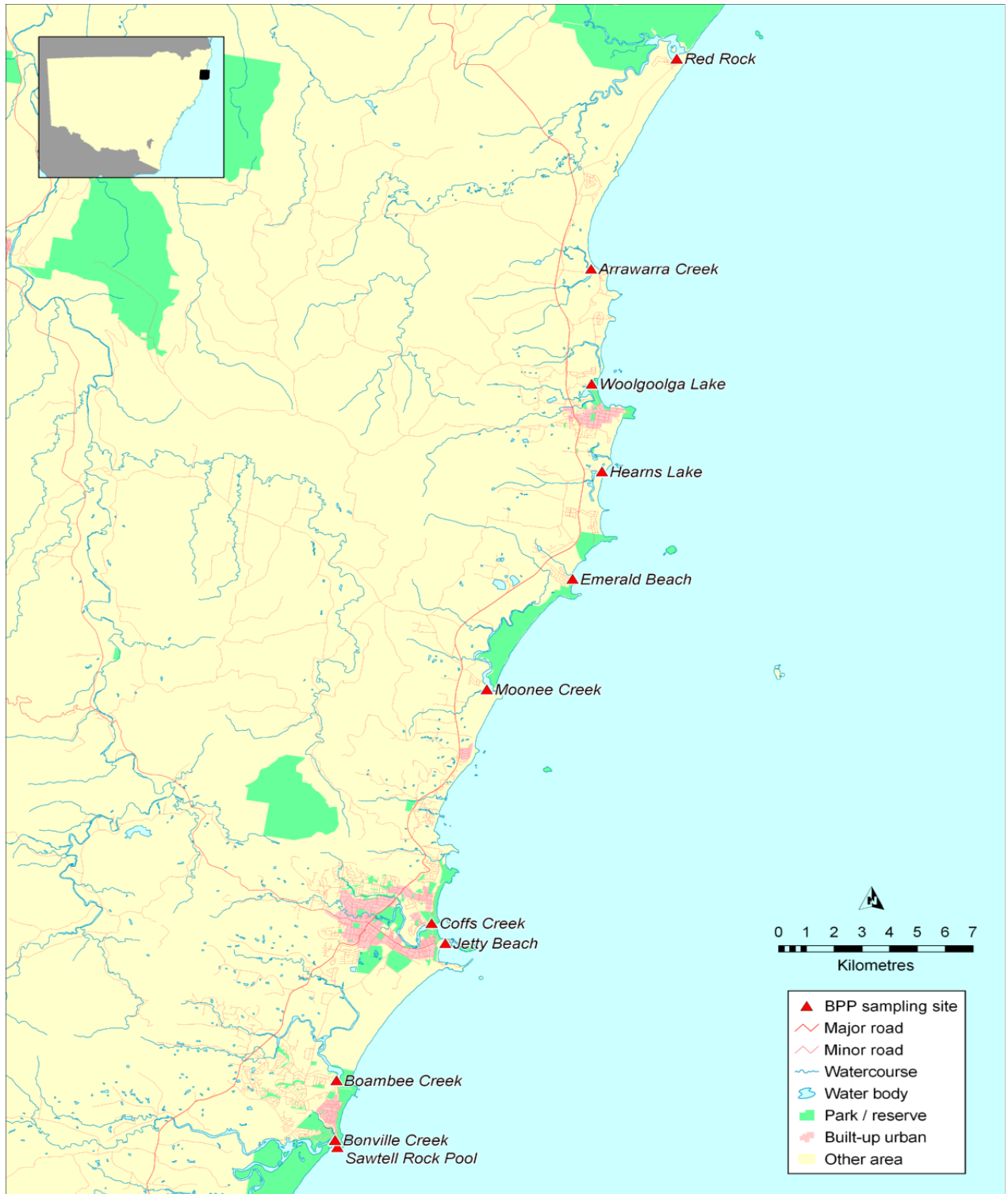


Coffs Harbour City Council

Ocean beaches: Emerald, Jetty. **Creeks and Estuarine:** Red Rock, Arrawarra, Boambee, Bonville, Coffs, Moonee. **Coastal lakes:** Woolgoolga Lake, Hearn's Lake. **Ocean pools:** Sawtell Rockpool.



Local government area description

Coffs Harbour City Council is situated on the NSW north coast, approximately 550 kilometres north of Sydney. The council area covers 51 kilometres of coastline, stretching from Arrawarra in the north to Bundagen in the south and includes 21 beaches and 14 major coastal creeks. The Solitary Islands Marine Park encompasses much of the council's coastal waters.

