IUCN Conservation Outlook Assessment 2014 **(archived)**
Finalised on 13 November 2014

Please note: this is an archived Conservation Outlook Assessment for Shark Bay, Western Australia. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Shark Bay, Western Australia

SITE INFORMATION

Country:
Australia
Inscribed in: 1991
Criteria:
(vii) (viii) (ix) (x)

Site description:
At the most westerly point of the Australian continent, Shark Bay, with its islands and the land surrounding it, has three exceptional natural features: its vast sea-grass beds, which are the largest (4,800 km2) and richest in the world; its dugong (‘sea cow’) population; and its stromatolites (colonies of algae which form hard, dome-shaped deposits and are among the oldest forms of life on earth). Shark Bay is also home to five species of endangered mammals. © UNESCO

SUMMARY

2014 Conservation Outlook

Good

The Australian Shark Bay World Heritage site has a good conservation outlook overall thanks to the robustness of its values in the face of anthropogenic impacts, its relative inaccessibility, the appropriateness of the boundaries of the area and overall highly effective to effective management. The site's biodiversity values are maintained as outstanding, both in the marine and terrestrial environments. Risks from climate change and sheep and goat grazing require special consideration, in order to minimize potential future damage.

Current state and trend of VALUES

Good
Trend: Stable

The site provides exceptional living examples of the earliest life forms on earth in living stromatolites and microbialites, in a carbonate landscape and its hypersaline environments. These structures are in a good state and largely free of damage. The largest seagrass banks in the world also provide habitats for charismatic megafauna, especially dugongs, dolphins, turtles and sharks, as well as diverse genotypes in fish populations, sustainably managed. Geographical isolation has provided areas where environmental circumstances have enabled species to survive after extinction in surrounding areas. On land, the site includes transition zones in the flora, and examples of speciation, as well as high numbers of endemic species. There is some small risk to the values of interaction between climate change, feral animals and sheep and goat grazing

Overall THREATS

Low Threat

The site's World Heritage values are subject to only minimal threats. The robustness of its geological values and its effective management regime

combine to minimize threats to its integrity. Similarly, the site’s biodiversity values, which are more sensitive to anthropogenic impacts, are affected mainly by low threats, with the possible exception of ocean acidification and increasing temperatures in the marine environment.

Overall PROTECTION and MANAGEMENT

Mostly Effective

The protection and management of the Shark Bay Word Heritage Property is overall effective. There are a number of ongoing management issues and clarification of the implementation of its monitoring plans.

FULL ASSESSMENT

Description of values

Values

World Heritage values

- **Most diverse and abundant examples of stromatolites – the oldest form of life on Earth**
  Criterion:(vii)

  One of the superlative natural phenomena present in this property is its stromatolites, which represent the oldest form of life on Earth and are comparable to living fossils. (11) Analogous structures were the dominant benthic ecosystems on Earth for 3 000 million years. Their significance is due to their role in changing the earth's atmosphere, by photosynthesis. The hypersaline environments of Shark Bay exclude many competitors, consumers and predators, enabling the survival of complex ecosystems in Hamelin Pool (2).

- **One of the world's best examples of a living analogue for the study of the nature and evolution of the earth's biosphere up until the early Cambrian**
  Criterion:(viii)

  Shark Bay contains, in the hypersaline Hamelin Pool, the most diverse and abundant examples of stromatolites (hard, dome-shaped structures formed by microbial mats) in the world. The stromatolites of Hamelin Pool were the first modern, living examples to be recognised that have a morphological diversity and abundance comparable to those that inhabited Proterozoic seas. As such, they are one of the world's best examples of a living analogue for the study of the nature and evolution of the earth's biosphere up until the

early Cambrian (SoOUV, 2013).

► Seagrass banks of great geological interest
Criterion:(viii)

The Wooramel Seagrass Bank is also of great geological interest due to the extensive deposit of limestone sands associated with the bank, formed by the precipitation of calcium carbonate from hypersaline waters (SoOUV, 2013).

