6.3 c Marine Turtle Review Mar 2009 J. Thorogood

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Tuesday, 10 March 2009 Our Reference: 090307Lii

Mr Rob Lamb
Chairman
Satori Resorts Pty Ltd
GPO Box 2760
BRISBANE QLD 4001

Dear Mr Lamb,

Re: Proposed Ella Bay Resort / Turtles

Introduction

This 'report by letter' responds to your request that I review the validity of concerns recently expressed by the Environmental Defenders Office of North Queensland Inc. (EDONQ) in relation to the DEWHA determination (dated 4th of July, 2005), in respect of the EPBC Act self-referral lodged by The 20/20 group Australia Pty Ltd on behalf of the 3D Prestige Property Partnership (dated 1st of June, 2005).

In letters to the Minister for the Environment, the Hon. Peter Garrett (dated 18th and 24th February, 2009), the EDONQ requested that the Minister reconsider / revoke the determination on the basis that 'substantial new information' had become available. The information the EDONQ sought the Minister to consider related to surveys of turtle nesting activity on the beach adjoining and to the north of the Ella Bay Resort site near Innisfail.

As the original referral did not specifically present information relating to marine turtles, it is acknowledged that any information relating to marine turtles is new. This review thus focuses on consideration of the nature of the new information: is it 'substantive' in the context of the referral?

To complete this review, I have read the documents, listed in Appendix A, and visited the foreshore adjoining the site and to the north (March 2009). A concise review of the distribution, ecology and management of marine turtles likely to occur in the vicinity of the site is presented at Appendix B.

Author's Credentials

The views I offer are based on over twenty years of practice, and the experience gained in considering the ecology and conservation status of marine turtles and their habitat, and the management of human impacts upon turtles and their habitat. Recent studies I have lead or contributed to include the EISs and EMPs for Port of Airlie, Shute Bay Marina and Traveston Dam, an over-the-horizon radar system in the Torres Strait, and for Defence activities in Halifax Bay.

2008 Turtle Surveys

Surveys of turtle nesting activity were undertaken by Constable, Dobson and Connolly (believed to be local residents), in November and December of 2008 and February of 2009. These surveys recorded a recently dug nest adjacent to the proposed resort site, 8 recently dug nests within approximately 300m to the north of the proposed resort site and a further 39 recently dug nests along the 20km of beach extending to the north.

Significance of Survey Results

Suitability of Habitat

As described by Constable et al. (2009)[1], the potential nesting habitat adjoining the site and to the north is limited by geographic features that include dense foreshore vegetation, a mid-dune lagoon, and an apparently dynamic upper beach and fore dune.

Dense terrestrial vegetation limits the width of the low dunes available for turtle nesting. This is particularly so adjoining the site. The low dunes are commonly wider (to approx. 20m) to the north of the site. Dune vegetation includes several exotic weeds (e.g. Singapore daisy), which can impede turtle nesting.

The foreshore adjoining the site, and to the north is dynamic. Erosion scarps are indicative of widespread loss of the upper beach and fore dunes; elsewhere, sand has recently been deposited around the base of fore dune trees.

[1] Constable, R., Dobson, S. & Connolly, T. 2009, *Marine Turtle Nest Surveys of Bramston Beach and Ella Bay*, report prepared for the Department of Environment, Water, Heritage and the Arts.

Current Threats

In addition to the physical instability of the beach and fore dunes, feral pigs and dogs together with goanna are likely to predate nests.

In north Queensland, indigenous harvesting of turtles and eggs, accidental capture in fishing gear, boat strike, dredging, marine debris, habitat damage and light disorientation pose regional threats.

Intensity of Use (by Turtle)

During the Constable et al. (2009) surveys, a single nest was recorded adjoining the resort site; a further 47 nests were recorded along the 20 km of coast to the north. This indicative intensity of nesting is considered very low when placed in the context of known rookeries such as Capricorn Bunker Group (approx. 8,000 nests per season) and Raine Island – Pandora Cay (approx. 30,000 nests per season).

Likely Success of Nesting

The marginal nature of nesting habitat in the vicinity of the site, together with the elevated levels of predation associated with mainland sites, contribute to a likely lower level of hatching success for nests along the Ella Bay coast, when compared to offshore rookeries.

Likely Impacts of the Resort

As described in the project EIS, the resort will be well set back from the beach. Potential impacts associated with human activity (within the resort) and in particular light spillage can be effectively managed.

It is proposed to prohibit vehicle access to the beach (and it is noted numerous rocky headlands make this feasible).