The population of the area is approximately 70 000 and growing at a rate of 1.6 per cent each year. Approximately 91 per cent of the population reside in towns along the coast. The council area is interspersed with sparsely populated rural areas, and approximately half is covered by forest.

Average rainfall is 1700 mm a year and surface runoff is more than double the average for coastal NSW. Agriculture is very important to the region's economy—particularly beef and dairy farming, with extensive banana cultivation in the ranges. Industrial activities are generally small in scale (Coffs Harbour City Council 2000a, 2000b).

Program outline

Eleven swimming locations were monitored in the Coffs Harbour City Council area: two ocean beaches, one rockpool, one estuarine swimming location, two coastal lakes and five creeks. These sites were also monitored during the 2002–2003 and 2006–2007 summer swimming season (DEC 2004b, DECC 2007).

Enterococci samples were collected between November 2007 and February 2008, the four busiest months of the summer swimming season. Compliance was assessed against the NHMRC (1990) swimming water quality guidelines. It should be noted that the five samples necessary to calculate compliance were not collected in all months. In months when less than four samples were collected, compliance could not be determined.

Rainfall

Rainfall data presented in the timeseries plots were obtained from the Bureau of Meteorology gauges at Yamba, Woolgoolga

and Coffs Harbour. Rainfall for each site is from the closest rain gauge.

Ocean beaches

Guideline compliance

A high level of compliance with NHMRC (1990) swimming water guidelines was recorded at both ocean beaches. Emerald and Jetty beaches were suitable for swimming in the two months between November 2007 and February 2008 in which sufficient samples were collected to calculate compliance (Figure 5).

Response to rainfall

Enterococci levels were generally low throughout the monitoring period. Slightly elevated results were recorded at Emerald Beach in response to rainfall.

Rockpools

Guideline compliance

A high level of compliance with NHMRC (1990) swimming water guidelines was recorded at Sawtell Rockpool (Figure 5). The site was suitable for swimming in both months of the summer season in which sufficient samples were collected to calculate compliance (Figure 5).

Response to rainfall

Enterococci levels were generally low throughout the monitoring period, with only two elevated results recorded in response to heavy rainfall.

Coastal lakes

Guideline compliance

Woolgoolga Lake and Hearn's Lake both passed the NHMRC (1990) swimming water guidelines in only one of two months between November 2007 and February 2008 in which sufficient samples were collected to calculate compliance (Figure 5).

Response to rainfall

Levels of enterococci frequently exceeded the geometric mean guideline limit at Woolgoolga Lake and Hearn's Lake, with very high values recorded on a number of occasions in response to rainfall.

Creeks and estuarine locations

Guideline compliance

A high level of compliance was recorded at Red Rock and Coffs Creek which passed NHMRC (1990) swimming water guidelines in both months in which sufficient samples were collected to calculate compliance (Figure 5). This result was similar to the previous season's when both sites complied with guidelines in all four months between November 2006 and February 2007 (DECC 2007).

Arrawarra Creek, Moonee Creek and Boambee Creek complied in only one of the two months. All sites failed in February 2008 owing to elevated levels of enterococci.

