

Incorporating marine turtle habitats into the marine protected area design for the Great Barrier Reef Marine Park, Queensland, Australia

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Marine turtle habitats were considered in the design of the new zoning network for the Great Barrier Reef Marine Park as part of the Representative Areas Programme. One of the specific design guidelines developed was the incorporation of marine turtle inter-nesting and foraging habitats into the overall network of no-take areas. The guideline was refined further for individual nesting and foraging sites to incorporate all very high priority nesting sites and to incorporate 20% of each identified foraging site, respectively. Marine turtle inter-nesting habitat increased in no-take area protection from 781 km² to 1 886 km² (23.4% to 56.5% of all identified sites); marine turtle foraging habitat increased in no-take area protection from 3 063 km² to 12 490 km² (7.1% to 29.1% of all identified sites). Although the nesting and foraging principles were not achieved in total for all identified marine turtle sites, overall the level of protection afforded by the *Great Barrier Reef Marine Park Zoning Plan 2003* increased for nearly all marine turtle sites identified. Additionally, other activities (e.g. water quality, fisheries, traditional use of marine resources) occurring in the Great Barrier Reef Marine Park that may impact upon marine turtles are being addressed via other mechanisms.

Key words: Marine turtle, marine protected area, Great Barrier Reef, Australia.

INTRODUCTION

SIX of the world's seven species of marine turtle inhabit the Great Barrier Reef Marine Park (Marine Park) and were highlighted in the world heritage nomination for the Great Barrier Reef (Great Barrier Reef Marine Park Authority 1981). Globally significant populations of four species (loggerhead (*Caretta caretta*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), flatback (*Natator depressus*)) nest in the World Heritage Area and there is evidence that the populations of some of these marine turtle species (loggerhead, green, hawksbill) have declined or are declining (Chaloupka 2001, 2002; Limpus *et al.* 2001, 2003; Limpus and Miller 2000; Limpus and Reimer 1994). These four species of marine turtle, as well as the olive ridley (*Lepidochelys olivacea*) and leatherback (*Dermochelys coriacea*) are listed threatened species and hence are protected in the Marine Park.

As part of the Australian Federal Government's Representative Areas Programme, which aimed to protect the Great Barrier Reef's biodiversity through protecting 'representative' examples of all the different habitats and communities in the Marine Park (Fernandes *et al.* 2005), the Great Barrier Reef Marine Park Authority (GBRMPA) incorporated marine turtle habitats into the identification process for a new network of no-take areas (see Lewis *et al.* 2003 for a description of this process). The

Representative Areas Programme involved rezoning the entire Marine Park, one of the world's largest marine protected areas (344,400 km²), and provided an opportunity to develop a consistent reef wide framework for managing human use of the area (Day *et al.* 2002; Fernandes *et al.* 2005). The aim of this paper is to describe how incorporating marine turtle habitats into the network of no-take areas helped achieve the aims of the Representative Areas Programme.

Marine turtles use a variety of habitats throughout their life. Within the Great Barrier Reef World Heritage Area, sandy beaches are important for successful nesting and production of hatchlings; the waters surrounding nesting beaches are important inter-nesting habitat (e.g. the area used by breeding females in between emerging on beaches to lay clutches of eggs); and coral reef, benthic inter-reefal and inshore seagrass habitats are important as juvenile, subadult and adult foraging grounds. These three habitats (nesting, inter-nesting and foraging) were used as a basis for developing guidelines for the marine protected area design for the Marine Park.

Zoning

The *Great Barrier Reef Marine Park Zoning Plan 2003* is the overarching management tool used to manage human use and conserve areas of the

