
AUSTRALIAN NATIONAL PERIODIC REPORT

SECTION II

Report on the State of Conservation of Fraser Island

I.1. INTRODUCTION

a. State Party

Australia.

b. Name of World Heritage property

Fraser Island.

c. Geographical coordinates to the nearest second

Between latitudes in the Southern Hemisphere 24 degrees 41 minutes 39 seconds South and 25 degrees 48 minutes 12 seconds South, and longitudes 152 degrees 55 minutes 54 seconds East and 153 degrees 21 minutes 42 seconds East.

These coordinates are based on Fraser Island plus a 500m buffer seaward of the high water mark. The Fraser Island World Heritage Area covers approximately 184,000 hectares in total and also includes a number of small islands off its west coast including Stewart, Dream and small un-named islands between Dream Island and the mouth of Yankee Jack Creek and including Boonlye Point. The boundary on these smaller islands also includes 500 metres seaward of the high water mark on these smaller islands.

d. Date of inscription on the World Heritage List

Inscribed at the Sixteenth Session at Santa Fe, USA, 7–14 December 1992.

e. Organisation(s) or entity(ies) responsible for the preparation of the report

Environment Australia in conjunction with the Queensland Environmental Protection Agency.

II.2. STATEMENT OF SIGNIFICANCE

Criteria

Fraser Island was inscribed on the World Heritage List in December 1992 as a ‘natural property’, on the basis that the Island’s values satisfy the second and third criteria for natural values significance. These are:

- Natural criterion (ii) - outstanding examples representing significant on-going geological processes, biological evolution and man’s interaction with his natural environment; and
- Natural criterion (iii) – contain superlative natural phenomena, formations or features.

Revised criteria

The World Heritage criteria are periodically revised. The current criteria for natural properties were introduced in 1994 and are as follows:

- Natural criterion (ii) - Be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.
- Natural criterion (iii) - Contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance

Justification for listing

Fraser Island was nominated for World Heritage listing in 1991 along with the rest of the Great Sandy Region, including the Cooloola sand mass, Great Sandy Strait and Hervey Bay. A summary of the justification given in the nomination document (Department of the Arts, Sport, the Environment, Tourism and Territories, December 1991) for listing under criteria two and three is shown below, as it applies to Fraser Island.

Natural criterion (ii) - outstanding examples representing significant on-going geological processes, biological evolution and man's interaction with his natural environment

The nominated area represents an outstanding example of significant ongoing geological and geomorphological processes and associated vegetational successions.

The sandmass is made up of overlapping aeolian dune systems deposited during periods of low sea level that resulted from successive glacial events in the Pleistocene and periods of high wind activity during the Holocene. Many processes that have led to the formation of this sandmass are still occurring. Complex coastal dune formations are still evolving from the unique interaction of coastal successional vegetation, hydrological and geomorphological systems.

The superimposition of active parabolic dunes onto remnants of older dune forms has produced topographic elevations of up to 260 metres. The Region contains a diverse array of aeolian landforms; such highly developed coastal aeolian landforms ranging from incipient foredunes to remnant parabolic dunes stabilised by towering rainforests is not known to occur elsewhere. The great diversity of actively forming depositional and erosional aeolian dune forms includes: incipient foredunes, foredunes, relic foredunes, blow outs, parabolic dunes, barchanoid dunes, transverse dunes, lunettes, remnant knobs and sandsheets. The assemblage of such a diverse range in any one locality is unique.

The dynamic interrelationship between the coastal dune sand mass, hydrology, the ongoing processes of soil formation and the development of plant communities, is remarkable in its scale and complexity on a uniform substrate. The role of soil fungi and specialised sand

dwelling invertebrates in the establishment and dispersal of vegetation is also emerging as a result of recent research.

In particular, the development of rainforest vegetation on coastal dune systems at the scale found on Fraser Island and Cooloola is not known to occur elsewhere in the world. Some 15 650 hectares of closed forest types up to 50 metres tall occur in the central high dunes, including sites at over 200 metres elevation. The stability of the inland dune topography depends on the covering vegetation and, in particular, on the tall eucalypt forest and closed forest communities, as parabolic dunes can form only by transgression over previously vegetated dunes.

The process of soil formation is an ongoing pedological process that directly affects the development of these plant communities. As a result of the successive overlaying of dune systems, a chronosequence of podzol development exists both at Cooloola and on Fraser Island. In passing from the younger dune systems on the east to the oldest systems on the west, podzols change from rudimentary profiles less than 0.5 metres thick to giant forms more than 25 metres thick. The latter far exceed known depths of podzols anywhere else in the world.

In association with this podzol chronosequence, a progressive vegetational succession across the more recent dune systems is replaced by a retrogressive succession across the older dune systems where the B horizon has become too deep to provide nutrition for tall forest species. Such a vegetational chronosequence is of outstanding universal significance, and has led to a new understanding of successional processes.

The vegetation associations represented on Fraser Island, in particular, display an unusual level of complexity with major changes in floristic and structural composition occurring over very short distances. This is a result of the complexity of processes influencing geomorphological, hydrological and soil forming processes in the area.

The nominated area contains numerous sand blows, some very large in area. They arise when the stabilising effects of the vegetation fail. Existing sand blows represent all stages: actively advancing, stable, and being actively colonised by vegetation. Sand blows are natural features of great interest, dramatically illustrating active land-forming processes while revealing landscape history as buried layers are exhumed.

Both heathland and closed forest communities provide refugia for relict and disjunct populations, which are important to ongoing speciation and radiation. The occurrence of both communities in close proximity on identical substrate is remarkable, because they apparently evolved together in Mesozoic times in the humid parts of the southern Gondwanan landmass.

Evolution and adaptation is continuing in the ancient angiosperm flora of the heathlands and the associated vertebrate and invertebrate fauna. Specialised adaptations to low fertility, fire, waterlogging and aridity have developed, for instance myrmecochory (dependence on ants for dispersal), nectarivory in birds and mycorrhizal associations.

There are a number of taxa within the nominated area that indicate potential ongoing biological evolution, including genera of other habitats that have colonised the heathlands - this has in some instances led to the development of specialised heathland species (Kikkawa *et al* 1979) and must be considered an ongoing process of evolution. A striking example is the group of 'acid' frogs that have adapted to the highly specialised acidic environment of the wet heathlands / sedgeland in this siliceous sand environment. The fauna of the lakes of the nominated area, including fish, tortoises and invertebrates, also provides potential for ongoing evolution leading to speciation, as do the ant-associated Lycaenid butterflies occurring in the area.

A number of mammal species on Fraser Island, especially the arboreal marsupials that inhabit the tall forests, are now isolated from other populations and are potential subjects for future speciation.

The dynamic interrelationship between the coastal dune sand mass aquifer hydrology and the freshwater dune lakes is also remarkable on Fraser Island, demonstrating a sequence of lake- formation spatially and temporally.

In summary, the nomination document concluded that the whole Region is an outstanding example of dynamic geomorphological processes and ongoing evolution of sand dunes, with a great diversity of active depositional and aeolian dune forms in any one locality.

Natural criterion (iii) - contain unique, rare or superlative natural phenomena, formations or features of exceptional natural beauty.

As a unit, the nominated area represents an outstanding natural formation containing a diverse range of features that are of exceptional natural beauty.

The area includes over 250 kilometres of clear sandy beaches with long uninterrupted sweeps of ocean beach in a near natural environment. Along the ocean beaches there are more than 40 kilometres of strikingly coloured sand cliffs of unique and ancient origin, as well as spectacular blow-outs that are both of great scenic beauty.

The structure and floristic composition of vegetation across the sequence of giant coastal sand-dune systems exhibit considerable diversity over short distances considering the uniform and nutrient-poor substrate.

The nominated area contains a great diversity of vegetation forms, including treeless swampy plains, open heathlands that produce spectacular displays of wildflowers in spring and summer, mangroves, and outstanding, majestic rainforests growing on pure sand. Tall rainforests growing on sand dunes that are up to 240 metres in elevation are believed to be unique in the world.

The 'megaflora' of past ages of the earth's evolutionary history is largely being eliminated or replaced by vegetation of lower stature through the impact of natural climatic change, clearing and logging. The magnificent tall closed forests of *Syncarpia* Brush Box and Blackbutt on Fraser Island are outstanding examples of the evolutionary potential and

grandeur of the angiosperm form all the more impressive because they are growing on pure sand.

Within the rainforests and allied satinay-brush box forests, giant trees up to 50 metres in height and 2 to 3 metres in diameter provide an awe-inspiring experience. Hence, the forests of the region qualify as one of the most spectacular examples of the world's 'megaflora'. Historical records indicate that the forests were even more spectacular prior to the advent of logging. Fraser Island contains remaining old-growth forests providing representative samples of the original forest structure, diversity and faunal habitat, valuable refuge areas, sources of genetic diversity and valuable areas for scientific research, education, recreation and scenic value. With the exclusion of logging, the forests can be expected to gain even greater aesthetic appeal as their former glory returns.

The nominated area also contains outstanding examples of 'wallum' vegetation and other heathland communities along the coastal lowlands, particularly of low-lying wet heathland.

Fraser Island contains one of Australia's few 'lakeland' landscapes, with an outstanding number of freshwater lakes developed on a sandy stratum. More than 40 dune lakes occur in a rich variety of settings from rainforest to colourful heaths. These include perched lakes that represent more than half of the world's perched dune lakes and include the largest (Lake Boomanjin) and highest (Boomerang Lakes) such lakes. Lake Wabby is regarded as one of the most spectacular and scenic barrage lakes in Australia. A number of the lakes in the area are considered to be several hundred thousand years old and in some instances, have scenically outstanding and botanically important rainforest types around their margins.

The estuarine areas of the Great Sandy Strait have great aesthetic appeal and scientific interest with their mosaic of islands, banks and waterways, and large flocks of wading birds. It is a 'sand-passage' estuary between the mainland and an inshore island, and is the least developed of three such passages in Queensland.

The Great Sandy Region is also an outstanding example of a natural terrestrial ecosystem, providing a unique and restricted range of habitats for flora and fauna.

The massive sand deposits of the nominated area, the largest coastal sandmass in the world, appear to have played a significant role during the late Quaternary in providing suitable new habitats for both heathland and rainforest. The sandmass of Fraser Island holds an enormous aquifer, believed to be the largest unconfined sand island aquifer in the world. At lower elevations, the water table is sufficiently close to the soil surface to allow rainforest to exist, once successional processes have built up sufficient nutrients in the soil. Hence, the nominated area has provided a unique survival centre for rainforest plant species. The concept of the moist areas serving as rainforest refugia is supported by the relictual occurrence of four fern species (McDonald 1988) and other rainforest plant species that show major disjunctions from occurrences in other rainforest areas.

It is this record of disjunct extant occurrences in conjunction with the fossil record contained in lake sediments that provide a picture of past vegetation patterns of critical biogeographic significance.

At Wanggoolba Creek on Fraser Island there is an isolated population of a primitive fern, *Angiopteris evecta*, a member of an ancient group of ferns that first appeared in the Silurian Period, 400 million years ago and close in time to the origins of terrestrial life. This group reached its greatest development in the Carboniferous Period. Another fern species, *Lindsaea repens*, is found in Australia only on Fraser Island and in north-east Queensland including The Wet Tropics World Heritage Area. Other fern species with a relictual occurrence in rainforest on Fraser Island are *Selenodesmium elongatum* and *Macroglena brassii*.

