Stage 1:

The Potential for Establishing a Sustainable Geotourism Program in the Gunduwa Conservation Region

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Disclaimer
This report was prepared by Alan Briggs, PhD Candidate, in his research capacity with oversight by Associate Professor David Newsome. The opinions and views expressed in the research are the author’s own and do not reflect nor represent the views of the Gunduwa Conservation Region.

Photographs
Alan Briggs

Cover Photograph – Associate Professor David Newsome enjoying the "rock tourism" geology half way up Mount Singleton
Executive Summary

This report provides an inventory of geotourism potential in an ancient, flat, low population landscape and specifically within the Gunduwa Conservation region. The objective for this stage (Stage 1) of the research was to determine the potential for establishing a sustainable geotourism program in the Gunduwa Conservation Region by assessing the geological formations and landscapes, and determining the potential for local community support and engagement in undertaking future geotourism programs. Accordingly, the geotourism potential was determined by exploring the possibilities of existing and additional tourism opportunities in the Gunduwa Conservation Region which are based on geological features, proven human use and landscape characteristics.

A series of forums were held in March 2016 with local stakeholders at Morawa, Perenjori and Bencubbin which contributed to this report and towards developing sustainable tourism in the region, mainly in the form of geotourism. Stakeholders provided feedback on what the limitations were to tourism development and suggested opportunities to improve current services. Two key limitations were available accommodation and limited catering facilities.

Field visits were made to locally known tourist sites across the breadth of the Gunduwa Conservation Region (GCR) with a view to providing an initial assessment if they would be suitable for development and inclusion as geosites. Appendix 1 tabulates the sites visited and lists geotourism opportunities for each. These visits yielded a wealth of information about the status of sites and of the potential for development particularly when introducing a landscape story telling concept that brings in the geology, flora and fauna, Aboriginal culture and heritage, early European exploration and settlement, as well as contemporary land uses. No one place can nor needs to tell the same story.

To determine the geotourism potential of the region, 50-kilometre arcs into the GCR were determined for each key location. Within these arcs, geosites were identified and worked into case studies, some of which are provided in this report. The aim of this process was for the geosites to be accessible and attractive to visitors to encourage them (the visitors) to stay another day/night at the key location and then visit the sites during their stay. If this can be achieved there will result an increase in demand for accommodation, food and other services within the region.

The range of geosites available from each key location supports the potential for developing geotourism. For example, within Charles Darwin Reserve, half day self-drive and guided geotrails could be developed providing information using brochures, signs and previously downloaded mobile phone Apps. Visitors might stay an extra night to take advantage of such activities.
In peak times, such as the wildflower season, guided tours and visits could be led by local Aboriginal people who could interpret their connection with the land which itself is based on the geology of the environment. There is potential for this approach to be developed at most of the key locations associated with the GCR. Yalgoo raised the possibility of fly-in/fly-out visitors using the recently upgraded airstrip, providing an air-conditioned bus driven by a local Aboriginal person and conducting tours of the local geosites. Perenjori raised the possibility of providing a similar geotourism experience based on the caravan park from which advertised geotours might start.

These opportunities need to be supported by improving tourism services throughout the region. Access, signage, information shelters, camping facilities, rubbish disposal and support services are required to develop sustainable geotourism. There exists significant potential for geotourism to be developed within the GCR. There is community, Local Government Authority and government agencies (Department of Parks and Wildlife, Mid West Development Commission and Tourism WA) support to further develop and implement a coordinated program, within the constraints of each party, for geotourism. The improvement of existing tourism services needs to be addressed along with the identification and development of geotrails and supporting infrastructure.

This report indicates there are several stages to the development of geotourism within the Gunduwa Conservation Region (GCR). These stages are:

- Stage 1 is the development of the concept for geotourism and early evaluation of the potential for geotourism in the GCR;
- Stage 2 is to develop Geotourism through field verification, detailed field data gathering and visitor use surveys to underpin the project;
- Stage 3 involves the development of field specific guided and self-guided tours with information development for interpretation of themes and supporting signage; and
- Stage 4 sees the completion of tours and development of digitised and GPS field and tour technology to assist guided and self-guided tours.

This report for Stage 1 has addressed consideration of the potential for establishing geotourism in the region and has carried out a preliminary assessment of geosites across the extent of the GCR. Stages 2 to 4 are considered essential in developing the program for geotourism. These stages, should they be adequately facilitated and funded, could be conducted in parallel by incorporating the skills of experts associated with the project proposals such as with digital technology.

It is important that further business and community consultation and engagement programs be undertaken to underwrite confidence in developing the geotourism program as areas such as accommodation, catering and tourism services need to be consolidated. Local Government Authorities (LGAs) show commitment towards the geotourism program.
DePaW should be engaged with the geotourism program given its extensive pastoral lease holdings in the region and its influence over attractions, access and accommodation within the region.

There are several Geotourism proposals proposed within the Mid West Region and every opportunity should be taken to engage with the proponents to ensure the Gunduwa Conservation Region is foremost in their minds. These proposals include the Batavia Coast and the Murchison region.

The following recommendations are proposed:

- Consolidate business and community attitudes and support for the Geotourism program;
- Confirm LGAs and State agencies administrative and financial support for the Geotourism program and include funding support towards its implementation and maintenance;
- Engage a coordinating group to facilitate the development and implementation of the Geotourism program (consider a subcommittee of the GCR);
- Seek funding (for example Royalties for Regions) and engage an appropriately qualified consultant coordinator to develop, cost and implement the Geotourism program;
- Implement stages 2 to 4 to develop the Geotourism program;
- Undertake a review and cataloguing of assets associated with geological formations, fauna and flora to build a database for their conservation, protection and sustainable use within the project. The review would be in liaison with Aboriginal elders to ensure sites deemed culturally sensitive are protected where requested and appropriately acknowledged and that persons utilising these places respect the cultural sensitivity of the site.
- Reach agreement and develop opportunities with Aboriginal elders for access and interpretation of accessible places and cultural sites, and engage Aboriginal people to provide tourism services within the GCR.
- Review all current tourism businesses and opportunities to determine an overall strategic approach to developing each asset into the project.
- Consider nominating the GCR as a Geopark in due course as there are many features that would support the concept and this would also bring about increased coordination, marketing and promotional opportunities;
- Review progress on a regular basis and inform business and community groups involved to maintain their support.
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Acronyms, Terminology and Definitions

CDO(s)
Community Development Officers attached to Local Government Authorities.

Geocaching
Geocaching is a worldwide treasure hunt using GPS and map coordinates travelling on foot or by vehicle to destinations in either remote or urban locations in search of these cached treasures.

Geoheritage
Geoheritage focuses on features that are intrinsically linked to the geological evolution of the earth and includes more recently, culturally important sites (Brocx & Semeniuk, 2007).

Geoparks
Geoparks are areas where the earth’s geographical and geological heritage is the focus of local protection, education and sustainable development (UNESCO, 2012). Now a worldwide phenomenon, Global Geoparks have been adopted by 33 nations with 119 Geoparks established by 2015, mainly in Europe and China (UNESCO, 2016).

Geoparks provide a means of interpreting the Geoheritage (the origin of the earth and its landscapes) within Geoparks and utilise the concepts of Geotourism and Geotrails to achieve this.

Geotourism
Geotourism is a form of nature-based tourism which involves the interpretation of the landscape, geology and generally, the land we walk upon, as well as flora and fauna and the culture of the communities living there. Newsome and Dowling (2010, p3) provide a detailed definition of Geotourism explaining “it is sustainable tourism with a primary focus on experiencing the earth’s geological features in a way that fosters environmental and cultural understanding, appreciation and conservation, and is locally beneficial”. Farsani, Coelho, and Costa (2012) introduced Geotourism as “a new movement helping travellers to increase their knowledge about natural resources, the cultural identity of host communities and ways of preserving them.” (p1).

Geotrails
Geotrails facilitate the interpretation of landscapes and areas of geological significance and deliver geotourism experiences through a journey linked by an area's geology and landscape as the basis for providing visitor engagement, learning and enjoyment (Ng, 2014).

In Western Australia (WA), the Granite Way Geotrail has been adopted and marketed by TourismWA (Tourism Western Australia, 2015b) and several tourism industry businesses; and is a key tourist route through the case study area.
**Gnamma Holes**
Natural cavities are commonly found in hard rock, particularly granite outcrops, and as such act as natural water tanks, which are replenished from underground stores and rainwater run-off. Gnamma holes vary in shape and depth, and the small surface area of the hole helps to minimise evaporation (Western Australian Museum, 2017).

