

# EXECUTIVE SUMMARY

## PROJECT BRIEF

The Marine Plant Ecology Group (Queensland Fisheries Service, Queensland Department of Primary Industries) was commissioned by the Great Barrier Reef Marine Park Authority to undertake two (one autumn and one spring) detailed seagrass surveys of the Dugong Protection Areas in Upstart Bay, Newry region, Sand Bay, Llewellyn Bay, Ince Bay, and a reconnaissance survey in the Clairview region. The information gathered from these surveys enhances the understanding and subsequent management of seagrass resources for fisheries and as dugong feeding habitats.

## METHODS

Three sampling techniques were used to survey the DPAs. These were tailored according to the physical characteristics of each of the DPAs and according to knowledge of seagrass distribution from previous surveys (Coles et al. 1987). The techniques were: **helicopter reconnaissance surveys** (27-28<sup>th</sup> April 1999) of the extensive intertidal flats of Newry region, Sand Bay, Llewellyn Bay, Ince Bay and the Clairview region; **dive-based surveys** (16-25 May 1999 and 12-20 October 1999) of Upstart Bay, Newry region, Sand Bay, Llewellyn Bay and Ince Bay to sample shallow subtidal areas and intertidal areas and **deepwater surveys** (16-25 May 1999 and 12-20 October 1999) of Upstart Bay, Newry region, Sand Bay, and Llewellyn Bay using remote, real-time video sampling in >10m waters.

The seagrass distribution was mapped. Seagrass characteristics measured at each site included above-ground seagrass biomass and seagrass species composition. Environmental parameters measured included sediment characteristics and water depth. Beam trawling was conducted in representative seagrass communities within each DPA to provide an indication of seagrass associated fauna and implication for fisheries. A Geographic Information System (MapInfo®) was used to produce detailed maps.

## KEY RESULTS

- The **total area** of seagrass habitat mapped in the 5 DPAs surveyed (excluding Clairview region) was  $6015 \pm 982$ ha in May 1999 and  $7128 \pm 1232$ ha in October.
- Mean **biomass** for the above-ground plant material for the seagrass species found in the 5 DPAs ranged from less than 5 g DW m<sup>2</sup> in Llewellyn Bay to just over 20 grams dry weight (g DW m<sup>2</sup>) in Upstart Bay.
- *Halodule uninervis* was the most common of the **10 seagrass species** found in the study area (all sites pooled) and was present at approximately 55% of the seagrass sites. This is one of the species of seagrass preferred by dugong.
- With the exception of Nobbies Inlet in Upstart Bay, almost no seagrass was found in creeks and rivers entering into the DPAs.

- **Depth ranges** for seagrasses were very narrow with almost all records between 0 and 6 m below MSL. Most of the seagrass habitats found in the DPAs were at intertidal depths and would not be accessible to dugong during low-tide periods. The scarcity of seagrass habitat in sub-tidal areas is likely a result of the large tidal ranges and tidal currents and the corresponding high coastal water turbidity.
- Commercial prawns and fish species were found in trawls on the dense *Zostera capricorni* meadows in Upstart Bay and the Newry region.

**Summary Table.** Summary of seagrass resources in the Dugong Protection Areas of Upstart Bay, Newry region, Sand Bay, Llewellyn Bay, Ince Bay and Clairview region in April/May 1999 and October 1999.

DPA	Area of seagrass (ha $\pm$ ha)		No. of seagrass species		Average above-ground seagrass biomass (gDWm <sup>-2</sup> )		Dugong preferred seagrass species present		Dugong or feeding trails sighted	
	May 1999	Oct 1999	May 1999	Oct 1999	May 1999	Oct 1999	May 1999	Oct 1999	May 1999	Oct 1999
<b>Upstart Bay</b>	2247 $\pm$ 345	2987 $\pm$ 532	6	7	22.1 $\pm$ 5.4	21.0 $\pm$ 5.3	J ·	J ·	J ·	-
<b>Newry region</b>	2450 $\pm$ 360	2451 $\pm$ 345	9	7	8.3 $\pm$ 0.8	15.8 $\pm$ 2.5	J ·	J ·	J ·	J ·
<b>Sand Bay</b>	0	0	0	0	0	0	-	-	-	-
<b>Llewellyn Bay</b>	115 $\pm$ 50	117 $\pm$ 55	3	4	7.0 $\pm$ 0.5	2.4 $\pm$ 0.6	J ·	J ·	-	-
<b>Ince Bay</b>	1204 $\pm$ 134	1573 $\pm$ 187	4	5	7.2 $\pm$ 1.2	4.1 $\pm$ 1.3	J ·	J ·	J ·	J ·
<b>Clairview region</b>	na	na	>2	Na	na	na	J ·	na	J ·	na

## KEY ISSUES

- DPAs with the greatest seagrass abundance were all “DPA As”, offering the higher level of protection (Upstart Bay, Newry region and Ince Bay). The two bays assigned “Dugong DPA B” status had little or no seagrass (Llewellyn Bay & Sand Bay respectively). Anecdotal evidence indicates that dugong move through these areas, and they may act as a buffer to the “A” areas. The Clairview region “DPA B” appears to have extensive seagrass resources.
- From the quantitative long-term information that is available on seagrasses for the DPAs there is no evidence of seagrass area being less in 1999 than in 1987.
- It is difficult to interpret comparisons between the present results and those collected 12 years ago. In 1987 only one day was allocated to each region and no seasonal comparison was undertaken. Due to tidal conditions and time constraints on the day, little or no sampling occurred in the upper intertidal regions of Llewellyn Bay and Seaforth. Position fixing was by RADAR and position errors could be up to 100 times the error in the present study. Seagrass

biomass was estimated by percent area cover and is not easily comparable with present visual estimates of seagrass biomass.

- Most of the seagrass resources are confined to intertidal and very shallow sub-tidal depths due to large tidal ranges and tidal currents generating high coastal turbidity in these DPAs. This allows only a very limited area of seagrass feeding habitat available to dugong during low tide periods.
- Regular seasonal and annual surveys would be necessary to build a more detailed picture of the range of changes in availability that dugong face in finding food throughout the year and between years.
- There is little information on below ground biomass although roots and rhizomes make up a significant proportion of dugong food. Other information not available for dugong management include:
  - rates of seagrass productivity through a year;
  - long term trends in species mix and seasonality; and
  - the area of seagrass (and availability through a tidal cycle) that is required to support a dugong.