

# Darwin Harbour Beaches

## Summary

Several of Darwin Harbour beaches were closed in the dry season due to levels of microbiological water quality indicators being greater than guidelines.

## Nature of system

- Estuarine system likely to be well mixed via tidal inflows and outflows
- Many stormwater drains enter tidal creeks directly onto beachfront areas
- Mangrove habitat and inter-tidal mudflats in some parts
- A large proportion of the catchment has been urbanised
- Cyanobacteria blooms (e.g., maiden's tresses and sea sawdust) typically occur as a natural event in most years in the dry season and can wash ashore

## Sources of pollution

- Sediment, nutrient, bacteria, commercial and other human-related pollutants in stormwater runoff from rural, urban (e.g., residential, recreational facilities and areas, commercial areas) from diffuse sources in the catchment
- Sediment, nutrient, bacteria, and other pollutants from point sources (e.g., wastewater discharges, stormwater drains, recreational facilities and areas, commercial areas) to waterways
- Sewage treatment plant wastewater discharges at East Point and Larrakeyah between Darwin wharf and Lee Point



Mindil Beach is a popular recreation area in Darwin. Mindil Beach *E. coli* levels were above the NT water quality guidelines on 8 out of 25 sampling occasions from June to September 2010 (data supplied by Department of Health and Families).

**Darwin Harbour beaches area catchment showing rivers and monitoring sites**



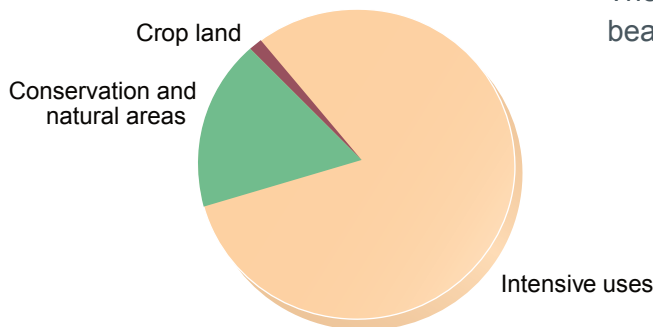
▲ Estuarine monitoring sites

● Outfall monitoring sites

0 6 12km



**Land use in the catchment**



**Catchment disturbance index**

The CDI for the Darwin Harbour beaches catchment is 0.44.

**Water quality issues in the catchment**



In the dry season of 2010, bacterial counts above recreational water quality guideline levels and presence of nuisance algae led to closures of several of Darwin’s beaches. Investigations into all of the sources of the high bacterial counts are ongoing.



Maiden’s tresses (*Lyngbya majuscula*) is a naturally occurring cyanobacteria (previously called ‘blue-green algae’) that has recently been observed in large masses on Darwin’s beaches. Blooms occur naturally, as in other years. *Lyngbya majuscula* can cause skin irritation in humans. Beaches were closed to assure public safety. This photo was taken on Casuarina Beach in June 2010. Photo: Julia Fortune



Slicks of sea sawdust (*Trichodesmium cf. erythraeum*), a nitrogen-fixing cyanobacteria (previously called ‘blue-green algae’) appear on the sea’s surface. The blooms are also commonly known as ‘red tides’. These blooms are natural occurrences in Darwin Harbour and typically occur every year between September and November. Slicks caused by sea sawdust can have a strong, rank smell and form dark green scums when they wash ashore, but they are not iridescent like oil slicks. This photo was taken 1 km west of East Point in Darwin Harbour on 8 November 2008. Photo: Neil Wright.





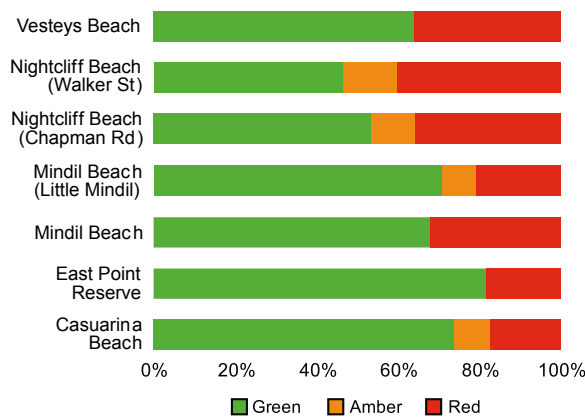
Sewage treatment plant wastewater discharges can contribute to nutrient, bacteria and other human-related pollutants. This photo was taken while water quality samples were collected at the East Point mixing zone monitoring area on 16 June 2010. Photo: John Drewry