**Indigenous Protected Areas**
Indigenous Protected Areas are voluntarily dedicated by Indigenous groups on Indigenous owned or managed land or sea country. They are recognised by the Australian Government as an important part of the National Reserve System, protecting the nation's biodiversity for the benefit of all Australians (Department of the Environment and Energy, 2017).

**Inselbergs**
Granite outcrops also known as monadnocks.

**LGA(s)**
Local Government Authorities (located within or adjacent to the study area in this research).

**Monadnocks**
See Inselbergs.

**Paleochannels**
Ancient (Paleo is Greek for old) river channels often filled with sedimentary rock materials. Water movement occurs over considerable time periods (Department of Environment, 2005).

**Salt lakes**
Highly saline internal drainage areas subjected to evaporative drying leaving salt crystals exposed at the surface as remnants of a drainage pattern which was active before continental drift separated Australia from Antarctica (Geoscience Australia, 2017).

**Salt rivers**
Rivers, such as the Avon River, that drain saline water from salt lakes and paleochannels (Department of Environment, 2005).
**Gunduwa Conservation Region Potential for Geotourism**

Many tourism visitors view geological landscapes without understanding the connections to local people, past and present. Landscape communities include Aboriginal people, early explorers and new communities.

This study proposes telling the stories of the landscape in a tourism context within the Gunduwa Conservation Region (GCR). The overall project encompasses 4 stages.

- **Stage 1** is the development of the concept for geotourism and early exploration of the potential for geotourism in the GCR;
- **Stage 2** is to develop Geotourism through field verification, detailed field data gathering and visitor use surveys to underpin the project;
- **Stage 3** involves the development of field specific guided and self-guided tours with information development for interpretation of themes and supporting signage; and
- **Stage 4** sees the completion of tours and development of digitised and GPS field and tour technology to assist guided and self-guided tours.

Geologically, no one landscape story will be told from a single perspective but from a multi-perspective. Geologically, what it means to people – Aboriginal, early settler, contemporary residents - and perspectives on what the landscape means now and into the future, questioning what has happened, understanding it and working towards a sustainable tourism experience.

The objective for this stage (Stage 1) of the research is to determine the potential for establishing a sustainable Geotourism program in the Gunduwa Conservation Region by assessing the geological formations and landscapes, and determining the potential for local community support and engagement in undertaking future geotourism programs. Accordingly, the Geotourism potential is determined by exploring the possibilities of existing and additional tourism opportunities in the Gunduwa Conservation Region which are based on geological features, proven human use and landscape characteristics.

**Gunduwa Vision and link to Geotourism:**

The Gunduwa vision includes development of the tourism industry. Geotourism interprets the geology and landscape in a sustainable way to educate and inform visitors in an engaging manner that protects and enhances the environment, involves the local community (people and businesses) to support and where possible participate in Geotourism activities.
The Need for Geotourism Development

Rural regions have been exposed to declining populations and services which have subsequently impacted on lifestyles. The western section of the Gunduwa Conservation Region (GCR) has relied on agricultural development and more recently, mining. The eastern section remains reliant on pastoral and mining land uses. There are currently limited business development options available to increase the economic circumstances for the region.

The GCR experiences a significant wildflower season with tourists and visitors arriving from local, interstate and international sources. The region’s wildflowers are promoted and are internationally renowned and local councils provide wild flower tourism in the region (Figure 1). The season is dependent on environmental factors to ensure a successful tourist season.

At the same time, travellers have been increasingly interested in the Earth’s geological heritage and Gunduwa has very interesting geological features. The underlying character of the GCR is its geology and interpreting these features to visitors might be an attractive option to increase tourism in the region. By extending visitor stays to add additional nights, further economic value can be realised and Geotourism has the potential to add to the tourism product by creating additional reasons for visitors to stay and explore the unique region.

Tourism development for the region is reflected in the Mid West Development Commission Blueprint which states “by diversifying through niche opportunities such as ... geo-sites and geo-tourism ..., the Mid West has potential to create authentic connections with visitors and increase visitation to and across the region” (Mid West Development Commission, 2015, p. 77). The future is very positive for increasing tourism potential in the region.

Figure 1: Roadside promotion of the Gunduwa Conservation Region and its wildflowers.
The Study Area

The Gunduwa Conservation Region (GCR) extends from Yalgoo in the north west of the Yilgarn Craton to Paynes Find in the east and follows the Mullewa-Wubin road before extending to Bencubbin in the south east (Figure 2).

The GCR is within the northern area of the International Biodiversity Hotspot for south western Australia, one of five internationally recognised Mediterranean-type ecosystems. Biodiversity Hotspots are areas where significant levels of biodiversity are under threat from human related impacts. It is also within the Southwest Australian Ecosystem Initiative\(^1\) that recognises the biodiversity of the region. Additionally, the GCR is superimposed across the land form between the South West and Youanmi terranes of the Yilgarn Craton and links the Wheatbelt and Pastoral regions.

Yalgoo, Paynes Find, Bencubbin, Wubin, Perenjori, Morawa and Mullewa are situated on the boundary of the GCR. These towns provide resources essential for the region including accommodation, health and welfare and support to their communities and visitors.

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\(^1\) Southwest Australian Ecosystem Initiative was established in 2006.
Gathering the Data

While a considerable amount of data was obtained through desktop analysis, three community consultations were held as well as a poster presentation at the Charles Darwin Conservation Reserve Open Day. The meetings and poster day provided opportunities for the respective local communities and decision makers to provide feedback on the project. Field trips were undertaken to key recognised tourism locations as well as additional potential locations that were identified through the community consultation process.

Community Consultation

Each interaction with the community was arranged in participation with the Community Development Officers of Perenjori and Morawa along with the support of their respective Chief Executive Officers. Consultation at Bencubbin was arranged through the local historian. Each forum was facilitated and the outcomes were recorded for each session. The notes were subsequently transcribed for later reference.

Perenjori (29th March, 2016)

Eleven attendees showed a keen interest in nominating their heritage and local tourism sites for inclusion in the Geotourism project. A locally produced book “Sound of the Cockies – Perenjori: 100 years of stories” by Bill and Jenny Bunbury was referred to the researchers. This text captured the essence of Perenjori and its surrounds and provided a useful source of information for the researchers.

Morawa (30th March, 2016)

Four attendees provided valuable local input into what aspects they considered important for Morawa area. The Historical Society was nominated as having detailed information about local heritage, including “The History of Morawa” by Frank H Goldsmith.

Bencubbin (31st March, 2016)

While only three local representatives could make the forum, they were key people with a sound knowledge of tourism aspects for Bencubbin area. Local heritage was captured in “Mount Marshall: A History of the district and its people from earliest times to 1942” by F. H. Broomhall.
Community Contribution
Each forum was introduced to the proposal for geosites and geotrails to be developed in association with their area. Attendees provided useful additional local information on geosites that were not previously known publicly. Most of these sites were visited during subsequent field visits and are listed in Appendix 1.

Community representatives participated fully in the forums and recommended additional local community members who might further assist in the development of geotourism for their local area. They also identified available resources to assist with this program including Historical Societies, local museums and the LGAs.

Accommodation and availability of restaurant services were key areas of concern especially if further tourists were to be encouraged to come to the region. While there are caravan and camping facilities in most towns there are currently no bed and breakfast facilities for a more personalised experience. Costs associated with travel, accommodation and food were identified as constraints in developing tourism opportunities.

Field Visits
Two field trips (Figure 3) were conducted during 2016. The first field trip (26th to 30th April, 2016) commenced with a two day stay at Charles Darwin Reserve (CDR) with the first day involving inspections across the extent of CDR, this program was coordinated and led by Dr Nic Dunlop. The second day was spent at Ningham Station and Paynes Find. Site inspections were then carried out in the area ranging from CDR to Perenjori where the team stayed overnight before travelling to Bencubbin for an overnight stay in Beacon.

During the second field trip (19th to 21st July, 2016) the team travelled to Yalgoo (overnight stay) before driving through the eastern pastoral section of GCR visiting Thundelarra pastoral station before travelling back through to Perenjori. After conducting several interviews the team travelled south visiting locations previously researched as potential Geotourism sites.

