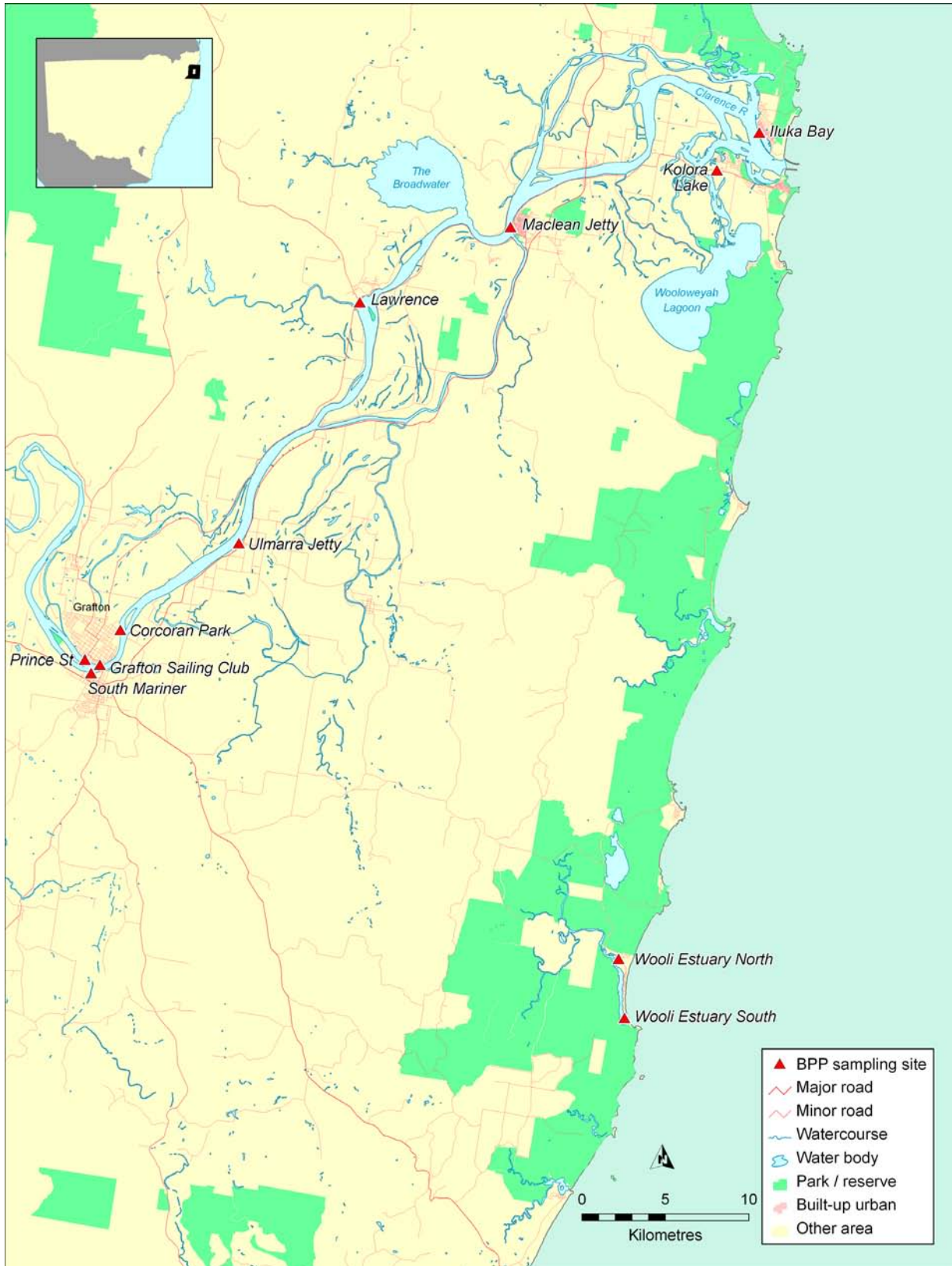


Clarence Valley Council

Estuarine beaches: Iluka Bay, Wooli Estuary North, Wooli Estuary South. **Lagoons:** Kolora Lake. **Riverine swimming sites:** Maclean Jetty, Lawrence, Ulmarra Jetty, Corcoran Park, Grafton Sailing Club, South Mariner, Prince Street (Grafton).



Local government area description

Clarence Valley Council extends from the temperate New England Plateau to the rugged Gibraltar Ranges, through rural lands and river plains to 80 kilometres of coastline. The council area covers 11 000 square kilometres and has a total population of approximately 49 000.

Clarence Valley Council is the largest local government area in the northern rivers region, covering 51% of the land area. The region has significant agricultural areas as well as extensive areas of National Parks and State Forests.

The Clarence River is the area's most significant natural feature, stretching over 400 kilometres from the Queensland border to Yamba (Clarence Valley Council 2004).

