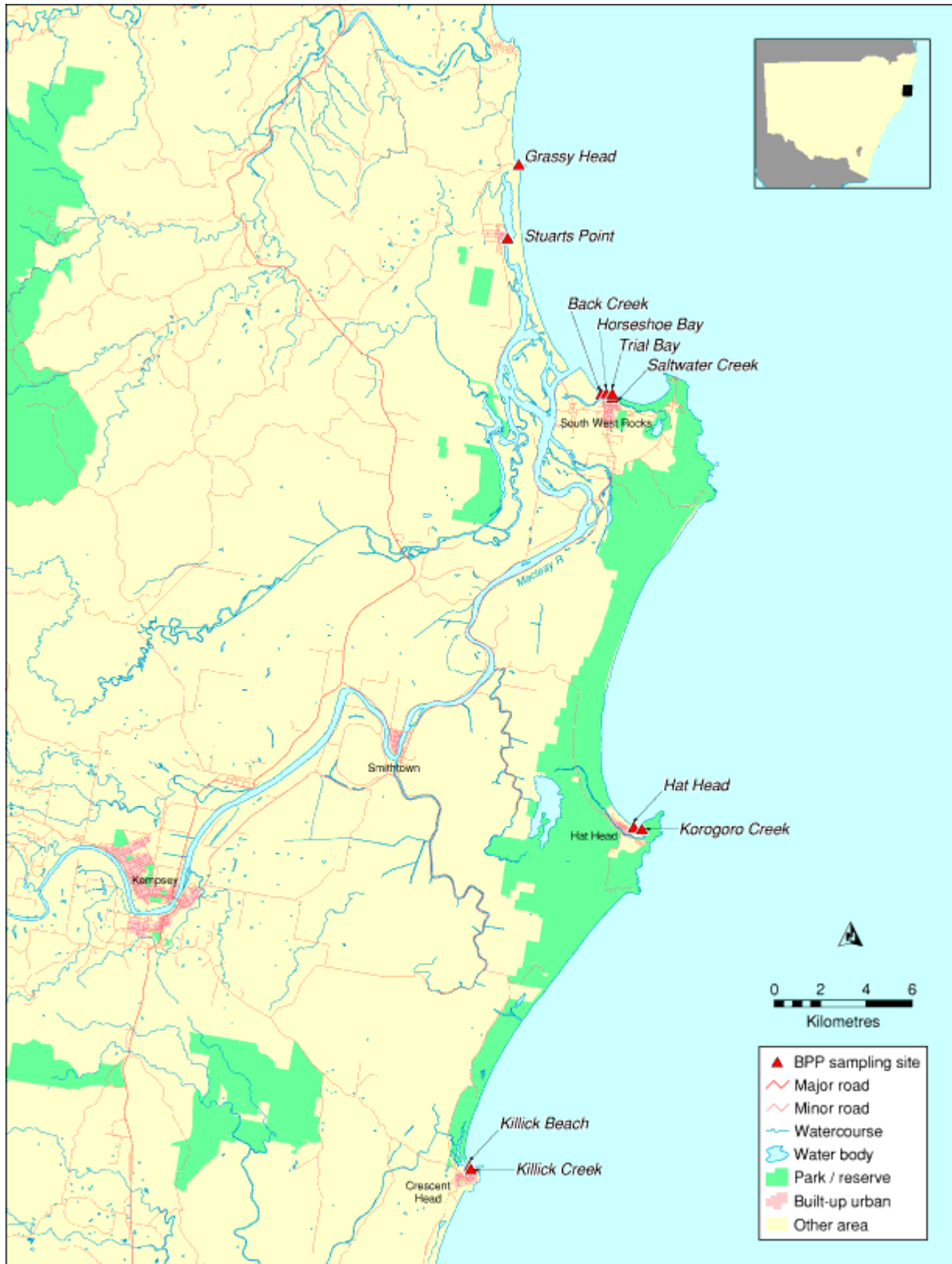


Kempsey Council

Ocean beaches: Grassy Head, Horseshoe Bay, Trial Bay, Hat Head, Killick Beach.

Estuarine location: Stuarts Point. **Creeks:** Back Creek, Killick Creek, Saltwater Creek, Korogoro Creek.



Local government area description

Kempsey Shire is situated in the Macleay Valley on the Mid North Coast of New South Wales. The Shire covers an area of 3376 square kilometres of which almost 30 per cent is under formal reserve. The council area has more than 80 kilometres of coastline.

The Kempsey Shire is part of the fastest growing non-metropolitan area in New South Wales and has a population of more than 28 000 (Kempsey Shire Council 2006).

The Macleay River is a significant natural feature of the region. It travels from the mountains of the New England Tableland through Kempsey, exiting to the ocean at South West Rocks.

Program outline

Ten swimming locations were monitored in the Kempsey Shire: five ocean beaches, one estuarine swimming location and four creeks. These sites were also monitored during the 2004–2005, 2005–2006 and 2006–2007 summer swimming seasons (DEC 2006a and 2006b, DECC 2007).

