North Coast region

Councils

The North Coast region of New South Wales extends from Grassy Head in the north to Laurieton in the south. Two local councils in this region participate in the Beachwatch Partnership Program (Figure 11):

- Kempsey Shire Council
- Port Macquarie-Hastings Council.

The programs

Monitoring in the North Coast region is conducted under the Beachwatch Partnership Program. In 2010–2011, 11 swimming locations were sampled (Table 12). Each council fully funded sampling collection and laboratory analysis, with quality assurance and reporting support provided by OEH.

Kempsey Shire Council has been part of the Beachwatch Partnership Program since 2004, with monitoring for enterococci beginning in 2007. Ten sites were sampled on a weekly basis from September 2010 to April 2011.

Port Macquarie-Hastings Council joined the Beachwatch Partnership Program in 2009. Enterococci samples were collected from one swimming location on a fortnightly basis from October 2010 to March 2011.

To ensure that the data collected and reported under the Beachwatch Partnership Program are accurate and reliable, quality assurance of sampling, microbial analysis and reporting is undertaken. The findings of the quality assurance program are described in the quality assurance section of this report.

2010–2011 results

Of the 11 sites monitored on the North Coast, 6 were graded as Good or Very Good (Table 13).

Ocean beaches

Two of the five ocean beaches were graded as Very Good: Grassy Head and Trial Bay in Kempsey Shire Council area. These sites had excellent water quality and few potential sources of microbial contamination.

The remaining three ocean beaches were graded as Good (Table 13). Enterococci levels were suitable for swimming most of the time, but the water may be susceptible to faecal contamination from a number of potential sources.

Estuarine

Four estuarine swimming sites were graded as Poor (Stuarts Point, Back Creek, Korogoro Creek and Killick Creek). Microbial water quality at Back Creek was often unsuitable for swimming during dry and wet weather conditions. Because of the unpredictable nature of the contamination, swimming should be avoided at all times.

Stuarts Point, Korogoro Creek and Killick Creek generally had good microbial water quality during dry weather conditions but were susceptible to faecal contamination following rainfall. Swimming in these locations should be avoided during and for up to three days following rainfall or if there are signs of stormwater contamination, such as discoloured water or odour or floating debris.

Table 12: Monitoring of North Coast swimming sites

Council	Sampling frequency	Number of sites					
		Ocean beaches	Ocean baths	Estuarine	Lagoon/ lake	Freshwater river	Total
Kempsey Shire Council	Weekly (September to April)	5	–	5	–	–	10
Port Macquarie-Hastings Council	Fortnightly (October to March)	–	–	–	1	–	1

Saltwater Creek was graded as Very Poor. The creek is only intermittently open to the ocean, and microbial water quality is often unsuitable for swimming even during dry weather conditions. Swimming at this location should be avoided if the creek is closed to the ocean. When the creek is open and being flushed by clean ocean water, swimming should be avoided during and for three days following rainfall or if there are signs of stormwater pollution, such as discoloured water or odour or floating debris.

Lagoons

Lake Cathie was graded as Poor. While microbial water quality was often suitable for swimming during dry weather conditions, the site is susceptible to faecal contamination following rainfall. Swimming at this location should be avoided when the entrance to the ocean is closed. When the entrance is open, care should be taken to avoid swimming during and for up to three days following rainfall or if there are signs of stormwater pollution, such as discoloured water or odour or floating debris.

Table 13: Beach Suitability Grades in the North Coast region, 2010–2011

	Site	Site type	Sanitary Inspection Category	Microbial Assessment Category	Beach Suitability Grade
Kempsey Shire Council	Grassy Head	Ocean beach	Low	Category A	Very Good
	Stuarts Point	Estuarine	Moderate	Category C	Poor
	Back Creek	Estuarine	Moderate	Category D	Poor
	Horseshoe Bay	Ocean beach	Low	Category B	Good
	Trial Bay	Ocean beach	Low	Category B	Good
	Saltwater Creek	Estuarine	High	Category D	Very Poor
	Hat Head Beach	Ocean beach	Low	Category B	Good
	Korogoro Creek	Estuarine	Moderate	Category C	Poor
	Killick Beach	Ocean beach	Low	Category B	Good
	Killick Creek	Estuarine	Moderate	Category C	Poor
Port Macquarie-Hastings Council	Lake Cathie	Lagoon/lake	Moderate	Category C	Poor

Kempsey Shire Council

Figure 12: Sampling locations and Beach Suitability Grades in the Kempsey Shire Council area

Overview of the area

Description

Kempsey Shire is situated in the Macleay Valley and covers an area of 3376 square kilometres. Almost 30 per cent of the area is under formal reserve, and the council has more than 80 kilometres of coastline.

The Kempsey Shire is part of the fastest growing non-metropolitan area in New South Wales, with the local resident population in 2010 estimated at 29,442 (ABS 2011).

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.

Tourism

Research by Tourism Australia indicates that, on average, each year more than 327,000 people holiday in the Kempsey Shire Council area and a further 221,000 people visit for the day. 'Going to the beach' is listed as a top activity by 65 per cent of international tourists and almost 50 per cent of domestic tourists holidaying in the area (RET 2008).

Rainfall

Extremely high rainfall levels were recorded throughout New South Wales during 2010–2011, with the wettest spring and fifth wettest summer on record. The period from late November 2010 to mid January 2011 was extremely wet with six major rain events affecting the North Coast of New South Wales during this time. The heavy rain triggered widespread flooding on many rivers and culminated in moderate flooding in Kempsey Shire during the second week of January. Coastal areas also experienced heavy rain during April 2011 with well above average monthly totals of 344 mm and 303 mm of rainfall recorded at Crescent Head and South West Rocks, respectively (BOM 2011).

Assessment

Microbial water quality

NHMRC recommends that at least 20 samples are collected each year, providing 100 data points over a five year period. The sampling frequency at sites in the Kempsey Shire is higher than this minimum, with approximately 27 samples collected each year at the ten monitored locations.

The Microbial Assessment Category for 2010–2011 was calculated from the most recent 100 data points up until the end of the 2010–2011 swimming season, covering the period January 2008 until April 2011.

Sanitary inspections

Sanitary inspections have been completed for all monitored swimming locations in the Kempsey Shire Council. These are scheduled for review during 2011–2012.

Beach Suitability Grades

Fiveof the ten swimming locations monitored in Kempsey Shire Council area were graded as Very Good or Good during 2010–2011 (Figure 13).

Very Good

One ocean beach (Grassy Head) was graded as Very Good.

This site had excellent water quality (Microbial Assessment Category A) and few potential sources of microbial contamination (Sanitary Inspection Categories of Low).

Good

Four swimming locations were graded as Good: Trial Bay, Horseshoe Bay, Hat Head Beach and Killick Beach.

These sites had mostly good water quality (Microbial Assessment Category B), but in the case Killick Beach, had more significant potential sources of microbial contamination such as urban stormwater runoff.

Fair

No swimming sites were classified as Fair.

Poor

Three creek locations (Back Creek, Korogoro Creek and Killick Creek) and one estuarine location (Stuarts Creek) were graded as Poor.

These sites often had poor water quality (Microbial Assessment Category C or D) and significant sources of microbial contamination, such as urban stormwater runoff or sewage treatment plant discharges. Elevated enterococci results were measured at Back Creek during both dry and wet weather conditions, and swimming should be avoided at all times due to the unpredictable nature of the contamination.

Microbial water quality at Stuarts Point, Korogoro Creek and Killick Creek was generally suitable for swimming during dry weather conditions. Care should be taken to avoid swimming during and for at least three days following rainfall or if there are signs of stormwater pollution, such as discoloured water or odour or floating debris.

Very Poor

Saltwater Creek was graded as Very Poor. The creek is only intermittently open to the ocean and microbial water quality is often unsuitable for swimming during dry weather conditions. Swimming at this location should be avoided if the creek is closed to the ocean. When the creek is open and being flushed by clean ocean water, swimming should be avoided during and for three days following rainfall or if there are signs of stormwater pollution, such as discoloured water or odour or floating debris.

Management

Wastewater management

Kempsey Shire Council Water and Sewer Division manages seven separate sewerage reticulation systems. The major systems are in Kempsey (West and South), with other smaller reticulation systems in the Crescent Head, Hat Head, South West Rocks, Smithtown/Gladstone and Frederickton areas.

The Crescent Head Sewage Treatment Plant (STP) discharges to the ocean via an outfall at Little Noddy Headland. West Kempsey, Frederickton and Gladstone STPs discharge to the Macleay River and South Kempsey STP discharges to Gills Creek, a tributary of the Macleay River. Hat Head and South West Rocks STPs discharge to sand dunes adjacent to water (EPA NSW 2011).

Significant works have been undertaken to improve the capacity of the sewerage systems and to cater for continued growth in the region, with further upgrade works planned.

The South West Rocks STP upgrade included the establishment of an urban dual-reticulation re-use system, which was commissioned at the end of 2010.

