 1: Geological time periods.

From there, you will travel back to Bathurst via Ophir Road. Take a short detour along Pine Ridge Road before completing the tour at Apex Park, on the southern bank of the Macquarie (Wambool) River. A few short walks along the way are possible for those wanting to exercise a little.

Toilet stops are available at McPhillamy Park (Site 1), Site 6, The Beekeepers Inn at Vittoria (closed Monday and Tuesday), and a long drop behind the fire Brigade Shed at Rock Forest.

You will travel through 'deep -time', stand on or view ancient volcanic flows (12 – 22 Ma [million years ago]), spend the most time on the Bathurst granite (310 Ma) and visit deep ocean sediments of the Devonian, now metamorphic³ rock (350 Ma) (**Figure 1**).

¹ Natural History in the 18th and 19th centuries was the observation of nature in all its forms including geology, flora and fauna and astronomy. It was often synonymous with museum and personal collections of natural objects e.g. butterfly collections. Outstanding Natural Historians including Charles Darwin, were also scientists, men and women who sought to see patterns and processes at work in nature rather than just objects in a collection. These were the first professional scientists.

² In Aboriginal Australia the word 'Country' includes all living things. It incorporates people, plants, animals, landscape, seasons, stories and creation spirits. Country is about belonging and a way of believing.

³ Metamorphic rocks have been formed from sedimentary rocks/layers and igneous rocks by intense heat and pressure deep inside the earth's crust over long periods of time.

Good mobile phone coverage is available throughout the route unless there is a failure in the system. Remember to take a first aid kit with you, food and water and please heed safety warnings provided in the notes below.

Morning tea or lunch can be purchased at the Beekeepers Inn at Vittoria (closed on Mondays and Tuesdays), phone 02 6868738. With a bit of pre-planning, you might like to take a self-guided tour of Abercrombie House⁴ on the Ophir Road or order High Tea.

These tour notes have been prepared in good faith. However, the onus for safely navigating the route is entirely in the hands of the car driver and passengers who choose to traverse the suggested path. Neither Greening Bathurst nor Bathurst Regional Council accept any responsibility for any adverse outcomes suffered as a result of participating in this tour.

The tour traverses only public roads. However, many of the sites described are on private land adjacent to suggested roadside stops. This guide does not provide permission to trespass onto private land or climb over fences onto private areas, however enticing that possibility. Please be mindful and view sites safely from a publicly owned property or safe roadsides. Tours 1-3 are like pieces of a jigsaw; each contributing to a better understanding of the Natural History of Bathurst and can be undertaken in any order.

Useful Apps

Bird Identification A pair of binoculars and a bird ID book would also be helpful to have on hand. Alternatively, download onto your phone from the App Store: “Michael & Stewart Guide to Birds of Australia” @ \$29.99, or the ‘lite’ version with only 59 listed species: “The Michael Morcombe eGuide to the Birds of Australia” for free.

Geoscientific data If you have an iPad/laptop you might like to download for free the package ‘MinView’ from <https://minview.geoscience.nsw.gov.au> (version 2).

It is also possible to download MinView to an iPhone, laptop or iPad so that no Wi-Fi or mobile reception is required for use once downloaded. One can also access base maps, aerial photography and satellite imagery within MinView. These interactive geology maps display a range of information. Touch the screen to reveal the name, description, age, lithology and environment of formation of the underlying rock type.

Eucalyptus identification The ‘Euclid’ App was produced by CSIRO and enables users with little botanical training to readily identify Eucalypts, including species from the recently split-off *Corymbia* genus. The App also includes those species in the *Angophora* genus. The App uses readily observable characteristic of each tree species and can be downloaded from either GooglePlay or Apple App Store for around \$20 for iPad or mobile.

⁴ Closed on Monday and Tuesdays. Open Wednesday, Thursday, Friday: 10.00 am — 4.00 pm, Sat & Sun 9 – 5pm, phone (02) 63314929

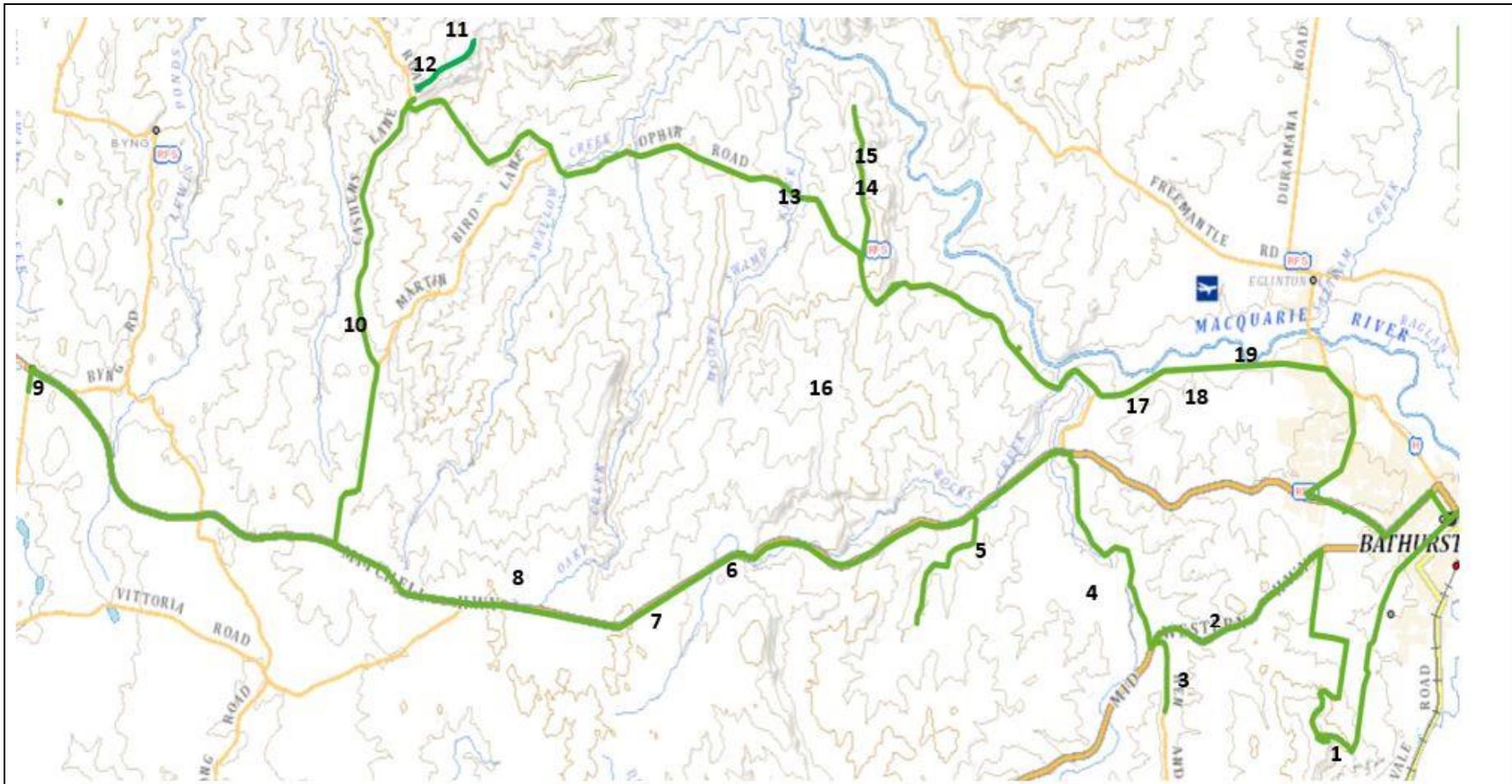


Figure 2: Overview of tour geography identifying approximate locations of Site 1- 19. The distance from Bathurst PO to Site 9 is about 34 km.

Site 1: View from Mount Panorama/Wahluu

Northings: 737162; **Eastings:** 737162; **Elevation:** 892 m.

Directions

Drive along William Street to the top of Mount Panorama-Wahluu in a clockwise fashion, then turn left into McPhillamy Park and immediately left again, stopping in front of the Castrol Tower entrance track signed as 'McPhillamy Park Lookout'. Walk to the edge of the racetrack to take in the panoramic view.

Site Description

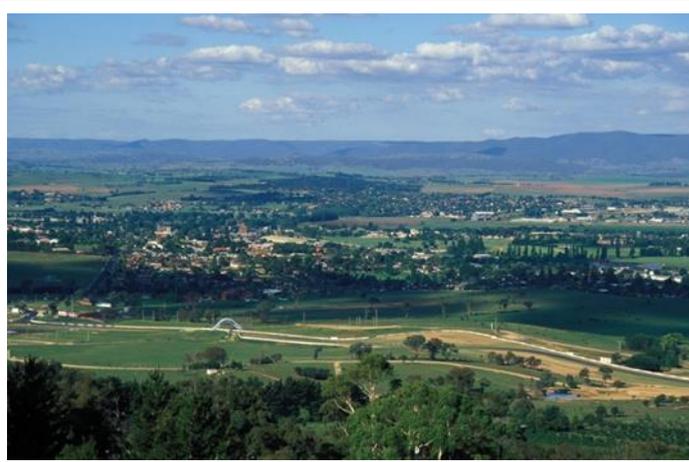


Figure 3: Panoramic view from the top of Mount Panorama/Wahluu.