Faecal coliform samples were collected during October 2007 and November 2007 and enterococci samples were collected from November 2007 to April 2008 to assess compliance with 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 with only four samples, a sample from an adjacent month was 'borrowed' in order to provide the five data points required. 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 gauge at South West Rocks.

Ocean beaches

Guideline compliance

A high level of compliance with NHMRC (1990) swimming guidelines was recorded

at the ocean beaches during the 2007–2008 summer swimming season (Figure 6).

Grassy Head, Horseshoe Bay, Trial Bay, Hat Head and Killick beaches all complied with the swimming guidelines in all months in which sufficient samples were collected.

Response to rainfall

Levels of enterococci were generally low at ocean beaches over the monitoring period, indicating little sewage contamination at these sites.

Elevated enterococci levels were occasionally measured in the later months of the monitoring period in response to heavy rainfall.

Estuarine location

Guideline compliance

A high level of compliance was recorded at Stuarts Point, which complied with the NHMRC (1990) swimming water quality guidelines in four of the five months in which sufficient samples were collected (Figure 6).

Response to rainfall

Enterococci levels at Stuarts Point were generally low throughout the monitoring period, with some elevated results recorded in response to heavy rainfall in January and February 2008.

Creeks

Guideline compliance

A low level of compliance was recorded at Killick Creek and Back Creek, which passed the NHMRC (1990) swimming water quality guidelines in only two of five months during the summer swimming season (Figure 6). Korogoro Creek complied with swimming guidelines in October 2007 and January 2008, only two of the three months in which sufficient samples were collected to calculate compliance.

Compliance in Saltwater Creek was the lowest, complying with swimming guidelines in only one of the five months in which sufficient samples were collected (Figure 6).

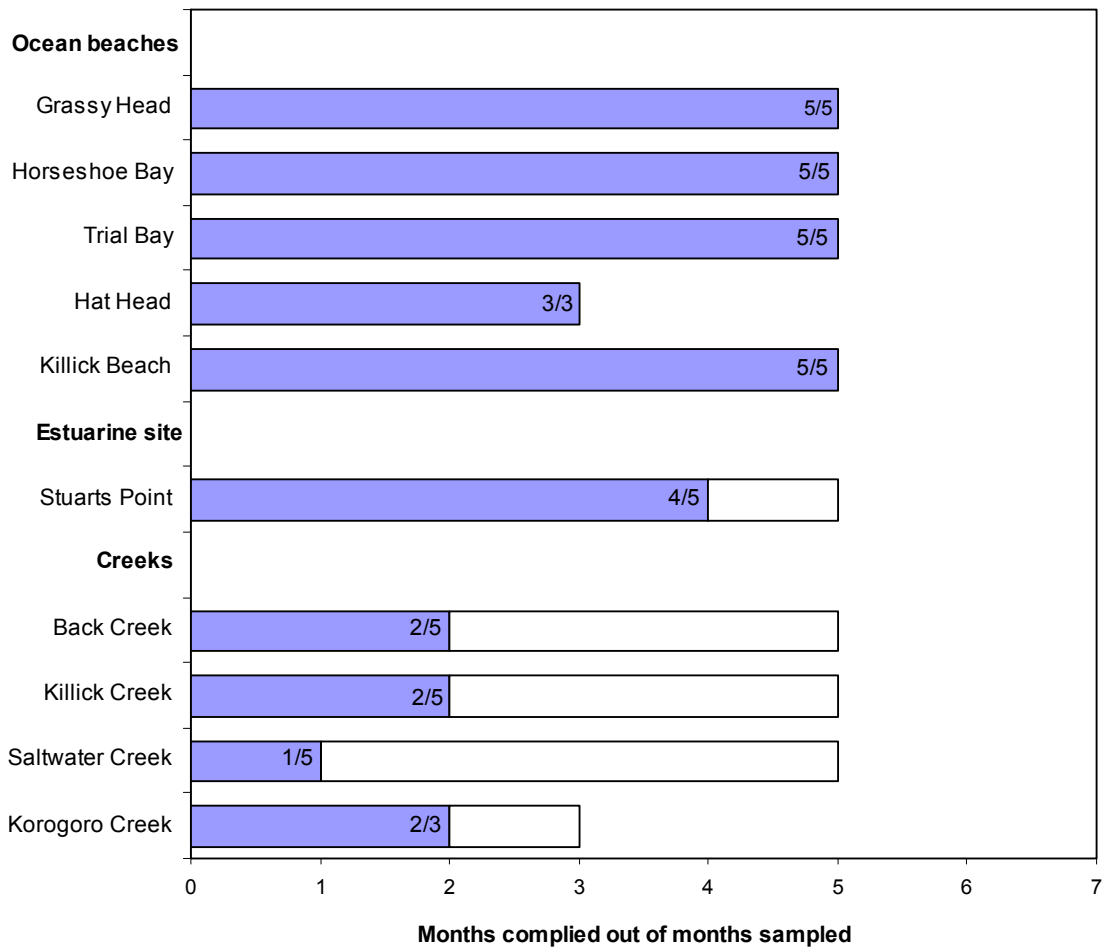
Response to rainfall

All creek sites recorded elevated enterococci levels in response to rainfall during the 2007–2008 summer swimming season. Very high levels were recorded at Killick Creek in

response to heavy rainfall in February and April 2008.