Kempsey Shire has approximately 4930 on-site sewage management systems, which are inspected by council officers to ensure they function correctly.

Stormwater management

Kempsey Shire Council is currently installing high and low flow stormwater channels as part of the Mitchell Street, Paragon Avenue, and Brighton Park Stormwater Upgrade and Foreshore Rehabilitation project. Reeds are being planted in the channels to filter the stormwater. The project is funded by the NSW Government Estuary Management Project and has been designed specifically to improve the quality of stormwater entering Saltwater Creek. The project also includes the stencilling of seven storm water curb inlet pits to make the public aware that the storm water from these drains directly to the creek.

Management plans

Kempsey Shire Council has a number of management plans. These include the Killick Creek Estuary Management Plan, the Back Creek South West Rocks Sustainability Assessment Report, the Korogoro Creek Estuary Management Plan and the Saltwater Creek Estuary Management Plan.

Lifeguard service

Kempsey Shire Council lifeguards patrol beaches in the council area during the swimming season.

Grassy Head

Beach Suitability Grade: **Very Good**

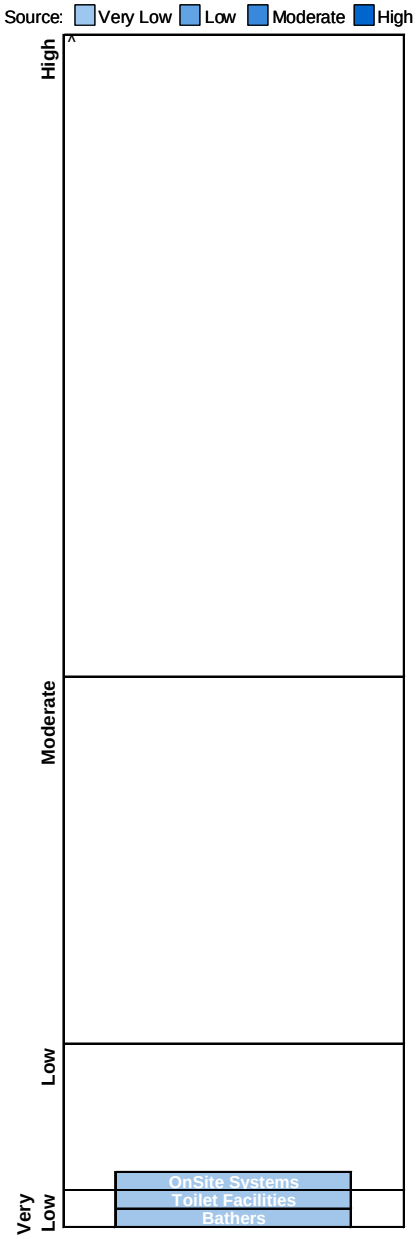
Grassy Head is located in the southern corner of Grassy Beach. The adjacent headland provides some protection from southerly ocean swells. The beach and surrounds are undeveloped and the area is used mainly by visitors staying at the nearby caravan park.

The Beach Suitability Grade of Very Good indicates that the microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

The response to rainfall graph indicates that enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to 20 mm of rainfall or more.

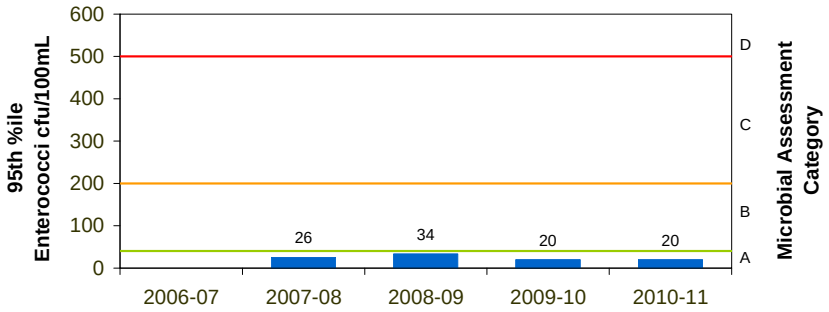
The site has been monitored since 2007. Water quality has generally been of a very high standard.

Sanitary Inspection**: Low**



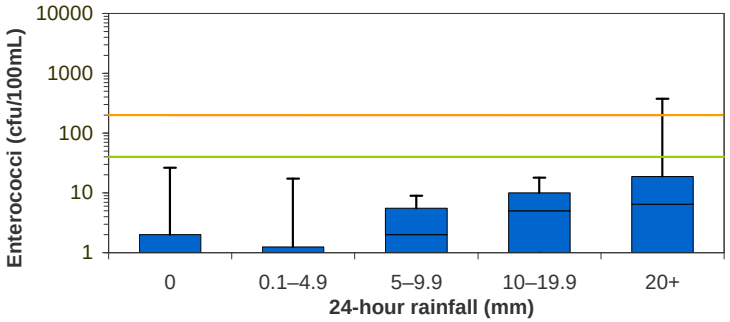
Microbial Assessment: **A**

Monitoring period for 2010–11 result is January 2008 to April 2011.

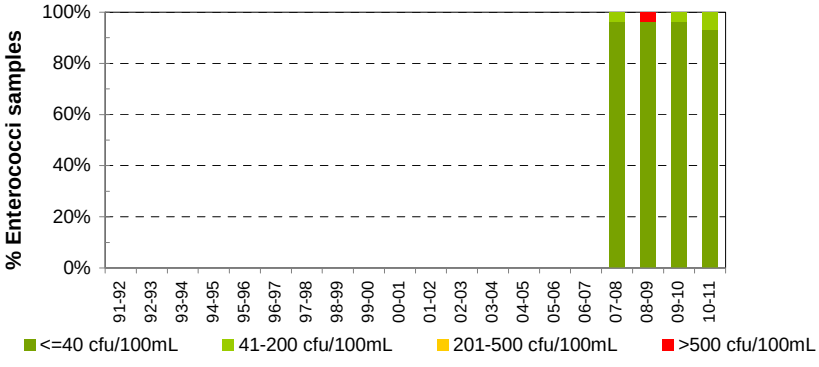


Response to rainfall

Rainfall from South West Rocks rain gauge



Trends in enterococci data through time



Stuarts Point

Beach Suitability Grade: **Poor**

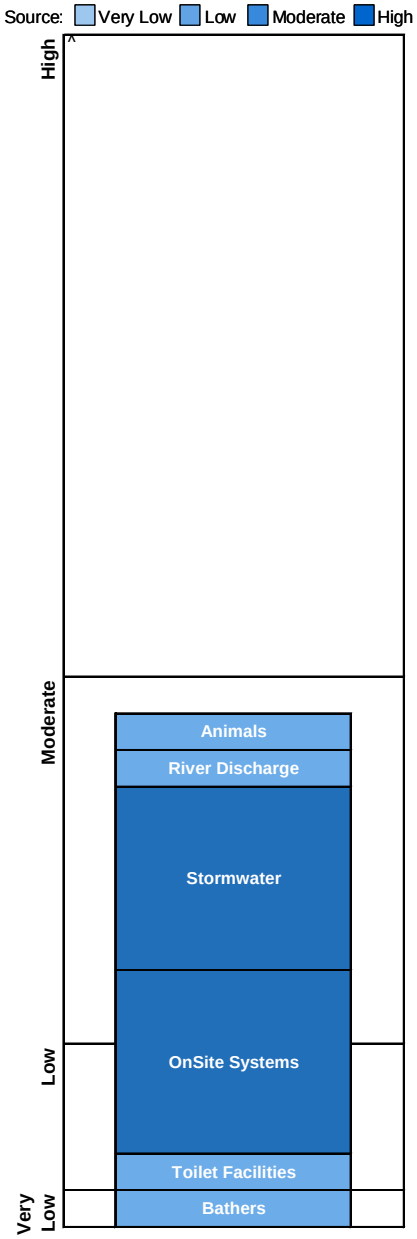
Stuarts Point is located on the Macleay Arm – a broad, shallow, sandy riverbed that was once the main channel of the Macleay River. The site is a popular play area for young children and visitors, offering protected non-surf swimming. Samples are collected from the footbridge.

The Beach Suitability Grade of Poor indicates that the microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with several potential sources of faecal contamination including stormwater and on-site systems.

The response to rainfall graph indicates that levels of enterococci increased with increasing rainfall, often exceeding the safe swimming limit in response to 5 mm of rainfall or more.

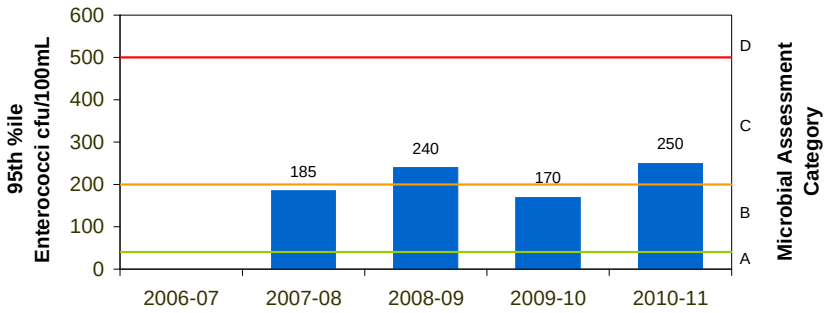
The site has been monitored since 2007, with a small percentage of elevated enterococci results recorded in all years.

