REEF RESEARCH
INFORMATION SHEET NO. 2

GREAT BARRIER REEF MARINE PARK AUTHORITY

A Research and Monitoring Co-ordination Unit Publication - JULY 2003

THE STATUS OF DUGONGS ON THE GREAT BARRIER REEF AND THE SOUTHERN COAST OF QUEENSLAND

SUMMARY

- Dugong numbers on the urban coast of the Great Barrier Reef and the southern coast of Queensland appear to have declined significantly since the 1960s.
- It is too early to say whether this decline is still occurring, at what rate, or whether the population is beginning to stabilise at a much lower level than previously.
- However, surveys since 1986/87 indicate that numbers on the urban east coast of Queensland can fluctuate significantly, probably as a result of large-scale movements in response to seagrass dieback.
- In contrast, surveys since 1985 of dugong populations north of Cooktown suggest that numbers are relatively stable, although (1) there is evidence of movements between regions; (2) individual dugongs undertake movements over several hundred kilometres, (3) the human related mortality of dugongs is not sustainable in at least some years and the likelihood of local depletions should not be ignored.

INTRODUCTION

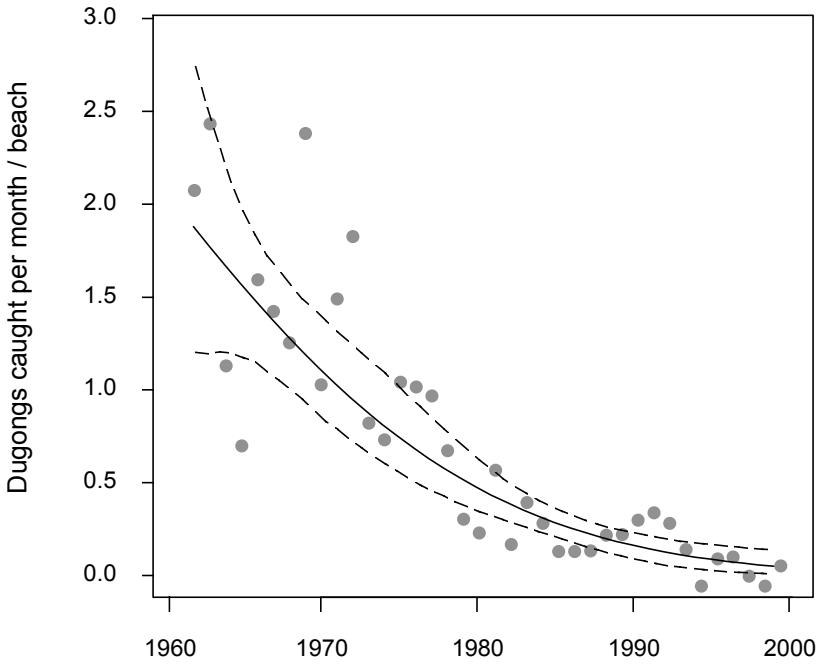
Dugong (*Dugong dugon*) numbers have experienced a decline throughout much of its range. Australian waters support the majority of the world's remaining dugongs. Due to the rapid worldwide decline in numbers, the dugong is now listed as 'vulnerable to extinction' by the International Union for Conservation of Nature and Natural Resources (IUCN) and under Queensland legislation.

There is significant dugong habitat in the Great Barrier Reef (GBR), with an estimated 43 000 km^2 of seagrass, the dugong's major food source, in the region. The importance of the GBR for dugong conservation was confirmed when dugongs were specifically listed as one of the World Heritage values of the Great Barrier Reef World Heritage Area (GBRWHA).

Since the 1980's, the Great Barrier Reef Marine Park Authority (GBRMPA) has supported the conservation of dugongs by protective zoning and other management strategies in the Marine Park, and by funding a significant proportion of the dugong research and monitoring that has occurred. A team of James Cook University scientists, led by Professor Helene Marsh, has undertaken ongoing research and monitoring of the GBR dugong population over the period. To estimate the population size, since 1986/87 the team has conducted aerial surveys using standardised techniques at approximately 5 yearly intervals. In addition, an analysis has been conducted of the incidental catch of dugongs in shark nets set for bather safety since 1962 at many urban beaches. This information sheet summarises the results of the latest aerial surveys and the shark net study, and examines the reef wide status of the dugong. Additional surveys of populations south of the GBR have been funded by the Queensland Environmental Protection Agency.

