



Port of Gladstone
Growth, Prosperity, Community.

Briefing

Western Basin Dredging and Disposal Project Environmental Impacts



Last update: 27 September 2011



Table of Contents

<i>Executive Summary</i>	<i>3</i>
<i>1. Current State of Dredging Project</i>	<i>5</i>
<i>2. WBDDP Water Quality Monitoring</i>	<i>6</i>
<i>3. Reports of Impacts of WBDDP on Marine Life & Live Fish Exports</i>	<i>10</i>
<i>4. Impacts of Extreme Summer Weather 2010.....</i>	<i>11</i>
<i>5. Reasons for Marine Deaths</i>	<i>15</i>
<i>6. Other Information</i>	<i>18</i>
<i>Map of Monitoring Sites.....</i>	<i>19</i>

Executive Summary

The significant loss of marine life and the discovery of diseased fish in the Gladstone area over the past 6 months has been of concern to many Gladstone residents.

Some in the community have been quick to relate the deaths and the diseased fish to the Western Basin Dredging and Disposal Project (WBDDP).

There is no scientific evidence to suggest the WBDDP to date has had any impact that would contribute to loss of marine life or to the causation of disease in fish.

The dredging companies started on 10 June 2011 with two small backhoe dredges. A third small grab dredge commenced operation in August and the main cutter suction dredge Almahaar, commenced operations on 5 September 2011.

To date (as at 25 September 2011), 1,114,906m³ of dredging has occurred - a minor figure in comparison to a number of dredging campaigns conducted in the last decade.

The extensive monitoring program associated with the WBDDP shows no visible signs of any negative impact from the project to date. There was a short period of heightened turbidity levels near the Fisherman’s Landing bund wall when the cutter suction dredge started. The turbidity reduced back to within required levels within eight days.

The following are details of recorded dugong, dolphin and turtle strandings in Queensland from 1 January to 20 September 2011.

	Queensland		Gladstone Area	
	Strandings	Live Release	Strandings	Live Release
Dugongs	150	3	9	1
Dolphins	42	5	6	0
Turtles	999	<i>not verified</i>	188	<i>not verified</i>

**source – Department of Environment and Resource Management (DERM)*

The reasons for the marine strandings, the cause of the red spot disease in fish and the discovery of a fish parasite has yet to be finally determined.

The assessment by both the Great Barrier Reef Marine Park Authority (GBRMPA) and Department of Environment and Resource Management (DERM) is that the majority of marine deaths are related to the impact of last summer’s floods and extreme weather conditions which destroyed large areas of seagrass beds. The red spot disease in fish is also related to high fresh water levels and colder water temperatures which puts the fish under stress.

The Gladstone Area Water Board (GAWB) has advised that Awoonga Dam overflowed from 12 December 2010 to 23 June 2011 (193 days) pushing an estimated 1,093,760 mega litres of fresh water into the Gladstone Harbour (the equivalent of in excess of 220,000 Olympic sized swimming pools).

The Calliope River discharged significantly more water over last summer compared to the prior summer and for a longer period of time.

Seagrass mapping undertaken late last year and earlier this year has revealed a significant reduction in seagrasses especially in Gladstone Harbour.

These effects all occurred prior to commencement of the WBDDP.

However, the latest seagrass monitoring report from July this year shows most seagrass cover and biomass has increased at most locations indicating the onset of recovery after the wild summer season.

At Inner Harbour sites, in the high impact zone, seagrass was found and new shoots were reported across sites where plants had previously been absent or extremely low in abundance from February to April this year.

At Outer Harbour sites in the low impact zone, seagrass increased in abundance at Pelican Banks consistent with increases seen from April to August in 2010.

Seagrass cover at Facing Island continued to decline and was the lowest level reported over the course of the monitoring program.

Recovery was also reported at the out of port reference sites at Rodds Bay, with an increase in seagrass abundance and new shoots reported at the sites.

In relation to the fish deaths being experienced in Gladstone Harbour, scientific advice is that fish take days to weeks to develop lesions. They would not develop as a consequence of travelling through Gladstone Harbour waters.

The Gladstone Ports Corporation is committed to ensuring the WBDDP is conducted within the strict conditioning guidelines set under the WBDDP approval and as such ensure minimum impact on the marine life in Gladstone Harbour.

1. Current State of Dredging Project

- The campaign started on 10 June 2011 with 2 small backhoe dredges – the Big Boss and the Razende Bol. A third grab dredge, Tarvos commenced operation in August 2011. The cutter suction dredge Al Mahaar commenced operation on 5 September 2011. As of 25 September 2011, 1,114,906m³ of dredging has occurred.
- As shown below, there has been much more significant dredging activity in Gladstone Harbour in past years than has occurred to date with the WBDDP.

Previous Dredging Events in Gladstone Harbour

Capital dredging projects

Date	Location	Depth	Volume	Dredge type	Disposal site
1960-66	Auckland Point berths, Barney Point berths and harbour channel	Auckland Point - 23ft Barney Point - 39ft Harbour channel -9.6m	A significant volume		
1968	Entrance channel	10.4m	Further deepening		
1980-82	Approach channels to Clinton and Fisherman's Landing, as well as the Marina		20 mill m ³	Trailer / Cutter	sea / ashore
1986-87	Inner harbour channels widened and berths deepened	Auckland channel widened to 180m and deepened to 15m	3 mill m ³	Trailer / Cutter	ashore
1987	Outer channel	15.8m	2.5 mill m ³	Trailer / Cutter	sea
1997	Fisherman's Landing		1 mill m ³		
1997	Outer channel	16.3m	1 mill m ³	Trailer	sea
1998	Inner channel swing basin		2 mill m ³		
1999	Inner channel		2 mill m ³	Trailer / Cutter	ashore
2001-03	Berth 3 at RG Tanna Coal Terminal and Fisherman's Landing including deepening of Targinnie Channel and Clinton Bypass Channel		2 mill m ³	Trailer / Cutter	ashore
2005	RG Tanna Coal Terminal berth 4		0.75 mill m ³	Cutter	ashore
2008-09	Fisherman's Landing berth pocket and approach		0.66 mill m ³	Cutter	ashore
2009-10	Gladstone Marina		350,000 m ³	Trailer / Cutter	ashore

Maintenance Dredging

From 1996 maintenance dredging of 100,000m³ has occurred every year.