This panoramic view is saucer-like. The Macquarie River (Wambool) is at the lowest point in the landscape in central Bathurst at 650 m (**Figure 3**). The rim of the saucer is the snow country of the Tablelands at around 1000 m. The prominent Winburndale escarpment and associated plateau are directly east, the Vittoria Plateau to the west, the Oberon Plateau to the south-east, and Fitzgeralds Mount-Blayney Plateau to the south-west. We are looking out over the fabulous Bathurst Plains described by George Evans in 1815.

At the time of European settlement, the plains were dominated by very fertile soils hosting Grassy Yellow Box- Blakely's Red Gum Open Woodlands, with significant areas of treeless plains throughout the valley. To the south-east can be seen the junction of the Fish and Campbells Rivers that join to form the Macquarie/Wambool River and jointly drain the western escarpment of the Great Dividing Range.

The first European road to Bathurst built by William Cox and his team in 1814/1815 came into Bathurst from the south near the now settled Lagoon village located adjacent to the Campbells River. The Wiradjuri have inhabited these lands for at least 22,000 years⁵, about the time of the last glacial maximum⁶. At this site, we are standing on the remains of the Abercrombie volcanic flow (basalt) over the Bathurst Granite, centred in the Black Springs-Trunkey area, some 18 Ma. We look down on the variable soils derived from the underlying Bathurst Batholith⁷ (granite) that stretches from near Macquarie Woods west of Bathurst to the edge of the sandstone country in the Kanimbla Valley about 60km away. While the basalt flows result from a volcanic above-ground eruption, the Bathurst granite batholith formed 5–10 km deep underground in an upwelling of hot, fluid magma at around 1200°C. The hot granite acted as an underground oven that on its edges (the rim of the Bathurst saucer) baked

⁵ Kiackatoo man, believed to be the earliest Wiradjuri burial site, located near Condobolin, has been dated at 22,000 BP.

⁶ Global sea levels were much lower than today since about 8% of the earth was covered with glaciers.

⁷ Batholith is a large body of igneous rock, in this case granite, with a surface area of at least 100 km².

adjacent sediments of various metamorphic rocks that were often harder than the Bathurst granite and less erodible by water.

The Winburndale escarpment represents sandy marine deposits that once covered the Bathurst granite but were transformed by the pressure of heavy landmasses above into metamorphic rocks. These events all happened deep underground 325-330 Ma in the supercontinent Pangea, long before splitting into the continents we recognise today, including Australia and Antarctica, with very different flora, fauna, climate, and absence humans. The relatively flat top of Mount Panorama/Wahluu approximates the surface of the ancient volcanic lava flow, now a geological remnant.

Site 2: Cherry Tree Hill (Mount Aspley) and Bald Hills Complex

Northings at the roadside: 6297575; **Eastings at roadside:** 735196;

Elevation at the top of the hill: 853 m.

Directions

Exit left onto the racetrack continuing along Conrod Straight, turning left at Hinton Road and then right onto Boundary Road, continuing to the Mid Western Highway. Turn left and travel about 2.4 km, stopping safely on the left-hand roadside opposite Cherry Tree Hill (**Figure 4**).



Figure 4: Mount Aspley/ Cherry Tree Hill.

Site Description

Four relatively small hills (**Figure 5**), Cherry Tree Hill (Mount Aspley), the Mount Panorama/Wahluu complex, Richardsons Hill and the Bald Hill collectively make up a group of hills, from the mid-19th C, known as the Bald Hills. In a relatively flat landscape, these four hills stand out as landscape features. They owe their existence to being capped by the remnants of a basalt lava flow some 18 Ma. The hard basalt layer protected the underlying granite from erosion over the past 18 million years.

How collectively did they become known as the Bald Hills? First, the Bathurst plains were treeless because they were too wet. Secondly, the Bald Hills were treeless, at least in their upper sections, most likely because of Wiradjuri burning. The Wiradjuri carried out burning practices usually for two reasons. Burning could create a habitat suitable for hunting (however, since hunting was usually confined to the plains, we can likely discount that reason). The second possible reason is that the Bald Hills were burnt to keep their upper sections

treeless for cultural reasons, including for possible campsites, Bora grounds or because a particular site was sacred. So, it seems reasonable to conclude that the Bald Hills were kept treeless for cultural reasons.

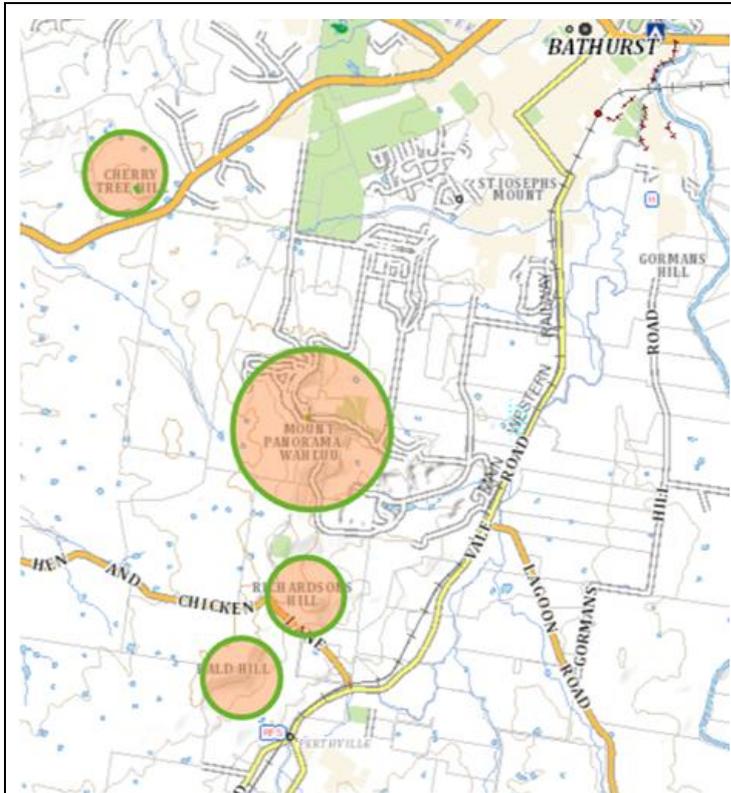


Figure 5: Cherry Tree Hill (853 m) in relation to Mount Panorama/Wahluu (905 m), Richardson's Hill (898 m) and Bald Hill (874 m)

Soon after the Proclamation of Bathurst as a settlement in May 1815, land grants were being freely made available on the eastern bank of the Wambool River. From around the 1820s, the newly installed Governor Brisbane made land freely available on the west bank of the Macquarie River. By that time, we have every reason to believe that Wiradjuri burning on the Bald Hills had ceased due to their displacement from their traditional lands favouring settlers. Grazing animals and later rabbits would have likely kept native trees and shrubs regrowth in check. However, old-timers in the 1970s informed the author that trees began to reappear on Mount Panorama in the 1920s. A possible reason for this is reduced grazing pressure as the City of Bathurst grew numerically, and land-uses other than grazing were adopted.

Site 3: Spring Creek Cottage and a Recovering Series of Swampy Meadows

Northings: 733233; **Eastings:** 6295407; **Elevation:** 712 m.

Directions

Continue west along the Mid Western Highway for about 2.4 km and then turn sharp left onto the Hen and Chicken Lane. Travel around 2 km until you come to the 1860s pisé cottage with a very rusty roof (**Figure 6**) on the right-hand side of the road. Turn into the driveway to enable you to reverse and drive back along the same route. This building is in private hands.

Site Description

This house was built in the 1860s on a 160-acre (65 ha) subdivision of the grand Stewart estate to implement government closer settlement policy. Making a living for a family off such a small block was always a big ask, and it nearly always led to severe land degradation, particularly on Bathurst granite soils.

Significant soil losses in the Bathurst area were not brought under control until the 1950s. The introduction of improved grazing and pasture management systems, together with the

construction of contour banks, controlled rampant erosion. You can also see evidence of contour construction at this site.



Figure 6: 1860s pisé cottage.

Under the plough, particularly when at right angles to contours, soil losses up to 100 tonnes/ha could be lost from the slopes above this cottage when it rained heavily. In contrast, native vegetation communities likely lose around 7 kg/ha/year of soil components as naturally occurring background erosion.

Travel slowly back along the laneway and observe the status of Spring Creek that rises near Vale Road. Even during the severe drought (2017- 2020), some water flowed at various locations but very likely greatly diminished compared to 1815. Why greatly reduced? From the upper reaches of Spring Creek to its junction with Evans Plains Creek, the valley floor was once a series of gradually stepping-down swampy meadows punctuated with semi-permanent pools and occasional sediment bars/barriers - known as a chain of ponds⁸. The latter formed where the creek grade could not support swampy meadow formations. The swampy meadows hydrated the associated floodplains, helped drought-proof the landscape, drove mega-productivity and supported teeming wildlife - particularly waterbirds but likely also many other vertebrate and invertebrate species. Floodplains were hydrated by overland flow, direct precipitation, upstream flows, and, as the creek's name implies, from groundwater-fed springs.

