

Shoalwater and Corio Bays Area - Queensland.

1. Country: Australia

2. Date: 1995

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4. Name and address of compiler: Environment and Heritage Section, Facilities and Property Division, Department of Defence, Campbell Park Offices, CANBERRA ACT 2600, Australia.

Conservation Strategy Branch, Queensland Department of Environment, and Heritage, PO Box 155, Brisbane Albert Street, Queensland 4002, Australia.

Planning Section, Great Barrier Reef Marine Park Authority, PO Box 1379, TOWNSVILLE QLD 4810, Australia.

Wetlands & Migratory Wildlife Unit, Australian Nature Conservation Agency, GPO Box 636, CANBERRA ACT 2601, Australia.

5. Name of wetland: Shoalwater and Corio Bays Area (Shoalwater Bay Training Area, in part - Corio Bay).

6. Date of Ramsar Designation: 11/03/1996

7. Coordinates: (map attached)

Approximate area: 22° 16'S to 23° 3'S and 150° 9'E to 150° 47'E.

8. General Location: (map attached)

Australia, State of Queensland, Livingstone Shire. The southern boundary is approximately 50km north of Rockhampton. The majority of the area falls within the Shoalwater Bay Military Training Area (SWBTA) and includes the intertidal areas, adjacent lands and marine waters up to High Astronomical Water Mark (HAWM) from Broome Head in the north to the southern boundary of the SWBTA and the intertidal areas of Corio Bay in the south. Within the SWBTA the area includes all marine waters within the training area boundary reverting to the 6m depth contour (at approximately 22° 31'S and 150° 51'E revert to 22° 31'S and 150° 48'E and follow 6m depth contour) south of Cape Clinton to the southern boundary of SWBTA and at Corio Bay down to the 23rd parallel. The area includes all terrestrial land on Akens Island and Pelican Rock, and in part, land within the Dismal Sector of the SWBTA incorporating upper part of the Water Park Creek Catchment and extending north into the Freshwater Sector to include Freshwater Swamp, the Freshwater Barrier and the Clinton Lowland. Biogeographic region: Central Mackay Coast (CMC, code 43).

9. Area: total area approximately 239,100ha

Intertidal area: 25,900 ha. (Broome Head, SWBTA and Corio Bay).

10. Wetland Type: A1, A2, A4, A5, A6, A7, A8, A9, A11, B2, B9, B10, B13, B14.

Most dominant type: A2, A9.

11. Elevation: Inland terrestrial lakes and swamps: 40 - 100 m (ASL)
Marine, estuarine and intertidal wetlands and riverine floodplains: 0 - 20 m (ASL).

12. Overview: The Shoalwater and Corio Bays area is bounded by approximately 330km of coastline including all islands. The area's terrestrial and five major estuarine and marine environments represent the largest area in central east Queensland containing representative coastal, subcoastal, aquatic landscapes and ecosystems which are relatively undisturbed habitat areas for significant floral and faunal assemblages, including populations of rare and threatened species. The area represents a climatic overlap zone with an unusual mix of tropical, sub-tropical and temperate species. The area also represents the largest wilderness area within the Central Mackay Coast biogeographic area and on the central Queensland coast. Such places are rare on the eastern coastline of Australia (AHC, 1993; Aust. Govt., 1994a).

13. Physical Features: *Geology/Geomorphology*: The area contains a wide diversity of landscape types, including riverine plains, swamps, old beach ridges, sand and mud intertidal flats, dunes, estuarine inlets, sand beaches flanked by coastal cliffs, undulating lowland terrain with sands earths and textured contrast soils, hills with skeletal soils and mountains. Shoalwater Bay contains five broad landforms widely represented and relatively undisturbed which include extensive lowland areas of open forest and woodland, a belt of old dune often over 300m high in the west and a coastal area comprising large parabolic dunes. Parabolic dunes appear to be of the Holocene and not Pleistocene age. These dunes are more developed than those of other areas and probably contain a better record of Holocene events. Pleistocene beach ridge landforms of Clinton Lowland are only one of three beach ridges recorded in Queensland and represents a site between the tropical and sub-tropical sites. Less than half the area's surface is solid rock. Sedimentary formations are the most common (25%) with granite formations (13%), colluvium (16%), riverine and coastal alluvium (15 and 9%), weathered deposits (8%), two volcanic formations (7%), aeolian sands (6%) and metamorphic rock (less than 2%) making up the landscape.

