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**IDENTIFICATION AND PROTECTION OF SPECIAL AREAS AND
PARTICULARLY SENSITIVE SEA AREAS**

**Extension of the Great Barrier Reef and Torres Strait PSSA to include
the south west part of the Coral Sea**

Submitted by Australia

SUMMARY

Executive summary: This document is a proposal to extend the eastern boundary of the existing Great Barrier Reef and Torres Strait Particularly Sensitive Sea Area (PSSA) to include an area of the south west Coral Sea that is vulnerable to damage by international shipping activities. The Coral Sea is a remote ocean ecosystem recognized for its unique physical, ecological and heritage values. The proposal includes the implementation of new ships routing systems in the proposed extended area, with the aim of minimising the risk of damage to the fragile coral reef ecosystem from shipping, taking into account projected increases in shipping activity throughout the area.¹

Strategic direction: 7.1

High-level action: 7.1.2

Planned output: 7.1.2.2

Action to be taken: Paragraph 16

Related documents: Resolutions A.1061(28) and A.982(24); MEPC.44(30); MEPC.133(53); NCSR 2/3/3 and NCSR 2/3/4

Introduction

1 Australia proposes to extend the boundary of the existing Great Barrier Reef (GBR) and Torres Strait Particularly Sensitive Sea Area (PSSA), to include an area of the south west Coral Sea (figure 1). Further details of the proposal are provided in the annex, in accordance with the criteria set out in the *Revised Guidelines for the identification and designation of Particularly Sensitive Sea Areas* (Assembly resolution A.982(24)).

¹ In accordance with the Committee's Guidelines (MSC-MEPC.1/Circ.4/Rev.3), the annex to this document is submitted in English only.

2 The Coral Sea is a remote ocean ecosystem covering approximately 4,791,000 square kilometres that extends from the east coast of Australia and is bound by New Caledonia and the Solomon Islands in the east and Papua New Guinea in the north. The area is considered one of the most distinctive and undisturbed natural systems in the world and provides refuge for a wide range of threatened, migratory and commercially valuable species.

Discussion

3 The Coral Sea is recognized for its rich biodiversity, unique physical features and important heritage values. The area contains outstanding examples of reef communities and a diverse array of isolated sandy cays, islands, deep-sea plains, seamounts and canyons. Collectively, these areas provide critical habitat for a rich diversity of species, including some of the world's most unique and globally significant marine species.

4 Thousands of species rely on the ecosystem processes within the Coral Sea region for foraging, breeding and migration. Three-hundred and forty one species found in the Coral Sea are recognized for their conservation significance. This includes 26 species of cetaceans, 219 species of corals, 21 species of fish, 46 species of sharks and rays, five species of marine turtles and 24 species of birds. Many of these species are listed either as threatened or migratory species, or both, and, whilst over half show declining population trends worldwide, many are still found at healthy levels in the Coral Sea.

5 The remarkable biodiversity gene pool of the Coral Sea is a combination of Pacific, Southeast Asian and Indian Ocean flora and fauna populations, and the reefs, atolls and islands of the area form an important link between the genetic diversity of the South Pacific islands and the GBR.

6 The area is also recognized for its social, economic and cultural heritage attributes. It contains a large number of historic shipwrecks and is of indigenous cultural and social importance for Aboriginal and Torres Strait Islander people. Nature-based tourism activities also take place in the Coral Sea and the area provides ideal baseline conditions for scientific monitoring studies, given its remoteness and undisturbed condition.

7 Whilst the geomorphic features of the area provide important habitat for the area's remarkable fauna and flora, they also pose a significant challenge to safe navigation. The large number of historic shipwrecks, as well as a number of incidents and near misses in recent years, demonstrates that the area is vulnerable to damage from ship groundings or collisions and the associated marine pollution that may ensue.

8 In addition to ships using the Outer Route (also known as the deep-water route) to transit between Torres Strait and east coast Australian ports, the Outer Route converges in the south western Coral Sea with the north/south route used by ships transiting between Asian ports via Jomard Entrance (Papua New Guinea) and major Australian east coast ports such as Newcastle, Sydney and Melbourne and commodity exporting ports in Queensland. There are four main passages through the GBR that result in a concentration of traffic in the south west Coral Sea (see appendix 2 of annex). Shipping traffic has increased as a result of growth in commodity exports from the region and is considered to be one of the most persistent and significant anthropogenic threats to the ecosystem's distinct and near-pristine characteristics.

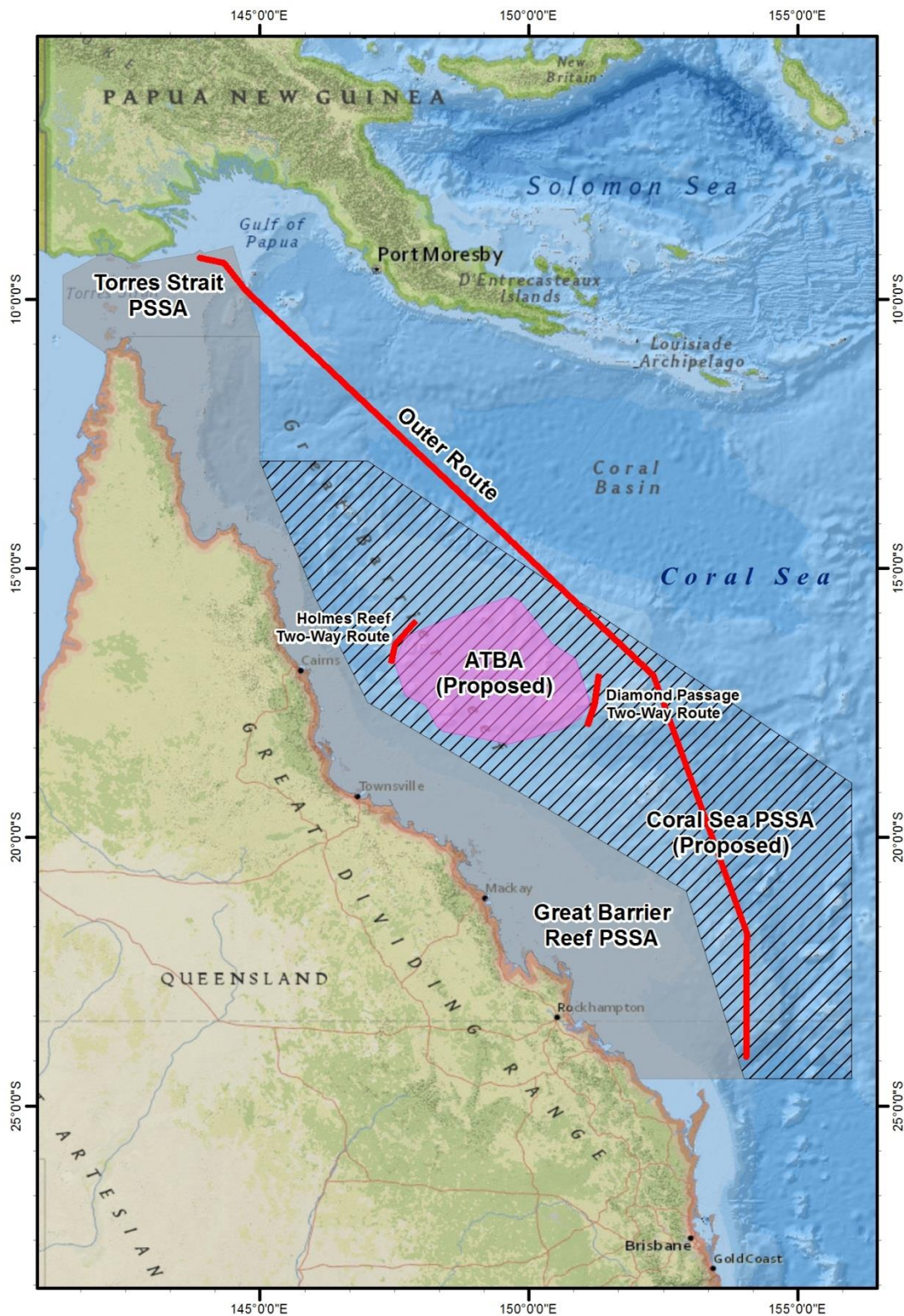


Figure 1: Proposed extension to GBR and Torres Strait PSSA showing routing systems

9 Based on the above attributes and sensitivities, the submission in the annex to this document details Australia's proposal to extend the eastern limit of the current GBR and Torres Strait PSSA to encompass the south west of the Coral Sea (approximately 12% of the Coral Sea area). It would be situated entirely within Australia's Exclusive Economic Zone and comprise a significant part of Australia's Coral Sea Commonwealth Marine Reserve (CMR), which was established under national legislation to protect and maintain the ecological and heritage values of the region. The proposed area encompasses several significant geomorphic features in the Queensland and Marion Plateaux, including the Osprey, Shark, Tregosse, Lihou and Bougainville Reefs and the Townsville Trough.

10 The objective of the proposed extension to the existing PSSA is to further protect the area from the possible adverse impacts from anticipated increased shipping activity in the region. This extension recognizes and reflects the unique and vulnerable characteristics of the Coral Sea and aligns with key conservation values of the Coral Sea CMR.

11 The submission proposes the implementation of three Associated Protective Measures (APMs) to mitigate the identified risks and impacts associated with increased international shipping activities in the region. The proposed APMs are new recommendatory ships' routing systems under regulation V/10 of the International Convention for the Safety of Life at Sea (SOLAS) 1974 and are:

- .1 an area to be avoided (ATBA) between Palm and Hydrographers Passages to reduce the risk of a maritime accident and protect the sensitive marine environment of the region; and
- .2 two five nautical mile wide two-way routes; one in Diamond Passage and the other to the west of Holmes Reef (on either side of the proposed ATBA above), aimed at reducing the risk of ship collisions and groundings by separating opposing traffic streams, whilst ensuring ships keep clear of reefs, shoals and islets.

12 The proposed APMs aim to enhance the safety of navigation with only minimal impacts on ships transiting the area. The proposed two-way route in Diamond Passage is aligned with existing shipping traffic patterns in the region. The proposed ATBA will result in minor changes to the traffic pattern for ships that are required to conform to SOLAS requirements. Some of these ships (e.g. cruise ships), which demonstrate an operational need to visit a location within the ATBA and which have adequate risk mitigation measures in place, may enter the ATBA.

13 The establishment of the ATBA and the resulting deviation by ships to pass west of Holmes Reef will add approximately 11 nautical miles to a ship's overall voyage. This represents only a 0.3% increase on a typical voyage, based on an approximate 3,800 nautical mile journey from Palm Passage to Shanghai, China. Implementing the ATBA for ships SOLAS that are required to conform to SOLAS requirements will also mitigate the risk of groundings and allow more time for intervention, in case of developing situations (e.g. a ship suffering breakdown of its propulsion machinery).

14 Australia has submitted proposals for these APMs to the second session of the Sub-Committee on Navigation, Communication and Search and Rescue (NCSR 2) for consideration and approval. These proposals are provided in full in appendices 3 and 4 to the annex.

15 The existing Outer Route is a non-IMO-adopted five nautical-mile route extending from the southern part of the Coral Sea to the boundary of the PSSA extension (shown in figure 1). It was surveyed and charted in the 1990s with the objective of encouraging ships, particularly tankers, to use this route over the Inner Route of the GBR in order to reduce the risk of a maritime incident and protect the sensitive marine environment of the region.

Action requested of the Committee

16 The Committee is invited to consider the submission provided in the annex and approve the proposal to extend the south eastern boundary of the existing GBR and Torres Strait PSSA to include an area of the south west Coral Sea, and noting the outcomes of the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) on the proposed APMs, subsequently approve the final PSSA designation.

ANNEX

PROPOSAL TO EXTEND THE GREAT BARRIER REEF AND TORRES STRAIT PSSA TO INCLUDE THE SOUTH WEST PART OF THE CORAL SEA

INTRODUCTION

1 Australia proposes to extend the boundary of the existing Great Barrier Reef (GBR) and Torres Strait Particularly Sensitive Sea Area (PSSA) to include an area of the south west Coral Sea that is vulnerable to damage by international shipping activities. The Coral Sea is a remote ocean ecosystem recognized for its unique physical, ecological and heritage values. The coordinates of the proposed extension are provided in appendix 1 and fall within Australia's Exclusive Economic Zone (EEZ).

2 The Coral Sea extends from the east coast of Queensland and is bound by New Caledonia and the Solomon Islands in the east and Papua New Guinea in the north (see figure 1 below). The environmental significance of the Coral Sea lies in its diverse array of coral reefs, sandy cays, deep sea plains, seamounts and canyons. The Coral Sea islands and associated reefs support critical nesting sites for the green turtle and a range of seabird species and are also renowned for the diverse range of predatory fish that regularly pass through them. This proposal refers to the part of the Coral Sea within Australia's EEZ that is particularly vulnerable to damage by international shipping activities because of the combination of its ecological sensitivity, vessel traffic and natural factors.

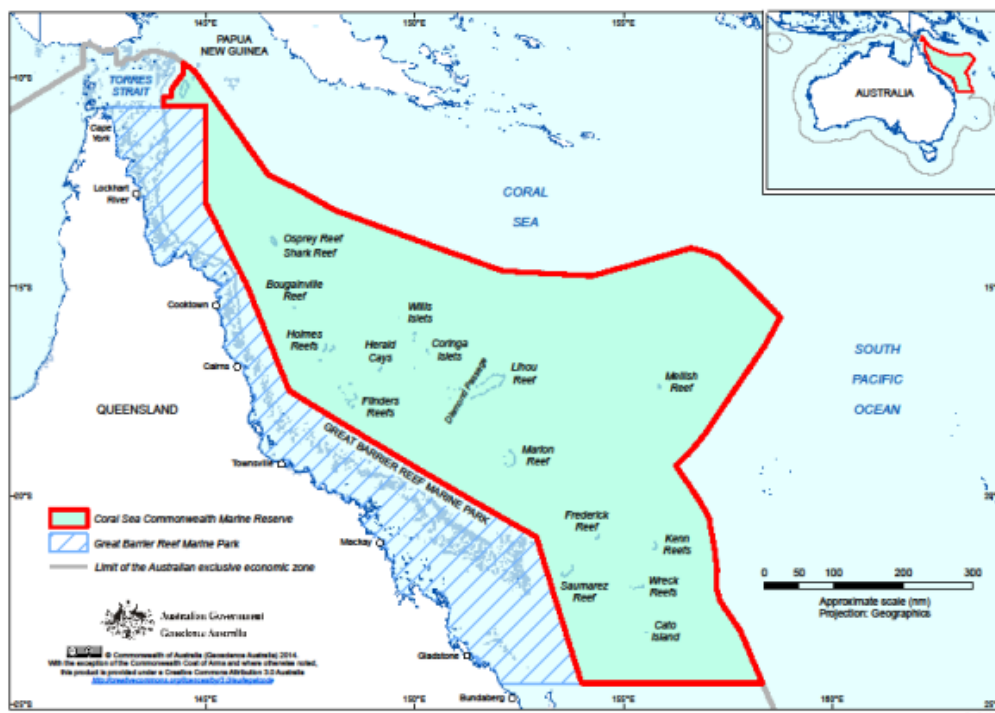


Figure 1: The Coral Sea area within Australia's EEZ (Note: see appendix 2 for the proposed PSSA within the Coral Sea)

3 The objective of the proposed extension to the existing PSSA is to address the area's fragility, and to preserve as far as practicable, its status as a relatively pristine marine ecosystem while allowing for projected increased shipping traffic in the area. The proposal includes the implementation of three recommendatory Associated Protective Measures (APMs), which will, with minimal impacts on the shipping industry, help reduce the risk of

shipping-related incidents in this sensitive area. These APMs are listed in section 114 of this document and proposals for each of these APMs have been submitted to the second session of the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR 2) for consideration and approval.

DESCRIPTION OF THE AREA

General

4 The Coral Sea is an international body of water recognized for its rich biodiversity, unique physical features and important heritage values. The section of the Coral Sea proposed for designation as part of the GBR and Torres Strait PSSA lies entirely within Australia's EEZ, and comprises the majority of Australia's Coral Sea Commonwealth Marine Reserve.

5 The proposed area to be included in the PSSA extends from the eastern edge of the GBR and Torres Strait PSSA to some 180 nautical miles from the coast. Appendix 2 provides a chartlet showing the geographic coordinates and shipping routes. The proposed area encompasses several significant geomorphic features in the Queensland and Marion Plateaux, including the Osprey, Shark, Tregosse, Lihou and Bougainville Reefs, and the Townsville Trough, among other features.

6 The proposed PSSA contains outstanding examples of reef communities and a diverse array of isolated sandy cays, islands, deep-sea plains, seamounts and canyons. These features provide important habitat for remarkable fauna such as manta rays, marine turtles, nautilus and large predatory fish, reef fish and sea birds. The remarkable biodiversity gene pool is a combination of Pacific, Southeast Asian and Indian Ocean flora and fauna populations, and the reefs, atolls and islands of the area form an important link between the genetic diversity of the South Pacific islands and the GBR.

7 The Coral Sea Commonwealth Marine Reserve contains over 100 historic shipwrecks and was the site of several World War II naval battles. To date, the locations of many shipwrecks remain unknown. Australia's *Historic Shipwrecks Act 1976* provides protection for these unknown wrecks as well as those that are known, including the historically significant *Cato* and *HMS Porpoise*.

8 In 2009 approximately 972,000 square kilometres of the Coral Sea within Australian waters was declared a Conservation Zone under Australia's national environmental law. This led to the introduction of interim management measures for operations in the Conservation Zone, including permit requirements for activities with the potential to threaten the values of the area and general approvals for other activities, while the area was being assessed for further management.

9 The newly proclaimed Coral Sea Commonwealth Marine Reserve replaces the entire Coral Sea Conservation Zone and includes the two former Coringa-Herald and the Lihou Reef National Nature Reserves, originally proclaimed in 1982. The Reserve was created for the primary purpose of conserving biodiversity while also allowing for ecologically sustainable natural resource use in some areas.

10 The Reserve is designed to protect the diverse reefs and cays, seafloor features, associated ecological processes and biodiversity across a range of depths, and to maintain ecological connectivity between the South Pacific and the GBR. Increased shipping traffic with associated increases in noise and risk of vessel collisions is recognized as a pressure on the values of the Reserve, requiring additional management. The proposed PSSA covers the waters of the Reserve in which the risk of impacts from shipping activities is highest, currently and in the near future.

The Coral Sea ecosystem

11 The Coral Sea is a near-pristine marine environment that is internationally recognized for its rich biodiversity, unique species and important heritage values. It is considered one of the most distinctive and undisturbed natural systems in the world and provides refuge for a wide range of threatened, migratory and commercially valuable species under serious threat elsewhere. The area included within the proposed PSSA contains a wide range of habitats, including isolated shallow reefs, plateaux, seamounts, sandy cays and islands, and in areas extends down to remote, little-known deep-water environments.

12 The proposed PSSA is characterized by significant variation in seafloor features, ranging from shallow reefs and cays to little-known abyssal trenches and plains up to 5000 metres in depth. Many of the deep-sea ecosystems have remained largely unchanged for millions of years. The southern reaches of the proposed PSSA contain the northern extent of the remote Tasmanid Seamount Chain, a prominent chain of submarine volcanoes, plateaux and terraces. The seamounts support a range of habitats, including deep-sea sponge gardens and near-pristine tropical coral reef systems. Collectively the seamounts are known to be biological hotspots, with considerable species diversity. They are also known feeding and reproduction grounds for open ocean species such as billfish and marine turtles, with high species endemism.

Existing level of environmental protection

13 The Coral Sea area within Australia's EEZ is primarily protected by national legislation, in particular giving effect to the International Convention for the Prevention of Pollution from Ships 1973 (MARPOL) and the protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Protocol) to prevent marine pollution by controlling dumping of wastes and other matter.

14 The values of the proposed PSSA have been recognized through over 30 years of marine protection measures designed to prevent the impacts of anthropogenic change. Two no-take Commonwealth marine protected areas, the Coringa-Herald and the Lihou Reef National Nature Reserves, were originally proclaimed in 1982. These reserves were proclaimed because of their internationally significant near-pristine marine ecosystems protected from human-induced impacts, including marine pollution, by their isolation from the mainland. In 2002, these reserves were also designated a wetland of international importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their listed wetlands.