The relict conifer, Kauri Pine (*Agathis robusta*), reveals close affinities with the fossil, *Agathis jurassica*, from the 175 million-year-old Tabralgar deposits. Kauri Pine occurs in rainforests on Fraser Island and at Cooloola. Apart from small populations on the adjacent mainland area, the only other occurrences are more than 1000 kilometres away in north-east Queensland. The Tabralgar deposits reveal a forest containing Podocarp Conifers along with Kauri Pine. Interestingly, two species of podocarp, *Podocarpus elatus* and *P. spinulosus*, occur in the rainforests of the nominated area, along with two other species of ancient conifers, *Araucaria cunninghamii* and *A. bidwillii*.

The rare, endemic angiosperm species, *Cinnamomum baileyianum* (Lauraceae), occurs in the rainforests of Fraser Island and Cooloola, and elsewhere only in north-east Queensland including the Wet Tropics World Heritage Area. Other rainforest species with similarly disjunct distributions are *Euodia haplophylla* (Rutaceae) and *Phaleria octandra* (Thymelaeaceae).

Two other rainforest angiosperms with disjunct occurrences on Fraser Island or Cooloola occur elsewhere in rainforests to the south. These are *Harpullia alata* and *Ripogonum discolor*.

The nominated area supports a diverse flora with more than 920 species of plants, including ferns, in a land area of about 230 000 hectares. This degree of floral diversity is striking considering it occurs on such a low-nutrient substrate.

Although the vegetation supports few large macropods, the terrestrial and aquatic fauna is particularly interesting. Fraser Island contains a population of dingoes, considered to be the purest strain remaining in Eastern Australia. The bird-life, particularly the migrating wading birds, is diverse and numerous.

The area provides most of the world's known habitat for 'acid' frogs. In wet heathland areas associated with lakes and swamps in this siliceous sand environment, unusual acidic conditions have developed. This provides a very restricted and highly specialised habitat to which a small number of vertebrate species have adapted. Four species of 'acid' frogs have been identified in the nominated area (*Litoria cooloolensis*, *L. olongburensis*, *L. freycineti*, *Crinia tinnula*). Although the phenomenon of 'acid' frogs does occur elsewhere in the

world, there are only rare examples, and the processes that formed and maintain these habitats are fully contained within the area.

The nominated area is outstanding for its richly diverse invertebrate ground fauna. It is also home to an extraordinary species of butterfly. Illidge's Ant-Blue (*Acrodipsas illidgei*) belongs to a genus that is unique in being predatory on ants throughout its entire larval history. It is dependent on one species of ant that in turn is dependent on one species of mangrove.

IUCN Technical evaluation

The IUCN technical evaluation of the nominated area (IUCN, 1992) stated that Fraser Island clearly met the requirements of Criterion (ii) on the basis of ongoing geological and biological processes acting on a sand medium including “longshore marine transport, coastal beach and lagoonal deposition, dune building, soil development (eg podsolisation), biological adaptation (eg rainforest succession) and biological evolution (eg acid frogs)”.

The evaluation also considered that Fraser Island met the requirements of Criterion (iii). “It has long uninterrupted ocean beaches backed in some places by coloured sand cliffs. Inland from the beach are found majestic remnants of tall rainforest growing on sand and half the world’s perched freshwater dune lakes”. However the evaluation found that the existence of world heritage values in Cooloola was less convincing due to the existence of land use problems in the southern section, and recommended that it not be considered as part of the property.

World Heritage Values Table – Fraser Island

The World Heritage criteria against which Fraser Island was listed in 1992 remain the formal criteria for this property, although they are not necessarily identical with the current criteria. Examples of the World Heritage values for which Fraser Island was listed are included in the Values Table below. These examples are illustrative of the World Heritage values of the property, and do not necessarily constitute a comprehensive list of values. More detailed information about the World Heritage values of Fraser Island may be found in the nomination document (Department of the Arts, Sport, the Environment, Tourism and Territories, December 1991).

Natural criteria against which Fraser Island was inscribed on the World Heritage List in 1992.	Examples of World Heritage values of Fraser Island for which the property was inscribed on the World Heritage List in 1992.
<i>Criterion (ii) outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment.</i>	Fraser Island provides a globally significant example of geological processes and biological evolution, including complex coastal dune formations that are still evolving, an array of lakes that is exceptional in terms of number, diversity, age and the evidence of dynamic and developmental stages, and outstanding examples of ecosystems that have developed in response to maritime conditions and poor soils coastal dune formations. The World Heritage values include: <ul style="list-style-type: none"> • the largest sand island in the world which contains complex, evolving

Natural criteria against which Fraser Island was inscribed on the World Heritage List in 1992.	Examples of World Heritage values of Fraser Island for which the property was inscribed on the World Heritage List in 1992.
	<p>coastal dune formations; and</p> <ul style="list-style-type: none"> • an array of dunes and dune lakes which is exceptional in terms of number, diversity and age, and which provides evidence of dynamic and developmental stages in dune formation including: <ul style="list-style-type: none"> - freshwater dune lakes; - actively forming depositional dune forms; - erosional aeolian dune forms; - chronosequence of podsol development; and - chronosequence of dunes with its varying stages of soil development and associative successive and retrogressive stages of vegetation communities; • an outstanding example of the combination of rain forests growing on tall sand dunes; • species of flora and fauna which have adapted to the comparatively nutrient-poor, acidic, sands of the island; • vegetational chronosequences including successional stages associated with the development of these rainforest communities; • an outstanding example of subtropical patterned fens which contain a variety of organisms not normally found in such acid conditions, including “acid” frogs; and • the diversity of plant and animal species.
<p><i>Criterion (iii) contain unique or superlative natural phenomena, formations or features of exceptional natural beauty.</i></p>	<p>Fraser Island, the largest sand island in the world, has exceptional natural beauty and aesthetic importance and contains superlative natural phenomena including: over 250km of sandy beaches with long, uninterrupted sweeps of ocean beach, with more than 40km of strikingly coloured sand cliffs, as well as spectacular dune blowouts; and ocean surf beaches, strikingly coloured sand cliffs, spectacular tall rainforests growing on low nutrient sands, perched dune lakes including both clear "white water" lakes and dark "black water" lakes, banksia woodlands, heath, patterned swampy fens and sheltered mangrove areas in a spectacular mosaic landscape.</p>

Additional information since listing

The Fraser Island World Heritage Area Scientific Advisory Committee (FIWHASAC) recently reviewed the World Heritage values of Fraser Island (FIWHASAC, in press), using the revised criteria for natural properties. The Advisory Committee found that

“Extensive scientific information exists to support the assessment that Fraser Island demonstrates outstanding universal value within all four new natural criteria for World Heritage listing. Hence all these values and the attributes that define them should be afforded equal consideration in the management for their protection and presentation”.

A World Heritage Expert Panel convened during the Regional Forest Agreement process has also identified Coolooloa National Park as a place that warrants further investigation for possible inclusion in the Fraser Island WHA. In particular, the Panel identified Coolooloa as appropriate for extending the eucalypt forest values of the WHA, while also fitting within its major geomorphological theme. The Commonwealth has agreed to investigate the possibility of an extension to the Fraser Island World Heritage area to include Coolooloa.

At the request of the Queensland EPA/QPWS, the Fraser Island World Heritage Area Scientific Advisory Committee (FIWHASAC) also compiled a report on the potential outstanding universal value of the Coolooloa Area. The Advisory Committee found that

“Extensive scientific information exists to support the view that Coolooloa demonstrates outstanding universal value within all four new natural criteria for World Heritage listing. Hence, there is support that management attention and resourcing at Coolooloa should be afforded an equal status to that of Fraser Island.”

II.3. STATEMENT OF AUTHENTICITY/INTEGRITY

Authenticity/Integrity

The nomination document for Fraser Island and the Great Sandy Region (Department of the Arts, Sport, the Environment, Tourism and Territories, December 1991) provided the following information about the integrity of the nominated area in 1991.

Integrity Condition (ii) - the sites described should have sufficient size and contain the necessary elements to demonstrate the key aspects of the processes and be self-perpetuating.

“The nominated area (The Great Sandy Region) is a dynamic entity with sufficient scale, diversity and integrity to maintain ecological processes and landforms and to ensure self-perpetuation of all species.

In addition, the inclusion of both Coolooloa and Fraser Island provides 'insurance' against local species extinction in the event of catastrophic perturbations such as massive fire.

Soil profiles and ongoing pedological evolution remain essentially undisturbed on all but mined areas. Any impact of logging on processes such as nutrient cycling, forest structure and population genetics will shortly cease, and the refugial role of both closed forests and heathlands is assured. Weeds, plant diseases and feral animals are present but in low numbers subject to active management and are controllable. The low fertility of the sands provides a measure of protection against such disturbance.

Disjunct and relict populations of flora and fauna, including those associated with lakes, creeks and acid habitats have remained intact and will continue to be important for ongoing

speciation. The only exception is Lake Wabby, which is gradually being infilled by an encroaching sand-blow as part of natural dune movement”.

Integrity Condition (iii) - the sites described should contain those ecosystem components required for the continuity of the species or the other natural elements or processes to be conserved.

“The nominated area is sufficiently large, diverse and free from disturbance to contain all ecosystem components required for viable populations of all species and for continued maintenance of all natural phenomena.

While the tall forests have been affected to some extent by logging, they have the capacity to return to their former grandeur. Populations of whales and dugongs have largely recovered from earlier harvesting, and their habitats will be protected both in their current tenure and as part of the proposed Regional Park.

The primitive experiences of wilderness in such areas as northern Fraser Island are maintained under present management regimes, and will be further protected within the proposed Regional Park”.

WCMC/IUCN Summary and IUCN Technical Evaluation of the nomination

The WCMC/IUCN Summary of the nomination document and IUCN technical evaluation also commented on the integrity of the nominated area. These documents noted that at the time of nomination, both sandmining and extractive forestry had impacted on the region, with the forests of Fraser Island subject to logging for the past 130 years. However, as a result of an agreement between the Queensland government and the timber industry, all logging on Fraser Island ceased at the end of 1991. While there was no evidence that any species had been eliminated from the region due to logging, the impact in terms of changes to forest structure, floristic composition and relative species abundance was noted.

Sandmining in the 1970's took place on around 350 ha of land on Fraser Island to extract heavy minerals in ore bodies throughout the sandmass. Mining ceased in 1976 and rehabilitation was undertaken in the areas mined, however it was considered that the topography of 150ha of mined dunes of Fraser Island was irreversibly simplified by mining and the removal of vegetation.

Invasion by weeds, pathogens and feral animals at the time of listing was minimal and controllable, and the impacts of recreational use and vehicular access were under active management to ensure resource conservation.

The IUCN Technical Evaluation of the integrity of the nominated area (IUCN, 1992) addressed the issues of human impact, management and boundaries.

It found that recreational use of the area was intensive along the coastal strip, with seven resorts catering to visitors, and there were additional development proposals both within

and adjacent to the area. The unknown effect of heavy 4WD traffic on the beaches and littoral fauna was highlighted along with the possible need for control measures.

Tenure changes in favour of conservation were anticipated as lands were added to Great Sandy National park in response to a report of a Commission of Inquiry in 1990-91. The Commission of Inquiry also proposed nomination of the region for World heritage listing, the cessation of forestry in the region, and the establishment of a Regional park authority to manage the Great sandy region. In 1991 an interim management board had been established, a management plan for the region was being prepared.

Maintenance of values

The Fraser Island World Heritage Area Scientific Advisory Committee (FIWHASAC) recently reviewed the World Heritage value of Fraser Island (FIWHASAC, Fraser Island World Heritage Area; Review of Outstanding Universal Value, in press).

