IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 08 November 2017

Please note: this is an archived Conservation Outlook Assessment for Australian Fossil Mammal Sites (Riversleigh / Naracoorte). To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Australian Fossil Mammal Sites (Riversleigh / Naracoorte)

SITE INFORMATION

Country:
Australia
Inscribed in: 1994
Criteria:
(viii) (ix)

Site description:
Riversleigh and Naracoorte, situated in the north and south respectively of eastern Australia, are among the world's 10 greatest fossil sites. They are a superb illustration of the key stages of evolution of Australia's unique fauna. © UNESCO

SUMMARY

2017 Conservation Outlook

Good

While a number of threats and other issues affecting the property exist they are all minor and do not impact upon the Outstanding Universal Value of the property. The current state of World Heritage values continues to be good, because overall threats at the moment are very low, although higher at Riversleigh. At the present time, site protection and management are effective. Accordingly, the conservation outlook remains good but there is concern regarding the sustainability of funding and consequent effects on attaining and managing future research. The unique aspect of the AFMS is that its value lies in knowledge and understanding, a value which should be constantly pursued and enhanced. The addition of sustainable funding as a key performance indicator would be beneficial. Such an indicator should reflect current and sustainable funding models that contribute to education, protection and management.

Current state and trend of VALUES

Good
Trend: Stable

The current state of the AFMS WH values is good and stable. The extent to which the fossils are affected by excavation in Riversleigh is less than 1%. Excavations in Naracoorte affect a higher proportion but most of the valuable deposits have not been disturbed. Both sections of the property implement strict procedures to ensure that disturbance is minimal and that the specimens retrieved are not widely dispersed.

Overall THREATS

Very Low Threat

Threats such as site damage and illegal fossil collecting are considered to be very low due to controlled public access and supervised research activity and (at

Riversleigh), remoteness and relatively low numbers of visitation. Provided there is continual and further (extra) funding support the threat level remains at very low. Concerns about compliance with research practices should be addressed by rigorous monitoring by the management authorities. At Naracoorte, access to the site is by permit and/or supervision. Illegal access is a low threat - Naracoorte's fossil sites are underground and in the main are secure from impact from natural events. Illegal access to Riversleigh is much more difficult to control and has led to allegations of theft of unique and irreplaceable materials. Overall, the threat to the World heritage values of the property is very low.

Overall PROTECTION and MANAGEMENT

Mostly Effective

The protection and management of the property is mostly effective although there is some concern about the security of funding. The integrity of both sites is dependent on management plan updates (maintenance of cave monitoring and regular inspections), adaptive management (necessary actions taken if current management practices are found to be ineffective) and continued financial support for on-going site protection, staff training and scientific research. Protection and management in the future may therefore be limited by lack of funding support for on-going site protection and the upkeep and maintenance of interpretive facilities. While there is currently no single management plan for the entire Property which consists of two component sites – Riversleigh and Naracoorte, consultations are ongoing on finalising a draft Australian Fossil Mammal Sites – Strategic Management Framework for the Property. This draft Framework has been prepared to complement existing legislative structures and other regimes to address Australia's international responsibilities under the World Heritage Convention. The Framework specifically describes how the existing management and governance arrangements provide for the long-term protection, conservation, presentation and transmission of the World Heritage values of the Property. The Framework provides overarching guidance for management of the Australian Fossil Mammal Sites while detailed management objectives and strategies for Riversleigh and Naracoorte are included in site-specific management plans prepared by the respective State governments. (Draft AFMS SMF).

FULL ASSESSMENT

Description of values

Values

World Heritage values

► **Extensive deposits of vertebrate fossils**
Criterion:(viii)

The property contains and protects extensive vertebrate fossil deposits which provide a significant insight to the understanding of the record of life in Australia during some major stages of Earth's history.