Sanitary Inspection: **Moderate**



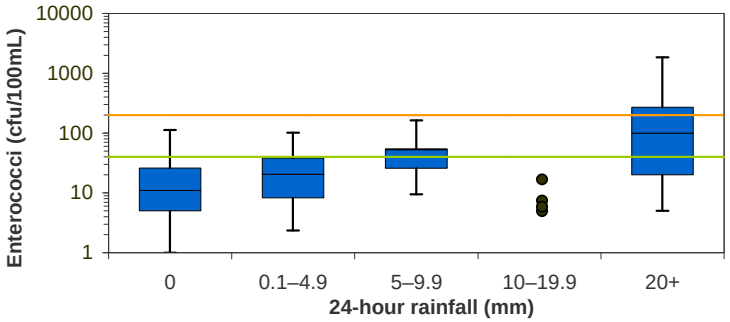
Microbial Assessment: **C**

Monitoring period for 2010–11 result is January 2008 to April 2011.

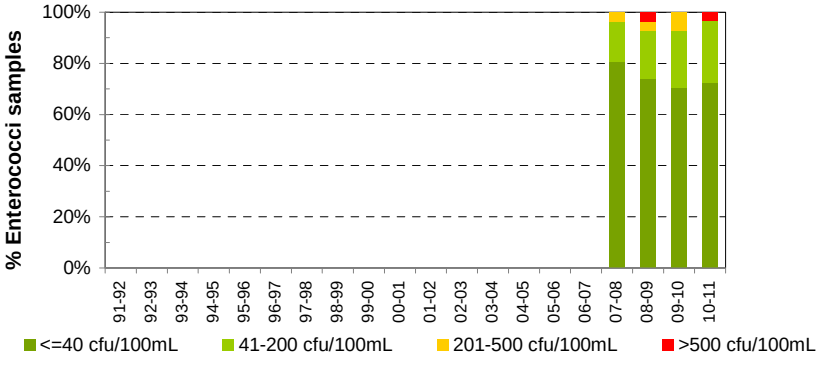


Response to rainfall

Rainfall from South West Rocks rain gauge



Trends in enterococci data through time



Back Creek

Beach Suitability Grade: **Poor**

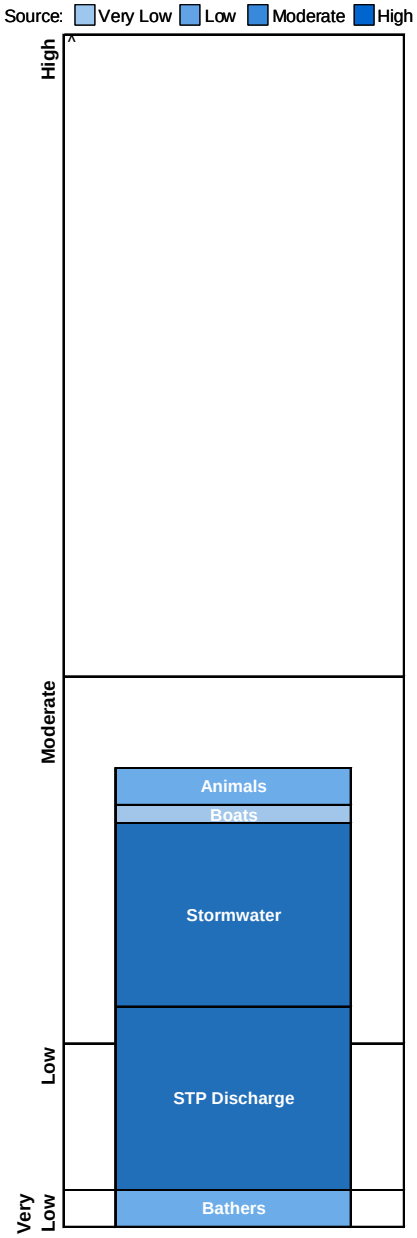
Back Creek is kept open to the ocean to allow the passage of commercial and recreational fishing boats. The shallow intertidal area near the mouth of the creek is protected from the ocean and is a popular play area.

The Beach Suitability Grade of Poor indicates that the microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions with several potential sources of faecal contamination including sewage treatment plant and creek discharge.

The response to rainfall graph indicates that enterococci levels often exceeded the safe swimming limit in response to little or no rain.

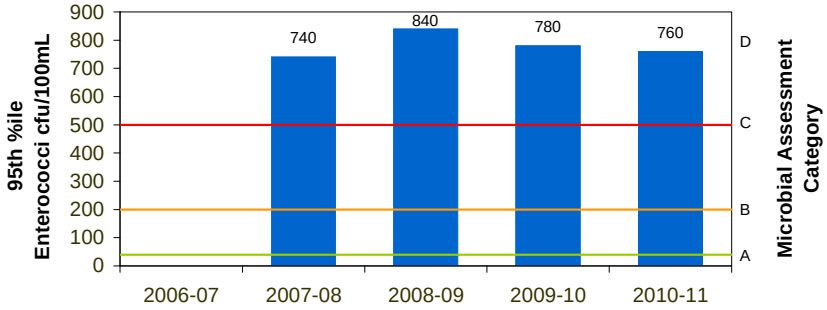
The site has been monitored since 2007. Elevated enterococci results have been recorded in all years, and in more than 30 per cent of samples in 2008–2009.

Sanitary Inspection: **Moderate**



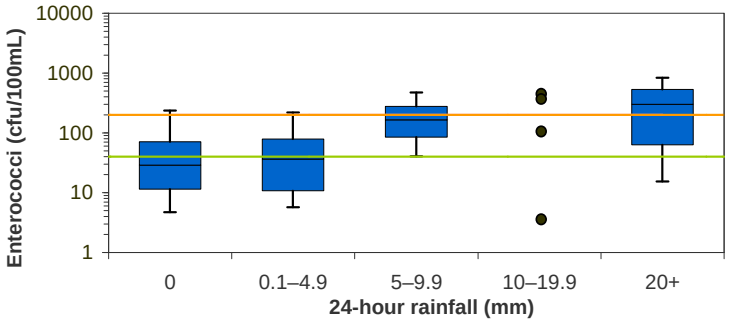
Microbial Assessment: **D**

Monitoring period for 2010–11 result is January 2008 to April 2011.

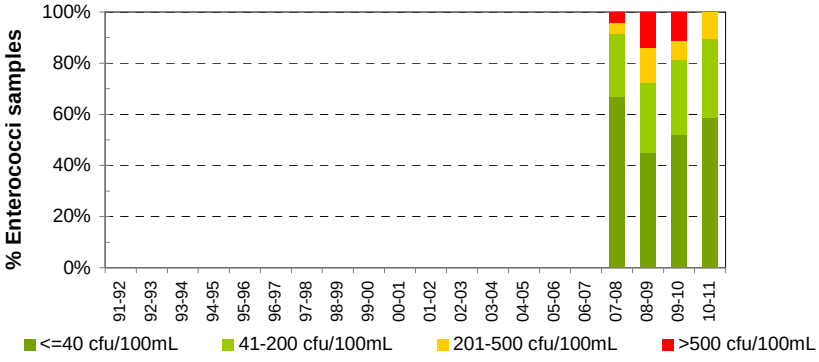


Response to rainfall

Rainfall from South West Rocks rain gauge



Trends in enterococci data through time



Horseshoe Bay

Beach Suitability Grade: **Good**

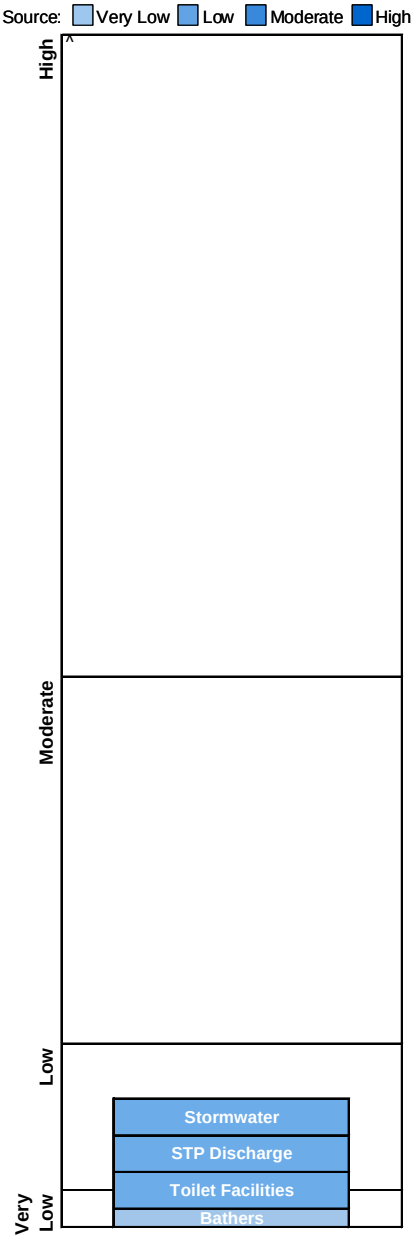
Horseshoe Bay is a crescent-shaped beach approximately 100 metres long and located near the commercial centre of the town of South West Rocks. The beach is enclosed by headlands and much protected, making it very popular with families and children.