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GBRMPA Zoning (see relevant Zoning Plans and Regulations for details)	Zoning Plan							
	General Use Zone	Habitat Protection Zone	Conservation Park Zone	Buffer Zone	Scientific Research *	Marine National Park Zone	Preservation Zone	
Aquaculture	Permit	Permit	Permit *	X	X	X	X	
Bait netting	✓	✓	✓	X	X	X	X	
Boating, diving, photography	✓	✓	✓	✓	✓ *	✓	X	
Crabbing (trapping)	✓	✓	✓ *	X	X	X	X	
Harvest fishing for aquarium fish, coral and beachworm	Permit	Permit	Permit *	X	X	X	X	
Harvest fishing for sea cucumber, trochus, tropical rock lobster	Permit	Permit	X	X	X	X	X	
Limited collecting	✓ *	✓ *	✓ *	X	X	X	X	
Limited spearfishing (snorkel only)	✓	✓	✓ *	X	X	X	X	
Line fishing	✓ *	✓ *	✓ *	X	X	X	X	
Netting (other than bait netting)	✓	✓	X	X	X	X	X	
Research (other than limited impact research)	Permit	Permit	Permit	Permit	Permit	Permit	Permit	
Shipping (other than in a designated shipping area)	✓	Permit	Permit	Permit	Permit	Permit	X	
Tourism programme	Permit	Permit	Permit	Permit	Permit	Permit	X	
Traditional use of marine resources	✓ *	✓ *	✓ *	✓ *	✓ *	✓ *	X	
Trawling	✓	X	X	X	X	X	X	
Trolling	✓ *	✓ *	✓ *	✓ *	X	X	X	

PLEASE NOTE: This guide provides an introduction to Zoning in the Great Barrier Reef Marine Park. Relevant Great Barrier Reef Marine Park Zoning Plans should be consulted for confirmation of use or entry requirements.

* Additional restrictions / conditions apply.

ACCESS TO ALL ZONES IS PERMITTED IN AN EMERGENCY.

Fig. 1. Activity matrix for the Great Barrier Reef Marine Park zoning plan.

Marine Park. It divides the Marine Park into eight zones, providing for increasing levels of protection and various types of human use. Specific activities that may be undertaken in a zone with or without a permit are specified in the 'use and entry' provisions for each zone in the Zoning Plan. All other activities are prohibited.

Within the Great Barrier Reef World Heritage Area, there are many potential threats to marine turtles and the severity of each threat varies by location and species of marine turtle; the following activities (not in any priority order) are known to have the potential to injure or kill marine turtles (Dobbs 2001; Greenland *et al.* 2002; Haines *et al.* 1999; Haines and Limpus 2000; Queensland Environmental Protection Agency unpublished data): incidental capture in fishing gear (trawl nets, large mesh gill nets, crab pots and float lines, fishing line and hooks, baited drum lines), unsustainable Indigenous hunting, poaching, ingestion of or entanglement in marine debris, boat strike, coastal development leading to decreased water quality (pollution) and habitat loss (nesting and foraging), feral animal predation on nesting beaches and increased incidence of disease. Not

all known or potential threats to marine turtles could be addressed through Marine Park zoning. Figure 1 provides a general overview of the types of use and entry provisions in relation to the eight Marine Park zones relevant to marine turtles and human activities that threaten or potentially threaten marine turtles. For the purposes of the Marine Park, no-take areas are those areas zoned as Marine National Park or Preservation. For more detailed information about the Zoning Plan, zone objectives and types of activities, refer to GBRMPA (2003, 2005).

METHODS

The application of biophysical data in the 'Identification Phase' of the Representative Areas Programme (Lewis *et al.* 2003) was assisted by advice from an independent Scientific Steering Committee and other reef and non-reef experts (Fernandes *et al.* 2005). The Scientific Steering Committee recommended eleven biophysical operational principles (see Fernandes *et al.* 2005 for a description of these principles) to guide the establishment of a new network of no-take areas that would achieve the objectives of the Representative Areas Programme.

One of the biophysical operational principles was 'to represent a minimum amount of each community type and physical environment type in the overall network'. This principle was developed to ensure that all known communities and habitats that exist within bioregions were included in the network of no-take areas. Specific communities and habitats were identified, including marine turtle habitats, for protection in no-take areas based upon the reliability and comprehensiveness of available data. For marine turtle habitats, the Scientific Steering Committee recommended to the GBRMPA that at a minimum no-take areas should include known major turtle nesting and foraging sites.