Program outline

Eleven swimming locations were monitored in the Clarence Valley council area during summer 2007–2008. The sites were a coastal lagoon, three estuarine swimming locations (one at the mouth of the Clarence River and two in the lower reaches of the Wooli Wooli River) and seven locations in the Clarence River itself.

Lawrence and South Grafton Mariner were added to the program in 2006–2007 summer season. The remaining nine locations were also monitored during the 2004–2005, 2005–2006 and 2006–2007 summer seasons and the results were reported in the State of the Beaches report for those years (DEC 2006a and 2006b, DECC 2007).

Monitoring in this region was also undertaken during the 2003–2004 summer swimming season and the 2002–2003 summer swimming season. The results were reported in the BPPP State of the Beaches reports for these years (DEC 2004b and 2004c).

Enterococci samples were collected between November 2007 and March 2008 to assess compliance with NHMRC (1990) swimming water quality guidelines. It should be noted that the five samples necessary to calculate compliance were not collected in all months. Where only four samples were

collected, the closest sample in time from an adjacent month was 'borrowed' in order to provide the five data points required. Where only three samples were collected, guideline compliance could not be determined.

Rainfall

Rainfall data presented in the timeseries plots were obtained from the Bureau of Meteorology's gauges at Grafton Olympic Pool, Yamba and Wooli. Rainfall for each site is from the closest rain gauge.

Clarence River

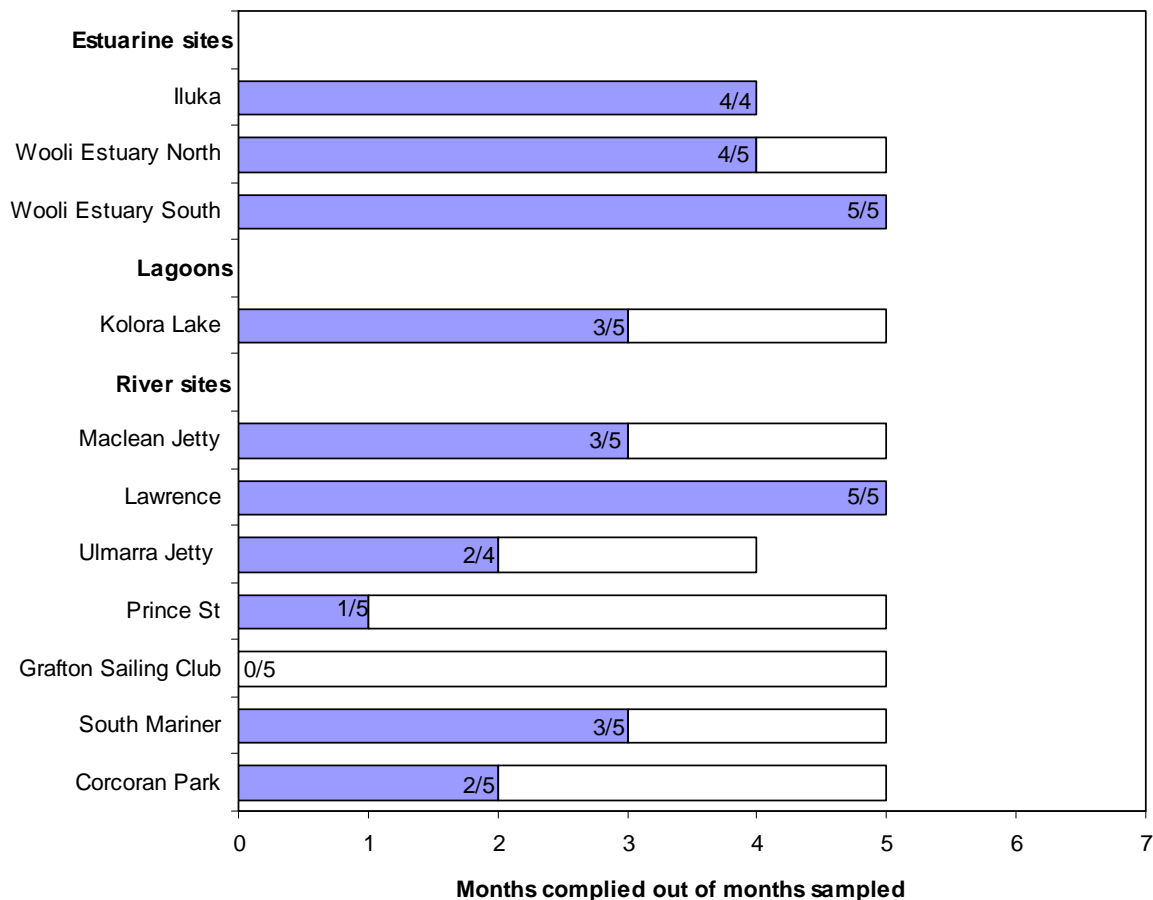
Guideline compliance

Eight locations were monitored in the Clarence River: an estuarine swimming site (Iluka Bay) and seven riverine swimming sites (Maclean Jetty, Lawrence, Prince Street, Grafton Sailing Club, South Mariner, Corcoran Park and Ulmarra Jetty).