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Nic Dunlop is a terrestrial and marine ecologist. As the Environmental Policy and Science Coordinator with the Conservation Council of WA he runs the ‘Citizen Science for Ecological Monitoring Program’. This includes coordinating monitoring and research projects at the Charles Darwin (terrestrial) Climate Change Observatory and the Lancelin Island (marine) Climate Change Observatory.
Figure 3: Routes of research team field visits to the Gunduwa Conservation Region. Not shown in Figure 3 is the southern route which extended from Dalwallinu through Kalannie to Beacon then on to Bencubbin.
The Geological Heritage

The Yilgarn Craton is one of the oldest (Archean) land surfaces in the world (Braimbridge & Commander, 2005). With a land area of some 657,000 km², it forms one of the largest intact segments of Archaean crust on Earth (Anand & Paine, 2002) and is situated in the Pre-Cambrian Western Shield of Australia (Monroe, 2013). It is estimated to be between 3 and 2.5 billion years old, with no evidence of glaciations since the Permian and has been extensively eroded over a long time to give a dominantly flat landscape with remnant higher graduations and isolated outcrops comprising in the main of granites, gneisses and greenstones. The Gunduwa Conservation Region overlies a junction between the South West and Youanmi Terranes of the Yilgarn Craton (Figure 4).

Figure 4: Terranes of the Yilgarn Craton (Note: Yellow markings not relevant to this study).
A geological heritage of deformation and metamorphism has given rise to upstanding land formations of geological, biological and cultural interest. For example, Mount Singleton comprising greenstone and basalt (678m), located on Ningham Station, is a prime geological feature within the region. Such outcrops rise above the ‘Old Plateau’ and are resistant remnants remaining after differential weathering and erosion of the Archaean surface (Payne, Vreeswyk, Leighton, Pringle, & Hennig, 1998). Such greenstone ranges have dense Casuarina and Acacia shrublands associated with them.

Other striking erosional landforms are breakaway escarpments which may be 30 m above the surrounding plains (Figures 5 and 6). Breakaways represent regional erosion fronts in which highly weathered saprolite, capped by a duricrust of indurated saprolite, silcrete or ferricrete is eroded by lateral retreat. Breakaways are commonly well developed on granitic rocks (parts of the Sherwood and Gumbreak land systems) in the survey area (Payne et al., 1998).

![Figure 5: Breakaway near Warrdagga Rock on Ningham Station.](image)

![Figure 6: Breakaway near Mount Marshall on private land.](image)

**Geology and the Landscape**

Australia’s geological heritage is mostly ancient (2 to 3 billion years) granite and greenstone with some formations brought about through relatively recent land movement events. The region also comprises some folded Archean mafic volcanic rocks and is cut by several regional faults that can be traced in a southwest orientation (WCP Resources, 2013).

There has not been any recent glacial activity however some changes have occurred around the edges of the tectonic plate such as the formation of the Darling Scarp and between the different terranes of the Yilgarn Craton giving rise to the Gunduwa landscape. This landscape provides an impressive range of vistas from roads and hill top viewpoints. It is
these features that make the GCR an attractive environment in which to develop a geotourism program.

Geological formations provide opportunities for viewing as ranges, hills and knolls. Within those features can also be seen the detail such as bands of ironstone associated vegetation (Figure 7). Granite outcrops (also known as inselbergs and monadnocks) are also significant landscape features in the region and include outstanding features such as Warrdagga Rock. There are several prominent granite rocks along the Wildflower Drive including Mundine Rock and War Rock which have been developed for visitors with parking, signs and rubbish disposal facilities. These rocks provide the foundation for geotourism as geosites for interpretation of the geology surrounding their origin, and the events surrounding their significance for humans including early exploration and settlement, land clearing and contemporary land use.

Fine detail which can be seen in the geological formations, rocks and crystals provide a connection to Earth and forms the basis for the types of vegetation associated with different soil types which are derived from basement geology (Figures 8 to 11).
From the salt lakes to the ranges Gunduwa provides a variety of landscapes that can attract attention. Lake Moore, Mongers Lake and salt lakes (Figures 12 and 13) reflect ancient paleochannels associated with erosion, silting and flooding. The uplifted ranges display banded iron stone, greenstone and granites and contain a range of metalliferous minerals such as gold, copper, lead and zinc. In some areas, the flat areas between have also been mined for similar metals and there are areas where pit mines remain exposed.
The Landscape and the Biological Environment

The Gunduwa Conservation Region is situated between the South West and Youanmi terranes of the Yilgarn Craton where the regional landform has created a range of soil types and habitats that has over the millennia generated a landscape of considerable environmental significance.

As a reflection of this significance, in 2000, Western Australia’s southwest was the only Biodiversity Hotspot in Australia named out of 15 International Hotspots (Figure 14). There are now 35 International Biodiversity Hotspots including only one other Hotspot in Australia – the “Forests of East Australia” (Williams et al., 2011).

Figure 14: International Biodiversity Hotspots (image courtesy of Google).

Gunduwa lies on the northern boundary of the South West biodiversity hotspot. It also lies within the northern portion of Australian National Biodiversity Hotspot 10 (of 15) and the Interim Biogeographical Regionalisation of Australia (IBRA) of Southern Yalgoo and Central and Eastern Avon Wheatbelt subregions.

Recognition of the importance of the environment within which GCR is situated, lends itself to creating a range of foci that will generate local and international interest in the region.

Protection of the environment is important. There are a range of land tenures within GCR (Figure 15 (p13)). This can make landscape scale land management difficult however, in the case of GCR, it would appear most landowners share a belief for sustainable land management given the large areas of reserves within the region. Within the GCR the Department of Parks and Wildlife own and manage 7 pastoral properties across the region; 2 pastoral properties have been purchased by Non-government organisations (the Australian Wildlife Conservancy leases and manages the Mount Gibson Reserve and Bush Heritage Australia leases and manages Charles Darwin Reserve (CDR) (Figures 16 to 19). Table 1 (p12) shows the respective values associated with each of these conservation oriented reserves.
Ntingham Station is currently leased and managed by three generations of traditional Aboriginal custodians, the Bell family, and includes a Federal Government Indigenous Protected Area of 48,000 hectares covering the Mount Singleton range area.

A mining company holds another lease and the remaining pastoral stations within the GCR are leased and managed by private lease holders.

There are extensive freehold lands under private ownership developed for agriculture in the western and southern sections of the GCR producing mixed grains and sheep (meat and wool).

The Local Government Authorities of Yalgoo, Paynes Find, Perenjori, Morawa, Mullewa, Mukinbudin and Dalwallinu extend across the GCR and each has a commitment to tourism within their respective boundaries whether it is promoting drive trails such as the Wildflower Way or providing and servicing tourism sites for camping and picnicking.

Table 1: Conservation values of Mount Gibson and Charles Darwin reserves.

<table>
<thead>
<tr>
<th>Name of Reserve</th>
<th>Mt Gibson</th>
<th>Charles Darwin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchased/Established</td>
<td>2001</td>
<td>2003</td>
</tr>
<tr>
<td>Size/Area (Hect)</td>
<td>131,710</td>
<td>68,600</td>
</tr>
<tr>
<td>BioRegion</td>
<td>South West Botanical Province - Avon Wheatbelt/Yalgoo</td>
<td>South West Botanical Province - Avon Wheatbelt/Yalgoo</td>
</tr>
<tr>
<td>Ecosystems</td>
<td>16</td>
<td>NA</td>
</tr>
<tr>
<td>Plants</td>
<td>700-800 (est)</td>
<td>680</td>
</tr>
<tr>
<td>Animals</td>
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<td>230</td>
</tr>
<tr>
<td>Mammals</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td>144</td>
<td></td>
</tr>
<tr>
<td>Reptiles</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Amphibians</td>
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<td></td>
</tr>
<tr>
<td>Threatened species</td>
<td>50+</td>
<td></td>
</tr>
<tr>
<td>Threatened Wildlife</td>
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<td></td>
</tr>
<tr>
<td>Plants – priority listed</td>
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<td>27</td>
</tr>
</tbody>
</table>

(Note: Derived from Mount Gibson and Charles Darwin Reserve web pages)
Figure 15: Gunduwa Conservation Region (Source: http://gunduwa.org.au/)
How Aboriginal people lived with and used the landscape

Aboriginal people have lived with and used the landscape as their home and for sustenance for over 40,000 years (Bush Heritage Bush Heritage Australia, 2007a). Gole (2006) suggests that Aboriginal occupation of Western Australia could extend to over 50,000 years ago. The Aboriginal communities developed close associations with components of the region’s abiotic and biotic natural diversity which occur at the junction of four bioregions (Australian Government, 2006). Mount Singleton is regarded as a significant meeting place for three Aboriginal nations: Yamadji, Wongai and Noongar (Australian Government, 2006) and is the custodial land of the Badimaya people. Trading and exchanges took place in this area and there also exists culturally important (men’s and woman’s) places where traditional customs and practices occurred.
Gunduwa is the Aboriginal name given to the short-beaked echidna (*Tachyglossus aculeatus*) and there exists on Charles Darwin Reserve a rock sculpture of unknown age depicting an anteater thought to have been created (hand pecked using rock) by early Aboriginal people (Figure 20).