### Darwin Harbour beaches area marine ambient water quality

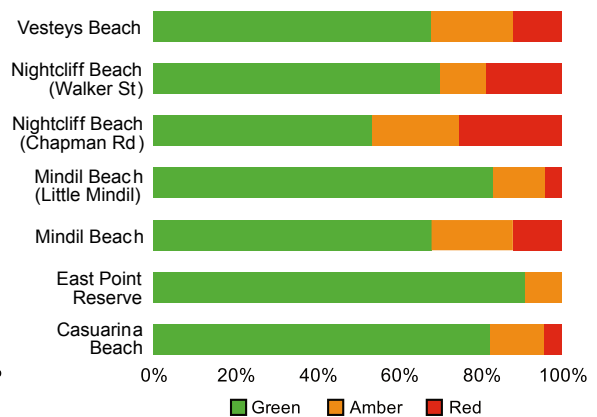
This section shows green (beach open), amber (alert-open) or red (beach closed) mode compliance for Darwin beaches monitored from 7 June to 13 September 2010. Criteria for each mode are described in the 'Interpreting the Report Cards' section. Data are *E. coli* and enterococci data collected by the Department of Health and Families. In line with national guidelines for recreational marine waters, the Department is transitioning to enterococci as the preferred indicator for 2011.

Sample numbers ranged from 15 to 28.

The graphs show the percentage of samples monitored that were in green, amber or red mode. For example, Casuarina Beach had 74% of *E. coli* samples in green (beach open) mode, 9% of samples in amber (beach open), and 17% of samples in red (beach closed) mode.



*E. coli* data for beaches  
7 June to 13 September 2010.

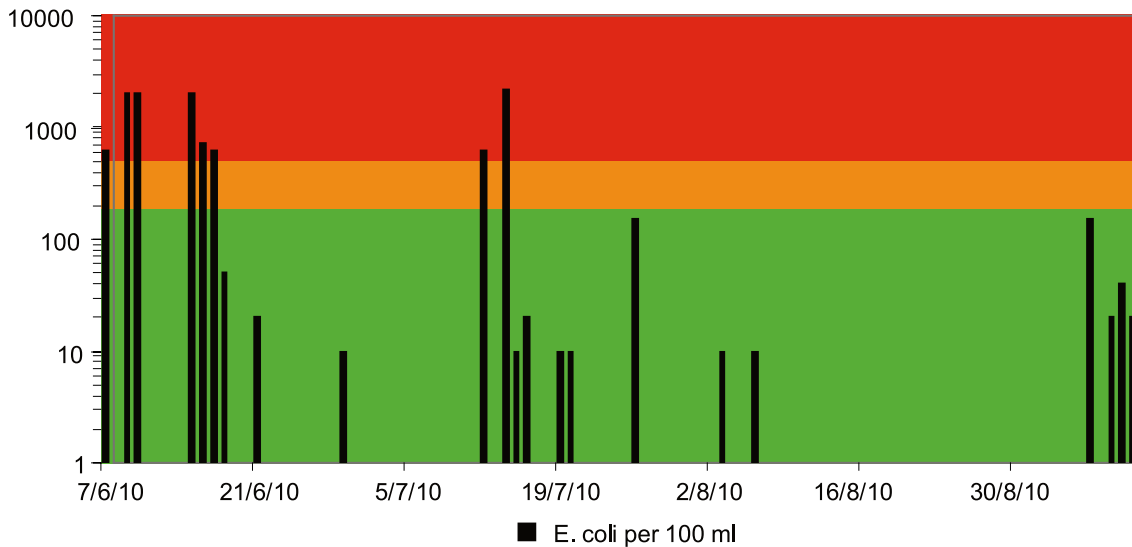


Enterococci data for beaches  
7 June to 13 September 2010

### Mindil Beach area marine ambient water quality

Levels of *E. coli* for Mindil Beach monitored from 7 June to 13 September 2010 are presented here. Data were collected by the Department of Health and Families. For 111 days from 1 June to 19 September 2010 there were only three days (6 July, 4-5 September) with rainfall recorded at Darwin airport.