2. WBDDP Water Quality Monitoring

The project conditioning requires a comprehensive water quality monitoring program involving 20 monitoring sites with 9 continuous monitors testing water samples to provide actual readings close to the dredges as well as background readings throughout Gladstone Harbour.

See attached map

The GPC water monitoring program has been in place since 2003. The approvals for the WBDDP required continuous monitoring for 6 months prior to the commencement of dredging operations as well as during, and for a period after the completion of the dredging project.

The monitoring program requires monitoring of the following parameters:

Turbidity, total suspended solids, temperature, conductivity, pH, dissolved oxygen and light attenuation.

Results

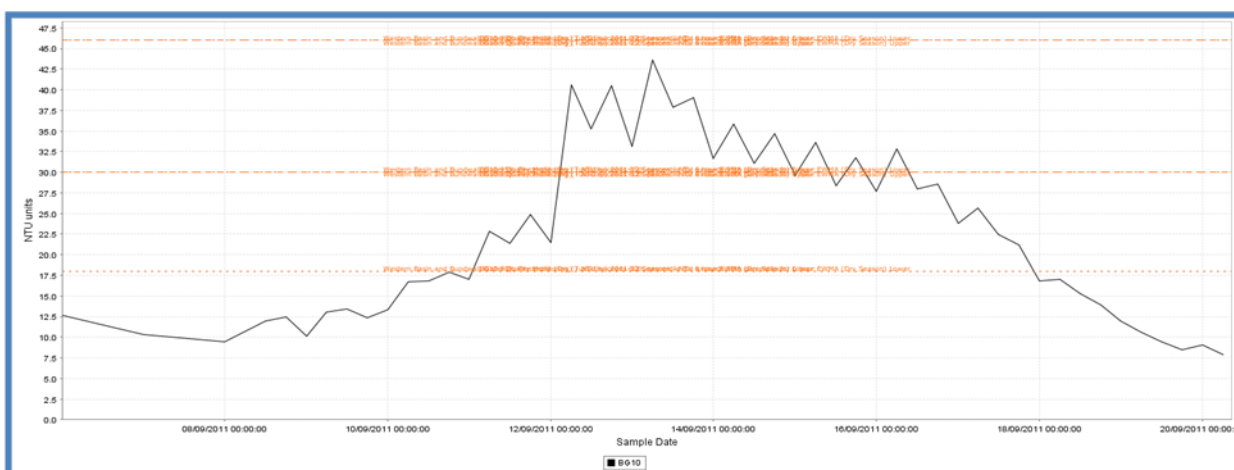
- The waters of Gladstone Harbour are naturally turbid. Tidal activity frequently causes turbidity results which exceed the Queensland Water Quality Guidelines (QWQG);
- Results have consistently shown that turbidity levels and total suspended solids' levels are primarily impacted by tidal activity;
- There is clear seasonal variability in turbidity levels, higher in summer the rainy season lower in winter. Results show a consistent reduction in recorded turbidity levels since April;
- Water clarity is generally lower in the Narrows and around the mouth of Graham's Creek and higher toward the outer harbour;
- Dissolved oxygen (DO) and pH show similar trends with lower values in the Narrows and Grahams Creek areas and higher values in the outer harbour;
- Dissolved oxygen levels fluctuate with tidal and diurnal (daily) cycles;
- DO concentrations general fall within the Australia Water Quality Guidelines (AWQG) recommended range of 80-120% saturation;
- Dissolved oxygen levels decrease after rainfall events, with little recent rain DO levels are remaining steady ;
- Water temperature has decreased markedly at all monitored sites from the wet season into the dry season (on average a 5° reduction in temperature has been recorded);
- Conductivity results have remained lower than typical marine/estuarine conditions indicating a lingering effect from rainfall in March 2011.

Dredging activities undertaken to date appear to have had very little impact on the water quality in Gladstone Harbour.

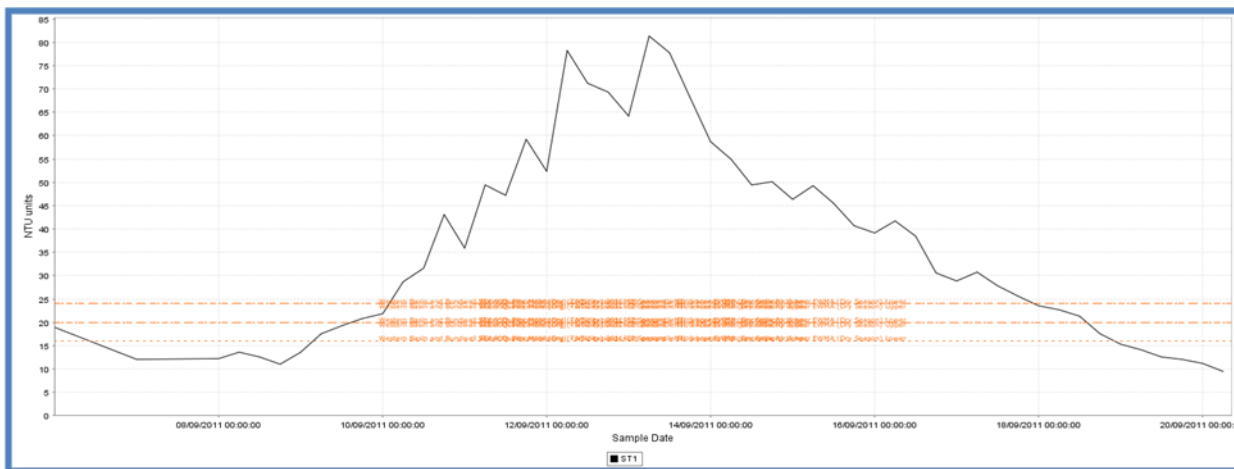
All water quality monitoring will be displayed and updated weekly on the GPC website at www.gpcl.com.au.