ANALYSIS OF SHARK CONTROL RECORDS

To provide information on the long-term status of dugong populations along the Queensland coast, an analysis was undertaken by a team led by Professor Marsh of the number of dugongs caught incidentally in shark nets set for bather safety at urban beaches from Cairns to Brisbane from 1962 to 1999.



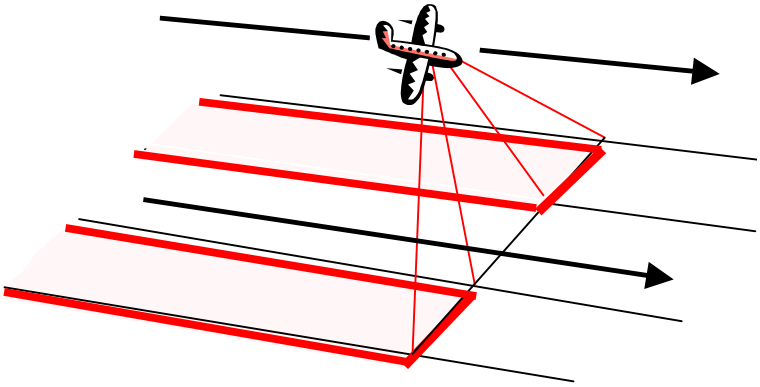
Graph 1. Change in the catch per unit effort of dugongs caught in Shark nets for bather protection on the urban Queenland coast between 1962 and 1999.

Have dugong numbers changed since 1962?

This analysis indicates that the numbers of dugong caught in shark control nets adjacent to the urban coast of Queensland has declined since the introduction of the Queensland Shark Control Program in the 1960's. If the by-catch of dugongs is a reliable index of changes in dugong abundance from all causes in the urban coastal region, the results suggest that by 1994, dugong numbers in the region had declined to about 3% of their 1960 value, representing an average annual decline of 8.7% in the region over the 38 years (see Graph 1).

AERIAL SURVEY TECHNIQUE

In addition to the Shark Net study, since the 1980s aerial surveys of dugong numbers have also been conducted on the east coast of Queensland. The surveys are the most efficient and effective means of assessing the distribution and abundance of dugongs. They are conducted along defined east-west transects which are approximately perpendicular to the coast. The aircraft flies at a constant height (137m) and speed (185km/h), as indicated by the diagram below. Two teams each of two observers researchers on each side of the plane record all dugongs observed. Each team of observers is isolated from the other team using separate intercoms and a curtain. This makes their observation independent so that the observations of each member of team can be used to cross-check those of the corresponding member of the other. team



The counts of dugongs are corrected for perception bias (the proportion of dugongs present in the transect but missed by observers) and availability bias (the proportion of dugongs below the surface as the aircraft flies over that are invisible to observers due to water turbidity). Recently studies have also been undertaken to improve the accuracy of the survey information, for instance, using fibreglass models to estimate the depth at which dugongs can be seen from the air in a variety of sea and weather conditions. The new population estimates using the revised protocols are very similar to those obtained using the former methodology and reported below.

1999-2001 GBR REGION, HERVEY BAY AND MORETON BAY SURVEYS

From October-December 1999 an aerial survey of the southern region of the GBR and extending south to Moreton Bay was conducted, covering specifically,

- the Southern GBR region south of Cape Bedford (15º30'S - near Cooktown) to the southern GBRMP boundary
- Hervey Bay, and
- Moreton Bay.

The 1999 survey was characterised by unseasonally poor weather conditions that resulted in the survey being incomplete. The focus was therefore directed towards high quality habitats at the expense of regions where few or no dugongs have been recorded in previous surveys, approximately north of Innisfail (17º25'S). The Innisfail to Cape Bedford region was included in the 2000 Northern GBR survey. The Moreton Bay dugong population has been surveyed a number of times since 1988. Comparisons of estimates of the dugong abundance within Moreton Bay can be problematic due to varying methodologies, however surveys conducted in 2000 and 2001 can be compared to the results from the GBR surveys conducted as they used identical methodology.