The Marine Park extends seaward from mean low water adjacent to islands owned by the State of Queensland; hence all the important marine turtle nesting (=terrestrial) sites (except Lady Elliott Island) identified for the Representative Areas Programme are outside the zoning arrangements for the Marine Park and most of the nesting sites (33 of 37) are managed by the Queensland Government as part of their National Park or Reserves system. However during the inter-nesting period nesting female marine turtles use water depths in the Marine Park up to 40 metres (Bell 2005) and habitat up to 10s of kilometres from the nesting beach (Tucker *et al.* 1996). Some species (e.g. loggerhead turtles) appear to show quite strong fidelity to inter-nesting habitats (Limpus and Reed 1985; Tucker *et al.* 1996), whereas other species may be less tied to one specific location (e.g. green turtles Carr *et al.* 1974; Meylan 1982). To be able to account for the important nesting sites identified for the Representative Areas Programme, all locations included a 5 km radius for the protection of inter-nesting habitat. This distance reflected the Queensland Government's coastal waters jurisdiction and represented a compromise with the published distances travelled by marine turtles between nesting attempts.

Marine turtle nesting sites were identified by genetic stock for each species and prioritized on published and spatial information, which indicated the importance (based on the number of individual turtles nesting) of the sites to the maintenance and/or recovery of the genetic stock (Dobbs *et al.* 1999; Limpus 1980; Limpus *et al.* 1981, 2000, 2003; Limpus and Miller 2000; Limpus and Reimer 1984; Miller *et al.* 1995; Parmenter 1994). For green turtles there are two genetic breeding populations which are delineated by the area North and South of Princess Charlotte Bay; these stocks are termed the 'northern GBR stock' and the 'southern GBR stock'. For the loggerhead, flatback, leatherback and hawksbill turtle there is only one genetic breeding population of each species

in the Marine Park. For olive ridley turtles, there are no known nesting locations adjacent to the Marine Park.

Incorporating the above information, the Scientific Steering Committee recommendation was refined for inter-nesting habitat as follows:

- Very high priority nesting beaches for each genetic stock should include a 5 km radius in no-take zones;
- High priority nesting beaches for each genetic stock should include a 5 km radius and be included in no-take areas whenever possible; and
- Medium priority nesting beaches for each genetic stock including a 5 km radius should be used as a parameter during reporting on how well the range of biophysical operational principles were achieved (refer to Lewis *et al.* 2003 for a description of this process).

Seven very high, ten high and 20 medium priority sites were identified (Table 1, Fig. 2a).

Virtually the entire Marine Park is used as a foraging area for marine turtles. However, for the purposes of the Representative Areas Programme, six marine turtle foraging areas were identified as a high priority for inclusion in the network of no-take areas (Fig. 2b). These sites captured both cross-shelf and latitudinal diversity (which was another Scientific Steering Committee recommendation for the Representative Areas Programme, Fernandes *et al.* 2005) and were further described by genetic stock where possible. Many of the high priority foraging sites were based on published (Limpus *et al.* 1992, Limpus *et al.* 2005, Limpus and Miller 2000) and unpublished (Queensland Environmental Protection Agency data) information indicating significant numbers or sightings of the particular genetic stock of marine turtle. Not all species were represented in the identified foraging habitats: sites were identified for the northern and southern Great Barrier Reef green turtle stocks and for hawksbill and loggerhead turtles. No sites were identified specifically for flatback, olive ridley or leatherback turtles because of a lack of information about known aggregations of these species. For foraging habitats, the guideline was refined to recommend the inclusion of 20% of the priority foraging sites in no-take zones and to include inshore coastal strips with a 12 km radius and reefal areas with a 1 km radius.

RESULTS

Overall, an increased level of protection of marine turtle inter-nesting habitat was achieved in the *Great Barrier Reef Marine Park Zoning Plan 2003*. Of the total inter-nesting habitat

Table 1. Percentage of priority marine turtle inter-nesting habitats in no-take zones Pre- and Post- the Representative Areas Programme. MNPZ=Marine National Park Zone; PZ=Preservation Zone.

Priority and Species by Genetic Stock (number of sites)	Percentage of inter-nesting habitat in highly protected zones (MNPZ or PZ)		
	Area (km ²)	Pre-Representative Areas Programme	Post-Representative Areas Programme
Very High			
Flatback (2)	203	2	87
Northern GBR Green (1)	88	100	100
Southern GBR Green and Loggerhead (2)	173	14	20
Hawksbill (1)	90	14	100
Loggerhead (1)	77	15	36
High			
Flatback (1)	94	0	27
Northern GBR Green (2)	166	81	100
Southern GBR Green and Loggerhead (4)	331	45	74
Hawksbill (3)	255	37	98
Medium			
Flatback (6)	737	0	13
Northern GBR Green (3)	245	41	89
Southern GBR Green and Loggerhead (8)	624	16	56
Hawksbill (3)	255	22	48

(3 338km²) identified for the Representative Areas Programme, the area contained within no-take zones increased from 781km² to 1 886km², an increase from 23.4 to 56.5% (Table 1).