Iluka Bay complied in all four months sampled in the 2007–2008 summer swimming season in which sufficient samples were collected (Figure 4). Insufficient data were collected in January to calculate compliance for that month. Compliance at this site has varied substantially between years. The lowest level of compliance was recorded in summer 2004–2005 when the site complied in only one of four months (DEC 2006). The highest level of compliance was recorded in the 2003–2004 and 2006–2007 summer seasons when the site passed the NHMRC (1990) swimming guidelines all six months (DEC 2004c, DECC 2007).

Maclean Jetty, located farther upstream on the Clarence River near the town of Maclean, complied with the NHMRC (1990) swimming guidelines in three of the five months sampled during the 2007–2008 summer season. Compliance was higher during the previous summer season when the site complied all six months. The 2007–2008 summer season results are more similar to the results from the 2004–2005 summer season, when the site failed in two of the four months (2006a).

Figure 4: Summary of compliance with NHMRC (1990) microbiological guidelines for swimming at Clarence Valley Council swimming sites during the 2007–2008 summer swimming season



Lawrence is located upstream of Maclean at the town of Lawrence. The site passed the NHMRC (1990) swimming guidelines in all five months of the 2007–2008 summer season (Figure 4). This result is similar to the previous summer season when the site passed all six months (DECC 2007).

Ulmarra Jetty is located upstream of Lawrence at the town of Ulmarra. The site complied in only two of the four months sampled in the 2007–2008 summer swimming season (Figure 4). Insufficient data were collected in January to calculate compliance for that month. Although the 2007–2008 summer swimming season compliance is less than the previous season it is still an improvement on the results from the 2005–2006 summer season when the site failed in all four months of monitoring (DEC 2006).

Compliance levels at Prince Street, Grafton Sailing Club, South Mariner and Corcoran Park, all located in the town of Grafton, were varied (Figure 4). South Mariner passed the NHMRC (1990) swimming guidelines in three of the five months, Corcoran Park passed in two of the five months, Prince Street passed the guidelines in only one of the five months and Grafton Sailing Club failed all five months sampled in the 2007–2008 summer swimming season. Although compliance at these sites is lower than that for the previous summer season, the results from Prince Street and Corcoran Park are an improvement on results from the 2005–2006 summer season when both sites failed the swimming guidelines in all four months in which compliance was assessed.

Clarence Valley Council has erected warning signs at sites with low compliance and has undertaken further monitoring to

investigate the pollution source at these locations.

Response to rainfall

During the 2007–2008 summer swimming season, slightly elevated enterococci levels were recorded at Maclean Jetty and Iluka Bay. Previous monitoring conducted at these swimming locations has indicated that water quality at these two sites may be unsuitable for swimming for up to two days following heavy rainfall (DEC 2004b).

Slightly elevated enterococci levels were also recorded at Prince Street, South Mariner and Corcoran Park in response to heavy rainfall.

Elevated enterococci levels were measured at Grafton Sailing Club throughout the monitoring period in both dry and wet weather conditions.

Wooli Wooli River Estuary

Guideline compliance

Two locations were monitored in the Wooli Wooli River estuary. The southern site was suitable for swimming in all five months of the 2007–2008 summer swimming season. The northern site was suitable for swimming in four of the five months, failing to comply with guidelines in February due to elevated levels of enterococci (Figure 4).

Response to rainfall

Levels of enterococci in Wooli Wooli River estuary generally remained below the geometric mean guideline throughout the monitoring period. Slightly elevated results were recorded on a number of occasions, generally following rainfall.

Kolora Lake

Guideline compliance

Kolora Lake, located between the town of Yamba and the Clarence River, complied with the swimming water quality guidelines in three of the five months of the 2007–2008 summer swimming season (Figure 4).

Response to rainfall

Elevated enterococci levels were measured on several occasions during summer 2007–2008, generally in response to rainfall.

Sampling conducted at the site during wet weather events in May and June 2003 indicated that water quality in the Lake may be unsuitable for swimming for up to two days following heavy rainfall (DEC 2004b).

Iluka Bay

See page 32 for key to map

Description The swimming area is a netted enclosure protected by a sea wall at the northern end of Iluka Bay. It is very popular during holiday periods and important to local tourism. The area is backed by a commercial area, caravan park and public toilets. There is also significant bird life and boat use within the Bay.

Pollution sources Stormwater from the commercial and urban areas is discharged to the swimming area in wet weather. Litter and other gross pollutants are commonly observed in the discharge. Overflows from septic tanks in the caravan park and public toilets are further potential sources of contamination. Effluent from boats and faecal deposits from domestic animals and wild birdlife may also be pollutants at this site.