Use of the beach after dark (when females come ashore to nest and the majority of hatchlings emerge) is likely to be minimal. The beach is relatively narrow and steep, the fore dunes strewn with flotsam. Crocodiles are common in the region.

Day time use of the beach is unlikely to impact 'late returning' females and incubating eggs.

That interaction between humans and turtles is likely to be minimal, and significantly less than at major rookeries such as Heron Island and Mon Repos.

Conclusions

Whilst records of nesting activity in the vicinity of the proposed resort are new, they are not of substantial relevance to the Proponent's EPBC Act referral.

The reported density of nesting activity is low, reflecting the marginal character of the habitat available. As reported nests are most likely to have been those of predominantly green turtles, the 20km stretch of coast from the resort site north, represents approx. 0.1% of known annual nesting activity along the Queensland coast.

Further, the likely threats posed by the proposed development are minor: development is to be well set back from the beach and fore dunes, potentially damaging activities (such as vehicle access) are to be restricted, and the likely incidence of interactions between humans and turtles is low.

'Worst Case' scenarios would not lead to significant impacts on turtle populations. Likely negative impacts on turtles will have trivial consequences for turtle conservation.

Opportunities for Enhanced Management

The Proponent has undertaken to support the EPA's interests in turtle monitoring and management within the vicinity of the site. Monitoring of nesting activity and of hatching success is likely to contribute to the effective management of mainland nesting sites.

The environmental management initiatives flagged in the EIS Ecology Report are supported (some refinement is likely to be required; cordoning off of nests is not recommended); as is the intent to include an element relating to turtle ecology in the visitor 'inductions'.

On the basis of the material reviewed, the proposed resort poses a negligible threat to turtle nesting along the Ella Bay coast. Yet it offers the prospect of enhanced ecological understanding through monitoring, and enhanced management primarily through education. On balance this is a desirable outcome.

The new information presented to the Minister by the EDONQ is not of substantial relevance to the EPBC Act referral, and does not warrant revocation of the Minister's decision.

Yours sincerely,

John Thorogood, M.Sc., Ph.D., FAIBiol., FEIANZ
Managing Principal

Appendix A

List of documents reviewed:

- letter to Minister Garrett – Ella Bay reconsideration request – 18-2-09.pdf
- letter to Minister Garrett – provision of additional information – 24-2-09.pdf
- Sea Turtle Nest Survey of Bramston Beach and Ella Bay 6Feb09.pdf (Constable et al. 2009)
- Threats to Marine Turtle Nests at Bramston Beach and Ella Bay 6Feb08.pdf (Constable et al. 2009; NB incorrect date in file name)
- Ella Bay Fauna Survey Report January Draft C.pdf (BAAM 2009)
- DEWHA EPBC referral 2005.pdf
- COG Terms of Reference Document.pdf

Appendix B

Ella Bay Integrated Resort Development

Marine Turtle Review

Prepared for:

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Distribution Record

Santori Resorts Pty Ltd: PDF via email

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1 Introduction

This report supports the 'report-by-letter' authored by Dr John Thorogood and dated 10th of March, 2009. It presents information relating to the conservation, distribution, ecology and management of marine turtles in Queensland, and in the vicinity of the proposed resort development at Ella Bay, near Innisfail.

2 Legislative Context

The inshore coastal waters of Ella Bay provide habitat for six species of conservationally significant marine turtles. Marine turtles as recognised under the State *Nature Conservation Act 1992* and Nature Conservation (Wildlife) Regulation 1994 (NCWR); Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); and various international instruments, such as the International Union for Conservation of Nature and Natural Resources (IUCN) Red List (Table 2.1).

Table 2.1 Conservationally significant marine turtles that have been recorded from, or that may occur in, the waters of Ella Bay.

Species	Common Name	EPBC Act	NCWR	IUCN Red List
Cheloniidae				
Caretta caretta	loggerhead turtle	E, M, O	E	EN
Chelonia mydas	green turtle	V, M, O	V	EN
Eretmochelys imbricata	hawksbill turtle	V, M, O	V	CE
Lepidochelys olivacea	olive ridley turtle	E, M, O	E	EN
Natator depressus	flatback turtle	V, M, O	V	DD
Dermochelyidae				
Dermochelys coriacea	leatherback turtle	V, M, O	E	EN

EPBC Act: E - endangered, V - vulnerable, M - migratory, O – marine (DEWHA 2009).
NCWR: E- endangered, V – vulnerable (EPA 2009).
IUCN Red List: EN – endangered, CE – critically endangered, LR – lower risk, DD – data deficient (IUCN 2009).