15 The Coral Sea Commonwealth Marine Reserve was established under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and protects the waters of the Coral Sea that fall within Australia's EEZ. Australia's Commonwealth reserves are managed in accordance with a management plan or, until such time as a management plan has taken effect, in accordance with the requirements of the EPBC Act and EPBC Regulations, which includes Australian International Union for the Conservation of Nature (IUCN) Reserve Management Principles.

16 The EPBC Act prohibits certain actions in Commonwealth reserves except in accordance with a management plan. These actions include killing, injuring, taking, trading, keeping or moving native species; actions for commercial purposes; and mining operations. Regulations control, or allow the Director of National Parks to control, a range of activities in Commonwealth reserves such as access, use of vessels, waste disposal, commercial fishing, recreational fishing and research.

ECOLOGICAL, SOCIO-ECONOMIC AND SCIENTIFIC CRITERIA

Ecological criteria

Uniqueness or rarity

17 The Coral Sea is considered one of the most distinctive and undisturbed natural systems in the world and is internationally recognized for its rich biodiversity, unique species and important heritage values.

18 In the area proposed to be covered by the PSSA, three large-scale ecological features that support distinct or important ecological communities at a regional scale are present. The Queensland and Marion Plateaux, together support over 20 coral reefs and cays, most notably the Tregosse, Lihou, Marion and Saumarez Reefs. These provide complex habitats with diverse and abundant invertebrate and fish communities. Similarly, the northernmost parts of the Tasmantid Seamount Chain contain a diverse range of habitats, including deep-water sponge gardens and near-pristine tropical coral reef systems. Collectively these are known to be biological hot-spots, with significant species diversity.

19 Over millennia, the geological and oceanographic history of the region and its warm and cool current patterns have prevented the migration of species, prompting the development of flora and fauna that evolved, adapted and spread in isolation. Localized currents can act as a barrier to dispersal; as a result the area has high levels of endemism. For example, the Queensland Plateau contains approximately 440 species of demersal fish, of which 70 are not found anywhere else on the planet. The Marion Plateau contains unique, endemic demersal sponge communities. Reefs separated by only small distances have significantly different fish assemblages and coral community structures, not only to other marine regions, but also to each other.

20 The proposed PSSA contains some of the world's most unique and globally significant marine species, such as the leatherback turtle (*Dermochelys coriacea*), humphead Maori wrasse (*Cheilinus undulatus*) and nautilus (*Nautilus pompilius*).

21 The Coral Sea provides migratory corridors for cetaceans, sharks, fish, turtles and seabirds, many of which are of conservation concern. Successive research efforts have highlighted the significance of the Coral Sea in patterns of dispersal, whereby the reefs provide a series of dispersal stepping-stones from the western Pacific towards the GBR.

22 In 2009 an expedition explored the deep fore-reef slopes of the Queensland Plateau's western reefs to a depth of 850 metres. This discovered gardens of precious corals (*Corallium* sp.) as well as rock sponges (Lithistida) and cold water corals (*Madrepora* sp.) on the walls of Osprey Reef.

23 The proposed PSSA contains outstanding examples of isolated sand cays and islands, which support approximately 15% of Australia's *Pisonia grandis* forest, a flowering tree in the Bougainvillea family that provides important habitat for nesting seabirds. The *Pisonia* forests on the Coringa Islets and the Herald Cays provide significant habitat for nesting seabirds such as

frigatebirds (*Fregata spp.*), the black noddy (*Anous minutus*) and the red-tailed tropicbird (*Phaethon rubricauda*). *Pisonia* forest is relatively uncommon in Australia and globally because of disturbance by cyclones, and its historical clearing and phosphate (bird guano) mining. The forest remains on less than five per cent of the islands within the GBR region.

24 Deep, cold water troughs and abyssal basins are habitat for an array of benthic species, many of which are a protected matter under the EPBC Act or international agreement or are unique to the area, including 18 endemic species of deep-water sharks, rays and chimaera fish.

25 The remoteness and challenging environment of the proposed PSSA means that although recorded observations of flora and fauna date back to the 1850s, much of its biodiversity remains undescribed and new species found nowhere else are routinely discovered. Surveys in the deeper reef habitats at Osprey Reef have revealed prehistoric six-gilled sharks, giant oil fish and many crustaceans and unidentified fish at depths of 1400 metres. A recent study of nautilus species, regarded as one of the world's oldest living fossils, on Osprey Reef also identified a unique, dwarf speciation of *Nautilus pompilius*. This species evolved isolated from nautilus in the nearby Coral Sea and GBR, and is a reflection of the endemic nature of ecosystems within the area.

26 The north-western Coral Sea hosts the only confirmed spawning aggregation of black marlin (*Makaira indica*) in the world. This species migrates throughout the Pacific Ocean, but only uses the Coral Sea to spawn. The Gloria Knolls in the Queensland Trough, discovered recently, are a unique vulnerable cold water coral community of significant biodiversity. The trough contains canyons and gullies that are likely to support distinctive deep-water ecosystems.

27 The few detailed surveys undertaken have shown that as many as 40 per cent of the invertebrates inhabiting seamounts in the proposed PSSA are new to science while up to 34% of the species may be endemic. Scientists expect that research into the lesser known, deeper areas of the region will uncover many new species.

Critical habitat

28 The area includes species listed as threatened and/or migratory under the EPBC Act and under international agreements. These include: the white shark (vulnerable, migratory); whale shark (vulnerable, migratory); greater and lesser frigatebirds (migratory, marine); green turtle (vulnerable, migratory, marine), loggerhead turtle (endangered, migratory, marine), leatherback turtle (endangered, migratory, marine), hawksbill turtle (vulnerable, migratory, marine), flatback turtle (vulnerable, migratory, marine), olive ridley turtle (endangered, migratory, marine) and the humpback whale (vulnerable, migratory, cetacean). International agreements that apply to species within the proposed area include:

- .1 the Convention on the Conservation of Migratory Species of Wild Animals 1979 (CMS or Bonn Convention);
- .2 the Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment 1974 (JAMBA);
- .3 the Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment 1986 (CAMBA); and
- .4 the Agreement between the Government of Australia and the Government of the Republic of Korea on the Protection of Migratory Birds 2007 (ROKAMBA).

29 A number of biologically important areas are located within, or intersect with the proposed PSSA:

- .1 Seasonal migration routes and feeding sites for cetaceans including the humpback whale occur throughout the area. The humpback whale (*Megaptera novaeangliae*) is also known to breed and calve in the area.
- .2 Migration routes and foraging and feeding sites for 13 species of seabird listed as threatened, endangered and/or migratory are located in the area. The cays and islets of the Coringa-Herald-Lihou area provide significant breeding sites for seabirds and are important foraging areas as part of migration pathways. The critically endangered Herald petrel (*Pterodroma heraldica*) is thought to forage in the area, which also contains a range of breeding areas for frigatebirds, terns (family Sternidae) and boobies (*Sula spp.*).
- .3 The vulnerable green turtle (*Chelonia mydas*) is dependent upon the region for breeding and foraging sites, with the Coringa-Herald-Lihou area particularly important for nesting and inter-nesting activities, while other species, including the dwarf minke whale (*Balaenoptera acutorostrata*) and hawksbill turtle (*Eretmochelys imbricata*), depend on the region for foraging.
- .4 In spring and summer, whale sharks (*Rhincodon typus*) aggregate to feed around Bougainville Reef and white sharks (*Carcharodon carcharias*) use the south west of the area, adjacent to the Swain Reefs, as they move between nursery areas and for opportunistic feeding.
- .5 The Tasmantid Seamount Chain of submarine volcanoes, plateaux and terraces support significant aggregations of marine life. The reefs in the northern extent, including Bird and Cato Islands, provide feeding and breeding grounds for open ocean species, such as billfish, marine turtles and marine mammals.
- .6 Collectively, the diverse habitats of the region provide foraging, breeding and nesting grounds for a rich array of marine species, including those which are unique and threatened, such as green turtles, humpback whales, sharks, billfish, whale sharks and seabirds.

30 The Coral Sea hosts 341 species that are recognized by the IUCN Red List of Threatened Species for their conservation significance. This includes 26 species of cetaceans, 219 species of corals, 21 species of fish, 46 species of sharks and rays, five species of marine turtles and 24 species of birds. Over half (51%) of these species show declining population trends.

31 The IUCN Red List of Threatened Species describes worldwide population trends for over half of the area's known species as declining or showing depressed numbers with the threat of extinction due to over-harvesting and habitat degradation. Apex predators with significantly decreasing numbers worldwide, such as large shark species, humphead Maori wrasse, billfish and tuna, and iconic molluscs such as the nautilus, are still found in healthy numbers in the Coral Sea. By contrast many of these species are locally extinct, rare or in rapid decline in other parts of the region.

32 The major fish species listed by the IUCN as "species of concern" were recorded at healthy levels in the Coral Sea where data was available. It is also thought that bigeye tuna undertake a cyclic migration for feeding and spawning in the western part of the proposed PSSA each year, which contributes to a strong mid-year peak in catch rates by commercial fisheries. The area, therefore, provides an important global refuge and source of "restocking" for many vulnerable, threatened and commercially valuable species under pressure elsewhere.

33 Thirteen species of seabird listed as threatened and/or migratory under the EPBC Act are known to occur in the proposed PSSA, and the area also contains refuge and feeding grounds for seabirds that nest on GBR islands. Satellite transmitters attached to shearwaters from an island group in the southern GBR have shown that the birds travelled more than 2000 kilometres on a single 15-day foraging trip to visit multiple seamounts in the proposed PSSA.

Dependency

34 The presence of coral populations characteristic of Pacific Ocean reefs suggest that the reefs of Coringa-Herald and the surrounding Coral Sea provide stepping-stones for the dispersal of species between the GBR and the greater Pacific Ocean region. Maintaining the overall integrity and resilience of these reefs is therefore necessary to ensure that they can function effectively as stepping-stone habitats.

35 The Coral Sea also provides migratory corridors for cetaceans, sharks, fish, turtles and seabirds, many of which are of conservation concern. There are likely to be further important areas for feeding, breeding, migrating and resting that have yet to be clearly identified, and which may act as critical habitat for many species.

36 Thousands of species rely on the ecosystem processes within the Coral Sea region to provide opportunities for foraging, breeding and migration. These processes are largely driven by the availability of energy within the system, which in turn is dependent upon the unique interactions between the region's oceanographic and topographic features. For example, the prevalence of apex predators, such as sharks and large predatory fish, which has a significant effect on fish assemblage structures in the proposed PSSA, is highly dependent upon the canyons of the Eastern Continental Slope, which are associated with the topographically induced upwelling of nutrient rich cold waters.

37 Localized turbulence in the lee of reefs, islands and seamounts influences biological communities by creating patches of high to intermediate productivity in the nutrient-poor open-water environment. These sites of enhanced productivity are important aggregators for a range of pelagic species including small fish (e.g. lanternfish, mackerels), mid-trophic predatory fish (mahi-mahi, albacore tuna) and large predators such as billfish, tunas and sharks. They are also known to attract a range of species of conservation concern including marine turtles, marine mammals and seabirds.

38 Cays in the area offer important habitat for seabirds to roost and nest, and turtles to lay eggs above the high tide mark. Seabirds provide the main source of energy on these cays, through their nutrient-rich guano, eggs and carrion, which support food webs of terrestrial and intertidal invertebrates and over time facilitate the development of soil and organic matter, which in turn provides habitat for more complex plant communities.

39 The species assemblage and trophic structure of the region relies on the highly interlinked web of local oceanographic patterns, topography and energy inputs. An impact on any one of these can disrupt this web, destabilizing ecosystem processes and the species that rely on them.

Representativeness

40 The reefs, cays and herbivorous fish of the Queensland and Marion Plateaux and the northern extent of the Tasmantid Seamount Chain highlight the biological significance and ecological value of the region.

41 The Queensland and Marion Plateaux are considered important for aggregations of marine life and the high levels of biodiversity they support. The reefs and islands of these plateaux are approximately 200–400 kilometres from the coast and provide for diverse and abundant invertebrate (e.g. sea cucumber) and fish communities.

42 The iconic Osprey, Bougainville, Lihou, Marion, Tregrosse and Saumarez Reefs form part of the Queensland and Marion Plateaux. These reefs are known for their particularly high densities of shark species, and Osprey Reef in particular is also recognized for its populations of the iconic humphead Maori wrasse and nautilus. The lagoons of these reefs are important nursery sites for sharks and predatory fish, while the island areas support critical nesting sites for the green turtle and a range of seabird species, including the red-footed booby (*Sula sula*) and frigatebirds. The plateaux also abut two significant deep-water regions: the Queensland Trough, which separates the Queensland Plateau from the GBR and the Townsville Trough, which separates the two plateaux from each other. These troughs contain canyons and gullies that are likely to support unique deep-water ecosystems.

Diversity

43 The reef systems in the Coral Sea are dominated by spectacular sponge gardens, and support high biodiversity. Approximately 745 species of molluscs (shellfish, squid and octopus) have been found, including several that are considered rare. Six hundred and twenty eight species of fish are known to occur in the Coral Sea. The small islets and cays of the Coral Sea are important nesting places for many species of seabirds. Thirteen of these are migratory species listed under international agreements with China and Japan (the China-Australia Migratory Bird Agreement (CAMBA) and the Japan-Australia Migratory Bird Agreement (JAMBA)).

44 The proposed PSSA contains a wide array of reefs, cays, deep-sea trenches, plateaux and seamounts, supporting rich biological diversity. Reefs in the area provide a habitat mosaic for diverse and abundant invertebrate and fish communities. A diversity of hard and soft corals, sponge gardens, crustaceans and molluscs are found in the area, as well as a distinct Coral Sea reef fish community that includes many unique species.

45 Significant variation in water depth and sea floor features are contributing factors to the high levels of species diversity in the area. Sections of the continental shelf have a mosaic of rocky reefs and soft sediments and support species from a diverse range of taxonomic groups. The extensive seamount systems of the Coral Sea are hotspots of biodiversity, with unknown levels of endemism. They can act as obstacles to restrict deep-ocean currents, intensifying their flow and creating sediment build up. This creates ideal and unique environments for slow-growing, fragile cold water reefs dominated by corals and other filter-feeder animals that benefit from the increased particulate organic matter occurring in these areas. Such seamounts contain a large variety of sponges, corals, gorgonians, sea squirts and crinoids, the latter of which can grow unusually large and are frequently very long-lived, often exceeding several hundred years.

46 Abyssal regions are yet to be fully explored, but there is evidence of biologically important systems likely to contain a vast reservoir of undiscovered species. It is currently hypothesized by scientists that deep-sea ecosystems support more species than anywhere else on Earth. Based on past exploration of abyssal areas, it is likely that up to 90 per cent of species collected in a typical abyssal sample are new to science, with deep-sea ecosystems generally displaying high endemism.

Productivity

47 As discussed above, the pelagic environment of the proposed PSSA is akin to a vast desert with small oases of biodiversity and productivity. These areas of primary productivity influence the spread of algae, one of the area's most abundant and diverse life forms, covering a greater region than corals and forming an important part of the food chain. Areas with a high biomass of algae increase planktonic activity and create high levels of prey abundance, attracting aggregations of higher order herbivorous and apex predator species. These localized productivity hot spots in an otherwise nutrient-poor environment provide habitat, migration and dispersal corridors for many iconic and endangered species.

48 Marine species and seabirds can journey hundreds or even thousands of kilometres to breed in the Coral Sea, or to travel through en route to breeding areas beyond the region. Areas of high productivity such as the seamounts are therefore critical "stepping stones" within the barren open ocean and are important aggregators for a range of species including lantern fish, albacore tuna, billfish and sharks. These species rely on foraging opportunities supplied by productivity hot spots in the Coral Sea to sustain them on their journey. Large marine mammals journey many kilometres to breed in the Reserve, or to travel through en route to breeding areas.

- .1 The southern bluefin tuna (*Thunnus maccoyii*) migration extends into the southern part of the proposed PSSA, and is timed to coincide with autumn blooms of phytoplankton along the shelf and upper slopes.
- .2 Loggerhead turtles (*Caretta caretta*) travel through the area from Eastern Indonesia, Papua New Guinea, the Solomon Islands, New Caledonia and the Northern Territory to nest on the Queensland coastline, and leatherback and hawksbill turtles move from eastern Australian waters through the Coral Sea to Vanuatu, the Solomon Islands and Papua New Guinea, depending on foraging opportunities around areas of high productivity.
- .3 Masked boobies (*Sula dactylatra*), ranging widely from their breeding islands in search of food, have been sighted foraging at upwellings of cool nutrient-rich waters in the region.
- .4 The regionally important billfish population is associated with upwellings around the Cato Trough and seamounts.

49 It is also thought that the organic particulates contained in nutrient-rich intrusions in the proposed PSSA are responsible for the settlement and sustained growth of coral reef ecosystems, which have the highest gross primary productivity of all ocean ecosystems. These waters carry organic matter into the region where they contribute significantly to the overall productivity of the system.

Spawning and breeding grounds

50 The proposed PSSA contains critical habitat features used by numerous species to spawn and breed and which are therefore essential for their survival.

- .1 The waters over the Queensland and Townsville Troughs appear important for attracting aggregations of large pelagic species, either to feed or spawn. A spawning aggregation of lanternfish periodically attracts feeding schools of tunas, billfish and whale sharks.

- .2 Extensive seabird rookeries within the small islets and cays of the area are of global and national importance. Large concentrations of migratory seabirds travel across vast ocean expanses to breed in the region, with many listed under JAMBA and CAMBA. The cays of Lihou Reef and Coringa Herald host an important proportion of Australia's breeding population of seabirds, including the red-footed booby, lesser frigatebird (*Fregata ariel*), great frigatebird (*Fregata minor*) and red-tailed tropicbird.
- .3 The proposed PSSA is a major feeding and breeding location for six of the world's seven species of sea turtles, all of which are listed on the IUCN Red List of Threatened Species. The cays provide important nesting areas for turtles arriving from foraging grounds as far away as the Torres Strait and Papua New Guinea.
- .4 Particularly sheltered regions, such as lagoons, are thought to be important nursery sites for sharks and predatory fish, while other species, such as the dwarf minke whale, the hawksbill and leatherback turtles and the endangered Herald petrel, forage in these calmer areas. The terrestrial zones of these features support critical breeding and nesting sites for turtles and seabird species.
- .5 The northern extension of the Tasmanid Seamount Chain, where the seamounts extend to the surface and are capped by islands and reefs, provide feeding and breeding grounds for open ocean species including billfish, marine turtles and marine mammals. Several islets within the site comprise undisturbed sandy habitat used for nesting by the globally endangered green turtle, along with forest and shrubland that supports important breeding populations of terns and other seabirds.
- .6 Each year from September to December, black marlin aggregate in the area to spawn. This is the only known spawning location for black marlin in the world. Tagging studies have shown that large marlin stay around the Queensland Plateau after spawning, before moving on to Vanuatu, Papua New Guinea, Solomon Islands and occasionally further across the Pacific.

Naturalness

51 The Coral Sea is considered one of the most distinctive and undisturbed natural systems in the world. The Coral Sea Commonwealth Marine Reserve was established to protect and maintain this biodiversity, and to help ensure the long-term ecological viability of Australia's marine ecosystems. Designating the area as an extension of the GBR and Torres Strait PSSA should further protect it from the possible adverse impacts of shipping in the region.

52 The Reserve is not directly threatened by land-based sources of pollution and has relatively low levels of fishing. It is one of the world's last tropical oceanic regions containing high biodiversity coral reefs that are virtually pristine, and where large populations of pelagic predators have not been severely depleted. The topography of the area has also contributed to its pristine nature, with recent surveys identifying deep-sea ecosystems which have remained largely unchanged for millions of years.

53 The Coringa Cays and Lihou Islets contain important bird and turtle nesting sites that are almost totally free from anthropogenic disturbances such as lighting, beach use, pollution, feral animals, and boat traffic compared to nesting sites throughout the GBR. These areas, therefore, are reference sites to determine the impacts of such disturbances on breeding success within the populations.

Integrity

54 The proposed extension of the PSSA covers a large area, and encompasses parts of six provincial bioregions identified in the Integrated Marine and Coastal Regionalisation of Australia Version 4.0 (IMCRA v.4.0). These are the Cape Province, the Northeast Transition, the Northeast Province, the Kenn Transition, the Kenn Province and the Central Eastern Transition. These bioregions contain a wide variety of interconnected habitats, and also provide important "stepping-stone" links between the GBR and the wider Pacific Ocean.

