

Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

1. Date this sheet was completed/updated:

May 1999

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Designation date

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Site Reference Number

2. Country:

Australia

3. Name of wetland:

Great Sandy Strait (including Great Sandy Strait, Tin Can Bay and Tin Can Inlet).

4. Geographical coordinates:

Centroid: Latitude: 25° 28' 46" S Longitude: 152° 54' 9" E

5. Altitude:

Marine, estuarine, intertidal wetlands and salt pans -6 to highest astronomical tide on the western and southern area of the Strait but to 2m above sea level for selected areas on the eastern (Fraser Island) area of the Strait.

6. Area:

About 93 160 ha including wider channels and open water.

7. Overview:

Great Sandy Strait is a sand passage estuary between the mainland and the World Heritage-listed Fraser Island, and is the least modified of three such passages in Queensland. It 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.

8. Wetland Type:

marine-coastal: A B C D E F G H I J K

inland: L M N O P Q R Sp Ss Tp Ts

U Va Vt W Xf Xp Y Zg Zk

man-made: 1 2 3 4 5 6 7 8 9

9. Ramsar Criteria:

1a 1b 1c 1d | 2a 2b 2c 2d | 3a 3b 3c | 4a 4b

Please specify the most significant criterion applicable to the site: 3a

10. Map of site included? Please tick *yes* -or- *no*.

11. Name and address of the compiler of this form:

Department of Environment and Heritage
PO Box 155
BRISBANE ALBERT STREET QLD 4002.

12. Justification of the criteria selected under point 9, on previous page.

1(a): it is a particularly good representative example of a natural or near- natural wetland, characteristic of the appropriate biogeographical region;

Great Sandy Strait is an outstanding example of a sand passage estuary and is in a relatively undisturbed state. Large, well developed expanses of sand and mud flats, salt flats, mangroves and seagrass beds are widespread along the Strait. Such passages are rare in Queensland but less spectacular passages occur elsewhere in the South East Queensland bioregion.

1(b): it is a particularly good representative example of a natural or near-natural wetland, common to more than one biogeographical region;

Great Sandy Strait contains excellent examples of intertidal wetlands that are found along the coast of Queensland. This aggregation is representative of southern species and communities, but more extensive and less disturbed.

1(d): it is an example of a specific type of wetland, rare or unusual in the appropriate biogeographical region.

Patterned fens have been recorded along Great Sandy Strait. These are rare in Australia and have not previously been recorded in subtropical regions of the world.

2(a): it supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant or animal, or an appreciable number of individuals of any one or more of these species;

Wetlands along Great Sandy Strait support an appreciable number of dugong, turtles, Illidge's ant blue butterfly and yearling eastern curlews which do not migrate in their first winter. All of these species are listed as rare, vulnerable or endangered under the *Nature Conservation Act 1992* (Queensland), the *Endangered Species Protection Act 1992* (Commonwealth) or the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn, 1979).

2(b): it is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna;

Great Sandy Strait represents an area of biogeographic significance with respect to the large area of subtropical mangrove communities near their northern limit. The mangrove communities within the Strait represent a transition between essentially temperate and tropical flora. It is the transition between the southern and northern species composition of mangrove wetlands.

3(a): it regularly supports 20 000 waterfowl;

Wetlands along Great Sandy Strait regularly support in excess of 20 000 migratory shorebirds. Counts between 30 000 and up to 40 000 shorebirds have been recorded in recent years.

3(b): it regularly supports substantial numbers of individuals from particular groups of waterfowl, indicative of wetland values, productivity or diversity;

The wetlands support substantial numbers of particular shorebird species with 17 species with 4% or more of their State totals being recorded for the region. Maximum numbers recorded include Grey-tailed Tattler (7681 – 42%), Eastern Curlew (6018 – 33%), Bar-tailed Godwit (13 359 – 27%), Greenshank (1069 – 24%) and Terek Sandpiper (2494 – 21%). (Note these are the maximum numbers recorded.)