Swampy meadow formations were once common across eastern Australia where rainfall exceeded yearly evaporation⁹, but most collapsed suddenly due to ongoing land degradation post-1815. There were also likely a few degraded systems present in 1815 resulting from non-human/natural causes, such as the product of the extreme glacial climate that existed about 20,000 years ago. Then, the valleys filled with coarse erosion deposits and later topped with finer, dark organic soils formed as the climate moderated from about 15,000 years ago, especially in the last 8,000 years when the current climatic conditions became established. Many swampy meadow systems likely collapsed around 1900 at the end of the millennial drought. Since most landscapes had been heavily overgrazed, drought-breaking rains washed

⁸ Chain of ponds in relation to swampy meadows should not be confused with pools of water in a creek or river present under drought conditions, when river/creek flows cease, also sometimes confusingly referred to as 'chain of ponds'.

⁹ Sometimes where evaporation exceeds yearly rainfall, swampy meadow formations persist due to seasonal moisture gains, particularly in winter.

away the swampy meadows, possibly in a time frame as little as 24 hours¹⁰ in a torrent of mud and water. The sediments were deposited on downstream floodplains and eventually washed into the Macquarie/Wambool River. In places at the top of the now incised creek profile, you can see deposits of sand overlaying the dark fine pre-European topsoils indicating the first flush of accelerating erosion.

The loss of the swampy meadow systems was a part of the drying out of Australia! However, Spring Creek is demonstrating a significant recovery. When the author first visited this site in 1972, the depth of the incision varied between 4-8m in depth. In the 1980s, NSW Soil Conservation Service began experimenting with wire weirs placed at various creek locations, which facilitated rebuilding the stream bed and allowing native vegetation to gain a foothold and stabilise the system. The stream is now much better managed by local landholders, and they are beginning to see the benefits of such restoration efforts. But it will take many decades for this stream bed to infill.

Site 4: Evans Plains – Part of the Fabled Bathurst Plains

Northings: 6299006; **Eastings:** 732477; **Elevation:** 660m.

Directions

Travel from Site 3 and turn left with care onto the Mid-Western Highway. Move into the right turn lane after 130 m and turn right onto Evans Plains Road. Drive north about 1.5 km and stop on the roadside to look across Evans Plains and Evans Plains Creek.

Site description

Surveyor George Evans named these plains in 1813 – ‘Evans Plains’ (**Figure 7**). These formed a part of the sequence of 160 km² series of treeless plains located on the Fish, Campbells and Macquarie Rivers, which were subsequently mapped in 1815 by John Oxley with precision and likely aided by Evans. 1815 was the same year that Bathurst was proclaimed Australia’s first European inland settlement. This 4.5 km stretch of road runs along the boundary (break of slope) between the treeless river flats and the rising lands to the east, which host the critically endangered Grassy Yellow Box-Blakely’s Red Gum Woodlands (Box-Gum Woodlands). There is some evidence that in 1815 trees were spaced at around 40-50 m intervals, maintained as park-like woodlands by Wiradjuri burning, but why the treeless plains on the ‘river flats’? It has little to do with Aboriginal burning and a lot to do with water – too much water for grassy box-gum woodlands to grow! Evans Plains Creek in this section was once a series of stepping-down swampy meadows. Local geomorphologies may also have formed non-permeable, clay-based aquitards that pooled water through these river flats. These flats were likely boggy and filled with lagoons and billabongs of various shapes and areas (demonstrating the water table levels). So, when you see names like Pretty Plains Road, Meadow Flat, Kings Plains, Fredericks Valley, etc., think swampy meadows, swampland, lagoons, and mega-productivity.

¹⁰ When I first came to Bathurst in 1972 one farmer in his 90s told me that at the break of the millennial drought ‘we woke up one morning and our flood plains had washed away’.



Figure 7: Evans Plains Creek and the surrounding Evans Plains named by George Evans, May 1825

Post the Macquarie years, from 1820 onwards, these sites were quickly taken up as land grants by early European settlers. We are now looking at a degraded and less productive system, mainly caused by overgrazing, intentional burning and/or draining, both failed attempts to improve productivity. The creek-line shows some signs of recovery and conserves water within the creek-line better than many tableland streams. This scenario is part of the sad story as to how we have dried out Australia since 1788! Peter Andrew's significant contribution to land restoration, the philosophy and practice termed Natural Sequence Farming, demonstrated how streams such as Evans Plains Creek and their flood plains could rapidly re-hydrate by constructing leaky weirs within the stream bed.

In many places on this tour, you will see healthy stands of reeds and other water-loving plants in the flow lines, evidence that the hydrology of these systems is improving. If you stop at one of these sites in summer, you may be lucky enough to hear the call of breeding Reed Warblers that are recolonising these previously lost habitats.

Site 5: Back Swamp Creek Road – intersection with Mitchell Highway

Northings: 6300008; **Eastings:** 729939; **Elevation:** 692 m.

Directions

Turn left from Evans Plains Road and drive about 3.6 km along the Mitchell Highway to Back Swamp Road. Turn left, cross the Backswamp Creek, travelling parallel with it for about 2km, before locating a safe place to turn around and head back to the Mid Western Highway.

Site description

The creek name alerts us that Backswamp Creek was once an extensive linear series of swampy meadows (chain of ponds). Backswamp Creek is a tributary of Rocks Creek, the latter flowing into the Macquarie River. Back Swamp Creek is now an incised and degraded creek line that leaks water from the landscape that would have previously been stored underground in the adjacent flood plains as part of a functioning water cycle (**Figure 8**).

Swampy meadow systems leaked at very slow rates in their intact form, filtering water to downstream catchments. The process of changing from a series of swampy meadows to a leaking incised channel represents a change in ecological state and a loss in ecosystem resilience.



Figure 8: Degraded swampy meadow/Back Swamp Creek, immediately upstream of the bridge crossing. The black line indicates the current cross section structure and the red line the profile of the once intact swampy meadow, often slightly convex in shape.

However, this is a reversible situation. This system reminds us how widespread swampy meadows were in the tablelands and slopes in circumstances where a low-grade stream bed existed and where the moisture budget is high seasonally or cumulative throughout the year. The slope of Back Swamp Creek is around 0.9%. The loss of infill/soil when the swamp gave way was approximately 90,000 tonnes – all eventually being washed down into the Macquarie River.

Driving from Site 5 through the Rocks area to Site 6

Travel on another 5.6 km along Mitchell Highway from Backswamp Creek Road. The road steepens as it approaches the high point in the landscape. As we pass the property 'The Rocks' on the right, we are now on the true Tablelands. 'The Rocks locality' is at a high point towards the western extent of the Bathurst Granite. Being at the edge of the eroding river basin, the granite here has been exposed to erosion forces for far less time than those closer to the basin's centre. You can see the rock fabric in the regolith¹¹ with angular quartz and feldspar grains dominating, resulting in low clay content. This situation exists because there hasn't been enough time for the feldspar to decompose completely to clay. This is a critical difference between The Rocks and Bathurst Soil types. Granite tor and boulder formations are apparent.

The width of the Macquarie River Valley just traversed is around 32 km, the valley carved out over three million years by the river and its tributaries. For about every kilometre of river length, an incredible 8 km³ of material has been eroded! Red Box (*Eucalyptus polyanthemos*), Western (Inland) Scribbly Gum (*E rossii*) and Red Stringybark (*E macrorhynca*) with Black Wattle (*Acacia decurrens*) and Sifton Bush (*Cassina arcuata*) are dominant in rocky areas intergrading with patches of grassy Yellow Box (*E melliodora*) - Blakely's Red Gum (*E blakelyi*) in sections of deeper granite soils. Rocks Creek meanders down to its junction with Evans Plains Creek, but the grade is too steep to form swampy meadows. In the early 1970s, the platypus was relatively common along this stream but are now absent. The Suttor property ('The Rocks') to the right once extended to 'Bruceedale' at Peel, a distance of 23 km, forming part of the large Suttor estate. George Suttor was a protégé of Sir Joseph Banks. To further

¹¹ Regolith is the layer of broken and unconsolidated rock and soil material that forms the surface of the land and mostly covers the bedrock.

increase wealth and landholdings at the height of the squatter period large property owners, mainly if they had a significant convict allocation, could use such properties as stepping-stones for large, illegal land grabs further west. The NSW Government closer settlement policies combined with many other sociological and economic factors ended the vast landholdings east of West Wyalong.

Site 6: The Rocks Main Road Toilet stop

Northings: 6298264; **Eastings:** 721307; **Elevation:** 1,012 m.

Directions

Drive approximately 4.3 km from the gateway of 'The Rocks' property to the Main Roads toilet facility on the northern side of the road.

Site Description



Figure 9: Regrowth woodland in forest formation. The green shrub on the right of the photo is a root-parasite, Cherry Ballart.