![Aboriginal Rock sculpture on Charles Darwin Reserve.](image)

Aboriginal people lived a low impact existence with the land engaging in nomadic hunter gathering lifestyles. Communities existed in low populations scattered across the landscape within a relatively hostile environment barely disturbing the land, leaving little impact of their existence other than pathways between watering points (Bush Heritage Australia, 2007a). While some watering points were naturally occurring (Figure 21) some were created in what are known as gnamma holes (Figure 22).

![Water point – Bencubbin (on route).](image) ![Covered gnamma hole for water point (CDR).](image)

While there remain varying opinions about the time Aboriginal people have been in Australia, even with a low impact lifestyle, the extensive timescale of occupation has brought about changes to the landscape through their use of fire for land management and constant nomadic lifestyle. Nomadic Aboriginal families used fire to regenerate the land as they passed through the landscape creating natural feed sources for future hunting and
gathering. This use of fire gradually changed species distribution across the landscape (Bowman, 1998).

Cultural importance has grown during this period of occupation and there exists a strong connection with the land. Natural outcrops provided places for camping and water sources (Figure 23) and from these places families could range outwards gathering natural foods (bush tucker) (B York Main, 2000). Prominent rock outcrops also provided meeting places between the Aboriginal nations of the Noongar, Yamatji and Wongai, with Mount Singleton being a recognised place for ceremonies and trading. Warrdagga Rock, a significant granite outcrop also on Ningham Station with a view towards Mount Singleton, was also a recognised cultural place (Bush Heritage Australia, 2007b).

As oral communicators, stories have evolved providing a rich interpretation of the past. This oral history and interaction with the environment is of interest for tourists. Having Aboriginal individuals and communities involved in telling those stories, sharing the landscapes, cultural and traditional values will have a strong impact on establishing geotourism in the region by telling their own stories of how the landscape came about. Figure 24 shows natural features on granite outcrops.

Figure 23: Gnamma holes.  
Figure 24: Natural surface colorations on granite outcrops.
Early explorers, shepherds, pioneers and miners

The region was explored in the 1840s and 1850s as government and settlers sought new lands for development. Early explorers included N.W Cooke and J.H. Monger in 1868 (after whom Mongers Lake is named) and John Forrest in 1869 on his expedition searching for the missing explorer, Leichardt. Forrest, who later became the first premier of Western Australia, has a popular tourist location east of Perenjori named after him, the John Forrest Lookout (Figure 25). Forrest explored the region moving from peak to peak, naming them as he travelled. In 1876 Forrest used an Aboriginal word when naming Yalgoo Peak. Yalgoo was interpreted to mean a place of blood or the red sap of a nearby bush, Eyalgru, a bloodwood (Shire of Yalgoo, 2017).

![Figure 25: John Forrest Hill Lookout, east of Perenjori looking towards Mount Singleton.](image)

The relict outcrops, ranges and peaks provided crucial survey points across the landscape. They remain significant to Aboriginal people who continue to have cultural and practical values associated with them. The high points often provided guiding directions, sanctuary, habitat, food and water for the Aboriginal communities. Early explorers used them for navigation points as they trekked across the landscape, incorporating them into their surveys.
Early day shepherds including the Benedictine monks roamed the area around Mongers Lake herding sheep and cattle. Water wells and temporary accommodations were constructed; however, dense bush and limited water supplies were limitations on further development. In the north-west of GCR, Yalgoo was an area used by early European settlers for sheep grazing during the wet season after which the herds were driven back to the coastal properties for shearing during summer. From the 1870s, pastoral leases were taken up.

**Mining**

The geological landscape evolved through the Yilgarn Craton terranes with tectonic movement creating uplifts that exposed underlying minerals (Cawood & Tyler, 2004). Early explorer prospectors discovered gold which lead to mining across the region. Mining played a significant role in Yalgoo’s development with gold discovered in the early 1890s with mines such as Joker’s Tunnel creating opportunities for gold extraction. Yalgoo is an attractive town servicing tourists during the wildflower season (Figure 26). In 1894, an explorer George Woodley, discovered gold at Rothsay, east of Perenjori. This mine site closed in 1902 then re-opened in the 1930s before closing again in 1935. The mine has since been re-opened. There is a self-drive heritage interpretation trail from Perenjori to Rothsay (Figure 27). Paynes Find (Figure 28) named in 1911 after Thomas Payne who was the first to discover gold and register a lease in the area, still has an operating gold battery processing gold ore which is also used as a tourist attraction.

**Bencubbin Pioneers**

Near Bencubbin at the southern end of the GCR, the ruins of Pergande Farm reflect early settlement and the creativity of those settlers where sheep yards were constructed from exfoliated granite sheets erected vertically to create sheep runs and holding areas (Figure 29). Making best use of available resources the pioneers also mined the granite outcrops by using fire and water to force further exfoliation to create more building materials.
Figure 26: Yalgoo is home to an historic Police station and courthouse, and the Dominican Chapel of St Hyacinth (pictured) built by Monsignor Hawes in 1920.

Figure 27: Signage in Perenjori for the Perenjori-Rothsay Heritage Trail.

Figure 28: Paynes Find – the home of the only gold battery still operating in Western Australia.

Figure 29: Pergande Farm, Bencubbin where exfoliated granite rock sheets were used to construct sheep yards.
Contemporary Communities

Wheat/sheep to pastoralists
The extent of clearing for agriculture was determined by soil types and rainfall. Several attempts at farming in the 1940s and 1970s failed to extend the clearing line further east. Beyond the clearing line, pastoral stations such as Charles Darwin Reserve (formerly White Wells Station) and Ningham Station survived the demand for clearing and now focus on conservation and tourism (Bush Heritage Australia, 2007a).

West of the clearing line, shires such as Perenjori are highly productive wheat and sheep farms (Shire of Perenjori, 2011). However anticipated climate changes are likely to have a negative impact by 2050. Adaptive farm management strategies are being developed to combat these potential problems (Bruce, 2008).

East of the clearing line pastoral properties have been converting from sheep to cattle as wild dogs and dingos make their impact on smaller livestock. Goats have ranged extensively across the GCR and are now more managed as pastoral leases are managed under both private and public ownership for conservation purposes in the GCR. Figure 30 shows the delineation between cleared agricultural land and the uncleared rangelands.

Figure 30: Looking east from Buntine Rock across cleared agricultural lands towards the rangelands.
Mining
Following early explorers, the land was opened to mining with exploration for minerals recorded as early as 1892 when gold was discovered near Yuin (north-east of Mullewa) and later in Gnaws Nest (Shire of Yalgoo, 1995). Gnow (a local name for malleefowl) was used to name the Gnows Nest gold mine which was pegged in 1918 and operated until 1939 (Hudson Institute of Mineralogy, 2017). In the 1920s, Retaliation Gold Fields (Figure 31) operated on Charles Darwin Reserve and the Julie Mine (Figure 32) which operated in the 1920s to 1930s was reopened in the 1990s using modern mining equipment until it was mined out. Both have left a scar on the landscape.

![Figure 31: The former Retaliation mine site.](image1)

![Figure 32: The former Julie mine site.](image2)

While gold mining has diminished, mining opportunities continue to develop with recent mine site development for extracting iron ore at Extension Hill, Mount Gibson, commencing in 2011 (Figure 33). In the case of the Mount Gibson Iron mine, the ore is crushed onsite before being trucked to Perenjori, loaded onto rail and transported to Geraldton and stored before finally being loaded and exported by ship. Mount Gibson Iron plans to export around 3 million tonnes of ore annually over 5 years (Mount Gibson Iron, 2017).