As a precaution, swimming in these creeks should be avoided following rainfall.

Figure 6: Summary of compliance with NHMRC (1990) microbiological guidelines for swimming at Kempsey Council swimming sites during the 2007–2008 summer swimming season



Grassy Head

See page 61 for key to map

Description The site is situated in the southern corner of Grassy Beach, adjacent to Grassy Head, which provides some protection from southerly ocean swells. The beach and surrounds are undeveloped and the area is used mainly by visitors staying at the nearby caravan park.

Pollution sources Much of the catchment is Crown land and State Forest, and apart from the caravan park there are few known potential sources of pollution.

Compliance Water quality at Grassy Head complied with NHMRC (1990) swimming guidelines in all five months of the 2007–2008 summer swimming season in which sufficient samples were collected.



Compliance with NHMRC (1990) swimming guidelines at Grassy Head

	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	PASS	PASS	PASS	PASS*

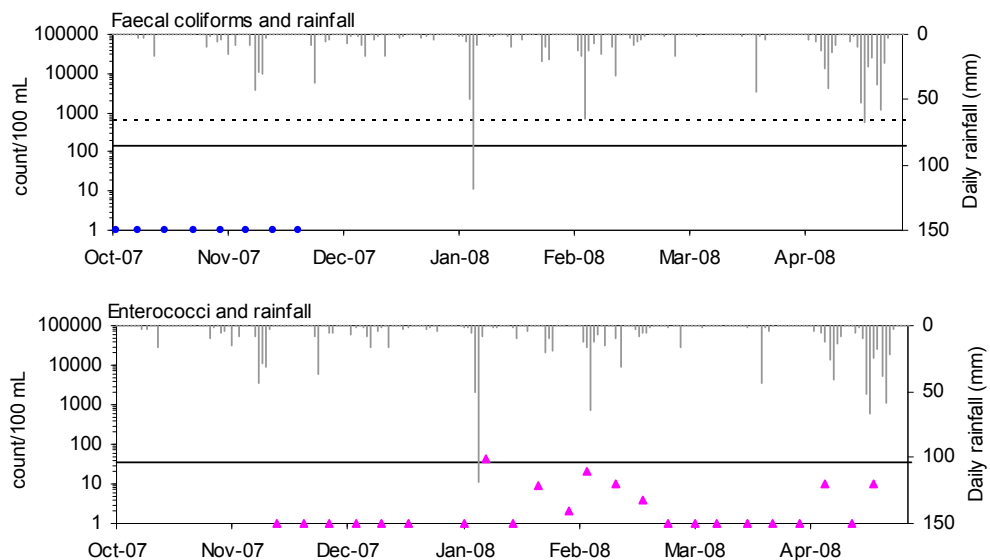
- no samples collected this month

* 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

Bacterial levels generally remained low and below the median and geometric mean guideline values throughout the monitoring period. A single elevated enterococci result was recorded in January 2008 following heavy rainfall.



See page 5 for key to graph

Stuarts Point

See page 61 for key to map

Description

The swimming area is located on the Macleay Arm – a broad, shallow, sandy riverbed that was once the main channel of the Macleay River. The site is a popular play area for young children and visitors that want protected non-surf swimming. Sampling takes place from a footbridge that crosses the river.



Pollution sources

The site receives stormwater from State Forest, rural lands, coastal Crown land and the small community of Stuarts Point.

Compliance

Water quality at Stuarts Point complied with NHMRC (1990) swimming guidelines in four of the five months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed to comply in February 2008 owing to elevated levels of enterococci.

