
Marine Parks

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Environmental, Economic and Social Values of the Upper Spencer Gulf Marine Park

PART 1



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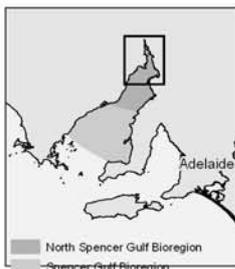
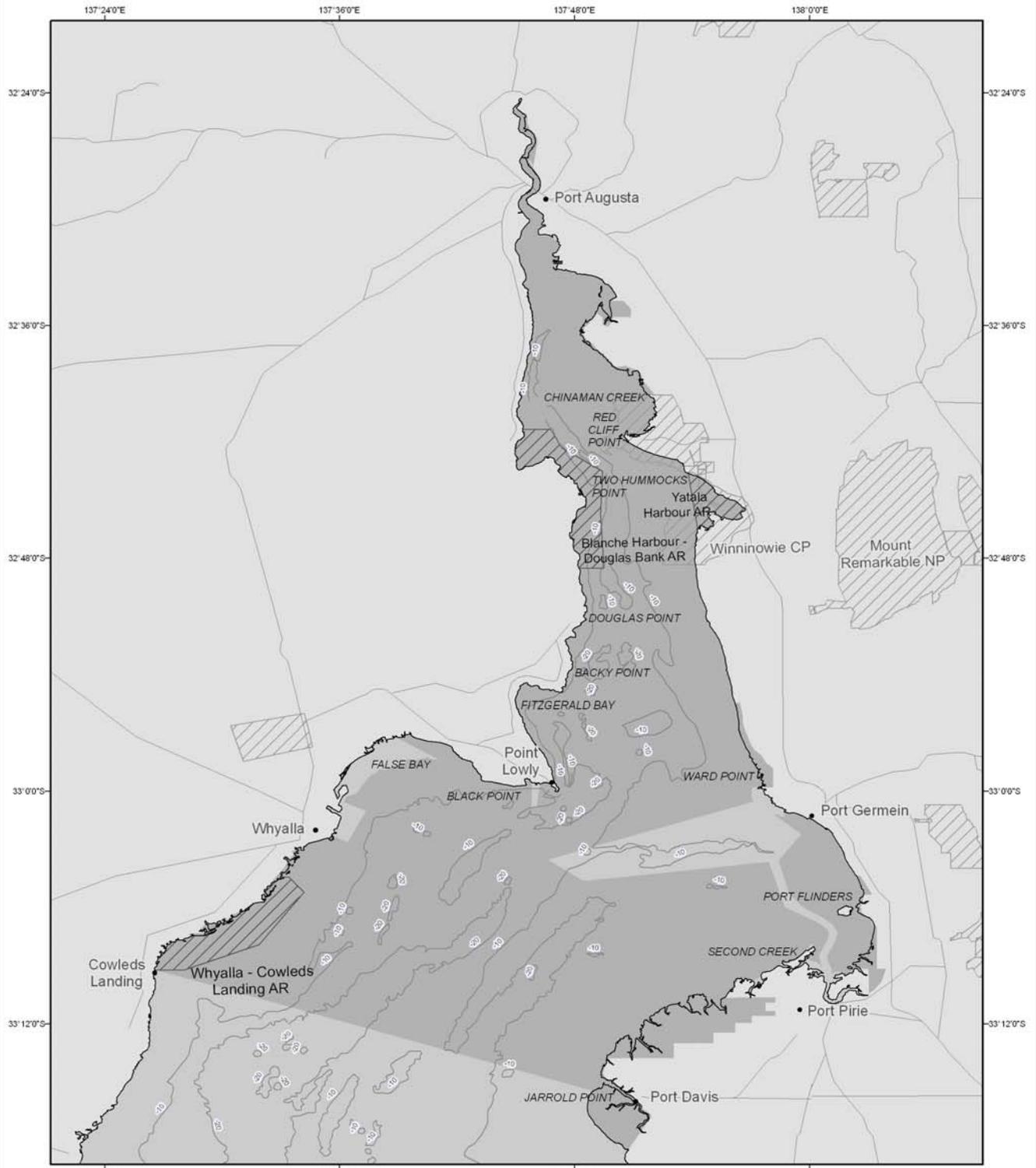
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PART 2 AN ATLAS OF MAPS

An atlas of maps containing environmental, economic and social/cultural information for this marine park has been produced as Part 2 of the Values Statement. The maps provide details specific to this park in a user-friendly visual format and may be viewed and downloaded from <http://www.marineparks.sa.gov.au>.