![Figure 33: A view from the west looking across the Mount Gibson Iron Mine observing the visual impact and scale of mining on the landscape.](image3)
Tourism

The wildflower season in the region is known internationally for its carpets of *Helichrysum bracteatum* (commonly known as everlasting daisies) (Figure 34). There are other flowering plants that also attract attention such as the *Lechenaultia* species (Wreath Flower) (Figure 35). The wildflower season attracts many visitors to the region as day trippers and holiday makers booking out camp sites and caravan sites for weeks on end. According to TourismWA, there are increasing numbers of intrastate, interstate and international visitors arriving in the Golden Outback region (Tourism Western Australia, 2015a). Similar reports apply within the Midwest Development Commission area (Tourism Western Australia, 2015b).

Other than caravan parks and free camping (which is frowned upon under Health and Hygiene regulations) there are limited accommodation opportunities across the GCR. While main towns along the western boundary of the GCR such as Perenjori may have hotel and caravan accommodation, there are few, if any, private or on-farm accommodations providers such as bed and breakfast facilities. Also, as commented on during the stakeholder forums, there are very few opportunities outside of shop hours for dining. Anecdotally, visitors regularly arrive on dusk in search of accommodation and a meal and are often disappointed.

Most towns fringing the GCR have provided tourism amenities where they can within their operating constraints. Towns along the Wildflower Way have participated in signage and feature programs to provide attractions for their visitors. These include the metal carved silhouettes (Figure 36) and wildflower signs (Figure 37).
Perenjori has engaged with its community to create heritage walks and designed and incorporated street art on rubbish bins to improve the main street appearances (Figures 38 to 40).

Perenjori and Mount Magnet (Bencubbin/Beacon) both maintain tourist visitor sites. Perenjori has established visitor attractions such as Mongers Lake Lookout, John Forrest Lookout (Figure 41) and Camel Springs site (Figure 42). Mount Marshall Shire provides and maintains facilities at Mount Marshall (figure 43) and Pergande Farm site (Figure 44).
The town of Kalannie has also established visitor facilities with an entrance statement (Figure 45) and interpretation of the town’s heritage (Figure 46). Interestingly, the displays are often incorporated with local granite rock.
Improving the Regional Image

Improving the GCR’s image can mean many things – signs, toilets, parking areas, rubbish bins, walk trails, interpretation at site, of sites and information shelters. In recent times, effort and funding by those involved such as Local Government Authorities (LGAs) and Bush Heritage Australia has been improving the image throughout the Gunduwa Conservation Region. From interviews with shire Chief Executive Officers provision is being made in LGA budgets to maintain facilities however it remains a large task given the size of the region. There remain many examples on pastoral leases and at sites previously funded by grant allocations that require replacement, repair or updating. Figures 47 to 53 show examples of the status of signs across the region.

Figure 47: Rothsay Gold mine directional sign.
Figure 48: Jokers Tunnel, Yalgoo.
Figure 49: Warrdagga Rock sign.
Figure 50: The Salmons.
Several of the facilities and infrastructure within the region are showing signs of wear and tear, and others could be considered inappropriate or rustic. Often this is possibly an outcome of Commonwealth and State capital grants which enable the installation of visitor information and amenity services without provision for the maintenance of such services. This then falls back onto already extended LGAs or other organisations to fund the maintenance. Some communities take matters into their own hands. Figures 54 to 57 are examples where maintenance or re-installations are required or should be reconsidered.
Former exploration and mining sites also represent safety hazards (Figures 58 and 59). This area is a challenge for management with many unmarked exploratory digging and other more recent excavations on both public and private lands, leasehold and unvested crown reserves.
The Way Forward, with a Focus on Geotourism

There is a strong commitment within the region for tourism development. Stakeholders have expressed strong support for tourism development and have made considerable recommendations through community forums and in completion of questionnaires used to determine stakeholder perceptions about developing geotourism in the region. The opportunity to develop Geotourism within the Gunduwa Conservation Region appears to be significant and in considering opportunities for establishing a program for geotourism several case studies were initiated. These case studies incorporate information from the field surveys which are outlined in Appendix 1. Figure 60 displays survey routes and 50-kilometre travel circuits from key centres used to develop case studies.

![Field survey routes and 50-kilometre arcs from key centres to determine geotour circuits.](image_url)
Case studies

For geotourism development in the Gunduwa Conservation Region, the main town/place centres were initially selected and 50-kilometre radius arcs defined for each area to provide an overview of achievable day trips to view geosites. Charles Darwin Reserve and Ningham Station were considered self-contained areas of interest that would provide a day trip within their bounds. A key feature for the GCR is to integrate the Aboriginal stories into the landscape and combine this with geotourism. Selections of sites which have been summarised for their geotourism potential are depicted above in Figure 60.

Geotourism opportunities derived from Charles Darwin Reserve

A survey of Charles Darwin Reserve (CDR) revealed a plethora of geotourism opportunities extending from north to south. Rock features in the south such as breakaways (Figure 61) provide the visual factor which can then lead to interpretation of soil formation and the relationship of vegetation to soil types (Figure 62). Aboriginal land use and customs could be explained where they relate to the place by engaging with Traditional custodians.

Further north old mining sites, exposed geology and remnant buildings and mine entry points provide sites for interpretation of early exploration for gold, living conditions, successes and disappointments (Figures 63 and 64).

There is also the story of CDR and its conservation endeavours, community science and awareness campaigns, and the significant facilities on site (Figure 65).

Figure 61: Charles Darwin Reserve breakaway.  Figure 62: CDR flora on different soil types.
Furthermore there is the potential to link geotourism into the events that CDR hosts. The geotours could be held in conjunction with the current bus trips provided for visitors at the Blues for the Bush Concert Event, other open days or linked in with other peak visitation periods.
Geotourism opportunities derived from Ningham Station

With an Indigenous Protected Area (IPA) established in 2006, Ningham Station (Figures 66, 67 and 68) has the potential to become a significant geotourism destination linked to, and with, Aboriginal cultural values. Mount Singleton (almost 700 metres above sea level) is at the intersection of four bio-regions, giving the location special significance. The geology of the region underpins this biodiversity.

Mount Singleton provides a challenge for vehicle drivers with opportunities along the drive for interpretation of geo-features and of links to Aboriginal culture. From the summit the views could be interpreted to cover Aboriginal landscapes, cultural heritage and engagement between the three nations – Noongar (south), Yamatji (north and west) and Wongai (east) – as they came together at Mt Singleton as their meeting place.
Mount Singleton is within Ningham Station lease area and within the Indigenous Protected Area (IPA). It is a significant feature in the region with 360 degree views across the landscape (Figure 69).

There is also opportunity to present information on early exploration and explorers as well as contemporary land use including mining and pastoralism. A large granite outcrop, Warrdagga Rock (Figures 70 and 71), located approximately within 45 minutes of the Ningham homestead, is of Aboriginal cultural significance and is recognised in the IPA. This makes an excellent story to be told by Aboriginal tour leaders.
Geotourism opportunities derived from Perenjori
Gazetted in 1916, Perenjori is today a main tourism hub as a destination with a fully serviced caravan park, fixed accommodation and hotel. It has an attractive streetscape, a rich cultural heritage and is near several key geotourism features including Camel Soak, John Forrest Hill Lookout (named during Forrest’s 1897 exploration and is part of the Damperwah Hills, previously named by Forrest in 1869), Rothsay Minesite, Mongers Lake and Monks Well, and The Salmons Rock (Figures 72 to 75). These sites are within a half day’s drive along accessible roads.

Figure 72: Perenjori-Rothsay Heritage Trail – John Forrest Lookout. Figure 73: Mongers Lake Lookout plaque.

Figure 74: Camel Soak with picnic/camping site.  Figure 75: The Salmons Rock.