Compliance with NHMRC (1990) swimming guidelines at Stuarts Point

	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	PASS	FAIL*	PASS*	PASS*

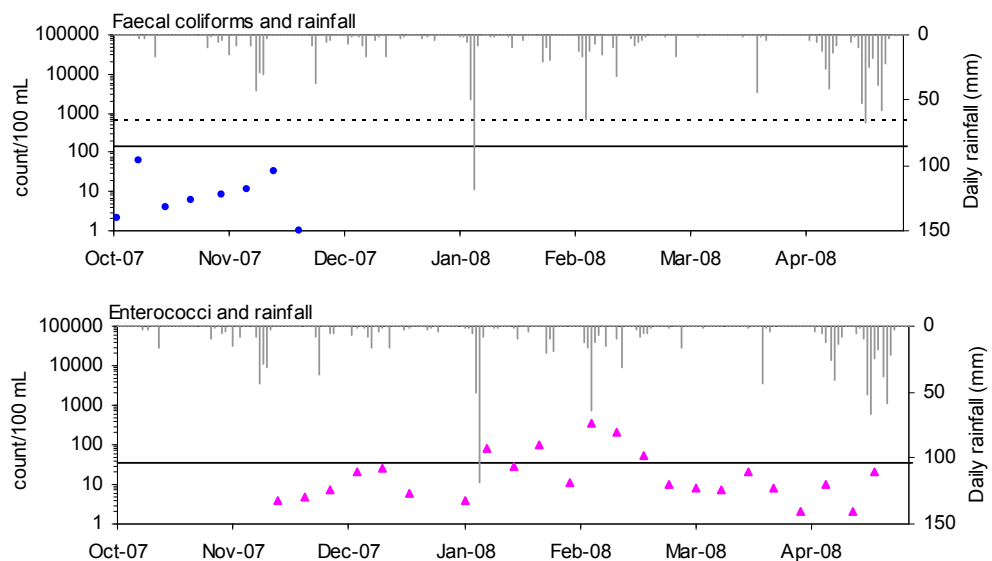
- no samples collected this month

* 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 bacteria mostly remained below the median and geometric mean guideline limits over the monitoring period, with some elevated enterococci levels recorded in January 2008 and February 2008 in response to rainfall.



See page 5 for key to graph

Horseshoe Bay

See page 61 for key to map

Description

Horseshoe Bay is a crescent-shaped beach approximately 100 metres long and located near the commercial centre of South West Rocks. The beach is enclosed by headlands and is very protected, making it very popular with families and children.



Pollution sources

The beach receives stormwater runoff from the town's commercial and urban areas and a carpark. The mouth of the Macleay River is situated 1.5 kilometres to the north and outflow may affect the swimming site following severe rain events.

Compliance

Water quality at Horseshoe Bay complied with NHMRC (1990) swimming guidelines in all five months of the 2007–2008 summer swimming season in which sufficient samples were collected.

Compliance with NHMRC (1990) swimming guidelines at Horseshoe bay

	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	PASS	PASS	PASS	PASS*

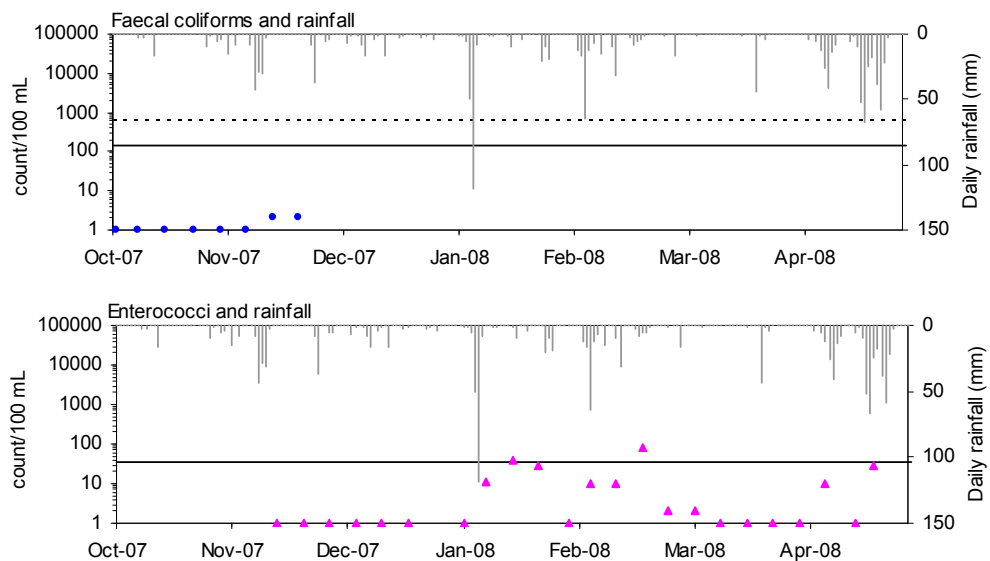
- no samples collected this month

* 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 bacteria remained generally low over the monitoring period, with enterococci levels exceeding the geometric mean guideline value on only one occasion.



See page 5 for key to graph

Trial Bay

See page 61 for key to map

Description

The sampling site is located at the western end of the three kilometre-long Trial Bay Beach, near the town of South West Rocks. The beach is within walking distance from the town centre and is a popular location for families with children. There is a surf club adjacent to the site and Saltwater Creek discharges nearby.



Pollution sources

Discharges from Saltwater Creek may be a source of pollution at the site. The creek receives urban stormwater and the catchment also includes semi-rural land and nature reserves. The mouth of the Macleay River is situated two kilometres to the north and outflow may affect the swimming site during severe rain events.

Compliance

Water quality at Trial Bay complied with NHMRC (1990) swimming guidelines in all five months of the 2007–2008 summer swimming season in which sufficient samples were collected.