3(c): where data on populations are available it regularly supports 1% of the individuals in a population of one species or subspecies of waterfowl.

Wetlands along Great Sandy Strait regularly support more than 1% the total flyway (or world) population of the following species: Eastern Curlews (19.6%), Grey-tailed Tattlers (16.2%), Lesser Sand Plovers (5.5%), Terek Sandpipers (5.0%), Whimbrels (3.8%), Bar-tailed Godwits (3.7%), Pied Oystercatchers (3.2%), Greenshanks (2.6%) and Grey Plovers (1.6%).

4(b): it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

The Great Sandy Strait tidal wetlands are extremely important for protection of and source of food for juvenile and adult fish, prawns and other crustaceans. It is highly valued for commercial and recreational fishing. An important offshore prawn fishery is dependent on the migration of prawn stocks out of the Strait.

13. General location:

Australia, State of Queensland, spread over parts of the cities of Maryborough and Hervey Bay, and the shires of Tiaro and Cooloola.

The northern boundary is a line south of the Urangan Boat Harbour northeast to include Round Island and surrounds, north of Datum Point on Woody Island then across open water to Moon Point on Fraser Island. The site extends the length of Great Sandy Strait to the eastern end of Inskip Point and the southern extent includes Tin Can Inlet and Tin Can Bay. Its western extent continues along the Mary River as far as the boundary between Portions 45 and 23, and includes the Susan River mangrove system. Along other creeks, such as Kauri Creek and Tuan Creek, it extends as far as the tidal influence. It includes freshwater swamps and patterned fens contiguous with the mangroves on Fraser Island and south-west of the Rainbow Beach township. It excludes private freehold lands, local government foreshore reserves on the mainland, the Urangan Boat Harbour and a 500 m zone around it, Snapper Creek Boat Harbour, jetties and boat launching ramps, and 30 m either side of these structures. See attached map.

Biogeographic Region: South Eastern Queensland.

14. Physical features:

Geology/Geomorphology: Great Sandy Strait is one of the few passage landscapes in Australia where an offshore barrier island has formed sufficiently close to the mainland to block the flow of a substantial river system, creating a double-ended estuary with a shifting (though relatively stable) pattern of mangroves, sand banks and mud islands (FIU 1994).

Soils: Soils are mostly modern fluvial sediments — fine to medium grained felspathic sands with a 3–6% mud content. An analysis of substrate particle size from a range of intertidal sites throughout the Strait has shown very little coarse material such as shells or stones, and a fairly consistent nature to the substrate (Driscoll 1989). The composition of the sediments of the Strait, particularly south of the Mary River, has altered over the last 20 years with a significant increase in the amount of fine mobile sand (FRC 1994).

At the southern end of Great Sandy Strait there are areas of “coffee rock” and harder rock below low water mark, creating scattered reefs (G. Brooks pers. comm.).

Hydrology: The majority of the area has saline water although permanent or seasonal flows of fresh water occur into most estuaries in the system. Fresh water is present in swamps behind the mangroves in some parts of the system.

Currents within Great Sandy Strait are tidal with essentially 180 degree reversal in direction between ebb and flow tides, and may exceed 0.8m/s. Tidal variation can be up to 2.5m. An appreciable saline 'wedge' has been detected in Tin Can Inlet, and the southern waters of the estuary were of lower salinity than those adjacent to Tin Can Bar (Dredge, Kirkman and Potter 1977). In the rest of the estuary, water exchange rates with the open ocean are rapid, owing to the presence of a deep main channel and the absence of mobile, unstable sand bars. A tidal interface exists within the Strait at approximately the position of the Moonboom Islands (Dredge, Kirkman and Potter 1977).

Catchment: The largest catchment draining into the Great Sandy Strait is that of the Mary River, approximately 9600sq.km (Anon. 1993). The average annual discharge of the Mary River into the system is 2300 GL. Large inputs of fresh water and sediment occur during flooding on a more or less annual basis (ANCA 1996). Smaller though still significant inflows result from the Susan River and a number of smaller creeks of which Kauri Creek is the largest on the western side of the Strait. Significant quantities of pure freshwater drain out of the Fraser Island (1850sq.km) and Cooloola sandmasses via small creeks and drainage lines.