Potential exists for daily tours to be established from the caravan park in peak season; however this needs to be tested. The opportunity to provide details of the geological heritage and linking this with Aboriginal cultural values and uses, early explorer uses and contemporary events makes this an exciting proposition.
Geotourism opportunities derived from Bencubbin

The backdrop to the town of Bencubbin is Mount Marshall, which although to the south east of the GCR demarcation, has two granite domes with a camp ground located between them, managed by the Mount Marshall Shire. The peak has 360 degree views across an extensive agricultural landscape which includes distant granite outcrops and salt flats, the surface expression of ancient paleochannels (Figures 76 and 77).

Bencubbin may benefit from recently developed transportable accommodation near the town centre. If this does transpire it will increase the town’s tourism potential markedly.

Nearby is Pergandes farm, a pioneer farm and homestead in the district, which used exfoliated granite slabs to create sheep pens (Figure 78). While now in ruins (Figure 79), the site is well interpreted and signposted with a comprehensive information shelter providing the history of Pergande farm (Figures 80 and 81).
Figure 78: Pergande granite slab sheep yards.

Figure 79: Pergande shearing facility ruins.

Figure 80: Pergande homestead (1970s)  
(Photograph from Interpretation panel)

Figure 81: Pergande information shelter.
Using Beacon as a base (as it has a caravan park with accommodation), there is an opportunity for geotrails to be developed with interpretation to include Askew Salt Lake – eastern portion (Figures 82 and 83), Datjoin Rock and Lookout (Figures 84 and 85) to the east and Billiburning Rock (Figures 86 and 87) to the north. Similar tours proposed for Perenjori could be arranged from the Beacon caravan site to take in these geological features. The stories of landscape, paleochannels, Aboriginal cultural heritage, early pioneer and contemporary land uses could be developed as interpretive themes for tourism.

![Figure 82: Askew Salt Lake (eastern portion) looking north along the Beacon Bencubbin Road.](image1)

![Figure 83: Askew Salt Lake (eastern portion) looking west.](image2)

![Figure 84: Datjoin Rock.](image3)

![Figure 85: Datjoin Rock Lookout.](image4)

![Figure 86: Billiburning Rock.](image5)

![Figure 87: Billiburning Rock Lookout.](image6)
**Geotourism opportunities derived through Karara Rangelands Complex**

Excellent work by the Department of Parks and Wildlife (DePaW) has laid the foundation for an extensive conservation oriented tourism experience extending from west to east across the Gunduwa Conservation Region (GCR). In a response to a question by the Honourable Robin Chapple (Legislative Council of Western Australia, 2015), pastoral leases Locharda, Karara, Thundelarra, Burnerbinmah and Kadji Kadji were purchased between 1995 and 2007 to become part of the State conservation reserve system. Recently a Recreation Master Plan was commenced that will formalise opportunities for management, recreation and tourism at several locations within the complex.

The Karara Rangeland Park will encompass six former pastoral leases with Thundelarra as the headquarters due to its existing and serviceable infrastructure which will provide for visitor accommodation and camping onsite. A park ranger has recently been appointed to manage the complex.

Opportunity exists for a collaborative approach to attract and retain tourists to the GCR for extended stays well beyond the wildflower season. Concepts are being developed by DePaW for entrance ways into the complex and several homesteads are being refurbished to provide camping and accommodation. Other off road camping sites are also being considered within the pastoral lease areas.

**Geotourism opportunities derived through Batavia Coast**

Consideration is being given to developing Geotourism opportunities within the coastal region surrounding Geraldton. One proposal, a foreshore Geo Rock walk, has the potential to be an information jump off point where visiting tourists find out about the different geology and sites within the region then, following Geotrails, make their way to the Gunduwa Conservation Region.

Collaboration and partnerships are the keys with this concept. Early engagement with the Batavia Coast Maritime Heritage Association would be important to ensure the goals for the GCR are supported in Geraldton and on the coastal region. A recent proposal through the Batavia Coast group is for a “cluster” to be established that would facilitate Geotourism, Geotrails and Geopark development across the Mid West Region. This follows the growing interest in the development potential of Geotourism which includes a proposal for Murchison focussed Geotourism, a project initiated under the Mid West Development Commission Blueprint.
Additional Geotourism Opportunities

While much focus has been on established tourism sites of geological interest, there are other aspects that could be included with interpretation in developing geotourism trails. For example, near Beacon, excavations for sand (Figure 88) show a different and contrasting image to the granite outcrops. The sand results from weathering over the millennia of ancient landforms. There is a story to be told of its formation, vegetation adapting and growing on it and contemporary land uses for it.

Some of the less known geologic features can be further identified and, provided access is available, interpretation and formal infrastructure that will enable the conservation and protection of these sites, such as Datjoin Rock where graffiti has been applied to the rock surface (Figures 89 and 90).
More recent geotourism opportunities have been developed including geocaching, a geo-hunt activity which engages with interested community members who use GPS technology to locate hidden caches in which a range of materials and information are stored. This sport does require a level of management to ensure conservation and protected places remain protected.

**Linking Vegetation with Geology**
The natural vegetation links with the geology of the landscape. Interpretation of the different vegetation types and their association with the underlying soil and rocks can be used to increase awareness of the importance and responsiveness of remnant vegetation in the rural landscape. Stories can be told of the original vegetation types (Figure 91), clearing for agriculture (Figure 92), subsequent findings about over clearing and contemporary efforts to redress this through tree planting activities for carbon and woodland restoration.

![Figure 91: Western Woodland Vegetation (Beacon).](image)

![Figure 92: Remnant vegetation on granite outcrop (Buntine Rock).](image)
Integrating Aboriginal Culture and Heritage

Many tourists come to Australia to see and interact with Aboriginal people. Few ever get to have that experience and the few that do often only visit arts and crafts shops where Aboriginal souvenirs are on display or for sale.

There are opportunities for Aboriginal individuals to provide guiding services within which they relate their culture and heritage, in this case, with the geology of the region, including developing, maintaining and using gnamma holes, hunting and gathering techniques and stories from dream times. Aboriginal communities can also provide displays of arts and crafts, bush tucker and storytelling.

Stories associated with the geology of the region would support geotourism, providing an educative source to visitors and employment for local people.

Anecdotal and research information indicates that where show and tell story opportunities have previously been trialled they have been successful. Morrison, Collins, Basu, and Krivokapic-Skoko (2014, p. 14) observed “For example a Darwin-based tourism business owned and operated by an Indigenous woman had a comparative business advantage that derived from the ability to provide Indigenous insights to the experience of local and international tourists.” These tourism business opportunities could be linked into the wildflower season and provided as invitations for caravan visitors to attend or for specially designed tourism programs advertised as such to coincide with local agricultural shows and events.
Incorporating European Heritage

There are many excellent opportunities to link with European heritage. Early explorers who travelled throughout the region provide a basis for guided drives and walks. Most notably, the John Forrest story could provide a link not only with his exploration adventures where a trail between stone cairns might be developed but also with his political successes being the first Premier of Western Australia. Just imagine, you are standing at the very same place as the first Premier of Western Australia did in 1897?

Further opportunities arise from long past mining towns, their remnant structures, cemeteries and still standing heritage buildings, to abandoned gold mines and associated infrastructures. Each place has a unique story to be told (Figures 93 to 98).
Conclusion

This report provides an inventory of geotourism potential in an ancient, flat, low population landscape and specifically within the Gunduwa Conservation region. The objective for this stage (Stage 1) of the research was to determine the potential for establishing a sustainable geotourism program in the Gunduwa Conservation Region by assessing the geological formations and landscapes, and determining the potential for local community support and engagement in undertaking future geotourism programs. Accordingly, the geotourism potential was determined by exploring the possibilities of existing and additional tourism opportunities in the Gunduwa Conservation Region which are based on geological features, proven human use and landscape characteristics.

A series of forums were held in March 2016 with local stakeholders at Morawa, Perenjori and Bencubbin. Stakeholders advised there have been many forums to engage with the community but few obvious outcomes that ensued in the form of employment and tourism development opportunities. This subsequently contributed to stakeholder burnout and reduced interest in attending such forums. It is anticipated that this report might go some way towards developing sustainable tourism in the region, mainly in the form of geotourism.

Stakeholders also provided feedback on what the limitations were to tourism development and suggested opportunities to improve current services. Two key limitations were available accommodation and limited catering facilities. Stakeholders recounted how tourists regularly arrived after closing time (for shops and the hotel) on the expectation of being able to purchase an evening meal and often had to wait until the following day to obtain food and supplies. Such situations make it difficult to accommodate additional visitors to the region.