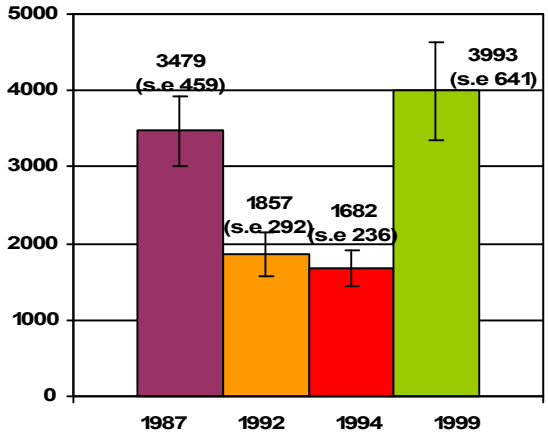
How many dugongs were present:

a) In the Innisfail to Cape Bedford region?

Data were obtained for most of the area (17º25'S to 17º45'S), but about 35km of coastline was unsurveyed due to poor weather. As in previous surveys of this region, the numbers of dugongs observed were too few to estimate the population size.

b) In the remaining Southern GBR region?

Counting during the 1999 survey of the remaining southern GBR region indicated that an estimated 3993 (± s.e. 641) individuals were present.



Graph 2. Estimated dugong abundance in the sGBR 1986/87 - 1999

c) In Hervey Bay?

The total estimated dugong population for Hervey Bay in 1999 was 1654 (± s.e. 248) in November 1999, and 1708 (+/- 392) in December 2001. Most of the coast between Hervey Bay and Moreton Bay was not surveyed.

d) In Moreton Bay?

Surveys in December 2001, estimated the population to be about 493 (± s.e. 45) individuals, with the most critical habitat occurring in the eastern Amity and Moreton Banks area.

Have the dugong numbers changed:

a) In the southern GBR?

Graph 2 shows that the 1999 monitoring survey results were not significantly different from the 1986/1987 results, however they showed an apparent increase in the dugong population from that estimated in the 1992 and 1994 surveys. The apparent increase in dugong numbers between 1994 and 1999 could not have resulted solely from increased breeding in the population, due to the animal's slow reproductive capability. Instead it is likely that the increase was due to a large-scale movement of animals into the region from elsewhere, probably the northern GBR region. This apparent increase must be considered in the larger context of data from the shark netting program. Graph 1 shows that there is good evidence that the number of dugongs on the urban coast of Queensland, south of Cooktown, has declined by over 90% since 1962.

b) In Hervey Bay?

The results of the 1999-2001 surveys indicated a significantly higher population of dugongs than in 1994. However there were still fewer dugongs in this region than in 1988 or in the first survey in 1992 several months after flooding after a major cyclone destroyed much of the seagrass in the region, resulted in large scale of movement of dugongs out of the area. Similar to the Southern GBR population, the increase in numbers since 1994 cannot be attributed solely to an increase in reproduction but must have resulted from the movement of many animals into the area.

c) In Moreton Bay?
Due to a lack of standard survey results from this area, it is not possible to comment on whether or how the population size has altered since the 1988 when the first survey was conducted using the technique that is used in other areas. Whilst numbers appear to have fluctuated over the years, it is well established that Moreton Bay consistently supports a significant population of dugongs and is thus a very important dugong habitat.

2000 NORTHERN GREAT BARRIER REEF SURVEY
In November 2000 an aerial survey of the Northern region of the GBR was conducted, covering specifically: the Northern GBR region between Hunter Point (11º15'S - South of Cape York) and Cape Bedford (15º30'S - near Cooktown).

How many dugongs were present in the Northern GBR region?
Counting during the survey of the northern GBR region indicated that an estimated 9081 dugongs (± s.e. 917) were present (after the correction factors mentioned previously were considered).