The Beach Suitability Grade of Good indicates that the microbial water quality is generally suitable for swimming but the water may be susceptible to pollution from several sources of microbial contamination.

The response to rainfall graph indicates that levels of enterococci increase slightly with increasing rainfall, often exceeding the safe swimming limit in response to 20 mm of rainfall or more.

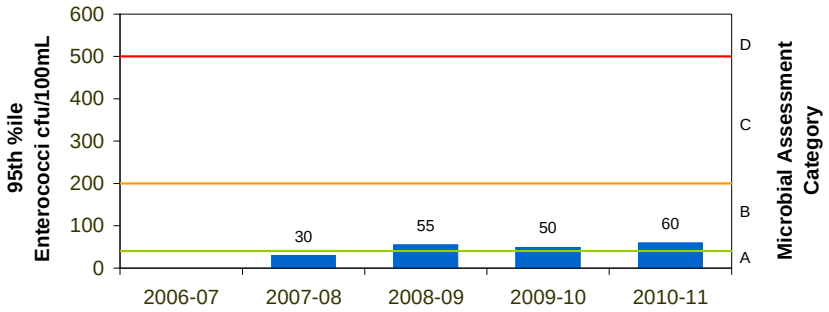
The site has been monitored since 2007. Elevated enterococci levels were recorded in a small percentage of samples in 2008–2009.

Sanitary Inspection: **Low**



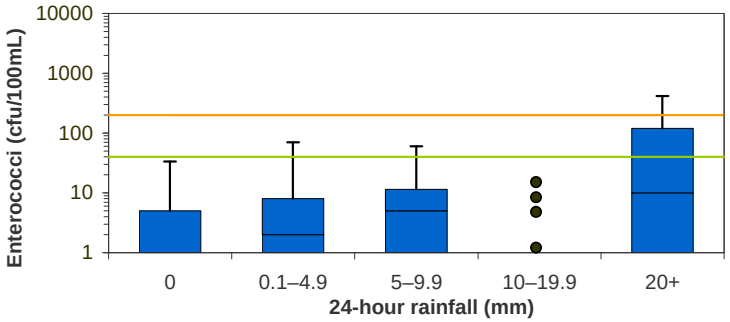
Microbial Assessment: **B**

Monitoring period for 2010–11 result is January 2008 to April 2011.

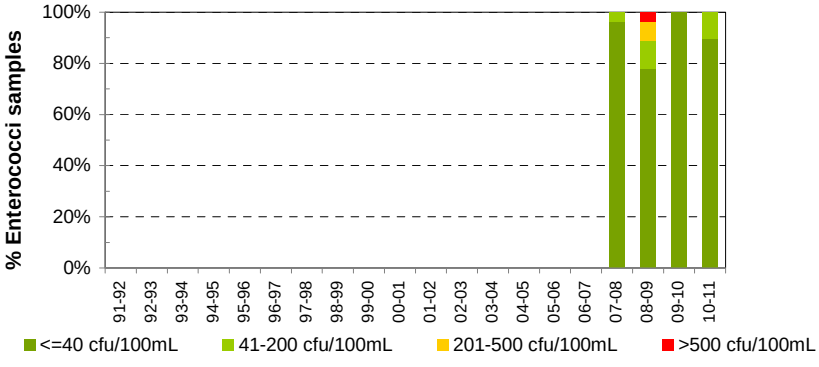


Response to rainfall

Rainfall from South West Rocks rain gauge



Trends in enterococci data through time



Trial Bay

Beach Suitability Grade: **Good**

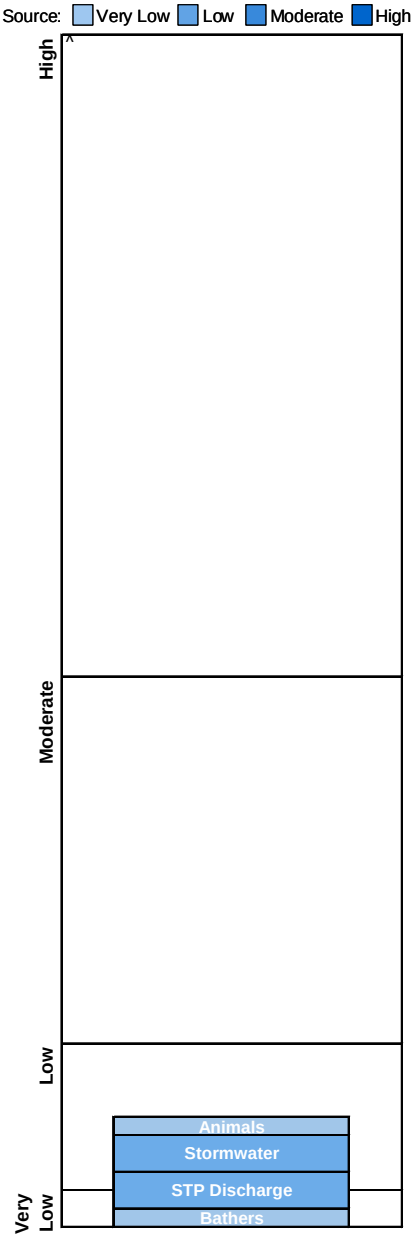
Trial Bay is located within walking distance of the town of South West Rocks and is a popular location for families with children. Samples are collected from the western end of the beach, adjacent to the surf club.

The Beach Suitability Grade of Good indicates that the microbial water quality is generally suitable for swimming but the water may be susceptible to pollution from several potential sources of microbial contamination.

The response to rainfall graph indicates that levels of enterococci increase slightly with increasing rainfall, often exceeding the safe swimming limit in response to 20 mm of rainfall or more.

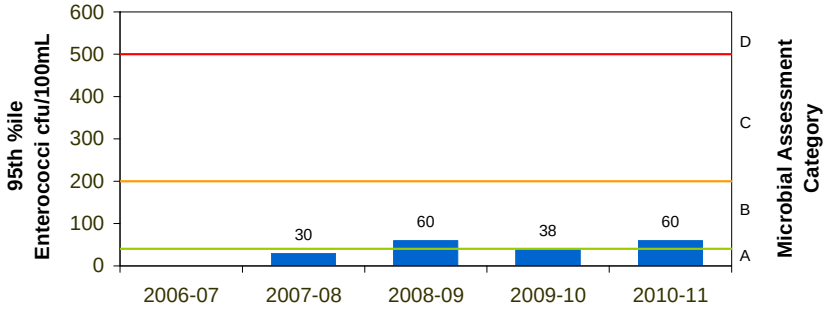
The site has been monitored since 2007. Elevated enterococci levels were recorded in a small percentage of samples in 2008–2009 and 2010 2011.

Sanitary Inspection: **Low**



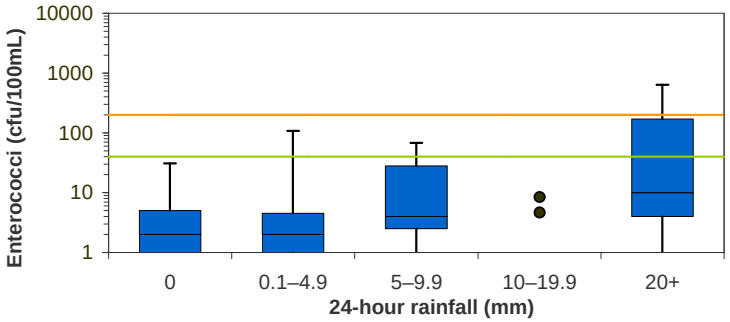
Microbial Assessment: **B**

Monitoring period for 2010–11 result is January 2008 to April 2011.

