

Harmful Algal Bloom in Gladstone Harbour Coincides with Toxic Algal Symptoms in 42 Fishermen

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Introduction - On 16 September 2011, Fisheries Queensland closed Gladstone Harbour and the surrounding area to fishing under section 46 of the Fisheries Act 1994 while the Queensland Government investigated a condition affecting some locally caught fish. A poorly built bund wall was leaking in the vicinity of 180 tonnes per hour of dredge spoil according to engineering reports which was contributing to poor water quality and toxic algal blooms. At that time, and contributing to the harbour closure, health issues were noted in 42 fishermen. The health department was tasked to investigate the symptoms in fishermen.



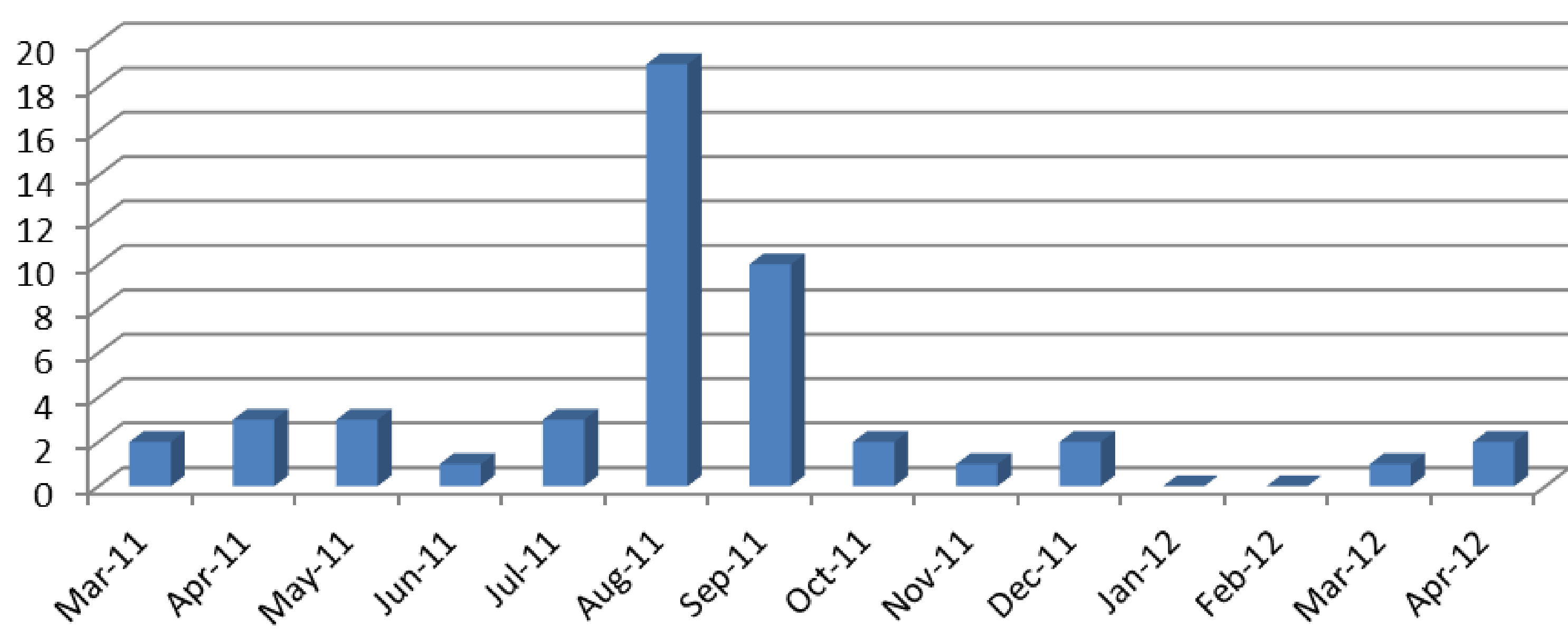
January 2004 Blue Harbour June 2011 Brown Harbour
Dredging the World Heritage Gladstone Harbour contributed to an environmental disaster— fishing industry collapsed.