e.g. the water quality monitoring data for the period September 2010 to September 2011 is provided below. As the data shows, there was a short period of heightened turbidity levels near the Fisherman's Landing bund wall when the cutter suction dredger started operation. This was due to seepage through the wall which was conditioned to be constructed entirely of rock without a clay core. The turbidity reduced quickly after the inner bund wall was covered by dredge spoil.

BG10

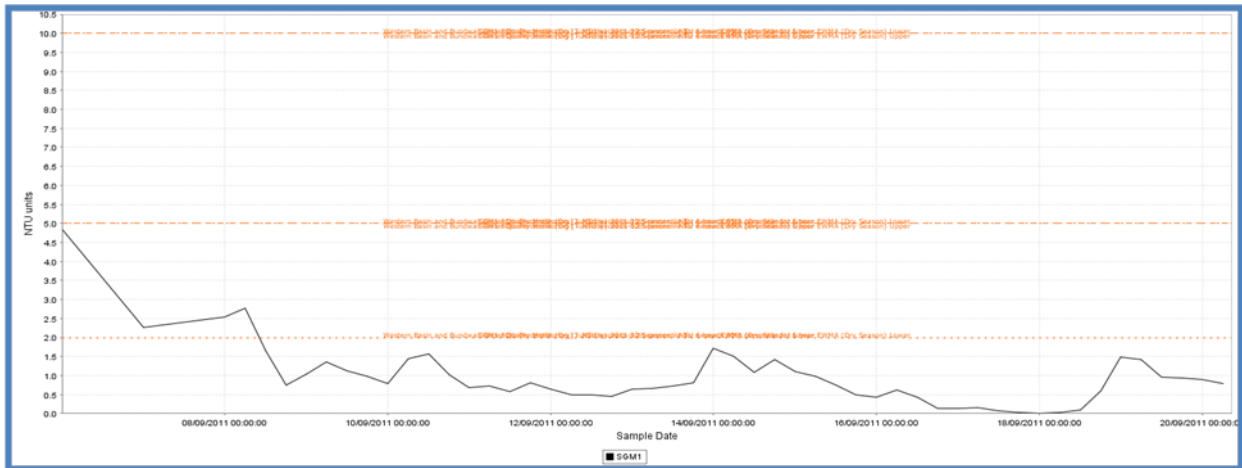


ST1

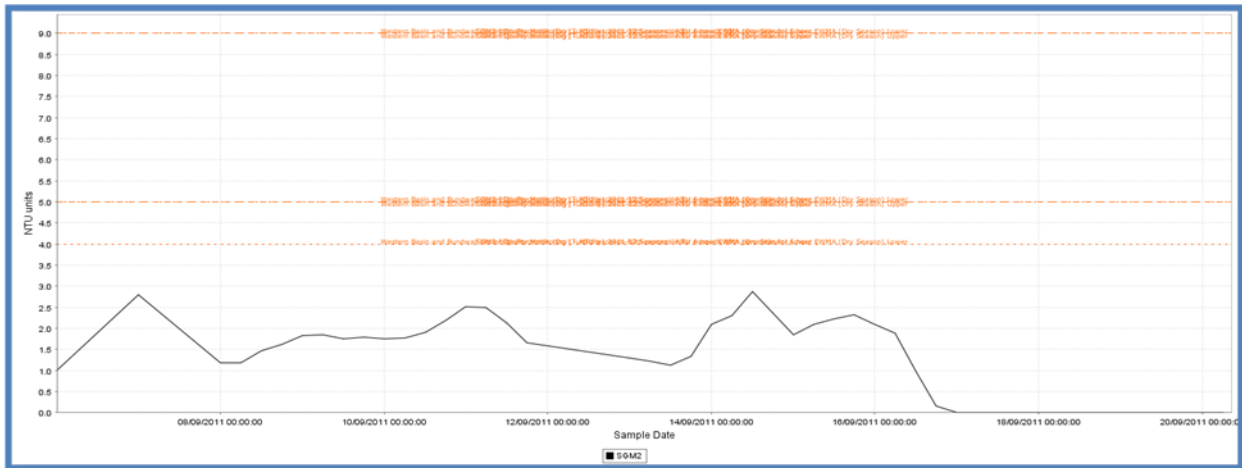




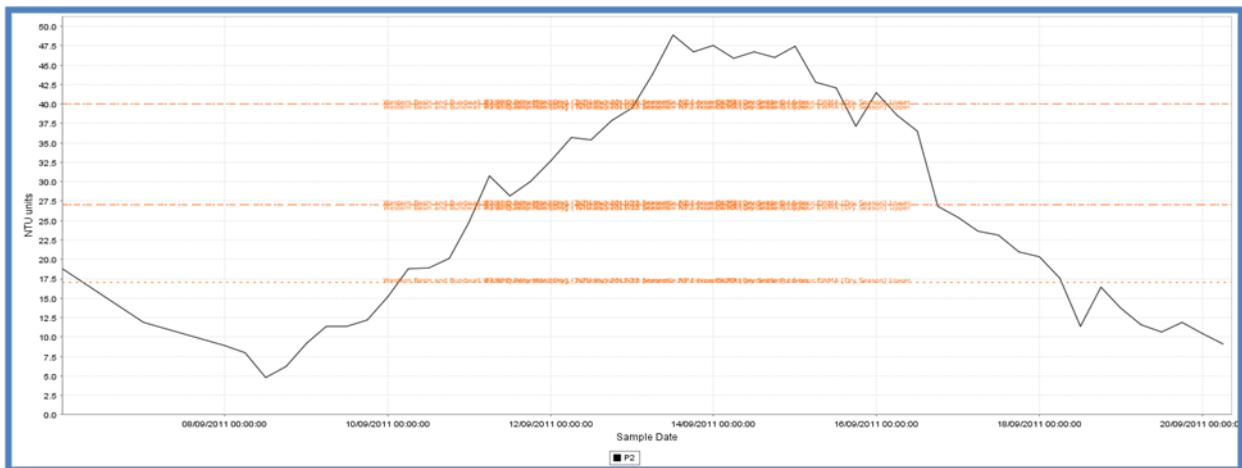
SGM1



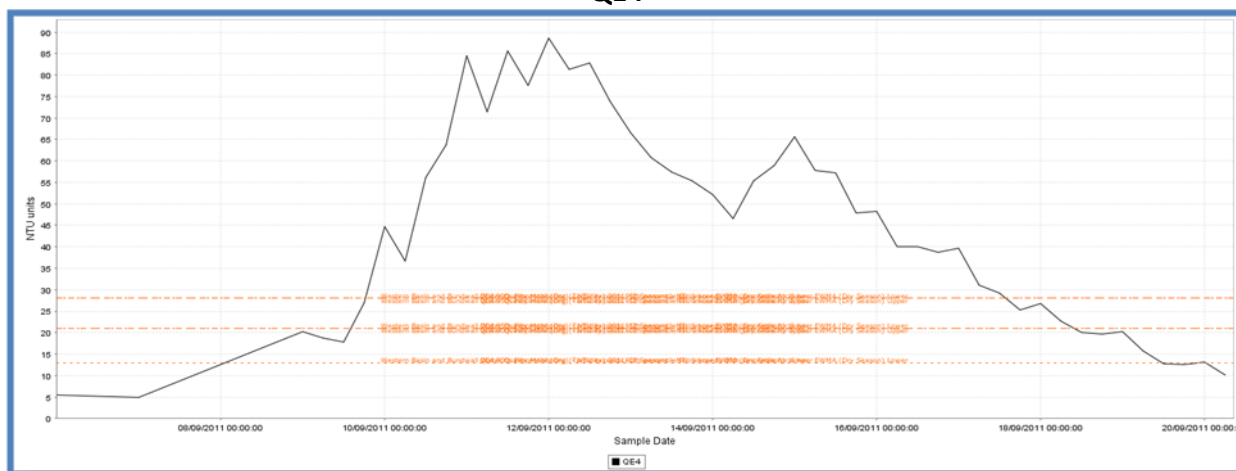
SGM2



P2



QE4



Dredging Technical Reference Panel

The WBDDP approval required GPC to establish a technical reference panel prior to and for the duration of dredging operation to oversee all aspects of water quality monitoring. The technical reference panel is comprised of scientific experts in seagrass and benthic habitat, project proponent representatives, regulators and dredge technical advisors.

The panel is chaired by Dr Rick Morton from Brisbane who has vast experience in dredging activities.

The panel assesses any exceedence of trigger values and seagrass changes at key monitoring locations and advises changes to dredging practices up to and including cessation of dredging operations.

This group has had no cause to implement any changes to date.

3. Reports of Impacts of WBDDP on Marine Life & Live Fish Exports

There have been numerous media reports of sea mammal and turtle deaths and negative impacts from Gladstone Harbour water quality on live fish exports and on the health of fish and crabs in Gladstone Harbour.

The following is details of recorded dugong, dolphin and turtle strandings in Queensland from 1 January 2011 to 20 September 2011.

	Queensland		Gladstone Area		[2010]
	Strandings	Live Release	Strandings	Live Release	
Dugongs	150	3	9	1	[2]
Dolphins	42	5	6	0	[1]
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**Source – Department of Environment and Resource Management (DERM)*

Note: of the 999 turtle strandings, 856 have been verified leaving 143 that have not been verified.

The report from DERM states most of the deaths are likely to be related to a lack of food.