Field visits were made to locally known tourist sites across the breadth of the Gunduwa Conservation Region (GCR) with a view to providing an initial assessment if they would be suitable for development and inclusion as a geosites. Appendix 1 tabulates the sites visited and lists geotourism opportunities for each. These visits yielded a wealth of information about the status of sites and of the potential for development particularly when introducing a landscape story telling concept that brings in the geology, flora and fauna, Aboriginal culture and heritage, early European explorers and settlement, as well as contemporary land uses. No one place can nor needs to tell the same story.
To determine the geotourism potential of the region, 50-kilometre arcs into the GCR were determined for each key location. Within these arcs geosites were identified and worked into case studies, some of which are provided in this report. The aim for this process was for the geosites to be accessible and attractive to visitors to encourage them (the visitors) to stay another day/night at the key location and then visit the sites during their stay. If this can be achieved there will result an increase in demand for accommodation, food and other services within the region.

The range of geosites available from each key location provides a solid basis for developing geotourism. For example, within Charles Darwin Reserve half day self-drive and guided geotrails could be developed providing information using brochures, signs and previously downloaded mobile phone Apps. Visitors might stay an extra night to take advantage of this activity.

In peak times, such as the wildflower season, guided tours and visits could be led by local Aboriginal people who could interpret their connection with the land which itself is based on the geology of the environment. There is potential for this approach to be developed at most of the key locations associated with GCR. Yalgoo raised the possibility of fly-in/fly-out visitors using the recently upgraded airstrip, providing an air-conditioned bus driven by a local Aboriginal person and taken on a tour of the local geosites. Perenjori raised the possibility of providing a similar geotourism experience based on the caravan park from which advertised geotours might start.

These opportunities need to be supported by improving tourism services throughout the region. Access, signage, information shelters, camping facilities, rubbish disposal and support services are required to develop sustainable geotourism.

The findings for Stage 1 of this process indicates there exists significant potential for geotourism to be developed within the GCR. There is community, Local Government Authority and government agency (DePaW, Mid West Development Commission and Tourism WA) support to further develop and implement a coordinated program, within the constraints of each party, for geotourism. The improvement of existing tourism services needs to be addressed along with the identification and development of geotrails. Recommendations are proposed as follows.
Recommendations

This Stage 1 report has addressed the potential for establishing geotourism in the region and has carried out a preliminary assessment of geosites across the extent of the GCR. It is important that further business and community consultation and engagement program be undertaken to underwrite confidence in developing the geotourism program as areas such as accommodation, catering and tourism services need to be consolidated. Local Government Authorities (LGAs) also should continue to show commitment towards the geotourism program. Similarly, government agencies, such as the Department of Parks and Wildlife (DePaW), Mid West Development Commission and Tourism WA, need to be consulted and enlisted to provide support in coordination and marketing of the geotourism program. DePaW, in particular, needs to be engaged with the geotourism program given its extensive pastoral lease holdings in the region and its influence over attractions, access and accommodation within the region. With these considerations in mind, the following recommendations are proposed:

- Consolidate business and community attitudes and support for the Geotourism program;
- Confirm Local Government Authorities and State agencies administrative and financial support for the Geotourism program and include funding support towards its implementation and maintenance;
- Engage a coordinating group to facilitate the development and implementation of the Geotourism program (consider a subcommittee of the GCR);
- Seek funding (Royalties for Regions) and engage an appropriately qualified consultant coordinator to develop, cost and implement the Geotourism program;
- Implement stages 2 to 4 to develop the Geotourism program;
- Undertake a review and cataloguing of assets associated with geological formations, fauna and flora to build a database for their conservation, protection and sustainable use within the project. The review would be in liaison with Aboriginal elders to ensure sites deemed culturally sensitive are protected where requested and appropriately acknowledged and to ensure persons utilising these places respect the cultural sensitivity of the site.
- Reach an agreement and develop opportunities with Aboriginal elders for access and interpretation of accessible places and cultural sites, and engage Aboriginal people to provide tourism services within the GCR.
- Review all current tourism businesses and opportunities to determine an overall strategic approach to developing each asset into the project.
- Consider nominating the GCR as a Geopark in due course as there are many features that would support the concept and this would also bring about increased coordination, marketing and promotional opportunities;
- Review progress on a regular basis and inform the business and community groups involved to maintain their support.
References