3 Distribution and Ecology of Marine Turtles

Marine turtles are generally highly migratory, moving between feeding grounds and rookeries (mating and nesting areas), with both males and females undertaking migrations of up to 3,000 km (Environment Australia 2003). Turtles typically nest along the Queensland coast from October to February, and they predominantly nest at night around the high tide (GBRMPA 2009). Nesting sites are situated above the high tide mark, and nesting females prefer moist sand to dry sand (GBRMPA 2009). Loggerhead, green and flatback hatchlings emerge from December to May (GBRMPA 2009), usually at night (although they do emerge during the day on occasion; pers. obs.).

All marine turtle species are experiencing serious threats to their survival. The main threats are (Environment Australia 2003; Kirkwood & Hooper 2004; GBRMPA 2009):

- habitat degradation and destruction, particularly seagrass beds, mangrove forests, nesting beaches and coral reefs
- entanglement and drowning in fishing gear and shark nets and drum lines
- ingestion of plastic bags
- pollution and declining water quality
- indigenous over-harvesting of both turtles and eggs, and
- predation of eggs by native and introduced animals.

The majority of strandings and mortality reports in Queensland are related to boat strike and entanglement in fishing gear (Table 3.1 & Table 3.2). The majority of reports are in southern Queensland (Hervey Bay to the Gold Coast; Haines et al. 1999; Haines & Limpus 2000; Greenland et al. 2004; Greenland & Limpus 2006; 2008).

Table 3.1 Number and cause of reported marine turtle strandings and mortalities in Queensland from 1999 to 2004.

Year	Total	Not determined	Natural	Human-Related
		554		
2000[1]	495	63	9	28
2001[2]	533	69	5	26
2002[2]	543	68	4	28
2003[3]	549	71	4	25
2004[4]	574	66	2	32

Table 3.2 Causes of human-related strandings and mortalities in Queensland from 2000 to 2004.

Year	Total	Shark Control Program	Boat Strike	Dredging	Ingested Plastic	Illegal Hunting	Entanglement in fishing gear
		3	78	2	15	0	14
2001[2]	533	4	141	5	7	9	29
2002[2]	543	4	150	7	9	4	52
2003[3]	549	9	75	0	5	7	45
2004[4]	574	4	59	2	15	5	39

3.1 Green Turtle

The green turtle *(Chelonia mydas)* is listed as 'vulnerable', 'marine' and 'migratory' under the EPBC Act and 'vulnerable' under the NCWR. Globally, it is also listed as 'endangered' by the IUCN.

[1] Haines & Limpus 2000
[2] Greeland et al. 2004
[3] Greenland & Limpus 2008
[4] Greenland & Limpus 2006

Green turtles are likely to nest on the beach adjacent to the proposed development (A. Freeman 2009 [Queensland Environmental Protection Agency], pers. comm., 10 March). They are also likely to use the adjacent waters for foraging.

Distribution

Green turtles have a worldwide tropical and subtropical distribution, and appear to the be the most abundant of the six species found in Queensland. They are found over subtidal and intertidal (coral and rocky) reefs and seagrass meadows of the continental shelf (GBRMPA 2009).