4. Impacts of Extreme Summer Weather 2010

i. Boyne River

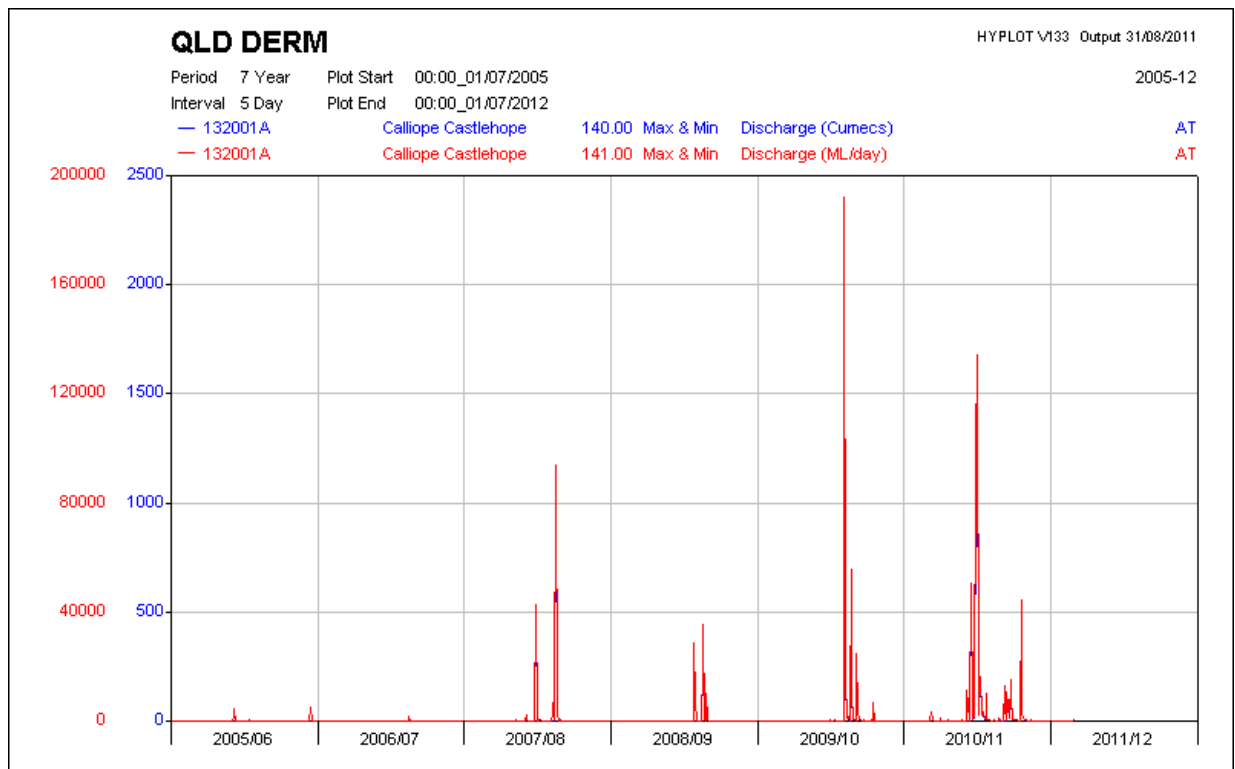
The Awoonga Dam overflowed from 12 December 2010 to 23 June 2011 (193 days).

The GAWB estimates that 1,093,760 mega litres of fresh water was discharged into Gladstone Harbour.

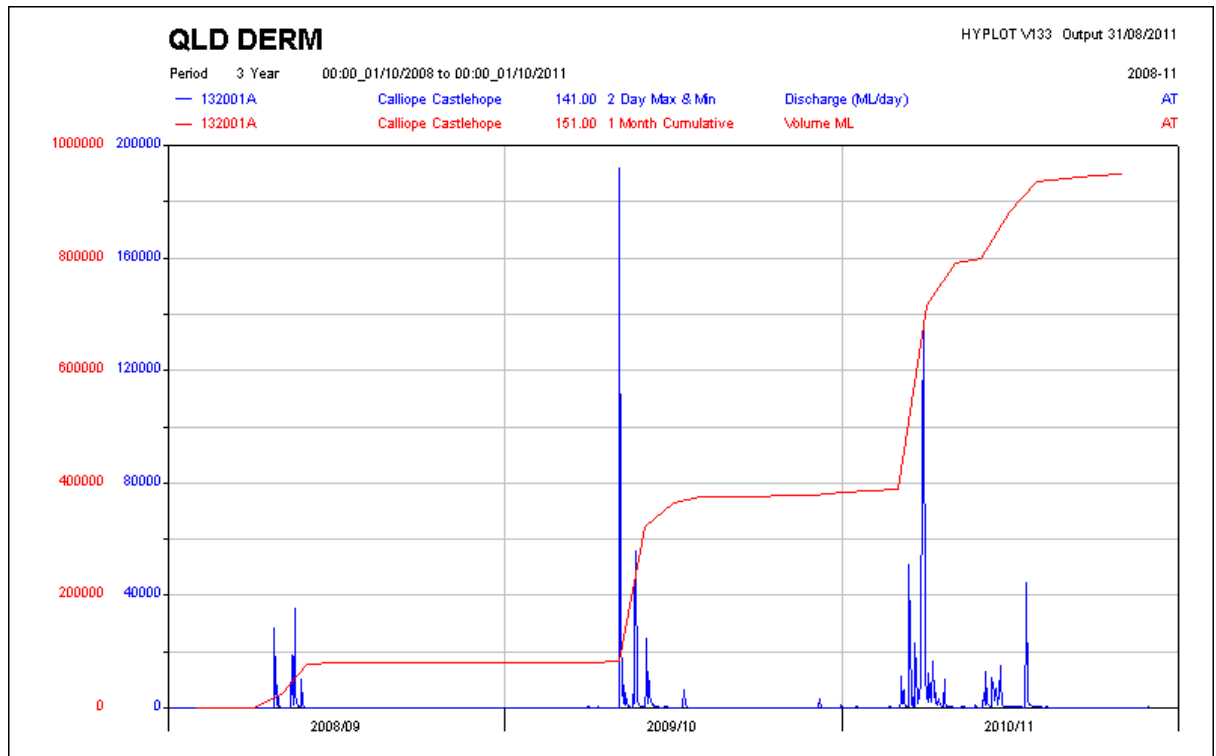
ii. Calliope River

River flow in the Calliope River for the last seven years.