Water quality: Water quality is generally good, although inputs of sewage, stormwater and agricultural runoff, particularly from the Mary River, may cause a decline in quality (ANCA 1996). Water quality from the Fraser Island and Cooloola sandmasses is extremely high.

Climate: The mean daily maximum temperature for the Maryborough area is 21.9 to 30deg.C, and the mean daily minimum is 8.5 to 20.6deg.C. January is the hottest month while July is the coldest. The mean monthly rainfall ranges from 40.0mm to 174.5mm, with August being the driest month and February the wettest on average. Most of the area lies on or close to the 1200mm isohyet.

15. Hydrological values:

Great Sandy Strait is a double-ended sand passage estuary containing a diversity of marine and coastal wetland types with examples of eight of the eleven marine types. It is the largest and the least disturbed wetland area in southern Queensland. Large horizontal tidal movements are common because of the preponderance of relatively flat nearshore areas resulting in low water mark being about one kilometre offshore in some areas. Extensive wetlands at the tidal interface near the Moonboom islands trap sediments and assist in the maintenance of water quality south of the Mary River. The shoreline is protected from erosion by an almost unbroken line of mangrove forests in many areas but erosion can occur from wave and tidal action in exposed areas.

16. Ecological features:

Wetlands are the dominant intertidal habitat of Great Sandy Strait and Tin Can Inlet. Major habitat types include mangrove forests, intertidal and subtidal seagrass beds, saltmarshes, unvegetated mud, sand and salt flats, and estuarine and channel waters of varying depth and width. Morton and Healy (1992) reported 2800ha of saltmarsh and claypan, 15 500ha of mangrove and 12 300ha of seagrass within Great Sandy Strait. Extensive seagrass beds also occur in the southern part of Hervey Bay. The seagrass is subject to rapid change due to influx of fresh water associated with the periodic flooding from the Mary River, and any associated pollutants and turbidity.

Wetlands on the western side of Great Sandy Strait are between 5.5km and 13.5km wide at their widest point. Generally, unvegetated saline flats or saltmarshes fringe their western shoreline. In contrast, on the opposite side of the Strait, freshwater swamps merge in many places with the mangroves (Hegerl 1993). The hydrological and nutrient flows between fresh and marine wetlands are highly significant to flora and fauna and contribute to the numbers and diversity of species.

An unusual feature of the wetlands abutting Tin Can Inlet west of Rainbow Beach is the presence of a “reticulated” patterned fen behind the mangroves. This fen is directly adjoining tidal wetlands along the Inlet. Others have been recorded on western Fraser Island behind tidal wetlands east of Moon Point (“string” patterned fan), near Urang Creek and Ungowa, as well as other areas on Fraser Island and in the Cooloola area some 50km to the south.

Several coral reefs and bommies occur in the shallow waters of the northern part of the Strait. Coral growth occurs at Big Woody Island, where total hard and soft coral growth is up to 50 percent, and also near Round Island. Spectacular sponges are found on coarse coral grit south of Little Woody Island. Hard and soft corals, hydroids, gorgonia, sea pens and small reefs of wormshell also occur in this area. Small areas of hard and soft coral also occur near Tinnanbar (G. Brooks pers. comm.).

The Great Sandy Strait is a major feeding ground for migratory shorebirds on the east coast of Australia (Lane 1987) and important for a wide range of other waders, waterbirds and seabirds. Expansive intertidal areas beside the main waterways are intensively used by waders especially in the vicinity of the seagrass beds.

Large communities of mangrove invertebrates and fish are present throughout the wetland. The wetland is also home to dugong and sea turtles, numbers of which are highly dependent on the quality and quantity of seagrass.