The vegetation change at this location is noticeable. The vegetation community appears to be a regrowth Scribbly Gum – Red Stringy Bark Open Forest. This is one of the best examples in the tablelands of this open forest type. In the right of **Figure 9** is the semi-root parasite, Cherry Ballart (*Exocarpus cupressiformis*), its fruit sought after by Wiradjuari and colonial settlers. The change in geology from the much younger Bathurst granite (320 Ma) to the east and the Silurian-Devonian sediments (400 – 412 Ma) to the west– mainly slate, greywacke and shales, is relatively sharp. The dominant shales are mostly Phyllite¹². 400 – 412 Ma. Australia was then still part of the supercontinent Pangea (all lands) and joined to Antarctica with Pangea eventually breaking up about 200 million years ago.

As modern humans in the Anthropocene, we stand at this point in a part of Australia, now drifting slowly northward on its very own tectonic plate! When the granite was forming to the east and the adjoining geologies metamorphosing, above this location would have been around 5 km of other geological layers that over time have been eroded by mostly water working its magic as either moving ice sheets or flowing water. We are on relatively poor soils at this location, supporting a different vegetation community.

¹² Phyllite is a foliated metamorphic rock created from slate by further metamorphosis.

Site 7: Beekeepers Inn (Open Wednesday to Sunday each week)

Northings: 629895; **Eastings:** 719919; **Elevation:** 990 m.

Directions

Drive approximately 1.5 km to reach the Beekeepers Inn, where there is ample off-road parking (**Figure 10**).

Site Description



Figure 10: Beekeepers Inn, Vittoria

This is an iconic building situated right beside the highway, midway between Bathurst & Orange in a locality known as Vittoria. Initially built in 1859, now known as The Beekeepers Inn, the life of this old building started with Mr Thomas Higgins. Opening a bar in the township of Vittoria, he offered first-class accommodation for man and horse, stock of liquors of the best quality, and not forgetting the most important, the rules of the house 'cleanliness and civility'.

The hotel traded from 1859 to 1877 under various owners and was a Cobb & Co horse changing station. With the extension of the railway from Sydney, reaching Orange in April 1877, the Cobb & Co stop was discontinued. The building was then known as 'The Halfway House'. The building has been the Vittoria post office, telephone exchange, local store, farm supply shop, mechanical repairs, fuel station, and public telephone box out the front. It was operated by the Hilder family until the 1970s, when it closed and became a private residence. Grant and Vicki Lockwood purchased the house in 2003, restoring and adding to the infrastructure to its present state as a café and multifunction centre.

Site 8: Oaky Creek Lane

Northings: 6298310; **Eastings:** 718076; **Elevation:** 1016 m – at the junction with Mitchell Highway.

Directions

Travel about 1.9 km to reach the junction with Oaky Creek Lane. Use the right turn lane and follow the laneway for 1.5 km to its terminus at two private properties. Drive through to the right turn and then along a delightful native vegetation corridor that also protects stock from the icy cold winds that sweep through this plateau country in the winter months.

Site Description

The beginnings of one of the first-order tributaries of Oaky Creek can be observed in the centre of the image running northeast. South of the red line (**Figure 11**) is the rich, deep soils derived from the metamorphosed slates/phyllites derived from ancient marine sediments (401 – 412 Ma). Two hundred metres north of this corridor can be seen the sharp granite boundary easily visible courtesy of a line of granite boulders.



Figure 11: Oaky Creek Lane (yellow) showing the granite country north of the red line and to the south the Cunningham phyllite/slate geology derived from ancient marine sediments.

The geology south of the red line is derived from the same marine sediments as described at Site 6, the Main Road Rest Area, but the dominant trees here are somewhat different since the soils are deep and rich compared to Site 6, where surface rock is encountered. Hence at this location, Scribbly Gum and Red Stringy Bark are absent. The vegetation along this east-west corridor appears to be a transient community, changing from an open forest to the familiar Yellow Box- Blakely's Red Gum Grassy Woodlands on the undulating granite country immediately to the north. Along the corridor, the dominant trees are Blakely's Red Gum, Apple Box (*E. bridgesiana*) and Broad-leafed Peppermint (*E dives*).

The understory is highly modified and dominated by introduced weeds. The transition along the road to the Box Woodlands occurs as soon as we cross into granite country. Mature trees range in age from 20 – 250 years, some likely predating 1815. Along this short track and in the surrounding farmland, one gets a glimpse of what this country probably looked like around 1820, 200 years ago, and the stately appearance of 200 plus-year-old trees – now very uncommon in the landscape.

Site 9: Pretty Plains Road and Billabong Homestead

Northings: 6302806; **Eastings:** 706727; **Elevation:** 965 m.

Directions

Drive west about 15 km to Pretty Plains Road on the left-hand side, turn into this road and turn around at the first farm gate on the right, *Billabong*, (**Figure 12**) about 350 m from the highway.



Figure 12: Billabong name plate, Pretty Plains Road

Site Description

At this location, we are on an extensive area of a high plateau at around 930 m. Pretty Plains Road lies wholly within the Oakdale geological formation dated between (446 – 458 Ma). Most of us are familiar with the formation of sandstones from accumulating fine sand put under pressure from the geological layers above changing (lithification¹³) the material over time to sandstone as occurs in the Blue Mountains. However, sandstones can also be produced from volcanic (mafic) material, basalt, basaltic andesite, latite lavas and intrusions, volcanoclastic breccia and conglomerate, siltstone, shale and chert; minor allochthonous limestone and calcareous sediments, laid down as ancient marine sediments.

The headwaters of Summer Hill Creek rise on this contained plateau and divides the Lachlan and Macquarie catchments. Two names alert us to what this site was probably like around 1815 – the name of the road ‘Pretty Plains’ and the name of the property ‘Billabong’. ‘Plains’ is often code for ‘treeless-plains’. Such clues are scattered over the tablelands and slopes: Kings Plains, Evans Plains and sometimes ‘valley’ is included in the various descriptors. The lack of trees in such cases can be unrelated to Wiradjuri burning to create a cultural landscape. Rather, it is very wet ground due to the prevailing geomorphology, making it difficult for trees to grow. The property ‘Billabong’ appears to confirm that the surrounding flats were very wet – a billabong being the physical expression of the presence of a near-surface water table.

Recharge comes from the slightly higher surrounding land, rainfall and possibly an aquitard that prevents water from readily draining down through the soil. One billabong is extant behind the homestead; others have probably been drained, no doubt in an ill-judged decision around 1850 to improve productivity. Swampy meadows could have been scattered across the landscape or formed on the lower sides of the plain. This was likely an area with mega-production, a water bird haven teeming with wildlife, many wetland plants, including cumbungi (bulrush) phragmites (common reed), sedges, rushes and tussock grasses. Colonial settlers homed in on such sites when seeking land grants. The site demonstrates some retention of ecosystem function but appears to have lost much of its former drought-proofing capacity. Draining the land was often an attempt to control various stock diseases, particularly liver fluke in sheep.

Driving Instructions from Site 9 to Site 10

Turn right onto the Mitchell Highway to continue the tour. After 2.5 km, we cross the geological boundary between the Oakdale formation and the Byng Volcanics (445 – 467 Ma). As you approach a hill about 3 km east of Pretty Plains Road we come across Hanson’s Basalt Quarry. The visible ridge is the remains of an active basalt flow occurring aeons before the well-known Mount Canobolas lava flows 12 Ma. Between 30 - 85 Ma ‘Australia’ broke away from Antarctica to begin its journey northward on its tectonic plate, colliding with the Pacific plate near New Guinea. ‘Australia’ was then covered with lush temperate rainforests. Five to ten million years ago, rainfall decreased in ‘Australia’ due to rapidly accumulating ice in Antarctica. The rainforest retreated to the wetter coastal area or was protected within the Blue Mountains within deep shady canyons. The drier Eucalyptus open forest and woodlands were spreading in the drier area. A further 3.5 km towards the Beekeepers Inn is the boundary

¹³ Lithification is the compaction and cementation of sediments into rock while metamorphism is the process by which rocks are changed into other forms by the application of heat and/or pressure with some recrystallisation and folding often occurring.

between the Byng Volcanics and the siltstone of the Anson Formation (433 – 443 Ma) deposited as ancient marine sediments.

On our journey, we pass Cassans Lane (not to be confused with Cashens Lane), once the near centre of a proposed Growth Centre midway between Bathurst and Orange. Millions of dollars were invested by State and Commonwealth Governments in the late 1970s, progressing the concept of Vittoria as a new city and purchasing huge swathes of farming land. Eventually, this planning initiative was stopped. If it had succeeded, 'Vittoria' would have become the highest city in Australia, and always disadvantaged by having to pump all its water from the Macquarie River! Turn left at Cashens Lane at the Macquarie Woods, part of another failed dream and part of the New City planning. Macquarie Woods, so we were informed at its grand opening, would showcase, via interactive museums and a working mill, the history and benefits of pine plantations and their many products.