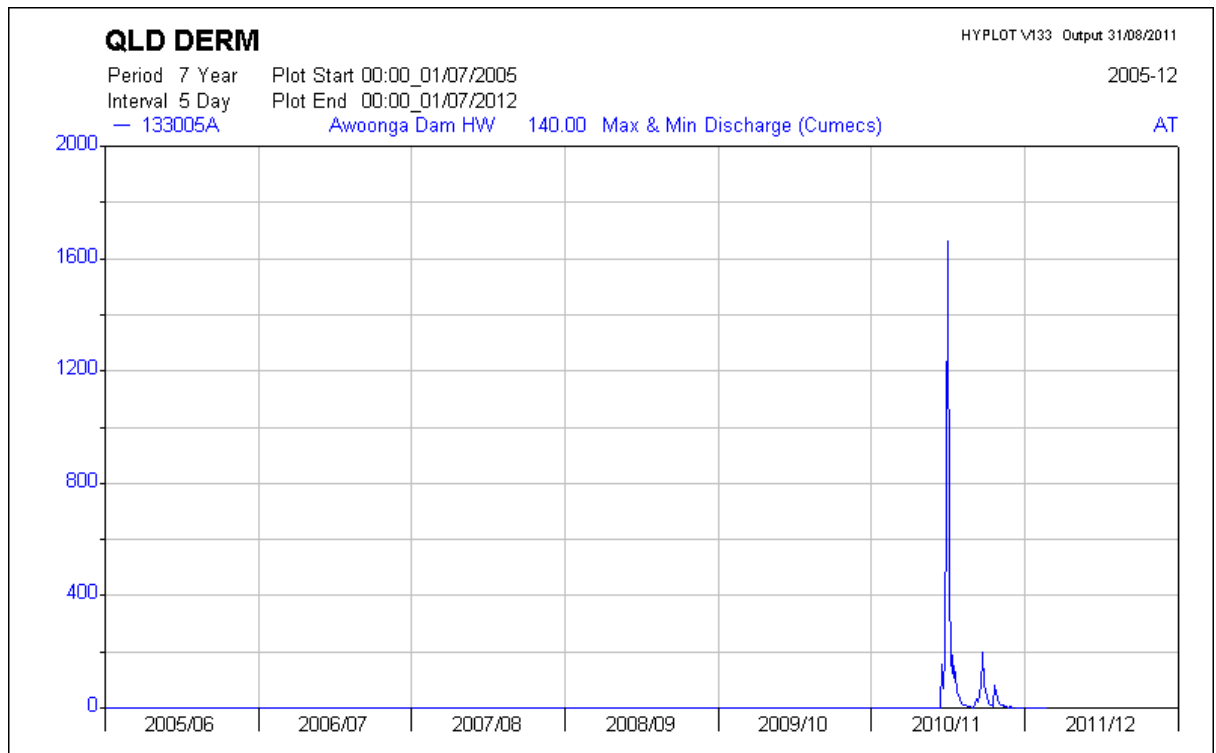
Shows a significantly longer wet season discharge over the last summer compared to previous years.



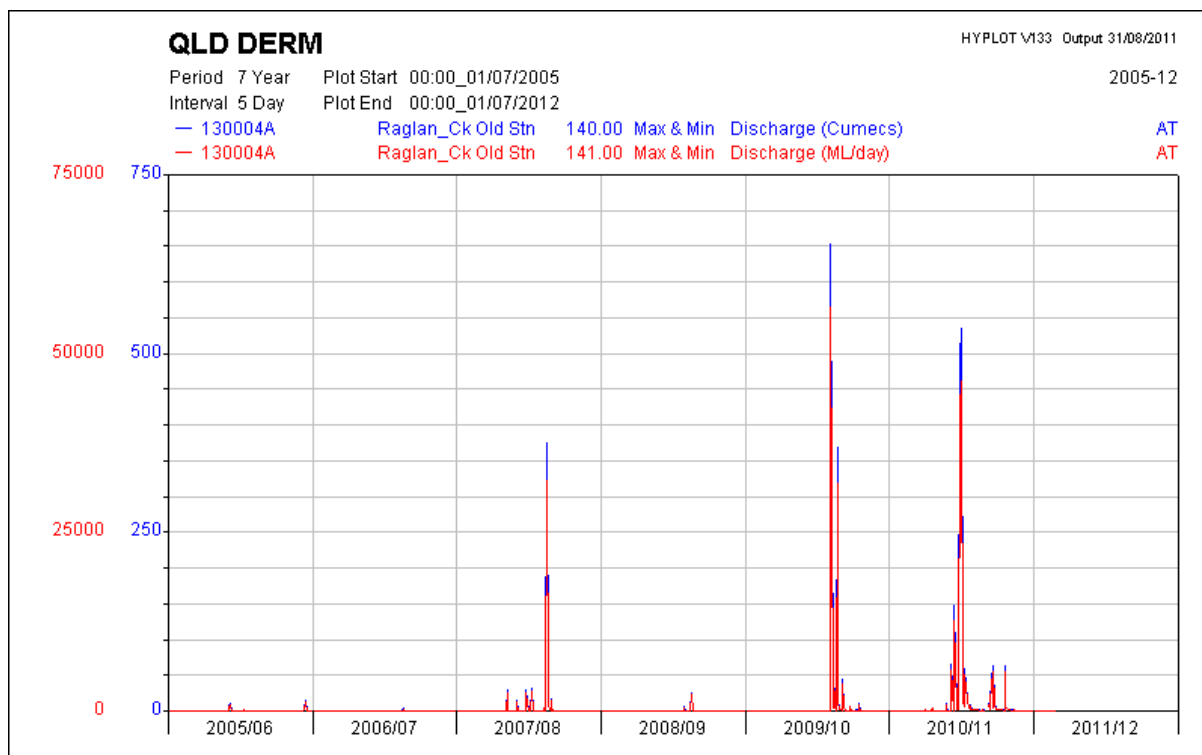
Red line below shows the cumulative volume of water discharged from the Calliope River over the past year, note significantly more over the past summer.