Riversleigh provides exceptional, and in many cases unique, mammal assemblages spanning the period from Late Oligocene (approximately 28 million years ago) to Late Pleistocene in age (approximately 30,000 years ago). From studying these assemblages it is possible to document changes in habitat from humid, lowland rainforest to dry forests, woodlands and grasslands. These assemblages also provide the first fossil record for many distinctive groups of living mammals such as the marsupial moles and feather-tailed possums. The Naracoorte assemblages open a window into a significant period of Earth’s history from the mid-Pleistocene to present (530,000 years ago to today), a period characterised by great climatic changes. (SoOUV, 2012)

► **Evidence of evolutionary change**
Criterion:(ix)

The two component sites provide complementary evidence of key stages in the evolution of the fauna of one of the world's most isolated continents. The history of mammal lineages in modern Australia can be traced through these

fossil deposits and, as a consequence, there is a better understanding of the conservation status of living mammals and their communities. Both component sites are rich in a diverse range of vertebrates including mammals and at Riversleigh also plants and invertebrates.

The Naracoorte assemblages span the time of arrival of humans to Australia and thus are of additional value in helping unravel the complex relationships between humans and their environment. The sites highlight the potential impacts of climatic change and humans on Australia's mammals, including its now vanished megafauna. (SoOUV, 2012)

Other important biodiversity values

- **Breeding habitat for the critically endangered Southern bent-wing bat**

The major extant faunal feature of the Naracoorte section of the property is its population of the 'Critically Endangered' Southern bent-wing bat (Miniopterus orianae bassanii). Each population of bent-wing bats in Australia occupies a relatively discrete geographical range. Within this range, one cave will be chosen as the maternity site and used for the birth and rearing of each generation of young. In the case of the Naracoorte population its range consists of south-eastern South Australia and south-western Victoria and the maternity site for the population is a cave within the property boundary. Here the bats gather in September and give birth during November/ December. By mid to late April the pups are capable of independent flight and hunting. Most of the population leave the maternity cave at this time and disperse to other caves, many of which are within the Property, and enter a state of torpor during winter. Although currently numerous, this bat is an extremely vulnerable species. Disturbance at the maternity site can lead to massive death among juveniles. Similarly, disturbance during winter torpor leads to depletion of fat reserves and subsequent death from starvation. The population is entirely dependent on night flying insects for food which in turn provide the environment for a wide range of invertebrate species including parasites and organisms that live in bat guano. Over 30 species of arthropods have been collected from the guano deposits of the maternity

cave, some of which appear to be endemic to the cave.(TNMP), (Periodic Report).

► **A vital breeding ground for many northern Australian vertebrates**

The Riversleigh area is a vital breeding ground for many northern Australian vertebrates including Purple-crowned fairy wrens (Malurus coronatus), Gulf snapping turtles (Elseya lavarackorum) (first described as a fossil from Riversleigh's fossil deposits), Spectacled hare-wallabies (Lagorchestes conspicillatus), endemic Purple-necked rock-wallabies (Petrogale purpureicollis) unique Rock Wallabies and Rock-haunting ringtail possums (Petropseudes dahli).

Assessment information

Threats

Current Threats

Very Low Threat

Threats such as site damage and illegal fossil collecting are considered to be very low due to controlled public access and supervised research activity and (at Riversleigh), remoteness and relatively low numbers of visitation. Provided there is continual and further (extra) funding support the threat level remains at very low. Concerns about compliance with research practices should be addressed by rigorous monitoring by the management authorities. At Naracoorte, access to the site is by permit and/or supervision. Illegal access is a low threat - Naracoorte's fossil sites are underground and in the main are secure from impact from natural events. Illegal access to Riversleigh is much more difficult to control and has led to allegations of theft of unique and irreplaceable materials. Overall, the threat to the World heritage values of the property is very low.