Compliance with NHMRC (1990) swimming guidelines at Trial Bay

	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	PASS	PASS*	PASS*	PASS*

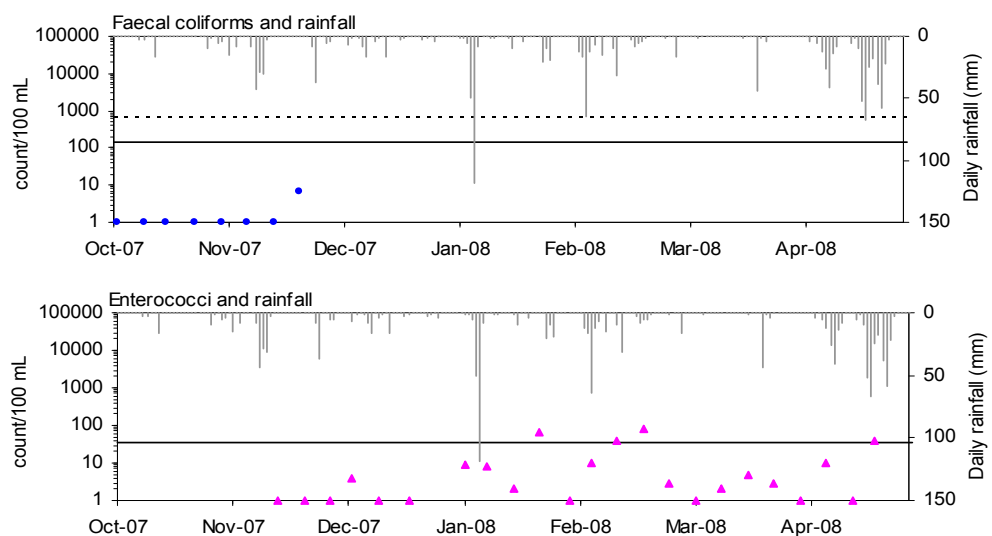
- no samples collected this month

* 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 bacteria remained generally low over the monitoring period, with enterococci levels exceeding the geometric mean guideline value on only two occasions.



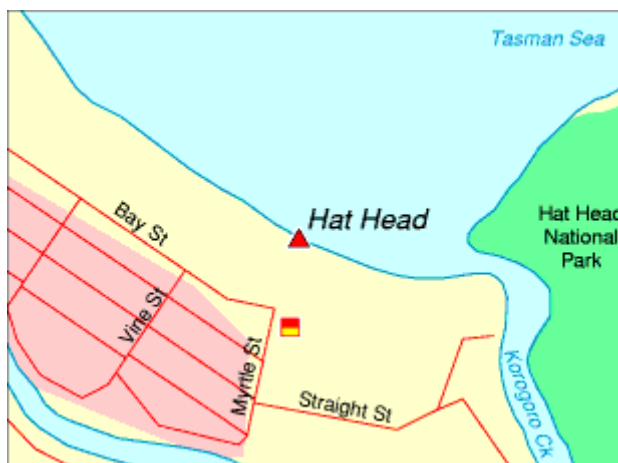
See page 5 for key to graph

Hat Head Beach

See page 61 for key to map

Description

The beach is situated in the southern corner of South Smokey Beach, adjacent to Hat Head and Korogoro Point, which provides protection from ocean swells from the south. There is a surf club, and the beach is popular mainly with visitors to the area.



Pollution sources

Much of the catchment is covered by Hat Head National Park and is composed of near-pristine coastal dunes and wetlands. The beach is near the mouth of Korogoro Creek, which receives urban stormwater from the township and caravan park and is generally open to the ocean.

Compliance

Water quality at Hat Head Beach complied with NHMRC (1990) swimming guidelines in all three months of the 2007–2008 summer swimming season in which sufficient samples were collected.

Compliance with NHMRC (1990) swimming guidelines at Hat Head Beach

	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	PASS	**	PASS	**

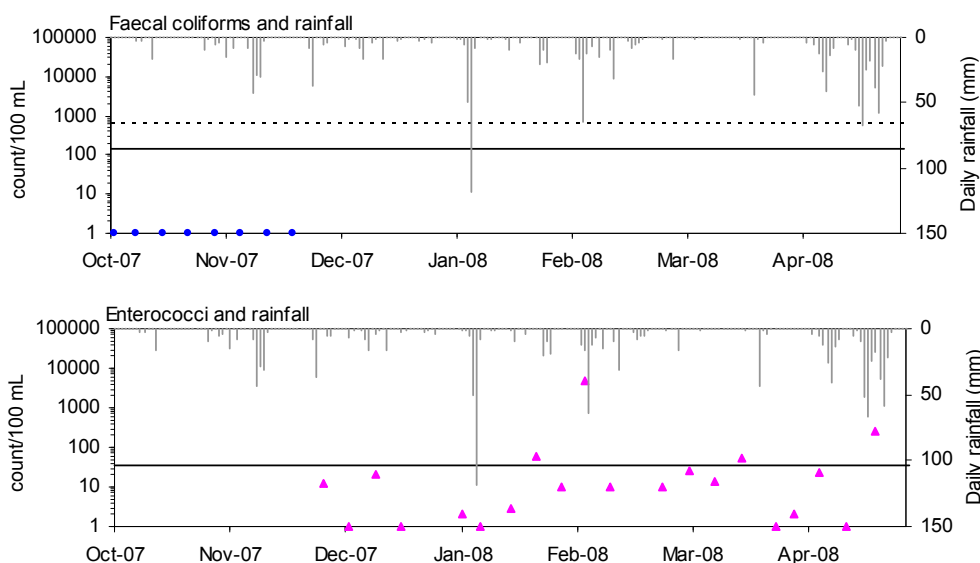
- no samples collected this month

* 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

Bacterial levels remained generally low over the monitoring period, with elevated levels recorded on four occasions. A very high value was recorded in February 2008 during heavy rainfall.