55 The integrity of the area is in part due to its remote nature, with the nearest point to a mainland coast over 60 kilometres away, and the furthest point 1100 kilometres.

56 The apex predator-dominated system in the proposed PSSA is dependent upon and supported by the trophic chain, beginning with organic matter and particulates provided by cold water upwellings over the eastern canyons. These provide the basis for the growth and development of the coral reefs and sponge communities. Larger currents provide dispersal mechanisms for species; however, smaller localized currents prevent some species movement from an ecological feature or habitat, such as the reefs. Many of the area's species are genetically endemic to individual reefs, with little or no dispersal options, and are thought to be largely dependent on self-replenishment. The area therefore demonstrates the characteristics of an isolated, effectively self-sustaining ecological unit, as evidenced by the high proportion of endemism both within the region, and between individual reef communities.

Fragility

57 Although the Coral Sea contains a number of critical shallow reef and terrestrial habitats, these represent less than 1% of the total area. Their small size, isolation from each other and high exposure to cyclones and storms make them more vulnerable to catastrophic impacts of natural disturbances than the contiguous reef systems of the GBR. These precarious conditions increase the area's ecological fragility and the risk of local extinctions. A high proportion of pelagic and deep-water species are particularly vulnerable to anthropogenic impacts.

58 The pressures on the conservation values of the Coral Sea Commonwealth Marine Reserve, which encompasses the proposed PSSA extension area, have been identified as the introduction of a known or potential pest or invasive species; marine debris, including lost or discarded fishing gear; increased shipping traffic with associated increases in noise and risk of collisions; and climate change.

59 Pressures related to the effects of climate change and associated large-scale effects on the marine environment are unpredictable and may include shifts in major currents, rising sea levels, ocean acidification, and changes in the variability and extremes of climatic features (e.g. sea temperature, winds, and storm frequency and intensity).

60 While the isolation of the area's ecosystems has ensured a great deal of diversity and endemism between communities and populations, it also means these systems can be particularly fragile and susceptible to external factors with potentially catastrophic, long-term cascade effects.

61 The area's deep-sea organisms are generally slow growing, long-lived, late-reproducing species with few offspring, and as a result can take a significant amount of time to rebuild populations. The cold coral reef systems take thousands of years to develop even in areas with stable conditions. They are fragile and extremely susceptible to damage as recovery rates are immensely slow.

62 These precarious conditions increase the area's ecological fragility as well as the risk of local extinctions, as has been demonstrated by the demise of populations of grey reef sharks (*Carcharhinus amblyrhynchos*), nautilus, humphead Maori wrasse and numerous other commercially sought after species on many Indo-Pacific reefs.

Bio-geographic importance

63 A number of biologically important areas are located within, or intersect with the area:

- .1 Seasonal migration routes and feeding sites for cetaceans including the humpback whale occur throughout the region. The humpback whale is also known to breed and calve in the area.
- .2 Migration routes and foraging and feeding sites for 13 species of seabird listed under the EPBC Act as threatened, endangered and/or migratory are located in the area. The cays and islets of the Coringa-Herald-Lihou area provide significant breeding sites for seabirds and are important foraging areas as part of migration pathways. The Herald petrel is thought to forage in the area, which also contains a range of breeding areas for frigatebirds, terns and boobies.
- .3 The green turtle breeds in the area, with the Coringa-Herald-Lihou area particularly important for nesting and inter-nesting activities.
- .4 In spring and summer, whale sharks aggregate to feed around Bougainville Reef and white sharks use the south west Coral Sea, adjacent to the Swain Reefs, as they move between nursery areas and for opportunistic feeding.
- .5 The minimal impacts on the area and its relative lack of disturbance mean that its various ecosystems provide a representation of what the geographic distribution of organisms would naturally resemble in comparable, but more highly impacted marine ecosystems around the world.

Social, cultural and economic criteria

Social or economic dependency

64 Commercial fisheries have a relatively small presence in the south west Coral Sea compared to other marine regions around Australia. Commonwealth and Queensland state managed fisheries occur in the area, including line, hand collection, trawl, purse seine, trap and net fisheries.

65 Almost all tourism activities that occur in the south west Coral Sea are nature-based and reliant on an intact Coral Sea ecosystem. They include charter fishing, snorkelling, scuba diving, whale watching and cruising. The local tourism industry offers trips to key locations in the area with a range of visitor experiences, often combining visits to locations within the GBR and the Coral Sea. Local tourism activities are supported by permanent moorings at various locations to help prevent damage to habitat while also providing vessels with secure anchorage and refuge from rough seas.

66 Known scuba diving and snorkelling hotspots in the Coral Sea region include the Osprey and Shark Reefs, for their significant populations of shark. These activities also occur in the Coringa Islets, Herald Cays and at Lihou Reef, although the extreme isolation of these locations means that they are not often visited. They also take place off other islands and shallow water seafloor features in the Coral Sea region, albeit on a limited basis.

67 Scuba diving and snorkelling are predominantly eco-tourism or heritage-based tourism activities with participants preferring locations that offer near-pristine marine environments or dive wrecks of interest. Some commercial and educational organizations offer science-based tourism opportunities where divers and snorkelers participate in experiments or surveys. Cruise ships also frequent the region, some regularly visiting Willis Island.

Human dependency

68 There is only one inhabited island in the proposed PSSA – Willis Island, which is the location of a permanently occupied weather station.

Cultural heritage

69 Like the GBR and Torres Strait, the Coral Sea is also of indigenous cultural and social significance to island and coastal communities. Many Aboriginal and Torres Strait island people undertake traditional use of marine resource activities to provide traditional food, practice their living maritime culture and to educate younger generations about traditional and cultural rules and protocols. The marine interests of Aboriginal communities adjacent to the GBR may extend beyond the outer boundaries of the GBR Marine Park, particularly in the north. Likewise, Torres Strait Islanders have a rich history as seafarers, and are likely to have interests in the northern extreme of the Coral Sea, which may coincide with the proposed PSSA extension area. Native title rights are held over approximately 37,000 square kilometres of sea in the Torres Strait and extend into a small portion of the north-west of the Coral Sea Commonwealth Marine Reserve.

70 The proposed PSSA contains a large number of historic shipwrecks, including the wrecks of the *Cato* and *HMS Porpoise*, which are located in protected zones established under Australia's *Historic Shipwrecks Act 1976*. The region was significant in the Battle of the Coral Sea during World War II.

71 The Coral Sea islands were discovered by Europeans in the early 1800s. The Coringa Islets were named after the *Coringa Packet*, a sailing ship wrecked there in 1845. Relics of guano mining during the 1860s still remain on Chilcott Islet in the Coringa group.

Scientific and educational criteria

Research

72 Given the scale and location of the proposed extension area to the PSSA, large-scale oceanographic features are well known and documented. However, there is a lack of knowledge of finer-scale hydrodynamics linking habitats within the Coral Sea. Further, the potential impacts of climate change on the Coral Sea are yet to be understood.

73 The scale and location also mean that existing scientific research of the area is limited. The ecosystems, conservation values and uses of the area, including the six provincial bioregions that make up the proposed extension area, indicates that detailed study and data gathering has been carried out on the Tregrosse-Lihou and Coringa-Herald reef complexes, but notes that detailed study of the biological communities of the remaining provincial bioregions in the area has not yet taken place.

74 In spite of the relatively few detailed studies on the area, it remains one of high scientific interest. The remote location of the area, and its reputation as one of the most distinctive and undisturbed natural systems in the world, offers researchers a rare opportunity to study a biota over an area of significant scale that has not been markedly impacted by fishing and which is likely to remain undisturbed.

75 Research and monitoring activities in the proposed PSSA extension area will be regulated by a management plan and in accordance with the EPBC Act and EPBC Regulations. Such activities may be allowed in the Reserve in accordance with a permit with associated conditions issued by the Director of National Parks.

76 Domestic and international research institutions are actively undertaking research in the Reserve. In addition to research institutions, tourist operators and volunteer organisations maintain active monitoring programs.

77 The occupied meteorological facility on Willis Island has been providing data to Bureau of Meteorology scientists and others since 1921. Automatic weather stations are located on Bougainville Reef, Cato Island, Flinders Reef (Flinders Coral Cay), Frederick Reef, Holmes Reef, Lihou Reef (Turtle Islet), Marion Reef and Moore Reef. Observations from Willis Island and the automatic weather stations are important for climate analysis and numerical weather prediction models, for fine-tuning forecasts and warnings, and are particularly important for early warning of tropical cyclones.

78 Much of the published ecological knowledge about the Coral Sea Marine Region stems from long-term research programs in the former Coringa–Herald and Lihou National Nature Reserves. Irregular monitoring of coral reefs, and regular counts of turtles and seabirds, has provided important information about the biology and ecology of the region.

79 More recently, scientists have focused on deeper parts of the Coral Sea Marine Region, mapping the contours of reefs, seamounts and deep sea knolls.

Baseline for monitoring studies

80 As noted above, the proposed extension area to the PSSA is remote and considered a relatively undisturbed natural system. Although its location has meant that detailed studies of the area are limited, the Coral Sea is a known habitat for many protected species, and spawning aggregations and nesting locations have been identified. The area also provides migratory corridors for a variety of important species, and as such provides suitable baseline conditions for future monitoring studies.

VULNERABILITY TO IMPACT FROM INTERNATIONAL SHIPPING ACTIVITIES

Vessel traffic characteristics

Operational factors

81 There are two major shipping routes in the region – the Inner Route and the Outer Route of the GBR. While the Inner Route lies relatively close to the Queensland coast within the existing GBR and Torres Strait PSSA, the Outer Route begins at the north-eastern limit of the Torres Strait (the Great North-East Channel), continues southwards through the Coral Sea and re-joins the Queensland coast near Sandy Cape (south of Gladstone) (see figure 1 of appendix 3).

82 The Outer Route experiences south-east trade winds and heavy seas for about nine months of the year. A vessel suffering serious propulsion or power failure in the Coral Sea will be many hundreds of kilometres from towage assistance and could drift on to one of the numerous reefs or cays in the Coral Sea before any towage assistance can arrive. Anchoring is impractical due to the precipitous depths that prevail up to the edges of these reefs.

Vessel types

83 There is a wide variety of vessel types operating in this area. Ships entering and leaving Queensland coastal ports are primarily dry bulk carriers (most notably carrying coal) and, increasingly, liquefied natural gas (LNG) tankers. Oil and chemical carriers calling at Australian east coast ports mainly choose to use the Outer Route. Other ships transiting through the south west Coral Sea trading between Asia and other east coast Australian ports, such as Brisbane, Newcastle, Sydney and Melbourne, transport a variety of cargoes including containerized, dry, liquid, vehicular and general cargoes.

Traffic characteristics

84 In addition to ships using the Outer Route to transit between Torres Strait and east coast Australian ports, the Outer Route converges in the south western Coral Sea with the north/south route used by ships transiting between Asian ports via Jomard Entrance (Papua New Guinea) and major Australian east coast ports such as Newcastle, Sydney and Melbourne, and commodity exporting ports in Queensland.

85 Australia and Papua New Guinea (PNG) co-sponsored an IMO proposal for the establishment of two-way routes and a precautionary area at Jomard Entrance, PNG. These routing measures were approved by the Sub-Committee on Navigation, Communications and Search and Rescue (NCSR) at NCSR 1 in June/July 2014 and adopted at the ninety-fourth session of the Maritime Safety Committee in November 2014. The measures will come into effect on 1 June 2015.

86 Ships bound to and from Queensland ports are also a major consideration in terms of the risk to the ecosystem from international shipping activities in the south west Coral Sea. There are four main passages through the GBR that result in a corresponding concentration of traffic in the south west Coral Sea. These are Grafton Passage (near Cairns); Palm Passage (near Townsville); Hydrographers Passage (near Mackay); and through the Capricorn and Curtis Channels in the south.

87 These shipping routes and passages can be identified in the Automatic Identification System (AIS) vessel traffic density information provided in appendix 2.

88 During the first decade of this century, Australia's resources sector expanded significantly, driven by demand from industrialising Asian economies and high global commodity prices. During this time, the value of Australia's mineral and energy exports increased at an average annual rate of approximately 10%.² This is expected to continue; between 2010 and 2025, world trade in thermal coal, metallurgical coal, iron ore and natural gas is expected to increase per annum by an average of 2.6%, 3.6%, 4.3% and 1.4%, respectively.¹

¹ Australian bulk commodities exports and infrastructure – Outlook to 2025, Bureau of Resources and Energy Economics.

² Deloitte Access Economics, *Advancing Australia – Harnessing our comparative energy advantage*, Australian Petroleum Production and Exploration Association Limited, June 2012.

89 With regard to coal, by 2025, it is predicted that Australian exports of thermal coal will be between 267 and 383 million tonnes and exports of metallurgical coal will be between 260 and 306 million tonnes¹. In Queensland, this predicted growth for thermal coal will be between 79 and 185 million tonnes in 2025 (c.f. 54 million tonnes in 2011) and for metallurgical coal between 226 and 262 million tonnes (c.f. 111 million tonnes in 2011).¹ Industry, government and environmental groups have predicted varying degrees of growth in export production and port capacity up to 2025.

90 With regard to LNG, it is predicted that Australian exports will be between 86 and 130 million tonnes by 2025.¹ Significant increases in production capacity over the next 10 years means that Australia is likely to be the world's second largest exporter of LNG (after Qatar) with Australia's production and prices expected to peak in 2020. Around \$60 billion of capital expenditure has been confirmed across three LNG projects in Gladstone and Curtis Island with operations starting in 2015/16. A fourth LNG project (Arrow LNG (formerly known as Shell Australia LNG Project)) is expected to have a production capacity of up to 16 million tonnes per annum. Australian LNG exports are likely to triple over the next five years with actual output expected to grow by around 250% between 2011 and 2018.²

91 The figure below describes the projected capacity for GBR ports.

92 The expansion of the Australian resources sector, which includes other east coast bulk ports such as Newcastle and Port Kembla (most ships en route to and from these ports use the north/south route through the south west Coral Sea), is the major factor in the expected growth of 81 per cent in the total national traffic at sea by 2020.

93 Risks associated with the predicted growth of traffic are also highlighted by converting it into a Monetary Value at Risk (MVR), based on vessels that traded in the GBR area from June 2012 to June 2013. MVR is based on a methodology developed by Heij and Knapp (2012)³ and provides an estimate of all expected damages that can be insured against in case of an incident. MVR translates ship specific incident type probabilities (Knapp, 2013)⁴ into a monetary value by adjusting total insured values (TIV) for each damage type and vessel by the unconditional probability of an incident and the conditional probability of each damage type if an incident occurs.

94 When applying this methodology to pollution damages for vessels trading in the GBR area, a total yearly pollution risk exposure for cargo (oil tankers) and bunkers (all ship types) can be estimated at USD 8.4 million. Given the projected increase in traffic in the GBR, this figure is expected to increase to USD 12.5 million by 2017, USD 19.6 million by 2025 and USD 21.4 million by 2032.

³ Heij, C., Knapp, S., 2012. Evaluation of safety and environmental risk at individual ship and company level. Transportation Research Part D 17, 228–236.

⁴ Knapp, S., 2013. An integrated risk estimation methodology: Ship specific incident type risk. Econometric Institute Report 2013-11.

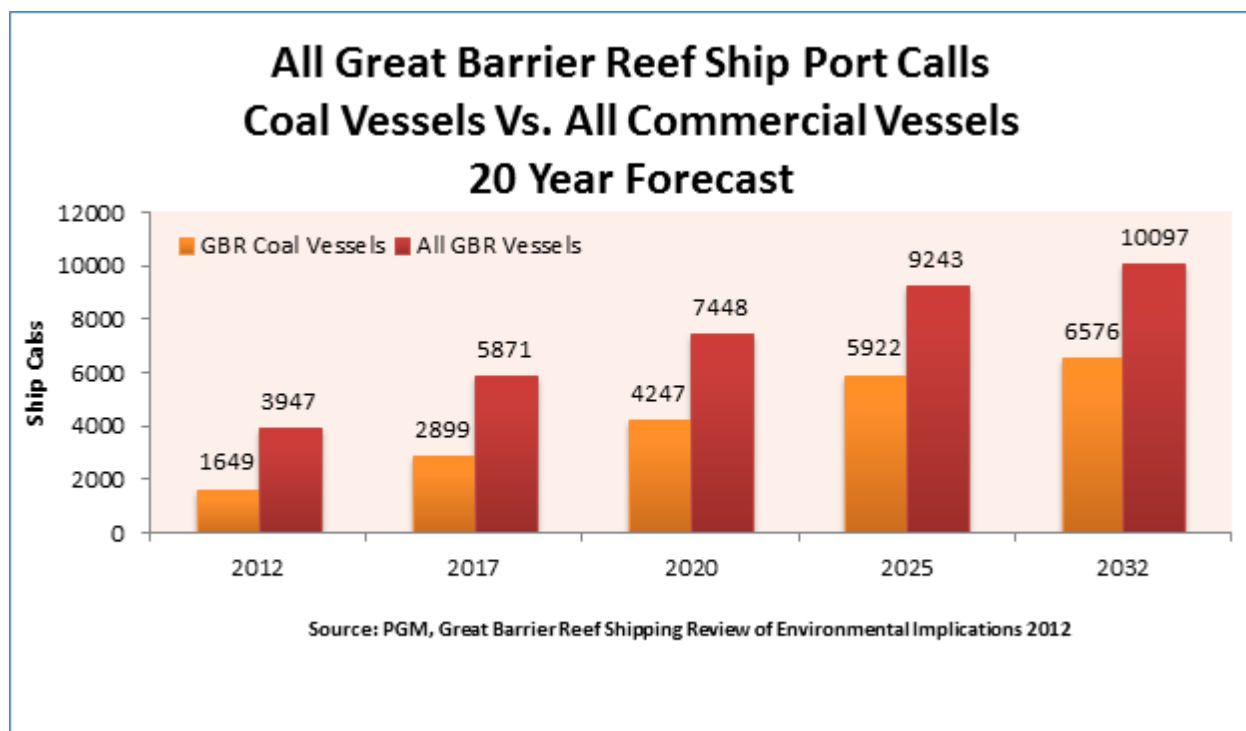


Figure 2: Projected shipping increase in the Great Barrier Reef

Harmful substances carried

95 As indicated previously, a wide variety of vessels carrying a range of potentially harmful substances operate in this area. The Outer Route is generally used by oil and chemical tankers visiting Australian east coast ports, while there is increasing LNG tanker traffic entering and leaving Queensland ports.

Natural factors

Hydrographical

96 Areas within the inner GBR, including areas of high volume commercial vessel traffic, have been determined to be adequately surveyed for bathymetric data by the Royal Australian Navy's Australian Hydrographic Service.

97 The quality of this bathymetric data is reflected in the charted depths and respective chart notes via the allocated Zones of Confidence (ZOC). Areas of much deeper water within the proposed PSSA however may have a lesser ZOC rating, noting the much deeper indicated depths in those locations would offer a considerable vertical safety margin.

98 There are some areas immediately around Coral Sea cays, reefs and islets where the depth of water, surveyed bathymetry quality and/or final charted product scale pose some navigational risk for larger vessel types. These areas are clearly marked on nautical charts and, in general, such areas should be well avoided by commercial shipping. Shipping should always navigate with due regard for charted data, chart scale and stated reliability of data within the area of interest.

99 Generally, all areas within the proposed PSSA (apart from the proposed area to be avoided (ATBA), discussed below) are too deep to offer any anchoring opportunity.

100 Limited surface current data is available. British Admiralty Sailing Directions may offer more detailed information for some locations (also refer to NCSR 2/3/3).

Meteorological

101 Weather and ocean current patterns in the Coral Sea are driven by Pacific-wide climate cycles such as the El Niño-Southern Oscillation (ENSO) Index. Parts of the proposed PSSA are subject to the highest frequency of tropical cyclones in eastern Australia, creating a high disturbance regime for its ecological communities, resulting in increased diversity due to the frequent regeneration of reefs following storm events. In the last 100 years, cyclones have become less frequent but more intense, and in the last 12 years the region has experienced four extreme cyclones (category 4 or 5).

102 In general, during winter months, the predominant winds are from the south-east with small southerly and easterly components. Summer months exhibit an increased easterly component in addition to the south easterly winds.

