

Appendix A JCU Consultancy Report

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**Consultancy Report for the Queensland Environment
Protection Agency**

**An Evaluation of the Likely Impacts of the
Proposed Port Airlie Marina on the Dugong
and its Seagrass Food**

Answers to Questions posed by the EPA Staff

**Helene Marsh
James Cook University**

Executive Summary

- The Whitsunday region supports a relatively small population of dugongs some of which feed in Boathaven Bay.
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- The seagrasses in this area include food species preferred by dugongs. Dugongs prefer to graze on sparse seagrass. Thus seagrass biomass may not be a reliable indicator of the quality of seagrass as habitat for dugongs.
- The distribution and biomass of seagrass beds off the Queensland coast vary over time, probably due to reduced light availability caused by increased turbidity as a result of terrestrial runoff associated with episodic extreme weather events.
- As seagrass meadows which support the species that are the preferred food of dugongs are patchy in the Whitsundays, the loss of any of these meadows is likely to have some impacts on dugongs.
- Given that the area of seagrass in Boathaven Bay is relatively small, I expect that most of the dugongs, which now use the area, would cease to do so if a significant proportion of the seagrass is lost due to the construction of the development and maintenance dredging. Whether this would cause these dugongs to leave the area or delay breeding would depend on the availability of alternative seagrass habitat. The dugongs would certainly be able to relocate to other areas.
- The presence of the marina is likely to increase the mortality of dugongs in the region should they continue to use the nearby remaining areas of seagrass. Even if the marina does not substantially increase the number of boats using the Whitsunday area, it will act as a hub from which boats will travel to and from the remainder of the region. It thus seems inevitable that boat traffic in Boathaven Bay will increase.
- As dugongs do not react to an approaching boat until it is almost on top of them, the most important initiative to minimize the effect of the development on dugong mortality would be to introduce speed limits for vessels using Boathaven Bay. These limits should be accompanied by appropriate signage.

Answers to Questions posed by the EPA Staff

The extent and variability of seagrass cover at the proposed site

Existing knowledge of the extent and variability of the seagrass cover at the proposed site is adequately reviewed in the EIS (Windward 2002). There is increasing evidence that such temporal variability is usual for seagrasses off the Queensland coast. The reasons for this variability are poorly understood but seem to be associated with reduced light availability caused by increased turbidity as a result of terrestrial runoff associated with episodic extreme weather events (Preen *et al.* 1995, Poiner and Peterkin 1996) and anthropogenic disturbance both chronic (pollution) and pulsed (dredging). This is comprehensively explained in the EIS (Windward 2002). I consider it likely that this variability in seagrass cover in the Whitsunday Region will continue even if anthropogenic disturbance does not increase. The proposal to include sewage pump out facilities at the marina connected to the main sewage works in the area at the marina (Windward 2002) is sensible and necessary.

The level of use of seagrass by the dugong

Knowledge of the use of the proposed site by dugongs is anecdotal at best. The EIS (Windward 2002) reports incidental sightings of dugongs at this site. The aerial surveys for dugongs conducted by Marsh and her co-workers (e.g. Marsh *et al.* 1996, Marsh and Lawler 2001) are not a reliable indicator of local scale use of a small area such as Boathaven Bay by dugongs as these surveys are designed to provide a regional scale picture of dugong distribution and abundance at five-year intervals. However, these surveys suggest that, although dugongs occur in the Whitsunday area, it is not a major dugong area in the context of the eastern coast of Queensland as a whole. Given that Boathaven Bay can support meadows of *Halodule* and *Halophila* species, preferred foods of the dugong (Marsh *et al.* 1982), I would expect that small numbers of dugongs use the area, a conclusion supported by the observations of local residents (Windward 2002). It should be noted however, that dugongs prefer to graze on sparse seagrass (Preen 1992) and so seagrass biomass may not be a reliable indicator of the quality of seagrass as habitat for dugongs. As pointed out by Campbell *et al.* (2002) seagrass meadows which support the species which are the preferred food of dugongs are patchy in the Whitsundays and thus the loss of any of these meadows is likely to have some impacts on the Whitsundays as habitat for dugongs and as a staging post for dugongs moving between the major dugong habitats such as Shoalwater Bay and Hinchinbrook. The cumulative impact of such seagrass beds is also of concern given the evidence of a substantial reduction in dugong numbers on the urban coast of Queensland since the 1960s (Marsh *et al.* 2001).

Potential impacts on the loss of seagrass by the dugong

The loss of seagrass can have one of several effects on dugongs:

1. They can leave the denuded area (Preen and Marsh 1995; Marsh and Lawler 2002)
2. They can stay in the denuded area and starve to death (Preen and Marsh 1995)
3. They can delay breeding (Marsh 1999).

Given that the area of seagrass in Boathaven Bay is relatively small (10s hectares) I would expect that most of the dugongs, which now use the area, would cease to do so if a significant proportion of the seagrass lost due to the development construction and maintenance dredging. Whether this would cause these animals to delay breeding would depend on the availability of alternative seagrass habitat.