This assessment of World Heritage value is based on the criteria for World Heritage listing, which as noted previously have changed since Fraser Island was listed in 1992. The review used the new criteria to look at whether the property would meet the requirements of the World Heritage Convention today. The project identified attributes and key locations which demonstrate the values under each criterion as well as threats to these and has made the following assessments of the integrity of the area:

For Natural Criterion (ii) Biological Processes, the FIWHASAC found that:

“The infertile sandy soils of Fraser Island support a diversity of plant communities ranging from colonising plants and open woodlands to very tall eucalypt forests and rainforests to low, shrubby heath. The distribution of these communities across the island landscapes is intimately related to the distribution of the soils that have developed on the various dune systems. The Fraser Island and Cooloola dunes together provide at least nine windows in time that show progressive stages in plant succession, including changes in floristics, structure and increasing biomass, followed by stages of decline as access to nutrients decreases (retrogressive succession). Each of these stages has a particular assemblage of species adapted to the nutritional conditions of the site. These processes of ecosystem development and maturation as well as species sifting are continuing. The soil fauna assemblages are not well known for any of these ecosystems but research at Cooloola implies that there is a similar correspondence between these and the dune system chronosequence.

The nature and distribution of the attributes that support this criterion are such that it is robust and not threatened as a whole. The integrity of the present World Heritage property is satisfactorily captured by the present boundaries such that the majority of the attributes that contribute to the World Heritage value are contained within it. Local degradation can occur from the effects of excessive numbers of visitors, inappropriate fire management and the invasion of exotic species and pathogens”.

For Natural Criterion (iii) Natural phenomena and areas of exceptional natural beauty, the FIWHASAC found that:

“Fraser Island was inscribed on the World Heritage List in 1992 under Criterion III, and it was the unanimous position of workshop delegates that the outstanding international status of associated attributes continue to support the assessment made in 1992. The large scale of Fraser Island and its diversity of landscape elements with vistas and sites of exceptional beauty are of world quality.

The diversity of ecosystems and habitats developed on the sandy substrate contribute to world class opportunities for aesthetic appreciation. The unique *atmosphere* of the Island and a sense of awe capture visitors and wonderment is generated through interaction with a *world of quartzose sand*. These subjective feelings are promoted, developed and enhanced through interpretive presentation of the World Heritage Value of the property, and contribute to a powerful visitor experience. Consequently there was consensus at the workshop that addition of *aesthetic importance* to Criterion III substantially strengthens the rationale for listing under this criterion.

In terms of integrity, Fraser Island, as an essentially self-contained entity, is large enough to include and preserve the diversity of landscape elements that contribute to the outstanding aesthetic value as defined by the attributes supporting this criterion. It was however, the feeling of the workshop that inclusion of adjacent sand passages, estuaries and islands, would serve to reinforce the integrity of the World Heritage Area. From a purely aesthetic point of view, the relevant boundaries would be the limit of visibility.

The overall scenic beauty of the site was not considered to be compromised by current human activities. Some localised degradation of amenity has resulted from identified threatening processes. These include the physical and social impacts associated with increasing visitor numbers; continuing development within island communities; existing fire regimes; introduction of invasive plants and pathogens; and development of management infrastructure and visitor restrictions.

There was however, consensus within the workshop group that all of the identified threats are currently being, or have the potential to be, ameliorated through pro-active and effective management. The site has a current and effective management plan and receives institutional protection through Commonwealth and State nature conservation and biodiversity legislation. It may be concluded that the overall integrity under Criterion III has changed little since the positive assessment in 1992, and that both the management and legislative status have improved since that time”.

Boundaries and buffer zones

The boundaries of the WHA have not been revised or extended since the property was listed in 1992. Changes to the tenure of areas within the WHA have been made and are discussed in section II.4 Management – ‘Changes in ownership and/or legal status’.

The Great Sandy Strait acts as a buffer zone between the WHA and the mainland. A proposal to establish the Great Sandy Marine Park is currently being developed to establish a marine protected area over tidal waters and lands from the southern boundary of the Great Barrier Reef Marine Park to the southern bank of the Noosa River in south-east Queensland.

The Marine Park will be introduced in two parts: the Great Sandy Marine Park (Northern Section) and the Great Sandy Marine Park (Southern Section).

The Northern Section, which encompasses part of the Fraser Island WHA, is currently being considered. A discussion paper has been released (http://www.epa.qld.gov.au/environment/coast/parks/Great_Sandy_Marine_Park.pdf) as the first stage of a planning process seeking community involvement with identifying issues for the protection, conservation and ecologically sustainable use of the area's marine resources.

The Northern section extends north from Double Island Point, and includes Woongarra Marine Park, Hervey Bay, the Hervey Bay Marine Park, the Great Sandy Strait, Tin Can Bay and Inlet, and Queensland waters around Fraser Island. It contains existing fish habitat reserves and wetland reserves. The boundary of the planning area for the Great Sandy Marine Park (Northern section) is shown in Figure 2 attached.

The Southern Section (south of Double Island Point) will be introduced at a later date.

The Great Sandy Strait is one of the few passage landscapes in Australia. It is a double-ended estuary, characterised by the largest areas of tidal swamps in the South-east Queensland Region. The Strait has shifting patterns of mangroves, sandbanks, intertidal sand, mud islands, salt marshes and extended seagrass beds. The area is located between the rapidly growing population centres of Hervey Bay and Tin Can Bay, and the Fraser Island World Heritage Area. The Strait has been declared a wetland of international significance under the Ramsar Convention (see section II.4 Management (International) below). It is considered that the proposed marine park will provide better management of the Ramsar site through specific regulation of activities that threaten resident and migratory shorebirds, such as disturbance by dogs and boating activity.

Similarly, the inclusion of Queensland tidal lands and waters abutting the coasts of Fraser Island WHA and parts of the Cooloola section of the Great Sandy National Park will further promote complementary management of these magnificent sand coasts.

II.4. MANAGEMENT

International

The Great Sandy Strait is a sand passage estuary between the mainland and Fraser Island, and is the least modified of three such passages in Queensland. Most of the eastern side of Great Sandy Strait is in the Fraser Island World Heritage Area which extends 500m

seaward of the high water mark. This includes freshwater swamps and patterned fens which are contiguous with the mangroves on Fraser Island.

At the time of listing the Great Sandy Strait was largely undisturbed. The Great Sandy Strait Wetland was listed under the RAMSAR Convention in 1999, primarily for the protection and conservation of waterfowl and wader habitat. It includes the Great Sandy Strait, Tin Can Bay and Tin Can Inlet. Although much of the RAMSAR site is outside the World Heritage area there is limited but important habitat for an internationally significant population of trans-equatorial migratory waders within the 500 m World Heritage boundary off the western shore of Fraser Island.

The Strait is the largest area of tidal swamps within the South East Queensland bioregion, consisting of intertidal sand and mud flats (roughly one-third), extended seagrass beds, mangrove forests, salt flats and saltmarshes, and often contiguous with freshwater Melaleuca wetlands and coastal wallum swamps. The Strait is an exceptionally important feeding ground for migratory shorebirds and important for a wide range of other shorebirds, waterfowl and seabirds, marine fish, crustaceans, oysters, dugong, sea turtles and dolphins.

The coastal wetlands of Great Sandy Strait are also of international significance for migratory shorebirds designated under the Japan Australia Migratory Bird Agreement (JAMBA) and the China Australia Migratory Bird Agreement (CAMBA). Eighteen of the 24 species listed under these agreements use these wetlands, which are recognised as among the most important roosting areas for migratory trans-equatorial shorebirds in Australia.

National legislation and controls

At the time of listing, Commonwealth legislation governing the management of World Heritage Areas was the *World Heritage Properties Conservation Act 1983* ('the WHPC Act'). The WHPC Act enabled the Commonwealth to make regulations to protect Australia's World Heritage Properties from threatening actions identified in the regulations. This legislation, in effect, operated as a last resort mechanism for stopping specific actions.

In 1999, the *Environment Protection & Biodiversity Conservation Act 1999* ('the EPBC Act') was introduced. This Act replaces and significantly improves on the WHPC Act, by ensuring up-front protection and improved management for the world heritage values of Australia's World Heritage Properties. Under the EPBC Act a person must not, without an approval under the Act, take an action that has or will have, or is likely to have, a significant impact on matters of national environmental significance including the world heritage values of a declared World Heritage property. The unlawful taking of such an action may attract a civil penalty of up to \$5.5 million or a criminal penalty of up to seven years' imprisonment.

An 'action' includes a project, development, undertaking or an activity or series of activities. An action does not require approval if it is a lawful continuation of a use of land, sea or seabed that was occurring before the commencement of the Act. An enlargement, expansion or intensification of a use is not a continuation of a use. An action does not

require assessment or approval under the Act if it was approved by the Commonwealth or a State before 16 July 2000 (even if had not commenced by that date); and no further approvals are required in order for the action to be lawfully taken.

A person proposing to take an action that the person thinks may be prohibited by the Act without approval must refer the action to the Commonwealth Minister for the Environment for a decision on whether or not the action needs an approval.

8 referrals for actions proposed to be taken within or adjacent to Fraser Island have been referred to the Commonwealth for assessment. Of these, 4 were assessed as being controlled actions, and controlling provisions under sections 12 and 15A of the Act were developed for one of these proposals. The remaining 4 proposals were assessed as not constituting controlled actions. However the status of one of the proposals is now being reconsidered due to changes to the proposal in question.

State legislation and controls

At the time of listing, Fraser Island was managed as a recreation area in accordance with the provisions of the *Recreation Areas Management Act 1988* ('the RAM Act'). The WHA continues to be managed under the provisions of this Act.

The RAM Act provides for the setting apart of land and waters throughout Queensland as recreation areas and the management of recreational activities in those areas. The Act is administered by the Recreation Areas Management Authority ('the Authority'), which consists of the Minister/s charged with administration of the *Nature Conservation Act 1992* ('the NCA') and the *Forestry Act 1959*.

The Act also establishes the Recreation Areas Management Board ('the Board'), and provides the Board with certain powers and responsibilities. The Board consists of the chief executives (or their nominees) of the departments that deal with matters under the *Forestry Act 1959* and the NCA, and is legally independent of the two departments. The annual reports of the Board, which reports to the Authority, are published as part of the Environmental Protection Agency annual reports (<http://www.epa.qld.gov.au/environment/about/reporting/>).

An important characteristic of the RAM Act is that it facilitates management of recreation activities in areas under multiple tenure. Declaration of a recreation area does not change the underlying land tenures and does not affect the rights and obligations of landholders (including government agencies), except to the extent of any agreement between the landholder and the Board. The Act does not allow the Board to own land.

One of the main objectives of the RAM Act is to 'provide, coordinate, integrate and improve recreational planning, recreational facilities and recreational management on recreation areas, taking into account their conservation, recreation, education and production values and the interests of the proprietors'.

The Act therefore addresses matters such as the declaration of recreation areas, administration, functions and powers of the Board, management plans and financial provisions. The *Recreation Areas Management Regulation 1989* and the *Recreation Areas Management By-law 1991* supplement the RAM Act and contain specific provisions relating to visitor use of recreation areas, including requirements for permits and permit fees.

The Board aims to provide a wide range of opportunities for public recreation in natural environments and to facilitate public appreciation, enjoyment and protection of resources in recreation areas. Economic objectives are to provide for the co-ordination of recreation management as cost-effectively as possible and with minimal economic burden on the Queensland community, subject to the maintenance of a broad range of conservation and recreational values. Matters under the Board's control include management of visitor access, provision of public facilities, management of commercial activities (including tours) and regulation of fees for access, camping and commercial activities.

The Fraser Island Recreation Area includes land to low water mark around the entire island and most of the land on the island except the townships, some leases and privately owned land. Most is under State ownership. The recreation area is about 170 000ha.