In a study conducted by Dredge, Kirkman and Potter (1977), the distribution of juvenile prawns was found to be restricted to seagrass beds and, for greasyback prawns, also mudflats adjacent to mangrove areas. Juvenile bream were most commonly found in deltaic areas while juvenile winter whiting were also widespread in estuaries although they did not occur in brackish areas. Juvenile yellowfinned whiting and mullet were only in brackish areas. Juvenile summer whiting were most commonly found on fringing mangrove-seagrass beds adjacent to bars while juvenile flathead were most frequently found where littoral seagrass occurred.

17. Noteworthy flora:

Six species of seagrass have been recorded from the Strait and southern Hervey bay: *Cymodocea serrulata*, *Halodule uninervis*, *H. ovalis*, *H. spinulosa*, *Syringodium isoetifolium* and *Zostera capricorni*. These species comprise beds varying in coverage from sparse to very dense and are likely to be one of the most important habitat components for maintenance of the present ecological health and diversity exhibited by the region. These areas act as nursery and feeding grounds for prawns and fish, and feeding grounds for dugong and turtles.

Great Sandy Strait also represents an area of biogeographic significance with respect to the large area (15 000ha) of subtropical mangrove communities near their northern limit (Dowling and McDonald 1982). The mangrove communities within the Strait represent a transition between essentially temperate and tropical flora. Nine species of mangrove occur in Tin Can Bay/Great Sandy Strait. *Casuarina glauca* uncharacteristically grows below high water mark in the region. The southernmost limit of the club mangrove *Aegialitis annulata* and *Xylocarpus granatum* occurs in Great Sandy Strait (Hegerl 1993).

18. Noteworthy fauna:

The coastal wetlands of Great Sandy Strait are 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. More than 21 000 birds were counted at roosting sites during January–February 1990 and 13 700 during April–May 1989, while the total population of waders in Great Sandy Strait

during summer 1990 was estimated at between 30 000 and 40 000 (Driscoll 1989,1990, 1997). There is evidence that the Strait is of critical importance for non-breeding yearling birds that do not return to the northern hemisphere until the following year.

Wetlands along Great Sandy Strait regularly support more than 1% the total flyway (or world) population of the following species: Eastern Curlews *Numenius madascariensis* (19.6%), Grey-tailed Tattlers *Tringa brevipes* (16.2%), Lesser Sand Plovers *Charadrius mongolus* (5.5%), Terek Sandpipers *Tringa cinerea* (5.0%), Whimbrels *Numenius phaeopus* (3.8%), Bar-tailed Godwits *Limosa lapponica* (3.7%), Pied Oystercatchers *Haematopus longirostris* (3.2%), Greenshanks *Tringa nebularia* (2.6%) and Grey Plovers *Pluvialis squatarola* (1.6%).

The wetlands support substantial numbers of particular shorebird species with 17 species with 4% or more of their State totals being recorded for the region. These include Grey-tailed Tattler (7681 – 42%), Eastern Curlew (6018 – 33%), Bar-tailed Godwit (13 359 – 27%), Greenshank (1069 – 24%) and Terek Sandpiper (2494 – 21%).

The rare little tern *Sterna albifrons* has also been recorded from the area. Numerous other waterfowl, such as several species of ducks, black swans, herons, ibis and brolgas have also been recorded (G. Brooks pers. comm.).

Several isolated old stands of grey mangrove *Avicennia marina* subsp. *australasica* harbour populations of the unusual and endangered butterfly, Illidge's ant blue *Aerodispas illidgei*.

A total of 27 species of molluscs belonging to 17 families have been recorded from sites in Great Sandy Strait (FRC 1994), while 63 species of fishes were recorded in one survey of the wetlands near Moon Point, at least 18 of which were important to commercial or recreational fishing (Hegerl 1993). Some 104 species of fish from 60 families were recorded from Tin Can Bay (Beumer and Halliday 1994), of which 39 species were of commercial or recreational importance. The significance of the Strait's tidal wetlands and estuarine waters for the protection of juvenile and adult fish, prawns, mudcrabs *Scylla serrata* and sandcrabs *Portunus pelagicus* has been recognised by the declaration of fish habitat areas over much of Great Sandy Strait.

