

South East Queensland Floods 2011

Seagrasses, turtles and dugongs
Newsletter #3, April 2011

Moreton Bay is internationally recognised for its large population of green sea turtles and dugongs, and for its unique location next to a major capital city. The Eastern Banks area of Moreton Bay, near South Passage, is one of the only places in the world where you can be surrounded by healthy populations of turtles and dugongs while viewing the skyline of a major city. Green sea turtles and dugongs feed on seagrasses that thrive on the shallow sand banks, particularly Moreton and Amity Banks. Following the January flood, there has been serious concern about the impact of the flood plume on these symbolic Moreton Bay creatures. This newsletter provides an overview of some of the initial flood impact assessment results for seagrasses, turtles and dugongs, and identifies the risks that need to be monitored.

Ongoing monitoring to ensure recovery

Seagrasses exposed to the flood plumes in the central and western areas of Moreton Bay are likely to experience light reductions and resulting declines, particularly where they occur in deeper waters. While the Eastern Banks were largely out of the direct flood plume, continued monitoring of these seagrasses will be important, due to their critical role as turtle and dugong food and habitat. The 2011 flood is the eighth largest flood since 1840, but it is the first flood event to occur following a ten year ecosystem health monitoring effort.

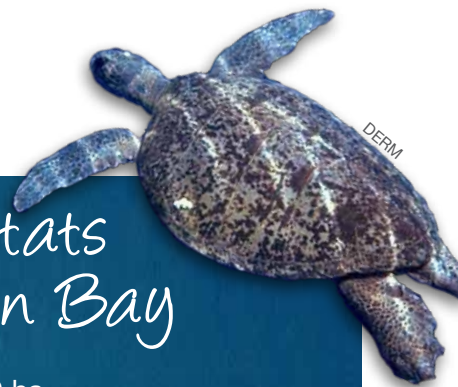
Thus, this is a unique opportunity to understand flood impacts and recovery processes. This can lead to better flood management and more targeted and cost effective monitoring in the future.



DERM

Pre-flood stats for Moreton Bay

- Seagrass area:** 25,000 ha
(equivalent to size of North Stradbroke Island)
- Number of seagrass species:** 6
- Number of dugongs:** 960
- Average annual dugong strandings:** 10-20
- Number of green sea turtles:** 10,000
- Average annual green sea turtle strandings:** 160



DERM



Dugongs (left) graze on the seagrass beds in Moreton Bay leaving behind "grazing trails" through the seagrass (main photo). Green sea turtles (above) also graze on seagrass in Moreton Bay