Badly built bund wall with torn geotextile leaked dredge spoil into the harbour with heavy metals and nutrients and contributed to algal blooms. (Independent review of the bund wall Port of Gladstone)

Methods - Fishermen were interviewed and the data available from the Gladstone Ports website, DERM, Fisheries Queensland, the Gladstone Fish Report and the Health Department was reviewed. Toxic Algal bloom data and water quality data that had been withheld from the public for over two years was analysed

Results - There were multiple symptoms reported in the fishermen that could be attributed to toxic algae. The harmful algal bloom levels peaked in August 2011 and remained at extremely high levels in September and October 2011. This coincided with the fishermen's peak complaints in August, September and October 2011. The experienced fishermen linked their disease with dredging. A case of respiratory symptoms in 2 members of a family required ambulance transfer to hospital. Their nets were tested and found to be heavily contaminated

Health Symptoms in Fishermen



"Algal cell numbers may have been much higher in August and September than that measured in October 2011 and that algal cell numbers quantified in October 2011 may have been an under estimation of actual bloom cell numbers. ..it is possible that harmful algal blooms may have been a possible contributing factor in the fish disease syndrome." (Vision 2011)

Lyngbya

- Marine blue-green algae (cyanobacterium)
- Made up of fine strands (10-30cm)
- In *small amounts* Lyngbya is natural & found in subtropical & tropical waters around the world
- However, in recent years large mono-specific blooms of Lyngbya have been observed in locations around world including SE QLD



Economic impacts

- Reduced fish catch
- No fishing during blooms
- Closure of beaches
- High removal costs to councils
- Effects on tourism



Floating Lyngbya rafts

- On hot, still days high photosynthetic rates generate lots of oxygen
- Cause Lyngbya to lift from the sediment/seagrass
- Large floating rafts of Lyngbya
- Can wash onto beaches (with correct winds)