The Oxleyan pygmy perch *Nannoperca oxleyana* and the Honey blue-eye *Pseudomugil mellis*, both listed as "vulnerable" under Commonwealth and State legislation, have been recorded from freshwater swamps and streams flowing into Tin Can Bay and on Fraser Island, and may occur within the site.

Great Sandy Strait and southern Hervey Bay provide feeding grounds for four species of sea turtle: the green *Chelonia mydas*, loggerhead *Caretta caretta*, hawksbill *Eretmochelys imbricata* and flatback *Natator depressa*, plus a further two: leatherback *Dermochelys coriacea* and Pacific ridley *Lepidochelys olivacea*, recorded as occasional visitors. All are listed as endangered, vulnerable or potentially vulnerable. The Susan River estuary has been recorded as providing the most southerly, contemporary habitat of the estuarine crocodile *Crocodylus porosus*. No sightings have been made recently though a reported sighting was made further south at Turkey Island in about 1970 (pers. comm. in Hegerl 1993).

The seagrass beds of southern Hervey Bay and Great Sandy Strait support a significant population of dugong *Dugong dugon*. At least two species of dolphin, the bottlenose dolphin *Tursiops truncatus* and the common dolphin *Delphinus delphinus* are commonly observed in the Strait, although quantitative studies to determine their abundance have not been carried out. The Susan River is also used by both species. Indo-Pacific humpbacked dolphins *Sousa chinensis* have also been recorded, as have pilot whales and false killer whales (FRC 1992).

19. Social and cultural values:

Aboriginal and non-Aboriginal historical significance is attached to much of the Great Sandy Region. Evidence of Aboriginal presence dates back 5500 years. At the time of European settlement, three main

Aboriginal groups lived on Fraser Island: the Ngulungbara (north), Badtjala (central) and the Dulingbara (south) while the Doombarah group are recorded as living in the vicinity of Tin Can Bay and nearby Rainbow Beach. Archaeological studies (McNiven 1991; Frankland 1990) have shown the occurrence of many contemporarily abundant molluscs within 19th century middens of the Tin Can Bay area and 3000-year-old middens near Booral (south of Urangan). Indigenous fishing was and still is a major activity. There are accounts of aboriginal gatherings on the southern bank of Kauri Creek, where a Bora ring was located (G. Brooks pers. comm.).

The Great Sandy Strait is highly valued for commercial and recreational fishing and boating. The Strait is of great importance to the region's fishing industry with an estimated return to commercial fishers in 1985/86 of about \$4.9M (Morton and Healy 1992). Tunnel netting, ringing, meshing and hauling have been widely practised. The intertidal flats south of Moon Point provide one of the more important netting grounds, targeting bream, whiting, flathead, mackerel and shark. Mullet make up between 50 percent and 90 percent of the catch (Jones and Shorthouse 1992). Areas near Turkey Island, Kauri Creek, Tinnanbar and within Tin Can Inlet are favoured by tunnel netters. Beam trawling principally for banana prawns takes place in areas adjacent to the Mary River and other creeks and rivers on the mainland coast. An otter trawl fishery to the east of Fraser Island is reliant on prawn stocks migrating seaward from the Strait. The majority of commercial net fishers also trap mudcrabs *Scylla serrata* and sand crabs *Portunus pelagicus*. There are 12 licensed oyster banks in the Strait near Boonooroo and Maroom (Hyland 1993).

The coast of Fraser Island and the Great Sandy Strait are one of the most important recreational fishing areas in Queensland (Morton and Healy 1992). The main elements of the fishery are a shallow water fishery for whiting, flathead, bream etc., a trap fishery for sand and mud crabs, and a bait fishery for yabbies, poddy mullet and hardyhead. Reef fishing for cod, sweetlip, snapper, spangled emperor, parrot, coral bream and morwong also occurs mainly in the north and north-eastern areas of the Strait. Almost all waters are fished heavily, with the distribution of angling effort varying on weather conditions, season and target species, but being generally concentrated near boat ramps. Hervey Bay charter vessels take anglers on daily trips to reefs in the Strait. There are several recreational fishing clubs in the region (FRC 1994).