► Fire/ Fire Suppression

Very Low Threat
Inside site, scattered(5-15%)

Wildfires occur at Boodjamulla (Lawn Hill) National Park, which includes the Riversleigh component of the property, and have an impact on extant biota but this isn't a significant issue for the World Heritage values. QPWS has a Fire Strategy and is working with neighbours to develop a system of fire control on a broad scale to minimise risk of large scale conflagrations. (Periodic Report, 2003) Department of Environment, Water and Natural Resources (DEWNR), South Australia has a Fire Management Plan (2010-2020) that facilitates practical reduction of fire impact for the Naracoorte section.

► Agricultural effluents

Very Low Threat
Inside site, localised(<5%)
Outside site

There is some evidence that the population of 'Critically Endangered' Southern bent-wing bats (Miniopterus orianae bassanii) that breed in the park each year has declined significantly over the past 30 years. Preliminary studies indicated that agricultural and viticultural practices may be contributing to this decline with the use of pesticides. (Periodic Report, 2003)

The National Recovery Plan for the Southern bent-wing bat shows a range of threats have been suggested as potential factors in this decline, including loss and modification of roosting and foraging habitat, human disturbance, pesticides, disease, and drought and climate change affecting food availability. Recent population monitoring indicates early population estimate methodology was flawed and that population variance has most likely been the result of normal fluctuations in climate. In 2016, the bats numbered between 30 000 and 42 000. Further research is continuing to gain a greater understanding population dynamics and impacts of human disturbance on this species.
The species is listed as Endangered in the 'Action Plan for Australian Mammals 2012', under the revised taxonomic name of Miniopterus orianae bassanii. (National Bat Recovery Plan, L.F. Lumsden and M.L. Jemison, 2015).

The National Recovery Plan recognises an urgent need to determine the factors contributing to this decline, in order to implement the most effective and targeted management actions.

► Tourism/ visitors/ recreation

Very Low Threat
Inside site, localised(<5%)

Illegal access is a very low threat at both components. At Naracoorte, caves are locked and/or fenced to prevent illegal entry and fenced caves are not lit after-hours which inhibits illegal access (IUCN Consultation, 2017).
There is anecdotal evidence of small-scale disturbance at Riversleigh but it is not clear that it is an ongoing threat. The responsible management authority subsequently developed a public education campaign to ensure visitors were well informed that removal of material is not permitted. (Periodic Report, 2003). Currently this threat is considered very low (IUCN Consultation, 2017).

► Other

Low Threat
Inside site, throughout(>50%)

Both the Naracoorte Management Plan and the Riversleigh Management Strategy acknowledge the significance of ongoing research to fully realize the World Heritage values of the Property. Both acknowledge the need to ensure that research is sustainable and detail appropriate controls and permitting procedures.

Both acknowledge the need for some degree of structure in the research. The Naracoorte plan includes a requirement to ‘establish a research program coordinating committee’ and the Riversleigh strategy includes the requirement to ‘develop and implement a five-year Research Plan’.
Research at Riversleigh is regulated by the Department of National Parks, Sport and Racing via the (Qld) Nature Conservation Act 1992 and permit applications are evaluated in coordination with the Queensland Museum (the States statutory custodian of the excavated fossils).
Permittees are required to put in a Referral to the Department of Environment and Energy under the Environment Protection and Biodiversity Conservation 1999. This referral also considers the proposed activities

impact on the World Heritage Value.

In accordance with the Australian World Heritage management principles, DEWNR developed The Naracoorte Caves Scientific Research Opportunities and Guidelines with input from the Naracoorte Caves Interagency Reference Group (IRG). DEWNR also sought expert advice from other stakeholders with a particular interest in the Naracoorte Caves including researchers, recreational cavers and community organisations.
The Commonwealth Government approved funding for the Naracoorte Caves Advisory Committee for Naracoorte for 2013-2018 (Accompanying document - AMFS Naracoorte Monitoring Evaluation Reporting and Improvement Strategy 2013-16). The Commonwealth has earmarked additional funding for World Heritage properties including AFMS Property from July 2017-June 2023.