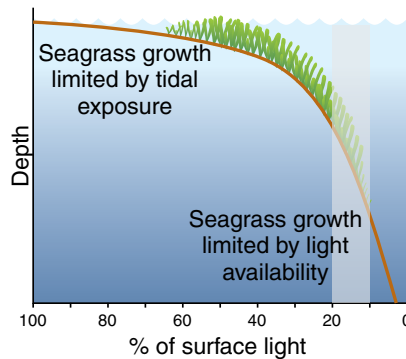
Chris Roelfsema, UQ



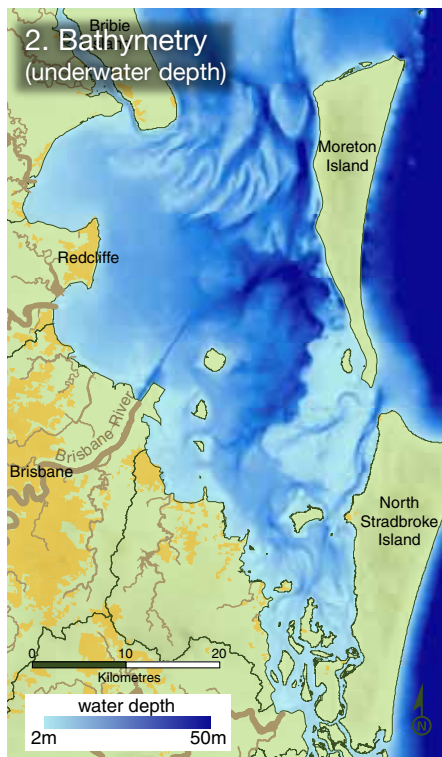
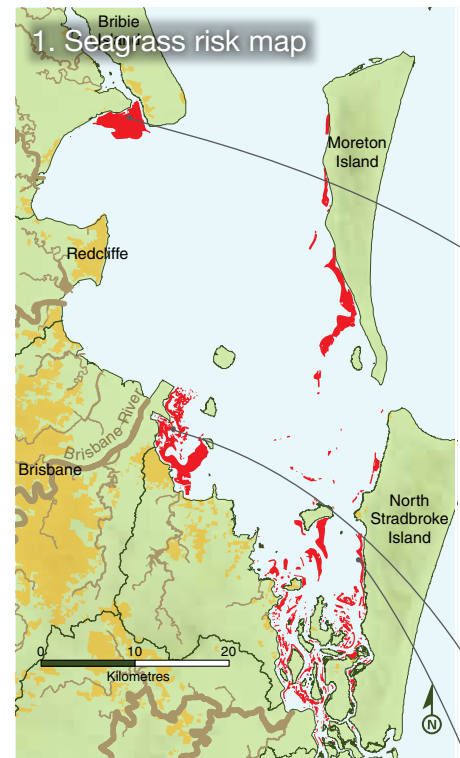


Seagrass at risk

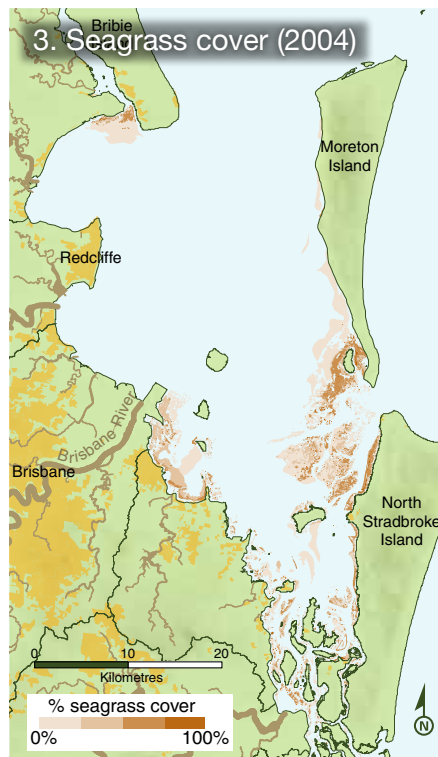
A seagrass risk map (Map 1) was developed for Moreton Bay by comparing bathymetry (underwater depth - Map 2), seagrass cover (Map 3) and light reductions caused by the flood plume (Map 4). The seagrass risk map identifies the high risk areas are in Deception Bay, portions of Waterloo Bay and some areas of southern and eastern Moreton Bay. Fortunately, Moreton and Amity Banks are low risk due to shallow water, water circulation patterns and proximity to oceanic flushing through South Passage. This seagrass risk map was validated with underwater light measurements taken at three locations in Moreton Bay, as well as field observations of seagrasses. The seagrass risk mapping exercise was conducted by Mitchell Lyons, Dr. Chris Roelfsema and Prof. Stuart Phinn, The University of Queensland.



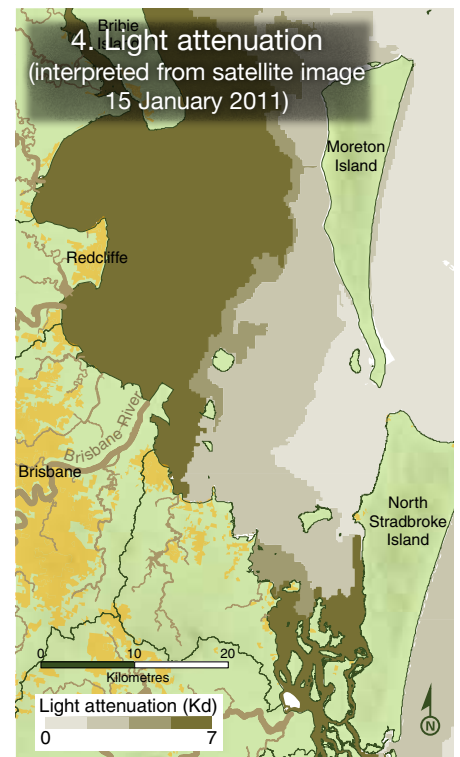
Seagrasses thrive in shallow, clear water as they require 10-20% of surface light for growth and survival. The distribution of seagrasses in Moreton Bay is primarily limited by the amount of light that reaches the bottom.