20. Land tenure/ownership:

Site: Small areas in the north are contained in national parks or environmental parks, and areas along the south-western coast of Fraser Island are national park and world heritage listed. Islands in the Strait which are currently Unallocated State Land are intended to be reserved for coastal management purposes under the *Coastal Protection and Management Act 1995*. Small areas of freehold and leasehold land also exist.

Though not a form of land tenure, fish habitat areas cover significant areas in the central and far southern portions and a small area of the north eastern part of the site on Fraser Island. Oyster areas, which are licensed for wild harvesting and/or culture of edible oysters, also occur in the site.

Terrestrial surrounds: On the eastern side of Great Sandy Strait, most of Fraser Island is national park. A small reserve (Oysterman's Camp R8, Parish of Talbour) at the mouth of Figtree Creek is set aside for oystermen's use. An area bounded by Dundonga Creek and Wanggoolba Creek and an unnamed service road to the east is subject to a native title claim. Wide Bay Military Training Area abuts the south-western coast of the strait, and large areas of state forest and numerous freehold blocks also occur there. The villages of River Heads, Maaroom, Boonooroo, Poona Point, Tawan and Tinnanbar occur on the western side of the Strait, while Tin Can Bay, Toolara and areas of the township of Rainbow Bay lie adjacent to Tin Can Inlet. Most of Inskip Peninsula on the eastern side of Tin Can Inlet is Unallocated State Land or National Park.

Marine surrounds: Hervey Bay Marine Park occurs to the north of the site in Hervey Bay on the western side of Fraser Island.

21. Current land use:

Site: Current uses include commercial fishing, aquaculture of oysters, recreational fishing and boating, nature-based tourism, effluent disposal and conservation. Minor uses include food/bait collection, and shipping. Between them, the Port of Maryborough, and the Maryborough Pilotage Area declared under the *Transport Operations (Marine Safety) Act 1994*, cover the entire site. Along the Mary and Susan Rivers, the river mangrove *Aegiceras corniculatum* has been used extensively for honey production by commercial beekeepers.

Surrounding areas: Major uses include plantation forestry, urban development, military training, recreational swimming and boating, nature-based tourism, fishing, offroad driving, agriculture and grazing. Minor uses are irrigated agriculture, native forestry and walking.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:

Great Sandy Strait is located close to regional population centres that are rapidly growing. Maryborough and Hervey Bay near the northern end of the Strait accommodated a combined population of 65 900 in 1996. Hervey Bay has experienced a growth rate of 7.8 percent over recent years. Apart from potential expansion of existing villages, a new residential development is planned at the head of Tin Can Inlet.

Development pressures are significant and continuing in some areas. Increased water extraction for servicing the increasing human population near Great Sandy Strait in future may affect localised areas of wetlands. Vegetation change through clearing of mangroves and disturbance to intertidal seagrass beds is a major concern in some parts of the wetland. The seagrass beds of the region have reportedly suffered significant depletion over the past 30 years (McLeod in FRC 1994). An increase in population and/or tourism is expected to lead to further recreational boating and fishing, as this is a major attraction of the region.

Landfill, dredging and spoil dispersal (associated with marine infrastructure development) are also major issues for the Great Sandy Strait, particularly in Tin Can Inlet. There is pressure to locate aquaculture developments within the wetlands but this has not been permitted to date. Only a small number of water intake and discharge facilities are currently permitted, and quality of water discharge is regulated under the *Environmental Protection Act 1995*. There may be future pressure to expand sugar cane farming to marginal lands close to wetlands along the Susan River, which could have impacts on these wetlands. Inappropriate development or ineffective management of potential Acid Sulfate Soils may result in fish kills, destruction of fish habitats and life-cycles, corrode infrastructure and lead to infestation of acid-tolerant plants.