► Other Activities

Very Low Threat
Inside site, localised(<5%)

Threats to the integrity of fossil sites through excavation and removal of fossil material for analysis are very low.
The analysis of the fossil record is fundamental to understanding the site’s Outstanding Universal value. The excavation of fossil material for scientific purposes from the Riversleigh component of the property is undertaken sensitively and under permit, and with sensitivity to the concerns from the Waanyi Aboriginal people (Traditional Owners) (IUCN Consultation, 2017).

Potential Threats

Very Low Threat

The property may need additional monitoring and supervision f the two component sites are promoted further and receive additional public attention. It would be beneficial to extend and improve external access monitoring so that staff can be alerted of illegal entry to the site/s. Queensland Government is cognisant of the need for additional monitoring and this will be undertaken through NPSRs values based management framework. As previously highlighted NPSR has developed a plan to redevelop visitor facilities and

significantly improve site interpretation. Once implemented these facilities should mitigate against impacts of future increases in visitation. While permanent security cameras are currently not considered necessary at Riversleigh, improved interpretation, community awareness and close cooperation between commercial tour operators and neighbouring landholders and park rangers help to mitigate against inappropriate visitor activities.

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Protection and management

Assessing Protection and Management

► Relationships with local people

Highly Effective

A Riversleigh Community and Scientific Advisory Committee has been

established, with representation from the scientific community, Queensland Museum, tourism, Waanyi Aboriginal people who are Traditional Owners, Local Councils and local landholder representatives, and Queensland and Australian governments. The Riversleigh Management Strategy gives priority to involving the community in management and planning of the property. (TRMS) Naracoorte has been able to gain the support of the local community. A strong 'Friends of Naracoorte Caves' group, an active consultative committee and supportive local businesses along with an understanding of the role the community has had in the development of Naracoorte Caves NP over 160 years contributes to a positive partnership between the park and community. (Accompanying document - Final Draft AMFS Naracoorte Master Plan – Nov'13) Continued Indigenous stakeholder involvement in consultative arrangements needs to be maintained to ensure that consensus and understanding underpin the future management of the site. The Naracoorte Caves Community Interagency Reference Group was established in 2014.

► Legal framework

Highly Effective

Both sites have significant strengths in regard to existing legislation, according to the interests of various stakeholders and as a result of on-going scientific interest. The Riversleigh site is protected under the Queensland's Nature Conservation Act (1992) and managed according to the Riversleigh Management Strategy (2002). The Riversleigh Community and Scientific Advisory Committee provides advice to the management agencies and State and Australian Government Ministers responsible for World Heritage on matters relating to the identification, protection, conservation, presentation and research priorities of Riversleigh. The Naracoorte World Heritage Area falls under the jurisdiction of the Naracoorte Caves National Park Management Plan (2001) with management guidance input provided by the Naracoorte Master Plan Reference Group.
The Riversleigh fossil deposits are largely situated within the boundary of the Boodjamulla (Lawn Hill) National Park, but also extend outside the World Heritage area in both the national park and on Riversleigh Station. The Naracoorte fossil deposits are situated within the Naracoorte Caves National Park. Both sections of the Property are protected under the relevant parks legislation of the States in which they are situated. In May 2017, the South Australian Heritage Council confirmed the Naracoorte Caves Complex as a

State Heritage Place in the South Australian Heritage Register. This formal recognition as an important part of South Australia's rich non-Aboriginal heritage adds another layer of protection as State Heritage Places are protected under the Heritage Places Act 1993 and the Development Act 1993.(Notice of confirmation of entry in South Australian Heritage Register, 2017)

They are also subject to the national Environment Protection and Biodiversity Conservation Act 1999 under which any action that has, will or might have a significant impact on the Outstanding Universal Value of a World Heritage property must be referred to the responsible Minister for consideration. Importantly, this Act also aims to protect World Heritage properties from impacts that originate outside the property. It thus forms an additional layer of protection designed to protect values of World Heritage properties from external impacts. (Periodic Report)

► Enforcement

Highly Effective

Enforcement of the relevant laws and regulations is highly effective. All research activity (especially involving excavations and removal of materials) is carried out at the sites is in accordance with existing procedures. It is doubtful that there would be any breaches of optimal conservation practice.