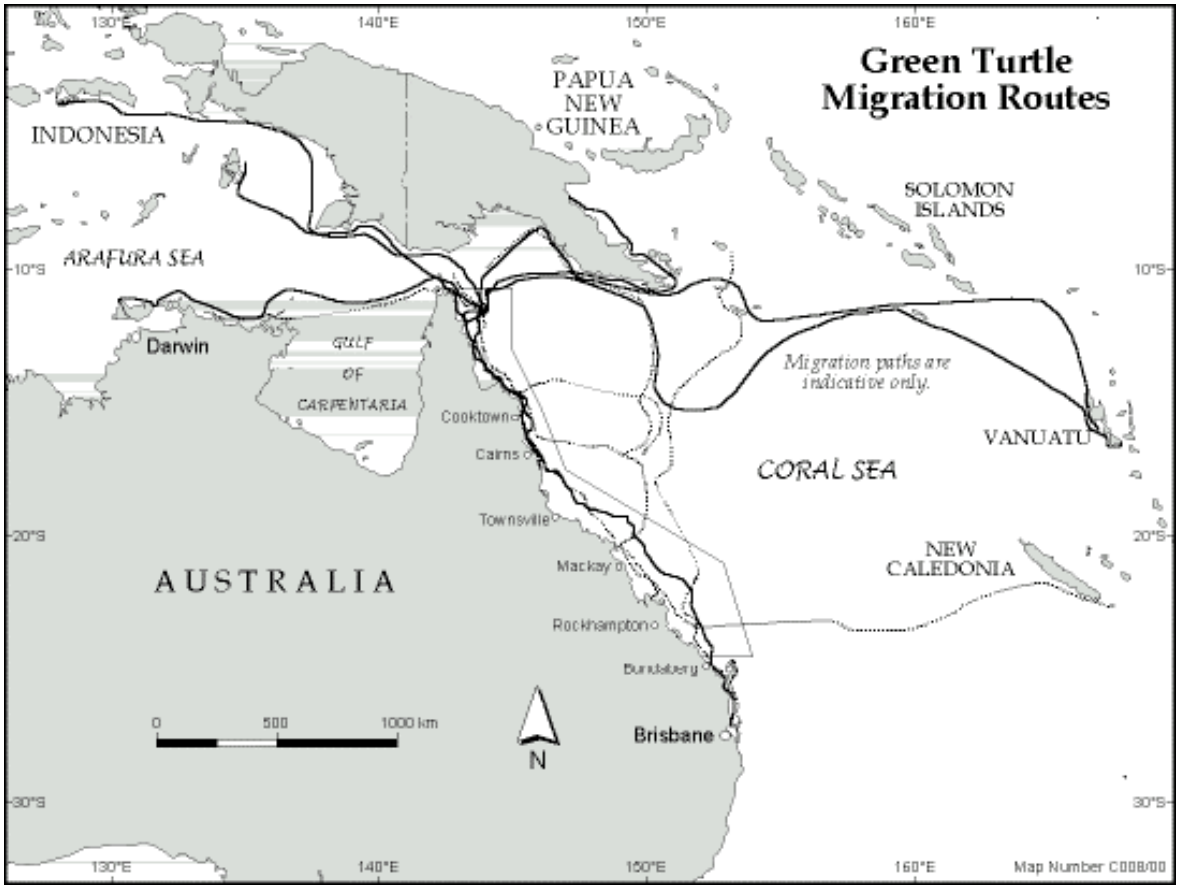

Figure 3.1 Green turtle migration routes between nesting and feeding grounds (GBRMPA 2009).

Nesting

There are two major green turtle rookeries in coastal eastern Queensland waters (Limpus 2008; GBRMPA 2009):

- Raine Island-Pandora Cay in the northern Great Barrier Reef (GBR; annual nesting population of approximately 30,000 females), and
- the islands of the Capricorn Bunker Group in the southern GBR (annual nesting population of approximately 8,000 females).

Each of these nesting sites supports a genetically distinct population (Dobbs 2001). There is genetic exchange within the GBR populations, but not between the GBR stocks and nearby Gulf of Carpentaria stock (Limpus 2008 and references cited within).

Minor breeding aggregations occur on the Murray Islands, Bramble Cay and other islands of the outer GBR, most inner shelf cays, and the mainland cost north of Cape Grenville (approximately 700 km north-west of the development).

Breeding is seasonal in northern GBR waters (Limpus 2008 and references sited within):

- mating from August (in southern Torres Strait) through late October to early November
- nesting can occur all year round, although most from October to March with a peak in late December to early January, and
- emergence of hatchlings emerge early December to May.

Adult females display high fidelity to nesting beaches. Most females return to the same beach for successive clutches (within a nesting season) and successive nesting seasons (Limpus et al. 2001; 2003).

Little information is available regarding hatching success of northern GBR green turtles on the mainland. Success of incubation and hatchling emergence is reliably high on undisturbed beaches (Limpus 2008).

Foraging

Green turtles migrate to breed, although they tend to maintain small home ranges, approximately 10 to 15 km of coastline, within their foraging (feeding) grounds (C. Limpus 2007 [Queensland Parks & Wildlife Service], pers. comm., 1 June). Turtle movements within foraging grounds are likely to be related to food availability and environmental

factors, such as the tide cycle (they can only feed in intertidal areas when the water depth is between 0.5 and 1 m over the substrate) (Bell 2003).

Green turtles feed extensively on seagrass, particularly *Halophila ovalis*, *Halophila spinulosa* and *Halodula uninervis*. Consequently, they are commonly found in association with seagrass meadows. Green turtles may also feed upon algae and propagules of the grey mangrove (GBRMPA 2009), which occurs within the proposed resort site. The actual species consumed depends on food availability at the foraging site (Limpus 2008).