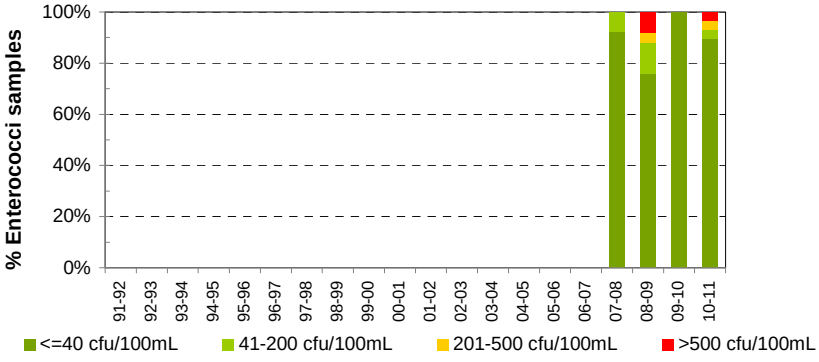


Response to rainfall

Rainfall from South West Rocks rain gauge



Trends in enterococci data through time



Saltwater Creek

Beach Suitability Grade: **Very Poor**

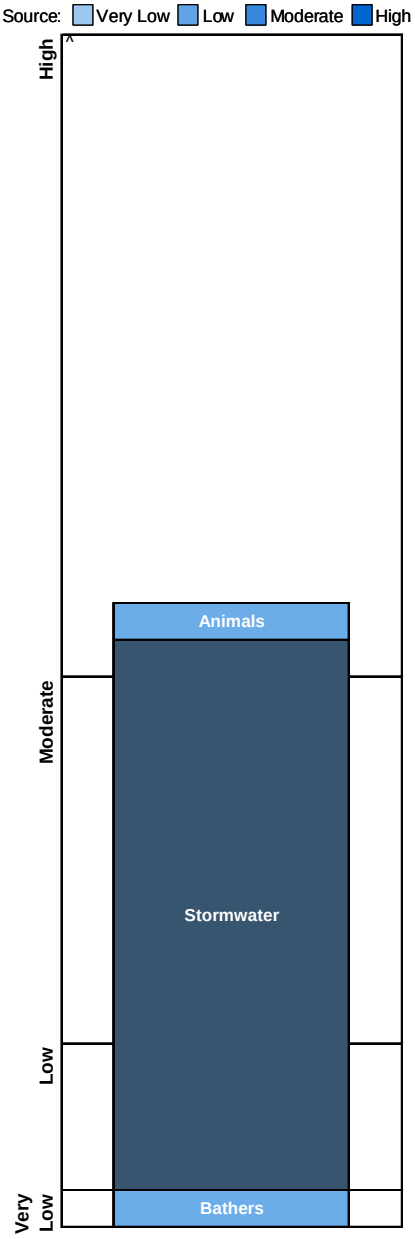
Saltwater Creek is shallow and sandy and located close to the South West Rocks town centre. It is a popular play area for young children. There is a shaded picnic area nearby, with food retail outlets within walking distance. The creek is intermittently open to the ocean.

The Beach Suitability Grade of Very Poor indicates that the microbial water quality is highly influenced by faecal pollution and swimming should be avoided at all times when the creek is closed to the ocean.

The response to rainfall graph indicates that enterococci levels frequently exceeded the safe swimming limit in response to little or no rain.

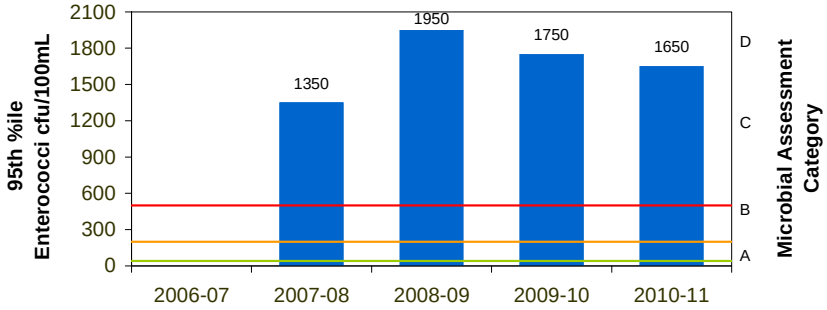
The site has been monitored since 2007, with elevated enterococci levels recorded in 20 to 40 per cent of samples.

Sanitary Inspection: **High**



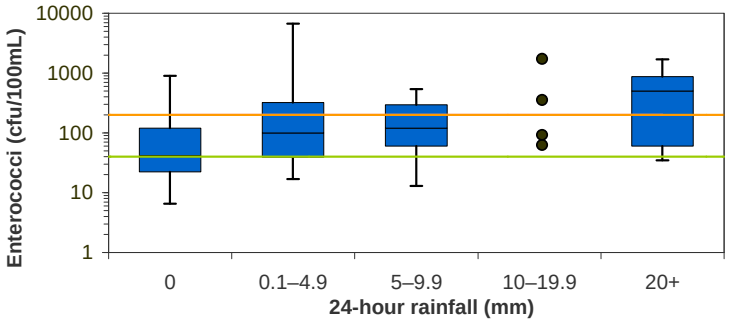
Microbial Assessment: **D**

Monitoring period for 2010–11 result is January 2008 to April 2011.

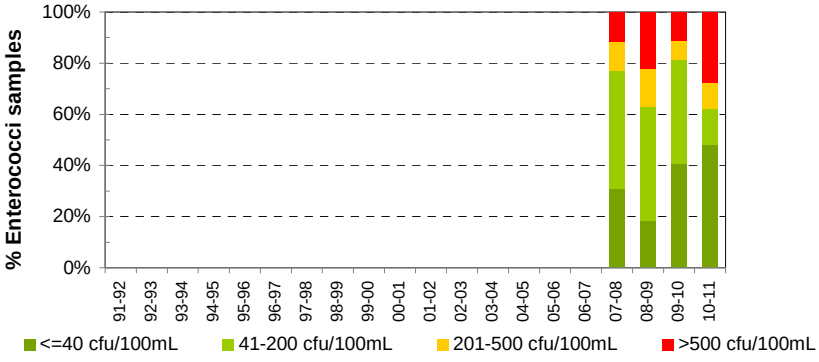


Response to rainfall

Rainfall from South West Rocks rain gauge

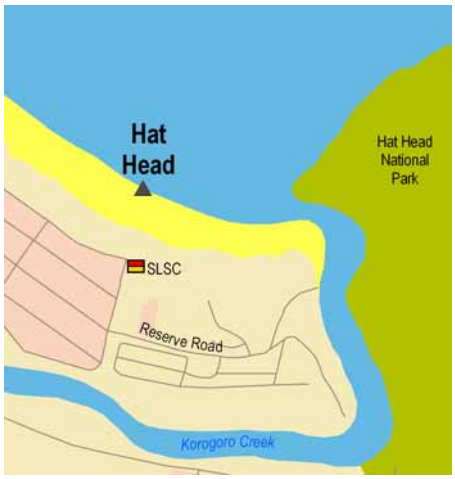


Trends in enterococci data through time



Hat Head Beach

Beach Suitability Grade: **Good**



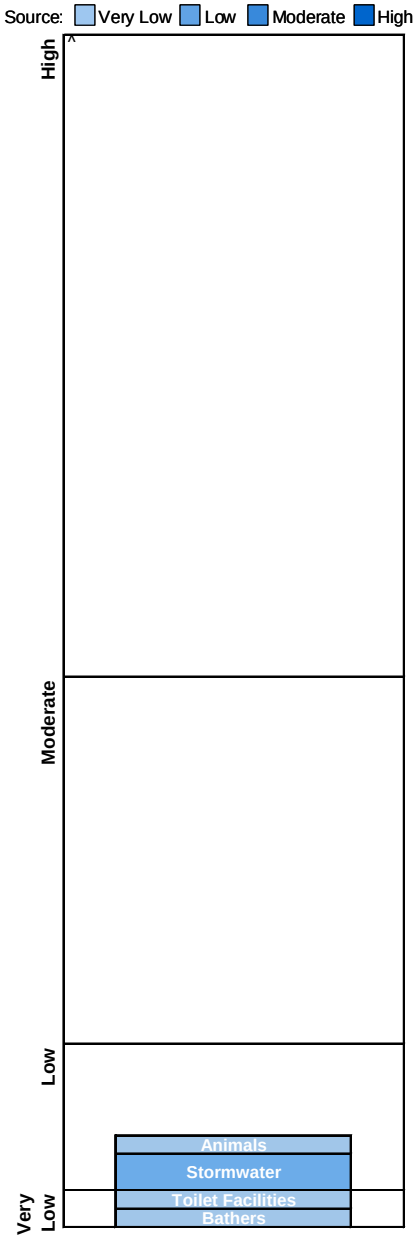
Hat Head Beach is situated in the southern corner of South Smokey Beach, adjacent to Hat Head and Korogoro Point, which provides protection from southerly ocean swells. Samples are collected adjacent to the surf club. The beach is popular with visitors to the area.

The Beach Suitability Grade of Good indicates that the microbial water quality is generally suitable for swimming but the water may be susceptible to pollution from several potential sources of contamination.

The response to rainfall graph indicates that enterococci levels mostly remain below the safe swimming limit, occasionally exceeding it in response to 10 mm of rainfall or more.

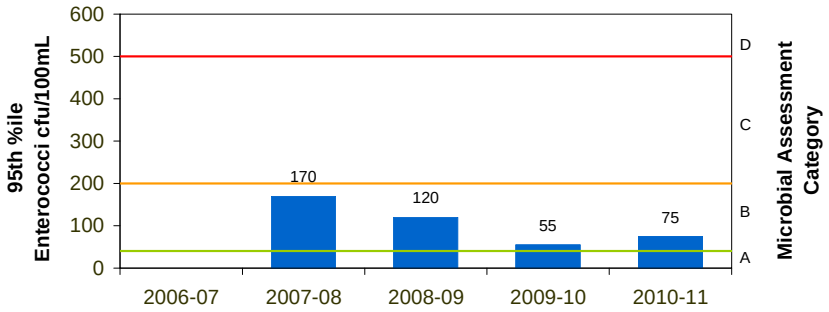
The site has been monitored since 2007 and water quality has been of a high standard over the last three years.