103 Winds in these areas may produce shallow surface currents in addition to those deeper currents described below.

Oceanographic

104 Oceanographic processes play a significant role in the biological patterns across the Coral Sea region. There are three main currents that affect the region; the South Equatorial, Hiri, and East Australian currents. The South Equatorial Current moves west toward Townsville and Cairns from offshore waters to the east. As it moves toward the coast it splits into the north-flowing Hiri Current and the East Australian Current. Geomorphic features interact with these ocean currents to create variable speeds and directions.

105 A slow and deep (>100m) clockwise eddy, originating from the East Australian Current, circulates around the Marion Plateau. A similar gyre system of ocean currents exists atop the Queensland Plateau. The flow of these localized features is thought to create a barrier to larval dispersal that contributes to the high species endemism and localized distribution of species in the region.

106 The geomorphic characteristics of the coral reefs and cays reflect the constant exposure to high energy wind and wave conditions. The East Australian Current and its associated eddy fields are large scale, spatially predictable, ecologically important pelagic features represented in the region.

Other information

107 Climate and weather patterns are especially important in shaping ecological communities in shallow waters, such as coral reefs, shoals and seamounts that reach into near-surface waters and terrestrial communities on islets and cays.

108 The Coral Sea's ecology is largely shaped by physical forces such as climate and weather patterns, the direction and strength of currents, the shape of the underlying seabed, and the interaction between water movement and seafloor topography. These forces affect the distribution of species, the availability of nutrients and prey, the levels of disturbance experienced by ecological communities and their ability to recover from natural and human pressures and impacts.

109 In addition to the shipwrecks mentioned above, there have also been a number of incidents and near misses in the region in recent years that demonstrate the potential risk of environmental harm by ships that conduct their passage through the waters of the proposed PSSA. Further information on these incidents can be provided upon request. Several case studies on near misses in recent years are provided in appendix 3.

ASSOCIATED PROTECTIVE MEASURES PROPOSED TO PROTECT THE AREA FROM THE IDENTIFIED VULNERABILITY

Existing protective measures

110 Australia has extensive navigation and pollution prevention controls in place throughout this region, including a variety of aids to navigation, legislation supporting control of pollutants and emergency response assets.

111 The existing Outer Route of the GBR is a non-IMO-adopted five nautical-mile wide route extending from the southern part of the Coral Sea to the boundary of the PSSA extension. It was surveyed and charted in the 1990s with the objective of encouraging ships, particularly tankers, to use this route (over the Inner Route of the GBR). Today, almost all tankers use this route voluntarily, in preference over the Inner Route of the GBR, primarily to reduce the risk of grounding in the Inner Route and any consequent oil spill in the GBR. Use of this route also enhances the safety of navigation by ensuring that ships keep clear of the numerous shoals, reefs and islands that lie close outside the route in the north-west portion of the Coral Sea.

112 In addition, under the EPBC Act, the Coral Sea Commonwealth Marine Reserve protects the waters of the Coral Sea within Australia's EEZ. The EPBC Act is also relevant to the protection of world heritage property and other matters of national environmental significance. Although the south west Coral Sea is adjacent to, and not within, the GBR World Heritage Area, the EPBC Act ensures world heritage values are maintained by requiring approval for any action that will have, or is likely to have, "a significant impact on the world heritage values of a declared World Heritage property", irrespective of whether that action occurs inside or outside the boundary of the property.

113 A Management Plan⁵ for the Coral Sea Commonwealth Marine Reserve will be prepared to guide management of the Reserve. The Management Plan is the primary tool for the conservation and management of the Reserve, and sets out the approach to and direction of management for the next 10 years. Sections 354 and 354A of the EPBC Act require commercial activities, including incidental activities such as transit, to be undertaken in accordance with the Management Plan.

New protective measures

114 Proposals to establish recommendatory Associated Protective Measures (APMs) are:

- .1 An area to be avoided (ATBA) encompassing the reefs, shoals, and islets that lie generally to the north-east of the GBR, between Palm and Hydrographers Passage. Keeping transiting SOLAS ships clear of this area will mitigate the risk of groundings and allow more time for intervention, in case of developing situations (e.g. a ship suffering breakdown of its propulsion machinery) (see appendix 3 for further information);

⁵ <http://www.comlaw.gov.au/Details/F2013L00425/Download>

- .2 Two five nautical mile wide two-way routes – one in Diamond Passage and the other to the West of Holmes Reef in the south west Coral Sea.
 - .1 The two-way route in Diamond Passage extends from approximately 25 nautical miles south of Diamond Passage through to approximately 35 nautical miles north of the passage.
 - .2 The two-way route West of Holmes Reef extends for 32.5 nautical miles approximately north west of Holmes Reef and 20.5 nautical miles approximately south west of Holmes Reef; and
 - .3 The proposed two-way routes aim to reduce the risks of collision and grounding of ships by separating opposing streams of traffic, whilst ensuring ships avoid the shoals, reef and islands that lie close outside the two-way routes. The two-way routes also aim to allow ships to follow well-defined lanes, thereby enhancing the safety and efficiency of navigation through effective passage planning. (see appendix 4 for further information).

115 The proposed APMs are new ships' routing systems under regulation V/10 of the International Convention for the Safety of Life at Sea 1974. Proposals for these APMs have been submitted to NCSR 2 for consideration and approval. These proposals are provided in full in appendices 3 and 4.

Possible impacts of proposed measures

116 The proposed two-way route in Diamond Passage is aligned with existing shipping traffic patterns in the region and can be used by all ships to navigate safely in the area.

117 The proposed ATBA and the two-way route off Holmes Reef will result in minor changes to the traffic pattern for ships that are required to conform to SOLAS requirements. Some of these ships (e.g. cruise ships) may visit locations within the ATBA where they have an operational need to do so and have implemented appropriate risk mitigation measures.

118 The proposed ATBA aims to influence SOLAS ships to use the two-way route west of Holmes Reef. This will enhance the protection of the region in case of a ship breakdown or collision between south and east of Holmes and Flora Reefs. It will also reduce the possibility of ships grounding on the reef due to negligent navigation. The establishment of the ATBA and the deviation by ships to pass west of Holmes Reef will add approximately 11 nautical miles to a ship's overall voyage. This represents only a 0.3 per cent increase on a typical voyage, based on an approximate 3,800 nautical mile journey from Palm Passage to Shanghai, China. The proposed ATBA will have no impact on the sea room available for navigation.

119 It is expected that the two-way routes will make navigation safer, easier and more efficient. They will also better accommodate the large increase in traffic that is anticipated in the coming years due to strong growth in commodity exports, mainly coal and LNG, from ports in the region. Ships transiting between Hydrographers Passage and Jomard Entrance that may have previously travelled south of Lihou Reef can now reduce their passage distance by approximately 26 nautical miles by using Diamond Passage. There will be minimal impact on the routes that ships would otherwise follow.

MISCELLANEOUS ISSUES

120 Noting the recommendatory nature of the proposed additional APMs, Australia will make use of the existing Modernized Australian Ship Tracking and Reporting System (MASTREP) (refer document NAV 58/INF.9) to monitor traffic in the area. Australia will also develop a custom polygon for use within the long-range identification and tracking system (LRIT) polygon in the proposed extension area to assist with monitoring, if required. The monitoring of the areas will provide a basis to assess the ongoing effectiveness of and compliance with the APMs.

APPENDIX 1

DESCRIPTION OF PROPOSED PARTICULARLY SENSITIVE SEA AREA: CORAL SEA

The area is defined by a line:

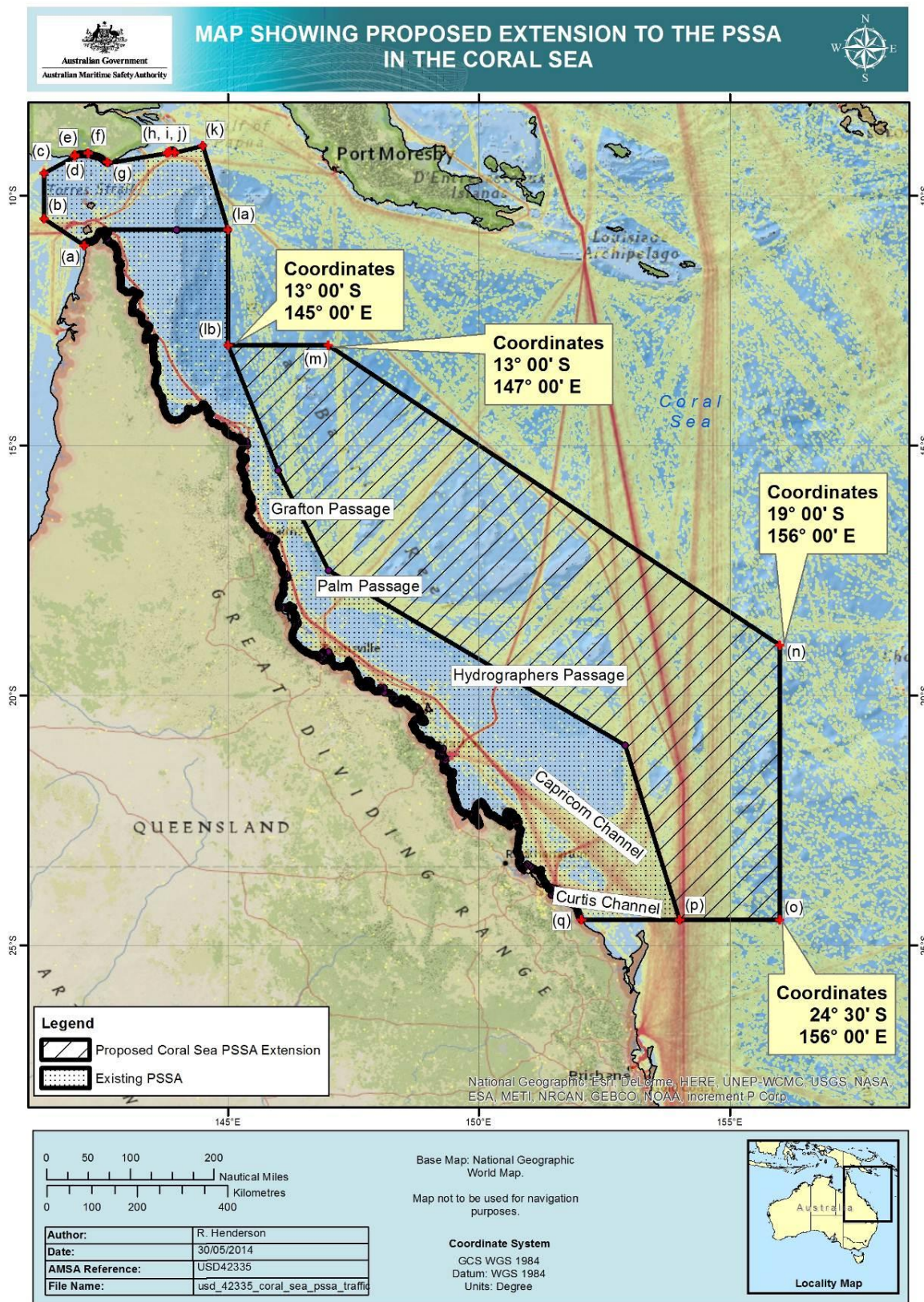
- (a) commencing at a point on the coast of Australia in latitude 11°00' South, longitude 142°08' East;
- (b) running thence north-westerly along the geodesic to the point of latitude 10°28' South, longitude 141°20' East;
- (c) thence north along the meridian of longitude 141°20' East to its intersection by the parallel point of latitude 9°33' South;
- (d) thence north-easterly along the geodesic to the point of latitude 9°13' South, longitude 141°57' East;
- (e) thence north along the meridian of longitude 141°57' East to its intersection by the southern coastline of the island of Papua New Guinea at low water;
- (f) thence generally easterly along the southern coastline of the island of New Guinea, that is along the low water line on that coast and across any river mouth and in the case of the mouth of the Mai Kussa River along the parallel of latitude 9°09' South, thence along the southern coastline of the island of New Guinea, that is along the low water line on that coast and across any river mouth to its intersection by the meridian of longitude 142°36' East;
- (g) thence south along that meridian to its intersection by the parallel of latitude 9°21' South;
- (h) thence north-easterly along the geodesic between that point of intersection and the point of latitude 9°09' South, longitude 143°47'20" East;
- (i) thence along the outer limit of the three-mile territorial sea of Black Rocks, so as to pass to the north-west of Black Rocks, to the point of intersection of that limit by the outer limit of the three-mile territorial sea of Bramble Cay;
- (j) thence along that outer limit, so as to pass successively to the north and east of Bramble Cay, to the point of latitude 9°08'30" South, longitude 143°55'57" East;
- (k) thence north-easterly to the point of latitude 9°00' South, longitude 144°30' East;
- (l) thence generally southerly along a line joining the following geographic positions:
 - a. 10°41' S 145°00' E
 - b. 13°00' S 145°00' E
- (m) thence easterly to a point of latitude 13°00' South, longitude 147°00' East;
- (n) thence generally south-easterly to a point of latitude 19°00' South, longitude 156°00' East;
- (o) thence south to a point of latitude 24°30' South, longitude 156°00' East;
- (p) thence westerly along the parallel of latitude 24°30' South to its intersection by the coastline of Queensland at low water; and
- (q) thence generally northerly along that coastline at low water to the point of commencement

Note: The geographic positions from sections (a) to (k) inclusive are those in IMO Resolution MEPC.133(53), adopted in 2005 to define the Torres Strait and Great Barrier Reef Particularly Sensitive Sea Area.

All coordinates are based on the WGS84 datum and are depicted in the diagram in appendix 2.

APPENDIX 2

CHARTLET OF PROPOSED PARTICULARLY SENSITIVE SEA AREA: CORAL SEA
(includes AIS traffic density)



APPENDIX 3

PROPOSED AREA TO BE AVOIDED IN THE SOUTH WEST CORAL SEA

In accordance with paragraph 7.5.2.2 of the Revised PSSA Guidelines a proposed Associated Protective Measure (Area to be Avoided) for the proposed extension of the GBR and Torres Strait PSSA to include an area of the south west Coral Sea is appended below.

SUB-COMMITTEE ON NAVIGATION,
COMMUNICATIONS AND SEARCH AND
RESCUE
2nd session
Agenda item 3

NCSR 2/3/4
4 December 2014
Original: ENGLISH

ROUTEING MEASURES AND MANDATORY SHIP REPORTING SYSTEMS

Establishment of an Area to be avoided in the south-west Coral Sea

Submitted by Australia

SUMMARY

Executive summary: This document is a proposal to establish a recommendatory Area to be Avoided (ATBA) in the Coral Sea off the coast of Australia. The ATBA aims to reduce the risk of a maritime incident and protect the sensitive marine environment of the region. The ship routing system will serve as an Associated Protective Measure for the proposed extension of the Great Barrier Reef and Torres Strait Particularly Sensitive Sea Area (GBR and TS PSSA).

Strategic direction: 5.2

High-level action: 5.2.4

Planned output: 5.2.4.1

Action to be taken: Paragraph 52

Related documents: SOLAS regulation V/10; resolution A.572 (14), as amended; MSC/Circ.1060; MSC.1/Circ.1060/Add.1 and IMO *Ships' Routeing* 2013 Edition.

Introduction

1 This document is a proposal by Australia to establish a recommendatory ATBA in the south-west portion of the Coral Sea off the coast of Australia.

2 Details of the proposed ATBA are as follows:

- .1 chartlets and a general description of the ATBA are set out in annex 1;
- .2 the names, numbers, editions and geodetic datums of the reference charts (paper and electronic) used to delineate the ATBA are set out in annex 2; and

.3 the geographical coordinates that define the ATBA are set out in annex 3.

3 The proposed ATBA will serve as a key Associated Protective Measure for the proposed extension of the GBR and Torres Strait Particularly Sensitive Sea Area in the Coral Sea. Australia will submit a proposal for extending the existing GBR and TS PSSA to MEPC 68 (May 2015).

Summary

4 The proposal aims to establish a recommendatory, IMO-adopted ATBA in the Coral Sea. The area lies off the north-east coast of Australia, within a proposed extension to an existing PSSA (figure 1). It encompasses a multitude of reefs, shoals and islets that lie generally to the north-east of the Great Barrier Reef (figure 2).