Recreation management of recreation areas is carried out by staff of the Queensland Parks and Wildlife Service, in accordance with the provisions of the Act, Regulation and By-laws, and subject to Board endorsements and policies. Recreation management of these areas is primarily funded from user charges such as camping fees, vehicle fees and fees for operating commercial tours. Funds raised from recreation areas must be used for recreation area purposes.

The RAM Act and subordinate legislation are currently being reviewed to improve their effectiveness and where applicable, make them more consistent with related legislation such as the *Nature Conservation Act 1992* and *Nature Conservation Regulation 1994* which apply to protected areas (including national parks). More than 98 percent of Fraser Island's 165 280 hectares is part of the larger Great Sandy National Park.

The *Nature Conservation Act 1992* replaced the former *Fauna Conservation Act 1974*, *National Parks and Wildlife Act 1975*, *Native Plants Protection Act 1930* and provisions of the *Land Act* relating to environmental parks. The Act is based on principles to conserve biological diversity, ecologically sustainable use of wildlife, ecologically sustainable development and international criteria developed by the World Conservation Union (International Union for the Conservation of Nature and Natural Resources) for establishing and managing protected areas.

The boundary of the Great Sandy National Park occurs at high water mark. The RAM Act therefore facilitates control of activities that occur on the beach, as the Fraser Island recreation area includes lands to low water mark.

Other lands on Fraser Island are a mixture of freehold land (approximately 370 ha), residual areas of the State Forest estate (approx 34 hectares, managed under the *Forestry Act 1959*) and Crown lands (approximately 1130ha, managed under the *Land Act 1994*).

It is intended that some residual unallocated state lands and state forest reserve areas will be added to the protected area estate when and as appropriate.

*Note that all Queensland legislation referred to in this and other sections can be accessed through the <http://www.legislation.qld.gov.au/Legislation.htm>.

Local government and Regional statutory controls

In Queensland, local government planning and development assessment and approval is currently undertaken in accordance with the *Environmental Protection Act 1994* (the 'EP Act') and the *Integrated Planning Act 1997* (the 'IPA'). While the two Acts have different roles, they apply together to protect the environment and manage the processes and effects of development.

The IPA establishes a framework to co-ordinate and integrate planning and to manage development assessment at the local, regional and State levels so that development and its effects are managed in ecologically sustainable ways. This legislation took effect in early 1998.

The purpose of the EP Act is to protect Queensland's environment while allowing for development that improves the total quality of life, now and in the future, in a way that maintains ecological processes on which life depends. This approach is termed 'ecologically sustainable development'.

Chapter 1 of the EP Act states that this is to be achieved by a cyclical integrated management program with four phases. **Phase 1** involves researching the state of the environment, including essential ecological processes, and deciding those environmental values which are to be protected or achieved by consulting industry, government departments and the community.

Phase 2 involves developing environmental protection policies which include indicators, standards, waste minimisation and management advice, and promoting community involvement and responsibility. **Phase 3** implements and integrates environmental strategies into matters such as landuse planning and managing natural resources, ensuring actions to protect environmental values from environmental harm, monitoring contaminants in the environment, and requiring those causing environmental harm to pay costs and penalties.

Phase 4 requires accountability including reviewing the impact of human activities, evaluating the efficiency and effectiveness of environmental strategies, and reporting on the state of the environment.

Elements of the EP Act were integrated with the IPA on 1 July 1998.

The IPA establishes an Integrated Development Assessment System (IDAS) to provide a single system for the assessment of development applications conducted by both State agencies and local government.

Planning schemes are also prepared by local governments under the provisions of the IPA to manage growth and change in their local government area. Schemes also integrate State, regional and local development strategies and recommendations for the local government area.

A planning scheme:

- Outlines the development outcomes sought for the local government area as a whole and for particular localities
- Allocates land for different uses, including residential growth areas, having regard to a range of considerations
- Indicates the location and nature of major infrastructure proposed to be provided
- Identifies areas or places that constrain the use of land due to their environmental value or their adverse effects on development
- Identifies the kind of development that requires approval (assessable development) or that can be carried out without approval if certain requirements are met (self-assessable development), and
- Specifies the requirements for assessing the suitability of a development proposal

The Great Sandy WHA extends over two Local Government Areas - Maryborough City and Hervey Bay City.

The Maryborough City IPA Planning Scheme was gazetted in March 2000. This scheme integrates and co-ordinates policies, actions, programs and information from the Commonwealth, State, regional and local levels. At the Commonwealth and International level it recognises and protects World Heritage values associated with Fraser Island and the Great Sandy Strait through the incorporation of principles contained in the Great Sandy Region Management Plan and specific measures for Fraser Island South and the coastal townships. It achieves this aim through a number of stated Desired Environmental Outcomes (DEOs) which are assisted in their implementation by various local area strategies (for example Fraser Island South Local Area and related Area Specific Codes).

The Hervey Bay City IPA compatible scheme is currently being finalised.

Management Arrangements

Strategic Planning

The Great Sandy Region Management Plan (1994) is the principal strategic planning instrument for natural and cultural resource management in the region. FIWHA is managed in accordance with this Management Plan. This plan provides direction on the protection

of natural systems, landscapes and cultural heritage values throughout the whole region, and also addresses recreation and visitor activities, the commercial use of resources on public land and water, and development in the region (Fraser Island, Cooloola, and the waters of Hervey Bay, Great Sandy Strait, and the Tin Can Bay Inlet). The Plan may be accessed via the following link

http://www.epa.qld.gov.au/environment/park/managing/great_sandy.html.

Administrative and contractual arrangements

The day-to-day management of the Recreation Area is undertaken by the Queensland Parks and Wildlife Service (QPWS), on behalf of the Recreation Areas Management Board (RAM Board). Other State and Local Government authorities manage other areas within their legislative responsibility.

The RAM Board meets with the property managers approximately twice a year to discuss and approve proposed work programs, budgets, and other management issues. Issues are also dealt with out of session as required. There are no formal arrangements covering dealings with other levels of government or other government agencies, these bodies liaise with and are consulted by QPWS as necessary in the course of normal operating procedure. Issues are also raised directly with the RAM Board, and redirected to the appropriate QPWS office for action. QPWS officers are delegated appropriate powers under the RAM Act 1988.

Management is undertaken in accordance with the Queensland Government Great Sandy Region Management Plan (1994). QPWS is the lead agency for the carriage and implementation of the whole of the Great Sandy Region Management Plan as it applies to the FIWHA.

In March 1997, the Commonwealth and Queensland Governments agreed to establish a joint Ministerial Council and a management structure for Fraser Island World Heritage Area. The agreement, ratified at the first Ministerial Council meeting in June 1997, provided for a structure consisting of the Ministerial Council comprising four Ministers, two each from the State and Commonwealth Governments. The Ministerial Council is chaired by the Queensland Minister for Environment.

The Ministerial Council is advised by a FIWHA Management Committee. This Committee is comprised of appropriate State and Commonwealth Departmental Officers, the Mayors of Hervey Bay City Council and Maryborough City Council and the chairs of the two advisory committees. The Management Committee is advised by the FIWHA Community Advisory Committee and the FIWHA Scientific Advisory Committee.

Joint Management measures (Traditional Protective measures)

No joint management arrangements have yet been established for the FIWHA.

Management planning

The Great Sandy Region Management Plan 1994 ('the GSRMP') (http://www.epa.qld.gov.au/environment/park/managing/great_sandy.html) is the principal strategic planning instrument for natural and cultural resource management in the Great Sandy region, which includes Fraser Island. Preparation of the GSRMP included extensive public consultation processes.

While the GSRMP does not meet the *Nature Conservation Act 1992* requirements for a statutory management plan, it has been approved by the Queensland Government and therefore represents a whole-of-government directive about the future of the Great Sandy region.

The plan provides a framework for decision-making so that four outcomes can be achieved in the Great Sandy Region by or before the year 2010. These outcomes are:

- a secure future for the natural and cultural environment;
- a secure community setting for residents;
- community access to resources and opportunities; and
- a basis for sustainable use of renewable resources.

A set of management purposes has been developed to direct management and allow for proposals to be considered. These purposes, not necessarily in order of priority, are:

- *to protect, conserve, present, rehabilitate and transmit to future generations the physical landscape, biological, cultural heritage and other significant values of the entire Great Sandy Region, together with the components and processes required for their continuance;*
- *to meet Australia's international obligations under the World Heritage Convention for the protection, conservation, presentation, rehabilitation and transmission to future generations of the Fraser Island World Heritage Property;*
- *to provide meaningful opportunities for Aboriginal people to be involved in and consulted about the planning and management of the Great Sandy Region;*
- *to foster a secure community setting for people living in the Region;*
- *to allow for the provision of essential and appropriate public utilities, services and structures for the residents of, and visitors to, the Great Sandy Region consistent with the protection of the Region's values;*
- *consistent with the protection of values, to provide a diversity of high-quality recreation opportunities to ensure that the widest possible cross-section of the community is able to experience and appreciate the Great Sandy Region commensurate with their needs, interests, capabilities and expectations; and*

-
- *to ensure that development and resource harvesting activities occurring within the Great Sandy Region are conducted in an ecologically, economically, socially and culturally sustainable manner.*

The Plan also includes over 550 actions that outline the next level of planning and policy development or management activity required to achieve the desired outcomes. QPWS has established the Great Sandy Implementation Database to track the progress towards implementing each action in the 1994 Plan.

Amendments to the Plan may be made as a result of changing circumstances or better information resulting from research and monitoring activities. A mid-term review of the Plan is currently underway and is expected to be finalised by early 2004.

Contact details of manager

Director QPWS (Southern region)
PO Box 64
Bellbowrie, QLD, 4070
Australia.

Changes in ownership and/or legal status

At the time of listing in 1992, the most significant conservation reserve protecting Fraser Island was Great Sandy National Park. This park, which also extends to mainland areas, contained 83 700 ha in 1992, with approximately 74 900 ha located on the Island.

The Great Sandy National park has been significantly increased in size as a result of the addition of new lands, and also the consolidation of existing protected areas, and now protects 220 000 ha. Most of Fraser Island (over 155 000) has now been gazetted as part of the national park.

Since 1996 three Native Title applications have been lodged in the Federal Court over lands that include Fraser Island. Information on some of the processes that relate to the Native Title Act 1993 and resolution of native title claims may be accessed through the following link to the Native Title Tribunal www.nntt.gov.au.

Staffing, financial and training resources

QPWS field staff on Fraser Island carry out a variety of functions including public contact, natural and cultural resource management, recreation management, maintenance and development of infrastructure, enforcement, emergency response, waste removal, road management, and administration.

The number of staff based on Fraser Island has increased significantly over the past 7 years as shown below.

Year	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02
No of Staff	24	24	30	37	35	39	63

During 2002 these staff members have received a variety of training, including in the use of firearms, fire management, workplace health and safety, first aid and CPR, advanced resuscitation, compliance and legislation, and enforcement. A campground ranger training workshop has also been delivered.

Field staff are supported by policy, planning and administrative staff primarily located in Maryborough and Brisbane. Volunteers and students on work experience placements also contribute to natural resource management. There are currently 12 volunteers registered as being available to undertake work on the Island.

All but one site on Fraser Island have broadband satellite connectivity to the EPA network. This link provides staff with access to departmental email, internet and a subset of corporate applications.

The majority of funding for the management of Fraser Island is derived from receipts under the *Recreation Areas Management Act 1988*. Revenue received by the Board (such as user charges from the issue of camping and vehicle service permits, the sale of brochures and other items, and penalties) is paid into the Queensland Recreation Areas Management Board Fund in accordance with Part 7 of the Act. These funds are then spent on recreation management in recreation areas, including the provision of facilities and services, for example campgrounds, day-use facilities, roads and walking tracks, signs and visitor information.