Only one very high priority inter-nesting site (and its 5km buffer) for one genetic stock of one species of marine turtle was 100% in highly protected zones under the pre-Representative Areas Programme zoning (northern GBR green turtle site at Raine Island) (Table 2a). However, this increased under the post-Representative Areas Programme zoning to include the one very high priority hawksbill turtle (Milman Island) and one high priority (Moulter Cay) and one medium priority (MacLennan Cay) northern GBR green turtle inter-nesting site (Table 2a).

When assessed by priority against all the zoning, the inter-nesting habitat for each genetic stock of marine turtle increased in the overall protection afforded by the Zoning Plan. Zoning protection was increased at all identified priority marine turtle nesting sites with most achieving greater than 50% in no-take zones. Under the pre-Representative Areas Programme zoning, eleven sites did not have any Marine Park waters within no-take zones; this was reduced to just two sites (Facing Island, Farmer Island) in the post-Representative Areas Programme zoning. Details about individual sites are contained in GBRMPA (2005) and Dobbs (2007a).

Overall, marine turtle foraging habitats identified for the Representative Areas

Programme increased in the level of protection in no-take zones from 7.1% to 29.1%, an increase in area from 3 063km² to 12 490km² (Table 2b).

Protection of marine turtle foraging habitats in no-take areas identified for the Representative Areas Programme increased for all six sites (Table 3). Overall there was a general reduction in less protected zones (e.g. General Use) and more of the areas in Habitat Protection or Conservation Park zones. Although these zones allow large mesh gill netting and limited fishing or collecting, respectively, it is important to remember that these zones still offer a level of protection against activities considered harmful to marine turtles and/or their habitats (e.g. trawling). Further details about individual locations are contained in GBRMPA (2005) and Dobbs (2007a).

DISCUSSION

Marine megafauna are being used increasingly in the justification for and design of marine protected areas around the world (Hooker and Gerber 2004; Hoyt 2004; Preen 1998). Within the Marine Park, the Representative Areas Programme achieved many of the recommended biophysical operational principles. For example, all 70 'bioregions' achieved a minimum of 20% in no-take zones. Overall no-take zone protection across the Marine Park was increased from <5% to >33% (Fernandes *et al.* 2005).