The green turtle's reliance on seagrass, as a primary food source, causes them to be indirectly affected by seagrass health, which can be negatively impacted upon by sediment, nutrient and pesticide levels (e.g. McKenzie & Campbell 2003). *Halophila*, a preferred food item, appears to be particularly sensitive to the duration and frequency of light-deprivation events such as the high-sediment loads of floodwater. This is particularly true for environments subject to temporarily variable light conditions (Longstaff et al. 1999), such as inshore waters of Innisfail. The health of seagrass meadows can also be negatively impacted by physical damage associated with boating, dredging for shipping channels (Schaffelke et al. 2001) and trawling (Lee Long et al. 1997).

Anthropogenic Impacts

Northern GBR green turtle populations are being negatively impacted by a wide range of anthropogenic activities, including (Limpus 2008):

- indigenous harvest for food (largest source of loss; GBRMPA permits were issued to capture 140 green turtles from Mackay to Cairns during 1991 to 1993; unpublished data from GBRMPA in Limpus 2008)
- accidental capture in fishing gear (e.g. shark control programs, commercial fisheries)
- boat strike (high 10s to low 100s of green turtles are expected to die annually in Queensland)
- port dredging (ten turtles or less annually in Queensland)
- marine debris (e.g. 'ghost nets')
- disease (e.g. fibropapilloma, coccidiosis, parasites)
- habitat damage
- feral animals (e.g. pigs and dogs), and
- light horizon disorientation (e.g. street and house lights).

When moving from the nest to the sea, marine turtle hatchlings orient to low elevation light horizons; bright lights can therefore disorient hatchlings (Limpus 2007). Disorientation appears to be minimal for yellow (i.e. low-pressure sodium vapour lights) or flashing lights (Limpus 2007 and references cited within).

There are low numbers of reported strandings or mortalities (generally less than 10) of green turtles in the Innisfail region each year (15 km south of Cairns to South Mission Beach; Haines et al. 1999; Haines & Limpus 2000; Greenland et al. 2004; Greenland & Limpus 2006; 2008).

Conservation Status

The northern GBR stock is the largest remaining green turtle breeding population in the world (Limpus 2008). The current generation of northern GBR green turtles are very seriously threatened by (Limpus 2008):

- excessive harvest of adult and near-adult turtles across foraging grounds, and
- climate and habitat related loss of hatchling success.

3.2 Flatback Turtle

The flatback *(Natator depressus)* turtle is listed as 'vulnerable', 'migratory' and 'marine' under the EPBC Act and 'vulnerable' under the NCWR.

Flatback turtles are likely to nest on the beach adjacent to the proposed development (A. Freeman 2009 [Queensland Environmental Protection Agency], pers. comm., 10 March). They are also likely to use the adjacent waters for foraging.

Distribution

Flatback turtles have a restricted distribution; they are one of only two marine turtles without global distribution (Limpus 2007). All recorded nestings of flatback turtles are on Australian beaches (Limpus et al. 1988), and feeding appears to be limited to waters of the Australian continental shelf (Limpus 2007).