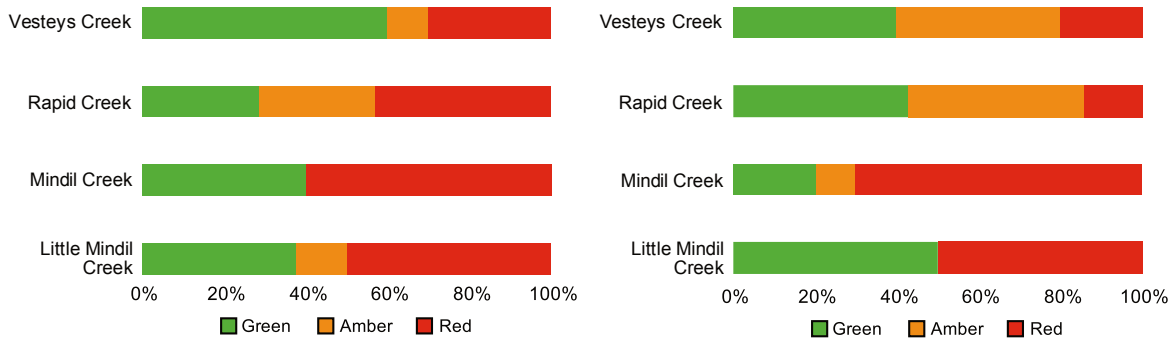
Note the logarithmic scale (useful for showing small and very large values) where each major division is 10 times greater than the previous division. Colours are green (beach open), amber (alert-open) or red (beach closed).



### Darwin Harbour beaches area tidal creeks marine ambient water quality

This section shows green (beach open), amber (alert-open) or red (beach closed) mode indicative compliance based on *E. coli* or enterococci data for four tidal creeks monitored weekly from 24 June to 14 September 2010. Sample number: Little Mindil Creek (8), Mindil Creek (10), Rapid Creek (7), Vestey's Creek (10).

Note that beach closures are *not* determined from these tidal creek monitoring data. The graphs show the percentage of samples that were in green, amber or red indicative mode.



*E. coli* data for 4 tidal creeks

Enterococci data for 4 tidal creeks

### Treatment plant mixing zone marine ambient water quality

This table shows preliminary results for the percentage of samples that are greater than or below the red (beach closed) trigger value for *E. coli* and enterococci levels at or near the East Point and Larrakeyah mixing zone monitoring areas. For these methods and conditions at the time of sampling, and the limited number of samplings, most samples contained fewer, or much fewer, *E. coli* and enterococci than the 'beach closed' trigger values. The source of the elevated bacteria levels at beach monitoring sites is unclear and investigation is continuing.

The East Point mixing zone was sampled at five nearby sites in August and September 2010. The Larrakeyah mixing zone was sampled at six nearby sites in August and September 2010. Trigger values are from NT recreational water quality guidelines. Note that these guidelines may not apply within a mixing zone. The complete extent of mixing zones have not yet been fully determined.

STP mixing zone	Date	Percentage of samples <500 <i>E. coli</i> /100 ml	Percentage of samples >500 <i>E. coli</i> /100 ml	Percentage of samples <200 enterococci /100 ml	Percentage of samples >200 enterococci /100 ml
East Point	6/08/2010	80	20	100	0
East Point	24/08/2010	80	20	100	0
East Point	7/09/2010	100	0	100	0
East Point	21/09/2010	100	0	100	0
Larrakeyah	9/08/2010	100	0	100	0
Larrakeyah	24/08/2010	100	0	100	0
Larrakeyah	7/09/2010	100	0	100	0
Larrakeyah	20/09/2010	83	17	83	17