Compliance Iluka Bay was monitored between November 2007 and March 2008 and complied with NHMRC (1990) swimming guidelines in all four months of the 2007–2008 summer swimming season in which sufficient samples were collected.

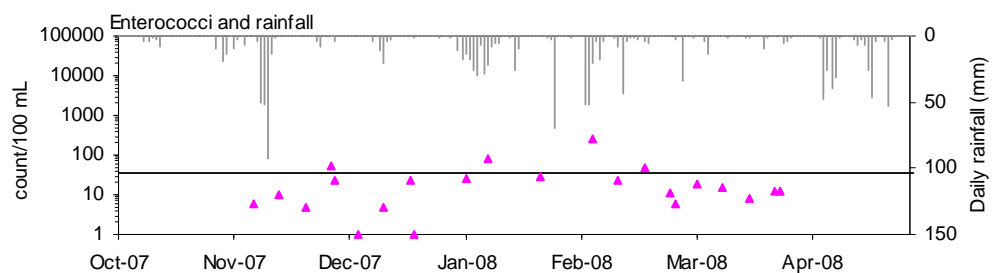
Compliance with NHMRC (1990) swimming guidelines at Iluka Bay

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

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

Timeseries plots Levels of enterococci generally remained below the geometric mean guideline throughout the monitoring period. Slightly elevated results were recorded occasionally, generally following rainfall.



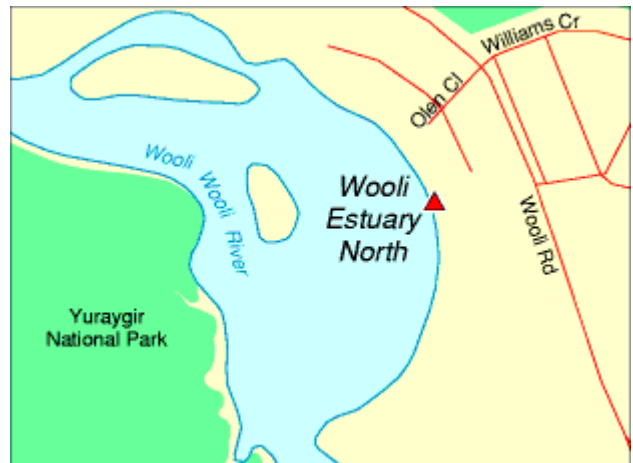
See page 5 for key to graph

Wooli Estuary North

See page 32 for key to map

Description

The sampling location is a shallow sandy area, approximately four kilometres upstream from the mouth of the Wooli Wooli River and approximately two kilometres north of Wooli town. The area is tidal and well flushed, and is a popular location in summer, as it provides protected swimming waters suitable for children.



Pollution sources

Leachate from the septic systems of dwellings near the sampling site or in Wooli may affect the water quality at times.

Compliance

Wooli Estuary North was monitored between November 2007 and March 2008. Levels of enterococci complied with NHMRC (1990) swimming guidelines in four of the five months. The site failed the swimming guidelines in February 2008.

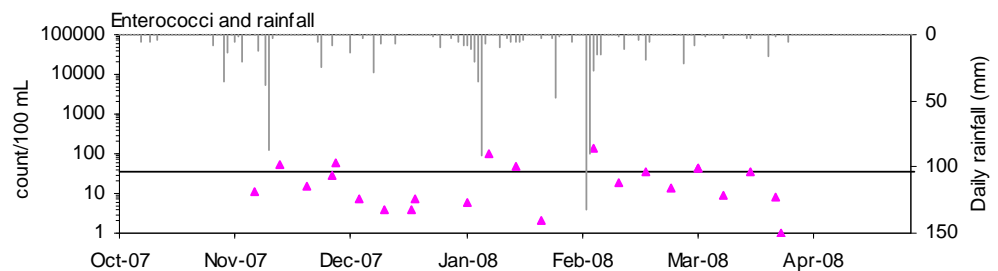
Compliance with NHMRC (1990) swimming guidelines at Wooli Estuary North

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots

Levels of enterococci generally remained below the geometric mean guideline throughout the monitoring period. Slightly elevated results were recorded on a number of occasions, usually in response to heavy rainfall.



See page 5 for key to graph

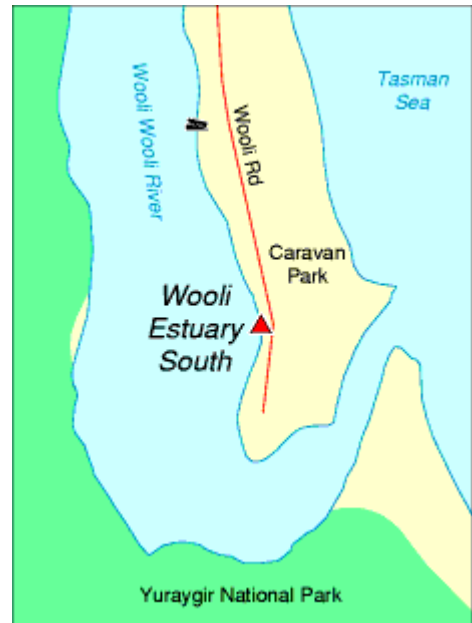
Wooli Estuary South

See page 32 for key to map

Description The sampling location is a shallow, sandy estuary area near the mouth of the Wooli Wooli River, approximately two kilometres south of Wooli town. The river is open to the ocean and receives good tidal flushing. This area is a popular location in summer, as it provides protected swimming waters suitable for children.