RAM Receipts collected have increased in the past 10 years, as shown below.

	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-1	2001-02
RAM receipts	1475000	1572500	1640000	1573000	2071069	2875750	3162876	3170287	3.4m	4132761

Other funding is received from Commonwealth government programs (including through the Natural Heritage Trust), and state appropriations and special grants for specific purposes.

Scientific and technical studies

The original nomination document noted that the degree of scientific interest in the Great Sandy Region was reflected in the large number of studies undertaken, which underscored the value of the nominated area as an extensive 'natural laboratory'.

The high level of scientific interest in the area has continued since listing. The Fraser Island World Heritage Area supports research undertaken by the following organizations and Consultants:

- Bug Catch Program
- CSIRO
- Commonwealth Department of Environment
- Queensland Department of Primary Industries (Veterinary Laboratories, Fisheries Management)
- Queensland Department of Natural Resources and Mines
- Griffith University
- James Cook University
- Museo Regionale Di Science Naturali – Torino, Italy.
- Queensland Herbarium
- Queensland Museum
- Queensland University of Technology
- University of Canberra
- University of New South Wales
- University of Queensland
- University of the Sunshine Coast
- University of Wollongong
- Australian National University
- Fraser Island Scientific Advisory Committee
- Gutteridge Haskins and Davey Pty Ltd
- EDAW Australia Pty Ltd

Research Programs include

- Biological control of *Melaleuca* and *Lygodium*
- Biological control of *Lantana* and *Groundsel*
- Dingo genetics
- Dispersal mechanisms and population genetic structure in habitat restricted species
- Distribution database of Queensland's Coleoptera
- Effect of aestivation on muscle function/locomotor performance in frogs
- Endangered frog research program
- Flora population genetics
- Ground Parrot distribution and population genetics
- Insects of the Gondwanian lines
- Interactive key to the grasses of Australia
- Invertebrate fauna research
- Managing threatened wildlife at risk from fire in a World Heritage Area, how do prescribed burns affect population viability.
- Managing wildlife on Fraser Island
- Marine mammal histopathology

-
- Marine turtle reproduction and population biology
 - Morphological evolution in rainbowfish
 - Population genetic structure of Sand Yabby *Cherax robustus*
 - Population genetics of freshwater turtles
 - Fraser Island Review of Universal Value
 - Social behaviour and ecology of Allodapine Bees in Great Sandy
 - Taxonomic status of Double Eyed Fig Parrots
 - Taxonomic studies of ground hunting spiders and insects
 - Thermoluminescence dating of sediment samples
 - Vouchering orchid species records for southeast Queensland
 - Spiders of southeast Queensland
 - Marine fishes of Fraser Island
 - Effects of fire interval on the relative abundance of three native rodent populations in foredune complex vegetation on Fraser Island
 - Effects of sand mining on the reptile community
 - Effects of relative usage on Fraser Island Lake nutrient concentrations
 - Genetic links between Hoop, Kauri and Woolemi pines

The above lists are not comprehensive but give a reasonable indication of research previously and presently being conducted in the World Heritage area. Some of the key studies that are currently underway or have been recently completed are listed below along with a brief overview of the scope of each project.

Sustainable transport study

(<http://www.epa.qld.gov.au/environment/park/fraser/transport.htm>)

The purpose of this study is to develop an integrated transport management strategy for Fraser Island. The impact of vehicles on Fraser Island's natural and cultural heritage values is a concern. Concerns include erosion, which can lead to sedimentation of creeks and the freshwater lakes; vibrational impacts on soil and vegetation stability; damage to vehicles from deteriorating roads (particularly commercial tour operators vehicles); and the ability to manage such an extensive road network in a sand environment.

It is intended that the Strategy will protect World Heritage values and address issues of concern; provide for appropriate recreation and tourism opportunities and general Island needs; address existing and potential desired site capacities for major destinations; and identify resources needed for implementation. The Strategy is being developed by Gutteridge Haskins Davey Pty Ltd and is expected to be completed by mid 2003.

Draft Fraser Island Fire Strategy

(http://www.epa.qld.gov.au/environment/park/fraser/FIFMS_Public_Consultation_Summary.pdf)

The Draft Fire Strategy provides the strategic framework and direction for fire management on the park, along with the Wildfire Response Procedure, and the Planned Burn Program. It details the values of the protected area and surrounding lands, the long-term fire management aims for the park, and how these relate to on-ground management. An acceptable range of fire regimes to suit the desired fire management objectives is provided

for each major ecosystem type present. Any management practices that involve the use of fire (for example planned ecological burning or fuel reduction burning, wildfire suppression activities, and burning for weed control and site rehabilitation) will all be subject to the requirements of this Fire Strategy.

Optimisation of sand road serviceability

QPWS is contributing to a Queensland University of Technology study being carried out by PhD student Kevin Wake-Dyster under the supervision of Dr A Gonetilleke (QUT), Prof F Bullen (University of Tasmania) and Mr L Fullerton (QPWS): “Development of a storm water management strategy for Fraser island based on sand and spatial characteristics to optimise sand road serviceability”. The following stages of the project has been completed - a hydrologic and hydraulic study, undertaking material characterisation and pavement analysis, integration of hydrologic, hydraulic and pavement data and modelling. Development of design and maintenance strategies for sand based roads is currently being undertaken. The results of this study will be integrated into the sustainable transport study.

Fraser Island Desired Site Capacities Study (2002)

In 2001 QPWS commissioned EDAW (Aust) landscape architects and planners to prepare a desired site capacities study. The study provides much needed data on existing visitor use at 44 key day use areas on the island, and establishes capacities for these sites. The study also provides a simple repeatable methodology for establishing desired visitor capacities.

Fraser Island World Heritage Area Monitoring and Management Effectiveness Report

A monitoring and assessment project has been developed for the Fraser Island WHA. Management outcomes have been addressed through a series of monitoring programs that address the desired outcomes of the 1994 Great Sandy Region Management Plan. The 63 sub-strategies in the management plan have been used as the basis for developing a comprehensive monitoring program, and specific monitoring projects have been developed for priority areas. (Hockings & Hobson 2000)

Draft Camping Management Plan (<http://www.epa.qld.gov.au/cgi-bin/w3-msql/environment/recreation/camping/msqlwelcome.html?page=fidcmsr.html>)

QPWS has recognised the need for the development of a camping management plan to reduce the environmental impacts of camping and improve the visitor experience on the Island. A draft camping management strategy has therefore been prepared as a basis for consultation. In 1998 QPWS engaged EDAW (Aust) landscape architects and planners to undertake environmental and infrastructure needs assessment component of the project – a technical report was produced which has been incorporated into the draft camping management plan.

The plan proposes a series of actions aimed at improving Island-wide camping management, upgrading or developing 18 existing and proposed campgrounds and managing 7 foreshore camping zones. Concept plans have been prepared for key campgrounds together with an implementation schedule that identifies priority actions. The final camping management plan is currently being finalised.

Visitation

Visitors are able to access Fraser Island independently or as passengers on a commercial tour. All vehicles brought onto the island must be covered by a Vehicle Service Permit issued under the RAM Act. Commercial tour operators must also possess a commercial tour operator permit issued under the RAM Act and submit passenger returns and appropriate fees to the RAM Board.

QPWS is able to obtain an accurate estimate of visitation each year using information held on numbers of Vehicle Service Permits issued, and information supplied by commercial operators on the numbers of passengers they carried. The number of visitors to Fraser Island since 1991-92 is shown below.

Financial year	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-2001	2001-2002
Number of visitors	211461	238974	262037	271819	275072	278889	295153	311557	314051	301220	339470

Numbers of visitors have increased each year, with the exception of 2000-2001. At the time of listing, there were just over 200,000 visitors to the Island annually. In 2001-02 visitation had risen to almost 340,000.

The pressures associated with increasing levels of visitation are discussed below in Section II.5

Education, interpretation and awareness raising

Education, interpretation and awareness raising is carried out through a variety of means. Information is made available to Fraser Island visitors at different stages of their trip.

1. Pre-visit:

Prior to their trip, visitors are able to access QPWS information on Fraser Island through a variety of media — brochures, videos, maps and the web.

- The Fraser Island visitor information sheet (<http://www.epa.qld.gov.au/environment/park/discover/fraser.pdf>) details everything visitors need to know to plan a Fraser Island trip. This is available on the EPA website.
- Visitors receive an information kit with their permit. This kit contains four brochures explaining geological processes, vegetation types and associated fauna, short walks on the island, touring, camping and dingo information (<http://www.epa.qld.gov.au/environment/park/discover/dingoaware.pdf>)
- Fraser Island information is prominently displayed on the EPA website (www.epa.qld.gov.au), allowing visitors to access information easily.
- Backpackers visiting the island from Hervey Bay or Rainbow Beach receive a pre-visit briefing on environmentally responsible camping, and tips on appropriate 4WD

techniques, aided by backpacker-industry developed videos featuring QPWS Rangers.

- Collaboration on maps with Sunmap and Hema maps to ensure accurate information is provided.

2. Off-site orientation:

Once en route to the island, visitors have more opportunities to find out about the unique features of Fraser Island.

- QPWS displays in hostels and 4WD hire offices at Hervey Bay and Rainbow Beach reinforce the messages in videos viewed by backpackers.
- Interpretive displays have been installed at River Heads and Inskip barge departure points, as well as at Tewantin Information Centre for those visitors travelling through Cooloola to Fraser Island.
- Visitors can read interpretive displays while they travel travelling on barges to three different entry points on the island.

3. On-site orientation (island-wide):

- Interpretive shelters at all campgrounds and day visit areas provide visitors with attractive, accurate and readily accessible information. Panels provide answers to questions such as ‘Why World Heritage?’. This not only enhances visitors’ experience but also motivates minimal impact behaviour.

4. On-site orientation (site-specific)

- At Central Station an old forestry shed has been converted to a large informative display shelter.
- Major campgrounds (Dundubara, Waddy Point, Lake McKenzie and Lake Boomanjin) have interpretive displays with specific information relating to special features of the site.
- Day use areas at Eli Creek, Middle Rocks, Lake Garawongera, Lake Wabby and Ocean Lake also have interpretive displays with specific information relating to special features of the site.

5. Site interpretation

- Interpretive trails have been developed along Wanggoolba Creek and Middle Rocks boardwalks.
- A heritage trail has been developed at Central Station.
- Signs at Pile Valley and the wreck of the Maheno, provide site-related information.

6. Post-visit reinforcement

This is available through publications including

- *Treasures in the sand*, and a dingo story book and colouring book,
- Postcards and posters of the striking features of Fraser Island; and
- The *Discovering Fraser Island and Cooloola* brochure in the information kit which was designed as an attractive souvenir to keep or pass on to friends.

Role of World Heritage listing in interpretation, education and awareness raising.