The lowest level of compliance was recorded at Bonville Creek which failed to

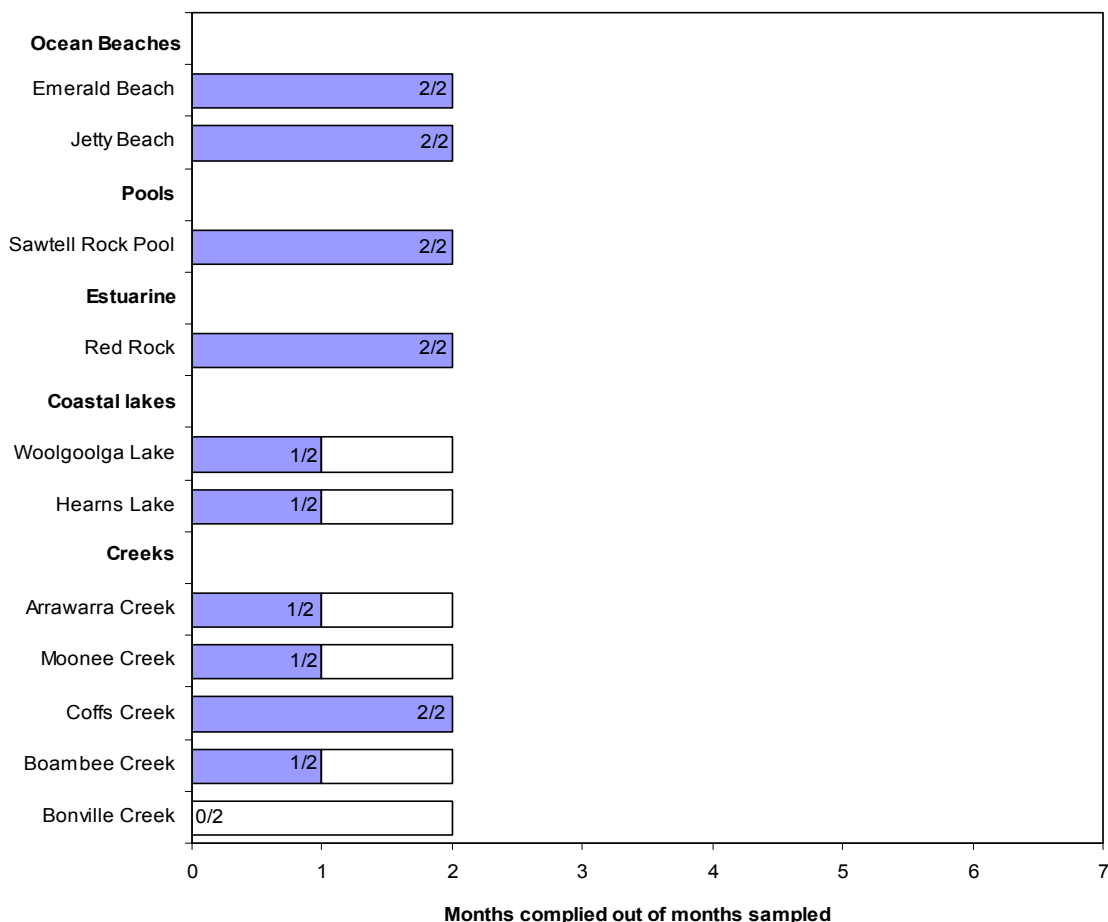
comply with swimming guidelines in both months in which sufficient samples were collected to calculate compliance (Figure 5).

Response to rainfall

Although low levels of enterococci were often recorded at Coffs Creek throughout the monitoring period, some high results were recorded in January and mid-February 2008 in response to heavy rainfall.

Elevated enterococci levels were frequently recorded at all other creeks in response to heavy rainfall. Monitoring conducted during summer 2002–2003 under the BPPP and during 2006–2007 also found high levels of bacteria at these sites following rainfall (DEC 2004a, DECC 2007).

Figure 5: Summary of compliance with NHMRC (1990) microbiological guidelines for swimming at Coffs Harbour City Council swimming sites during the 2007–2008 summer swimming season



Emerald Beach

See page 47 for key to map

Description Emerald Beach lies to the north of Dammerals Head. The beach is accessed at the southern end, where there are amenities, picnic facilities and a park. This is a popular swimming beach that is patrolled during the summer.

Pollution sources Sewage pumping stations and on-site wastewater management systems are potential pollution sources. Elevated bacterial levels have previously been measured in Fiddamans Creek, which discharges to the north of the sampling site. Domestic animal droppings may also be a potential pollution source.

Compliance Emerald Beach complied with NHMRC (1990) swimming guidelines in both months of the 2007–2008 summer swimming season in which sufficient samples were collected.

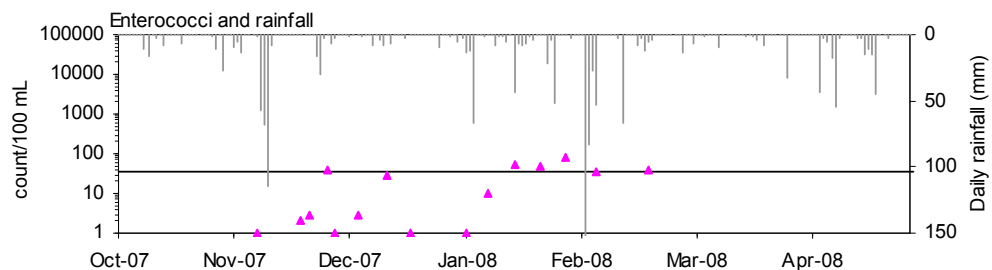


Compliance with NHMRC (1990) swimming guidelines at Emerald Beach

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	PASS	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots Enterococci levels were generally low, with an occasional slightly elevated results recorded in January and February 2008 in response to heavy rainfall.