Soils: There are many different soil types with a complex distribution. Most of them are highly leached with low nutrient levels. Lakes, swamps and streams are an integral part of the dune field and are representative of freshwater features on elevated sand dunes (Aust. Govt., 1994a; Thompson and Walker, 1993; AHC, 1980; Stanton and Morgan, 1977).

Hydrology: The climate is subtropical with short temperate winters and long humid summers (mean maximum temperature in January is 32⁰ C, mean minimum in July is 10.5⁰ C). Rainfall is variable within the area with the south-east having the highest rainfall (1800 mm). Fifty percent of rain falls between December and March. Streams and creeks on the eastern side derive their base flow from groundwater, predominantly in dune systems, and flow permanently. Seasonal and annual variation in rainfall have the most profound influence on the hydrology of the area and for the water supply of the catchment supplying the Capricorn Coast (Livingstone Shire). The catchments for the

estuarine areas (except Corio Bay) are wholly within the boundary of the Shoalwater Bay Training Area. The area represents one of a few large estuarine systems that retains a relatively undisturbed catchment. The catchment of Corio Bay contains areas of State Forest and includes Byfield National Park. The hydrology of the catchment is complex and vital to the integrity of the habitats. The tidal range is high and approaches seven metres at the mouth of Shoalwater Bay and in excess of five metres at Port Clinton. The large tide has contributed to the development of extensive mud and sand flats and mangrove forests.

14. Ecological Features: Shoalwater Bay contains significant representations of many vegetation types. The extent of the dominant, and uncleared, Eucalypt forest and Eucalypt/Melaleuca woodland is unequalled within its biogeographic region. The area also contains some of the least disturbed and extensive examples of Holocene dunes, Pleistocene beach ridges and dune vegetation (Thompson, 1981, 1983; Thompson and Walker, 1993). Total number of floral species and sub-species has been surveyed to be approximately 791. The dune fields appear to contain 'perched' or 'elevated' water bodies, and these are uncommon on a national scale. The dune waterbodies and associated floral communities are significant in Queensland and nationally. The dune fields also contain peat swamps (Aust. Govt., 1994a).

The following key community types occur in the area:

- (i) Poplar box (*Eucalyptus populnea*) grassy woodland,
- (ii) Gum-topped box (*Eucalyptus moluccana*) woodland / forest,
- (iii) Poplar gum (*Eucalyptus platyphylla*) grassy woodland,
- (iv) Paperbark (*Melaleuca viridiflora* / *M. nervosa*) woodland,
- (v) White mahogany (*Eucalyptus acmenioides*) forest / woodland,
- (vi) Narrow-leaved ironbark (*Eucalyptus crebra*) woodland / forest,
- (vii) Hoop pine (*Araucaria cunninghamii*) forests on sand dunes,
- (viii) Beach She-oak (*Casuarina equisetifolia*) foredune communities,
- (ix) Notophyll and microphyll vine forests (beach monsoon scrub),
- (x) Wet heath community.

The following wetland habitats occur in the area:

- (i) Fringing coral reefs,
- (ii) Shallow open water systems including seagrass beds,
- (iii) Rocky marine shores; beaches, bars, etc,
- (iv) Lower intertidal mudflats and sand flats,
- (v) Mangrove communities,
- (vi) Supratidal flats,
- (vii) Fresh water lagoons, swamps, streams, perched lakes, springs and sinkholes
- (viii) Peat swamps