Upper Spencer Gulf Marine Park



- Marine Park
- State Waters Jurisdiction
- Parks and Reserves
- Aquatic Reserves
- Bathymetry Contours
- Roads
- Coastline (median high water)



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DEH MapID: 2010-3232

Upper Spencer Gulf Marine Park

Located in the North Spencer Gulf Bioregion, the Upper Spencer Gulf Marine Park covers 1,602 km² and includes waters north of a line from the southern end of the Whyalla-Cowleds Landing Aquatic Reserve on the western side of Spencer Gulf to Jarrold Point on the eastern shore. The park also includes the uppermost reaches of Spencer Gulf extending north of Port Augusta. The landward boundary of the marine park extends at least to the median high water mark and where possible incorporates coastal Crown Lands including beaches, sand dunes, estuaries and saltmarshes, as shown in the map. This marine park includes a number of other protected areas, including Blanche Harbour-Douglas Bank, Yatala Harbour and Whyalla-Cowleds Landing Aquatic Reserves and overlays part of Winninowie Conservation Park.

1 ENVIRONMENTAL VALUES

1.1 Ecosystem services

Ecosystems provide many critically important services that people benefit from, often at no direct cost to us. Examples of ecosystem services provided by coastal and marine habitats are shown in the following table. It is important to ensure that ecosystem health and integrity are maintained so that ecosystems continue to provide these services to us all.

Table adapted from McLeod, K and Leslie, H (2009).

	Life supporting services				Resources and products				Maintain earth's living space						Recreational and cultural services					
	Biogeochemical processes	Biophysical processes	Biodiversity	Nutrient cycling	Food	Fibre, fuel, shells etc	Non-biological materials (eg minerals)	Pharmaceuticals & nutraceuticals	Climate regulation	Waste processing	Flood/storm protection	Water flow/circulation	Erosion control	Water quality	Sediment quality	Cultural and amenity	Recreation and tourism	Aesthetics	Spiritual, religious, lifestyle	Education and research
Coastal, estuarine and marine habitat types																				
Bare sand	x	x	x	x	x	x	x			x		x		x	x	x	x	x	x	x
Seagrass	x	x	x	x	x	x		x	x	x		x	x	x	x	x	x	x	x	x
Water column	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x
Bedrock platform	x	x	x	x	x	x	x	x	x	x			x			x	x	x	x	x
Sandy beaches (dunes, coarse sand, fine sand)	x	x	x	x	x	x	x			x		x			x	x	x	x	x	x
Other beaches (boulder, pebble/cobble, mixed)	x	x	x	x	x	x	x			x		x	x		x	x	x	x	x	x
Mudflats and sandflats	x	x	x	x	x	x	x			x		x			x	x	x	x	x	x
Saltmarsh	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mangrove	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

The Upper Spencer Gulf Marine Park will be designed to conserve examples of the variety of habitats and species found in the North Spencer Gulf Bioregion. Habitats, species and natural processes found here are summarised below.

1.2 Physical influences

Physical influences shape the type of habitats and species found in an area. Physical influences typical of this marine park include the following:

- limited, occasional fresh water inputs contribute to an inverse estuary, in which salinity is higher at the top of the estuary than at the bottom;
- salinities ranging from 35 to 42 ppt;
- frequent dudge tides, periodically limiting water movement;
- sheltered waters, grading to semi-sheltered waters in the south of the park;
- large tidal ranges; and
- variety of current types (tidal, wind-driven, thermo-haline, surface wind).

1.3 Habitat variety

Table 1 Benthic (subtidal) habitats found in the Upper Spencer Gulf Marine Park

Benthic Habitat**	Area (km ²)*	% of park
Bare sand	849	56%
Dense seagrass	579	38%
Dense seagrass patches	<1	0%
Medium seagrass	49	3%
Unmapped	47	3%

* habitat areas have been rounded to the nearest whole number

**habitats included are those found from mapping at a resolution of 1:100,000

Table 2 Shoreline (intertidal) habitats found in the Upper Spencer Gulf Marine Park

Shoreline Habitat	Length in park (km)*	% of park length
Bedrock platform	9	2%
Coarse sandy beach	89	16%
Mudflats and sandflats	1	<1%
Mixed beach	59	11%
Mangrove	377	68%
Pebble/Cobble beach	3	<1%
Saltmarsh	16	3%

* habitat lengths have been rounded to the nearest whole number

Upper Spencer Gulf is a recognised Wetland of National Importance containing a variety of coastal and marine habitats including the sheltered, low wave energy coast of the upper reaches of the Gulf; the strong tidal currents in Middle Bank channel; and tidal creeks, mangroves and saltmarsh areas along the eastern coastline. Above the median high water mark, the marine park includes several large areas of coastal saltmarshes and coastal dune systems, allowing for the protection of ecological linkages between land and sea.