► Integration into regional and national planning systems

Highly Effective

The Australian and South Australian governments endorsed The Naracoorte Caves National Park Management Plan in February 2001 following a lengthy period of community consultation.

The South Australia Heritage Act, 1993 provides for the conservation of places of heritage value and the Development Act 1993 provides for planning and regulating development, the management of land, and the design and construction of buildings.

The Boodjamulla (Lawn Hill) National Park, which the Riversleigh property is a part, has a Management Strategy in place. The Riversleigh Management

Strategy is scheduled for review (IUCN Consultation, 2017).

► Management system

Mostly Effective

A number of framework documents guide the management of the component sites of this serial property. The Riversleigh Management Strategy (scheduled for review) gives priority to involving the community in management and planning of the property (IUCN Consultation, 2017). The Boodjamulla (Lawn Hill) National Park and Resources Reserves Management Statement 2013 sets high-level strategies and priorities for managing the national park of which Riversleigh is a part. The State government through the QPWS effectively resources day-to-day management activities while the strategic management of Riversleigh is administered by the World Heritage Unit, Department of Environment and Heritage Protection (EHP). The Federal Government funds Executive Officer who provides the secretariat support and operation of the RCSAC (IUCN Consultation, 2017).
Management of both components of this serial site therefore appears effective. However, once the draft AFMS Strategic Management Framework under consideration is finalised, it will significantly strengthen the management of the Property.

► Management effectiveness

Mostly Effective

There is a suite of legislation in place that provides suitable support for protection and management. There are regular site inspections, flood control measures (for Naracoorte) and a prescribed burning programme designed to mitigate any negative effects associated with wildfires. Management of both components of this serial site appears effective. NPSR Values Based Management Framework, is proposed to provide a management effectiveness evaluation (known as Park Review - assessing management effectiveness at all stages of the management cycle). Management effectiveness is also proposed to be reported on in Queensland’s State of the Parks Reporting (2023 and onwards). While there is no single management plan for the entire World Heritage Property, consultations are ongoing on finalising a draft Australian Fossil Mammal Sites – Strategic Management Framework for the Property. Once finalised this Framework will complement

existing legislative structures and other regimes to address Australia's international responsibilities under the World Heritage Convention. Such a strategic framework for the entire site would further strengthen its management.

► Implementation of Committee decisions and recommendations

Data Deficient

None applicable

► Boundaries

Mostly Effective

The boundaries of the Naracoorte Caves National Park do not match those of the caves in which the fossil deposits occur, although the entrances to the caves are protected. Since the World Heritage inscription, the boundaries of the National Park have been expanded and cover most known caves within the park.

The Riversleigh section of the Property is contained within the boundaries of the Boodjamulla (Lawn Hill) National Park and the boundary is deemed to be adequate. (Periodic Report).

► Sustainable finance

Some Concern

In Australia it is a general principle for the state governments to fund day-to-day management activities in World Heritage properties while the national government funds those additional activities necessary to meet World Heritage obligations. (TRMS) The AFMS remains dependent upon regional funding to undertake any programs which are specifically targeted on the World Heritage values. Faced with growing competition for finite resources this funding has been more focused on protecting Australia's existing biota than understanding its extinct biota, despite the fact that the fossil record in the World Heritage Area at Naracoorte and Riversleigh often contain critical information important for the development of more effective long-term conservation programs for endangered living species such as the Mountain pygmy-possum (Burramys parvus). Hence better funding for understanding the far longer, pre-modern history and potential environmental resilience of

modern lineages should be better supported than it is at present (IUCN Consultation, 2017). On 27 September 2017 the Australian Government announced funding of AUD $145,000 per annum for five years from July 2018 to provide the continuation of the World Heritage Executive Officer and Advisory Committee for AFMS Riversleigh.