Shoalwater Bay provides good protection from strong SE winds providing sheltered conditions, together with a large tidal range (in excess of 5m) these have given rise to vast areas of mangroves, mud and sand flats and seagrass beds. The catchments for the estuarine areas (except Corio Bay) are wholly within the boundary of the SWBTA. The hydrology of the area is complex and is

considered vital to the integrity of the habitats, particularly in the eastern areas. The Shoalwater and Corio Bays diverse range of mangrove community types cover over half the intertidal area available (Byron and Hall, 1995). These communities are more diverse in the eastern estuaries than those in Shoalwater Bay, and provide important high-tide roost sites for migratory birds like Whimbrel (*Numenius phaeopus*), Grey-tailed Tattler (*Tringa brevipes*) and Terek Sandpiper (*Tringa terek*). Saline coastal flats on the landward side of the mangroves are also important roosting habitat for other shorebird species such as Eastern Curlew (*Numenius madagascariensis*), Mongolian Plover (*Charadrius mongolus*) and Pied Oystercatcher (*Haematopus longirostris*). Extensive occurrences of intertidal mud and sand flats in the estuarine areas are important feeding sites for a large number and diversity of shorebirds. The intertidal flats and adjacent areas support extensive seagrass beds which are a critical food source for both marine turtles and Dugong. Sandy beaches characterise much of the oceanic eastern half of the area but occur less frequently in Shoalwater Bay.

15. Land Tenure (site and surrounds): *Site - Terrestrial*: Shoalwater Bay Training Area is the responsibility of the Commonwealth of Australia - Department of Defence (Army). Corio Bay is the responsibility of the Queensland Department of Environment and Heritage.

Site - Marine: Intertidal areas (between mean high and low water and including enclosed waters of bays and estuaries) are the responsibility of the State of Queensland - Department of Environment and Heritage and are mostly within a State Marine Park. Substantial areas are the responsibility of the Commonwealth Government and are mostly within the Great Barrier Reef Marine Park. In addition, Corio Bay is a declared Fish Habitat Reserve and State Marine Park and is managed by Queensland Department of Primary Industries.

Surrounds - Terrestrial: Multiple land use including National Park, State Forest and lease hold land all of which are the State of Queensland responsibility, some freehold and unallocated State land also occurs in the area.

Surrounds - Marine: State Marine Park is the responsibility of the Queensland Department of Environment and Heritage, and Commonwealth Marine Park is the responsibility of the Great Barrier Reef Marine Park Authority.

16. Conservation Measures: Principal Commonwealth legislation that will effect the use of the area include:

- * Environment Protection (Impact of Proposals) Act 1974,
- * Great Barrier Reef Marine Park Act 1975,
- * Defence Act 1903,
- * Endangered Species Protection Act 1993,
- * National Parks and Wildlife Conservation Act 1975,
- * Whale Protection Act 1980,
- * Australian Heritage Commission Act 1975,
- * Aboriginal and Torres Strait Islander Heritage Protection Act 1984.

Principal State legislation that will effect the use of the area include:

- * Nature Conservation Act 1992,

- * Marine Parks Act 1982, 1988,
- * Queensland Marine Act 1958-1985,
- * Fisheries Act 1976-1984, 1994,
- * Water Resources Act 1989,
- * Local Government (Planning and Environment) Act 1991,
- * Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987.

The Shoalwater Bay Inquiry (Aust. Govt., 1994a) has made 35 recommendations regarding the future use of the area requiring in essence: 'that by reason of the outstanding National Estate and World Heritage values, in particular its biodiversity and wilderness values and the ecological integrity of the whole area, including land and sea, the Area be conserved as an area of national, state and regional significance. Future management of permissible uses and activities in the Area should be undertaken in such a way as to ensure that these values are not degraded', and 'that conservation use of the area as a whole - land and sea - be elevated in importance and explicitly recognised as being a concurrent and equally significant use with Defence use of the area' (Aust. Govt., 1994a). The Shoalwater Bay area has been listed on the Register of the National Estate since 1980 (AHC, 1980). The Department of Defence maintains a feral pest control program over its area of responsibility. Corio Bay is a gazetted Fish Habitat Area and has restrictions placed on it to protect its fish habitat values. The entire area is within the Mackay-Capricorn Marine Park and managed within the provisions of its Zoning Plan. Conservation management of the marine areas are the responsibility of the Great Barrier Reef Marine Park Authority, the Queensland Department of Environment and Heritage and the Department of Primary Industries. In addition to legislative requirements a number of international agreements and conventions that are applicable to this area including the Convention on the Conservation of Migratory Species of Wild Animals and the two bilateral migratory bird agreements between Australia and the Governments of Japan and China (JAMBA/CAMBA).