See page 5 for key to graph

Jetty Beach

See page 47 for key to map

Description

Jetty Beach is approximately 1.4 kilometres long and extends south from a marina to Corambirra Point. There is no surf at the beach and it is a popular swimming location during summer. The beach is backed by a line of vegetation, behind which there is urban development. The sampling site is located at the northern end of the beach, between Coffs Harbour Jetty and the marina.



Pollution sources

Urban stormwater is discharged from drains at the northern and southern ends of the beach. Boat effluent and contamination from the marina and domestic animal droppings are also potential sources of pollution.

Compliance

Jetty Beach complied with NHMRC (1990) swimming guidelines in both months of the 2007–2008 summer swimming season in which sufficient samples were collected.

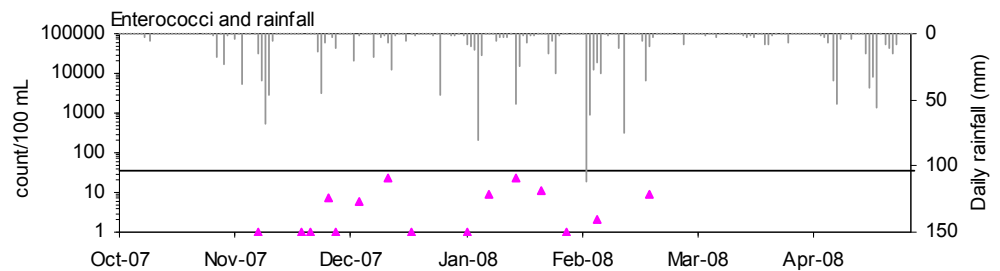
Compliance with NHMRC (1990) swimming guidelines at Jetty Beach

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	PASS	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots

Levels of enterococci were generally low over the monitoring period, remaining below the median guideline values.



See page 5 for key to graph

Sawtell Rockpool

See page 47 for key to map

Description

Sawtell Rockpool is located at the northern end of Bonville Beach, near the mouth of Bonville Creek. The pool has moderate use all year round and is popular in the summer with children and the elderly.



Pollution sources

The pool may be affected by discharge from Bonville Creek. The creek waters are potentially affected by urban stormwater runoff and overflows from several sewage pumping stations in the catchment.

Compliance

Sawtell Rockpool complied with NHMRC (1990) swimming guidelines in both months of the 2007–2008 summer swimming season in which sufficient samples were collected.

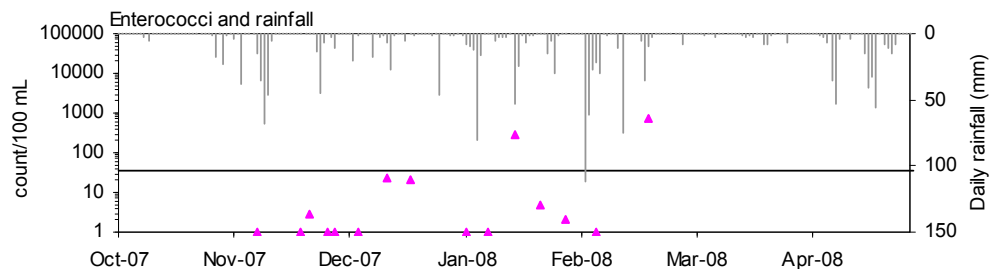
Compliance with NHMRC (1990) swimming guidelines at Sawtell Rockpool

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	PASS	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots

Levels of enterococci remained generally low over the monitoring period. Two elevated results were recorded in response to heavy rainfall.



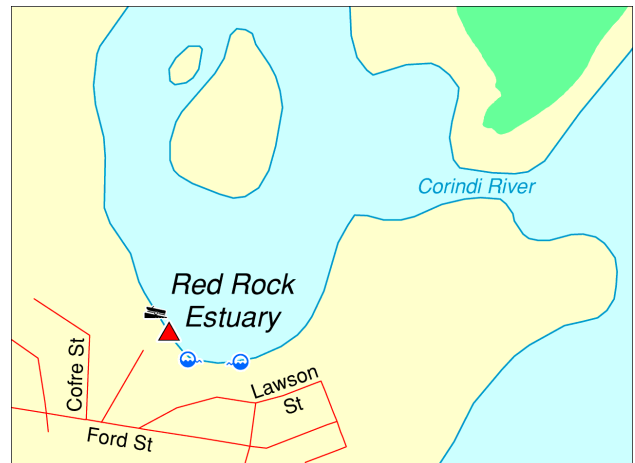
See page 5 for key to graph

Red Rock

See page 47 for key to map

Description

Red Rock is an estuarine swimming location situated at the mouth of Corindi River, adjacent to the township of Red Rock. The estuary is bordered largely by Yuraygir National Park and has strong tidal flows. The swimming location is very popular during summer, particularly with children. Dogs are permitted on the beach and a large number of boats use the ramp on weekends.