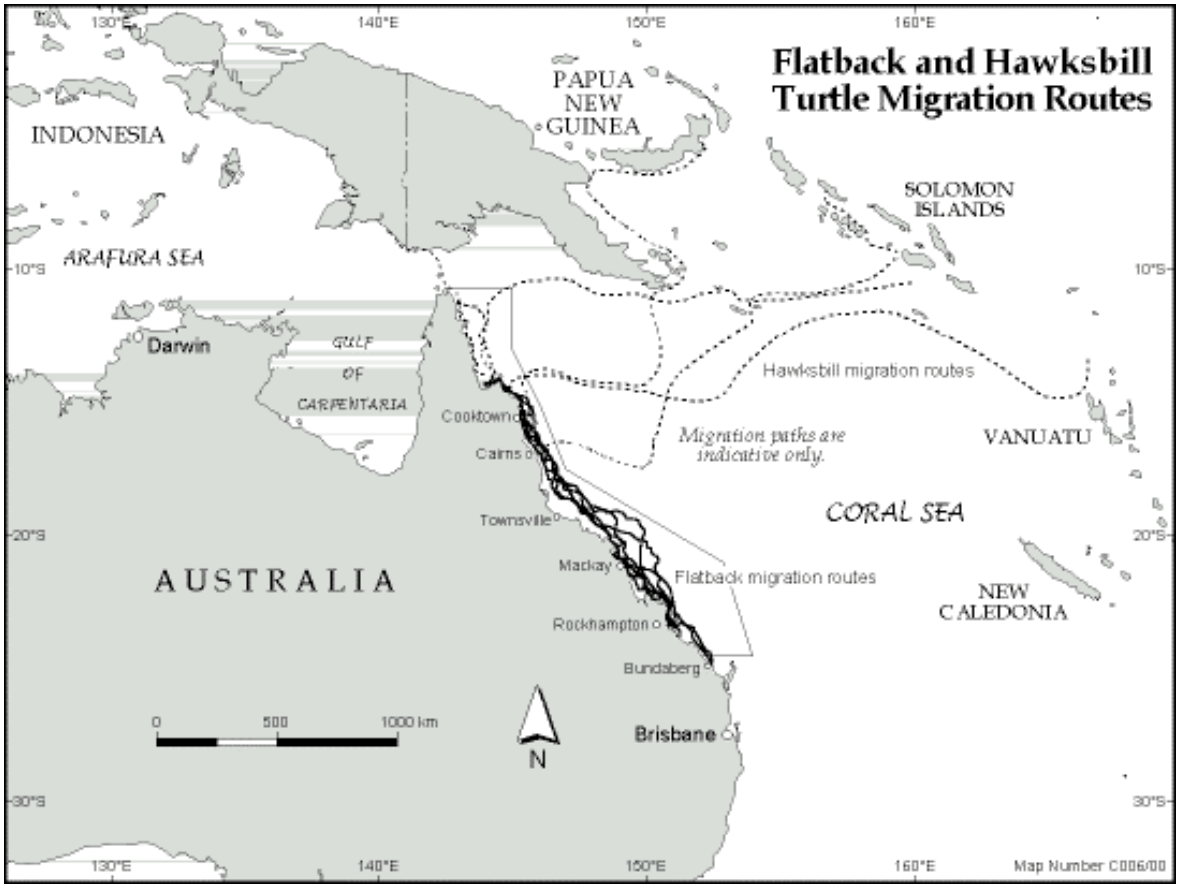

Figure 3.2 Flatback turtle migrations routes between nesting and feeding grounds (solid black line; GBRMPA 2009).

Nesting

There are two rookery areas for flatback turtles (Limpus 2007):

- south-east Queensland, and
- the north-western Gulf of Carpentaria.

There appears to be limited gene flow between the two groups (Dutton et al. 2002 in Limpus 2007).

Breeding is seasonal in eastern Queensland waters (Limpus 2007 and references cited within):

- mating occurs mid October
- nesting peaks in late November to early December and typically ceases by late January, and
- hatchlings emerge from early December to (typically) late March, with peak hatching in February.

Adult females display high fidelity to nesting beaches (Limpus 2007). Most females return to the same beach for successive clutches (within a nesting season) and successive nesting seasons (Limpus et al. 1984; 1992).

Nesting is centered on Peak, Wild Duck and Avoid islands (located between Sarina and Gladstone) (Limpus 2007). These islands are fringed by sand/mud flats; flatbacks rarely nest on beaches fringed by intertidal coral reefs (Limpus 2007). Minor breeding occurs along the eastern Queensland coast, and adjacent islands, from Mon Repos near Bundaberg to Herald Island near Townsville (Limpus 2007). There are minor rookeries at Cape Cleveland and Cape Bowling Green, near Townsville (Limpus 2007). Many of the minor rookeries on the mainland coast are being impacted by encroaching coastal development (Limpus 2007).

For successful incubation, eggs must be laid in 25 – 33 ºC, well-ventilated, low salinity, high humidity substrate, not subject to flooding (Limpus 2007 and references cited within). Flatback eggs appear to be more tolerant of severe moisture stress and high temperatures than other species (Hewavisenthi & Parmenter 2002). Flatback embryos can be killed by disturbance during incubation (Limpus 2007 and references cited within).

Little information is available regarding hatching success of east Australian flatback turtles. Egg clutch failure resulting from natural causes is variable, with high losses from erosion and flooding expected on mainland beaches (Limpus 2007). Clutch failure resulting from feral predators is highly variable (Limpus 2007). Success of incubation and hatchling emergence is reliably high on undisturbed beaches (Limpus 2007). Fencing constructed to reduce beach erosion may be reducing egg production or decreasing incubation success, by preventing adult turtles form reaching optimal habitat in the vegetated dunes (unpublished data by EPA Queensland Turtle Conservation Project in Limpus 2007).