The western side of the gulf is characterised by sheltered, generally shallow waters. From Cowleds Landing to Point Lowly, habitats include saltmarsh flats which are flushed by high spring tides, intertidal mangroves, beaches, headland reefs, near-shore patch reefs and some rocky shorelines. Intertidal sand and mud flats front the saltmarshes, which are linked to dense seagrass meadows, channels and sandy plain habitats. Rocky shorelines, headlands and reefs are limited in this park and occur mainly on the western coastline. The few that are present are dominated by communities of large brown algae.

Reefs off Point Lowly are recognised as an area of major significance for spawning aggregations of the giant Australian cuttlefish, currently nominated for protection under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). Two habitats important for the cuttlefish are described as 'urchin' reef and 'algae' reef. The urchin habitat occurs between 2–5 m and consists

of solid low relief reef or cracked bedrock with short algal clumps and high densities of sea urchins. The local purple sea urchin is found among the crevices and on the rock surfaces which they scrape for food. The algae reef habitat occurs between 5–8 m depth and consists of large brown algae (*Scaberia* (corkweed), *Caulocystis*, *Cystophora* species and *Sargassum* species) over patchy reef and sand.

Extending from Point Lowly to the Blanche Harbour Aquatic Reserve are a number of small bays and coves with some rocky coastline and intertidal mudflats. This area also includes sandy and shell grit beaches interspersed with fragmented mangrove stands and saltmarsh areas.

From Point Lowly to Camp Point, large seagrass meadows extend along the coastline and link to central channels in the Gulf. The channels have unusual mobile sand wave habitats, known as 'mega-ripples' which can be 1-2 m high. There are strong tidal currents in the channel area which influence the type of marine biota found in this region. For example razor fish (*Pinna bicolor*), bryozoans, soft corals (gorgonians), ascidians, sponges and sea pens are found in the channels.

Habitats from Camp Point north to the tip of the gulf include large intertidal sand and mud flats, in many cases backed by mangroves. Central waters in this area consist of bare sand/shelly habitats with numerous small patches of seagrass.

Winninowie Conservation Park is a flat coastal plain with extensive tidal saltmarshes and low dune shrubland. It is adjacent to a mangrove forest in Yatala Harbor Aquatic Reserve. The intertidal flats extend into bare sand and dense seagrass meadows.

Port Davis has extensive saltmarsh habitat fronted by low sand beach ridges and extensive tidal flats which include part of the Broughton River delta.

1.4 Marine species

The many habitats located within the Upper Spencer Gulf Marine Park support a variety of marine and coastal species, some of which have been identified as ecologically important. Refer to Appendix 1 for a more detailed list of species.

1.4.1 Plants and algae

The saltmarsh habitat in the Port Davis area protects many endemic species of flora and fauna including the nationally and state listed *vulnerable* bead glasswort and the state *rare* tiny arrow grass. Redcliff and Chinaman Creek contain the largest stands of mangroves remaining in South Australia.

Reef in the area is dominated by *Caulocystis* species, *Scaberia* (corkweed), *Cystophora* species and *Sargassum* species. The understory is a mix of red and turfing brown algae.

Seagrass beds are dominated by *Posidonia* species, with *Amphibolis* and *Heterozostera* also being present.

1.4.2 Bony fish, sharks and rays

Over 60 species of fish, sharks and rays are known to commonly occur in upper Spencer Gulf. Many common commercially and recreationally significant species inhabit seagrass, reef, sand and mud habitats.

The saltmarsh/mangrove/seagrass systems of the region provide habitat for larval and juvenile fish, including many of the commercially and recreationally significant species. These include King George whiting, snapper, yellow-fin whiting, and garfish. Nursery areas of upper Spencer Gulf contribute to the productivity of fish throughout the Gulf.

Several species of ray are found amongst the seagrass beds and sandy seafloor, including the smooth stingray, fiddler ray, and eagle ray.

The bronze whaler and hammerhead sharks are found seasonally in upper Spencer Gulf feeding on schools of fish. The nationally *vulnerable* white shark seasonally visits the area, particularly Mere's Tyre reef, Mudbanks, the *Leeton* wreck, other bank and channel areas off Whyalla and Point Lowly and deeper water areas to feed on large snapper. Other shark or ray species of conservation concern that occur in the area include coastal stingaree, whitespotted spurdog, spotted wobblygong and dusky whaler, which has been nominated for protection under the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act). The deep-water elephant fish is also seasonally present in upper Spencer Gulf.

Sheltered coastal seagrass habitats such as those around Whyalla, Fitzgerald Bay and Blanche Harbour are habitat for several pipefish species including the tiger pipefish (a sub-tropical species more commonly recorded in warmer parts of Australia), long-snout pipefish and the deep-bodied pipefish all of which are listed for protection under the EPBC Act. The southern potbelly seahorse is also known to occur in the shallow seagrass meadows of Blanche Harbour.