Pollution sources

Urban stormwater is discharged to the swimming area during wet weather and previous monitoring has revealed high levels of faecal coliforms which may be the result of septic leachate from the town. High use of the public toilet near the beach has led to septic tank overflows in the past. Other potential pollution sources include domestic and native droppings and effluent from boats.

Compliance

Red Rock complied with NHMRC (1990) swimming guidelines in both months of the 2007–2008 summer swimming season in which sufficient samples were collected.

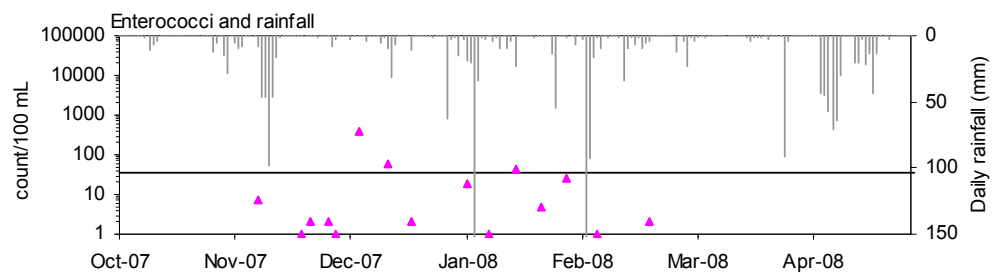
Compliance with NHMRC (1990) swimming guidelines at Red Rock

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	PASS	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots

Levels of enterococci remained generally low over the monitoring period with only three elevated results recorded throughout the monitoring period, in both wet and dry weather conditions.



See page 5 for key to graph

Woolgoolga Lake

See page 47 for key to map

Description Woolgoolga Lake is located behind Woolgoolga Beach. The sampling site is located at the mouth of the creek on a sandbar. Woolgoolga Creek enters the lake in its south-eastern corner and Poundyard Creek drains into the southwestern corner.

Pollution sources The lake may be affected by leachate from onsite wastewater management systems and urban stormwater runoff. Domestic animal droppings may also affect water quality.

Compliance Woolgoolga complied with NHMRC (1990) swimming guidelines in one of two months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed the swimming guidelines in January 2008.

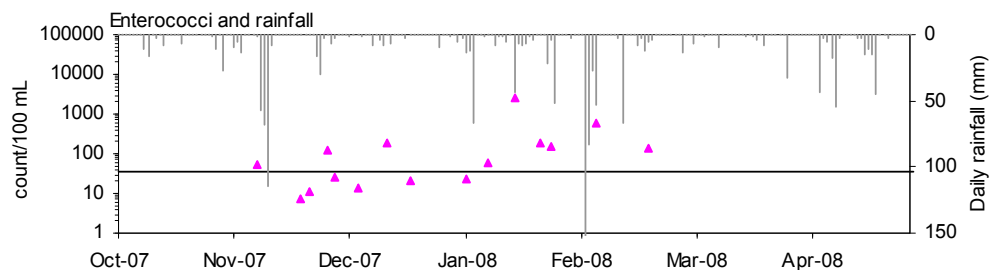


Compliance with NHMRC (1990) swimming guidelines at Woolgoolga Lake

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	FAIL	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots Levels of enterococci frequently exceeded the geometric mean guideline limit, with very high values recorded on a number of occasions in response to rainfall.



See page 5 for key to graph

Hearns Lake

See page 47 for key to map

Description Hearns Lake is an extensive wetland area that lies behind Hearns Beach. The lake mouth intermittently opens to the ocean.

Pollution sources Leachate from on-site wastewater management systems within the catchment and urban stormwater runoff are potential sources of contamination. Droppings from domestic animals and birdlife are further possible sources.

Compliance Hearns Lake complied with NHMRC (1990) swimming guidelines in one of two months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed the swimming guidelines in January 2008.