Map 2: There are large tracts of shallow water on Moreton and Amity Banks, as well as along the western shore of Moreton Bay. Moreton and Amity Banks are the lobes of sand that entered the Bay through South Passage, between Moreton and North Stradbroke Islands.



Map 3: Moreton Bay seagrasses are concentrated on Moreton and Amity Banks, around the Southern Bay islands and in Waterloo and Deception Bays on the western shore. Seagrass cover maps were generated with remote sensing and underwater surveys.

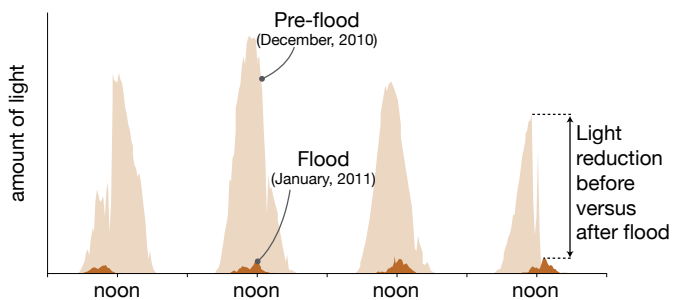


Map 4: The flood plume from the Brisbane River largely flowed to the north and out of the Bay through North Passage. The western embayments of Moreton Bay, Deception, Bramble and Waterloo Bays (north to south) were the most affected areas. Light reductions were calculated from remote sensing analysis.

Immediate light reduction in western Bay

Light reduction in Moreton Bay due to turbidity from the flood was assessed using underwater light sensors. Reductions in light levels were immediately evident in Deception Bay following January's major rain event when compared with the same site in December 2010. This data was collected and analysed by Peter Hanington, a PhD student at UQ, under the supervision of Assoc. Prof. Ron Johnstone.

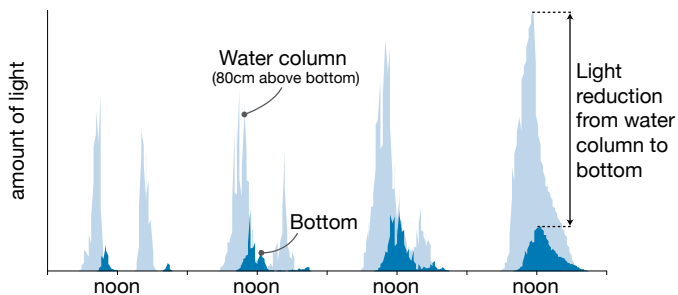
Deception Bay - western Bay



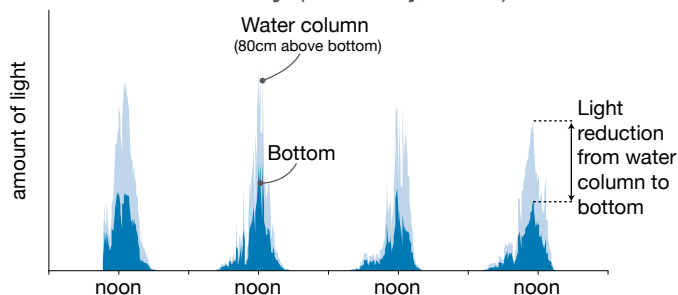
Ongoing reduced light after the floods

One month after the flood, data shows very little light is reaching the bottom in western Moreton Bay when compared to water column light at 80cm above the bottom and this may prevent seagrass survival. However, there is light reaching the bottom in eastern Moreton Bay. This data was collected and analysed by Paul Maxwell, a PhD student at Griffith University, under the supervision of Prof. Rod Connolly.

Western Moreton Bay (February, 2011)



Eastern Moreton Bay (February, 2011)



1992 flooding in Hervey Bay led to mass dugong mortality

Following two major floods and a cyclone in 1992, 1000km² of seagrass was lost from Hervey Bay. Deep seagrass beds died due to a reduction in light cause by dirty water. Shallow seagrass beds were also ripped from the sea floor by strong waves associated with the cyclone.