Fish and shark species such as dolphin fish, skipjack tuna, broadbill swordfish, and thresher sharks, some of which are thought to be sub-tropical or southern oceanic species, are occasionally observed or caught in upper Spencer Gulf waters. Shallow water scarlet and orange cardinal fish, which generally have a tropical distribution, are found beneath rock ledges along the rocky shores of the upper Spencer Gulf.

Fish with western affinities that do not commonly occur further east than the west coast of South Australia are also occasionally reported in upper Spencer Gulf, such as the red-lipped morwong.

1.4.3 *Marine mammals*

Australian sea lions seasonally visit northern Spencer Gulf to feed on cephalopods (e.g. southern calamari) and fish.

Some species of whale visit upper Spencer Gulf sporadically, including humpback whale, Bryde's whale, the strap-toothed whale and the pygmy sperm whale. Individuals and small groups of southern right whales are sighted in winter. Bottlenose dolphins also occur in the region with small pods visiting the mouth of Chinaman Creek.

1.4.4 *Seabirds and local and migratory shorebirds*

Located throughout the marine park are many important sites for local and migratory shorebirds, as well as seabirds. The area provides internationally important habitat for wading birds particularly on the samphire flats and along the shores of small tidal creeks. Over 65 species of wading bird, coastal bird and sea bird have been recorded, 19 of which are listed under international treaties. Examples include the black-faced cormorant at Winninowie Conservation Park and Weeroona Island, Caspian and little terns in the Whyalla -False Bay area, Ward Spit and Cackle Spit and the mangrove area around Point Patterson. Species diversity is high in Winninowie Conservation Park and includes a significant pied cormorant rookery amongst the mangroves.

Several species of coastal and sea bird species have been recorded in the Upper Spencer Gulf, 19 of which are listed under international treaties including the marsh sandpiper, sharp-tailed sandpiper, red-necked stint and curlew sandpiper.

Threatened bird species found in the park include the orange-bellied parrot which feeds in intertidal areas at Chinaman Creek, state *vulnerable* hooded plover, state *endangered* white-bellied sea eagle, state *vulnerable* eastern curlew and state *endangered* fairy tern.

The state rare pied and sooty oystercatchers and red-capped plovers are also found in this region. During years of high rainfall in the interior, migratory marine birds use the north/south configuration of Spencer Gulf as a wetland corridor.

Significant numbers of wader birds are found at Ward Spit including protected species such as the state *endangered* little tern and the migratory Caspian tern which often nests on Ward Spit.

1.4.5 Marine invertebrates

Large bivalves such as hammer oysters, and other animals such as molluscs, crustaceans, and ascidians are associated with the seagrass habitat of the park. Significant razorfish beds are found north of Point Lowly on the western coastline in the Blanche Harbour area. Point Lowly represents an area of major significance for spawning aggregations of the giant cuttlefish (*Sepia apama*).

Unique communities of organisms that live within sandy seafloor sediments are found in the mega-ripples and sandwaves. These organisms comprise mainly soft corals, sea fans, sponges, bryozoans and ascidians. Some of these invertebrates are endemic to South Australia or are of sub-tropical origin such as the tropical relic sea pen *Virgularia gustaviana* which is usually found in the Indo-Pacific. Species on the mega-ripples and sandwaves have evolved the unique ability to tolerate the constant movement of their substrate. These include the endemic egg cowrie, *Primovula cruenta*, sea pen, *Scytalium* sp, and gorgonian coral *Echinogorgia* sp.

Horseshoe worms can be found in northern Spencer Gulf. Only about 12 species are known globally and two have been recorded around Whyalla and Germein Bay.

The tidal creeks and mud flats south of Pt Pirie to Jarrold Point are significant as they are directly used by many species of commercially and recreationally important invertebrates at multiple stages of their life cycles. These include mud cockles, blue swimmer crabs and western king prawns.

For further environmental and social information refer to <http://www.marineparks.sa.gov.au>

2 ECONOMIC VALUES

The marine environment is an important source of wealth for South Australia and its coastal communities. Marine Parks will be designed to accommodate existing economic activities wherever possible. The main economic activities in the Upper Spencer Gulf Marine Park are summarised below. Information in the Aquaculture, Commercial fishing, and Mineral and energy resources sections have been provided by PIRSA.

2.1 Aquaculture

The South Australian aquaculture industry had a direct output value of \$324 million in 2008/2009 (EconSearch, 2010a). Marine species grown and harvested in South Australia include (but are not limited to) Pacific oysters and mussels (bivalve molluscs), Southern bluefin tuna (prescribed wild caught tuna), abalone, yellow-tail kingfish and other species of finfish (aquatic animals – other than prescribed wild caught tuna – which require regular feeding).