See page 5 for key to graph

Killick Beach

See page 61 for key to map

Description

The site is situated in the southern corner of Killick Beach, adjacent to the Crescent Head township and Little Nobby Point, which provides some protection from ocean swells. There are a surf club and golf club near the beach, and the area is popular with surfers and families with small children.



Pollution sources

Although much of the catchment is Hat Head National Park and is composed of near-pristine coastal dunes and wetlands, the swimming area is at the mouth of Killick Creek, which receives stormwater from the township and caravan park and is generally open to the ocean.

Compliance

Water quality at Killick Beach complied with NHMRC (1990) swimming guidelines in all five months of the 2007–2008 summer swimming season in which sufficient samples were collected.

Compliance with NHMRC (1990) swimming guidelines at Killick Beach

	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	PASS*	PASS	PASS	PASS*

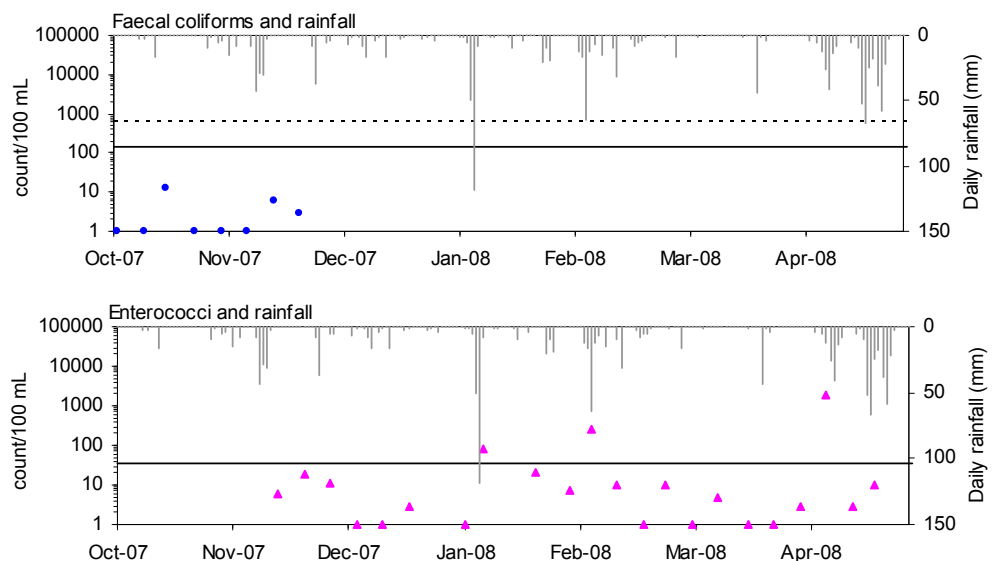
- no samples collected this month

* 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

Bacterial levels generally remained below the median and geometric mean guideline levels throughout the monitoring period. Elevated values were recorded on three occasions mostly in response to heavy rainfall.

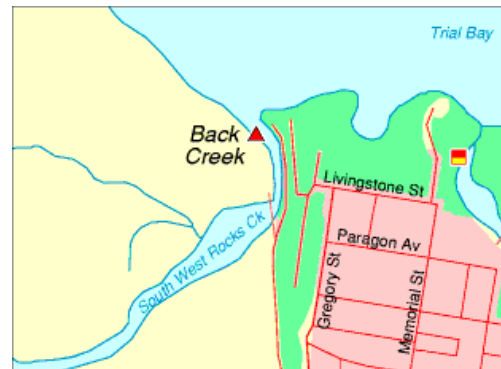


See page 5 for key to graph

Back Creek

See page 61 for key to map

Description This small coastal creek is kept open to the ocean to allow the passage of commercial and recreational fishing boats, and there are a number of moorings upstream of the site. An area at the mouth forms a shallow intertidal area that is protected from the ocean. This shallow and broad riverbed is a popular play area for families and younger children.



Pollution sources Much of the small catchment consists of mangroves, saltmarsh and wetlands. The creek is on the northern fringe of South West Rocks, and could be subject to urban stormwater discharges.

Compliance Water quality at Back Creek complied with NHMRC (1990) swimming guidelines in two of the five months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed to comply to swimming guidelines in January 2008, February 2008 and April 2008 owing to elevated levels of enterococci.