## Appendix 1

### Inventory of Indicative Geotourism Products based on Field Surveys

<table>
<thead>
<tr>
<th>Ref. #</th>
<th>Site</th>
<th>Geology Visible</th>
<th>Flora/Fauna</th>
<th>Aboriginal attributes</th>
<th>Cultural attributes</th>
<th>Landscape story</th>
<th>Management</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Charles Darwin Reserve (Overview)</td>
<td>Granite, Banded Ironstone, Greenstone</td>
<td>Eucalypt woodlands; Acacia</td>
<td>Aboriginal art (Gunduwa), gnamma holes, shelter.</td>
<td></td>
<td>Meeting point of 4 Aboriginal groups; Biogeographic region; Previous mining; Conservation of rare/endangered species.</td>
<td>Bush Heritage Australia as conservation reserve; Community science programs; Accommodation on site.</td>
<td>Remote; Off road access only.</td>
</tr>
<tr>
<td>1</td>
<td>Jokers Tunnel</td>
<td>Tunnel through geological feature; banded rock</td>
<td>Acacia</td>
<td>Unknown.</td>
<td></td>
<td>Geological feature; early explorer mining.</td>
<td>Yalgoo; 4WD access.</td>
<td>Limited interpretation or facilities.</td>
</tr>
<tr>
<td>8</td>
<td>CDR - South granite lookout</td>
<td>Granite mound; view towards Mt Singleton.</td>
<td>Acacia</td>
<td>Aboriginal marking on granite boulder.</td>
<td></td>
<td>Geological formations; Landscape; Aboriginal significance.</td>
<td>BHA pastoral lease.</td>
<td>Managing visitors; 4WD access.</td>
</tr>
<tr>
<td>9</td>
<td>CDR - Salmon gum corner</td>
<td>Breakaway country.</td>
<td>Eucalyptus; Acacia</td>
<td>Unknown.</td>
<td></td>
<td>Geology, landscape and vegetation.</td>
<td>BHA pastoral lease.</td>
<td>Managing visitors; 4WD access.</td>
</tr>
<tr>
<td>10</td>
<td>CDR - Edna Springs</td>
<td>Flat expansive granite outcrop.</td>
<td>Acacia</td>
<td>Aboriginal gnamma holes; use of fire to make gnamma holes.</td>
<td></td>
<td>Geology; Aboriginal heritage; early explorers.</td>
<td>BHA pastoral lease.</td>
<td>Managing visitors; 4WD access.</td>
</tr>
<tr>
<td>11</td>
<td>CDR - Retaliation Mine</td>
<td>Geological formation; natural range; open mine shows geology.</td>
<td>Eucalyptus; Acacia</td>
<td>Unknown.</td>
<td></td>
<td>Geological formation; Aboriginal heritage; early explorer; pastoral use.</td>
<td>BHA pastoral lease.</td>
<td>Managing visitors; 4WD access.</td>
</tr>
<tr>
<td>Ref. #</td>
<td>Site</td>
<td>Geology Visible</td>
<td>Flora/Fauna</td>
<td>Aboriginal attributes</td>
<td>Cultural attributes</td>
<td>Landscape story</td>
<td>Management</td>
<td>Issues</td>
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<tr>
<td>12</td>
<td>CDR - Julie Mine</td>
<td>Geological formation; open mine shows geology.</td>
<td>Eucalyptus; Acacia</td>
<td>Unknown.</td>
<td>Geographical features</td>
<td>Geological formation; Aboriginal heritage; early explorer; pastoral use.</td>
<td>BHA pastoral lease.</td>
<td>Managing visitors; 4WD access.</td>
</tr>
<tr>
<td>14</td>
<td>Ningham Station</td>
<td>Flat, expansive with high ranges, Mt Singleton and granite outcrops.</td>
<td>Eucalyptus; Acacia</td>
<td>High cultural heritage value; meeting place for 3 Aboriginal nations; Indigenous Protected Area (IPA).</td>
<td>Geological formation; Aboriginal heritage; early explorer; pastoral use.</td>
<td>Ningham pastoral lease and IPA.</td>
<td>Managing visitors; 4WD access.</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Mount Singleton</td>
<td>Outstanding geological feature; banded ironstone.</td>
<td>Eucalyptus; Acacia</td>
<td>High cultural heritage value; meeting place for 3 Aboriginal nations; Indigenous Protected Area (IPA).</td>
<td>Geological formation; Aboriginal heritage; early explorer; pastoral use.</td>
<td>Ningham pastoral lease and IPA.</td>
<td>Managing visitors; 4WD access.</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Warrdagga Rock</td>
<td>Outstanding granite geological feature.</td>
<td>Eucalyptus; Acacia</td>
<td>High cultural heritage value; meeting place for 3 Aboriginal nations; Indigenous Protected Area (IPA).</td>
<td>Geological formation; Aboriginal heritage; early explorer; pastoral use.</td>
<td>Ningham pastoral lease and IPA.</td>
<td>Managing visitors; 4WD access; visitor impacts (walk trails, camping, bins, information).</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Mongers Lake Lookout</td>
<td>Breakaway formations</td>
<td>Acacia</td>
<td>Unknown.</td>
<td>Geological formation; early explorer; pastoral use.</td>
<td>Perenjori; DePaW.</td>
<td>Managing visitors; Access; visitor impacts (walk trails, camping, bins, information).</td>
<td></td>
</tr>
<tr>
<td>Ref. #</td>
<td>Site</td>
<td>Geology Visible</td>
<td>Flora/Fauna</td>
<td>Aboriginal attributes</td>
<td>Landscape story</td>
<td>Management</td>
<td>Issues</td>
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<tr>
<td>23</td>
<td>Camel Soak Well</td>
<td>Granite formation.</td>
<td>Eucalyptus; Acacia</td>
<td>Link to water source and gnamma holes.</td>
<td>Geological formation; Aboriginal heritage; early explorer; pastoral use.</td>
<td>Perenjori.</td>
<td>Managing visitors; Access; visitor impacts (walk trails, camping, bins, information).</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Perenjori</td>
<td>Flat plains.</td>
<td>Eucalyptus</td>
<td>Unknown.</td>
<td>Geological weathering to create plains; exploration and early settlement; contemporary land use.</td>
<td>Perenjori.</td>
<td>Accommodation and services during peak visitor periods; low population (now increasing?)</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Caron Dam</td>
<td>Flat plains; deep yellow sands.</td>
<td>Eucalyptus</td>
<td>Unknown.</td>
<td>Geological weathering to create plains; exploration and early settlement; contemporary land use.</td>
<td>Perenjori.</td>
<td>Not a strong feature for geotourism; managing visitors; Access; visitor impacts (walk trails, camping, bins, information).</td>
<td></td>
</tr>
<tr>
<td>Ref. #</td>
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<td>Geology Visible</td>
<td>Flora/Fauna</td>
<td>Aboriginal attributes</td>
<td>Landscape story</td>
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<td>33</td>
<td>Xantippe Tank</td>
<td>Geological feature; deep yellow sand beside granite outcrop.</td>
<td>Acacia</td>
<td>Unknown.</td>
<td>Geological weathering to create plains; exploration and early settlement; contemporary land use.</td>
<td>Dalwallinu.</td>
<td>Not a strong interpretative feature for geotourism.</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Petrudor Rock</td>
<td>Granite outcrop.</td>
<td>Eucalyptus; Acacia</td>
<td>Cultural value; gnama holes.</td>
<td>Geological formation; Aboriginal heritage; early explorer; pastoral use.</td>
<td>Kalannie.</td>
<td>Managing visitors; Access; visitor impacts (walk trails, camping, bins, information).</td>
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</tr>
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<td>Ref. #</td>
<td>Site</td>
<td>Geology Visible</td>
<td>Flora/Fauna</td>
<td>Aboriginal attributes</td>
<td>Cultural attributes</td>
<td>Landscape story</td>
<td>Management</td>
<td>Issues</td>
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<tr>
<td>40</td>
<td>Beacon sand pit</td>
<td>Deep yellow sands.</td>
<td>Eucalyptus; Acacia</td>
<td>Unknown.</td>
<td></td>
<td>Link with geological weathering and erosion; formation of sand plains.</td>
<td>Mount Marshall.</td>
<td>Not currently developed; potential geosite.</td>
</tr>
<tr>
<td>41</td>
<td>Datjoin Rocks</td>
<td>Prominent granite outcrop with unique features.</td>
<td>Eucalyptus; Acacia</td>
<td>Shelter; forage; water source.</td>
<td></td>
<td>Geological formation; cultural values; early explorer; contemporary land use.</td>
<td>Mount Marshall.</td>
<td>Managing visitors; Access; visitor impacts (walk trails, camping, bins, information).</td>
</tr>
<tr>
<td>44</td>
<td>Askew Salt Lakes</td>
<td>Eroded landscape with underlying paleochannel and salt river flow.</td>
<td>Eucalyptus; Acacia</td>
<td>Possible source for forage and salt.</td>
<td></td>
<td>Geological weathering; erosion; sedimentation; underground river systems.</td>
<td>Mount Marshall.</td>
<td>Not currently developed.</td>
</tr>
<tr>
<td>45</td>
<td>Mount Marshall Rock</td>
<td>Prominent granite outcrop with unique features.</td>
<td>Eucalyptus; Acacia</td>
<td>Shelter; forage; water source.</td>
<td></td>
<td>Geological formation; weathering; development of gnamma holes; early explorer; water capture using granite slabs.</td>
<td>Mount Marshall.</td>
<td>Managing visitors; Access; visitor impacts (walk trails, camping, bins, information).</td>
</tr>
<tr>
<td>47</td>
<td>Bencubbin breakaway</td>
<td>Geological erosion creating breakaways</td>
<td>Eucalyptus; Acacia</td>
<td>Shelter; forage.</td>
<td></td>
<td>Geological formation; erosion by wind and water.</td>
<td>Mount Marshall.</td>
<td>Not currently developed; privately owned farm land.</td>
</tr>
<tr>
<td>Ref. #</td>
<td>Site</td>
<td>Geology Visible</td>
<td>Flora/Fauna</td>
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<tr>
<td>48</td>
<td>War Rock</td>
<td>Granite outcrop; flat with erosion; gnamma and soak.</td>
<td>Eucalyptus;</td>
<td>Water source.</td>
<td>Geological formation; Aboriginal culture; early explorer; contemporary land use.</td>
<td>Morawa.</td>
<td>Managing visitors; Access; visitor impacts (walk trails, camping, bins, information).</td>
<td></td>
</tr>
<tr>
<td>49</td>
<td>Bilya Rock</td>
<td>Granite outcrop; early explorer rock cairn (Forrest);</td>
<td>Eucalyptus;</td>
<td>Water source.</td>
<td>Geological formation; Aboriginal culture; early explorer; contemporary land use.</td>
<td>Morawa.</td>
<td>Managing visitors; Access; visitor impacts (walk trails, camping, bins, information).</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>Yalgoo breakaway</td>
<td>Geological feature with erosion by wind and water; multi-coloured.</td>
<td>Acacia</td>
<td>Possible shelter and forage.</td>
<td>Geological formation; Aboriginal culture; early explorer; contemporary land use.</td>
<td>Yalgoo.</td>
<td>Not currently developed; private leasehold; Gnows Nest nearby.</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Gnows Nest</td>
<td>Geological feature with erosion by wind and water; multi-coloured.</td>
<td>Acacia</td>
<td>Possible shelter and forage.</td>
<td>Geological formation; Aboriginal culture; early explorer; contemporary land use.</td>
<td>Yalgoo.</td>
<td>Vehicle layby on side of road with interpretative panel on mound; no access into breakaway.</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>Yalgoo - Paynes Find mine site</td>
<td>Geological feature; range of hills; mining.</td>
<td>Acacia</td>
<td>Unknown.</td>
<td>Geological formation; early explorer; early mining.</td>
<td>Yalgoo.</td>
<td>Not currently developed; Private leasehold land.</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Yalgoo - Paynes Find Old mine site</td>
<td>Geological feature; range of hills; mining.</td>
<td>Acacia</td>
<td>Unknown.</td>
<td>Geological formation; early explorer; early mining.</td>
<td>Yalgoo.</td>
<td>Not currently developed; Private leasehold land.</td>
<td></td>
</tr>
</tbody>
</table>