Table 3 The statewide economic value of aquaculture industries in South Australia, 2008/09 (excludes freshwater aquaculture)

	Gross value of on-farm production (\$m)	Value to downstream* sectors (\$m)	On-farm number of employees (FTE)	Number of employees in downstream* sectors (FTE)
Southern bluefin tuna (prescribed wild caught tuna)	\$157.8	\$16.0	348	58
Bivalve molluscs (oysters)	\$32.6	\$42.6	529	252
Finfish (other than prescribed wild caught tuna)	\$29.2	\$15.4	108	84
Bivalve molluscs (mussels)	\$2.5	\$2.8	114	16
Abalone	\$8.1	\$0	64	0
Other	\$10.9	\$0	44	0

EconSearch, 2010a * Downstream activities include processing, transport, retail and food service.

The Fitzgerald Bay aquaculture zone policy exists within this marine park boundary. The zone currently contains a number of sites farming yellow-tail kingfish, however other species are allowed to be farmed in the zone. A map showing current active sites, applications and aquaculture zone policies can be accessed online through the Aquaculture Public Register at: http://www.pir.sa.gov.au/aquaculture/public_register

2.2 Commercial fishing

The commercial fisheries that operate in the Upper Spencer Gulf Marine Park are:

- Spencer Gulf Prawn Fishery;
- Blue Crab Fishery (Spencer Gulf zone); and
- Marine Scalefish Fishery.

The value of each of these fisheries, including the direct and flow-on values, as well as the number of employees and export values, where available, are listed below. Note that the values provided below are for the entire area of the fishery and may not be specific to the Upper Spencer Gulf Marine Park.

Table 4 The 2008/09 economic value of fisheries operating in the marine park for relevant fishery areas (figures are not specific to the park area and include catches from outside the marine park boundary).

	Catch value(\$m)	Value of flow-on to other sectors (\$m)	Fishing (FTE) employment	Flow-on (FTE) employment
Prawn (Spencer Gulf & West Coast)	30.8	71.2	185	342
Blue Crab (State)	5.1	9.9	28	48
Marine Scalefish (Spencer Gulf/Coffin Bay)	10.9	10.0	249	51

EconSearch 2010 b, c and d.

These fisheries are important to regional economies of the area both directly, through employment in each fishery, and indirectly, through a range of additional services such as processing, local transport, marketing, local retail and food services. Each of these activities generates flow-on effects to other sectors, through purchases of inputs and employment of labour.

The Spencer Gulf Prawn Fishery is the largest of the three prawn fisheries in South Australia. Over 80% of South Australia's king prawn harvest comes from Spencer Gulf, with 1,800 tonnes taken from that region in 2008/09.

Blue swimmer crabs are fished commercially from Port Broughton to Port Pirie and from Cowell to Whyalla.

The Marine Scalefish Fishery is a diverse multi-species, multi-gear fishery that operates across State waters, targeting four key species: snapper, King George whiting, southern garfish and southern calamari.

Fishing charters also operate from a number of locations throughout this region.

For further information or to view maps of the fishing regions visit:

http://www.sardi.sa.gov.au/_data/assets/pdf_file/0010/99739/No_305_South_Australian_Wild_Fisheries_Information_and_Stats_report_200708_published.pdf

2.3 Mineral and energy resources

The upper Spencer Gulf region is regarded as having some petroleum potential (for coal seam gas). The potential for offshore geothermal energy resources has not yet been addressed, however potential exists to utilise geothermal energy in adjacent coastal or inland water settings for a variety of purposes, including power for desalination plants.

Regional magnetic and gravity data show that prospective rock units, particularly of the Gawler Craton, continue offshore in large areas of some parks. Prospectivity for minerals that could be dredged or remotely mined from the seabed is unknown. Exploration for basement rock targets, below the seabed, is likely to be limited to shallower water areas.

Part of Pipeline Licence 1 (Moomba-Adelaide) is located across the park leading to Whyalla. There are seven Mining Leases within and adjacent to the park near Whyalla, and several others adjacent to the north eastern end of the park. Southeast of Pt Augusta there are two mineral Retention Leases within and adjacent to the park for salt extraction. A Mining Claim (MC 3837) exists within the park for metallic minerals offshore from Whyalla. Four mineral Exploration Licences (ELs 3439 and 3547 south of Pt Augusta and ELs 3439 and 3504 north) and three Geothermal Exploration Licences (GELs 285, 246 and 247) overlap parts of this marine park. There are two Geothermal Exploration Licences (GELs 244 and 245) located inshore from the coast near Whyalla. A Petroleum Exploration Licence and several mineral Exploration Licences have been applied for over much of the park and two Geothermal Exploration Licences have been applied for adjacent to the park on Eyre Peninsula.

Cooper Basin liquid petroleum products are transported via a pipeline to Port Bonython where they are separated into a range of valuable products for export via the 2.4 km jetty.