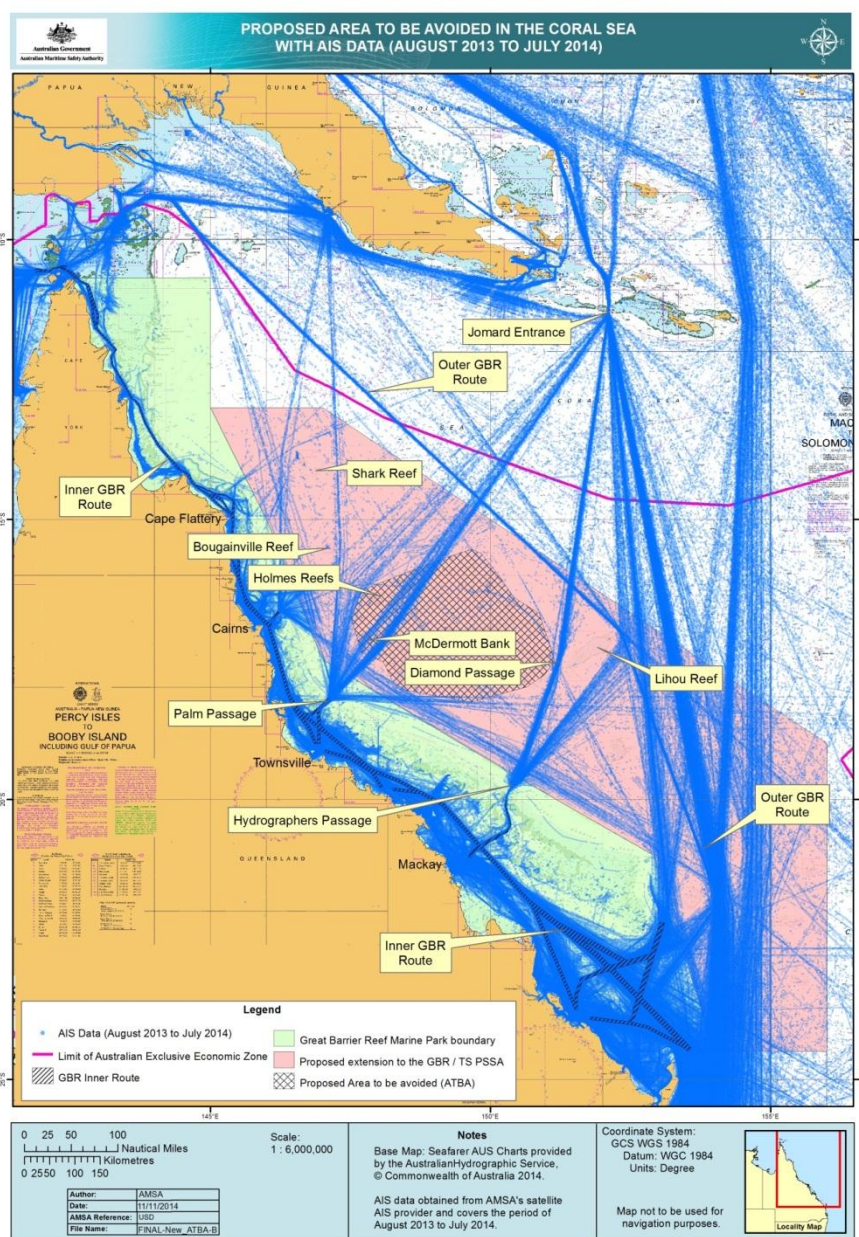


Figure 1: Location of the ATBA in the Coral Sea

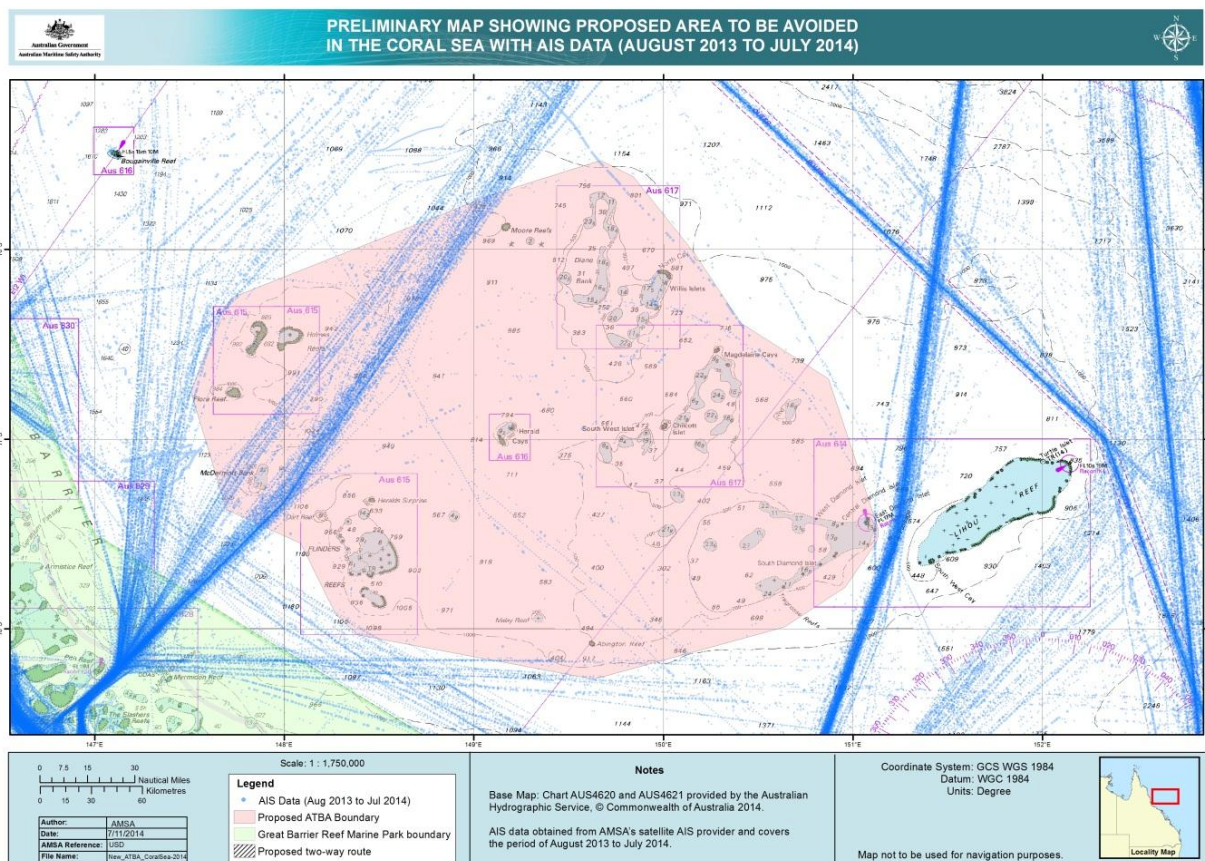


Figure 2: Extent of the proposed ATBA

5 The ATBA lies entirely within the limits of Australia's Exclusive Economic Zone (EEZ).

6 The ATBA will have little impact on transiting shipping traffic in the Coral Sea.

Objectives

7 The ATBA in the Coral Sea aims to:

- .1 increase ship safety by keeping shipping traffic away from the numerous shoals, reefs and islets that lie within the ATBA;
- .2 mitigate the high risk of groundings due to increasing shipping traffic;
- .3 allow more time for intervention, in case of developing situations e.g. a ship suffering breakdown of its propulsion machinery;
- .4 serve as a key Associated Protective Measure (APM) for the proposed extension to the PSSA in the south-west portion of the Coral Sea; and
- .5 raise awareness of the environmental sensitivity of the region.

The problem

8 The region's relative remoteness poses major challenges to any response operation in the event of an incident (or potential incident) and any consequent pollution. For example, the closest point of the ATBA to Australia is approximately 130 nautical miles from Townsville, which is the nearest major port capable of providing emergency towage facilities and pollution control equipment. The combination of numerous shoals, reefs and islets, their high environmental sensitivity and growing shipping traffic makes the area a high risk region. Therefore, it is exceptionally important to avoid casualties there.

9 A large proportion of the traffic to/from Palm Passage to Jomard Entrance, Papua New Guinea, passes east of Holmes Reefs and McDermott Bank (figure 1). Paragraphs 15 to 17 outline the impact that adverse weather conditions can have on traffic through this area.

10 Table 1 below summarizes traffic statistics for the period August 2013 to July 2014 in the area.

	Holmes Reef	McDermott Bank
Unique voyages	179	311
Unique vessels	125	311
Cargo ships	95	280
Tanker	25	19
Other	3	4
Passenger	0	0
Sailing vessels	0	0
Pleasure craft	1	1
Unknown type	1	7

Growth in shipping

11 In the first decade of this century, Australia's resource sector expanded significantly, driven by demand from industrializing Asian economies and high global commodity prices. During this time, the value of Australia's mineral and energy exports increased at an average annual rate of approximately 10%. Australian coal exports increased from 195 million tonnes (2000-01) to 284 million tonnes (2010-11)¹. This growth trend is forecast to continue.

12 Australia is currently the world's largest exporter of coal, both metallurgical and thermal, with Queensland supplying more than 75% of Australia's metallurgical coal resources. The Queensland commodity market, which is dominated by coal trades, is expected to represent about 81.8% of Australia's total trade by 2015².

13 Coal exports will therefore be the biggest driver of shipping through the north-east region, including the Coral Sea, where northbound coal ships from other east coast coal ports also traverse. There have been various forecasts of shipping activity in the north-east region made in recent years, which all predict an upward trend in shipping activity over the next 20 years.

¹ Australian bulk commodity exports and infrastructure – Outlook to 2025, Bureau of Resources and Energy Economics.

² North Queensland Ship Traffic Growth Study, Braemar Seascope, March 2013.

14 With moderate to strong south-easterly trade winds prevailing for three-quarters of the year, any ship with propulsion or steering problems will run the risk of running aground on a number of environmentally sensitive islands and reefs in the region (a list is in annex 1).

Drift groundings – a discussion

15 The predominant winds in the region can be summarized as per the wind roses in figure 3. The predominantly south easterly winds present potential drift grounding risks to the area south-east of Flora Reef and Holmes Reefs for ships transiting over McDermott Bank within the proposed ATBA (see figure 2).

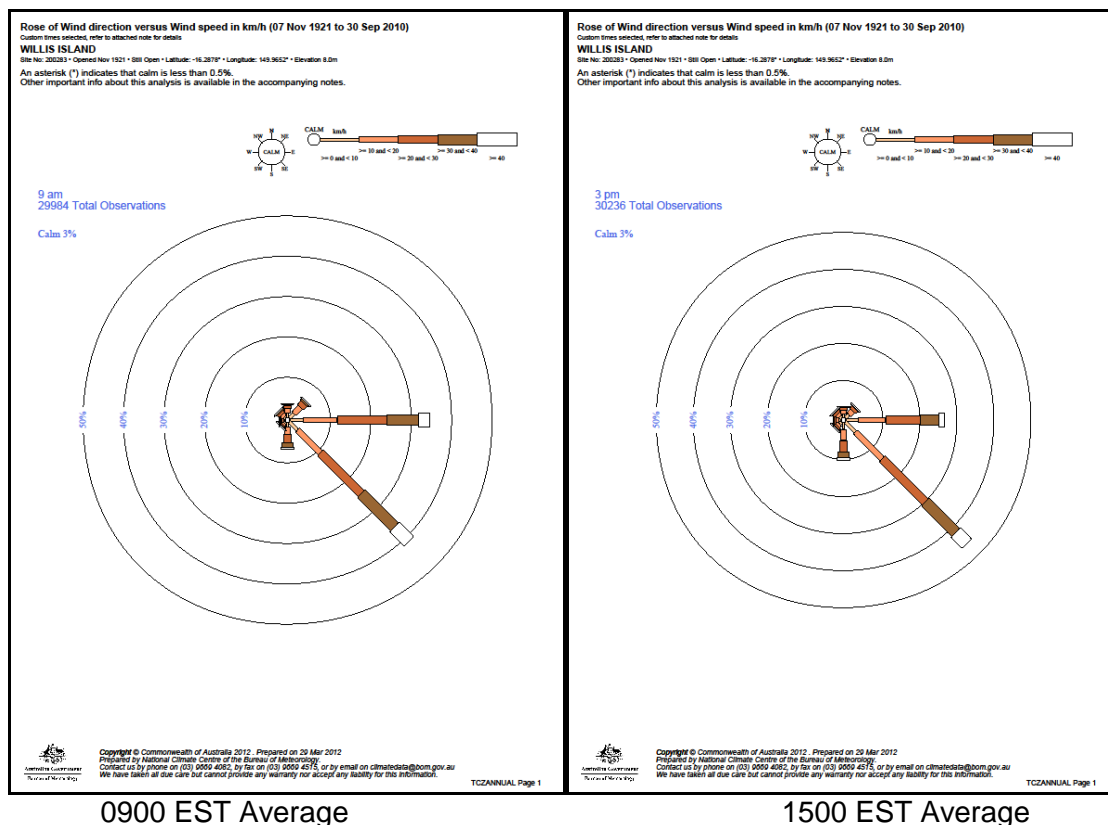


Figure 3: Summary information on predominant winds in the Coral Sea

16 Tidal stream information in this area is limited. The Admiralty Sailing Directions³ notes that a tidal stream of approximately 2 knots can be observed on a rising tide within the lagoon of Lihou Reef adjacent to the ATBA.

17 In this region, ships adrift, either loaded or in ballast, are more likely to be affected by wind than local currents.

18 Vessels passing south east of Holmes Reefs are in deep water⁴ and have little to no opportunity to deploy anchors near the reef edge before running aground. There is very little by way of response vessels (for any ship in difficulty) in this remote area; and if there was, they will be unlikely to reach the scene and assist before grounding occurs.

³ Australia Pilot Vol III, NP15, 2009, paragraph 2.131, Page 7.

⁴ Generally depths over 900 metres.

19 However, shipping passing through Diamond Passage and to the west of Holmes Reefs will generally have opportunities to deploy anchors in shallower water to arrest movement, before any grounding occurs. Additionally, shipping adrift west of Holmes Reefs are in closer proximity to response assets from Cairns.

20 Two near misses in recent years, as outlined in the following case studies, have prompted Australia to consider further risk mitigation measures for the region.

Case Study 1

In July 2010, a fully loaded 255 m long bulk carrier suffered propulsion failure in the Coral Sea, north-east of Bougainville Reef (figure 2). This followed a series of earlier breakdowns and erratic movements by the ship in the area. The ship was approximately 38 nautical miles (71 kms) offshore and drifting towards the GBR.

Although not within the proposed ATBA (but in close proximity), the case serves to describe a typical situation that Australia faces when ships suffer mechanical breakdowns in the north-east region.

When it became apparent that engine repairs could not be carried out without shore assistance, the Australian Maritime Safety Authority (AMSA) began monitoring the situation more closely and prepared for a potential pollution response.

Initially, a tug remained in company, to ensure response capacity was available to cover the eventuality of drifting on to Bougainville Reef. Subsequently, *Pacific Responder*, which was AMSA's Emergency Towage Vessel at the time, attached a line to the stricken vessel. With the assistance of two harbour tugs, the ship was towed to a safe anchorage off Cairns to carry out main engine repairs.

Australia's intervention prevented what may have been a catastrophic incident in the region. Had the incident occurred in the proposed ATBA, it is probable the ship would have run aground.

Case Study 2

In May 2012, a 188 m long geared bulk carrier in ballast reported a breakdown of its main engine machinery. The ship was outside the limits of Australia's EEZ at that time. Australia commenced monitoring the situation.

Subsequently, the ship (which had now drifted into Australia's EEZ), reported it was unable to restart its engines. Australia activated its National Maritime Emergency Response Arrangements. Australia evaluated towing resources, discussed the situation with the ship's master, managers and insurers and assessed various response options.

Two port tugs were tasked by the ship's managers; in addition, AMSA's Emergency Towage Vessel at the time, *Pacific Responder*, which was 350 nautical miles away, was tasked to proceed to the stricken ship.

The ship was drifting in a westerly direction at 3 knots in a south-easterly gale with heavy seas and swell. In agreement with the ship's master, it was decided not to use the ship's anchors to slow the drift.

As there was a likelihood of drifting on to Shark Reef (north, north west of Bougainville Reef), the ship pumped out some ballast water, thereby reducing its draught. The vessel drifted over Shark Reef and cleared the shoal with adequate under keel clearance. Had the incident occurred in the proposed ATBA, it is probable the ship would have run aground.

The next day, the first tug arrived on scene and connected a tow line. Fortunately, both tugs arrived on scene before the ship could drift in to the GBR Marine Park.

The stricken ship was then towed safely to the port of Cairns for repairs.

Emergency towage

21 One of the last defences against drift groundings is the taking of the drifting ship under tow. Since 2006, AMSA has contracted a dedicated emergency towage vessel to patrol the northern region of the GBR and Torres Strait.

North-East Shipping Risk Assessment

22 The results of a risk assessment conducted by Det Norske Veritas (DNV) in February 2013 indicates that drift grounding poses the highest risk (the others being collisions and powered groundings) to maritime safety in the region. The DNV risk assessment can be found on the AMSA website at:

www.amsa.gov.au/community/consultation/nesm-consultation.asp

23 The risk modelling results also indicate that an effective risk reduction measure is the availability of additional emergency towing capability. This may be achieved by contracts with existing emergency towage vessels and raising awareness of the environmental sensitivity of the region, utilisation of tows of opportunity, or other means. It is this last option that this proposal aims to address.

Applicability

24 In order to reduce the risk of a maritime casualty and potential damage to the sensitive marine environment, transiting ships should not enter the ATBA. The proposed ATBA will result in minor changes to the traffic pattern for ships that are required to conform to SOLAS requirements. Some of these ships (e.g. cruise ships) which demonstrate an operational need to visit a location within the ATBA and which have adequate risk mitigation measures in place, may enter the ATBA.

25 Other IMO-adopted ATBAs around the Australian coast are off the Ningaloo coast, Western Australia and in Bass Strait. These particular areas stipulate 150 and 200 gross tonnage, respectively, as recommended exclusion limits for vessels entering the relevant ATBAs. The proposed Coral Sea ATBA will rely on criteria outlined in paragraph 24 to limit ships entering the ATBA, rather than gross tonnage limits.

History of other ship routing systems in the region

26 In April 1983, Australia established an IMO-adopted ATBA in the Capricorn and Bunker Group of Islands off the port of Gladstone. MSC 94 in November 2014 approved the cancellation of this measure⁵.

27 In May 2014, the ninety-third session of the Committee endorsed an Australian proposal to establish a two-way route throughout the length of the GBR and Torres Strait (figure 4).

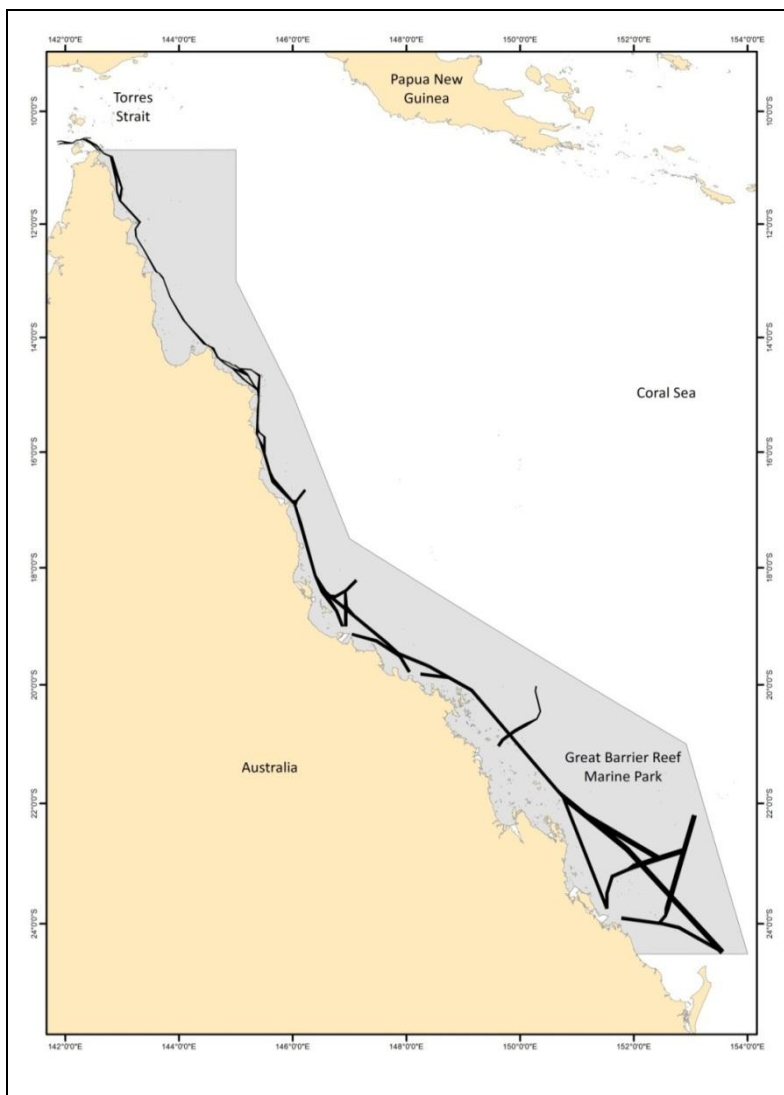


Figure 4: IMO-adopted Two-Way Route in the GBR and Torres Strait

⁵ This cancellation comes about because there is, in effect, duplicate protection of the region. As part of the Great Barrier Reef Marine Park's Zoning Plan, a Designated Shipping Area (DSA) regime for the waters of the Great Barrier Reef Marine Park exists. It covers an area larger than the ATBA in the region. The DSA subsumes the IMO-adopted ATBA, thereby rendering the protection offered by the ATBA superfluous.

Impact on shipping

28 Currently, ships on passage between Palm Passage and Jomard Entrance, Papua New Guinea have a choice of two routes. They can navigate either north of Holmes Reef or to the south of it, in the vicinity of McDermott Bank (figure 2).

29 Comparing usage of the two routes, the majority of ships currently transit south of Holmes Reef in the vicinity of McDermott Bank. A minority pass north of Holmes Reef.

30 Despite the current slowdown in the global economy, Australia's commodity exports appear to be on a path of steady growth. Therefore, traffic is expected to continue to increase steadily. However, this growth is unlikely to alter the existing traffic pattern.

31 The proposed ATBA aims to influence ships to use the route north of Holmes Reef. This will enhance the protection of the region in case of a ship breakdown or collision between south and east of Holmes and Flora Reefs. It will also reduce the possibility of ships grounding on the reef owing to negligent navigation.

32 Combined traffic statistics of voyages using the two routes (using 2013-14 traffic data) is in the table below.

	Holmes Reef and McDermott Bank
Unique voyages	490
Unique ships	436
Cargo ships	375
Tanker	44
Other	7
Passenger	0
Sailing ships	8
Pleasure craft	2
Type unknown	8

33 The establishment of an ATBA and the deviation by ships to pass west of Holmes Reef will add approximately 11 nautical miles to a ship's overall voyage of approximately 3,819 nautical miles from Palm Passage to Shanghai, China. This represents a 0.29% increase in the total distance on a typical passage between these locations.

34 By recommending vessels use the proposed two-way route, a significant number of voyages per day can be diverted from the area around McDermott Bank and south of Holmes Reef, further reducing risk and potential environmental damage.

35 The proposed ATBA will have no impact on the sea room available for navigation.

36 The region contains Australian Commonwealth Marine Reserves (marine protected areas). There are currently no restrictions on the transit of commercial ships through these reserves. The establishment of the proposed ATBA aims to keep transiting ships away from these reserves to enhance their safety and provide protection to these from potential damage or pollution due to maritime activities.

37 An ATBA is considered to be the most appropriate ships' routing measure, as it aims to keep ships away from an area of high environmental sensitivity. It is important to prevent incidents in this pristine marine environment.

Other information

38 While there are no trading ports or major harbours in the region, there are a number of major trading ports/harbour along the north-east Queensland coast.

39 Modern metric navigational charts at scale 1:150,000 (annex 2) offer coverage of the proposed ATBA. There is adequate coverage by Electronic Navigational Charts (ENC). Hydrographic surveys of all navigable waters outside the reef edge and within the proposed ATBA are classified as Zone of Confidence (ZOC) C⁶ and D⁷.

40 Owing to the generous depths of water in relation to the deepest draught ships using the routes (indicative depths of 800-900 metres), the associated risk of grounding on any unexpected seabed anomalies has been assessed as being negligible. Therefore, the charts of the region are adequate for coastal navigation.