► Outstanding examples of processes of biological and geomorphic evolution taking place in a largely unmodified environment
Criterion:(ix)

Shark Bay provides outstanding examples of processes of biological and geomorphic evolution taking place in a largely unmodified environment. These include the evolution of the Bay's hydrological system, the hypersaline environment of Hamelin Pool and the biological processes of ongoing speciation, succession and the creation of refugia. One of the exceptional features of Shark Bay is the steep gradient in salinities, creating three biotic zones that have a marked effect on the distribution and abundance of marine organisms. Hypersaline conditions in Hamelin Pool have led to the development of a number of significant geological and biological features including the 'living fossil' stromatolites. The unusual features of Shark Bay have also created the Wooramel Seagrass Bank. Covering 103,000 ha, it is the largest structure of its type in the world. Seagrasses are aquatic flowering plants that form meadows in near-shore brackish or marine waters in temperate and tropical regions, producing one of the world's most productive aquatic ecosystems. Australia has one of the highest diversity of seagrasses globally, with 12 species occurring in the Bay (SoOUV, 2013).

► A range for many globally threatened species of plants and animals
Criterion:(x)

Shark Bay is a refuge for many globally threatened species of plants and animals. The property is located at the transition zone between two of Western Australia's main botanical provinces, the arid Eremaean, dominated by Acacia species and the temperate South West, dominated by Eucalyptus species, and thus contains a mixture of two biotas, many at the limit of their

southern or northern range. The property contains either the only or major populations of five globally threatened mammals, including the Burrowing Bettong (now classified as Near Threatened), Rufous Hare Wallaby, Banded Hare Wallaby, the Shark Bay Mouse and the Western Barred Bandicoot. A number of globally threatened plant and reptile species also occur in the terrestrial part of the property. Shark Bay's sheltered coves and lush seagrass beds are a haven for marine species, including Green Turtle (VU) and Loggerhead Turtle (EN) and the property provides one of Australia's most important nesting areas for this second species). Shark Bay is one of the world's most significant and secure strongholds for the protection of Dugong, with a population of around 11,000. Increasing numbers of Humpback Whales and Southern Right Whales use Shark Bay as a migratory staging post, and a famous population of Bottlenose Dolphin lives in the Bay. Large numbers of sharks and rays are readily observed, including the Manta Ray which is now considered globally threatened (SoOUV, 2013).

Other important biodiversity values

▶ **Important area for migratory birds**

Shark Bay as a significant site for migratory birds. Hundreds of species come through Shark Bay and this seems to be an important area for them. Much more research is needed in this field (IUCN Consultation, 2014).

Assessment information

Threats

Current Threats

Low Threat

The site's World Heritage values are subject to only minimal threats. The robustness of its geological values and its effective management regime

combine to minimize threats to its integrity.

► Other Activities, Tourism/ visitors/ recreation

Low Threat
Inside site

Impacts from human activities include trampling of sensitive environments, hardening of shorelines and 4WD traffic over soft sediments. Aboriginal people can camp almost anywhere in a park for customary purposes (cultural camping). Cultural camping outside of designated camp sites can be carried out for 28 days. Where there are ceremonial events on country, it is allowed for 3 months.

► Other

Very Low Threat
Outside site

Shark Bay Salt activities, potentially changing the salinity regime through bittern drainage and dredging (channel deepening). This occurs outside WH boundary, but marine ecosystems are highly connected.

Potential Threats

Low Threat

Potential threats are mainly beyond the scope of management actions, including pollution, ocean acidification and increasing temperatures in the marine environment.

► Oil/ Gas exploration/development

Very Low Threat
Inside site
Outside site

Exploration permits exist but the area is classed as “not very prospective” (5)

► Water Pollution

Low Threat

Inside site
Outside site

A range of potential pollution sources exist which could impact on WH values. Most areas are under management and the site has extensive anti-pollution regulations. Potential pollution sources include land – littering and urban, industrial and agricultural pollution, groundwater pollution – seepage from septic drains, nutrients and chemicals, dust – mining and agricultural practices, marine pollution – sea dumping, bilge and ballast water, fuel, oil and chemical spills, hydrocarbon pollution, littering, sewage, dredging and discharge of bitterns, atmospheric pollution - vehicle, industrial emissions, carbon dioxide levels or bushfires, as well as noise pollution. (6)

► Fishing / Harvesting Aquatic Resources

Low Threat
Inside site
Outside site

Increasing pressure on managed fish stocks is occurring worldwide, but is managed sustainably in Shark Bay at present. Fishing is managed sustainably by WA Department of Fisheries. Closures to increase snapper stocks have been very successful in allowing populations to reestablish (9). Pink snapper did increase under the fishing ban, but it has been widely reported (and possibly there are some data to support) that other species have declined (such as black snapper). (IUCN Consultation, 2014)

► Fire/ Fire Suppression

High Threat
Inside site
Outside site

Fire risks are forecast to increase. Fire represents a significant threat to species that are highly restricted in their distribution, particularly populations which only survive on islands, where they could be severely affected or totally destroyed by a single large fire, especially from lightning strikes. (6) Vegetation structure in the site has been modified through grazing on current and ex-pastoral leases. There is evidence of numerous small fires in the past 50 years. Many recent fires have resulted from human activities. Appropriate management of fire is essential. Further knowledge of fire ecology and the

requirements of species and communities is required.