Site 10: Remnant Woodland Patch on Granite Soils:

Northings: 6303916; **Easting:** 714632; **Elevation:** 939 m.

Directions

From Mitchell Highway, drive 3.8 km north to the intersection with Martin Bird Lane. Continue left along Cashens Lane for 900 m and stop opposite a small remnant woodland patch about 3.5 ha (**Figure 13**). The roadway we are on is the recovery point of the Yetholme rain shadow when rainfall is coming from the east (less common) and the commencement of the rain shadow when moisture is coming from the west (most common).

Site Description



Figure 13: Cashens Lane remnant woodland on granite soils.

The road traverses Ordovician, Silurian and Devonian volcanic metasediments before passing onto the sharp boundary of the Icelly granite (323 – 359 Ma) about 500 m before the junction of Cashens Lane and Martin Bird Lane. The first section of Cashens Lane is the border between Cabonne Shire on the west and Bathurst Regional Council to the east. This is an earlier granite upwelling than the Bathurst granite. Can you observe any difference between the dominant tree species found on the volcanic metasediments and those on granite derived soils?

The remnant woodland patch appears to be stunted regrowth in open forest, almost forest formation, following clearing possibly in the 1960s during the wool boom. Alternatively, the woodland was left as shade for stock. It is part of the now critically endangered Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Woodland). The granite derived soils are shallow, and probably around 30 cm of topsoil has been lost to sheet and rill erosion. Pre 1815, the trees in this remnant community were likely spaced at 20-40m intervals. It has conservation value as a patch and a stepping-stone contributing to landscape connectivity for more mobile species. This particular remnant has likely been cleared at least once, and regrowth dates back to around the 1950s.

Most woodland remnants in the Tablelands are characterised by regrowth in forest formation rather than in woodland formation, have highly disturbed understories, lack tree regeneration and have few available hollows for wildlife. There are hundreds of similar remnants in the Bathurst area, many much smaller than this example. Many such remnants are unsustainable because of a lack of regeneration and inappropriate land management. The mix of species on this site includes Yellow Box, Blakely's Red Gum and Apple Box. Tree density and loss of topsoil likely place physiological limits on tree growth potential. Is there evidence that soil erosion is an ongoing issue? Is there much evidence of insect herbivory or the presence of vertebrate fauna? How would you rate the conservation value of this site based on plant structural components, available hollows, ground litter and logs etc.? As a general rule, the larger the area of a remnant, the more species it can hold.

Site 11: View to East Over the Macquarie/Wambool River Valley to the Eastern Escarpment

Northings: 6308531; **Eastings:** 716224; **Elevation:** 940 m.

Directions

From Site 10, continue along Cashens Lane. About 2 km before the junction with Ophir Road, the road tracks the boundary between the Anson formation [siltstone derived from ancient shallow marine sediments (433 Ma), and the Icely Granite (323 – 359 Ma). At the junction with White Rocks and Ophir Roads, continue north-east along Williamson Road for about 500m, past the Devils Marbles near Mount Dedman through to the first driveway on the left. Make a 180° turn using the wide track verge and take in the view east/south-east across the Macquarie River valley (**Figure 14**). The road we have just traversed is the border between Cabonne Shire Council and Bathurst Local Government Area.



Figure 14: View from the Devils Marbles through to the western suburbs of Bathurst.

Site Description

The dominant tree cover is the scattered trees of the critically endangered Box-Gum Woodlands. This treescape is captured in the self-evident remnant patches but mostly in the thousands of scattered, isolated trees. These scattered trees are the terminal treescape of the Bathurst granites since there is little to no tree regeneration occurring. The pre-European tree spacing was likely about 40-50 m intervals. The area has been significantly cleared. Some

permanent and semi-permanent creeks are lined with River She-oak (*Casuarina cunninghamiana*). This landscape has crossed many ecosystem thresholds¹⁴ and lost ecosystem resilience¹⁵, but the pre-European ecological footprint can be readily discerned. Bushland remnants are mainly located on higher rocky ground unsuitable for farming, and therefore never permanently cleared. However, a few mature trees date back pre-1815, but they are rare and difficult to find.

This landscape has been impacted by significant land degradation events over the past 200 years, including:

- The three significant cycles of nature – water, carbon and nutrient- have changed from being semi-closed at all scales to being open and leaking resources at every scale (water, nutrients and carbon captured as organic matter in the soil);
- Loss of soil carbon from around 8% on the flats and 4-6% on hillsides and crests, down to levels approaching 1% or less, resulting in a significant loss of soil water holding capacity;
- Landscape overheating due to the sun's energy input being highly modified by changes in on-ground plant density, mass tree clearing and subsequent adverse impacts on transpiration and leaf guttation¹⁶.
- Soil compaction is now standard, versus soil sponginess - resulting in runoff that is rapid and erosive, with sub-optimal soil absorption;
- The loss of the once common swampy meadows, wetlands and lagoons, either by poor land management or deliberate drainage, failing to boost production. Over 200 years of landscape mismanagement, we have managed to dry out the landscape.
- Periods of mass soil movement due to overgrazing under drought conditions followed by heavy erosive rainfall at the break of drought. This is up to 100 tonnes/ha where land has been ploughed versus background pre-European sediment loss around 7.5kg/ha. The latter being necessary to maintain landscape fertility. **Figure 15** illustrates an 'eco-history tree'; the photograph was taken around 1984 near the locality of Brewongle south-east of Bathurst. This tree subsequently fell over, and the mound – the remaining 1.2 m of topsoil of the fabled Bathurst plains and uplands, rapidly eroded a few months later. Such 'trees' were a relatively common sight in the 1970s and very much reminded the author of the soil erosion in the mallee country in his home state of SA; and
- The loss of teeming wildlife (vertebrates and invertebrates) on land, soil and waterways; and the ecosystem roles and linkages performed by individual species.

¹⁴ From a healthier state to a less healthy state that can be difficult to reverse.

¹⁵ Ecosystem resilience is the ability of a natural system to self-repair after being impacted by external /internal changes, often human induced.

¹⁶ Guttation is water droplets appearing on leaves pumped out by root pressure. It is an important cooling system in a functioning landscape.

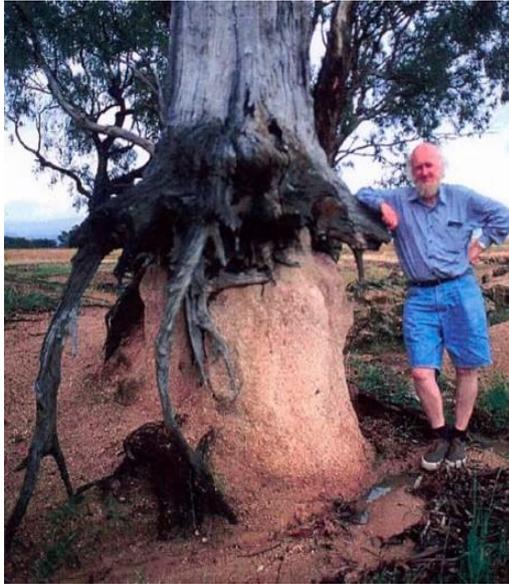


Figure 15: A dead Yellow Box 'eco-history tree' in the Wambool area c 1984. Photo Alex Goldney

One other point to note; in the significant 2012 drought, many native trees were showing signs of stress, were browning with signs of dying. Tree death appeared to be hastened by insects that home in on dying and stressed trees. In the last record-breaking drought (2017 – 2020), something strange seems to have happened; native trees generally looked healthy, random trees were stressed and dead or dying, sometimes independent of the drought. However, if you stood under large paddock trees in the recent drought, few to no insects and other invertebrates were associated with trees. This fits well with the global phenomena of a catastrophic loss of insects across the landscape.

Site 12: Devils Marbles

Northings: 6308855; **Eastings:** 716862; **Elevation:** 928 m.

Directions

Drive down through the Devils Marbles and stop and inspect the granite tors from the roadside. The tors are on private land.

Site Description

At this location, we are on the north-western edge of the Icely granite. To the west are the Silurian and Devonian sediments composed of lightly metamorphosed slates, greywacke and shales originally deposited as turbidites¹⁷ in a deep ocean environment. Stewarts Mount stands out in the foreground and is the remaining evidence of the extent of the Canobolas basalt flow more resistant to erosive forces.

Drive slowly down through the geological wonder, the Devils Marbles or Tors as they are called (**Figure 16**). Questions immediately come to mind: Why are the tors generally tall and rounded? Why are they often found on the rim of the Bathurst Basin adjoining the true tablelands? The answers to these and many other questions are provided in Tour 2 in this series. What ecological niches are available here that are not present in the broader granite landscape? Observe many phases of soil formation here, including the presence of dense colonies of lichens on boulders and evidence of frost heave.

¹⁷ Turbidites are sea-bottom deposits formed by massive slope failures.



Figure 16: Devils Marbles

There is not too much scope at this elevation for water to be a prime cause of rapid rock erosion, but the drip effect remains important in geological time. From a conservation point of view, this group of tors forms an island of granite boulders that have protected such areas from grazing stock.