Extensive infrastructure is located adjacent to the park. Significant proposals for other infrastructure include Olympic Dam Expansion desalination operations and mineral export facilities.

2.4 Transport and infrastructure

Transport and infrastructure provide an important economic contribution to the region and the state, providing for maritime activities such as: shipping ports for export of goods; boat ramps for launching of recreational or commercial vessels; jetties for fishing; and breakwaters and groynes for coastal management. Marine parks will be zoned to provide for existing and planned infrastructure development.

In 2008/09 exports from Whyalla, Port Bonython and Port Pirie totalled \$503 million, \$192 million and \$45 million respectively. Port Pirie was visited by a total of 72 commercial vessels during 2009 and the OneSteel port at Whyalla accepts 1198 vessels a year.

The Upper Spencer Gulf region supports minerals processing, manufacturing, energy generation and transport logistics. Additional exporting and shipping facilities may be needed in the future to facilitate growth in the mining sector. Other important infrastructure in the region includes the Power station at Pt Augusta, the Gas pipeline from Port Pirie to Whyalla and the water pipeline from Morgan to Whyalla, which crosses Spencer Gulf near Douglas Point.

Following consultation on the marine park outer boundaries, existing commercial ports and indenture areas that are heavily trafficked were excluded from the park boundaries in the July 2009 proclamation.

2.5 Local tourism

Tourism is an important economic activity along the coastal and marine areas of upper Spencer Gulf. Tourism is largely seasonal, with peak times occurring during school and public holidays, especially during the summer months.

The local government areas of Whyalla, Port Pirie, Port Augusta and Mt Remarkable together attract an average of 323,000 domestic overnight visitors who spend an average of \$84m annually, staying 745,000 nights.

Water based recreational activities such as fishing, boating and diving are major attractions. There is also a significant number of coastal holiday shacks in this area. Recreational fishing is a major attraction in this area; for example the Amateur Fishing tournament held annually in Whyalla generates over \$500,000 to the local economy.

The northern reaches of Spencer Gulf offer uncrowded and unique natural environments with target attractions heavily dependent on the local marine environment, the diverse cultural and geological features and the unique flora and fauna attractions found throughout the region. The giant Australian cuttlefish spawning ground off Point Lowly is world renowned and attracts many snorkellers and scuba divers.

Charter boat operations are based at a number of coastal locations around the park, providing for fishing, diving and eco-tours, such as dolphin and seal watching.

3 SOCIAL VALUES

The marine environment is an important recreational and cultural asset for coastal communities. Marine parks will be designed to accommodate existing recreational activities wherever possible. This section highlights the social values of Upper Spencer Gulf Marine Park and is separated into four parts:

- Aboriginal and European cultural heritage;
- scenic values;
- recreational activities and popular locations; and
- interpretive and educational opportunities.

3.1 Aboriginal heritage

Aboriginal people have interacted with the marine environment for thousands of years and their relationships with the sea remain strong through customs, laws and traditions. Traditional usage, Aboriginal cultural heritage, Indigenous Protected Areas (IPAs), Indigenous Land Use Agreements (ILUAs) and Native Title considerations will be taken into account in developing the management plan for the Upper Spencer Gulf Marine Park.

3.1.1 Language Groups

The Nukunu, Kujani, Kokatha and Barngarla Aboriginal people have traditional associations with areas of the marine park including estuarine and coastal environments, which provide food and resources for local Aboriginal people and still hold strong cultural significance today.

3.1.2 Agreements and Claims

The Nukunu (1996) and Barngarla (1996) people have lodged native title claims that contain parts of the Upper Spencer Gulf Marine Park.

3.1.3 Sites and Stories

Aboriginal campsites have been located within Winninowie Conservation Park and a further ten campsites have been recorded nearby. Fish traps have been recorded along the shores of Fitzgerald Bay.

The Government is aware that there may be confidential Aboriginal heritage sites in South Australia's coastal areas. Where possible, these sites will be considered in the planning process. Future management plans will ensure these heritage sites are appropriately respected.

3.2 European heritage

Where possible, the management plan for Upper Spencer Gulf Marine Park will recognise and complement sites of cultural and maritime heritage.

The explorer Matthew Flinders ventured to the head of Spencer Gulf in 1802 in search of a marine passage to the centre of the continent.

The upper Spencer Gulf is closely associated with the establishment of the pastoral industry in the far north of the state. Port Augusta became one of the state's most important ports in the 19th

century, servicing the pastoral industry in the northern regions, the northern railway line and the Overland Telegraph Line and Port Germein and Port Pirie developed to service the growing agricultural activities in the region. The Port Augusta Wharf and the Port Germein Jetty are included in the State Heritage Register.