Discharge from the Awoonga Dam into Boyne River over the last seven years.



Discharge in Raglan Creek.



iii. Tides

A number of king tides were experienced in the Gladstone region in February this year.

Gladstone 18/04/2011 21:35 4.57m
 19/02/2011 09:52 4.69m

Port Alma 17/05/2011 21:20 5.55m
 18/02/2011 09:11 5.78m

iv. Seagrass Beds

The Department of Employment, Economic Development and Innovation (DEEDI) has monitored the area, biomass and species composition of seagrass in Port Curtis since 2002.

The most recent report released by DEEDI (July 2011) reports on monitoring undertaken this year. The major finding was that, compared to the broad distribution of meadows mapped in 2010.

In July 2011 seagrass cover and above-ground biomass at the monitored sites had increased significantly at most locations since the previous survey in April 2011.



Seagrass had returned to all sites, including new shoots of *Halophila ovalis* and *Zostera capricorni* at sites where seagrass had previously been absent or very low in abundance along transects.

Seed banks for *Zostera capricorni* were discovered in March 2011 at Wiggins Island and Pelican Banks and for *Halophila ovalis* at Wiggins Island and Fisherman's Landing. In July 2011, new shoots of both species were reported across sites which had previously contained very little aboveground biomass. This provides evidence for the beginning of recovery of some meadows from seeds stored in the sediment.

Lower rainfall and higher levels of light available to seagrasses were likely to have contributed to the onset of recovery in July 2011. Should climate conditions continue to be favourable for seagrass growth, we would expect to see further recovery in the November 2011 survey.

5. Reasons for Marine Deaths

Fundamental Investigation Principles

When undertaking any investigation it is standard practice to follow a number of steps to assess the validity of claims or prove any offences.

These steps need to be followed to validate any claims that an activity (or activities) occurring in Gladstone Harbour is causing detrimental effects on aquatic life.

- i. The actual impacts on aquatic life need to be identified.
- ii. The range of causes for these impacts need to be identified and then investigated.
- iii. Causal links need to be proven between the source and the impact
- iv. Evidence needs to be provided which links an activity to the source and hence impact.

- **With respect to live coral trout being affected:**

To date, dead coral trout fish have not been provided to either the DERM or Queensland Fisheries for analysis. GPC understands that they have been processed and provided for sale to the public. This may be irresponsible if their deaths are found to be a result from contamination or biological issues. Without knowing the specific cause of death it is difficult to identify a specific event, or activity leading to fish deaths. GPC have been advised that the last live trout catches have shown no sign of contamination or stress.

- **With respect to general impacts on the commercial fishery:**

A range of issues may affect the productivity of commercial fisheries. Climatic conditions and weather events are foremost amongst these. The fact that impacts identified by commercial fishers were experienced prior to GPC commencing dredging suggests that factors other than the dredging operation are contributing to this situation.

- **With respect to dugong, dolphin and turtle deaths:**

The GBRMPA have advised they believe the majority of the deaths are related to the impact of last summer's floods and extreme weather conditions which destroyed vast tracts of seagrass beds along the Queensland coast.

The first reports of turtle deaths at the mouth of the Boyne River in April - May this year.

- **Lesions in Fish**

The GAWB advises that fish take days to weeks to develop lesions. They would not develop as a consequence of travelling through harbour water en-route to off load.

They also indicated that lesions are often triggered by exposure to increased nutrient load in water; a likely source of increased nutrients is runoff from agricultural land. So the current state of the fish could be a lingering effect of the summer floods.

- **Marina Sediment Quality**

The marina was dredged in 2009 to a depth of 4 metres removing 330,000m³.

This material was disposed on to land in dredge cells at Reg Tanna Coal Terminal (RGCT).

Prior to dredging a comprehensive suite of sediment analyses was undertaken.

- **Results**

Metals: arsenic, cadmium, chromium, cobalt, copper, lead, mercury nickel and zinc.

Low concentrations of metals were reported in the sediment samples analysed.

The level of metals reported all fell below relevant environmental guidelines, i.e. National Offshore Disposal Guidelines for Dredged Material (NODGDM) and the National Environmental Protection Measure (NEPM).

Most of these metals are naturally occurring in the Gladstone environment.

- **Diseased Fish**

First reports on diseased barramundi in the Boyne and Calliope Rivers appeared earlier this year. Biosecurity Queensland has undertaken a series of pathology tests on the affected fish.

Fisheries Queensland General Manager of Habitat and Assessment, Dr John Robertson, said initial test results identified two conditions, red-spot disease and a parasite.

“Red-spot disease is endemic and is seen in Queensland waters occasionally,” Dr Robertson said.

“In Queensland, red-spot disease usually occurs either during winter months when the immunity of the fish is lower, or following the first heavy rainfall of the wet season.

“Red-spot disease starts with a red spot, hence the name, but can develop into burn-like marks, or ulcers with red centres.”

“It is typically caused by a fungus and often occurs in fish when they are under stress.”

Dr Robertson said more research was needed into the parasite, which affected the eye of the fish.

“We now know that this parasite is what has been causing the cloudy eyes in some barramundi in the area,” he said.