41 The Australian Hydrographic Service confirms that the ATBA will be included on all affected paper charts and ENC, and that Sailing Directions will be amended accordingly if the ATBA is adopted.

Position-fixing in relation to the ATBA

42 The ATBA is provided with visual, radar and electronic aids to navigation. Two major lights provide coverage; East Diamond Islet light with characteristics Fl.5s 29m 17M Racon (M) and Lihou Reef light with characteristics Fl.10s 19M Racon (K).

43 A 10 nautical mile distance offset from reefs, cays and islets has been used to delimit the ATBA boundary. This is adhered to, except for the convergence required near Diamond Passage, noting the aid to navigation in the immediate vicinity.

44 There are no new aids to navigation planned in the near future, although Australia regularly reviews its aids to navigation requirements. A competent and alert navigator will have no difficulty transiting the region.

Marine environmental considerations

45 A PSSA is defined by the IMO as an area that needs special protection because of its ecological, socio-economic or scientific significance and which may be vulnerable to damage as a result of international maritime activities.

46 IMO declared the sea areas of the GBR and TS as PSSA's in 1990 and 2005 respectively. When an area is approved as a PSSA, internationally agreed associated protective measures may be used to manage shipping in that area. For the GBR and TS region of Australia, the measures include ship reporting and routing systems and vessel traffic services.

⁶ Positional accuracy \pm 500m with a depth accuracy equal to 2.00 metres \pm 5% depth.

⁷ Worse than ZOC C.

47 Australia proposes to extend the boundary of the existing GBR and TS PSSA to include an area of the south west Coral Sea that is vulnerable to damage by international shipping activities. Australia will submit a proposal in this regard to MEPC 68 (May 2015).

48 The Coral Sea is an international body of water recognized for its rich biodiversity, unique physical features and important heritage values. The section of the Coral Sea proposed for PSSA designation lies entirely within Australia's EEZ, and comprises the majority of Australia's Coral Sea Commonwealth Marine Reserve. It is considered one of the most distinctive and undisturbed natural systems in the world and provides refuge for a wide range of threatened, migratory and commercially valuable species under serious threat elsewhere.

Other measures proposed for the ATBA

49 Australia proposes to establish three other routing measures in the area as shown in figure 5. They are:

- .1 a Deep Water Route in the Coral Sea (*NCSR 2/3/2*);
- .2 a Two-Way Route in Diamond Passage; and
- .3 a Two-Way Route North-West of Holmes Reef (*NCSR 2/3/3*).

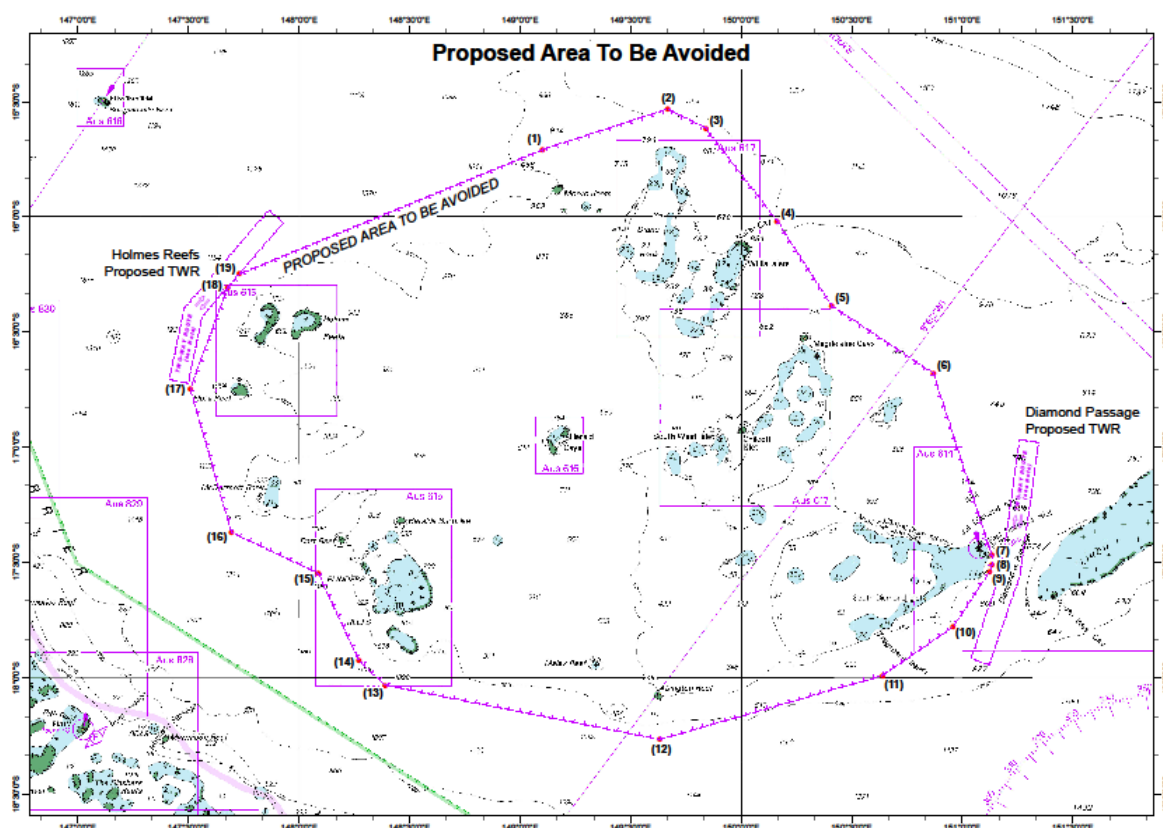


Figure 5: Proposed ATBA and two-way routes around it

Miscellaneous information

50 Local fishing vessels and tourist and recreational craft can be encountered anywhere in the area of the proposed ATBA. Chartered ship routing measures will provide certainty for both these users and commercial shipping operations.

51 There are currently no existing activities or foreseeable developments of offshore exploration or exploitation of the seabed. Similarly there are no offshore structures, other than those to provide aids to navigation.

Action requested of the Sub-Committee

52 The Sub-Committee is invited to consider the proposal and recommend the proposal to the Maritime Safety Committee for adoption.

ANNEX 1

CHARTLETS AND A GENERAL DESCRIPTION OF AREA TO BE AVOIDED IN THE CORAL SEA

The area lies off the north-east coast of Australia, within a proposed extension to an existing PSSA in the south-west Coral Sea (figure 1). It encompasses a multitude of reefs, shoals and islets that lie generally to the north-east of the Great Barrier Reef (GBR), between Palm and Hydrographers Passage (figure 2).

In order to reduce the risk of a maritime casualty and potential damage to the sensitive marine environment, transiting ships should not enter the ATBA. The proposed ATBA will result in minor changes to the traffic pattern for ships that are required to conform to SOLAS requirements. Some of these ships (e.g. cruise ships) which demonstrate an operational need to visit a location within the ATBA and which have adequate risk mitigation measures in place may enter the ATBA.

The proposed ATBA is recommendatory in nature.

The ATBA extends over approximately 25,250 square nautical miles and encompasses many reefs, cays, islets, sandbars and shoal patches (figure 5). The 21 recognized, named and charted features that are within the ATBA boundary include:

- Abington Reef;
- Central Diamond Islet;
- Chilcott Islet;
- Dart Reef;
- Diane Bank;
- East Diamond Islet;
- Flinders Reefs;
- Flora Reef;
- Herald Cays;
- Herald Surprise; and
- Holmes Reefs;
- Magdelaine Cays;
- Malay Reef;
- McDermott Bank.
- Moore Reefs;
- North Cay;
- South Diamond Islet;
- South West Islet;
- Tregrosse Reefs;
- West Diamond Islet; and
- Willis Islets.

ANNEX 2

**NAMES, NUMBERS, EDITIONS AND GEODETIC DATUMS OF THE REFERENCE
CHARTS**

Name	Number	Edition	Datum
Diamond Passage	AUS614	Ed 2	WGS84
Flinders Reefs	AUS615 Pt 1	Ed 2	WGS84
Flora Reef and Holmes Reefs	AUS615 Pt 2	Ed 2	WGS84
Willis Islets	AUS617 Pt 1	Ed 2	WGS84
South West Islet to Magdelaine Cays	AUS617 Pt 2	Ed 2	WGS84
Percy Isles to Booby Island	AUS4620 (INT 620)	Ed 6	WGS84
Mackay to Solomon Islands	AUS4621 (INT621)	Ed 4	WGS84

ANNEX 3

GEOGRAPHICAL COORDINATES OF THE AREA TO BE AVOIDED IN THE CORAL SEA

The geographical coordinates of the ATBA (figure 5) are provided below.

All geographical positions are based on WGS 84.

Individual coordinate numbers in brackets, refer to those shown in figure 5.

Area To Be Avoided

An area to be avoided is established bounded by a line connecting the following geographical positions:

(1)	15° 42.48' S	149° 06.07' E	(11)	17° 59.43' S	150° 38.35' E
(2)	15° 31.87' S	149° 40.07' E	(12)	18° 15.94' S	149° 37.97' E
(3)	15° 36.90' S	149° 50.43' E	(13)	18° 01.91' S	148° 23.34' E
(4)	16° 01.16' S	150° 09.79' E	(14)	17° 55.49' S	148° 16.26' E
(5)	16° 23.25' S	150° 24.56' E	(15)	17° 32.90' S	148° 05.14' E
(6)	16° 40.91' S	150° 52.21' E	(16)	17° 22.27' S	147° 41.63' E
(7)	17° 28.26' S	151° 08.01' E	(17)	16° 45.01' S	147° 30.47' E
(8)	17° 30.71' S	151° 08.01' E	(18)	16° 18.56' S	147° 40.61' E
(9)	17° 32.59' S	151° 07.45' E	(19)	16° 15.00' S	147° 43.82' E
(10)	17° 46.83' S	150° 57.56' E			

APPENDIX 4

PROPOSED TWO WAY ROUTES IN THE SOUTH WEST CORAL SEA

In accordance with paragraph 7.5.2.2 of the Revised PSSA Guidelines a proposed Associated Protective Measure (two-way routes) for the proposed extension of the GBR and Torres Strait PSSA to include an area of the south west Coral Sea is appended below.

SUB-COMMITTEE ON NAVIGATION,
COMMUNICATIONS AND SEARCH AND
RESCUE
2nd session
Agenda item 3

NCSR 2/3/3
3 December 2014
Original: ENGLISH

ROUTING MEASURES AND MANDATORY SHIP REPORTING SYSTEMS

Establishment of two-way routes in the south-west Coral Sea

Submitted by Australia

SUMMARY

Executive summary: This document is a proposal to establish two recommendatory, IMO adopted, two-way routes in the Coral Sea. The objective of the two-way routes is to reduce the risk of a maritime incident and protect the sensitive marine environment of the region.

The ships' routing systems will serve as Associated Protective Measures for the proposed extension of the Great Barrier Reef and Torres Strait Particularly Sensitive Sea Area (GBR and TS PSSA).

Strategic direction: 5.2

High-level action: 5.2.4

Planned output: 5.2.4.1

Action to be taken: Paragraph 60

Related documents: SOLAS regulation V/10; resolution A.572 (14), as amended; MSC/Circ.1060; MSC.1/Circ.1060/Add.1 and IMO *Ships' Routing* 2013 Edition

Introduction

1 Australia proposes to establish two recommendatory, IMO adopted, two-way routes in the south-west portion of the Coral Sea off the coast of Australia.

2 Details of the proposed two-way routes are as follows:

.1 general description of the two-way routes and chartlet are set out in annex 1;

- .2 the names, numbers, editions and geodetic datums of the reference charts (paper and electronic) used to delineate the two-way routes are set out in annex 2; and
- .3 the geographical coordinates that define the two-way routes are set out in annex 3.

3 The proposed two-way routes will serve as key Associated Protective Measures for the proposed extension of the Great Barrier Reef and Torres Strait Particularly Sensitive Sea Area in the Coral Sea (GBR and TS PSSA). Australia will submit a proposal for extending the existing GBR and TS PSSA to MEPC 68 (May 2015).

Summary

4 The proposal aims to establish two recommendatory, IMO adopted, five nautical mile wide, two-way routes in the Coral Sea region. The proposed routes lie off the north-east coast of Australia (figure 1). They are:

- .1 the two-way route in Diamond Passage, which extends from approximately 25 nautical miles south of Diamond Passage through to approximately 35 nautical miles north of the passage, representing a two-way route distance of approximately 60 nautical miles (figure 2); and
- .2 the two-way route west of Holmes Reef, which extends for 32.5 nautical miles approximately north west of Holmes Reef and 20.5 nautical miles approximately south west of Holmes Reefs, representing a two-way route distance of approximately 53 nautical miles (figure 3).

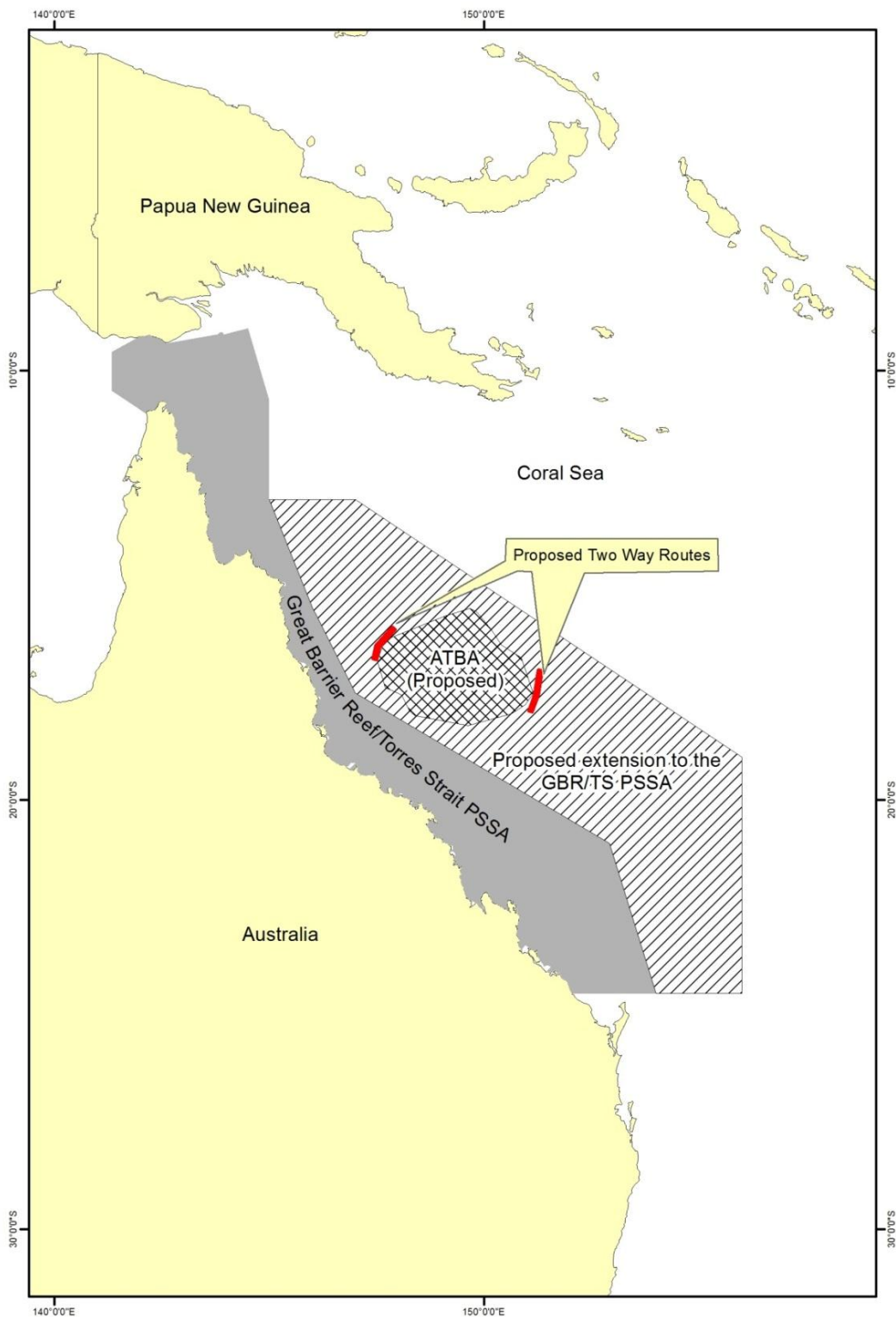


Figure 1: Location of the proposed two-way routes in the Coral Sea

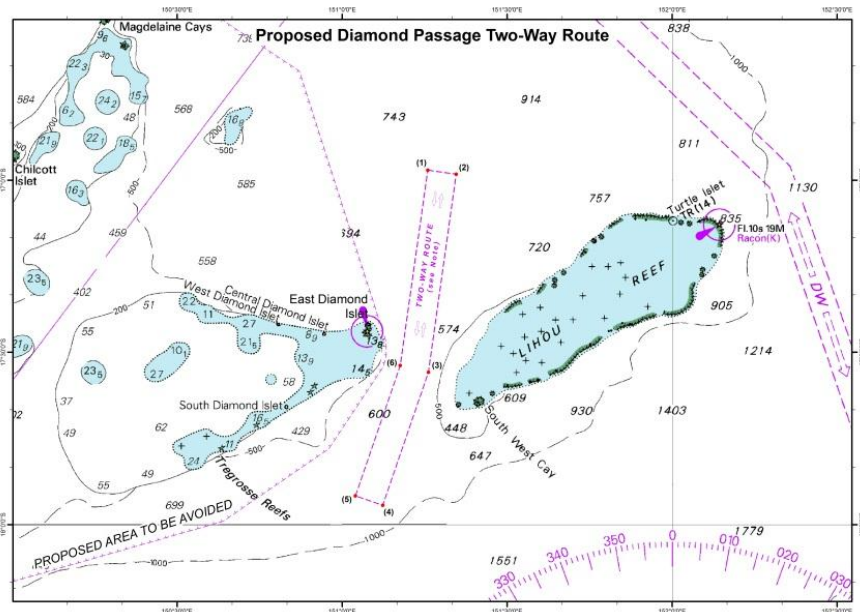


Figure 2: Extent of the proposed two-way route in Diamond Passage

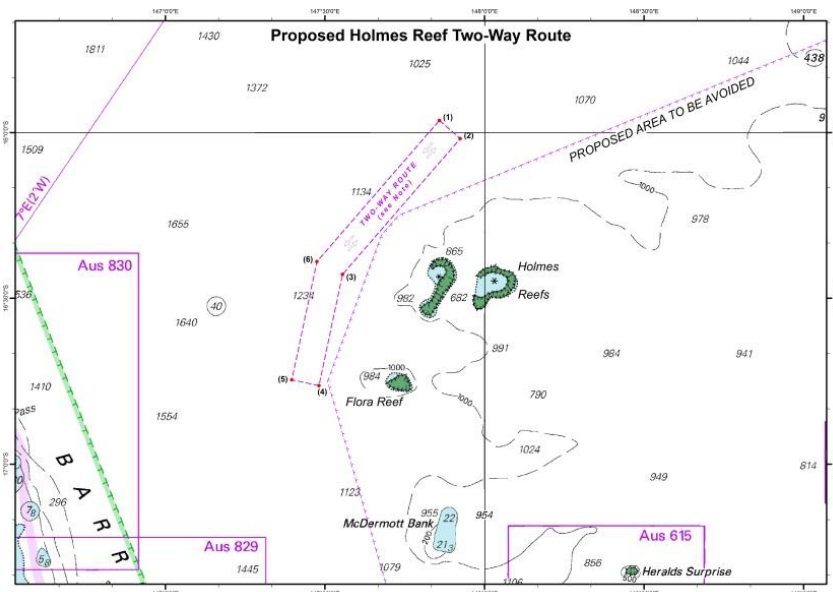


Figure 3: Extent of the proposed two-way route in the area west of Holmes Reef

5 The proposed two-way routes aim to separate opposing streams of traffic. In Diamond Passage, the two-way route aligns with the existing traffic pattern. The routing system west of Holmes Reef aims to keep ships away from a proposed IMO-adopted ATBA (NCSR 2/3/4), so as to limit the likelihood of drift groundings.

6 The two-way routes lie within the Exclusive Economic Zone (EEZ) of Australia. They will be recommended for use by all ships.