Foraging

Foraging habitat of the flatback turtle includes waters from Hervey Bay to the Torres Strait, and possibly into Papua New Guninea (Limpus 2007 and references cited within). Within waters of the GBR, flatbacks appear to prefer soft-bottomed waters, between 6 and 35 m deep, and are rarely found over intertidal seagrass meadows or coral reefs (Robins & Mayer 1998 in Limpus 2007).

Adult turtles are carnivorous and commonly forage for soft-bodied benthic invertebrates (e.g. soft corals, sea pens, holothurians and jellyfish; unpublished data by EPA Queensland Turtle Conservation Project in Limpus 2007). Juvenile and adult flatbacks seem to occupy similar habitats and forage on benthic organisms (Limpus et al. 1994 and in DE&WR 2006).

Anthropogenic Impacts

Flatback populations in north-eastern Australia are being negatively impacted by a wide range of anthropogenic activities, including:

- accidental capture in fishing gear
- marine debris
- indigenous harvest for food (mostly south-western Torres Strait)
- habitat damage
- boat strike (minimal; three known cases between 1995 and 2003)
- feral animals, and
- light horizon disorientation.

There were no reported strandings or mortalities of flatback turtles in the Innisfail region during the period 1999 to 2004 (Haines et al. 1999; Haines & Limpus 2000; Greenland et al. 2004; Greenland & Limpus 2006; 2008).

Conservation Status

Eastern Australian flatback turtles can be regarded as ‘currently secure but conservation dependent’, given (Limpus 2007):

- the stability in the size of annual nesting population

- the size of the breeding females over the last three decades (at Wild Duck Island, Curtis Island and the Woongarra Coast)
- population stability over about a generation
- that foraging habitat is with the Great Barrier Reef World Heritage Area and Great Barrier Reef Marine Park, and
- that more than 70% of the nesting is within National and Conservation Parks.

3.3 Loggerhead Turtle

The loggerhead *(Caretta caretta)* turtle is listed as 'endangered', 'marine' and 'migratory' under the EPBC Act and 'endangered' under the NCWR. Globally, it is also listed as 'endangered' by the IUCN.

Loggerhead turtles are unlikely to nest on the beach adjacent to the proposed development (A. Freeman 2009 [Queensland Environmental Protection Agency], pers. comm., 10 March), although they may use adjacent waters for foraging (DEWHA 2009).

Mon Repos, near Bundaberg, is an important rookery for loggerhead turtles (and to a lesser extent, flatback and leatherback turtles). The islands of the GBR Capricorn Bunker group are one of the world's major rookeries for loggerhead (and green) turtle (GBRMPA 2009).

Loggerhead turtles feed on benthic invertebrates, such as crustaceans and molluscs, in shallow, turbid waters. And as is the case with the green turtle, they tend to maintain small home ranges within their foraging grounds (Limpus & Limpus 2003; C. Limpus 2007 [Queensland Parks & Wildlife Service], pers. comm., 1 June). Loggerhead turtles commonly forage in shallow, turbid waters (GBRMPA 2009).

The east coast population of loggerheads has been sharply declining, with an estimated loss of 50 to 80% of its annual nesting population during the 15-year period from the mid-1970s to 1990. Furthermore, continued loss of a few hundred individuals annually may threaten the survival of the species on the east coast (Limpus & Reimer 1994).

During the period 1999 to 2004, no loggerheads have been reported stranded in the Innisfail region (Haines et al. 1999; Haines & Limpus 2000; Greenland et al. 2004; Greenland & Limpus 2006; 2008).

3.4 Hawksbill Turtle

The hawksbill *(Eretmochelys imbricata)* turtle is listed as 'vulnerable', 'migratory' and 'marine' under the EPBC Act and 'vulnerable' by the NCWR. It is also listed as 'critically endangered' by the IUCN. Globally, the hawksbill and leatherback are considered the most threatened marine turtles (IUCN 2007).

Hawksbill turtles are unlikely to nest on the beach adjacent to the proposed development (A. Freeman 2009 [Queensland Environmental Protection Agency], pers. comm., 10 March), although they may use adjacent waters for foraging (DEWHA 2009).

Hawksbills breed in the northern GBR and Torres Strait (C. Limpus 2007 [Queensland Parks & Wildlife Service], pers. comm., 1 June).

Hawksbills appear to forage within rocky and coral reef habitats (Witzell 1983 in DE&WR 2006b) for sponges and algae together with seagrass and a range of benthic invertebrates (Whiting 2000a in DE&WR 2006b). They commonly forage in shallow, turbid waters (GBRMPA 2009).