The 1994 *Appraisal of Water Supply Sources for the Sunshine Coast and the Mary River Valley* identified the Mary River system as the principal source of water to support continued economic development in the region through the period to 2041. It is estimated that Mary River Valley storages identified in this study would contribute some 95,000 ML per annum to supplies available for diversion. It is inevitable that continued development of water storages to support population growth and economic development and the effect of storages on floods will reduce stream discharges into the Strait. Reductions in flooding may marginally reduce turbidity and siltation (DNR in correspondence).

Erosion in the Mary River catchment contributes to turbidity and siltation in Great Sandy Strait. Sand and gravel extraction in the Mary River may also contribute to turbidity in the Strait. Pollution and contamination from herbicides, pesticides, fertilisers and sewage/ stormwater effluent currently pose a moderate threat to the wetland. Toxins delivered to the Mary River are carried south into the more pristine areas of the Strait, though the main flow direction is northward. It has been estimated that within

the Mary River catchment, urban sources contribute less than 2 percent of the annual nitrogen exports and less than 1 percent of the annual phosphorus exports. Diffuse sources were shown to be far more significant contributors (Moss *et al.* (1993).

Anecdotal evidence suggests that the catch rates for mackerel and mud crab fisheries are declining. Current levels of exploitation for bream, whiting and flathead are high and stocks may become threatened in future (Morton and Healy 1992). Increasing recreational and commercial boating and fishing may be damaging seagrasses, reducing fish stocks and adding to human waste and litter problems. Migration of fish between the Strait and freshwater habitat in the Mary River and Tinana Creek has been disrupted by the erection of barrages at the tidal interface.

23. Conservation measures taken:

Principal Commonwealth legislation that affects the use of the area includes:

Endangered Species Protection Act 1993

World Heritage Properties Conservation Act 1983

Principal State legislation includes:

Beach Protection Act 1968

Coastal Protection and Management Act 1995

Environmental Protection Act 1994

Fisheries Act 1994

Nature Conservation Act 1992

Recreation Areas Management Act 1988

Areas in the north and east of the wetland are protected in Woody and Great Sandy National Parks. Almost all of Fraser Island is national park. 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. Great Sandy Conservation Park (previously Kauri Creek, Turkey Island and South Head Mary River Environmental Parks) protects areas in the central part of the Strait. Inskip Point on the eastern side of Tin Can Inlet is a declared Recreation Area, under the jurisdiction of Department of Environment. Wetland areas on the south-eastern side of Tin Can Inlet are protected in Great Sandy National Park (Cooloolool section).

All marine plants (including mangroves, seagrasses and saltwater couch) are protected under the *Fisheries Act 1994*. Five Fish Habitat Areas have been declared under the fisheries legislation. The Susan River and Maroom Fish Habitat Areas combined protect (in part) tidal lands of approximately 28,000 ha in the centre of Great Sandy Strait, while Kauri Creek and Tin Can Bay Fish Habitat Areas protect significant tidal lands of approximately 7,600 ha in the south of the Strait. Fraser Island Fish Habitat Area protects (in part) tidal lands of approximately 18,000 ha. All of Great Sandy Strait is closed to otter trawling.

The entire area is contained in the Great Sandy Region for which a management plan emphasising ecologically sustainable use and nature conservation has been developed and is being implemented. Great Sandy Strait is on the Register of the National Estate. The Wide Bay Military Training Area (Commonwealth Department of Defence) has an Environmental Management Program in place, and forestry operators and other industries are developing Codes of Practice and Environmental Management Plans to minimise any offsite impacts.

24. Conservation measures proposed but not yet implemented:

A regional growth management framework for the Hervey Bay, Maryborough, Tiaro and Cooloolool local government areas, the Wide Bay 2020 Growth Management Framework, is nearing completion. The Great Sandy Strait and Tin Can Inlet are included in this area also. This framework aims to preserve the

existing conservation values of the area while supporting the economic growth of the Region, and is consistent with Ramsar values.