17. Conservation Measures Proposed: Shoalwater and Corio Bays are nominated, through a joint submission by the Queensland and the Commonwealth Government, as wetlands of international importance under the Ramsar Convention. Much of the marine environment is managed under complementary zoning plans of the Commonwealth Great Barrier Reef Marine Park and of the Queensland Mackay/Capricorn Marine Park. It is likely that the marine parks will be extended to include all marine areas in the near future. Preparation of a strategic plan for the whole area incorporating land management plans developed by the Department of Defence and management plans for the marine areas, as developed by Queensland Department of Environment and Heritage and the Great Barrier Reef Marine Park Authority are being undertaken following the Commonwealth Inquiry (Aust. Govt., 1994a). Future growth potential in marine based ecotourism, may require a planning exercise and management in accordance with the National Ecotourism Strategy.

18. Land and Marine Use: *On site*: The Shoalwater Bay area has been gazetted as a Defence Practice Area under the *Defence Act 1903*. The Commission of

Inquiry acknowledged that Defence use should be the primary use of the Area but recommended 'that conservation use of the area as a whole - land and sea - be elevated in importance and explicitly recognised as being a concurrent and equally significant use with Defence use of the area' (Aust. Govt., 1994a). Defence activities within the nominated area are localised and are appropriately managed under the areas integrated management plan. There has been an increase in the use of the Freshwater Sector by Aboriginal people as they renew their cultural and spiritual links to the land. Deliberate burning, as a fire control measure, occurring in the past during Aboriginal and pastoralist occupation has had some impact on the area. Feral animal and pest plant controls are effectively being implemented. Commercial and recreation fishing is an important activity at both bays and minor tourism and other recreation activities also occur. Fish netting may be having significant adverse effects upon Dugong populations in the area. Management strategies are being developed with fishers to counter the risk. Prohibition of trawling in much of the area and the current low level use for tourism and recreation mean that they appear to pose little threat to the values of the area. Oyster banks in the area are licensed by the Department of Primary Industries.

Surrounding area: Around Shoalwater Bay commercial and recreational fishing, agricultural and pastoral activities, and recreation activities are limited. Around Corio Bay, State Forest and National Park predominate with urbanisation, tourism, recreation and agriculture making up most of the remaining activities.

19. Possible Changes in Land and Marine Use: Future growth in marine based tourism and increased recreational activities, particularly in the area of ecotourism. Aboriginal interest in the Shoalwater Bay area is increasing as the dispossessed people rediscover their cultural ties with the area.

20. Disturbances and Threats: Defence training activities pose localised disturbance in the Shoalwater Bay Training Area but are appropriately managed under the guidelines of the areas integrated strategic plan. Threats posed by the use of fire as a management tool and feral pest control (cat, fox, rabbit, cattle, horses, pigs and goats) and weed control (*Lantana camara*, *Passiflora suberosa* and *Emilia sonchifolia*) have been corrected through the implementation of the management plan for the Area. Illegal fishing practices (e.g. netting) pose threats to the dugongs, turtles and fish stocks (especially Barramundi and Salmon).

21. Hydrological and Biophysical Values: Shoalwater Bay is a large and diverse embayment. The area contains a diversity of marine and coastal wetland types with examples of 14 of the 29 types of wetland found in Queensland. Of particular value are the eastern embayments of Port Clinton, the Port Clinton Lowlands, parts of the Water Park Creek catchment and Corio Bay. The eastern dune fields form a substantial part of the catchment of Water Park Creek which is the sole source of water to the towns south of the area along the Capricorn Coast.

22. Social and Cultural Values: The area is part of the traditional lands of the Darumbal Aboriginal people who have not had access to the area since dispossession. The dunefields contain archaeological sites consisting of shell middens and scatters of stone tools, possible stone arrangements and dinner

camp sites. Some sites are extensive and contain sub-surface *in-situ* deposits. Further research is required to identify and describe sites. European maritime explorers Cook, Flinders and Jukes made landfalls in Shoalwater Bay. The estuarine and marine sections of the area contribute to important regional commercial fisheries and provides opportunity for recreation and wilderness appreciation. The area contains the catchment of the fresh water supply of the Capricorn Coast.