Pollution sources Leachate from camp toilets or the caravan park in Wooli may affect water quality at the site at times.

Compliance Wooli Estuary South was monitored between November 2007 and March 2008. Levels of enterococci complied with NHMRC (1990) swimming guidelines in each of the five months.

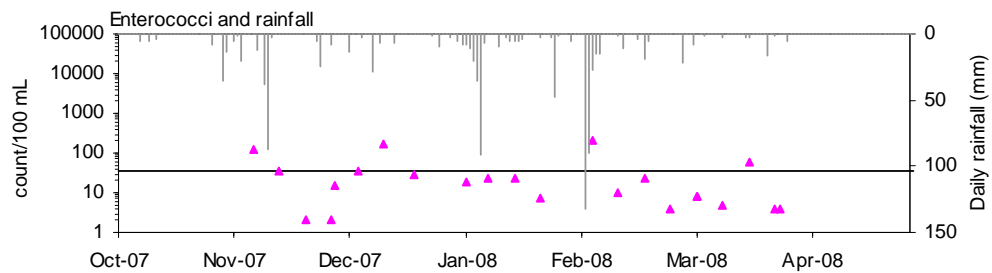


Compliance with NHMRC (1990) swimming guidelines at Wooli Estuary South

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots Levels of enterococci generally remained below the geometric mean guideline throughout the monitoring period. Elevated results were recorded on a several occasions, generally in response to rainfall.



See page 5 for key to graph

Kolora Lake

See page 32 for key to map

Description

Kolora Lake is situated between the town of Yamba and the Clarence River and is bordered on two sides by urban and commercial development. It is a popular swimming location, particularly in the holiday season, and is of major importance to the local community.

Pollution sources

Stormwater containing nutrients and faecal contamination from the surrounding urban and commercial areas is discharged to the lake. Sediment eroded from these areas is a further potential pollutant.

Compliance

Kolora Lake was monitored between November 2007 and March 2008. Levels of enterococci complied with NHMRC (1990) swimming guidelines in three of the five months. The site failed to meet the guidelines in January and February 2008.



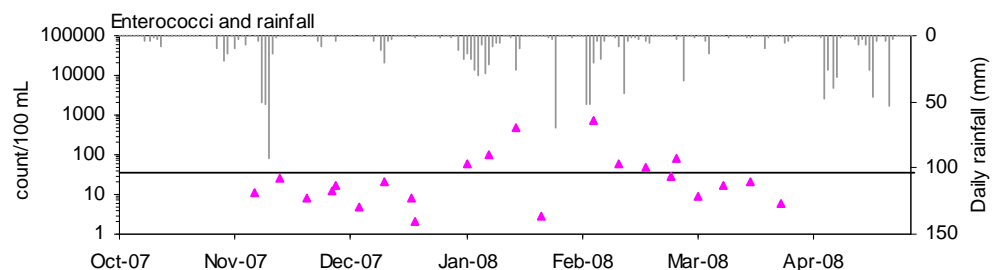
Compliance with NHMRC (1990) swimming guidelines at Kolora Lake

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots

Levels of enterococci exceeded the geometric mean guidelines level on several occasions during January and February in response to rainfall.



See page 5 for key to graph

Maclean Jetty

See page 32 for key to map

Description Maclean Jetty is situated in the Clarence River and backed by the town of Maclean. The sampling area is immediately downstream of the South Arm tributary. The location is a prominent recreational area, frequently used for fishing and visited by tourists.

Pollution sources Pollution sources at this site include run-off from the urban area and agricultural land that may contain nutrients, toxicants, oils and faecal contamination. Urban stormwater from the town is controlled with a gross pollutant trap. Two sewage treatment plants discharge treated effluent upstream and downstream of the site.

Compliance Maclean Jetty was monitored between November 2007 and March 2008. Levels of enterococci complied with NHMRC (1990) swimming guidelines in three of the five months. The site failed to meet the guidelines in January and February 2008.