“We still have more to learn about this condition and how it is affecting fish within the area.”

Additional testing is being conducted on newly received samples of other fish species, prawns and mud crabs but results are not expected for several weeks.

Dr Robertson said the temporary fishing closure would remain in place at this stage.

“The closed area is between Deception Creek at the top end of The Narrows down to Rodds Peninsula and to the outer edge of Facing Island and applies to all tidal waters including rivers, creeks and other waterways,” he said.

“While the temporary closure is in place commercial, charter and recreational fishing, including catch and release, are not permitted.”

Waters upstream of the Awoonga Dam wall are still open to recreational fishers and licensed commercial fishers can still operate outside the closed area.

An independent scientific panel has been appointed under the Chairmanship of Dr Ian Poiner, Australian Institute of Marine Science Chief Executive Officer. This panel is empowered to provide advice to the State Government on issues relating to water quality and any human health concerns.

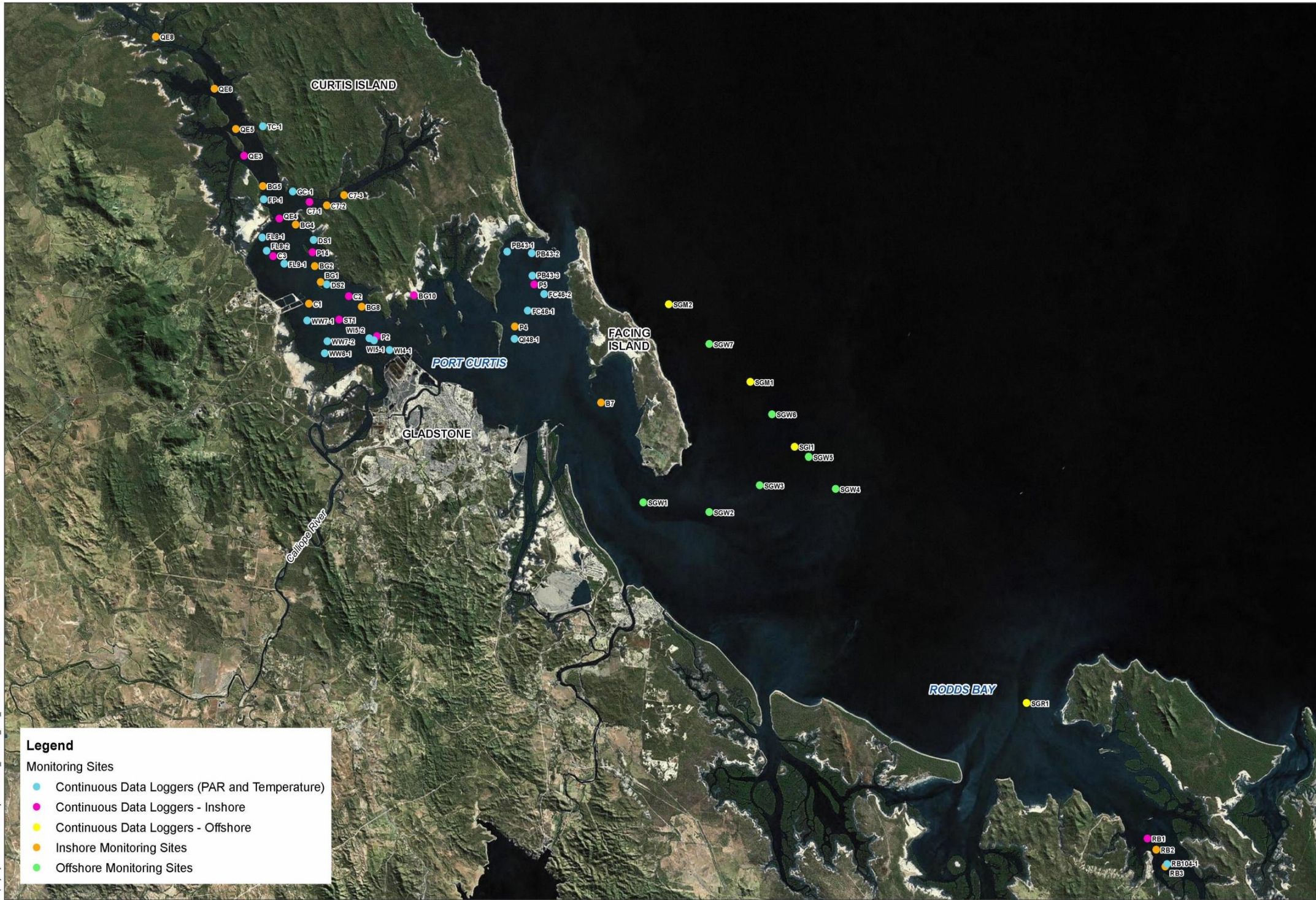
6. Other Information

i. Vessel Movements in Gladstone Harbour - i.e. ships x 2

	2010/11	2011/12	2014/15	2015/16
	2,898	3,404	3,750	3,974
<i>Per Day</i>	8	9.3	10.3	10.9
ie, 1 every hour	3hrs	2.6hrs	2.3hrs	2.2hrs

ii. Approximate 7,000ha of Seagrass Meadows in Gladstone Area

Seagrasses in project area (Fisherman’s Landing North) occur in aggregated patches, have little vertical structure and are highly variable in their prevalence.



Legend

Monitoring Sites

- Continuous Data Loggers (PAR and Temperature)
- Continuous Data Loggers - Inshore
- Continuous Data Loggers - Offshore
- Inshore Monitoring Sites
- Offshore Monitoring Sites