Mining also had an influence on the development of facilities at Port Pirie and Whyalla, with the establishment of smelters at both locations leading to an increase in shipping. The State heritage listed Hummock Hill Gun Emplacement at Whyalla was constructed during WW2 to protect the significant shipbuilding and smelting works of BHP.

The Point Lowly Lighthouse was constructed in 1883 and extended in 1908 in response to increased shipping in the area. It is included in the State Heritage Register and the Register of the National Estate.

The *Parara* was wrecked off Point Lowly in 1882 while servicing construction of the lighthouse. Other protected wrecks within the park include the *Letty* (1866), the *Apollo* (1889), the *Alpha* (1921) and the *Roogannah* (1927). The remains of the *Old Jeny* barge are familiar to travellers crossing the main road bridge at Port Augusta.

Several geological monuments located within the park include Redcliff Point, Douglas Point, Backy Point and Two Hummocks Point. Redcliff Point is also designated as being of geological significance in the State Heritage Register.

3.3 Scenic values

The scenic quality of South Australia's coast is a significant social, economic and environmental resource. The coastline has high amenity value and includes high quality landscapes, also known as viewsapes. The significance or quality of viewsapes is derived from a combination of landform (relative relief, variety and complexity of landscapes), land cover (nature, scale and variety of vegetation), land use (impact of human activity), water, diversity, naturalism and colour.

The coastline of the Upper Spencer Gulf Marine Park has low-moderate scenic values (Lothian 2005). Considerable areas of low lying land, mangrove and samphire are broken by low rocky headlands, beaches, low vegetated dunes and tidal flats. The topographical contrast and complexity of this coastline is minimal, resulting in low to moderate scenic values (Lothian 2005).

Scenic values of coastline in the Upper Spencer Gulf Marine Park (Lothian 2005).

Rating	Coastal landform type	Ranking
5.75 – 6.25	Headlands	Moderate
4.75 – 6.0	Dunes and beaches	Low - Moderate
4.75 – 5.25	Mangroves	Low

For further information on coastal scenic values and viewsapes refer to <http://www.environment.sa.gov.au/coasts/management/coastal-viewsapes.html>

3.4 Recreational activities in the marine park

The coastal and marine environments of the Upper Spencer Gulf Marine Park are very popular with recreational fishers, boat users, snorkellers, scuba divers, swimmers, and sightseers. Examples of these activities are provided below.

3.4.1 Recreational beach and boat fishing locations

Recreational fishing is a popular past time in South Australia. Recreational fishers collectively harvest significant proportions of the total catch for a number of key species. The total number of recreational fishers for the Upper Spencer Gulf (region 9) during 07/08 was 14,451 which amounted to 46,735 days of fishing. (Note figures relate to regions used for reporting fishing activities and may include catches from outside the marine park boundary). King George whiting, snapper, southern garfish, and blue swimmer crab were the most frequently caught species for the Northern Spencer Gulf region.

The Upper Spencer Gulf supports an important recreational fishing industry; it is highly popular due in part to protection from exposure as well as the productivity of the region. Fishing is the biggest participation sport in Australia and is a major form of recreation for the communities within the Upper Spencer Gulf and also forms a large part of the tourism market for the region.

Boat fishing is popular at many locations throughout the marine park. Marinas in the region are located at Whyalla Boat Harbor (Hummock Hill) and there is also an estuarine marina at Port Pirie River in close proximity to the commercial port.

Whyalla hosts the biggest amateur fishing tournament in South Australia over the Easter weekend. This attracted almost 1000 people from nearly all States and Territories in 2009. Whyalla, the self proclaimed snapper capital of Australia, is now nationally recognised for this annual snapper fishing tournament.

Artificial reefs are popular fishing sites also and are located near Port Pirie (tyre modules), Whyalla (tyre modules), Port Augusta (tyre modules) and Port Germein (sunken pipes).

3.4.2 Coastal camping

The conservation parks including Whyalla Conservation Park, Winninowie Conservation Park and Point Jarrold Sanctuary are places where many visitors are able to camp in a natural surrounding.

Winninowie Conservation Park is located on the eastern side of the gulf between Port Augusta and Port Pirie and contains mangroves and samphire flats that are abundant with birdlife. It also provides an access point for fishing.

3.4.3 Popular swimming beaches

Swimming and snorkelling are popular and occur from most of the regional centres and beaches.

3.4.4 Popular diving locations

The spawning event of the giant cuttlefish in and around the rocky shores of Black Point and Point Lowly at Whyalla is very popular with divers. Many dive sites are also popular snorkelling locations.

3.4.5 Other recreational activities in the park

Birdwatching is popular in the upper reaches of Spencer Gulf.

3.5 Interpretive and educational facilities within the marine park

School groups use the intertidal creek systems and mangrove areas for canoeing and nature study. In the past, Chinaman's Creek Research Station has been used for a variety of studies, but it now focuses primarily on ongoing meteorological and oceanographic monitoring.