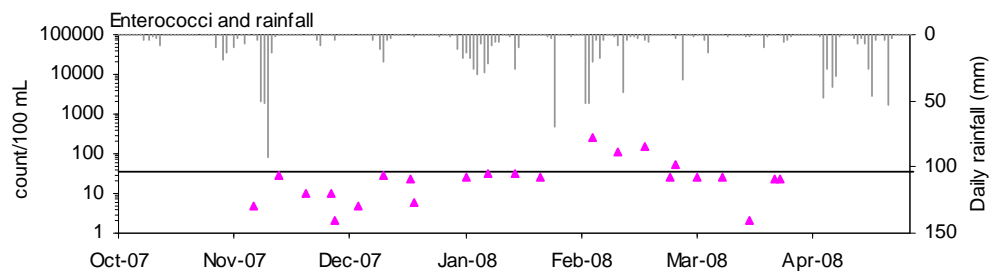


Compliance with NHMRC (1990) swimming guidelines at Maclean Jetty

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots Levels of enterococci were generally below the geometric mean guideline level with most elevated results occurring in response to rainfall during February 2008.



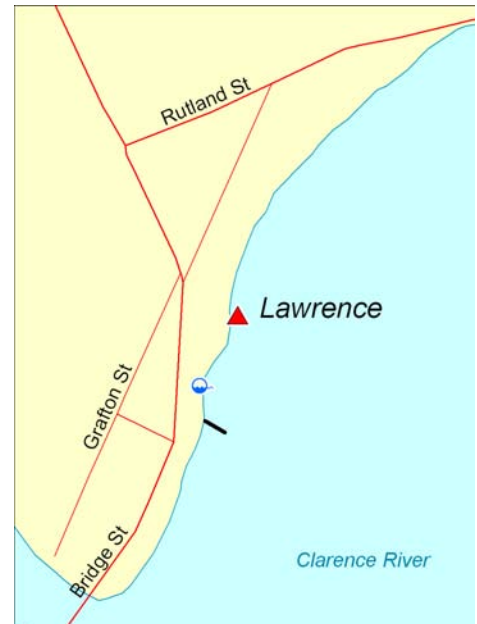
See page 5 for key to graph

Lawrence

See page 32 for key to map

Description

The sampling site is located on the north bank of the Clarence River at the Jetty in the centre of Lawrence, approximately 30 kilometres from the ocean. This site is not a popular swimming location but is popular for recreational boating, with houseboat charters in the area.



Pollution sources

The Clarence River extends for over 200 kilometres upstream from this location and the catchment (22 000 square kilometres) includes a broad combination of land uses, ranging from intensive primary industry to wilderness bushland. The township of Lawrence is criss-crossed by stormwater channels that can discharge poor quality stormwater in heavy rainfall. Failures of septic systems may also occur at times. Sportsmens Creek, immediately upstream of the Lawrence Jetty, is also a potential source of pollution as there are a number stormwater drains and septic systems that may affect the creek.

Compliance

Lawrence was monitored between November 2007 and March 2008. Levels of enterococci complied with NHMRC (1990) swimming guidelines in each of the five months.

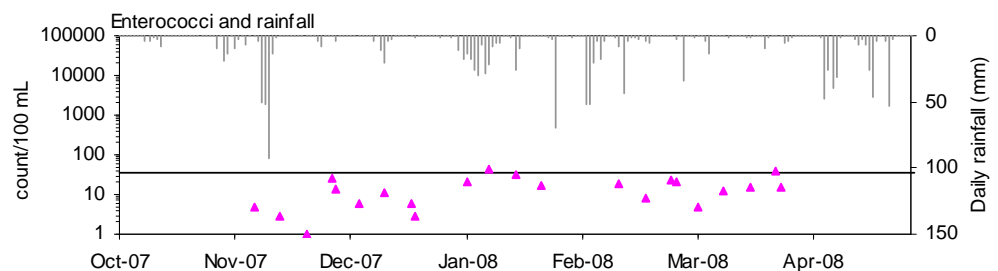
Compliance with NHMRC (1990) swimming guidelines at Lawrence

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots

Levels of enterococci generally remained below the geometric mean guideline level throughout the monitoring period, with only two slightly elevated results in January and March 2008.



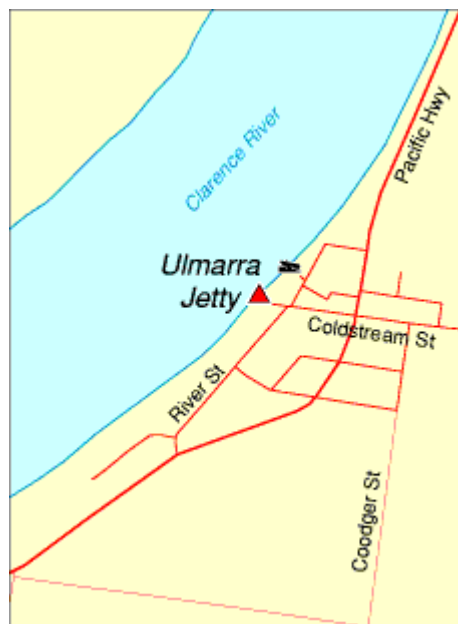
See page 5 for key to graph

Ulmarra Jetty

See page 32 for key to map

Description The sampling site is on the south bank of the Clarence River at the jetty in the centre of Ulmarra, approximately 40 kilometres from the ocean. This site is not a popular swimming location but is popular for recreational boating, with houseboat charters in the area.