23. Noteworthy Fauna: (Rare and threatened species occurring in the area are attached as an appendix)

The Shoalwater Bay Area contains a high diversity of freshwater, marine and estuarine fish species with 445 species recorded. Of these, 428 species were from marine or estuarine habitats and 17 were from freshwater. This represents 12.5% of marine and 9% of freshwater fish recorded in Australia. A further eight species of freshwater fish recorded from surrounding creeks and likely to occur within the SWBTA (Trnski *et al.*, 1994) combine to represent 14.6% of Australia's freshwater fish fauna within an area covering less than 0.035% of Australia's total land area. This is primarily due to the large range of habitats, relative lack of anthropogenic impacts, the lack of introduced fish species and the overlap of tropical and subtropical faunal zones (Trnski *et al.*, 1993; Aust. Govt, 1994a). There is evidence of endemism in the fish fauna with an undescribed species of weedfish (*Springeratus* sp.), a pipefish (*Halicampus boothae*) and a member of the clingfish genus (*Pherallodichthys*) being recorded from the area. The Honey Blue-eye (*Pseudomugil mellis*) is listed as vulnerable under the Commonwealth Endangered Species Protection Act 1993, while the endangered Oxleyan Pygmy Perch (*Nannoperca oxleyana*) may occur in dune swamps in the area, as they have been found in similar habitats elsewhere. Exotic fish are absent from the freshwater and estuarine wetlands. This characteristic does not occur in any other catchment on the east coast of Australia, therefore represent important fish habitat and representations of native fish communities (Aust. Govt, 1994a).

Populations of threatened species, listed in the Commonwealth Endangered Species Protection Act 1993, that inhabit the extensive areas of seagrass habitat include the vulnerable Green (*Chelonia mydas*) and Hawksbill (*Eretmochelys imbricata*) turtle, and the endangered Loggerhead (*Caretta caretta*) turtle. Also recognised are Flatback turtle (*Natator depressa*) and the Dugong (*Dugong dugon*) which is internationally recognised as vulnerable. The area is recognised as supporting the largest feeding population of Green turtles on the east coast of Australia with the largest dugong habitat in the Mackay-Capricorn section of the Great Barrier Reef (Aust. Govt., 1994a, b). The mangrove, tidal mudflats and saltflats are important habitats for local and migratory waterbirds. Sixteen species of holarctic breeding, migratory waders have been recorded from the area with numbers for 6 species exceeding 1% of their population in the Asian-Australian flyway. The area is identified as being of particular international importance to the Eastern Curlew (*Numenius madagascariensis*), the Whimbrel (*Numenius phaeopus*), and the Great Knot (*Calidris tenuirostris*). Sandy beaches support significant numbers of the Beach Thick-knee (*Burhinus neglectus*), recognised as vulnerable by Garnett (1992). Under international treaties a total of 26 bird species are protected by JAMBA,

while 27 bird species are listed under the CAMBA treaty. A range of other wetland birds and shorebirds feed and breed in the area. A total of 226 species of birds was recently recorded from the area representing 32% of the Australian bird fauna in less than 1% of the area of the continent. Surveys of waterbird populations conducted in the low season (Mar-June) have estimated bird numbers around 16 000, indicating that the area most likely supports numbers in excess of 20 000 birds in the high season (Dec-Jan) (O'Neill pers. comm., 1995).

Summary: Native species in the area include: 22 amphibians (frogs), 66 reptiles (20 species of snake, freshwater and sea turtles, geckoes, lizards, dragons, monitors, skinks), 226 birds, 24 mammals and 23 bats.