Driving from Site 12 to Site 13

We remain on the Icely granite (323 – 359 Ma). The Macquarie/Wambool River at this latitude is now well and truly within the Hill End Trough¹⁸. Keep an eye out for scattered White Box (*Eucalyptus albens*) trees along this next section of Ophir Road. What are the environmental variables likely to determine the distribution of White Box vs Yellow Box communities? We pass by a degraded minor valley and intermittent flow line (**Figure 17**) with Manna Gum/White Gum (*Eucalyptus viminalis*) in growth-locked formation. These trees have been in this state for over 45 years based on personal observation. Manna Gums have since invaded the site both within the drainage line and along the edges of the drainage line. This suggests that the drainage line is not waterlogged since Manna Gums do not like wet feet.

¹⁸ The Hill End Trough is a mid-Silurian to Mid Devonian depositional basin elongated north and south and flanked to the west by the Molong High and in the east by the Capertee High. The erosional infill is preserved as a large syncline of folded materials created over a very long period (500 – 350 Ma). See also Figure 21.



Figure 17: Degraded minor grassy valley flowline with invasion of Manna Gum

Manna Gum was the common name given to this tree by European settlers. At certain times of the year, this gum exudes a sweet sugary substance in smallish lumps or granules that reminded them of the Biblical Manna story in the Old Testament when manna could be collected from a particular bush in response to insect attacks. The 'manna' from Manna Gum was often so prolific in the early 1800s that settlers gathered it as part of their diet, up to 8kg/tree being reported, enough to make it a commercially viable industry at certain times of the year. Manna was collected from Manna Gum and Brittle Gum (*E mannifera*), and not to be confused with lerp, the larval stage of a leaf-eating insect that protects itself from the sun excreting a liquid starch. However, it wasn't until the 1970s that the importance of manna as a food source for birds such as honeyeaters, Bell Miners and pardalotes, was determined by ecologists.

It is also an essential part of the diet for a range of small arboreal mammals. However, the author has never seen manna in the significant quantities described by European settlers over 48 years of fieldwork in the Central West of NSW. So, what has changed? This is likely a direct result of 200 years of land degradation and a subsequent crossing of a nutritional threshold required to produce copious amounts of manna.

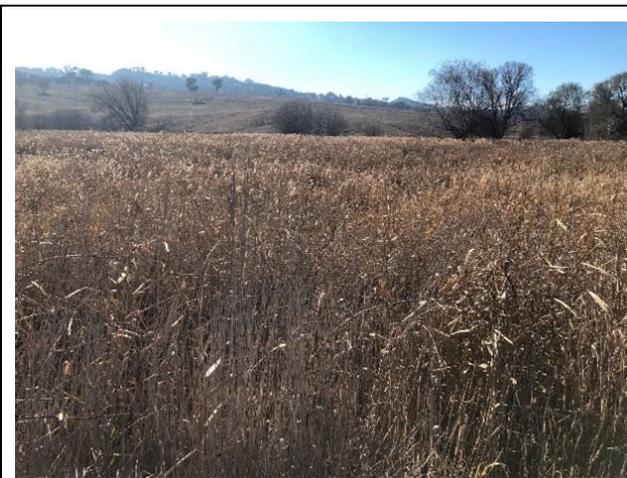


Figure 18: A largely intact and un-grazed, floodplain of Common Reed associated with a partially functioning swampy meadow formation on Oaky Creek.

We cross over the incised and degraded Swallow and Oaky Creeks, no longer hydrating their associated floodplains. The Oaky Creek is a 4th order stream with a large catchment and water discharge – its broad valley floor and downstream constriction once created a series of swampy meadows. The creek became channelised with the loss of the swampy meadows. Almost everywhere are the signs of land degradation and examples of minor to significant erosion. However, the pre-European ecological footprint can be readily discerned in the landscape (**Figure 18**), albeit badly tarnished by two centuries of European mismanagement.

At around 10.7 km from the Devils Marbles, we stop at the degraded and incised Mooney Swamp Creek.

Site 13: Mooney Swamp Creek

Northings: 6306200; **Eastings:** 724928; **Elevation:** 714 m.

Site Description

Many creek names provide a clue to the presence of a series of swampy meadows being present. Other names are used, such as Reedy Creek or Back Swamp Road (Site 5 – compare these two sites). This area is particularly rich in names indicative of swampy meadow formations (Jerry Swamp, Sandy Swamp, Green Swamp, Long Swamp, a range of Springs and the myriad unnamed upland tributaries of Swallow, Oaky and Mooney Swamp Creeks.



Figure 19: Incised but recovering swampy meadow formation on Oaky Creek, downstream of road bridge

This is another example of a degraded swampy meadow sequence that once graced this creek line with pools and sediment bars/barriers forming a ‘chain of ponds’ (**Figure 19**). This system would have once actively hydrated the flood plain to the break of slope, fostering dense grasslands on the flood plains or supporting extensive beds of the common reed and water-loving coarse ‘grasses’ (the latter name given by colonials to non-grasses such as *Carex* spp). The common reed is one of the most underrated stock feeds, often cleared or burnt by landholders. It is a high protein, high-calorie grass. There are some signs of system recovery, but this once conserving system is now leaking water, nutrients, carbon at all scales and facilitating landscape overheating. Significant ecological thresh-holds have been crossed, but this degraded system can relatively rapidly be restored with appropriate management inputs.

Mooney Swamp Creek rises in steep Icely Granite country immediately west of Crackerjack Rock. However, its lower reaches are contained wholly within the Waterbeach deep marine sediments (411 – 419 Ma) of the Hill End Trough (**see Figure 21 below**) that intrudes into the granite at this location. The parallel running Swallow and Oaky Creeks both rise in granite country, crossing the Ophir Road within the granite, Swallow Creek eventually joining Oaky Creek before traversing the Hill End Trough geology for 1km, eventually flowing into the Macquarie River.

Site 14: Shrubby Black Cypress Pine Community on Granite

Northings: 6305773; **Eastings:** 726514; **Elevation:** 783 m.

Directions

Travel along Pine Ridge Road 800 m to come to the above-ground granite belt supporting a Shrubby Black Cypress Pine – Bundy (long-leaved box) community (**Figure 20**).

Site Description

Black Cypress Pine (*Callitris endlicheri*) is found in a discontinuous band from this point, hugging the granite over a 700 m stretch. It is generally found on stony hills and ridges. George Evans visited this site in 1813, noting that the Black Pine he observed had circumferences in the order of 120cm - none of those are left.



Figure 20: Woodland dominated by Black Cypress Pine on rocky granite.

He went downstream along the Macquarie River about another 85 km noting that the fertile valleys became narrower, had some agricultural potential but not to be compared with the Bathurst Plains. Early European settlers travelled to this and other locations to log suitable timber for building infrastructure. A further 0.7 km brings you to the property 'Woollybutt', the common name in this locality for *Eucalyptus goniocalyx*, and also called Bundy and Long-leaved Box.

Mount Canobolas can just be observed from this location looking west. The other tree common in this community is Red Box (*Eucalyptus polyanthemos*). This small, isolated vegetation community is best thought of as a variant of critically endangered Grassy Yellow Box – Blakely's Red Gum – White Box Community.

Site 15: Geology Transitions and the Formation of the Bathurst Plains

Northings: 6306610; **Eastings:** 726421; **Elevation:** 785 m.

Directions

The geological boundary (**Figure 21**) is located about 1.8 km along Pine Ridge Road from Ophir Road. Continue through to the end of the bitumen and turn around. The property tracks at the terminus of the bitumen are not accessible to the public and extend down to the Macquarie River 0.93 km to the north.

As the crow flies, Bathurst is around 16 km south-east from the Macquarie/Wambool River at this location, much further as the river winds its way north. The Macquarie/Wambool River has dropped about 33 m between Bathurst and the intersection with the property track, about 1.5 m/river km. The geology boundary we have crossed changes sharply from Dunkeld Granite to the metamorphosed ancient sediments (411 – 419 Ma), known as the Turondale Sandstone, within the Hill End Trough. The Devonian Rock forms a hard barrier at right angles to the flow of the Macquarie River. The stability of the upstream Bathurst Plains is likely dependent on the presence of the Hill End Trough components at this critical boundary.



Figure 21: Geological boundaries associated with the Macquarie River (blue), Pine Ridge Road (brown), Mooney Swamp Creek (Green), Ophir Road (light brown) and the granite boundary (pink).

In effect, the upstream minor floodplains along the Macquarie River in this location and the extensive Bathurst Plains can be likened to an 'inland delta'. Within the 'delta', swampy meadow formations were relatively common where creek and drainage line gradients were less than 5%. On granite hillsides pre-1815, banded vegetation, mainly grasses, would be evident following the contours of the landscape. Degraded landscapes rarely have banded vegetation along contour lines. The Hill End Geological Trough (basin) running NNW effectively commences near this location.