During the period 1999 to 2004, two hawksbills have been reported stranded in the Innisfail region (Haines et al. 1999; Haines & Limpus 2000; Greenland et al. 2004; Greenland & Limpus 2006; 2008).

3.5 Olive Ridley Turtle

The olive ridley *(Lepidochelys olivacea)* is listed as 'endangered', 'migratory' and 'marine' under the EPBC Act and 'endangered' under the NCWR. It is also listed as 'endangered' by the IUCN.

Olive ridley turtles are unlikely to nest on the beach adjacent to the proposed development (A. Freeman 2009 [Queensland Environmental Protection Agency], pers. comm., 10 March), although they may use adjacent waters for foraging (DEWHA 2009).

The olive ridley primarily breeds in the Gulf of Carpentaria and Northern Territory. Nesting has not been recored in the GBR (GBRMPA 2009).

The olive ridley appears to forage in benthic and pelagic habitats (Musick & Limpus 1997), for mostly gastropods and bivalves (in Australian waters; Conway 1994 in DE&WR 2006b). It is most commonly found in waters with a depth of 11 to 40 m (Robins 1995 in

DE&WR 2006b) but has also been reported in water more than 100 m deep (Hughes 1974a in DE&WR 2006b).

During the period 1999 to 2004, no olive ridleys have been reported stranded in the Innisfail region (Haines et al. 1999; Haines & Limpus 2000; Greenland et al. 2004; Greenland & Limpus 2006; 2008).

3.6 Leatherback Turtle

The leatherback *(Dermochelys coriacea)* turtle is listed as 'endangered', 'migratory' and 'marine' under the EPBC Act and 'endangered' under the NCWR. It is also listed as 'critically endangered' by the IUCN. Globally, the leatherback and hawksbill are considered the most threatened marine turtles (IUCN 2007).

Leatherback turtles are unlikely to nest on the beach adjacent to the proposed development (A. Freeman 2009 [Queensland Environmental Protection Agency], pers. comm., 10 March), although they may use adjacent waters for foraging (DEWHA 2009).

Low numbers of leatherback breed on the mainland near Bundaberg and in Arnhem Land. No large rookeries are known in Australia (GBRMPA 2009).

Leatherbacks are pelagic species, uniquely adapted to survive in cold waters (C. Limpus 2007 [Queensland Parks & Wildlife Service], pers. comm., 1 June). They feed on gelatinous organisms such as jellyfish and salps from the surface layer of the water column to depths of over 200 m, and their distribution is influenced by prey abundance (DE&WR 2006b).

During the period 1999 to 2004, no leatherbacks have been reported stranded in the Innisfail region (Haines et al. 1999; Haines & Limpus 2000; Greenland et al. 2004; Greenland & Limpus 2006; 2008).

4 Turtle Nesting in the Vicinity of the Site

4.1 EPA Turtle Surveys

Marine turtle surveys of Ella Bay are not undertaken by the Queensland Parks and Wildlife Services (QPWS) / Environmental Protection Agency (EPA) (M. Jones [Environmental Protection Agency Brisbane], 10th March 2009, pers.comm.; A. Freeman [Environmental Protection Agency Atherton], 10th March 2009, pers.comm.)

Green and flatback turtles are likely to nest on the beach adjacent to the proposed development (A. Freeman 2009 [Queensland Environmental Protection Agency], pers. comm., 10 March). Loggerhead, hawksbill, olive ridley and leatherback turtles are unlikely to nest on the beach adjacent to the proposed development, although they may use adjacent waters for foraging (DEWHA 2009).

4.2 Ella Bay Turtles

Marine turtle nesting in the Innisfail area is threatened by (A. Freeman [Environmental Protection Agency Atherton], 10th March 2009, pers.comm.):

- predation by feral pigs and dogs
- vehicle and human traffic on beaches (e.g. fishing)
- high light levels
- water quality (e.g. pesticides and other pollutants), and
- marine debris.

5 References

BAAM 2009, *Ella Bay Integrated Resort Development – November 2008 Fauna Survey Results,* report prepared for Satori Resorts Pty Ltd, Brisbane.

Bell, I. 2003, *Turtle Population Dynamics in the Hay Point, Abbott Point and Lucinda Port Areas*, report prepared for the Ports Corporation of Queensland by the Threatened Species Unit, Queensland Parks and Wildlife Service, Townsville.

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