	Examples of Values of Criterion (ii) outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment.	1. Pre-visit information	2. Off-site orientation	3. On-site orientation (island-wide)	4. On-site orientation (Site specific)	5. Site interpretation	6. Reinforcement
A	Complex, evolving coastal dune formations;	x	x	x	x	x	x
B	An array of dunes and dune lakes which is exceptional in terms of number, diversity and age;	x	x	x	x		x
C	Dynamic and developmental stages in dune formation including freshwater dune lakes,	x	x	x	x	x	x
D	... actively forming depositional dune forms,	x	x	x	x	x	
E	... erosional Aeolian dune forms, and	x	x	x	x	x	
F	... chronosequence of dunes with its varying stages of soil development and associative successive and retrogressive stages of vegetation communities;	x	x	x	x	x	x
G	Combination of rainforests growing on tall sand dunes;	x	x	x	x	x	x
H	Species of flora and fauna which have adapted to the comparatively nutrient-poor, acidic sands of the island;	x	x	x	x	x	x
J	Vegetational chronosequences including successional stages associated with the development of these rainforest communities;	x	x	x	x	x	x
K	Subtropical patterned fens which contain a variety of organisms not normally found in such acid conditions, including "acid" frogs;	x	x	x	x		x
L	Diversity of plant and animal species.	x	x	x	x	x	x

	Examples of Values of Criterion (iii) contains unique or superlative natural phenomena, formations or features of exceptional natural beauty	1. Pre-visit information	2. Off-site orientation	3. On-site orientation (island-wide)	4. On-site orientation (Site specific)	5. Site interpretation	6. Reinforcement
A	Over 250km of long sandy beaches with long interrupted sweeps of ocean beach with more than 40km of strikingly coloured sand cliffs, as well as spectacular dune blowouts;	x	x	x	x		x
B	Ocean surf beaches,	x	x	x	x		x
C	Strikingly coloured sand cliffs,	x	x	x	x		x
D	Spectacular tall rainforests growing on low nutrient sands,	x	x	x	x	x	x
E	Perched dune lakes including both clear "white water" lakes & dark "black water" lakes,	x	x	x	x		x
F	Banksia woodlands,	x	x	x	x		x
G	Patterned, swampy fens, and	x	x	x	x		x
H	Sheltered mangrove areas in a spectacular mosaic landscape.	x	x	x	x		x

Identification of gaps and management needs

The FIWHASAC identified the following factors that they consider is impacting on management of the WHA:

“Scientific participants in the Review identified a number of resourcing issues that are currently imposing constraints upon the achievement of effective management. These include general funding limitations and issues relating to staffing levels and profiles. Some of the constraints may be addressed by:

- *Employing specialist on-site staff with expertise in key management areas, such as natural resource management, fauna management, fire management, and visitor management for example.*
- *Maintaining adequate staffing levels to allow specialist staff to focus predominantly on their areas of expertise.*
- *Maintaining adequate staffing levels to promote a culture of active rather than reactive management.*
- *Promoting a culture of adaptive and integrated management through cooperation and exchange between field staff, professional office-based planners, senior management, community representatives and scientific advisers.”*

Knowledge gaps for the attributes and components under each Criterion, as identified by the FIWHASAC, are shown below.

Natural Criterion II: Biological processes

Attribute 1 Vegetation sequence on dune systems:

There is little knowledge of the nature of the complete ecosystems (e.g. the associated soil fauna or above-ground terrestrial fauna) at any of the dune systems, although at Cooloola, changes in assemblages of larger fungi and some soil invertebrate species accompany the changes in vegetation. There is also a need to document the rate of human-induced change on the environment and how to manage these areas. For, example, are there appropriate fire regimes for particular vegetation and faunal communities? To gather this data, there is a need to continue measurement of long-standing scientific plots and to expand the types of measurements. Moreover, the number of plots needs to be increased at all sites and measurements commenced in unsampled vegetation types. Some of this work is underway on Fraser Island as part of a long-term monitoring program (Hockings and Hobson, 2000).

Attribute 2. Relictual vegetation types:

Little is known of the regeneration patterns of *Araucaria* or *Agathis* in these areas.

Natural Criterion III: Superlative Natural Beauty

Attribute 1. Different and Novel Landscapes and Features:

Visitor impacts associated with the full range of recreational activities occurring on the Island, and an understanding of appropriate fire regimes for different habitats and ecosystems.

Attribute 2. Diversity of Landscapes

No specific knowledge gaps identified, however there is a need for research on visitors' perceptions of the landscapes.

Attribute 3. Diversity of Experiences

Aesthetic value in broad terms is an important component of a visitor's experience to areas exhibiting exceptional natural beauty. This fact has been acknowledged by the World Heritage Committee through its incorporation of *aesthetic importance* into natural heritage Criterion III. Unfortunately, a technique suitable for identifying the subjective content of potential multi-sensory aesthetic dimensions for Fraser Island or World Heritage areas in general has not been developed. This represents a significant gap in knowledge of World Heritage attribute assessment. Until such methods are developed and tested, any systematic evaluation of this natural heritage attribute is limited.

Because the Cooloola sandmass and Fraser Island are part of one general geomorphic system and because many visitors travel through Cooloola en route to Fraser, there is an equal need to evaluate Cooloola's aesthetics and understand how journeying through Cooloola complements the total visitor experience of the sandmass environment.

There is a general paucity of social science research addressing visitor management issues. In order to better manage visitor behaviour to minimise environmental impact and maximise experiential benefits, there is a need to better understand visitor's attitudes, awareness setting and activity preferences. It would also be worthwhile to investigate visitors' reactions to physical impacts, social encounters, management interventions and interpretation initiatives. To achieve this, a social impact study adopting a technique like Visitor Impact Management (VIM) would directly assist management to review a range of strategies to counter recreation impact and enhance visitor experience.

Fraser Island has experienced recent dramatic increases in visitor numbers and whilst large, the Island is limited in access, particularly to areas away from the beaches. As a result, the park experiences concentrated patterns of use and visitor focus on high profile sites or opportunities (e.g. Lake McKenzie, Central Station, Eli Creek). In an overall threats analysis based on the transcripts of all expert scientific respondents (See Appendix 4) it was no surprise to see that recreational activity emerged as the greatest potential threat to the attributes defining World Heritage character on Fraser Island. The second highest threat was the lack of knowledge about the impacts of such visitor activity on ecological and cultural integrity, and the third ranked potential threat was infrastructure development. This basic finding highlights the priority to effectively manage tourist activity in the Park as a primary means of sustaining ecological and cultural integrity.

To this end, the information gained from visitor surveys and social science research conducted within the Park should provide vital insights and directions for management. Such research is critical to understanding the psychology and characteristics of visitors to the Park, their expectations of a visit, and the potential to influence their behaviour once they enter the Park. The knowledge is needed to inform all aspects of visitor management and especially to develop effective interpretation initiatives, to responsibly manage visitor safety and to optimise the quality of visitors' experiences. Social science research should be afforded similar status to ongoing natural science research in its ability to inform active management decisions aimed at sustaining the ecological and cultural integrity of the resource, as well as the quality of park experiences for visitors.

Detailed, on-going site monitoring is necessary to assess the full range of physical impacts caused by visitors (e.g. camping, trampling, vehicles travelling through beach roosting areas) and to reveal changes over time which point to recreation succession.

II.5. FACTORS AFFECTING THE PROPERTY

Since 1994 changes in circumstances noted in the Review of the GSRMP have included a significant growth in population in the Great Sandy Region, an expansion of residential development and an increase in tourism and support industries.

The FIWHASAC report, as well as identifying the qualities and attributes that together contribute to Fraser Island's *outstanding universal value*, records a consensus view on the extent and importance of processes that may threaten the integrity of Fraser Island and discusses the implications for the management of the Island

The FIWHASAC identified the following threatening processes that currently, or have the potential to, exert pressure on the World Heritage attributes of Fraser Island. These include (in approximate order of importance and extent):

- recreation/tourism activity;
- fire;
- lack of knowledge from systematic monitoring;
- infrastructure development; and
- exotic flora (including micro-flora) and fauna.

The Values Review acknowledged that the presence and impact of different threatening processes vary both spatially and temporally across Fraser Island, and that this fact confounds efforts to compare the relative significance of identified pressures.

The attributes and their components for each criterion, along with the major threats as identified by the FIWHASAC, are shown below:

Criteria	Attributes and components	Threats
Criteria 2	1. Vegetation sequence on dune systems	Inappropriate fire regimes Inappropriate siting of tourist access
	2. Relictual vegetation types	Inappropriate fire and disturbance regimes
Criteria 3	1. Different and novel landscapes and features	
	1a. Scale	No direct threats. Future threat from global warming
	1b. Long uninterrupted vistas of ocean beach in a near natural environment	Coastal urban development tourism impacts and littering excessive management infrastructure, beach camping
	1c. Coloured sand cliffs and sandblows	Impact of visitation
	1d. Lakeland landscapes and freshwater creeks	Visitation (trampling etc)
	1e. Forest and heath systems	Invasive species and pathogens, Inappropriate fire regimes
	1f. Adjacent sand passages, estuaries and islands	Non-inclusion in WHA
	1g. Terrestrial fauna	Increased visitation
	2. Diversity of landscapes	
	2a. Mosaic of visually, physically and biologically contrasting habitats.	Introduction of invasive plants and pathogens. Visitor impacts and inappropriate fire regimes
	3. Diversity of experiences	
	3a. Diverse natural landscapes provide settings and opportunities for a broad range of recreational and aesthetic experiences.	Increased visitation Risk of recreational succession and homogenisation of experiences
	3b. Opportunities for journeying experiences through diverse landscapes.	As for 3a. Also urban development, management infrastructure, road widening/vegetation destruction from large tourist vehicles, and juxtaposition of vehicle and walking tracks

Development pressures

Development within the WHA is controlled via local government planning schemes, State government legislation including the Nature Conservation Act 1992, and Commonwealth legislation (EPBC Act). The large amount of the WHA within the Great Sandy National Park ensures that conservation is the major thrust of the Island's management. No logging or agriculture is undertaken within the area.

However, development still has the potential to impact on the area. The FIWHASAC identified coastal urban development as a threat to the natural views available in the WHA, particularly in terms of the potential for electrical lighting to impact on night views and the clarity of the night sky, as well as the visual impacts of infrastructure (for example ramps and jetties along the western beaches, and management infrastructure including signage)

and beach camping activities. Littering, and the numbers and impacts of tourist vehicles were also identified as threatening the natural views available in the area.

The presence of infrastructure including roads was also identified as having the potential to interrupt the opportunity to journey across diverse landscapes, and threaten the opportunity for chance encounters with both the landscape and wildlife.

Tourism development was also identified as having the potential to impact on the property, for example in terms of the inappropriate siting of tourist access and the potential for weeds and pathogens to invade vegetation communities and threaten their integrity from along these access routes.

The presence of utilities infrastructure (telecommunication and power) within the Great Sandy National Park is controlled under the *Nature Conservation Act 1992*. The EPBC Act also acts to control the potential impact of major development on the WHA.

Environmental pressures

Use of inappropriate fire regimes has been identified by the FIWHASAC as a major and potentially broad-scale threat to the World Heritage attributes of Fraser Island. It has the potential to threaten vegetation sequences on dune systems, the existence of relictual vegetation types, forest and heath systems, and the existence in the WHA of a mosaic of visually, physically and biologically contrasting habitats.

Regimes that are inappropriate in terms of frequency, intensity and/or seasonality have the potential to effect regeneration and succession of vegetation communities. The cause of the problem has been identified as a lack of knowledge about the fire ecology of communities and of historical vegetation patterns prior to European settlement.

Since the review workshop, management has addressed this issue through convening a fire management workshop and the development of a draft fire management strategy (discussed in section 11.4 above).

Global warming was also identified by the FIWHASAC as a potential future threat to the different and novel landscapes and features in terms of sea level rises and accelerated erosion. It is also considered that inappropriate siting of tourist access within the WHA may allow for the introduction of weeds and other pathogens to invade the vegetation systems. A continued and expanded monitoring program has been identified as a method of dealing with this threat.

Visitor/tourism pressures

Visitation to the WHA has increased from 211 000 people in 1991-92 to over 339 000 people in 2001-02. Much of this visitor activity is concentrated on high profile sites including Lake McKenzie, Central Station, and Eli Creek.