Sanitary Inspection: **Low**



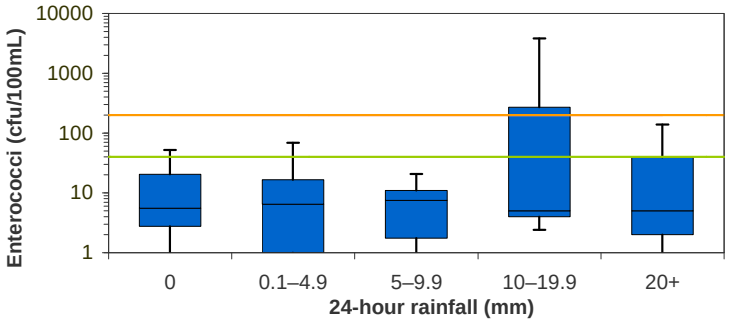
Microbial Assessment: **B**

Monitoring period for 2010–11 result is January 2008 to April 2011.

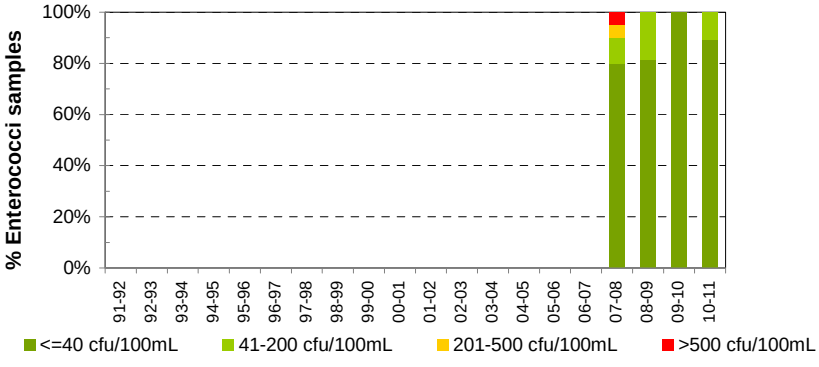


Response to rainfall

Rainfall from Crescent Head rain gauge



Trends in enterococci data through time



Korogoro Creek

Beach Suitability Grade: **Poor**

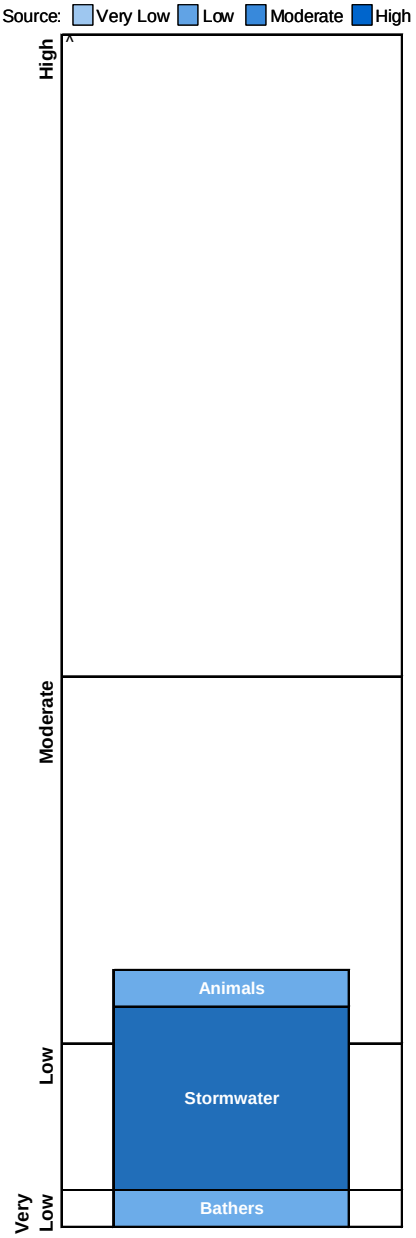
Korogoro Creek is adjacent to Hat Head National Park. The creek is open to the ocean and well flushed and the calm waters attract families with young children. Samples are collected near the mouth of the creek.

The Beach Suitability Grade of Poor indicates that the microbial water quality is influenced by faecal pollution, particularly after rainfall, with a number of potential sources of faecal contamination, including stormwater.

The response to rainfall graph indicates that enterococci levels often exceeded the safe swimming limit in response to 5 mm of rainfall or more.

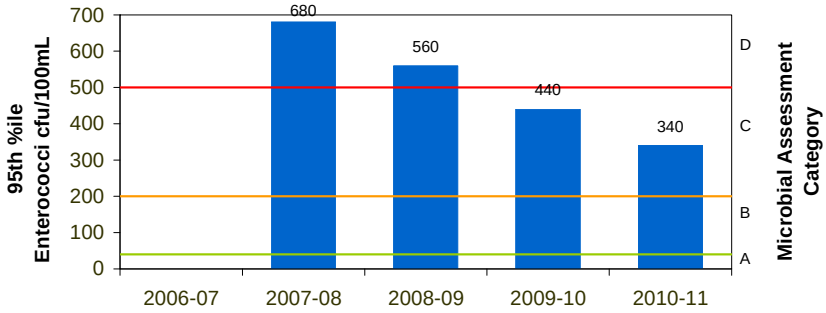
The site has been monitored since 2007. Data show that the microbial water quality was of a higher standard from 2009–2010 onwards.

Sanitary Inspection: **Moderate**



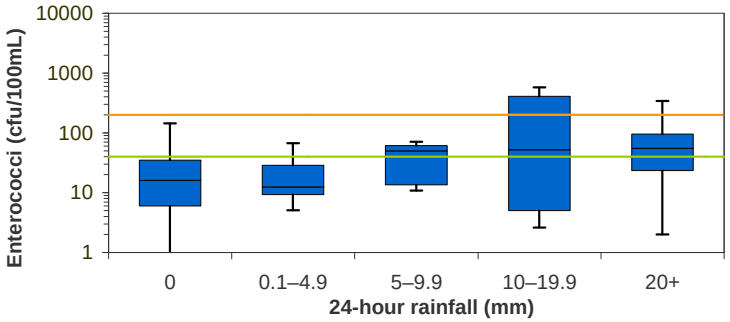
Microbial Assessment: **C**

Monitoring period for 2010–11 result is January 2008 to April 2011.

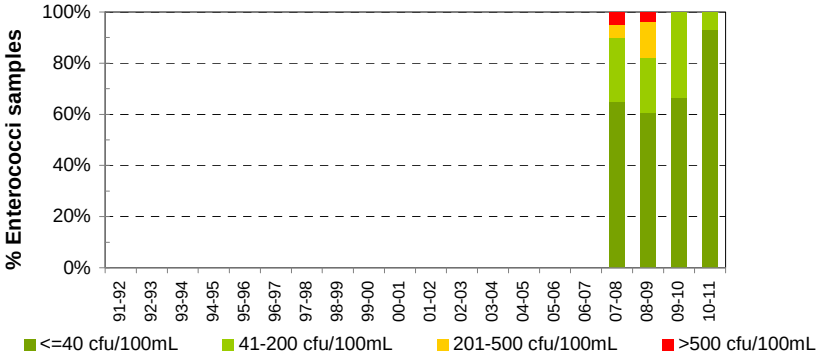


Response to rainfall

Rainfall from Crescent Head rain gauge



Trends in enterococci data through time



Killick Beach

Beach Suitability Grade: **Good**

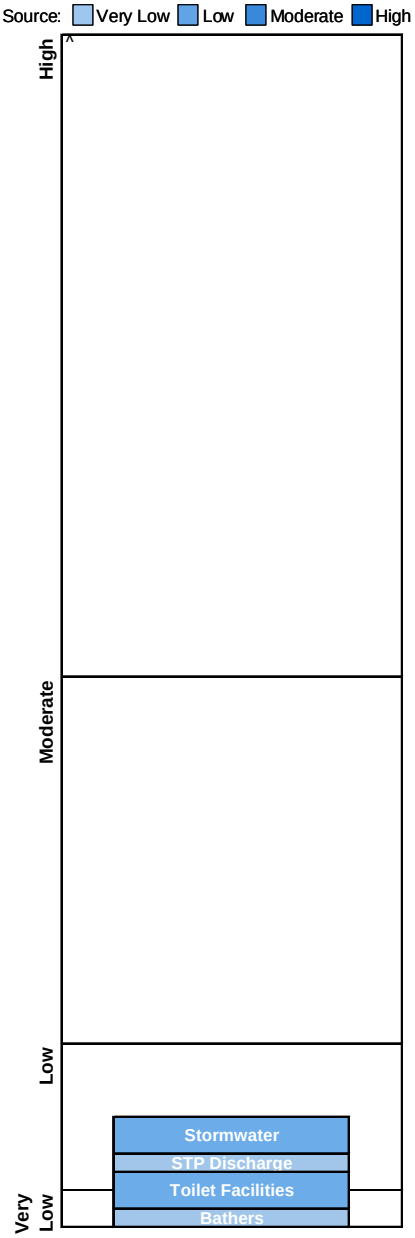
Killick Beach is located adjacent to the town of Crescent Head. Little Nobby Point provides some protection from ocean swells. A surf club and golf club are located near the beach and the area is popular with surfers and families with small children.