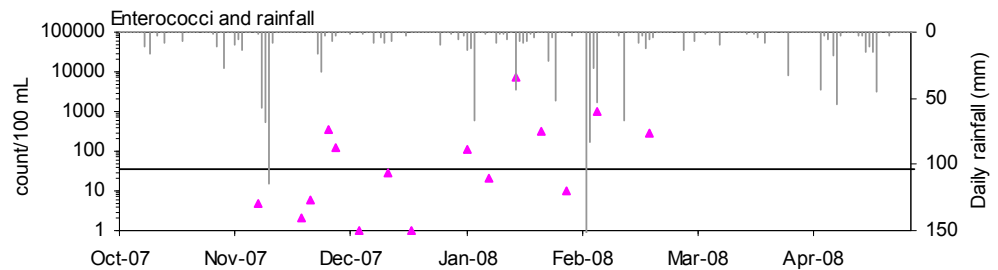


Compliance with NHMRC (1990) swimming guidelines at Hearns Lake

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	FAIL	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots Levels of enterococci frequently exceeded the geometric mean guideline limit, with very high values recorded on a number of occasions in response to rainfall.



See page 5 for key to graph

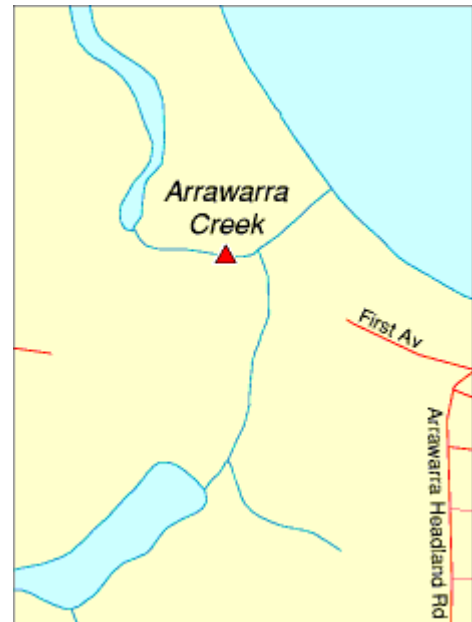
Arrawarra Creek

See page 47 for key to map

Description Arrawarra Creek discharges to the southern end of Corindi beach. Access to the swimming location at the mouth of the creek is via a caravan park behind the beach. Although undeveloped, this is a busy area during the summer months.

Pollution sources Onsite waste water management systems and urban runoff from the township of Arrawarra are potential sources of pollution. Other potential pollution sources include domestic and native droppings and effluent from boat discharges.

Compliance Arrawarra Creek complied with NHMRC (1990) swimming guidelines in one of two months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed the swimming guidelines in January 2008.

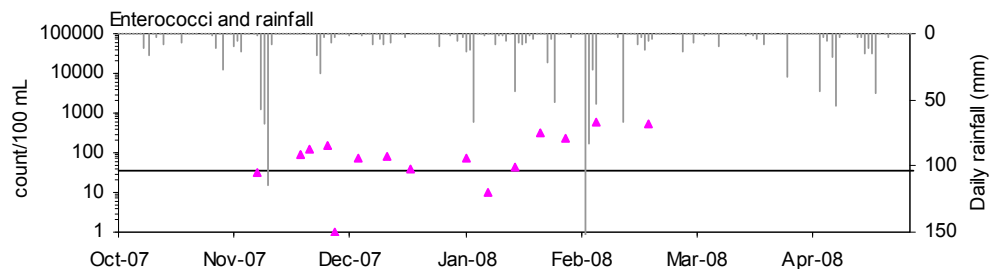


Compliance with NHMRC (1990) swimming guidelines at Arrawarra Creek

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	FAIL	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots Levels of enterococci usually exceeded the geometric mean guideline limit, with elevated levels recorded in both wet and dry weather conditions.



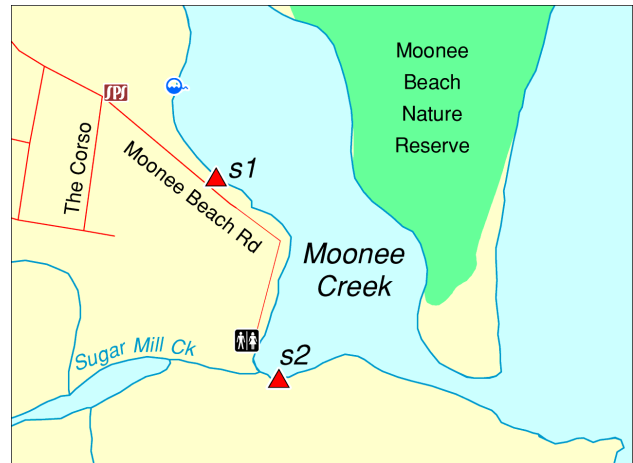
See page 5 for key to graph

Moonee Creek

See page 47 for key to map

Description

Moonee Creek discharges to Moonee Beach. The northern catchment contains the Moonee Beach Nature Reserve, whereas the southern catchment contains a popular caravan park and a residential area. The creek is used frequently during summer.