As for other long-lived species, the rate of population change of the dugong is most sensitive to changes in adult survivorship. Even a slight reduction in adult survivorship as a result of habitat loss, disease, hunting or incidental drowning in nets, can cause a chronic decline in a dugong population. Marsh (1999) suggested that the maximum rate of increase under optimum conditions would be on the order of 5% per year even when natural mortality is low (<5% per year). The sustainable anthropogenic death rate is likely to be in the order of 2% of the female population per year. This rate will be lower in areas where the pre-reproductive period and/or calving interval are lengthened by food shortage (Marsh 1999). Dugongs may be short of food for several reasons including habitat loss, seagrass dieback, decline in the nutrient quality of available seagrass, or a reduction in the time available for feeding because of acoustic disturbance such as boat traffic.

An opinion on whether the dugongs would be able to relocate to other areas

The dugongs would certainly be able to relocate to other areas.

Forty-three dugongs have been tracked using telemetry off the coast of Queensland for periods ranging from 15 to 483 days (Marsh and Lawler unpublished data). All moved at least 5 km during the tracking period and 47% of the animals moved more than 50 km. For example, of the ten dugongs fitted with satellite transmitters in Shoalwater Bay, Queensland by Preen (1999), four made substantial trips out of that bay. Two made return trips: one 100km north, the other 220km north. Two other animals journeyed 400km south to Hervey Bay where their transmitters detached. Thirteen dugongs were tracked between the Townsville and Hinchinbrook Island region in Queensland. Twelve trips were made of more than 30km beyond the area regularly used by these animals, six trips of more than 100km and one trip of more than 600km (Preen 2001). Most of these movements were return trips. For example, the animal that moved more than 600km north returned to her capture point after five months and almost immediately moved another 165km south along the coast. The movements of this dugong thus spanned about 800 km of coast. Both male and female dugongs (with and without calves) have been recorded making long distance movements. The reasons for these movements are unknown but a plausible explanation is that dugongs have to have a comprehensive spatial knowledge of the seagrass beds in their region because of the temporal variability in the availability of their seagrass food.

As summarized by Marsh *et al.* (2002 see also Marsh and Rathbun 1990, Preen 1992, de Iongh 1996, de Iongh *et al.* 1998), most movements of the more than 60 dugongs that have been tracked by means of VHF or satellite transmitters in Indonesian and Australian waters have been localised to the vicinity of seagrass beds. Animals caught in the same region and even at the same time tend to show individualistic patterns of movement. Daily movements depend on tidal amplitude. At localities where the tidal range is large (such as in the Whitsundays), dugongs can gain access to their inshore feeding areas only when water depth is 90cm or greater.

An opinion as to whether loss of seagrass would itself be likely to lead to increased mortality

See above

An opinion on whether the presence of the marina would be likely to increase mortality of dugongs should they continue to use the nearby remaining areas of seagrass

The simple answer to this question is yes. Even if the marina does not substantially increase the number of boats using the Whitsunday area, it will act as a hub from which boats will travel to and from the remainder of the region. It thus seems inevitable that boat traffic in Boathaven Bay will increase.

Marsh (2002) reviewed the status of dugongs throughout their range and concluded that mortality from boat strike was a concern in at least 11 of the 37 countries. Vessel strikes are a major cause of mortality for Florida manatees (Wright *et al.* 1995) and have been studied extensively. Although manatees possess the intellectual and physical ability to recognise and avoid boats (Hartman 1979; Gerstein 1994, 1995), the results of Gerstein *et al.* (1999) suggest that the West Indian manatee possesses a limited low-frequency hearing sensitivity and therefore has difficulty detecting and locating approaching boats from safe distances. The relevance of these results to dugongs is unknown because the anatomy of the dugong ear differs from that of the manatee (Ketten *pers comm.* 2001).

Preliminary results from a study monitoring the reactions of dugong to boats from an aerostat-mounted video camera indicate that dugongs do not react to an approaching boat until it is almost on top of them (Hodgson *pers comm* 2001). Although the number of documented dugong deaths due to vessel strikes in Queensland does not approach the number of manatees killed each year in Florida, increasing vessel traffic increases the likelihood of strikes. Areas where there are extensive shallow areas used by regionally important populations of dugongs close to areas of high boat traffic are particularly at risk and almost 50% of the vessel strikes in Queensland occur in the Moreton Bay Marine Park

As the information available suggests that Boathaven Bay area is not regionally important dugong habitat, I expect the absolute number of vessel strikes to be low. Nonetheless, it could be regionally significant in view of the relatively low dugong density in the Whitsunday area. It would be prudent to introduce speed limits for vessels as has been done in the Moreton Bay Marine Park. The other approach to reducing vessel strikes is to use transit lanes as have been adopted in the Hinchinbrook region. This measure is popular with the local public but its efficacy is unproven.

Despite consistent anecdotal reports of dugongs ceasing to use areas with high boat traffic, there are few data on the effects of acoustic pollution from boat traffic on the dugong. Amanda Hodgson has conducted relevant research in Moreton Bay. She found that the dugongs moved several hundred metres but remained on the seagrass meadows in response to repeat boat passes. However, this is a region where the seagrass beds are very extensive and I would expect the dugongs to respond differently in a region where seagrass beds are much less extensive such as in Boathaven Bay. Acoustic pollution could be particularly important in areas such as Boathaven Bay with large tidal ranges and relatively small seagrass meadows. Presumably, high levels of vessel traffic in such areas could prevent dugongs from accessing the available seagrass. This could be regionally significant given the limited aerial extent of seagrass usually considered high quality dugong habitat in the Whitsunday region.

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