▶ **Invasive Non-Native/ Alien Species**

High Threat
Inside site
Outside site

These require constant monitoring and active management and will continue to be a major risk to World Heritage values. (9) Rabbits are a serious problem in Shark Bay and make it difficult (along with the cats) for native marsupials to take hold in the various stages of Project Eden (DPaW).

Protection and management

Assessing Protection and Management

▶ **Relationships with local people**

Mostly Effective

Improved following replacement of Shire Council and President (pers. obs.)

▶ **Legal framework and enforcement**

Mostly Effective

Well established with outcomes based management assessment (3)

▶ **Integration into regional and national planning systems**

Mostly Effective

Strategic Plan signed off by state and federal governments (8)

▶ **Management system**

Mostly Effective

In place, most of the WH area is within existing reserves (8)

▶ **Management effectiveness**

Mostly Effective

High, advisory committees in place, with largely up to date management plans except for Marine Park which has been audited (3)

▶ Implementation of Committee decisions and recommendations

Data Deficient

Data deficient

▶ Boundaries

Mostly Effective

Effective

▶ Sustainable finance

Mostly Effective

The level of available funding is of some concern.

▶ Staff training and development

Mostly Effective

Good, but high staff turnover is an issue (3)

▶ Sustainable use

Mostly Effective

Acceptable levels of useage are in place (8, 3)

▶ Education and interpretation programs

Mostly Effective

Good signage and pamplets are in place (8, 3). Interpretation materials could be updated substantially to reflect the most recent research findings (IUCN Consultation, 2014).

▶ Tourism and interpretation

Mostly Effective

Acceptable ecotourism activities occur in Shark Bay (8, 3)

► Monitoring

Highly Effective

Effective monitoring of Shark Bay is in place for the marine reserves (3) and Project Eden (8)

► Research

Highly Effective

High levels of research have been taking place in Shark Bay through WAMSI, DPAW/DEC (3, 8). The profile of Shark Bay has been substantially raised by international research. In addition to a dedicated community of Australian scientists, there have been long-term research projects underway even before Shark Bay achieved World Heritage status. There are hundreds of scientific papers published on this site in the last 15 years.

Overall assessment of protection and management

Mostly Effective

The protection and management of the Shark Bay Word Heritage Property is overall effective. There are a number of ongoing management issues and clarification of the implementation of its monitoring plans.

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

Mostly Effective

Due to its inaccessibility and the appropriateness of its boundaries, the site is not subject to significant threats originating from outside its boundaries, with the exception of climate change and rising sea levels.

State and trend of values

Assessing the current state and trend of values

World Heritage values

► Most diverse and abundant examples of stromatolites – the oldest form of life on Earth

Low Concern
Trend:Stable

These structures are in a good state and largely free of damage. Stromatolites are largely stable geological structures, with many more subtidal habitats than were listed in the nomination document (2). Sediment flows in 2011 (9) were of concern (La Nina events) with increased sediment runoff due to overgrazing in the surrounding catchments.
Concerns about ocean acidification are largely beyond the scope of management, but Shark Bay will represent a stable natural laboratory for comparative purposes, strengthening its significance. (9)

► One of the world's best examples of a living analogue for the study of the nature and evolution of the earth's biosphere up until the early Cambrian

Low Concern
Trend:Stable

These structures are in a good state and largely free of damage. Stromatolites are largely stable geological structures, with many more subtidal habitats than were listed in the nomination document (2). Sediment flows in 2011 (9) were of concern (La Nina events) with increased sediment runoff due to overgrazing in the surrounding catchments.
Concerns about ocean acidification are largely beyond the scope of management, but Shark Bay will represent a stable natural laboratory for comparative purposes, strengthening its significance. (9)

► Seagrass banks of great geological interest

Good
Trend:Stable

Reserves are in generally good to excellent condition and are well managed (3, 6). The La Niña event in 2011 raised temperatures and increased sediment run-off resulting in a reduction in seagrass leaf density and cover (10), especially at the mouth of the Wooramel delta. Risks of increasing

frequency of such events with changes in global climate are still unknown (6).