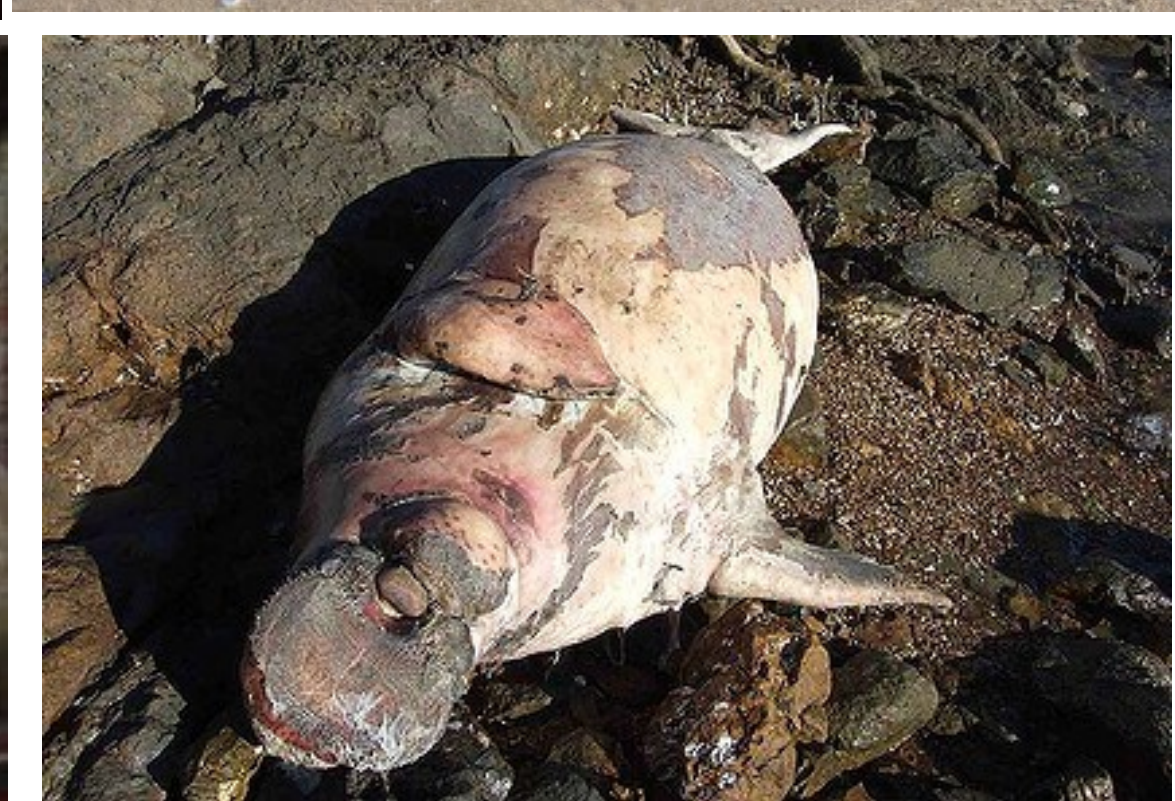
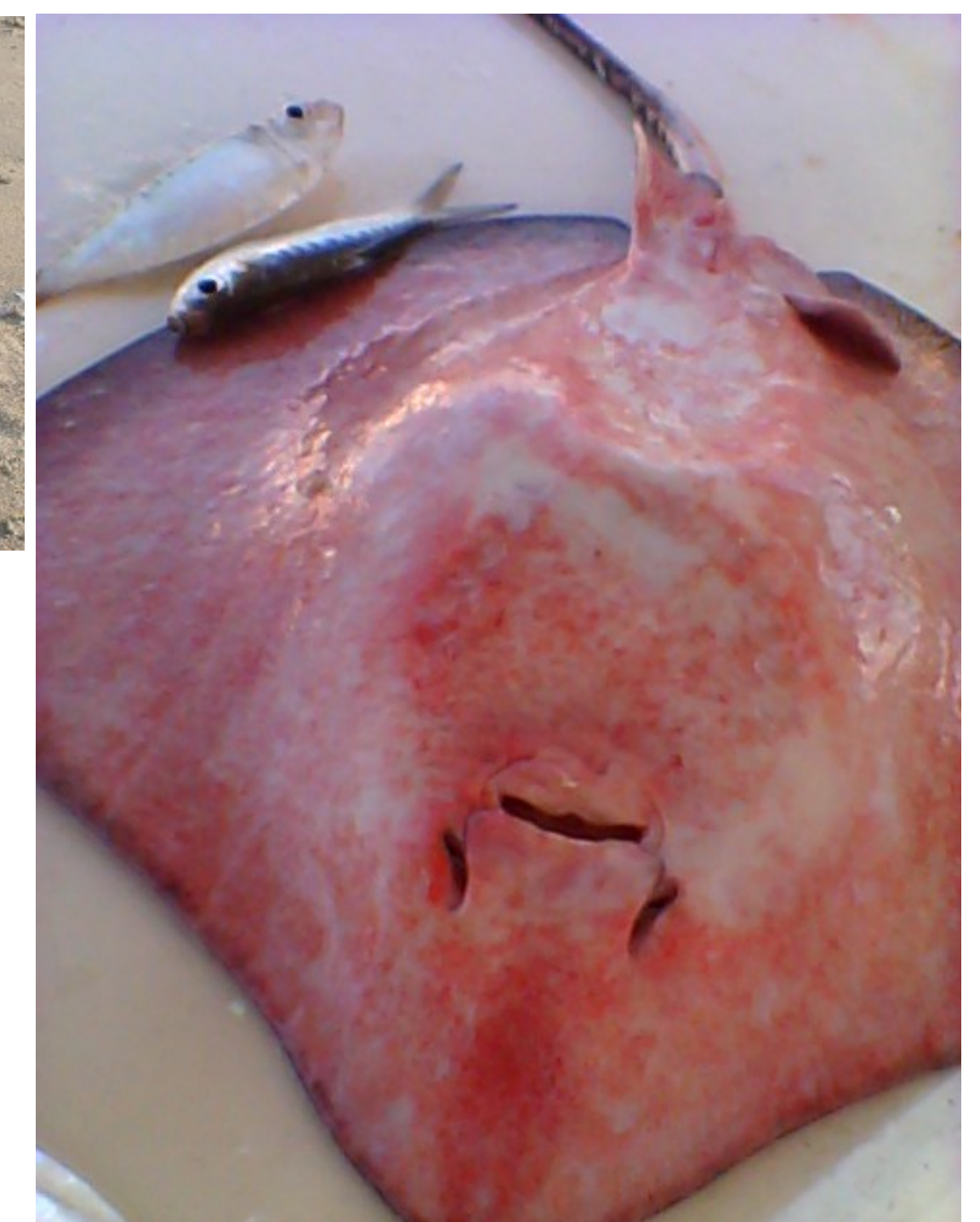
Human health impacts

- Severe contact dermatitis (~10 Moreton Bay fisherman & 1300+ Fraser Island & Rainbow Beach swimmers) Osborne 2004
- Asthma-like symptoms
- Eye irritation
- Toxic to wild life



Discussion:

Algal toxins are well known to cause illness. The temporal association of health symptoms with high toxic algal counts, high turbidity associated with dredging and a leaking bund wall in an occupationally exposed group (fishermen) is highly suggestive of environmental exposure to toxic algae. Qld Health was not fully informed about the bund wall leak, the water quality and the toxic algal blooms which made it difficult to investigate the potential sources. The harmful algal bloom plan was not implemented as the data was hidden and the public were not notified or educated. The bund wall leak of dredge spoil modelled to be 180 tonnes per hour in September 2011, may have created an environment conducive to toxic algal blooms. The Gladstone harbour



Toxic algae may have contributed to disease in multiple aquatic species as well as humans in Gladstone Harbour