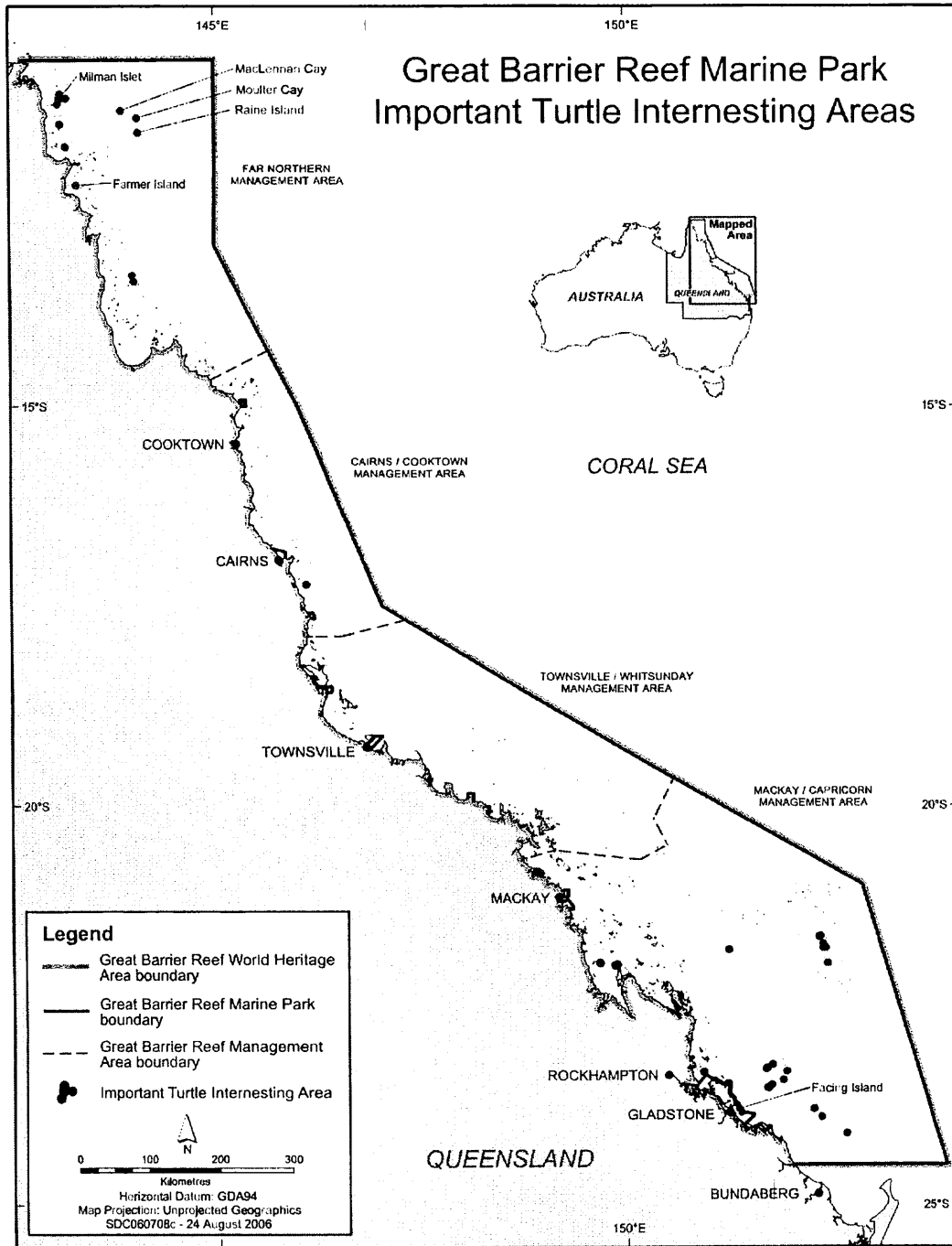


Fig. 2. Marine turtle (a) inter-nesting habitat identified for use in the Representative Areas Programme.

Another key principle of the Representative Areas Programme was to minimize social, economic and cultural impacts on users (Fernandes *et al.* 2005). As a result, recommended protection levels as stated in the refined turtle nesting and foraging guidelines were achieved in some sites and for some species, but not others. For example, there was only one foraging site in the Marine Park where the principle of incorporating 20% into no-take zones was not met (the region identified as from Hinchinbrook to Cape Bowling Green). The principle was not entirely met because this site

is an important recreational and commercial fishing area for the adjacent coastal communities. However, no-take zone protection was increased from 0.03% to 13.4% (Table 3).

Some of the marine turtle habitats identified for the Representative Areas Programme were also identified for other reasons. For example, the important southern Great Barrier Reef green turtle foraging habitat of Shoalwater Bay in the southern Marine Park was an area identified as highly important for dugongs (Dobbs *et al.* in press) and also an area that was special or