7 Australia seeks approval for the two-way routes to be adopted by IMO as ships' routing systems.

Objectives

- 8 The two-way routes aim to:
- .1 reduce the risks of collision and grounding by separating opposing streams of traffic;
 - .2 keep ships clear of the numerous shoals, reefs and islands that lie close outside the two-way routes, particularly where the area has not been surveyed thoroughly;
 - .3 enable better monitoring of a ship's transit through the region and allow more time for intervention in case a ship suffers a breakdown of its propulsion machinery;
 - .4 allow ships to follow well-defined lanes, thereby enhancing the safety and efficiency of navigation;
 - .5 prevent and reduce the risk of pollution or other damage to the marine environment; and
 - .6 serve as key Associated Protective Measures (APM) to support the proposed extension of the GBR and TS PSSA.

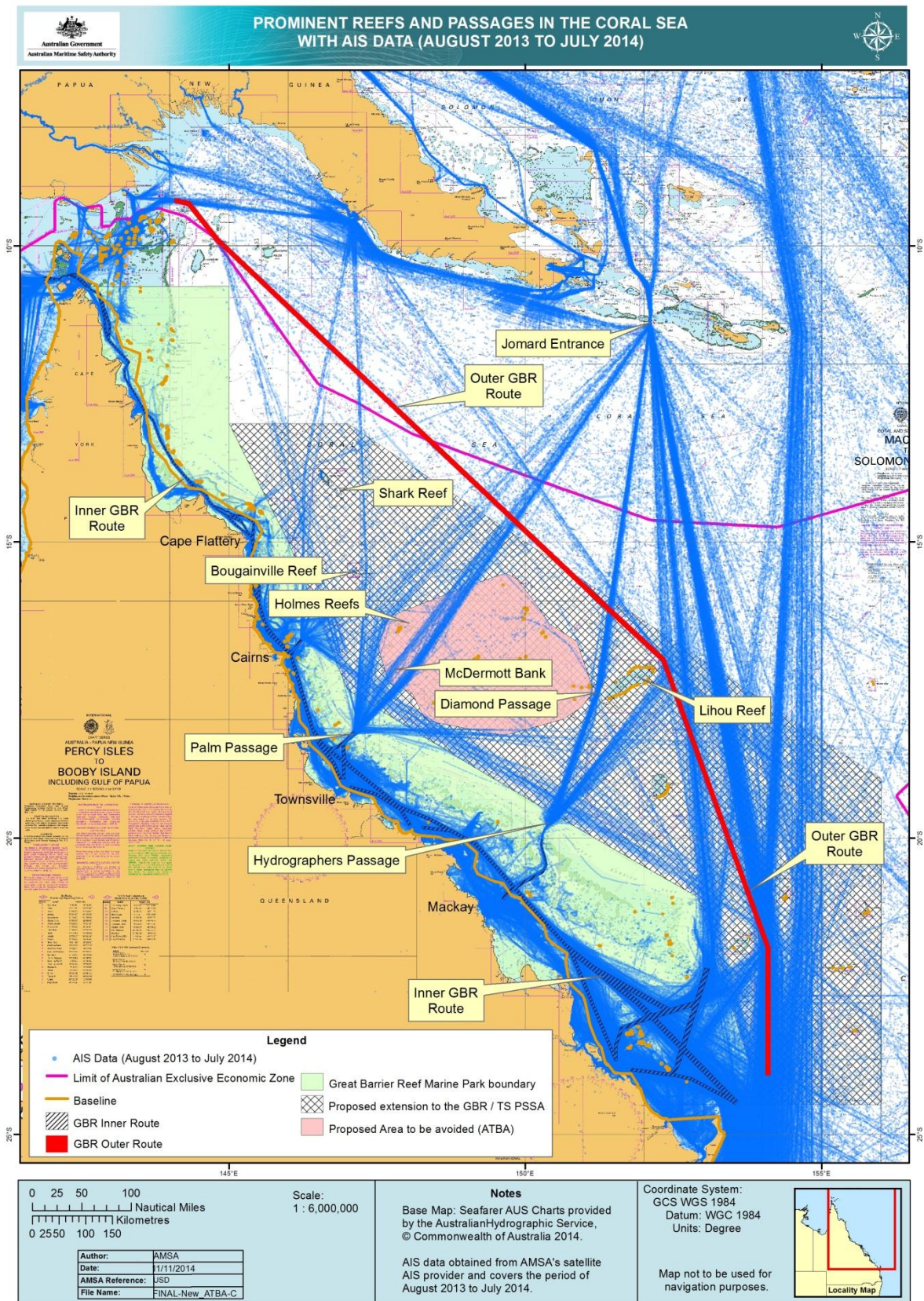


Figure 4: General shipping traffic patterns in the Coral Sea

Description of the Coral Sea

9 The Coral Sea extends from the east coast of Queensland in the west and is generally bound by New Caledonia and the Solomon Islands in the east and Papua New Guinea in the north (figure 4).

10 The Coral Sea is recognized for its rich biodiversity, unique physical features and important heritage values. Its environmental significance lies in its diverse array of coral reefs, sand cays, deep sea plains, seamounts and canyons. The Coral Sea islands and associated reefs support critical nesting sites for the green turtle and a range of seabird species such as noddies, terns, boobies, frigatebirds and other tropical bird species. The reefs are also renowned for the diverse range of large fish such as albacore, yellowfin and bigeye tuna, broadbill swordfish, marlin and sharks.

11 The portion of the Coral Sea proposed for designation as an extension of the GBR/TS PSSA, where the two-way routes are located, contains the majority of Australia's Coral Sea Commonwealth Marine Reserve. It is considered one of the most distinctive and undisturbed natural systems in the world and provides refuge for a wide range of threatened, migratory and commercially valuable species under serious threat elsewhere.

Traffic considerations

12 A significant amount of commercial shipping traffic currently pass through the area of the proposed two-way routes in a north-easterly/south-westerly direction between Jomard Entrance, Papua New Guinea, and Palm and Hydrographers Passages. The current shipping traffic patterns in the area are shown in figure 4.

13 In the period between August 2013 and July 2014, approximately 1,669 unique voyages by 1,096 individual ships were made in the general area. Of these, 90% of these were made by bulk carriers.

14 867 unique voyages were made through Diamond Passage. Correspondingly, approximately 312 voyages were made to the south east, near the exposed Lihou Reef area.

15 Holmes and Flora Reefs to the west saw approximately 179 unique voyages.

16 Table 1 below summarizes the traffic statistics for the period.

	Holmes Reef	McDermott Bank	Diamond Passage	Lihou Reef
Unique voyages	179	311	867	312
Unique ships	125	311	463	197
Cargo ships	95	280	439	183
Tanker	25	19	1	1
Other	3	4	5	7
Passenger	0	0	3	0
Sailing ships	0	0	2	0
Pleasure craft	1	1	2	0
Unknown	1	7	11	6

17 The shipping statistics indicate the region is particularly exposed to potential harm by international shipping activities.

18 The two-way route proposals allow for commercial shipping traffic that currently utilizes the track through McDermott Bank to be re-routed safely to the west of Holmes and Flora Reefs¹. Additionally, traffic using the route south of Lihou Reef will be encouraged, if travelling north to use Diamond Passage.

History of harm or potential harm to the marine environment

19 Since the introduction of REEFREP (the mandatory ship reporting system) in 1997, there have been nine groundings in the GBR region. However, after the establishment of REEFVTS (a coastal Vessel Traffic Service (VTS)) in 2004, there have been only two grounding incidents in 2009 and 2010. None of these have resulted in a significant oil spill.

20 In 2010, the loaded bulk carrier **Shen Neng 1** ran aground on Douglas Shoal, some 50 nautical miles north-north-east of the port of Gladstone. The grounding occurred outside the REEFVTS area. Since then, the area covered by the REEFREP (the ship reporting system that provides ship position information for REEFVTS) has been extended to the southern boundary of the GBR Marine Park. The proposed two-way routes aim to reduce the risk of such incidents occurring by establishing shipping routeing systems between the major ports on Queensland's east coast and the Coral Sea.

21 Also, over the years, there have been several reports of close-quarter situations between commercial fishing vessels and transiting ships in the waters of the GBR.

Demonstrated need for the establishment of the two-way routes

General

22 The two-way routes provide the safest passage for ships through waters where navigation is challenging due to numerous shoals, reefs and islands that lie close outside the two-way route. Other reasons for establishing the two-way routes are:

- .1 it is the preferred option when compared with recommended tracks as the routes will encourage ships to use the starboard side of the lanes, thereby reducing head-on encounters. Recommended tracks increase the risk of head-on collisions, particularly owing to the growing use of navigation using Global Navigation Satellite Systems (GNSS);
- .2 the movement of a variety of commercial ships and recreational vessels impose additional navigational demands on transiting ships. Established two-way routes offer certainty of tracks that transiting ships and will use;
- .3 offers assurance that hydrographic surveys have been carried out to an adequate standard, leading to safe routes being identified, thereby mitigating the risk of grounding; and
- .4 allows for better monitoring of a ship's transit and provides increased time for intervention in developing situations.

¹ The rerouting of shipping traffic from McDermott Bank to the proposed Holmes Reef two-way route will only add approximately 0.29% to the total distance between Palm Passage via Jomard Entrance to Shanghai. The total distance is approximately 3,819 nautical miles.

Drift Groundings

23 The two-way routes will provide some mitigation against drift groundings by re-routing commercial shipping away from potential navigational dangers.

24 The predominant winds in the region can be summarized as per the wind roses in figure 5. The principal south-easterly winds present potential drift grounding risks to both the area south of Lihou Reef and south east of Flora Reef and Holmes Reefs.

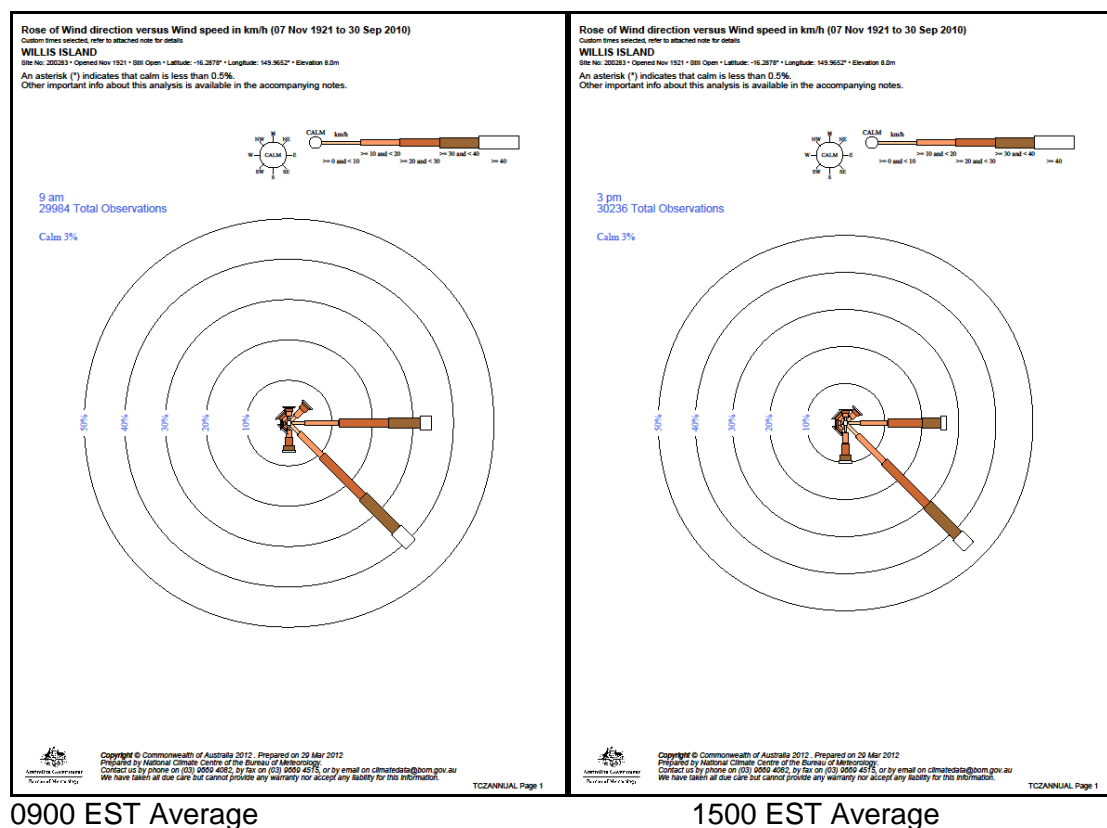


Figure 5: Summary of predominant winds in the Coral Sea

25 Tidal stream information in this area is limited. The *Admiralty Sailing Directions*² notes that a tidal stream of approximately 2 knots can be observed on a rising tide with the lagoon of Lihou Reef.

26 In this region, ships adrift, either loaded or in ballast, are more likely to be affected by wind than local currents.

27 Vessels passing south of Lihou Reef are in naturally deep water³, with little to no opportunity to deploy anchors near the reef edge before running aground. Support vessels in this remote region are very few and are unlikely to reach a ship in difficulty before grounding occurs.

28 Figure 6 represents a six hour drift model for ships passing south of Lihou Reef. A drift velocity of 3 knots and predominantly south easterly winds are used to define each coloured 2 hour drift band i.e. each colour band broadly represents 2 hours drift at 3 knots

² *Australia Pilot Vol III*, NP15, 2009, paragraph 2.131, page 77.

³ Depths are generally over 900 metres.

with a north-westerly set. This equates to a distance travelled of 6 nautical miles for each band.

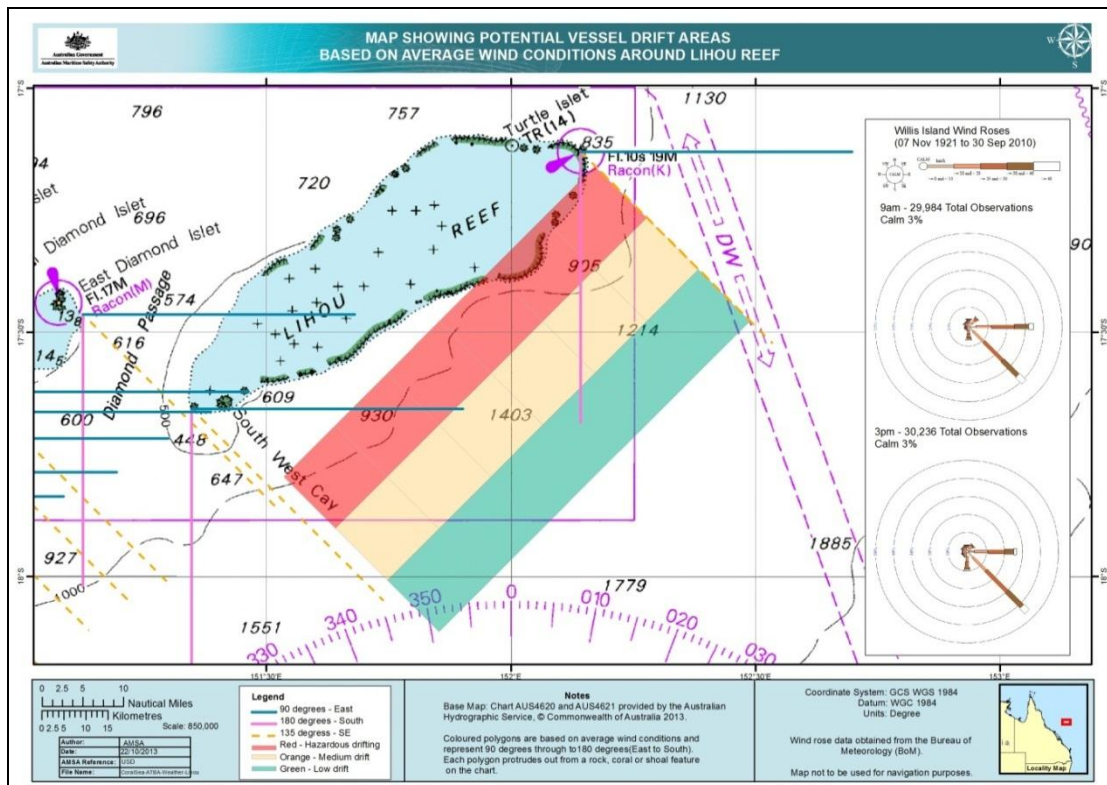


Figure 6: Drift modelling around Lihou Reef, Queensland

29 This is a similar scenario for shipping currently passing through McDermott Passage whereby the naturally deep water⁴ south east of Flora Reef and Holmes Reefs offers little to no opportunity to deploy anchors before any potential grounding.

30 However, ships passing through Diamond Passage will generally have some opportunities to deploy anchors in shallower water to arrest drift, before any grounding occurs. Additionally, ships adrift west of Holmes Reefs are in much closer proximity to response assets from Cairns.

Diamond Passage

31 From August 2013 to July 2014, 867 separate voyages were made by 463 individual ships through Diamond Passage. These ships were almost invariably on passage between Jomard Entrance, Papua New Guinea, and Hydrographers Passage (figures 2 and 4). The ships were primarily bulk carriers, representing over 95% of the total number of unique vessels.

32 The proposed routeing system in Diamond Passage is expected to cater for ships that elect not to use the route south of Lihou Reef.

⁴ Depths are generally between 600 and 900 metres.

33 The two Automatic Identification System (AIS) plots below (figure 7) show ships following reciprocal courses in the same water space. The establishment of a two-way route will separate opposing streams of traffic, thereby reducing the risk of collision and groundings.

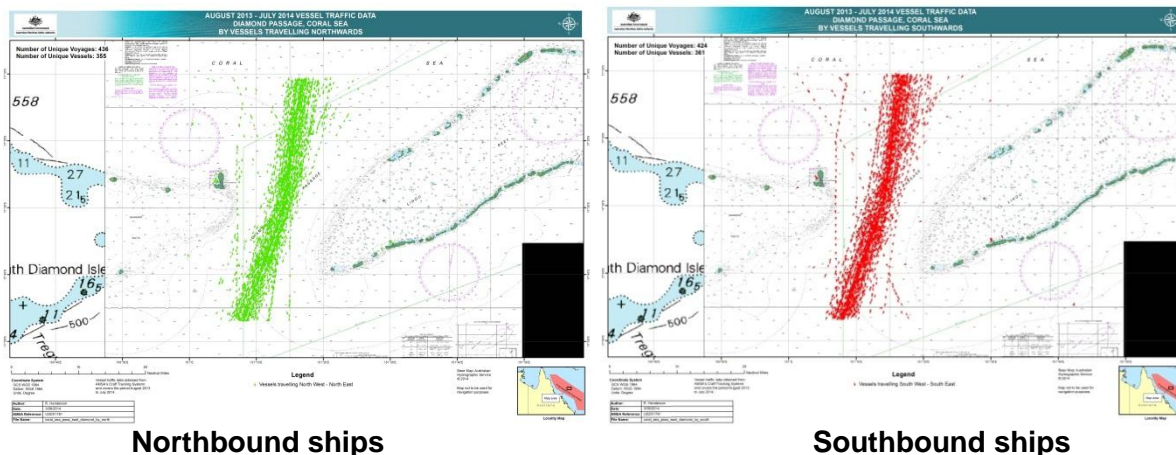


Figure 7: Current shipping patterns through Diamond Passage

West of Holmes Reefs

34 From August 2013 to July 2014, 179 separate voyages were made by 125 individual ships to the west of Holmes Reef. These ships were almost invariably on a passage between Jomard Entrance, Papua New Guinea, and Palm Passage off Townsville (figure 4). The ships were primarily bulk carriers, representing over 76% of the total number of unique vessels.

35 The proposed routing system west of Holmes Reef is designed to cater for the significant traffic that is expected to stay out of the proposed ATBA, thereby avoiding the sensitive area around McDermott Bank.

36 The two AIS plots below (figure 8) show ships following reciprocal courses to the west of Holmes and Flora Reefs over the same water space. The establishment of a two-way route will separate opposing streams of traffic, thereby reducing the risk of collision and groundings.