24. Noteworthy Flora: (Rare and threatened species occurring in the area are attached as an appendix)

The conservation value of SWBTA derives primarily from size, diversity and condition. The condition arises from the land use and management. The biotic diversity arises from the diversity of geomorphology, the gradient in rainfall, and the location on the Tropic of Capricorn. The location has resulted in a significant overlap of temperate and tropical species while the rainfall gradient has produced an overlap of coastal forest and inland woodland species. The very wide range of environmental conditions which prevail in the SWBTA have resulted in a diverse and complex arrangement of flora and associated vegetation types. A total of 791 species and subspecies were recorded by Melzer *et al.* (1994), who also reviewed other floral lists for the area to identify a total of 946 species. The flora of the area has high conservation value because of: the presence of a range of communities which are threatened elsewhere by extensive clearing; the presence of 20 rare or threatened vascular plants, where 12 are recognised as being nationally rare or threatened; high diversity and wilderness value and a low level of disturbance (Aust. Govt., 1994 a, b; Commonwealth of Australia, 1993; Melzer *et al.*, 1994). Although the taxonomy of seagrasses is uncertain, according to traditional classification schemes there are 10 species of seagrasses recorded from the area, with seagrass beds extending to water depths of 20m due to water clarity. Forty-three percent (18 of 39 species) of all mangrove species recorded in Australia occur in the area (Aust. Govt., 1994a, b; Melzer *et al.*, 1994).

25. Scientific Research and Facilities: It is believed the low level of disturbance, high wilderness value and diverse plant communities and integrity of the many ecosystems make the area an ideal benchmark for scientific research. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) established at least 20 permanent reference sites in the area during 1972-73. These were broadly characterised and measurements of fuel accumulation and the occurrence of fire recorded for a number of years. The Queensland Department of Environment and Heritage has also established permanent reference sites and regularly tags and monitors turtle populations in Shoalwater Bay.

26. Conservation Education: Local conservation groups regularly provide information on the area to various local, national and international interest

groups. Dugong and turtle issues have been a focus for marine education in the region. With Central Queensland University and other educational and research institutions using the area for research and educational purposes (Childs and Healy, pers. comm., 1995).

27. Recreation and Tourism: Access to the SWBTA is restricted and existing tourism and recreation use is at a low level. All tourism and recreational opportunities are marine based and these are totally restricted when in military use. Current levels of recreational fishing and tourism from the coast do not appear to be causing damage to the current national estate values.

28. Management Authority: *Functional authority terrestrial*: Department of Defence (Army) - Shoalwater Bay Training Area.

Administrative authority terrestrial: Department of Administrative Services (Minister for Administrative Services) - Shoalwater Bay Training Area.

Functional authority intertidal and marine: Queensland Department of Environment and Heritage (State Marine Park), Queensland Department of Primary Industries - (Corio Bay Fish Habitat Area and oyster banks) and Great Barrier Reef Marine Park Authority (Great Barrier Reef Marine Park).

29. Jurisdiction: Department of Defence (Commonwealth), Queensland Department of Environment and Heritage (State), Queensland Department of Primary Industries (State), Great Barrier Reef Marine Park Authority (Commonwealth), Department of Administrative Services (Commonwealth).

30. References:

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31. Criteria For Inclusion: 1A, 1C, 2A, 2B, 2C, 2D, 3A, 3B, 3C.

32. Site Map: See map attached.

Appendix: Identified Rare, Threatened and Vulnerable Floral and Faunal Species Within Shoalwater Bay Area (from Australian Government, 1994a).

Flora:

Marsdenia coronata

Comesperma oblongatum

Schizaea malacanna

Grevillea venusta

Myriophyllum implicatum

Xylosma ovatum

Pimelea umbratica

Lycopodiella serpentina

Sowerbaea subtilis

Phaius tankervilleae

Fauna:

Reptiles:

Caretta caretta

Chelonia mydas

Eretmochelys imbricata

Natator depressa

Fish

Pseudomugil mellis

Nannoperca oxleyana

Birds:

Burhinus neglectus neglectus

Erythrotriorchis radiatus

Petrophassa scripta scripta

Numenius madagascariensis

Sterna albigularis sinensis

Colluricincla megarrhyncha gouldii

Calyptorhynchus lathamii

Bats:

Chalinolobus dwyeri

Taphozous australis

Whales and Dolphins:

Megaptera novaeangliae

Dugong dugon

Tursiops truncatus

Sousa chinensis

Orcaella brevirostris

Monotremes:

Ornithorhynchus anatinus