The FIWHASAC review of universal values report identified recreational activity and visitor use as the most threatening process in areas of concentrated visitor access. The Advisory Committee also recommended that visitor management should be a priority action in order to minimise resource impacts and optimise the quality of visitor experiences and visitor safety.

Visitation pressures include threats from the associated development activities (see above) along with more direct impacts. These range from the impact of increasing tourist numbers, beach campsites, rubbish, vehicles and vehicle tracks on visual attributes of the area, the potential for people to climb on coloured sand cliffs and dunes, trampling around lake and creek edges and associated loss of riparian vegetation, movement of sand into lakes and creeks, species disturbance from the presence and behaviour of visitors (specifically recreational traffic and human use of creeks impacting on coastal wading birds, and interactions with humans is promoting dependant and aggressive behaviour from dingoes), and the potential for changes to visitor experiences as visitor numbers increase (through overcrowding in high use areas and increased interaction between visitors in more isolated areas). The potential for recreational succession, and homogenisation in terms of visitor experiences was specifically highlighted as a threat to the diversity of opportunities that Fraser Island currently offers (FIWHASAC, in press)

Management activities which are designed to address the potential impact of tourism include the 1998 review of tourism activities in the Great Sandy region, the development of a draft camping management plan, work done towards establishing desired site capacities at highly used day use areas, development and implementation of the Dingo Management Strategy and Dingo Risk Assessment (see http://www.epa.qld.gov.au/environment/park/fraser/dingo11_01.pdf and http://www.epa.qld.gov.au/environment/park/fraser/Dingo_risk.pdf) and the Transport and Access Study currently underway. Development and maintenance of appropriate infrastructure (including visitor infrastructure and roads) minimises the impact of tourism. Visitor behaviour is also influenced by the presence of staff on the island, and through the provision of visitor information.

Other pressures

‘The SAC identified a significant threat from the lack of consistent and continuous information needed to inform management decisions. This highlights the importance of a management commitment to continue and expand ongoing monitoring of key indicators of environmental condition, visitor satisfaction and management effectiveness.

Overall, the Values Review acknowledged the extensive body of knowledge that has been accumulated through research conducted at both Fraser Island and Cooloola. The challenge for management is now to translate this knowledge into practical management strategies aimed at preserving the identified World Heritage values and presenting these to the public. A number of resourcing issues that are constraining management were identified and have been outlined previously (‘Identification of gaps and management needs’ section).

Number of inhabitants living within the property

Approximately 200 people live on Fraser Island, comprising of residents of Orchid Beach and Eurong Communities, the Ranger Stations and tourist resorts.

II.6. MONITORING

Current monitoring program

A substantial monitoring program is conducted by QPWS on Fraser Island, and is complemented by programs conducted by outside research organizations and consultants. The table below is not exhaustive but provides examples of many of the monitoring projects currently being undertaken across Fraser Island.

Project	Indicators	Documents	Partners
Continued presence of key species	Presence of: Plants <ul style="list-style-type: none"> • <i>Acacia baueri</i> (Tiny Wattle) (vulnerable) • <i>Blandfordia grandiflora</i> (Christmas Bells) (rare) • <i>Boronia rivularis</i> (Wide Bay Boronia) (rare) • <i>Cinnamomum baileyianum</i> (Candlewood) (rare) • <i>Eucalyptus hallii</i> (Goodwood Gum) (vulnerable) • <i>Liparis simmondsii</i> (poorly known) • <i>Macrozamia pauli-guillielmi</i> (endangered) • <i>Myriophyllum implicatum</i> (Water milfoil) (rare) • <i>Phais australis</i> (vulnerable) • <i>Schoenus scabrides</i> (rare) • <i>Syncarpia hillii</i> (Fraser Island Satinay) (rare) • <i>Tecomanthe hillii</i> (Fraser Island Creeper) (rare) Animals <ul style="list-style-type: none"> • <i>Acanthophis antarcticus</i> (Southern Death Adder) (rare) • <i>Calyptorhynchus lathamii</i> (Glossy Black Cockatoo) (vulnerable) • <i>Caretta caretta</i> (Loggerhead Turtle) (endangered) • <i>Chelonia mydas</i> (Green Turtle) (vulnerable) • <i>Coggeria naufragus</i>, (Fraser Island Sand Skink) (poorly known) • <i>Crinia tinnula</i> (Wallum Froglet) (vulnerable) • <i>Eroticoscincus graciloides</i> (Elf Skink) (rare) • <i>Erythrotriochis radiatus</i> (Red Goshawk) (endangered) • <i>Esacus neglectus</i> (Beach Stone-curlew) (vulnerable) • <i>Acrodipsas illidgei</i> (Illidge's Ant-blue Butterfly) (endangered) • <i>Litoria cooloolensis</i> (Cooloola Sedgefrog) (rare) • <i>Litoria freycineti</i> (Wallum Rocketfrog) (vulnerable) • <i>Litoria olongburensis</i> (Wallum Sedgefrog) 	<ul style="list-style-type: none"> • Natural Resource Management Monthly Reports • Annual turtle monitoring reports • Hockings, M and Hobson, R (2000) Fraser Island World Heritage Area; Monitoring and Management Effectiveness Project Report, University of Queensland. 	<ul style="list-style-type: none"> • Queensland University • Queensland University of Technology • University of the Sunshine Coast • Wader Study Group

	<ul style="list-style-type: none"> (vulnerable) • <i>Nannoperca oxleyana</i> (Oxleyan Pygmy Perch) (vulnerable) • <i>Ninox strenua</i> (Powerful Owl) (vulnerable) • <i>Ophioscincus cooloolensis</i> (Cooloola Snake-skink) (rare) • <i>Pezoporus wallicus</i> (Ground Parrots) (vulnerable) • <i>Pseudomugil mellis</i> (Honey Blue-eye) (vulnerable) • <i>Ramphotyphlops silvia</i> (Silvia's Blind Snake) (rare) • <i>Sterna albifrons</i> (Little Tern) (vulnerable) • <i>Turnix melanogaster</i> (Black-breasted Button-quail)(vulnerable) • <i>Xeromys myoides</i> (Water Mouse) (rare) 		
Effects of fire on flora	<ul style="list-style-type: none"> • Species composition • Half heights 	<ul style="list-style-type: none"> • Hockings, M and Hobson, R (2000) Fraser Island World Heritage Area; Monitoring and Management Effectiveness Project Report, University of Queensland. 	<ul style="list-style-type: none"> • Queensland University
Effects of fire on fauna	<ul style="list-style-type: none"> • Small mammal population indices from Elliot box and pitfall trapping • Reptile population indices from pitfall trapping 	<ul style="list-style-type: none"> • Hockings, M and Hobson, R (2000) Fraser Island World Heritage Area; Monitoring and Management Effectiveness Project Report, University of Queensland. 	<ul style="list-style-type: none"> • Queensland University
Effects of fire on vegetation structure	<ul style="list-style-type: none"> • Visibility (as an index of vegetation thickness) 	<ul style="list-style-type: none"> • Thrash, I. 2001. Results and assessment of the Fraser Island photo monitoring project. Unpublished report. 	<ul style="list-style-type: none"> • Queensland University
Beach bird populations	Counts of birds	<ul style="list-style-type: none"> • Fisher, Fiona; Marc Hockings & Rod Hobson. 1998. Recreational impacts on waders on Fraser Island. The Sunbird . 28:1-11. • Fisher, Fiona. 1996. Wading birds and off road vehicles. Is this an impossible combination? Unpublished report for Queensland Parks and Wildlife. Fraser Island. • Hockings, M and Hobson, R (2000) Fraser Island World Heritage Area; Monitoring and Management Effectiveness Project Report, University of Queensland. • McFarland, D. 1993. Notes on the Pied Oystercatcher <i>Haematopus longirostris</i> in Cooloola-Fraser Island area. The Sunbird . 23:110-113. 	
Dingo home range	<ul style="list-style-type: none"> • Dingo sighting locations 		
Dingo diet, population dynamics and genetics	<ul style="list-style-type: none"> • Canine microsatellites • Skull dimensions 	<ul style="list-style-type: none"> • Wilton, A. 2000. Dog-like typings in Fraser Island Dingoes. Unpublished report. • Woodall, PF, Pavlov, P & Twyford, KL. 1996. Dingoes in Queensland, Australia: Skull dimensions and identity of wild canids. Wildlife Research. 23: 581-587 	<ul style="list-style-type: none"> • University of New South Wales • Laurie Corbett, Consultant • Department of Natural Resources
Frog monitoring	<ul style="list-style-type: none"> • Species presence and abundance index 		
Impact of traffic	<ul style="list-style-type: none"> • Incidental records of road kills 	<ul style="list-style-type: none"> • Natural Resource 	

on wildlife		Management Monthly Reports	
Groundsel rust monitoring	<ul style="list-style-type: none"> • Presence of rust 		<ul style="list-style-type: none"> • Department of Natural Resources
Pandanus leaf hopper monitoring	<ul style="list-style-type: none"> • Presence of leaf hoppers 		
Lake water quality	<ul style="list-style-type: none"> • Chlorophyll concentration 		<ul style="list-style-type: none"> • EPA Waterways Scientific Services
Drinking water quality	<ul style="list-style-type: none"> • Coliform and thermo-tolerant <i>E. coli</i> bacterial counts (per 100ml) 	<ul style="list-style-type: none"> • Marland, J. 2001. Report on QPWS water quality testing and management issues. Unpublished report. 	<ul style="list-style-type: none"> • Queensland Health
Road condition	<ul style="list-style-type: none"> • Road profiles 		<ul style="list-style-type: none"> • GHD consultants
Traffic monitoring	<ul style="list-style-type: none"> • Number of vehicles per week (one direction) 	<ul style="list-style-type: none"> • Natural Resource Management Monthly Reports 	<ul style="list-style-type: none"> • Queensland University of Technology • GHD consultants
Toyota Fraser Island Fishing Expo.	<ul style="list-style-type: none"> • Camp, tent and camper densities • Permit compliance • Minimal impact camping guideline compliance • Wildlife disturbance and mortality • Minimal impact driving guideline compliance • Beach and campsite pollution 	<ul style="list-style-type: none"> • Annual Toyota Fraser Island Fishing Expo monitoring reports 	<ul style="list-style-type: none"> • Toyota Motor Corporation Australia Ltd. • Department of Primary Industries
Beach camping impacts	<ul style="list-style-type: none"> • Track and clearing index (using aerial photography) • Fauna • Flora 	<ul style="list-style-type: none"> • Cattermole, A. 1995. <i>Impact assessment of campsites on the east coast of Fraser Island</i>. Unpublished report. Griffith University, Brisbane. • Garvie, L. 1999. Beach camping impact assessment and management proposals for the Eurong subdistrict, Fraser Island. Unpublished report. • Hockings, Marc and Twyford, Keith 1997. Assessment and management of beach camping impacts within Fraser Island World Heritage Area, South-east Queensland. <i>Australian Journal of Environmental Management</i>. 4: 26-39. • Thrash, I. 1999. Camping impact assessment. Dundubara, Fraser Island. QPWS report. 	<ul style="list-style-type: none"> • Griffith University • Queensland University

The table produced on the following pages relates current monitoring directly to the area's World Heritage Values as defined by Environment Australia.

Criterion (ii) outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment.

Fraser Island provides a globally significant example of geological processes and biological evolution, including complex coastal dune formations that are still evolving, an array of lakes that is exceptional in terms of number, diversity, age and the evidence of dynamic and developmental stages, and outstanding examples of ecosystems that have developed in response to maritime conditions and poor soils coastal dune formations.