► Staff training and development

Mostly Effective

Staff levels sufficient to meet day-to-day management and monitoring requirements. Staff are well trained (IUCN Consultation, 2017)

► Sustainable use

Highly Effective

Use of the site is limited mainly to research, education and tourism which pose little to no threat to the site’s values.

The DEWNR Scientific Permits Team with input from the IRG Research Subgroup, regional team and park management review all scientific research permit applications for work at Naracoorte Caves to determine the likely impacts of the research on World Heritage Values. In particular, DEWNR Permits Team assess the methods and always seek to minimise impacts of research from a conservation and aesthetic viewpoint if the area is in the public view. DEWNR developed a `Researchers Protocol' for Naracoorte covering all aspects of fossil extraction including minimum information that has to be recorded and procedures that are to be followed when conducting research.
Tourism is addressed by implementing rigid policies which prohibit access to all fossil producing caves within the park except where visitors are under the direct supervision of a park employee. (Periodic Report), (TRMS).

► Education and interpretation programs

Mostly Effective

Education is a significant use of the Riversleigh section of the property where the University of New South Wales research team has developed large amounts of educational and interpretation material over the years.
The Riversleigh Fossil Centre and Naracoorte Caves Fossil Centre and

interpretive displays are vital aspects of this serial World Heritage Property. The Riversleigh Fossil Centre at ‘Outback at Isa’ in Mount Isa provides an interpretation of Riversleigh’s World Heritage values and the ongoing research activities that occur. However, without adequate signage many members of the public as visitors fail to understand the importance and values of the Riversleigh fossil deposits. A plan to upgrade the site interpretation and facilities has been prepared. (IUCN Consultation, 2017).
Education has long been an integral part of the Naracoorte experience; special exhibitions and displays are an ongoing part of site presentation. While some of these take place external to the park, they mainly occur in the park’s visitor interpretive centre that hosts a sophisticated series of animatronic displays set within recreated habitats. Naracoorte has a range of informative interpretive signage that conveys information on the importance of the site. This a robust education and visitor experience will be developed incorporate findings from new research.
Improved interpretation of Riversleigh's World Heritage status and Outstanding Universal Value will enhance the sites reputation as an internationally significant World Heritage area. Existing interpretation at the site is dated. However, plans for new interpretive facilities have been prepared and are awaiting the allocation of funds (IUCN Consultation, 2017).

► Tourism and visitation management

Mostly Effective

The Riversleigh Strategy recognizes that visitors play a significant part in ensuring that the World Heritage area has a continuing function in the life of the community and that tourism provides important social and economic benefits to the region. An Interpretation Strategy was developed in 2012.

The Naracoorte Caves National Park is promoted as a prime visitor attraction and plays a substantial role in regional tourism. Modification of the caves to facilitate the interpretation of fossil deposits revolutionised the visitor experience as has the site’s interpretative centre which is focused specifically on the WH values. Cave tours give visitors an appreciation of the processes which formed the caves and their contents, with particular focus on the fossil deposits, the aesthetics of caves and the biology and cultural history of the caves and the region in which they occur.
It would be beneficial to promote the sites further via additional profiling in

order to build upon and enhance scientific and tourism interest. This would, however, need to be carried out in conjunction with additional site surveillance at vulnerable locations. The value of additional public interest will be in the economic benefits derived from tourism as well as increased awareness of the need continued monitoring of likely impacts of any disturbance to the site's World Heritage values.

► Monitoring

Data Deficient

Both sections of the Property have management documents which acknowledge the need to establish and maintain monitoring programs, however there is insufficient published data/ information to assess the effectiveness of monitoring of the AFMS. Monitoring of research is done through DEH and EPBC permitting and reporting. NPSR Values Based Planning framework, is proposed to provide for monitoring of key values in National Parks. This monitoring is also proposed to be reported on in Queensland's State of the Parks Reporting. Currently conditions and threats are reported on in Queensland's State of Environment Reporting which is published approximately every two years (IUCN Consultation, 2017).