The Beach Suitability Grade of Good indicates that the microbial water quality is generally suitable for swimming but the water may be susceptible to pollution after heavy rain due to contamination from stormwater.

The response to rainfall graph indicates that enterococci levels often exceeded the safe swimming limit in response to 20 mm of rainfall or more.

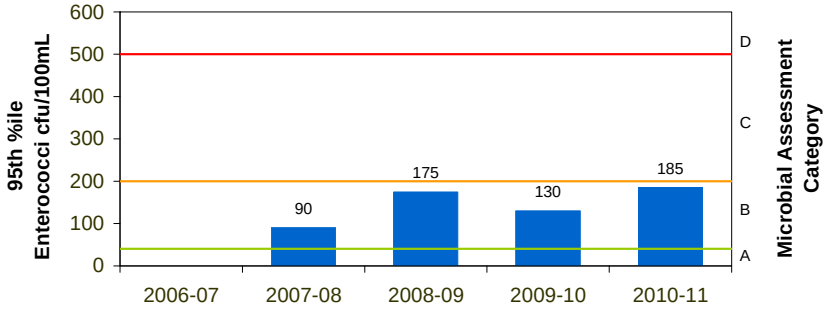
The site has been monitored since 2007.

Sanitary Inspection: **Low**



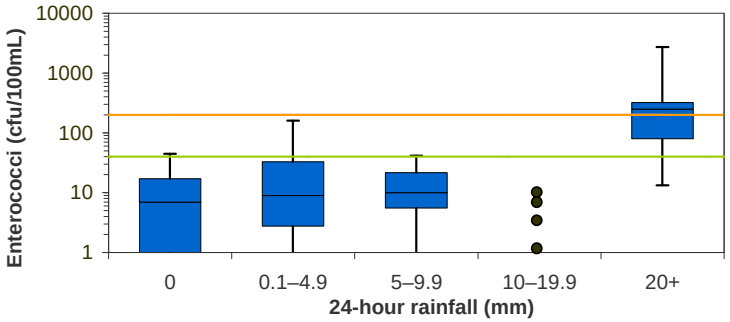
Microbial Assessment: **B**

Monitoring period for 2010–11 result is January 2008 to April 2011.

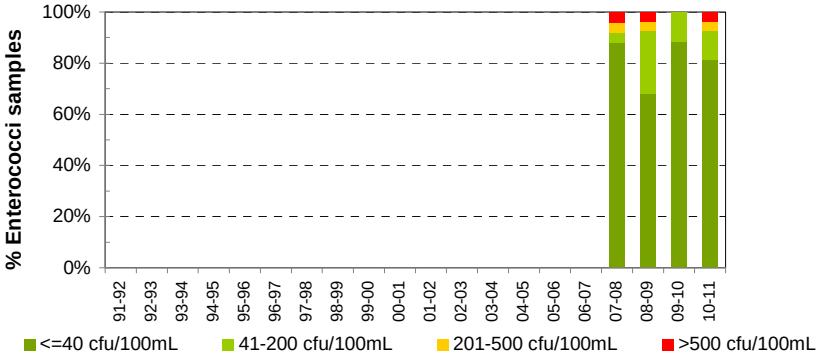


Response to rainfall

Rainfall from Crescent Head rain gauge



Trends in enterococci data through time



Killick Creek

Beach Suitability Grade: **Poor**

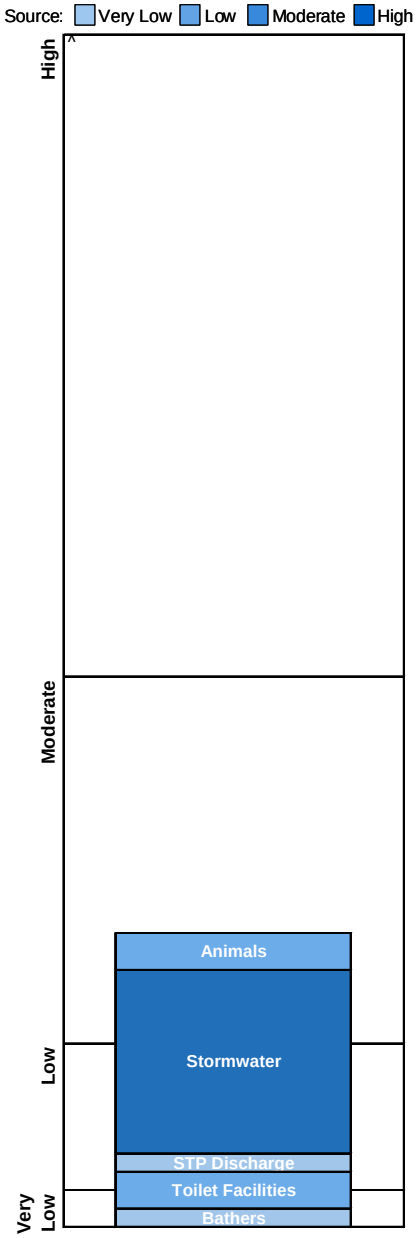
Killick Creek is backed by a caravan park and the town of Crescent Head. The sampling site is located at the mouth of the creek in a very shallow, sandy area. The water is calm and attracts families with small children.

The Beach Suitability Grade of Poor indicates that the microbial water quality is influenced by faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with potential faecal contamination from stormwater.

The response to rainfall graph indicates that enterococci levels occasionally exceeded the safe swimming limit in response to low levels of rainfall and regularly did so after 20 mm of rainfall or more.

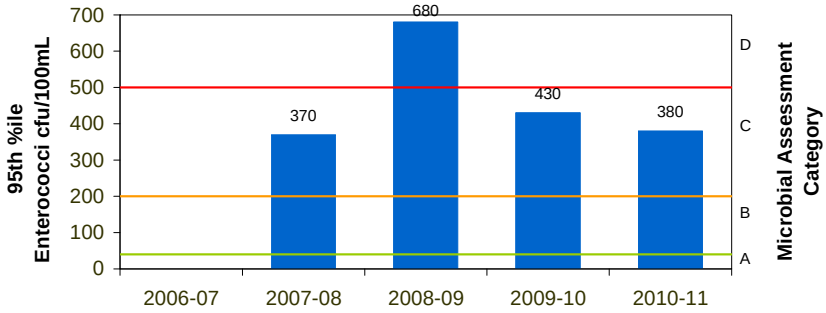
The site has been monitored since 2007.

Sanitary Inspection: **Moderate**



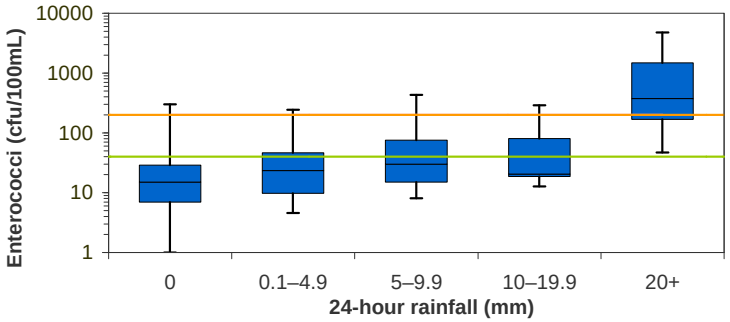
Microbial Assessment: **C**

Monitoring period for 2010–11 result is January 2008 to April 2011.