Southern Hervey Bay and Great Sandy Strait as far south as Teebar Creek in Tin Can Inlet have been proposed by the Commonwealth Government as one of nine Dugong Protection Areas. Under this proposal, river set nets may not be used in Kauri Creek, or the Mary River within 3km of the mouth. A Dugong Conservation Plan may be developed by the State under the *Nature Conservation Act 1992*.

25. Current scientific research and facilities:

The unique natural features and relative lack of disturbance of the area provide almost unequalled opportunities for research into the species, communities and processes at work in this large wetland system.

Studies conducted by fisheries researchers (Halliday and Young 1996) have investigated fish movement into *Rhizophora stylosa* forests in Tin Can Inlet. Though they are directly less productive than other Australian mangrove systems in terms of fish density and standing crop, their value as a feeding and nursery area for fish and in providing leaf litter for feeding in adjacent areas is unchallenged. Forty-two species of fish, many of economic importance, were recorded in these mangrove forest areas.

Seagrass beds in Great Sandy Strait have been mapped using Landsat Thematic Mapper satellite data (Lennon and Luck 1990). The use of the seagrass beds as nursery grounds for commercial prawn species has been documented and the influence of natural fluctuations in seagrass cover has been investigated. These studies have revealed that shallow water habitats may not need to be continually covered with seagrass to be of value to prawn fisheries (Halliday 1995).

Fisheries resources and their status have been documented (Morton and Healy 1992). From these and other research investigations guidelines are being developed to identify the value of different fisheries habitat areas, so that potential impacts of coastal development are recognised and appropriate mitigation measures can be implemented.

No purpose-built research facilities have been established on or adjacent to Great Sandy Strait.

26. Current conservation education:

Informal conservation education is being undertaken by local conservation groups and nature-based tourism operators in the area.

27. Current recreation and tourism:

Great Sandy Strait is one of very few passage landscapes in Australia that can be associated with wilderness vista and its scenic values are significant. Recreational fishing and boating is of great significance to the region and the area is an important holiday destination.

No tourism statistics are available for Great Sandy Strait itself. However statistics for the adjoining Maryborough–Hervey Bay subregion give a good indication of the composition of visitors. Some 55–60 percent of tourists who visit the area live in Queensland, 30 percent are from interstate and 10–15 percent are from overseas (mostly United Kingdom and Europe). Eighty percent of domestic visitors and 90 percent of international visitors are on holiday.

Most of the 250 000 visitors who visit Fraser Island annually reach it by boat across Great Sandy Strait using vehicular/passenger barges from Urangan to Moon Point, River Heads to Wangoolba Creek or from Inskip Point to Hook Point. A passenger service also operates from Urangan to Kingfisher Bay Resort and Village, the only major tourism development on western Fraser Island adjacent to the Strait. Nature-based activities including bird watching are conducted by the Resort.

Visitation to Fraser Island is highest in July through to October and in January. Christmas, Easter and September school holidays are the traditional peak times. For the Strait itself, other times corresponding to annual fish migrations are important for recreational fishers, though the fishery is productive throughout the year.

A considerable number of interstate tourists are believed to visit Great Sandy Strait with the primary aim of recreational fishing. Tourism support Industries, and boating activities associated with recreational fishing in Great Sandy Strait are also estimated to be worth several million dollars to the local economy (QFMA pers. comm.).

28. Jurisdiction:

State Government: Department of Primary Industries, Fisheries and Forestry; Department of Environment; Department of Natural Resources; and Queensland Transport.

Local Government: Hervey Bay and Maryborough City Councils for foreshore reserves along southern Hervey Bay and northern Great Sandy Strait.

29. Management authority:

Functional authority (terrestrial): Department of Environment (national parks and conservation parks); Department of Natural Resources (Unallocated State Land).

Functional authority (intertidal and marine): Department of Environment (coastal zone management) Department of Primary Industries, Fisheries and Forestry (Fisheries Group) for declared Fish Habitat Areas and marine plants, Queensland Transport (Marine Division) for jetties and boat ramps, channels and harbours.

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