► Research

Some Concern

There has been an enormous amount of literature published in regard to research in the AFMS which is not surprising as research is the cornerstone of the Property's WH value. Both the Naracoorte Management Plan and the Riversleigh Management Strategy acknowledge the significance of ongoing research to fully realize the World Heritage values of the Property. Both acknowledge the need to ensure that research is sustainable and detail appropriate controls and permitting procedures. The Naracoorte plan includes a requirement to 'establish a research program coordinating committee' and the Riversleigh strategy includes the requirement to 'develop and implement a five-year Research Plan'. The Strategy is scheduled to be reviewed which will include recommendations on how research should be regulated and prioritized. Inadequate support for research means the World Heritage Values of the the deposits are failing to be revealed and utilised to help develop conservation strategies (IUCN

Consultation, 2017).

Overall assessment of protection and management

Mostly Effective

The protection and management of the property is mostly effective although there is some concern about the security of funding. The integrity of both sites is dependent on management plan updates (maintenance of cave monitoring and regular inspections), adaptive management (necessary actions taken if current management practices are found to be ineffective) and continued financial support for on-going site protection, staff training and scientific research. Protection and management in the future may therefore be limited by lack of funding support for on-going site protection and the upkeep and maintenance of interpretive facilities. While there is currently no single management plan for the entire Property which consists of two component sites – Riversleigh and Naracoorte, consultations are ongoing on finalising a draft Australian Fossil Mammal Sites – Strategic Management Framework for the Property. This draft Framework has been prepared to complement existing legislative structures and other regimes to address Australia's international responsibilities under the World Heritage Convention. The Framework specifically describes how the existing management and governance arrangements provide for the long-term protection, conservation, presentation and transmission of the World Heritage values of the Property. The Framework provides overarching guidance for management of the Australian Fossil Mammal Sites while detailed management objectives and strategies for Riversleigh and Naracoorte are included in site-specific management plans prepared by the respective State governments. (Draft AFMS SMF).

▶ Assessment of the effectiveness of protection and management in addressing threats outside the site

Highly Effective

External threats are minimal and adequately addressed by the Environment Protection and Biodiversity Conservation Act 1999. This Act is the statutory instrument for implementing Australia's obligations under the World Heritage Convention.
Importantly, the Act also protects properties from impacts even if they

originate outside the property. (SoOUV, 2012)

▶ **Best practice examples**

Both sections of the Property have successfully developed an integrated approach to education, site interpretation and tourism. For Naracoorte this is primarily achieved as a function internal to the Property with some community outreach activity while for Riversleigh it is primarily achieved as an external function with some internal activities.

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ **Extensive deposits of vertebrate fossils**
Good
Trend:Stable

The extent to which the resource is affected by excavation in Riversleigh is less than 1% and all specimens remain the property of the Queensland Museum. Excavations in Naracoorte affect a higher proportion but most of the valuable deposits have not been disturbed.
Both sections of the property implement strict procedures to ensure that disturbance is minimal and that the specimens retrieved are not widely dispersed (Periodic report), (TRMS), (TNMP).
Overall, the integrity of the World Heritage listed fossils is considered sound with condition assessed by routine inspection. At Naracoorte, scientific research, recreational caving, filming and other access is only by approved permit and/or supervision (IUCN Consultation, 2017).

▶ **Evidence of evolutionary change**
Low Concern
Trend:Stable

This value is derived from comprehensive interpretation of the fossil fauna assemblages and what has been learned cannot be unlearned.

However, there is always more that can be learned and ongoing research must be encouraged.

Summary of the Values

▶ **Assessment of the current state and trend of World Heritage values**

Good

Trend: Stable

The current state of the AFMS WH values is good and stable. The extent to which the fossils are affected by excavation in Riversleigh is less than 1%. Excavations in Naracoorte affect a higher proportion but most of the valuable deposits have not been disturbed. Both sections of the property implement strict procedures to ensure that disturbance is minimal and that the specimens retrieved are not widely dispersed.