Eight months after the flood, the dugong population of 2000 was reduced to only 70, with almost 100 carcasses recovered along the east coast, south of Hervey Bay. The cause of death for many of these dugongs was starvation because the seagrass, the dugong's main food source, was so severely depleted. Some dugongs were able to relocate to other areas, such as Moreton Bay, but many died attempting this journey.

Almost two years after the 1992 flood, the dugong population was estimated at only 600. It may take up to 25 years for the Hervey Bay dugong population to recover to the same numbers seen before 1992.

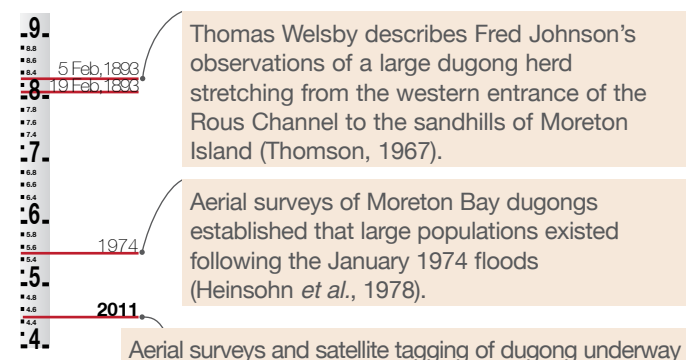


Hervey Bay deepwater seagrass

What is going to happen to seagrass, turtles and dugongs?

Previous experience with flood impacts in Moreton Bay suggests that seagrasses, turtles and dugongs on Moreton and Amity Banks will be relatively unaffected. However, immigration of animals from other regions (e.g. Hervey Bay) could reduce food availability and the high degree of cloudiness throughout the La Niña period could reduce food quality. Dugongs and turtles will often move into areas where they don't normally reside, searching for better food sources. As a result, the existing management regimes, such as 'go slow' zones, may need to be expanded to accommodate unusual dugong and turtle movements.

Historical accounts



Monitoring dugong health

Aerial observations of the region since the flooding have located large herds of feeding dugong. Initial observations suggest that dugongs are in generally good body condition, however comprehensive health assessments will be made of both Moreton Bay and Hervey Bay dugongs in May/June 2011.

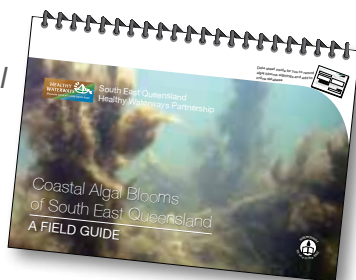
Dr Janet Lanyon and colleagues from The University of Queensland tagged over 850 dugongs in Moreton Bay and more than 450 dugongs in Hervey Bay prior to the flood. Dr Lanyon's team may also be able to distinguish between Hervey Bay and Moreton Bay dugongs using small but significant genetic differences, thus migrations into Moreton Bay may be discernible.



Janet Lanyon, UQ

Algal growth may also impact seagrass

There are several algal species that bloom in South East Queensland waters which can impact seagrasses. Bloom forming macroalgae include red, brown and green algae. Healthy Waterways' *Coastal Algal Blooms of South East Queensland: A Field Guide* can be consulted for identification of macroalgae.



References

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- Preen, A. and Marsh, H. (1995). Response of dugongs to large-scale loss of seagrass from Hervey Bay, Queensland, Australia. *Wildlife Research*. 22, 507-519.
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Existing stress from *Lyngbya* blooms

One of the ongoing pressures that Moreton Bay seagrasses, dugongs and turtles have been subjected to are blooms of the cyanobacterium *Lyngbya majuscula*.

Chronic *Lyngbya* blooms on the seagrasses of Deception and Eastern Moreton Bay have occurred since the 1990s. These blooms have affected seagrasses by smothering them and reducing the light reaching seagrass leaves. *Lyngbya* toxins also deter turtle and dugong feeding, with possible health effects if *Lyngbya* is consumed.



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For more information about the waterways of South East Queensland please visit Healthy Waterways' website:
www.healthywaterways.org

Front banner: A healthy seagrass bed, Department of Environment and Resource Management
Back banner: Seagrass beds of North Stradbroke Island, Piet Fiet, Healthy Waterways

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