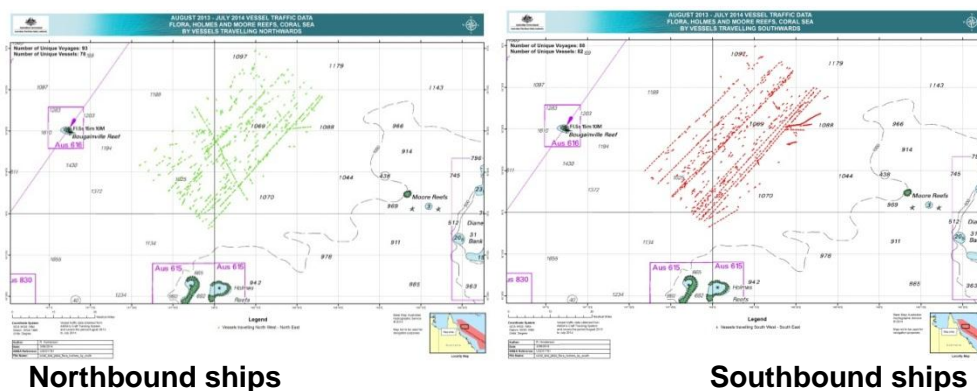


Figure 8: Current shipping patterns west of Holmes Reefs

Applicability

37 The two-way routes can be used by all ships navigating in the Coral Sea region. However, ships such as cruise ships and small coastal traders may choose to depart from the two-way route for operational reasons.

Proposed impact on navigation

38 It is expected that the two-way routes will make navigation safer, easier and more efficient. They will also better accommodate the large increase in traffic that is anticipated in the coming years due to strong growth⁵ in commodity exports, mainly coal and Liquefied Natural Gas, from ports in the region.

Expected impact on shipping

39 The new two-way routes align with existing traffic pattern as closely as possible. The well-defined and charted routes allow for prudent navigation and discourage taking risky short-cuts.

40 Ships transiting between Hydrographers Passage and Jomard Entrance that may have previously travelled south of Lihou Reef can now reduce their passage distance by approximately 26 nautical miles by using Diamond Passage. Additionally, ships using the proposed two-way route west of Holmes Reefs will only add 0.29% to their total distance from Palm Passage to Shanghai, China.

41 In summary, there will be minimal impact on ships due to the two new ship routing systems. There will be no significant deviations due to these new routes, a reduction in passage distance if using the proposed two-way route at Diamond Passage and an insignificant increase in passage distance when using the two-way route west of Holmes Reefs.

Position-fixing in relation to the ship routing system

42 The area has visual, radar and electronic aids to navigation. East Diamond Islet has light characteristics Fl.5s 29m 17M with Racon (M).

43 The eastern boundary limit of Holmes Reef two-way route is over 10 nautical miles from the north western most point of the charted reef offering considerable navigable sea room and a margin of safety.

Other traffic considerations

44 The proposed two-way routes follow existing shipping patterns as closely as possible (figure 4) and are designed so that:

- .1 course alterations along the route are kept to a minimum;
- .2 convergence areas and route junctions are kept to a minimum; and
- .3 junctions and convergence areas are not where crossing traffic is expected to be heavy.

⁵ North Queensland Ship Traffic Growth Study, Supplementary Report, Braemar Seascope, 22 March 2013.

45 Based on commercial shipping traffic figures for the period August 2013 to July 2014, Diamond Passage would have experienced an increase of 312 voyages from those that elected not to travel south of Lihou Reef. This would represent an increase in Diamond Passage from an average of 2.4 voyages per day to 3.3 voyages per day. This equates to a reduction of an average of 0.9 voyages per day in the area south of Lihou Reef.

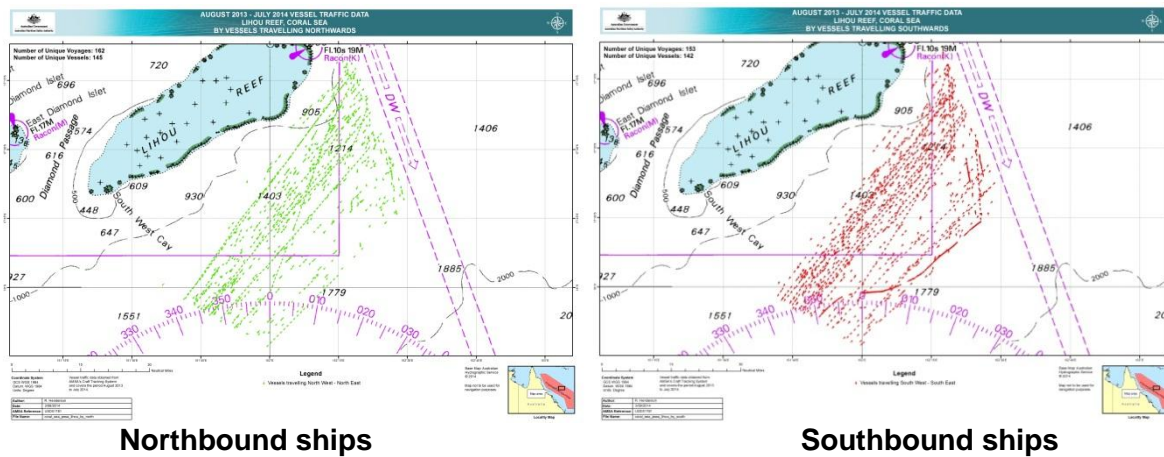


Figure 9: Current shipping patterns south of Lihou Reef

46 The re-routing of ships away from McDermott Bank and to the two-way route west of Holmes Reefs is expected to increase traffic in the Holmes Reefs area from an average of 0.5 voyages per day to 1.4 voyages per day. Vitaly, this redirection represents a reduction of an average of 0.9 voyages per day and consequentially reduces exposure to environmental harm through McDermott Bank.

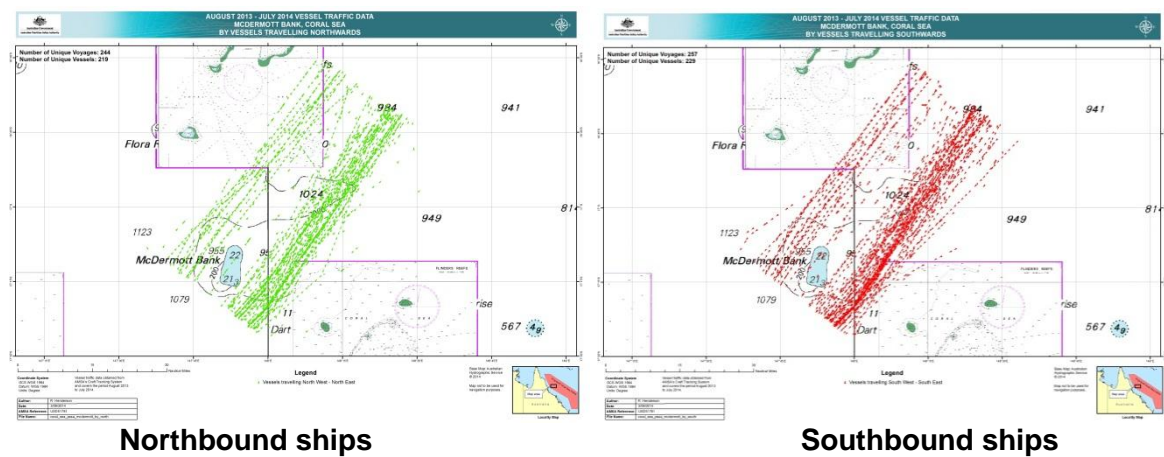


Figure 10: Current shipping patterns off McDermott Bank

47 The adoption and implementation of two-way routes through Diamond Passage and west of Holmes Reefs will reduce the risk of a maritime accident, increase the safety of commercial shipping and improve protection of the region's environmental sensitivity.

48 A summary table combining the traffic statistics between August 2013 and July 2014 to reflect the redirection of McDermott Bank and Lihou Reef shipping traffic to Holmes Reef and Diamond Passage respectively is below:

	Holmes Reef & McDermott Bank	Diamond Passage & Lihou Reef
Unique voyages	490	1,179
Unique ships	436	660
Cargo ships	375	622
Tankers	44	2
Other	9	16
Passenger	0	3
Unknown	8	17

49 Despite the current slowdown in the global economy, Australia's commodity exports, particularly from ports along the north-east coast of Australia⁶, appear to be on a path of steady growth. Therefore, traffic is expected to continue to increase in the Coral Sea including within the proposed two-way routes. The proposed recommendatory two-way routes have anticipated these increases and will be able to accommodate them.

50 Traffic in both areas has limited sea room, and ship encounters tend to be following or head on, similar or reciprocal courses respectively. It is these situations that the recommendatory two-way routes are designed to address. Importantly, the recommendatory two-way routes will also provide increased certainty to commercial crafts and other waterway users.

Hydrography

51 Hydrographic surveys of the immediate and surrounding waters are generally to Zone of Confidence (ZOC) B⁷, as draught and seabed characteristics dictate in all depth critical areas, progressively reducing to ZOC D in non-critical sedimentary areas of approximately 1000 m deep. Bathymetric surveys of the region of the two-way routes have been proven as adequate for safe navigation of commercial shipping.

52 Hardcopy nautical charts exist at scales of 1:1,500,000 and 1:300,000 for the general area. Other scales between 1:150,000 and 1:75,000 are available for critical navigational areas around islands, reefs and cays. All charts are in metric units and based on the WGS 84 datum.

53 Electronic Navigational Charts (ENC) for use with Electronic Chart Display and Information Systems (ECDIS) are also available for the entire region.

Marine environmental considerations

54 A PSSA is defined by IMO as an area that needs special protection because of its ecological, socio-economic or scientific significance and which may be vulnerable to damage as a result of international maritime activities.

55 IMO declared the sea areas of the GBR and TS as PSSA's in 1990 and 2005, respectively. When an area is approved as a PSSA, internationally agreed associated protective measures may be used to manage shipping in that area. For the GBR and TS region of Australia, the measures include ship reporting and routeing systems and vessel traffic services.

⁶ North Queensland Ship Traffic Growth Study, Supplementary Report, Braemar Seascope, 22 March 2013.

⁷ Positional accuracy $\pm 50\text{m}$ with a depth accuracy equal to $1.00\text{ metre} \pm 2\%\text{depth}$.

56 Australia proposes to extend the boundary of the existing GBR and TS PSSA to include an area of the south west Coral Sea that is vulnerable to damage by international shipping activities. Australia will submit a proposal in this regard to MEPC 68 (May 2015).

57 The Coral Sea is an international body of water recognized for its rich biodiversity, unique physical features and important heritage values. The section of the Coral Sea proposed for PSSA designation lies entirely within Australia's EEZ, and comprises the majority of Australia's Coral Sea Commonwealth Marine Reserve. It is considered one of the most distinctive and undisturbed natural systems in the world and provides refuge for a wide range of threatened, migratory and commercially valuable species under serious threat elsewhere.

Miscellaneous information

58 Local fishing vessels and tourist and recreational craft can be encountered anywhere in the area of the two-way routes. Chartered ship routing measures will provide certainty for these users on the routes taken by internationally trading cargo ships.

59 There are currently no existing activities or foreseeable developments of offshore exploration or exploitation of the seabed. Similarly, there are no offshore structures other than those used to provide aids to navigation.

Action requested of the Sub-Committee

60 The Sub-Committee is invited to consider the proposal and recommend the proposal to the Maritime Safety Committee for adoption.

ANNEX 1

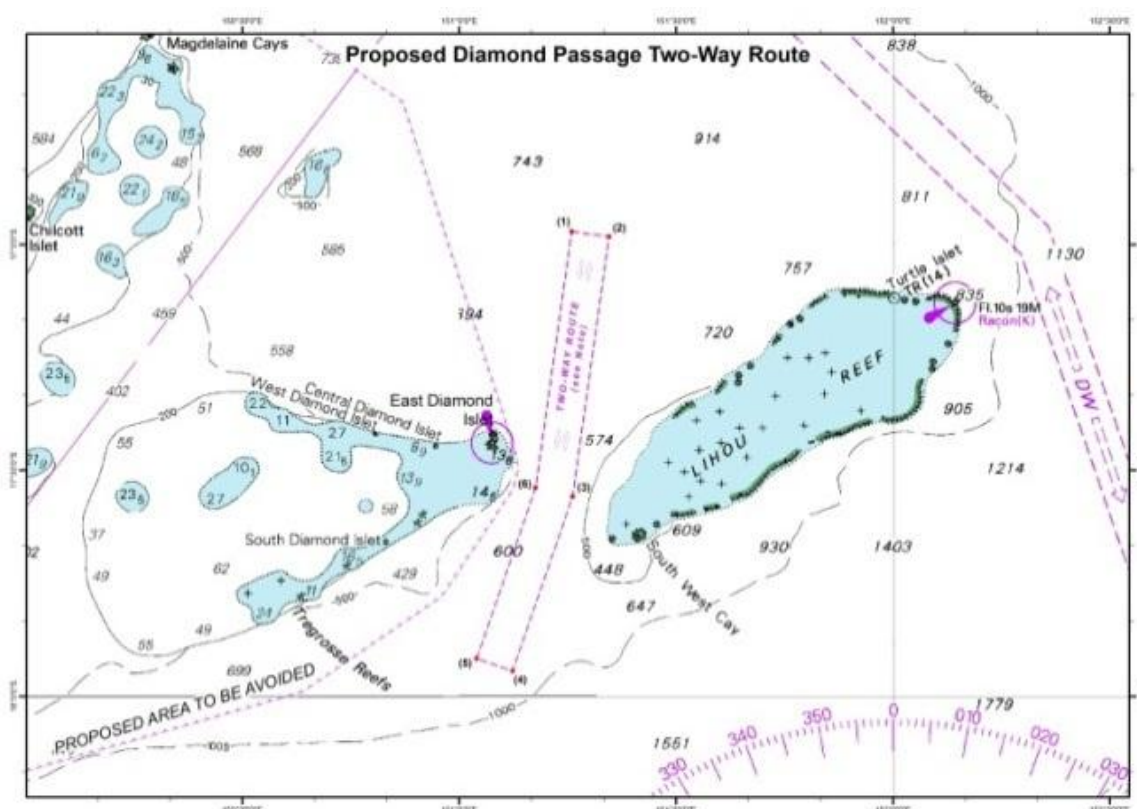
DESCRIPTION OF THE TWO-WAY ROUTES AND ASSOCIATED CHARTLETS IN THE CORAL SEA

The ship routing systems consist of two recommendatory two-way routes in the south-west portion of the Coral Sea, each being five nautical miles wide.

Diamond Passage

The Diamond Passage two-way route starts approximately south east of South Diamond Islet and extends on a bearing of 019-199 degrees for 24.5 nautical miles. It then changes to a bearing of 008-188 degrees for 35 nautical miles.

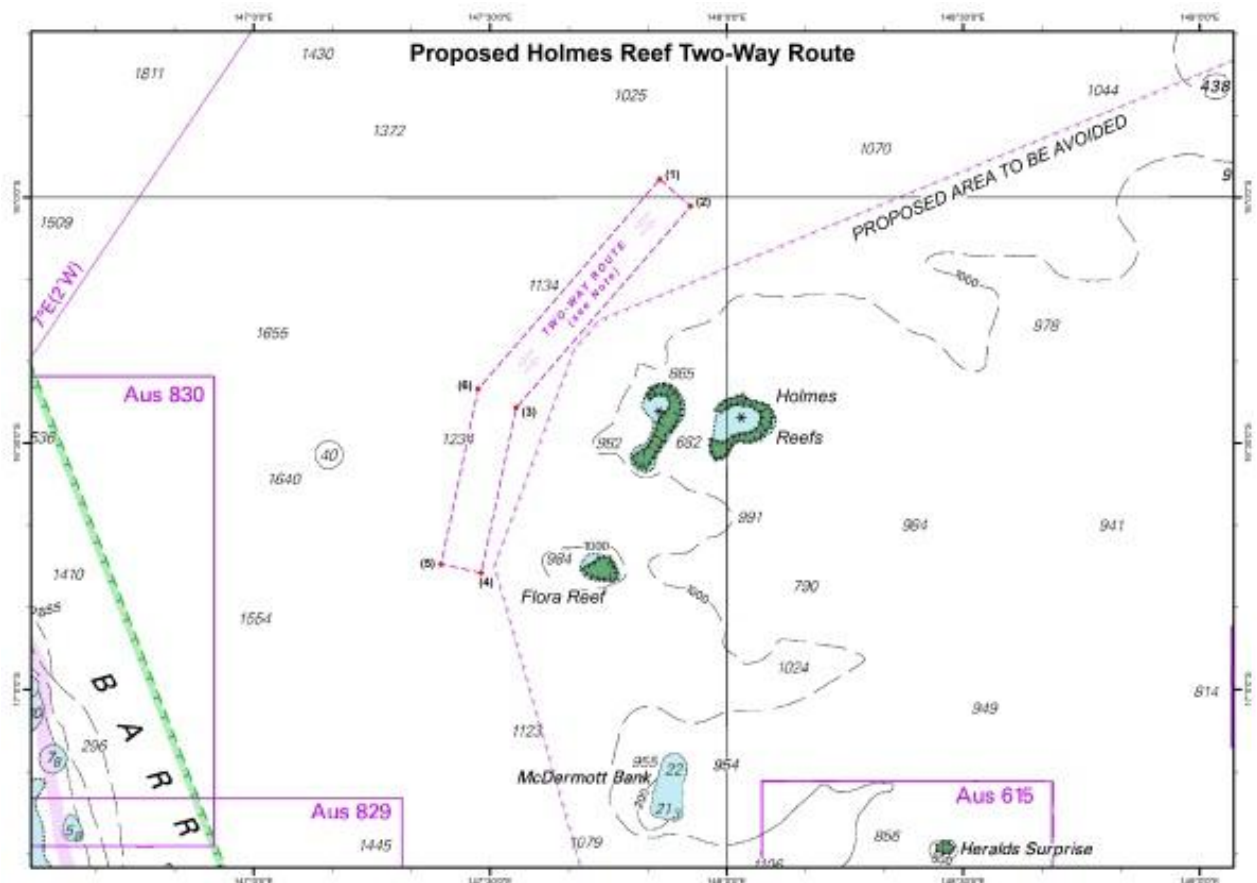
From the two-way route's centreline, the closest distance to the 100 metre bathymetric contour is approximately 6.9 nautical miles in both east and west directions. This means that the passage width between those contours, at its narrowest, is approximately 13.8 nautical miles.



West of Holmes Reef

The Holmes Reef two-way route commences west of Flora Reef and extends along a bearing of 012-192 degrees for 20.5 nautical miles. The bearing changes to 040-220 degrees for 32.5 nautical miles.

Holmes Reefs and Flora Reef are over 10 nautical miles from the eastern limit of the two-way route.



ANNEX 2

**NAMES, NUMBERS, EDITIONS AND GEODETIC DATUMS OF THE
REFERENCE CHARTS**

Diamond Passage

Names	Number	Edition	Datum
Diamond Passage	AUS614	Ed 2	WGS84
Willis Islets	AUS617 Pt 1	Ed 2	WGS84
South West Islet to Magdelaine Cays	AUS617 Pt 2	Ed 2	WGS84
Mackay to Solomon Islands	AUS4621 (INT621)	Ed 4	WGS84

West of Holmes Reef

Names	Number	Edition	Datum
Flinders Reefs	AUS615 Pt 1	Ed 2	WGS84
Flora Reef and Holmes Reefs	AUS615 Pt 2	Ed 2	WGS84
Percy Isles to Booby Island	AUS4620 (INT 620)	Ed 6	WGS84

ANNEX 3

GEOGRAPHICAL COORDINATES OF THE RECOMMENDATORY TWO-WAY ROUTES

A list of the geographical coordinates of the recommendatory two-way routes is provided below.

All geographical positions are based on WGS 84.

Individual coordinate numbering refers to those shown in figure 2 (Diamond Passage) and figure 3 (Holmes Reef).

Diamond Passage

The Western limit is bounded by lines joining the following coordinates:

- (1) 16° 58.25' S 151° 15.56' E
- (6) 17° 32.32' S 151° 10.56' E
- (5) 17° 55.00' S 151° 02.41' E

The Eastern limit is bounded by lines joining the following coordinates:

- (2) 16° 58.95' S 151° 20.72' E
- (3) 17° 33.50' S 151° 15.68' E
- (4) 17° 56.64' S 151° 07.37' E

Holmes Reef

The Western limit is bounded by lines joining the following coordinates:

- (1) 15° 57.78' S 147° 51.50' E
- (6) 16° 23.37' S 147° 28.48' E
- (5) 16° 44.76' S 147° 23.76' E

The Eastern limit is bounded by lines joining the following coordinates:

- (2) 16° 01.08' S 147° 55.42' E
- (3) 16° 25.69' S 147° 33.29' E
- (4) 16° 45.81' S 147° 28.86' E