Values	Current monitoring	Additional monitoring
the largest sand island in the world which contains complex, evolving coastal dune formations; and	Nil	Nil
an array of dunes and dune lakes which is exceptional in terms of number, diversity and age, and which provides evidence of dynamic and developmental stages in dune formation including:	Nil	Nil
freshwater dune lakes;	Water quality monitoring;	Biological indicator species; road impacts on sand infill
actively forming depositional dune forms;	Coastal camping impacts on dune areas	
erosional aeolian dune forms;	Nil	Research program to measure rate of sandblow movement-as base line for detecting possible human-induced changes
Chronosequence of podsol development; and	Nil	Nil
chronosequence of dunes with its varying stages of soil development and associative successive and retrogressive stages of vegetation communities;	Vegetation plot and photomonitoring in all major vegetation communities monitoring long-term change in community structure and composition (primarily concerned with potential fire impacts on vegetation)	Monitoring of erosion of dunes in relation to fire effects on ground cover using sand traps
an outstanding example of the combination of rain forests growing on tall sand dunes;	Nil	?
species of flora and fauna which have adapted to the comparatively nutrient-poor, acidic, sands of the island;	Fauna monitoring program focussing on rare and threatened species, species of special significance to the island	Ground parrot,
vegetational chronosequences including successional stages associated with the development of these rainforest communities;	Nil re rainforest	?
an outstanding example of subtropical patterned fens which contain a variety of organisms not normally found in such acid conditions, including "acid" frogs; and	Acid frogs, Freshwater fish, False water rat Fire and long-term vegetation change	Road impacts on hydrology,
the diversity of plant and animal species.	Vegetation and fauna monitoring, including incidental fauna monitoring program; wader surveys, turtle monitoring	

Criterion (iii) contain unique or superlative natural phenomena, formations or features of exceptional natural beauty.

Fraser Island, the largest sand island in the world, has exceptional natural beauty and aesthetic importance and contains superlative natural phenomena including:

Values	Current monitoring	Additional monitoring
over 250km of sandy beaches with long, uninterrupted sweeps of ocean beach, with more than 40km of strikingly coloured sand cliffs, as well as spectacular dune blowouts; and	Coastal camping impact monitoring	Visual amenity monitoring
ocean surf beaches, strikingly coloured sand cliffs, spectacular tall rainforests growing on low nutrient sands, perched dune lakes including both clear "white water" lakes and dark "black water" lakes, banksia woodlands, heath, patterned swampy fens and sheltered mangrove areas in a spectacular mosaic landscape.	Nil	Visual amenity monitoring Visitor perceptions of landscape integrity

II.7. CONCLUSIONS AND RECOMMENDED ACTION

a. Main conclusions regarding the state of the World Heritage values of the property (see items II.2. and II.3 above)

The World Heritage values for which Fraser Island World Heritage Area was originally listed remain intact.

b. Main conclusions regarding the management and factors affecting the property (see Items II.4 and II.5 above)

Management of the FIWHA has maintained the world heritage values. The two main threats to the values have been identified as being recreation and visitation, along with inappropriate fire regimes.

Knowledge gaps have been identified and will be addressed in future planning, management and research activities.

Many projects designed to minimise the threats posed by increasing numbers of visitors to the island are underway. Key projects include the Fraser Island Transport Study, development of a camping management plan, and the implementation of the recommendations of the Desired Site Capacities Study.

In addition, the continued development of appropriate visitor infrastructure will significantly enhance the capacity of QPWS to minimise and manage impacts.

A Draft Fire Strategy has been prepared to provide direction for fire management on Fraser Island.

c. Proposed future action/actions

Key actions include the continued implementation of the recommendations of the review of tourism document, dingo management strategy, and desired site capacities study. In addition, it is anticipated that several current projects including the development of the camping management plan, review of the Great Sandy Region Management Plan, transport and access study and fire strategy will be finalised during the next 12-18 months.

Discussions are underway with relevant stakeholder groups to consider a possible future extension to the boundary of the property.

d. Responsible implementing agency/agencies

Queensland Parks and Wildlife Service - in conjunction with appropriate governments, Advisory Committees and stakeholder groups.

e. Timeframe for implementation

Ongoing

Figure 1: Fraser Island

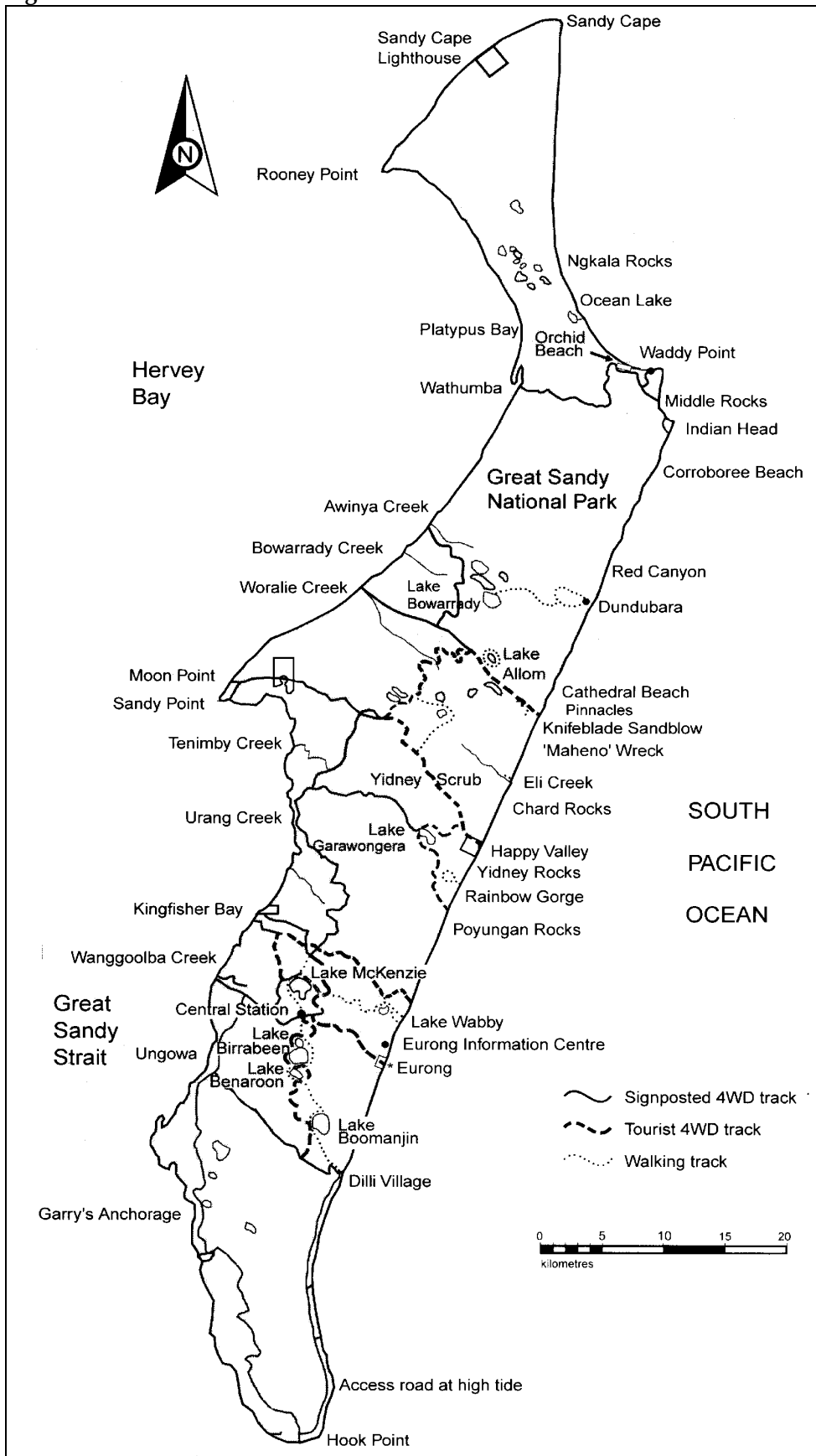
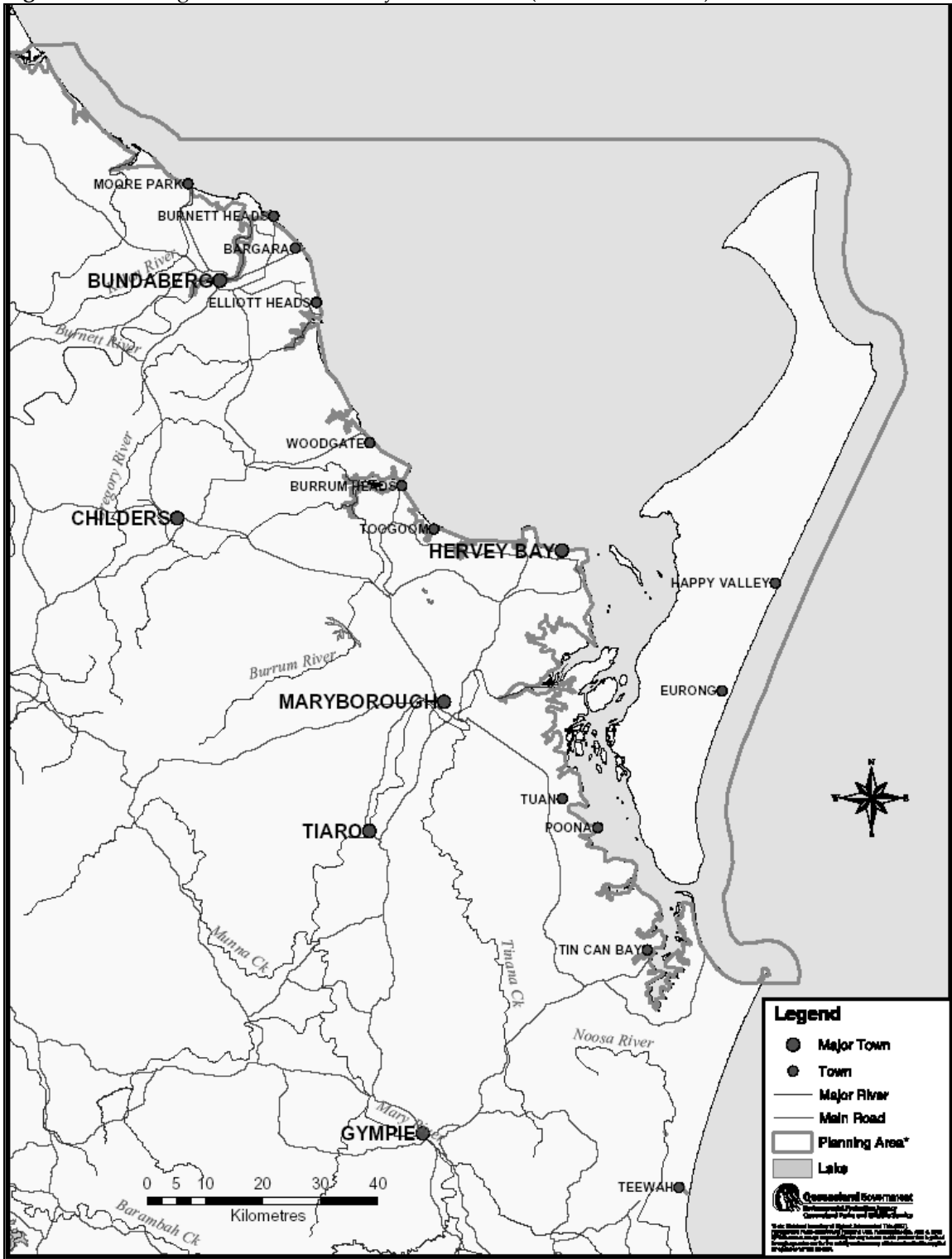


Figure 2: Planning area for Great Sandy Marine Park (Northern Section)



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