Compliance with NHMRC (1990) swimming guidelines at Back Creek

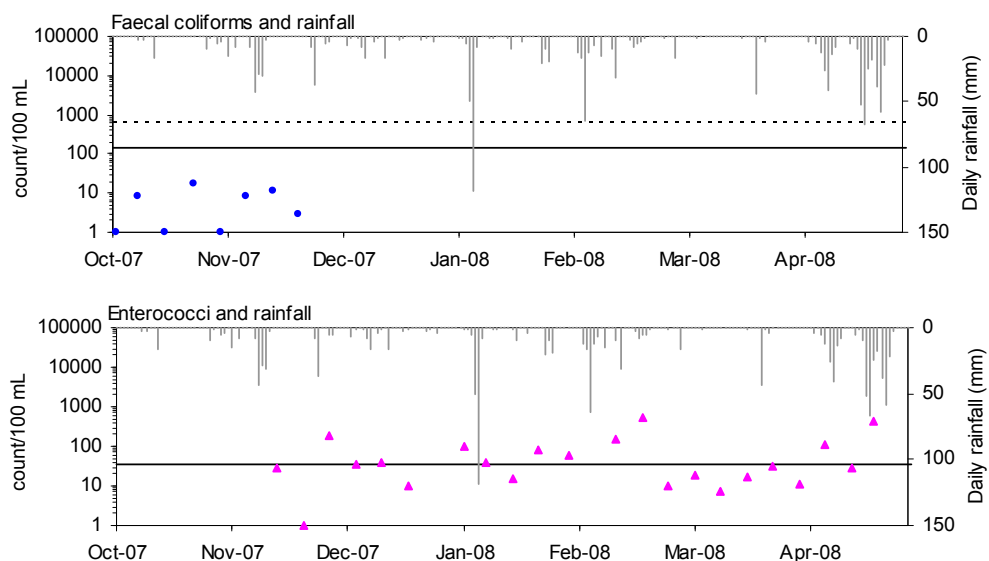
	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	FAIL	FAIL*	PASS	FAIL*

- no samples collected this month

* 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 Slightly elevated levels were recorded throughout the monitoring period, with values exceeding the guidelines limits on several occasions, often in response to rainfall.



See page 5 for key to graph

Killick Creek

See page 61 for key to map

Description

The sampling site is located at the mouth of the creek in a very shallow, sandy area. It is backed by a caravan park and the semi-urban centre of Crescent Head. Because of the calm waters, the area is a popular area for families with small children staying at the caravan park.



Pollution sources

The creek runs through the town of Crescent Head and receives stormwater from urban and commercial areas.

Compliance

Water quality at Killick Creek complied with NHMRC (1990) swimming guidelines in two of the five months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed to comply to swimming guidelines in January 2008, February 2008 and April 2008 owing to elevated levels of enterococci.

Compliance with NHMRC (1990) swimming guidelines at Killick Creek

	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	FAIL	FAIL*	PASS*	FAIL*

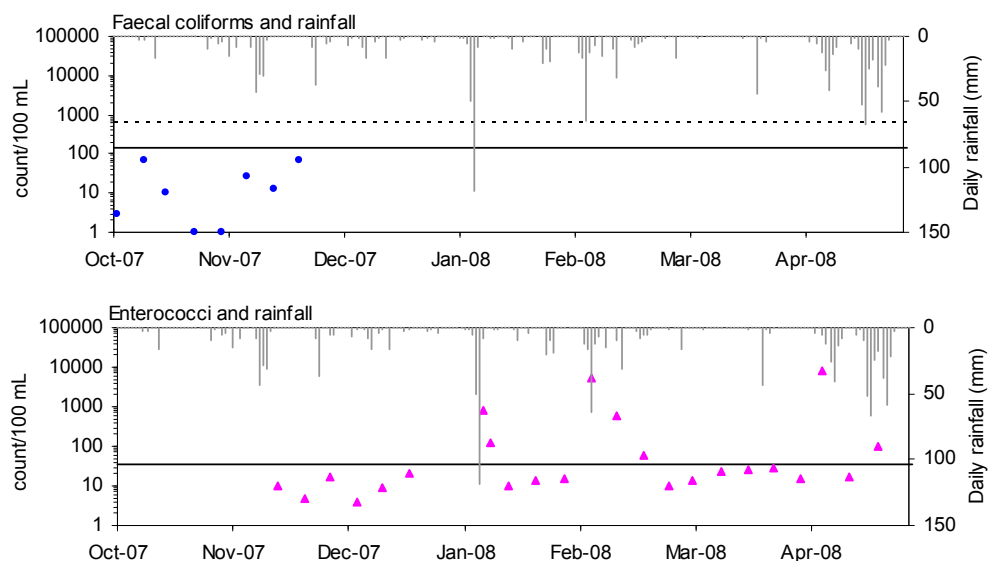
- no samples collected this month

* 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

Elevated bacterial levels were recorded on several occasions throughout the monitoring period. Very high values were recorded in February and April 2008 in response to rainfall.



See page 5 for key to graph

Saltwater Creek

See page 61 for key to map

Description The creek is shallow and sandy, and is located within the South West Rocks town centre. It is a popular play area for young children. There is a shaded picnic area nearby, with food retail outlets within walking distance. The creek is intermittently open to the ocean.



Pollution sources Saltwater Creek runs for approximately three kilometres and passes a caravan park, golf course, urban areas and semi-rural lands with septic systems. Stormwater discharges from these areas are potential sources of pollution during and following rainfall.

Compliance Water quality at Saltwater Creek failed to comply with NHMRC (1990) swimming guidelines in four of the five months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site passed the guidelines in October 2007.