APPENDIX 1 SPECIES LIST

This list of some of the species identified in the Upper Spencer Gulf Marine Park indicates the diversity of species found there.

Plants and algae

bead glasswort	<i>Sarcocornia quinqueflora</i>
corkweed	<i>Scaberia agardhii</i>
tiny arrow grass	<i>Triglochin minutissimum</i>

Bony fish, sharks and rays

black ray	<i>Dasyatis thetidis</i>
broadbill swordfish	<i>Xiphias gladius</i>
bronze whaler	<i>Carcharhinus brachyurus</i>
coastal stingaree	<i>Urolophus orarius</i>
deep-bodied pipefish	<i>Kaupus costatus</i>
deep-water elephant fish	<i>Callorhynchus milii</i>
dolphin fish	<i>Coryphaena hippurus</i>
dusky whaler	<i>Carcharhinus obscurus</i>
eagle ray	<i>Myliobatis australis</i>
fiddler ray	<i>Trygonorrhina fasciata</i>
garfish	<i>Hyporhamphus melanochir</i>
hammerhead shark	<i>Sphyrna zygaena</i>
King George whiting	<i>Sillaginodes punctata</i>
long-snout pipefish	<i>Vanacampus poecilolaemus</i>
orange cardinal pipefish	<i>Vincentia punctata</i>
red-lipped morwong	Signathidae
scarlet cardinal	<i>Cheilodactylus rubrolabiatus</i>
skipjack tuna	<i>Vincentia badia</i>
smooth stingray	<i>Katsuwonus pelamis</i>
snapper	<i>Dasyatis brevicaudata</i>
southern bluefin tuna	<i>Pagrus auratus</i>
southern garfish	<i>Thunnus maccoyi</i>
southern potbelly seahorse	<i>Hyporhamphus melanochir</i>
spotted wobblygong	<i>Hippocampus bleekeri</i>
thresher shark	<i>Orectolobus maculatus</i>
tiger pipefish	<i>Alopias vulpinus</i>
white shark	<i>Filicampus tigris</i>
whitespotted spurdog	<i>Carcharodon carcharias</i>
yellow-fin whiting	<i>Squalus acanthias</i>
yellow-tail kingfish	<i>Sillago schomburgkii</i>
	<i>Seriola lalandi</i>

Marine mammals

Australian sea lion	<i>Neophoca cinerea</i>
bottlenose dolphin	<i>Tursiops truncatus</i>
humpback whale	<i>Megaptera novaeangliae</i>
pygmy sperm whale	<i>Kogia breviceps</i>
southern right whale	<i>Eubalaena australis</i>
strap-toothed whale	<i>Mesoplodon layardii</i>

Seabirds and local and migratory shorebirds

black-faced cormorant	<i>Phalacrocorax fuscescens</i>
Caspian tern	<i>Sterna caspia</i>
curlew sandpiper	<i>Calidris ferruginea</i>
eastern curlew	<i>Numenius madagascariensis</i>
fairy tern	<i>Sterna nereis</i>

hooded plover	<i>Thinornis rubricollis</i>
little tern	<i>Sterna albifrons</i>
marsh sandpiper	<i>Tringa stagnatilis</i>
orange-bellied parrot	<i>Neophema chrysogaster</i>
piebald cormorant	<i>Phalacrocorax varius</i>
red-capped plover	<i>Charadrius ruficapillus</i>
red-necked stint	<i>Calidris ruficollis</i>
sharp-tailed sandpiper	<i>Calidris acuminata</i>
sooty oystercatcher	<i>Haematopus fuliginosus</i>
white-bellied sea eagle	<i>Fregatta grallaria grallaria</i>

Marine invertebrates

ascidian	Ascidacea
blue swimmer crab	<i>Portunus pelagicus</i>
bryozoans	Bryozoa
egg cowrie	<i>Ovula ovum</i>
giant Australian cuttlefish	<i>Sepia apama</i>
gorgonian	Alcyonacea
hammer oyster	<i>Malleus meridianus</i>
king prawn	<i>Melicertus latisulcatus</i>
King scallop	<i>Pecten fumatus</i>
mud cockle	<i>Katelysia</i> spp
mussel	Mytilidae
Pacific oysters	<i>Crassostrea gigas</i>
purple sea urchin	<i>Heliocidaris erythrogramma</i>
razorfish	<i>Pinna bicolor</i>
sea fans	<i>Mopsella</i> spp
sea pen	<i>Sarcoptilus grandis</i>
sea urchin	Echinoidea
soft coral	Alcyonacea
southern calamari	<i>Sepioteuthis australis</i>
sponge	Porifera
western king prawn	<i>Melicertus latisulcatus</i>

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