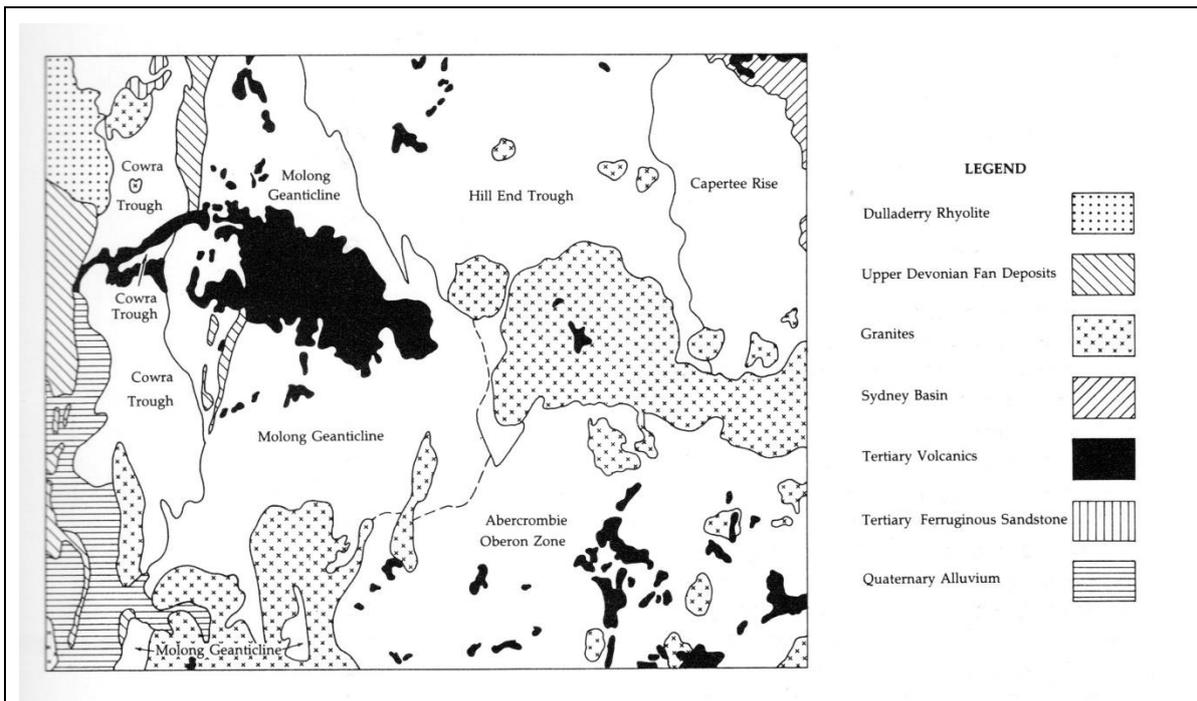


Figure 22: Geological zones in the Bathurst area, from the Soil Landscapes of the Bathurst 1:250,000 Sheet (Source: Kovac and Lawrie 1990).

The Hill End Trough (**Figure 22**) is a mid-Silurian to Mid Devonian basin into which various eroded particles were deposited by water. The trough is elongated north and south and flanked to the west by the Molong High and in the east by the Capertee High. The erosional infill is preserved as a large syncline¹⁹ of folded materials created over a long period (500 – 350 Ma). The complex folding within the trough occurred during the Devonian period. The tectonic history of the Hill End Trough and its marginal highs can be considered in three-time spans:

- Early, volcanic-arc phase, before the formation of the Hill End Trough (500 to 435 Ma);
- Birth and life of the Hill End Trough as an active basin (435 to 380 Ma); and
- Sedimentary infilling and terminal deformation (380 to 350 Ma).

The already hardened metamorphic boundary rock adjacent to the Icely granite was also likely further hardened due to the hot granite upwelling emplaced at depths of around 5 km and the subsequent ‘cooking’ effect.

Across the river are the localities of Watton and Billywillinga on Freemantle Road.

Site 16: North Jack- Granite Boulder/Tor Island

Northings: 6364650; **Eastings:** 726328; **Elevation:** 792 m.

Directions

Backtrack to the Ophir Road and turn left. A few examples of moderately tall Banksia shrubs (*Banksia marginata*)²⁰ are evident on the roadside. After 300 m travelling south, we reach an uninterrupted view to the south-west of a large granite ‘island’ - North Jack. The high point on the granite island is known by locals as Crackerjack.

Site Description



Figure 23: Aerial image of North Jack granite boulder ‘island’

On this tour, North Jack first came into our view as a dominant landscape feature at Site 10. This is a relatively large granite ‘island’ (about 5km²) dominated by boulders and tors and inaccessible country; parts never grazed by sheep or cattle (**Figure 23**). Such ‘island refuges’ are scattered across the Bathurst region and range from a few square metres to medium-sized areas such as the Devils Marbles (Site 12), North Jack, and Evans Crown Nature Reserve 35 km south-east Bathurst. North Jack is part of a Koala corridor running towards Freemantle, supporting a relatively sparse Koala population.

¹⁹ A syncline is the downward arc or curve of a fold, a fold being a bend in a rock layer caused by forces in the crust of the earth.

²⁰ This species has a very restricted distribution and many individuals are dying (2021) for unknown reasons.

A much larger population of Koalas is located south of Bathurst in the Mount Everden – Rockley Mount – Caloola area. Until recently, North Jack hosted a small colony of Tiger Quoll, now believed locally extinct. The ecology and species diversity associated with this compelling series of granite islands are mainly unexplored and likely hosts a range of cryptic small plants, invertebrates and small vertebrates. Several granite islands have significant cultural values to the Bathurst Wiradjuri. However, apart from Evans Crown Nature Reserve, their stewardship is in the hands of private landholders.

Site 17: Stewart Mount/Mount Pleasant:

Northings: 6302181; **Eastings:** 732641; **Elevation on mount:** 641 m.

Directions

From North Jack view, continue along Ophir Road about 7-8 km. From the junction with Dunkeld Road, continue about 800 m. Stewarts Mount is on the right looking directly south. The Dunkeld and Bathurst granite boundary is approximately 1.2 km west of the Ophir and Dunkeld Road junction.

Site Description



Figure 24: Mount Stewart is really a ridge created by a 12 Ma lava flow from Mount Canobolas.

Stewarts Mount (**Figure 24**) is now a disused quarry shell, giving up its valuable basalt to a long-term quarrying venture. The age of the basalt is the same as the Mount Canobolas flows (12 Ma). The base of this basalt flow lies at about 730 m compared to the bottom of the 18 Ma flow at Mount Panorama at approximately 830 m. The difference between the height of these two flows provides a clue to the erosion rate of about 100 m eroded over 6 million years. The critically endangered Yellow Box – Blakely's Red Gum Grassy Woodlands on the slopes of Stewarts Mount appear to be regrowth and the landscape is overgrazed. No tree regeneration is occurring. Sheet erosion depositing soil over the road following substantial rainfall often happens at this location.

Geologists have determined that the basalt topped Bald Hills (Refer to Site 2 description) is around 18 Ma, much earlier than the Canobolas flows, that reached as far as Stewarts Mount, 4km to the north.

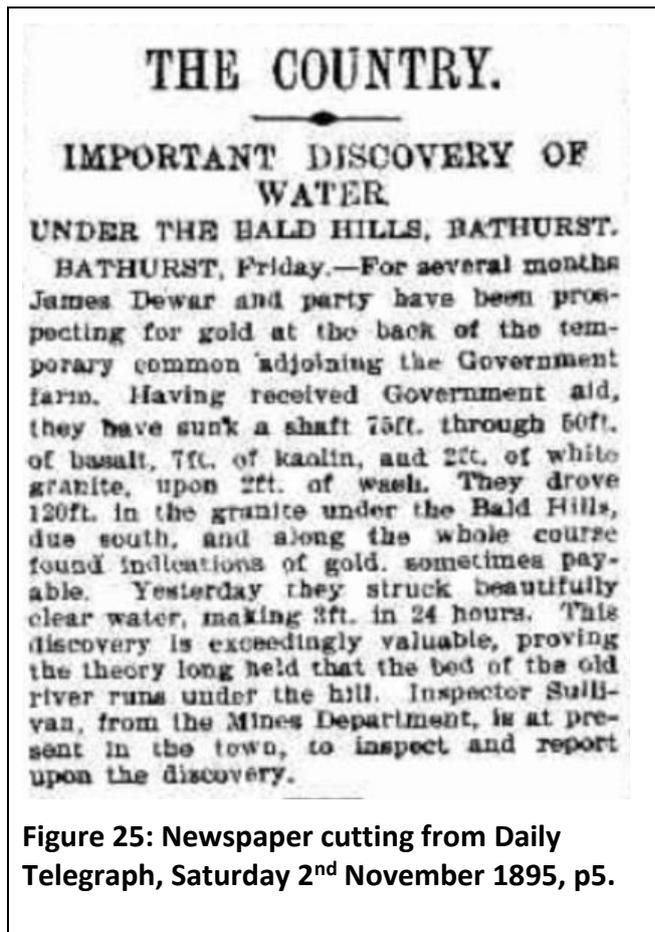


Figure 25 is a chance find of a newspaper article in 1895 regarding a well-informed gold prospector drilling for payable gold in ancient paleo streams on the foot slopes of Mount Panorama, about 1.5 km north of Pitt Straight. The paleo stream was likely the old stream bed of the Macquarie River. Nevertheless, it does appear to have been a rather heroic search for payable gold. The article does not inform us of the depth of the granite derived soil drilled through but does inform us that the drill went through 50 feet (15 m) of basalt, 7 feet of Kaolin (2.1 m), and 2 foot of white granite (60 cm), driving through more granite before eventually striking water at 120 feet (36 m). James Dewar, the miner, correctly interpreted the up-gushing water as being held within an old paleo stream. This basalt flow's location and altitude and its band depth roughly equate with the flow band at Stewarts Mount.