Have the dugong numbers changed in the Northern GBR?
Statistical analysis of the information gathered from the 2000 survey indicated that dugong numbers in the NGBR population have not altered significantly since the 1986/87 survey. However, the survey technique is unable to accurately detect localised changes in dugong population size. The 2000 survey showed that there had been a shift in the distribution of the dugongs compared to previous surveys in 1985, 1990 and 1995. Among other things, those surveys indicated that Princess Charlotte Bay supported between 37% and 56% of the NGBR dugongs. The 2000 survey showed a strong shift in dugong distribution from the Princess Charlotte Bay region to over 100km south at Cape Melville.

The latest estimates of dugong abundance in the NGBR and our knowledge of dugong life history have been used to estimate an ecologically sustainable catch for traditional use by Indigenous communities.

CONCLUSIONS
Studies to date indicate that the number of dugongs currently seen in the southern Great Barrier Reef and the urban coast of Queensland south to Brisbane is far fewer than the levels forty years previously, which are likely to have been less than those at the time of European settlement. Possible reasons for the decline include habitat degradation and loss, incidental capture in fishing nets (shark meshing, commercial and illegal), traditional hunting, and boat strike.

The long-term survey information indicates that a significant number of dugongs undertake large-scale movements. Although the reasons for all these large-scale movements are not known they are most likely associated with variations in the quality of available food (habitat) and disturbance events such as floods and cyclones.

Management Response
Many management actions have been implemented to enhance the conservation of dugongs on the Great Barrier Reef including:

- establishment of a network of Dugong Protection Areas (DPAs);
    - This included the buy-out of certain forms of commercial fishing net licences in the DPAs that represented a high risk to dugongs;

- establishing zones of high protection (yellow, green and pink) in many important dugong habitats, especially north of Cooktown to protect dugongs and their habitats from the effects of commercial fishing;
- establishment of vessel transit lanes in Hinchinbrook DPA to minimise boat strikes to dugongs;
- establishing water quality targets to protect the dugong's seagrass habitats from terrigenous runoff
- developing a regional plan to manage indigenous hunting, and
- funding research into dugongs and their habitats.

The re-zoning of the marine park through the Representative Areas Program will strengthen these initiatives. Information on dugong distribution, abundance and movement patterns is essential for the development of appropriate management of the species.

For more information, read or download:

- ***GBRMPA Research Publication 77***, http://www.gbrmpa.gov.au/corp_site/info_services/publications/research_publications/rp77/rp77-final.pdf. "*Dugong distribution and abundance in the northern Great Barrier Reef Marine Park - November 2000*" by Helene Marsh & Ivan Lawler.
- ***GBRMPA Research Publication 70,*** http://www.gbrmpa.gov.au/corp_site/info_services/publications/research_publications/rp70/index.html, which contains both "*Shark Control Records Hindcast Serious Decline in Dugong Numbers off the Urban Coast of Queensland*" by Helene Marsh, Glenn De'ath, Neil Gribble and Baden Lane and "*Dugong Distribution and Abundance in the Southern Great Barrier Reef Marine Park and Hervey Bay: Results of an Aerial Survey in October-December 1999*" by Helene Marsh and Ivan Lawler, on which this information sheet is based.
- ***GBRMPA Research Publication 67*** http://www.gbrmpa.gov.au/corp_site/info_services/publications/research_publications/rp67/index.html ' Dugongs, Boats, Dolphins and Turtles in the Townsville-Cardwell Region and Recommendations for a Boat Traffic Management Plan for the Hinchinbrook Dugong Protection Area' by Tony Preen
- ***GBRMPA Research Publication 66*** http://www.gbrmpa.gov.au/corp_site/info_services/publications/research_publications/rp66/index.html 'A Review of Water Quality Issues Influencing the Habitat Quality in Dugong Protection Areas' by Britta Schaffelke, Jane Waterhouse and Caroline Christie
- ***Dugong Information Kit*** http://www.gbrmpa.gov.au/corp_site/info_services/publications/dugong/index.html
- ***CRC Reef Brochure***, http://www.reef.crc.org.au/aboutreef/wildlife/pdf/dugong_2002.pdf. Dugongs in the Great Barrier Reef - Current state of knowledge, April 2002'.
- ***Actions for Marine Wildlife Conservation and Management*** http://www.gbrmpa.gov.au/corp_site/key_issues/conservation/threatened_species/actions.html

FOR MORE INFORMATION ON RELATED TOPICS:

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