Pollution sources The Clarence River extends for over 200 kilometres upstream from this location and the catchment (22 000 square kilometres) includes a broad combination of land uses, ranging from intensive primary industry to wilderness bushland. The township of Ulmarra and its surrounds are criss-crossed by stormwater channels that can discharge effluent of poor quality to this area in heavy rainfall, and failure of septic systems may occur at times.



Compliance Ulmarra Jetty was monitored between November 2007 and March 2008 and complied with NHMRC (1990) swimming guidelines in two of the four months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed the guidelines in February and March 2008.

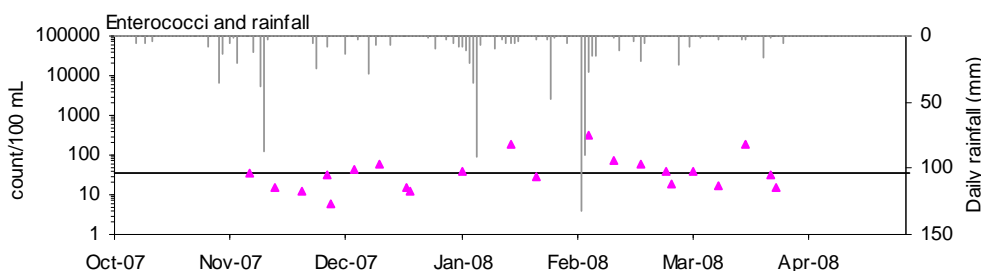
Compliance with NHMRC (1990) swimming guidelines at Ulmarra Jetty

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

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

Timeseries plots Levels of enterococci often exceeded the geometric mean guideline, with elevated results recorded on throughout the monitoring period.



See page 5 for key to graph

Prince Street

See page 32 for key to map

Description

The sampling site is located on the northern shore of the Clarence River and is backed by the city of Grafton. The site is approximately 55 kilometres upstream of the ocean. A jetty and boat ramp are located at the site and provide an entry point for swimming. A public reserve and a park are nearby.



Pollution sources

Several stormwater drains discharge in the immediate vicinity of the site. The site may also be affected by agricultural runoff from within the catchment (an area of approximately 22 000 square kilometres). Council has undertaken additional monitoring in order to identify the source of pollution at this site and investigations are continuing.

Compliance

Prince Street was monitored between November 2007 and March 2008. Levels of enterococci failed NHMRC (1990) swimming guidelines in four of the five months. The site passed the guidelines in November 2007.

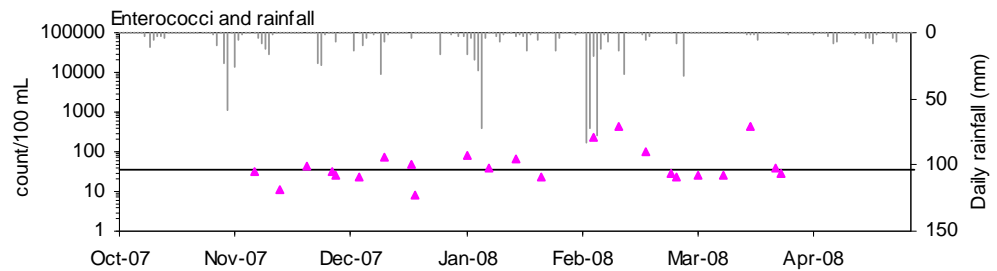
Compliance with NHMRC (1990) swimming guidelines at Prince Street

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots

Enterococci levels exceeded the geometric mean guideline level on several occasions throughout the monitoring period, not always in response to rainfall.



See page 5 for key to graph

Grafton Sailing Club

See page 32 for key to map

Description

The Grafton Sailing Club is located on the northern shore of the Clarence River, just upstream of the Grafton Bridge and approximately 55 kilometres upstream from the ocean. The club is a centre for aquatic recreation in the town, and this area of the river is a popular venue for sailing races between September and May involving children and adults. The area is also a popular swimming location in summer.



Pollution sources

Several stormwater drains discharge in the vicinity of the site. The site may also be affected by agricultural runoff from within the catchment (an area of approximately 22 000 square kilometres).

Compliance

Grafton Sailing Club was monitored between November 2007 and March 2008. Levels of enterococci failed the NHMRC (1990) swimming guidelines in each of the five months.