Pollution sources

The creek may be affected by urban runoff and overflows from on-site wastewater management systems in the catchment. Domestic animal droppings may also contribute to levels of faecal contamination.

Compliance

Moonee Creek complied with NHMRC (1990) swimming guidelines in one of two months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed the swimming guidelines in January 2008.

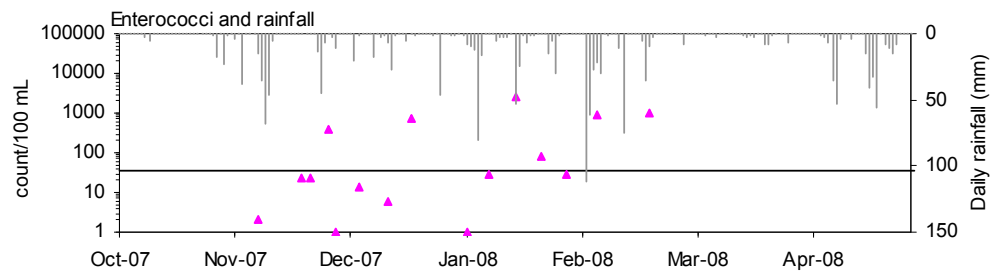
Compliance with NHMRC (1990) swimming guidelines at Moonee Creek

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	FAIL	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots

Levels of enterococci often exceeded the geometric mean guideline limit throughout the monitoring period, usually in response to rainfall. Very high results were recorded in January in response to heavy rainfall.



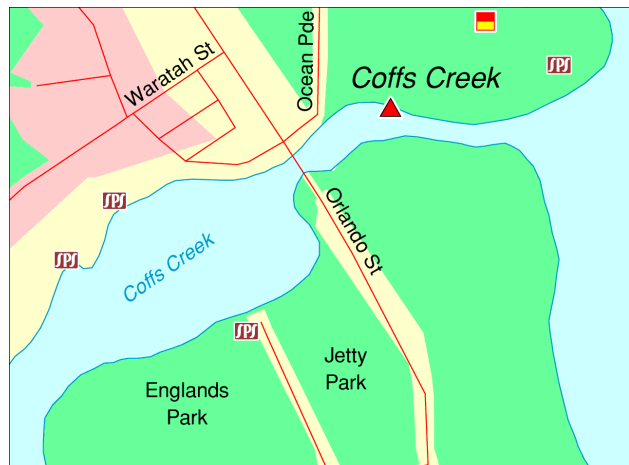
See page 5 for key to graph

Coffs Creek

See page 47 for key to map

Description

Coffs Creek discharges to the ocean at the southern end of Park Beach. The swimming site is located at the creek mouth. The sampling site is a popular swimming spot with children during summer. Since 2001, several locations within Coffs Creek have been monitored and have shown consistently high levels of faecal contamination with a strong correlation with rainfall.



Pollution sources

The creek receives urban stormwater runoff from Coffs Harbour and agricultural runoff from farmland in the upper catchment. Overflows from the numerous sewage pumping stations located within the Coffs Creek catchment are also a potential pollution source.

Compliance

Coffs Creek complied with NHMRC (1990) swimming guidelines in both months of the 2007–2008 summer swimming season in which sufficient samples were collected.

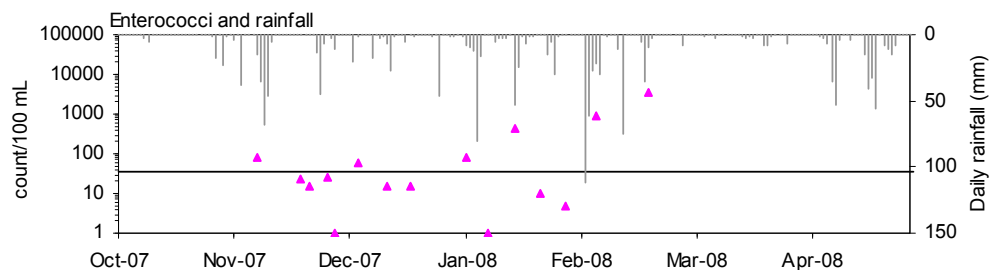
Compliance with NHMRC (1990) swimming guidelines at Coffs Creek

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	PASS	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots

Levels of enterococci exceeded the geometric mean guideline limit on several occasions throughout the monitoring period. High levels were recorded in January and mid-February 2008 in response to heavy rainfall.