▶ **Assessment of the current state and trend of other important biodiversity values**

Good

Trend: Data Deficient

Despite some early concerns for the stability of the critically endangered population of Southern bent-wing bats (Miniopterus schreibersii bassanii) which breed within the property (Periodic Report) more recent research has revealed that the earlier concerns were unfounded. The species status under the Federal EPBC Act is Critically Endangered though expected to be downgraded to Endangered (National Bat Recovery Plan, L.M. Lumsden and M.L. Jemison, 2015). The status of many of the unique/rare/or endangered modern species at Riversleigh has not been assessed.

Additional information

Benefits

Understanding Benefits

► Carbon sequestration

The property facilitates research leading to an understanding of palaeoclimates and the possible implications for climate change.

► History and tradition

The Property is of cultural significance to the Traditional Owners

► Importance for research

The property's core value lies in the knowledge derived from ongoing study of the fossil deposits providing insights to evolutionary trends in response to climate change. •The knowledge gained from research contributes to the global community's understanding of climate change and species evolution and may help to better develop strategies to conserve modern endangered species.

► Outdoor recreation and tourism

The Property provides significant opportunities for recreation and educational tourism which in turn stimulates local economic activity.

► Contribution to education

Remains of megafauna are of great tourism interest. The educational potential of both component sites is highly significant and is delivered via educational materials and displays which provide accounts of key stages in the evolution of Australian fauna in association with changing climates. Such Scientific and educational benefits highlight the importance of the sites and provide economic benefits to the local community that are and can be derived from tourism.

► Tourism-related income

This serial World Heritage property is an important tourism destination. As an

iconic tourism site, Naracoorte is located 12km from a regional centre andprovides an economic benefit related to tourism. The managing agency (DEWNR) provides guided tours and educational services whereby visitors are informed of site values and awareness of World Heritage is provided. Benefits of tourism involving visitation to Riversleigh, both via Adel's Grove (50km from Riversleigh) and the Riversleigh Fossil Centre in Outback at Isa, Mount Isa (250km from Riversleigh) also provides significant and growing financial and cultural benefits to those communities as well as Australia in general.

Summary of benefits

The essential benefits derived from the property include the knowledge gained from research contributes to the global community's understanding of climate change and species evolution,use of that knowledge to better understand the dynamics and future needs of living endangered species
and the conversion of such knowledge to an education focused tourism product for the economic benefit of regional and isolated communities.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	UNSW		Various palaeontological research projects
2	Friends of Naracoorte Caves (FONC)		Population monitoring of Southern bent-wing bats (Miniopterus schreibersii bassanii), AFMS Naracoorte
3	University of Adelaide School of Physical Sciences	From: 2017	Naracoorte Caves: a critical window on faunal extinctions and past climates
4	Flinders University School of Biological Sciences	From: 2017	Using the Naracoorte Caves fossil record to track changes in avian diversity and mammalian body sizes through time
5	The University of Melbourne School of Earth Sciences	From: 2017	Multi-proxy palaeoclimate investigation of speleothems at Naracoorte Caves

№	Organization/ individuals	Project duration	Brief description of Active Projects
6	The Australian National University	From: 2016	Palaeopathology of Australian Mammals in the Late Pleistocene

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	Naracoorte Caves National Park Interpretation and Signage Upgrade	Naracoorte Caves National Park Interpretation and Signage Upgrade	
2	Redevelop interpretive display at D-Site at Riversleigh	Redevelop interpretive display at D-Site at Riversleigh	
3	Upgrades to Cameras in Bat Cave– Installation of new Thermal Imaging Cameras and Infrared Cameras	Upgrades to Cameras in Bat Cave– Installation of new Thermal Imaging Cameras and Infrared Cameras. Develop interpretive display in the fossil laboratory, AFMS Naracoorte. Improve education offering and guiding knowledge as new research emerges.	

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