Dewar's team was working along this paleo stream for several months. So, by chance, we have located evidence from an event 125 years ago that suggests that the lava flow described is very likely associated with the Mount Canobolas lava flow of 12 Ma. Logically it cannot be from the Abercrombie flows that cap the Bald Hills at a much higher elevation. And the Kaolin? The reaction of feldspar minerals in granite with water produces kalinite, a white clay used to produce porcelain and other commercial products. Did Dewar make a fortune? As far as can be ascertained, if he did, it was not a result of his exploratory drilling around Mount Panorama. One other matter: if our working hypothesis proves to be accurate, then we can envisage what a small part of the landscape looked like between Stewarts Mount and what are now the foot-slopes of Mount Panorama, 12 Ma; a slightly sloping paleo-tableland at around 730 m elevation.

Site 18: Abercrombie House

Northings: 6302484; **Eastings:** 734170; **Elevation:** 680 m.

Description

From Site 16, drive on towards Bathurst, passing the grand Abercrombie House (**Figure 26**) on the right made from Bathurst granodiorite quarried on site.



Figure 26: Abercrombie House

Granodiorite is an un-decomposed form of granite and is relatively uncommon around Bathurst. From a distant perspective, it can be mistaken for grey basalt. Likely, the granodiorite in the Evans and Boar War memorials in Kings Parade and the George Street gates at Machattie Park came from this site. Abercrombie House is open to the public at various times – visit the website:

www.abercrombiehouse.com.au

Site 19: Apex Jubilee Park on the Macquarie River:

Northings: 6302627; **Eastings:** 735378, **Elevation:** 672 m.

Directions

About 1.7 km further along Ophir Road at its closest point to the Macquarie River, Apex Jubilee Park is located on the left-hand side of the road. Stop at the marked entrance to the walking track.

Site Description



Figure 27: John Lewin's Water Colour, Macquarie River 1815, downstream of the Bathurst settlement.

Walk down to the edge of the Macquarie River and compare the current river and its dominant riparian fringing forest of River She-oak with the watercolour provided by John Lewin, sketched in 1815 (**Figure 27**). John Lewin was both a naturalist and regarded as the first European to faithfully portray the Australian landscape.

He was a member of Governor Lachlan Macquarie's entourage to come via the newly completed Coxs Road in May 1815 to proclaim Bathurst as Australia's first inland European settlement. We know that this watercolour was sketched somewhere along the Macquarie River. However, Lewin was his own man and may have wandered some distance from the official campsite to find a suitable setting for his painting. It appears to be a scene looking west towards Mount Rankin in the early morning in late autumn (May). Early explorers and settlers described the Macquarie as lined with a continuous stretch of mature River She-oak,

but, obviously, not at this location. The far bank has been eroded back a few metres into the flood plain with some regeneration of River She-oak aged around 5-10 years old. Perhaps this painting is best interpreted as depicting a recent ecological resetting event resulting from a significant flood that tore away the opposite bank and toppled mature River She-oaks. The flow must have been energetic enough to remove 30 m trunks and deposit them somewhere downstream. The near bank withstood the onslaught, but never-the-less the evidence suggests that this flood event may also have initiated a regeneration event on the eastern bank. A painting by George Collinbridge in 1891 sketched from a balloon above Bathurst illustrates that all River She-oaks along the Macquarie, at least upstream from this point, had been removed by 1891, no doubt used for infrastructure of various kinds as well as firewood and roofing shingles. Early settlers also used the fronds of this tree as brooms. It was about this time (1891) that bank erosion was becoming a significant problem around Bathurst. Willow planting became widespread around 1890 and, like the introduction of the rabbit, had substantial adverse and unintended consequences.

You can observe granite outcrops in the riverbed, contrasting with the floodplain alluvium exposed in the riverbanks. Being the lowest point in the landscape, this is the modern erosion face of the Macquarie/Wambool River eroding its way down into the Bathurst Granite. You can see that despite the great width of the floodplain at this site, the deposited alluvium forms a relatively shallow lens. The source and character of these deposits at various depths tell a story that stretches back to the peak of the last great glacial climate some 20,000 years ago. With a much colder, dryer and windier environment than today, the river's catchment was yielding prodigious amounts of sand and gravel, which forms the lower levels of the floodplain deposits where they overlay the granite rock base. As the climate moderated from about 15,000 years ago, the catchment became better vegetated, and it yielded increasing amounts of more refined clay and loam. When the climate stabilised in a form similar to today's climate about 8,000-10,000 years ago, our modern soils began to form, as evidenced by the heavier, dark coloured organic topsoils observed at the top of the banks in Lewin's paintings. Over time, the river transitioned from being a broad and braided²¹ and complex meandering system to today's incised and relatively deep and steep-sided channel. If you access Google Earth of the area, you will see the pattern of the meandering system reflected in remnant billabongs and varying soil colours.

Visiting this site concludes Tour 1.

²¹ A braided river is made up of a network of river channels separated by small, often temporary islands called braid bars.

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Additional Natural History and Scenic Tours of the Bathurst District

1. **'Australian Fossil and Mineral Museum'** -make sure you visit this world-famous museum in Howick Street.
2. **Cox's Road Dreaming Guide Book**- Goldney, D.C. (2015) Cox's Road Dreaming Guide Book. A Natural History of Cox's 1814/15 Road – Australia's First Inland European Road. Land and Property Information, Bathurst.

This book (**Figure 28**) can be purchased in Bathurst at Books Plus (\$30) in Howick Street diagonally opposite the Post Office. Pages 10-35 enables a self-guided tour of 30 sites along the *original* line of Cox's Road (1814/1815) between Bathurst and the Fish River Crossing.

3. **Scenic and Natural History Tour 2** - Goldney, D.C (2021) Greening Bathurst's Scenic and Natural History Tour 2 of the Bathurst Region. BRC. 30 p booklet. Available Bathurst Tourist Centre.
4. **Scenic and Natural History Tour 3** - Goldney, D.C (2021) Greening Bathurst's Natural History and Scenic Tour 3 of the Bathurst Region. BRC. 25 p booklet. Available Bathurst Tourist Centre.

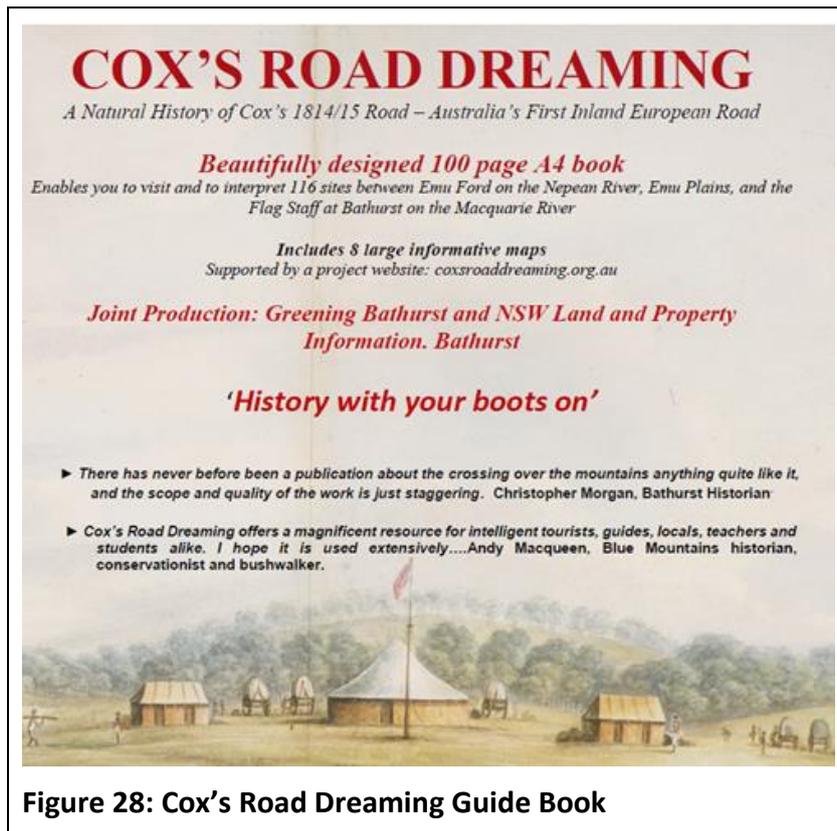


Figure 28: Cox's Road Dreaming Guide Book

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