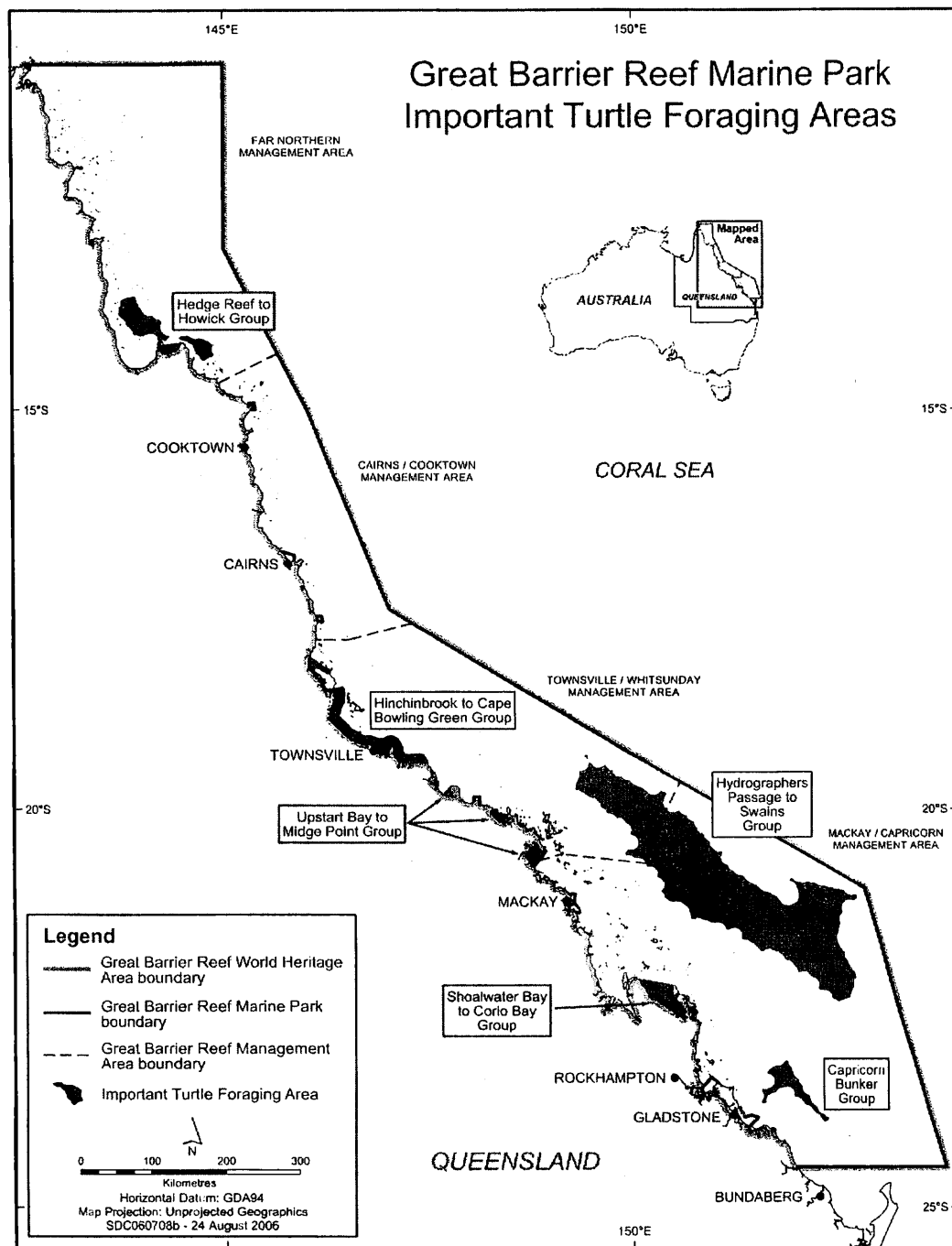


Fig. 2. Marine turtle (b) foraging habitats identified for use in the Representative Areas Programme.

unique because of physical or biological natural attributes (Dobbs in preparation). The zoning achievement in respect of the marine turtle habitat in Shoalwater Bay also achieved other design principles developed for the Representative Areas Programme, specifically that no-take areas should represent identified dugong habitats summing to about 50% of all high priority dugong habitat (Dobbs *et al.* in press).

Marine turtles exhibit strong fidelity to foraging areas and nesting beaches (Limpus

1984; 1985; Limpus *et al.* 2005). Therefore basing zoning protection around such sites is appropriate from a management perspective. This approach complements recommendations that protected areas should concentrate on protecting the most important life history stages of migratory species (Gerber and Heppell 2004). For marine turtles, population modelling suggests that adults and subadults are the most important life history stage for maintaining a stable marine turtle population (Crouse *et al.* 1987; Heppell *et al.* 1996). The fact that most of the important nesting sites in the Great

Table 2. Comparison of marine turtle habitat zoning within the Great Barrier Reef Marine Park Pre- and Post- the Representative Areas Programme.