See page 5 for key to graph

Boambee Creek

See page 47 for key to map

Description

Boambee Creek discharges to the ocean at the southern end of Boambee Beach. There is a resort development near the mouth of the creek and considerable riparian vegetation buffers the creek from urban and commercial areas. The sampling site is a popular swimming spot with children during summer. It is located approximately 100 metres upstream of the creek mouth.



Pollution sources

The water quality of Boambee Creek may be affected by urban stormwater runoff and overflows from sewage pumping stations in the catchment. Domestic animal droppings are also potential sources of contamination.

Compliance

Boambee Creek complied with NHMRC (1990) swimming guidelines in one of two months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed swimming guidelines in January 2008 owing to elevated levels of enterococci.

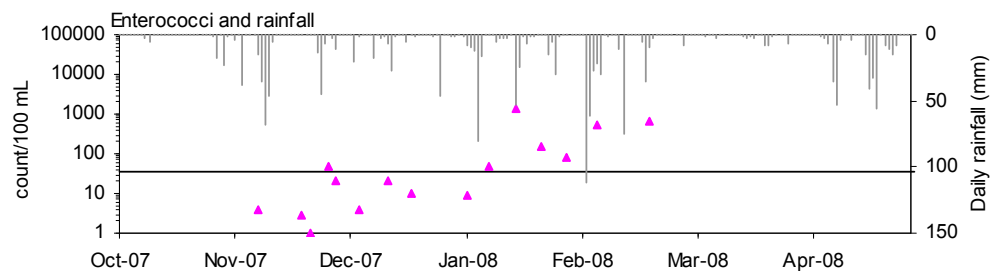
Compliance with NHMRC (1990) swimming guidelines at Boambee Creek

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	PASS	**	FAIL	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots

Levels of enterococci generally remained below the geometric mean guideline limits during November and December 2007. High levels of bacteria were measured from mid-January to February 2008 in response to heavy rainfall.



See page 5 for key to graph

Bonville Creek

See page 47 for key to map

Description Bonville Creek discharges to the ocean at the northern end of Bonville Beach. The creek has significant riparian vegetation, and the mouth is shallow and protected by sandbars. The sampling site is a popular swimming spot during summer.



Pollution sources Water quality in Bonville Creek may be affected by urban stormwater runoff, agriculture runoff and overflows from several sewage pumping stations in the catchment. Bird life may contribute to levels of faecal contamination in dry weather conditions.

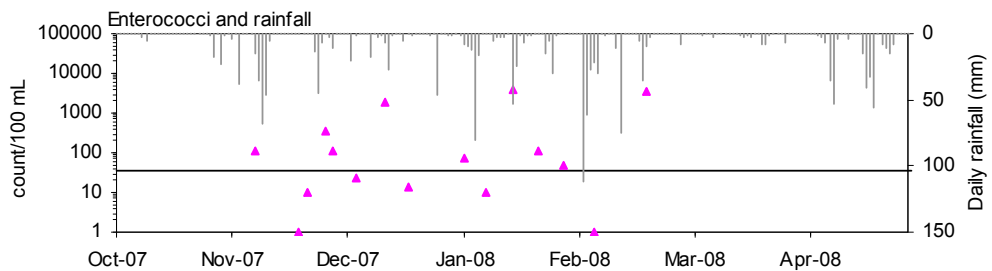
Compliance Bonville Creek failed to comply with NHMRC (1990) swimming guidelines in both months of the 2007–2008 summer swimming season in which sufficient samples were collected.

Compliance with NHMRC (1990) swimming guidelines at Bonville Creek

	NOV '07	DEC '07	JAN '08	FEB '08
ENT	FAIL	**	FAIL	**

** Insufficient samples to calculate compliance were collected in this month.

Timeseries plots Levels of enterococci were frequently above the geometric mean guideline limits. Very high levels of both bacteria were measured in December 2007 and January and February 2008 in response to heavy rainfall.



See page 5 for key to graph