▶ **Outstanding examples of processes of biological and geomorphic evolution taking place in a largely unmodified environment**
Good
Trend:Stable

The site's internationally and nationally important biodiversity values, which are more sensitive to anthropogenic impacts, are affected mainly by very low threats (9), with the possible exception of the interacting threats of sheep and goat grazing and climate change (6). Reserves are in generally good to excellent condition.

▶ **A range for many globally threatened species of plants and animals**
Good
Trend:Stable

Marine populations (e.g. dugongs and turtles) are all under Western Australian legislation for the protection of wildlife, as well as Marine Park status (3), diminishing the risks to World Heritage values. The isolation of fauna habitats on islands and peninsulas increase the likliehood of survival of marsupial species, such as the Shark Bay Mouse, Banded Hare Wallaby, Rufous Hare Wallaby, Western Barred Bandicoote, the Bilby and Bernier Island subspecies of Ash-grey mouse (6). Reserves are in generally good to excellent condition (6, 8).

Other important biodiversity values

▶ **Important area for migratory birds**

Shark Bay as a significant site for migratory birds. Hundreds of species come through Shark Bay and this seems to be an important area for them. Much more research is needed in this field (IUCN Consultation, 2014).

Summary of the Values

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

Trend: Stable

The site provides exceptional living examples of the earliest life forms on earth in living stromatolites and microbialites, in a carbonate landscape and its hypersaline environments. These structures are in a good state and largely free of damage. The largest seagrass banks in the world also provide habitats for charismatic megafauna, especially dugongs, dolphins, turtles and sharks, as well as diverse genotypes in fish populations, sustainably managed. Geographical isolation has provided areas where environmental circumstances have enabled species to survive after extinction in surrounding areas. On land, the site includes transition zones in the flora, and examples of speciation, as well as high numbers of endemic species. There is some small risk to the values of interaction between climate change, feral animals and sheep and goat grazing

Additional information

Key conservation issues

▶ **Climate change**

Global

Sea level rise will endanger all of Shark Bay’s outstanding universal value, as the complex nature of the coast risks drowning essential habitats for the iconic species and ecosystems of Shark Bay.
Ocean acidification has risks for Shark Bay’s calcareous environments and the essential processes driving the ecosystem.
Rising temperatures and a drying climate will affect both terrestrial and marine ecosystems that form part of the initial listing for Shark Bay, as well as increasing risks of fires damaging terrestrial ecosystems and rare and endangered animals.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	DPAW		Plant and animal research, particularly Project Eden, and plant genetics
2	Research organisations, e.g. UWA, CSIRO, Curtin University, Florida International University		Ecosystem processes Shark research
3	George Town University		Dolphin research
4	Australian Wildlife Conservancy		Mammal re-introductions
5	Curtin University		Stromatolites

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	Climate change mitigation research	Resources for all projects are hard to obtain.	

REFERENCES

№	References
1	Cowell C 2013 Shark Bay World Heritage Threats and risks analysis. DPAW
2	Fourqurean et al. 2012 Science for the Management of Subtropical Embayments: Examples from Shark Bay and Florida Bay. Marine and Freshwater Research, 2012, 63:11, 941-1199
3	Fourqurean, J. W., Duarte, C. M., Kennedy, H., Marba`, N., Holmer, M., Mateo, M. A., Apostolaki, E. T., Kendrick, G. A., Krause-Jensen, D., McGlathery, K. J., and Serrano, O. (2012). Seagrass ecosystems as a globally significant carbon stock. Nature Geoscience 5, 505–509.
4	Fraser et al. 2014 (submitted) Extreme climate events lower resilience of foundation seagrass at edge of biogeographical range. Journal of Ecology
5	Jahnert, R.J. and Collins, L.B. (2012) Characteristics, distribution and morphogenesis of subtidal microbial systems in Shark Bay, Australia. Mar. Geol., 303–306, 115–136.
6	MPRA 10-year Audit and Review of Shark Bay Marine Reserves April 2010 (attached)
7	McCluskey P (2008) Shark Bay Strategic Plan 2008-2020 DEC
8	Periodic Report 2003
9	Retrospective Statement of Outstanding Universal Value (2013).
10	WA EPA 2001 Assessment of Potential Petroleum Industry Impacts Study (Section 16E report)
11	Walker, D.I. 1989 Seagrass in Shark Bay - the foundations of an ecosystem (In : Biology of Seagrasses : A Treatise on the Biology of Seagrasses with special reference to the Australian Region. (Ed. A W D Larkum, A J McComb and S. A. Shepherd) Elsevier/North Holland. pp182-210.