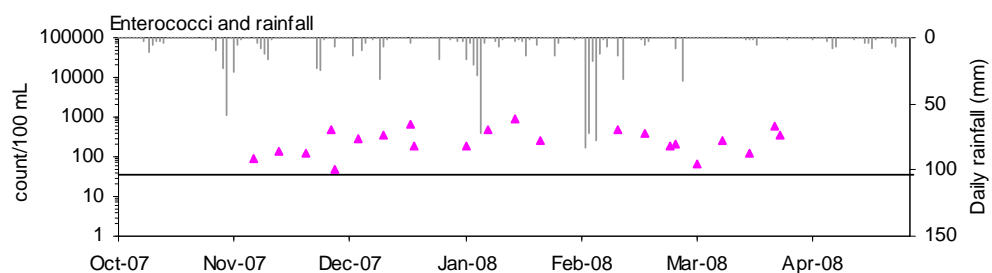
Compliance with NHMRC (1990) swimming guidelines at Grafton Sailing Club

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots

Levels of enterococci consistently exceeded the geometric mean guideline limit throughout the monitoring period. Elevated results were recorded in both dry and wet weather conditions.



See page 5 for key to graph

South Mariner

See page 32 for key to map

Description

South Mariner is located on the southern shore of the Clarence River, just upstream of the Grafton Bridge and approximately 55 kilometres upstream from the ocean. The sample is collected from the jetty adjacent to the main shopping area. There is also a boat ramp and a park nearby. The site is used for launching boats, with swimming common during the summer months.



Pollution sources

The site has a number of stormwater drains discharging from the commercial area of South Grafton and the South Grafton sewage treatment plant discharges approximately 600 metres upstream. The site may also be affected by agricultural runoff from within the catchment (an area of approximately 22 000 square kilometres).

Compliance

South Mariner was monitored between November 2007 and March 2008. Levels of enterococci passed the NHMRC (1990) swimming guidelines in three of the five months. The site failed the guidelines in January and February 2008.

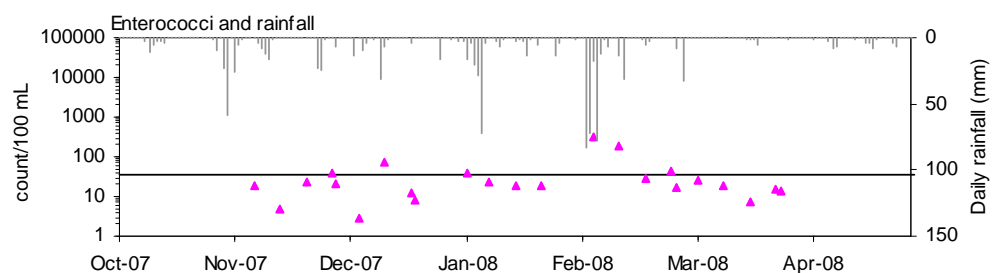
Compliance with NHMRC (1990) swimming guidelines at South Mariner

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots

Levels of enterococci generally remained below the geometric mean guideline limit throughout the monitoring period. Elevated results were recorded on several occasions generally in response to rainfall.



See page 5 for key to graph

Corcoran Park

See page 32 for key to map

Description Corcoran Park is located on the northern shore of the Clarence River and is backed by the city of Grafton. The site is approximately 50 kilometres from the ocean and is backed by a large park with facilities. The area is used for boating, fishing and swimming.

Pollution sources Treated sewage effluent is discharged approximately 500 metres downstream of the site. The site may also be affected by agricultural runoff from within the catchment and stormwater runoff from the city of Grafton.

Compliance Corcoran Park was monitored between November 2007 and March 2008. Levels of enterococci passed the NHMRC (1990) swimming guidelines in two of the five months. The site failed the swimming guidelines in December 2007, January 2008 and February 2008.

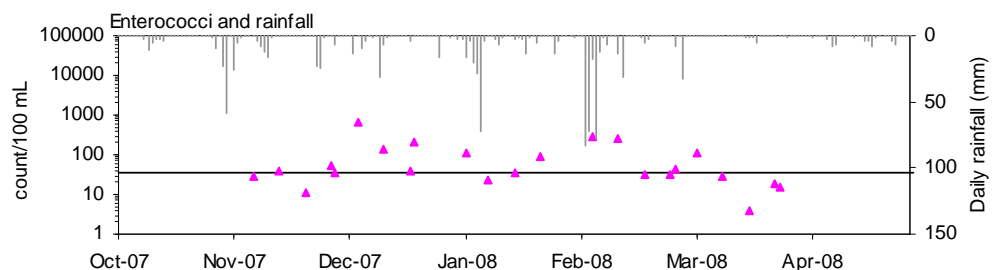


Compliance with NHMRC (1990) swimming guidelines at Corcoran Park

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

* Only four samples were collected in this month. An additional data point was borrowed from an adjacent month to calculate compliance.

Timeseries plots Enterococci levels frequently exceeded the geometric mean guideline level during the monitoring period, usually in response to rainfall.



See page 5 for key to graph