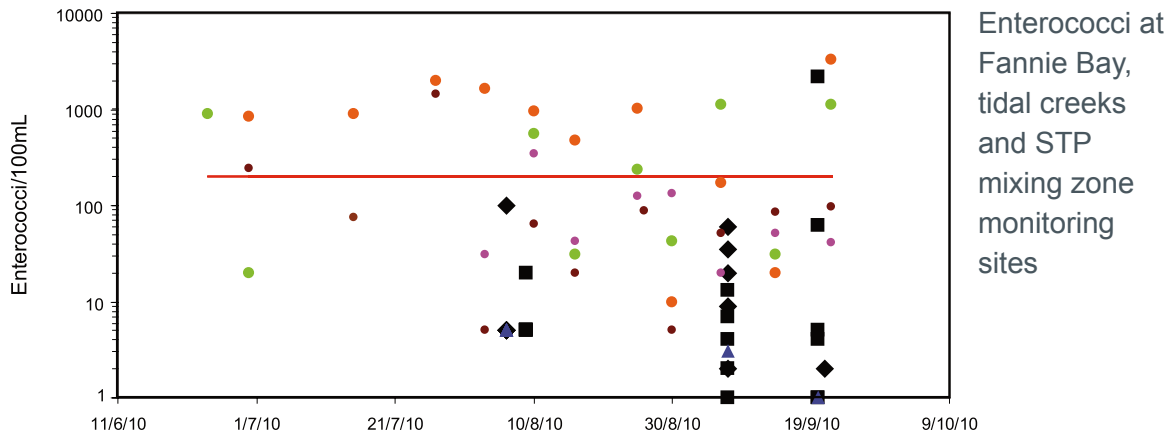
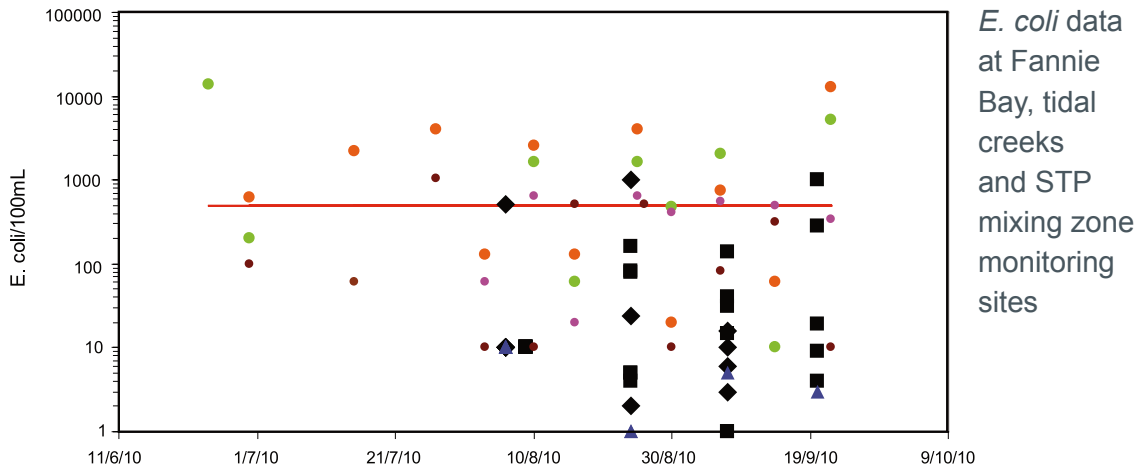
### Fannie Bay, tidal creeks, East Point and Larrakeyah mixing zone areas marine ambient water quality

These graphs show *E. coli* and enterococci monitored at Fannie Bay, four tidal creeks, East Point STP and Larrakeyah STP mixing zone monitoring areas. Darwin airport rainfall is shown.

Little Mindil Creek, Mindil Creek, Rapid Creek, and Vestey's Creek were monitored weekly. The East Point mixing zone was sampled at five nearby sites. The Larrakeyah mixing zone was sampled at six nearby sites. The 'beach closed' guidelines are the trigger values from NT recreational water quality guidelines (2007). Note that the guidelines may not apply within a mixing zone.

For the methods used and conditions at the time of sampling, most (but not all) samples near STP mixing zone sampling areas contained fewer *E. coli* and enterococci than the 'beach closed' trigger values. Tidal creeks varied above and below the 'beach closed' trigger values.

Note the logarithmic scale (useful for showing small and very large values) where each major division is 10 times greater than the previous division. Fannie Bay and mixing zone data are *E. coli* and enterococci per 100 mL. Tidal creek data are *E. coli* and enterococci per 100 mL MPN.



- ◆ East Point mixing zone
- Larrakeyah mixing zone
- Lt Mindil Creek
- Mindil Creek
- Rapid Creek
- Vestseys Creek
- ▲ Fannie Bay
- 'Beach closed' guideline



A Parks and Wildlife ranger overlooks a turtle release at Casuarina Coastal Reserve. The flatback turtle (*Natator depressus*) nests on Darwin's beaches including those within the Casuarina Coastal Reserve. Parks and Wildlife has an ongoing program to assist with the success of this nesting.

This program aims to improve the nesting success by actively monitoring each nest, and to allow the public to observe turtles emerging from their nest. Parks and Wildlife hold very popular public release viewings with accompanying talks during the dry season. Attendance is by booking only on (business hours) 08 8999 4555.

Darwin is the only capital city in the world that has flatback turtles nesting on its beaches.