(a) inter-nesting habitat

Zone Type	Pre-Representative Areas Programme		Post-Representative Areas Programme	
	Percentage	Area (km ²)	Percentage	Area (km ²)
Unzoned	0.6	21	0	0
General Use	51.0	1704	18.3	612
Habitat Protection	23.9	799	10.2	341
Conservation Park	1.0	34	14.4	482
Buffer	0	0	0	0
Scientific Research	0	0	0.5	16
Marine National Park	22.2	741	52.6	1755
Preservation	1.2	40	3.9	131

(b) foraging habitat

Zoning	Pre-Representative Areas Programme		Post-Representative Areas Programme	
	Percentage	Area (km ²)	Percentage	Area (km ²)
Unzoned	1.7	729	0	0
General Use	36.0	15 460	20.9	9 004
Habitat Protection	52.5	22 555	44.7	19 205
Conservation Park	0.6	268	3.4	1 451
Buffer	0.3	120	0.000001	4
Scientific Research	0.1	30	0.2	71
Marine National Park	6.9	2 956	28.6	12 296
Preservation	0.2	107	0.5	194

Table 3. Percentage of priority marine turtle foraging habitats in the Great Barrier Reef Marine Park in no-take zones Pre- and Post- the Representative Areas Programme.

Foraging Habitat	Species by genetic stock	Area (km ²)	Pre-Representative Areas Programme	Post-Representative Areas Programme
Hedge Reef to Howick Group	Hawksbill, Northern GBR green turtle	2786	21.6	45.0
Hinchinbrook to Cape Bowling Green	Southern GBR green turtle	2860	0.03	13.4
Upstart Bay to Midge Point	Southern GBR green turtle	766	0.0	25.4
Shoalwater Bay to Corio Bay	Southern GBR green turtle	1314	3.5	50.4
Capricorn Bunker Group	Loggerhead, Southern GBR green, Hawksbill turtle	1533	4.1	27.5
Hydrographers Passage to Swains	Loggerhead, Southern GBR green turtle	33517	7.0	28.6

Barrier Reef World Heritage Area were already included in protected areas (e.g. Queensland National Parks) meant that the nesting beaches were already under a management regime. Through the Representative Areas Programme, protection for the inter-nesting habitat adjacent to those beaches increased in nearly every case and has provided a complementary management approach to marine turtles that are managed by different government jurisdictions.

Marine turtles represent one of the most jurisdictionally complex species in the Marine Park. After the *Great Barrier Reef Marine Park Zoning Plan 2003* (GBRMPA 2003) came into effect on 1 July 2004, the Queensland Government complemented zoning arrangements for the Great Barrier Reef (Coast) Marine Park, effectively extending the Marine Park

zoning to the high water mark along the Queensland coast and state-owned islands. Kenchington (1990) described the complexities of managing turtle populations in the Marine Park. They 'hatch from nests on land under Queensland jurisdiction, move to the sea across the intertidal areas under state jurisdiction, cross the low water mark to enter Commonwealth jurisdiction, and then move on to feed and grow for years in international waters. Eventually they return to the Great Barrier Reef to mate in areas under Commonwealth jurisdiction and for females to lay eggs on Queensland territory'. The GBRMPA's ability to set specific guidelines for marine turtles was the result of the significant amount of marine turtle research and monitoring that had occurred in the Great Barrier Reef World Heritage Area over the past 30+ years. This meant that the habitats

important to most of these species could be specifically identified and incorporated into the new zoning plan. However, there was no specific recommendation made as part of implementation of the Representative Areas Programme to account for the migratory pathways that may be used by marine turtles in the Marine Park. There are no known specific migratory pathways in the Marine Park for any species of marine turtles even though it is known that marine turtles may migrate 100s to 1000s of kilometres between nesting and foraging sites (Limpus *et al.* 1992; Miller *et al.* 1998).

However, given the behaviour of marine turtles and the range of human activities that threaten or potentially threaten marine turtles in the Marine Park, zoning is not the only management tool that will result in the conservation of these threatened species. Marine turtle conservation in the Marine Park is achieved through managing human activities that impact on marine turtles, including both current activities and predicted future activities (Dobbs 2001). Other protection measures that came into effect through the *Great Barrier Reef Marine Park Zoning Plan 2003* that should benefit marine turtles and/or their habitats include:

- All marine turtle sites within the Far Northern Management Area are contained within the Remote Nature Area where activities involving dumping spoil, reclamation, beach protection works, harbour works and constructing or operating a structure other than a vessel, mooring or a navigational aid are prohibited.
- Raine Island, Moulter Cay and MacLennan Cay are surrounded by a Restricted Access Area that prohibits access unless the written permission of the GBRMPA has been obtained. In fact, the waters directly around Raine Island would have been considered suitable for inclusion in the Preservation Zone if the need for photography, filming or sound recording that would benefit the Raine Island Nature Reserve or the Great Barrier Reef World Heritage Area was not seen as a necessary activity to allow in the area. Recently (2007), Raine Island, Moulter Cay and MacLennan Cay were designated as National Park (Scientific), thereby receiving the highest level of protection under the Queensland National Park system.
- All six species of marine turtle were categorized as 'Protected Species' and the written permission of the GBRMPA is required to take one of these species from the Marine Park. This has since led to the development of a reef-wide *Policy on managing the direct take of Protected Species from the Marine Park*; and
- Special Management Areas for dugong conservation were established that reinforced large-mesh netting management arrangements in effect under the *Queensland Fisheries Regulations 1995*. As such, the provisions should also benefit marine turtles.

Collectively all these actions should assist with more effective conservation of marine turtles. However there is a need to continue to address other activities that impact on marine turtles and their habitats in the Marine Park. The GBRMPA is working with the Queensland Government to improve water quality thereby increasing the resilience of inshore habitats and to promote ecologically sustainable fisheries especially through the use of turtle excluder devices in the trawl fishery and better solutions (e.g. on-water attendance) for reducing entanglement in large-mesh gill nets. The GBRMPA is also working in partnership with the tourism industry to promote responsible practices for marine turtle tourism; with Aboriginal and Torres Strait Islander Traditional Owners to ensure sustainable hunting of marine turtles in the Marine Park (Dobbs 2007b, Havemann *et al.* 2005); and with local government to ensure sustainable coastal development practices (e.g. appropriate stormwater regimes) to minimize debris entering the Marine Park.

The Representative Area Programme provided an opportunity to increase the resilience of the Great Barrier Reef to current and future activities that may impact upon the reef ecosystem, including marine turtle habitats. The biological characteristics of marine turtles (Dobbs 2001) are a challenge for management because it is extremely difficult to assess whether populations are stable, increasing, or declining and to assess the effectiveness of management strategies. The effectiveness of strategies, such as the Representative Areas Programme, may not be measurable for another 20 to 50 years if indicators such as numbers of adult female marine turtles breeding at index nesting beaches are used. However other information, such as that collected about live or dead stranded marine turtles, may provide early indications of the effectiveness of various zoning regimes put in place through the Representative Areas Programme.

Some of the key lessons learned from the incorporation of marine turtle habitats into the marine protected area design for the Marine Park included:

- Using best available science to base decisions and identify areas important to marine turtles. There was an extensive information base upon which to identify important nesting (and hence inter-nesting) and foraging sites. As highlighted above the GBRMPA was in a unique opportunity in that a world class

research study on marine turtles had been in existence in the Marine Park for more than 25 years; this helped with prioritizing the multitude of nesting and foraging locations contained within the Great Barrier Reef World Heritage Area;

- The close working relationship between the managers of the identified priority nesting beaches and the GBRMPA to ensure complementary zoning arrangements were put into place under Queensland (state) Government legislation. This required open communication and a trusting relationship between the two government agencies to ensure complementary provisions could be put in place for the intertidal waters around the nesting beaches;
- Community acceptance of the value of protecting marine turtles habitats. Marine turtles are charismatic and iconic animals associated with the Great Barrier Reef, indeed they were specifically mentioned in the nomination document for World Heritage listing (GBRMPA 1981). Therefore, many submissions during the public consultation phases for the Representative Areas Programme highlighted the need to protect important marine turtle habitat. By having a prioritized list of inter-nesting and foraging sites based on the best available scientific information, the community was able to understand that not all locations were equal and hence greater protection was required in certain areas for marine turtles; and
- Balancing social and economic values with marine turtle conservation. For example, a spectrum of zoning (e.g. Habitat Protection and Conservation Park) was incorporated into the final marine protected area design when no-take zones could not be achieved in important marine turtle habitats. This meant that some potential threats to marine turtles were addressed through zoning but did not necessarily require no-take zones to achieve the desired outcome.

ACKNOWLEDGEMENTS

Thanks to the many staff of the Great Barrier Reef Marine Park Authority who assisted with incorporating important marine turtles habitats into the final network of zoning for the *Great Barrier Reef Marine Park Zoning Plan 2003*. In particular, appreciation is extended to the Spatial Data Centre of the GBRMPA (Mark Kelton, Paul Tudman, Kerry Sutton and Leath Muller) for pulling together statistics and the maps.

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