Compliance with NHMRC (1990) swimming guidelines at Saltwater Creek

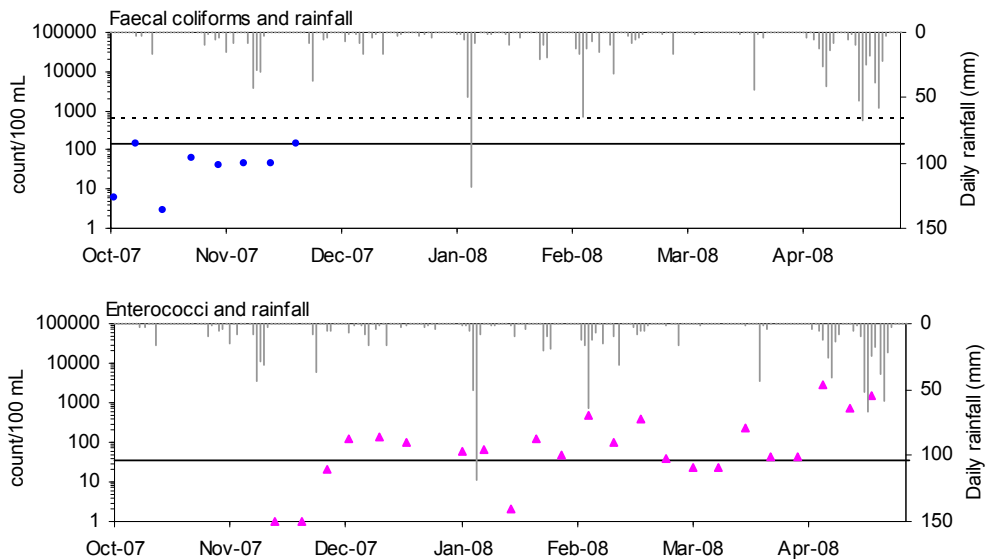
	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	FAIL	FAIL*	FAIL*	FAIL*

- no samples collected this month

* 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 Elevated levels of bacteria were measured throughout the monitoring period, in both wet and dry weather conditions.



See page 5 for key to graph

Korogoro Creek

See page 61 for key to map

Description

This sampling site is located at the mouth of the creek in a protected sand-spit. It is backed by native vegetation and Hat Head National Park. Because of the calm waters, it is a popular area for families with small children. The creek is well flushed with ocean water every tidal cycle.



Pollution sources

The creek runs behind the town of Hat Head for approximately three kilometres and receives stormwater from urban and commercial areas.

Compliance

Water quality at Korogoro Creek complied with NHMRC (1990) swimming guidelines in two of the three months of the 2007–2008 summer swimming season in which sufficient samples were collected. The site failed to comply to swimming guidelines March 2008 owing to elevated levels of enterococci.

Compliance with NHMRC (1990) swimming guidelines at Korogoro Creek

	OCT '07	NOV '07	DEC '07	JAN '08	FEB '08	MAR '08	APR '08
FC	PASS	**	-	-	-	-	-
ENT	-	**	**	PASS	**	FAIL	**

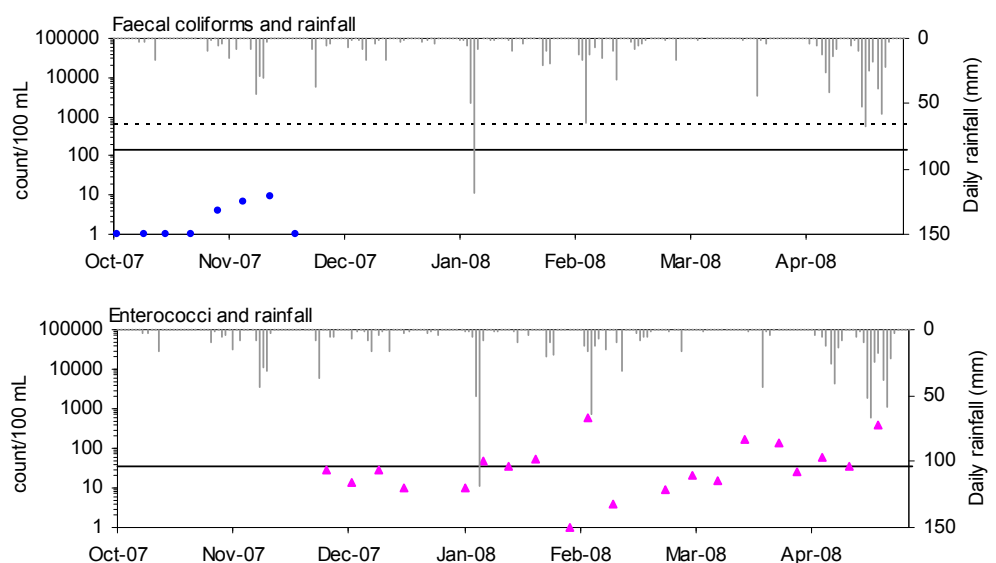
- no samples collected this month

* 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

Slightly elevated levels of bacteria were recorded during the last four months of the monitoring period in both wet and dry weather conditions.



See page 5 for key to graph