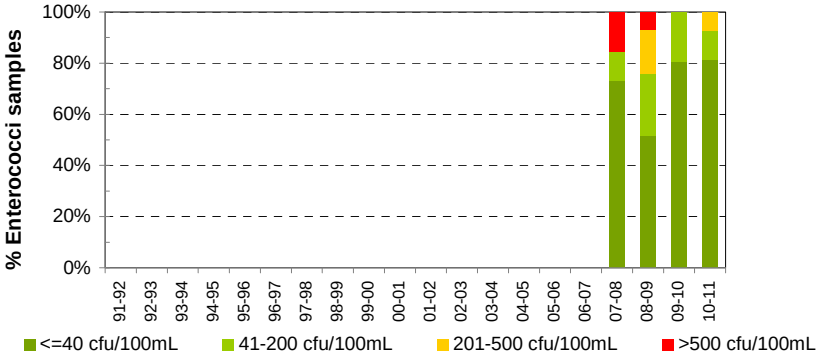


Response to rainfall

Rainfall from Crescent Head rain gauge



Trends in enterococci data through time



Port Macquarie-Hastings Council

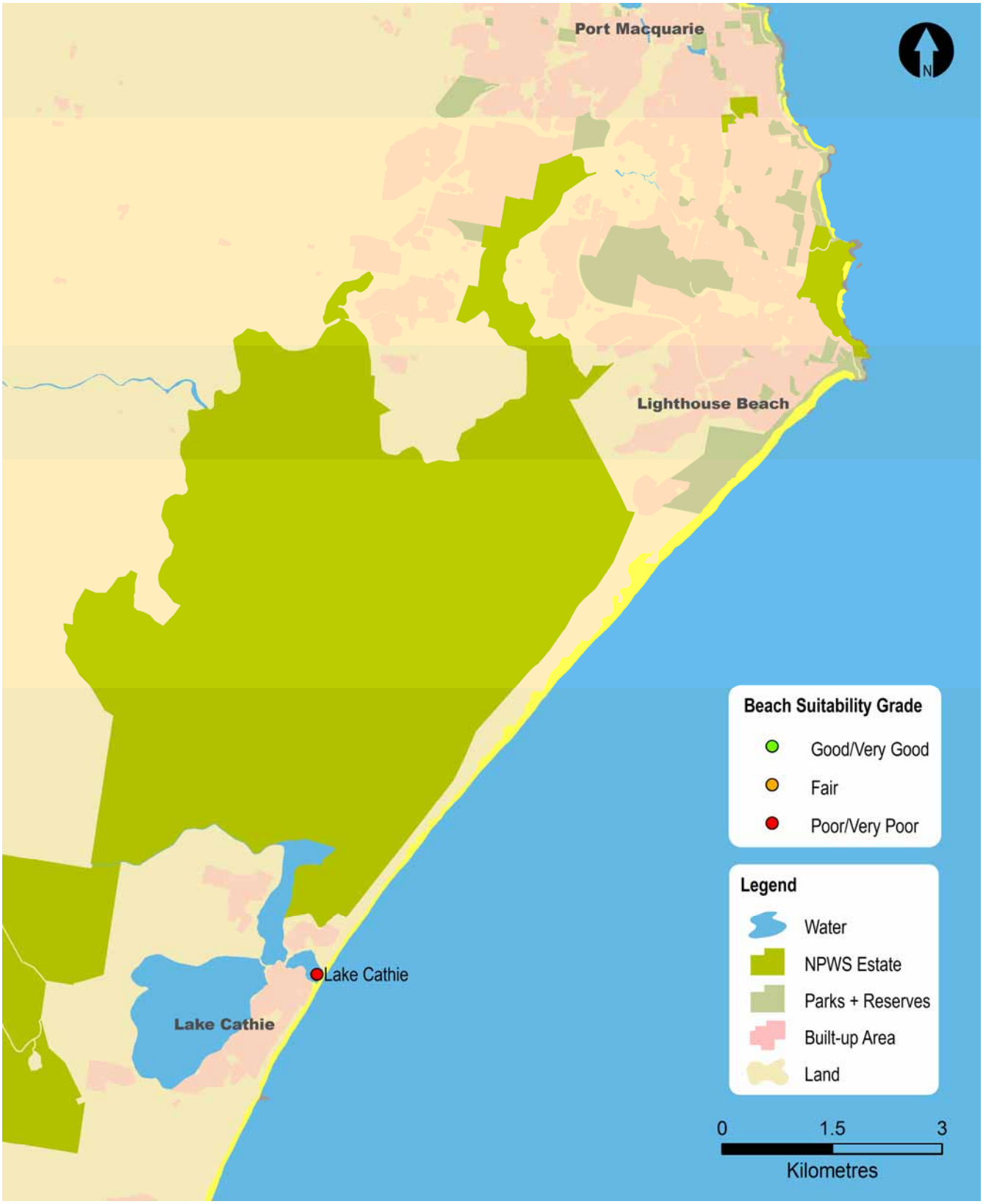


Figure 13: Sampling locations and Beach Suitability Grades in the Port Macquarie-Hastings Council area

Overview of the area

Description

Port Macquarie-Hastings Council is located on the Mid North Coast of New South Wales and covers an area of 3687 square kilometres. The council area has approximately 84 kilometres of coastline and 18 beaches. The topography of the area is very diverse and includes sand dunes, coastal wetlands, flood plains, forests and mountain regions.

In 2010, the estimated local resident population in the council area was 76,323, and it is currently growing at an average rate of 1.6 per cent each year (ABS 2011). The major town centres are Port Macquarie, Camden Haven and Wauchope. The most popular industries in the region are retail trade, health care, social assistance and construction (Port Macquarie-Hastings Council 2009).

Tourism

Research by Tourism Australia indicates that, on average, each year more than 750,000 people holiday in the Port Macquarie-Hastings shire and a further 662,000 people visit for the day. 'Going to the beach' is listed as a top activity by more than 45 per cent of domestic tourists holidaying in the area and almost 80 per cent of international visitors (RET 2008).

Rainfall

Extremely high rainfall levels were recorded throughout New South Wales during 2010–2011, with the wettest spring and fifth wettest summer on record. The period from late November 2010 to mid January 2011 was extremely wet with six major rain events affecting the North Coast of New South Wales during this period. The heavy rain triggered widespread flooding on many rivers and culminated in major flooding (including river and flash flooding) in the region. Port Macquarie also experienced flash flooding in March 2011 following severe thunderstorms and associated heavy rainfall. Heavy rain continued during April 2011 with Port Macquarie recording a total of 285 mm of rainfall during the month, with up to 63 mm of rain falling on one day (BOM 2011).

Assessment

Microbial water quality

NHMRC recommends that at least 20 samples are collected each year, providing 100 data points over a five year period. The sampling frequency at the one site in the Port Macquarie-Hastings Council area is below this recommended level, with 12 samples collected from October to March.

As sampling began in 2009, there are fewer than 100 data points currently available for analysis. The Microbial Assessment Category for 2010–2011 is therefore regarded as provisional. As more data become available in following years, the beach grade will become final and response to rainfall trend more defined.

Sanitary inspections

A Sanitary inspection has been completed for Lake Cathie in the Port Macquarie-Hastings Council area. This is scheduled for review during 2011 2012.

Beach Suitability Grades

Only one swimming location in the Port Macquarie-Hastings Council area was graded during 2010 2011 (Figure 14).

Very Good

No swimming sites were classified as Very Good.

Good

No swimming sites were classified as Good.

Fair

No swimming sites were classified as Fair.

Poor

Lake Cathie was graded as Poor. Although microbial water quality was often suitable for swimming during dry weather conditions, the site is susceptible to faecal contamination following rainfall. Swimming at this location should be avoided when the entrance is closed. When the entrance is open, care should be taken to avoid swimming during and for up to three days following rainfall or if there are signs of stormwater pollution, such as discoloured water or odour or floating debris.

Very Poor

No swimming sites were classified as Very Poor.

Management

Wastewater management

Port Macquarie-Hastings Council is responsible for wastewater management in the area and operates five sewage treatment plants (STPs): Kew-Kendall, Port Macquarie, Lake Cathie/Bonny Hills, Wauchope and Camden Haven.

The Kew-Kendall STP services the Kew and Kendall areas, with the treated effluent used to irrigate the Camden Haven Golf Course and nearby forest plantations (EPA NSW 2011, Port Macquarie-Hastings Council 2005).

Port Macquarie STP has an operational capacity to service a population of 52,000 and discharges disinfected wastewater into Kooloonbung Creek. Some wastewater is re-used to irrigate parks and gardens in the Port Macquarie area.

The Lake Cathie/Bonny Hills STP discharges to sand dunes behind Rainbow Beach. The STP was upgraded in 2010 improving effluent treatment processes and doubling the operational capacity of the STP to service 12,000 people. Also under development is the Southern Effluent Pipeline Network, which will transfer wastewater from the STP to supply irrigation for playing fields, farmland and other various needs (Port Macquarie-Hastings Council 2007). The first stage of this effluent re-use is expected to come on-line towards the end of 2011.

The Wauchope STP has an operational capacity to service a population of 8000 people. Some of the treated wastewater is used to irrigate the Wauchope Golf Course and farmland in the area, with the remainder discharged to the Hastings River (Port Macquarie-Hastings Council 2005).

The Camden Haven STP services communities in the Camden Head, North Haven, West Haven, Laurieton and Lakewood areas. Treated effluent is discharged at a shoreline ocean outfall. Upgrades to the Camden Haven STP are underway to improve wastewater treatment processes and increase the operational capacity to cater for the growing population in the area (Port Macquarie-Hastings Council 2007).

There are a number of on-site sewage management systems in the Rainbow Beach catchment.

Stormwater management

Port Macquarie-Hastings Council has installed stormwater quality improvement devices, including litter baskets, trash-racks, end-of-pipe nets, gross pollutant traps (GPTs), sand filters and constructed wetlands. There are currently 47 trash racks, nets and cages, 46 GPTs and ten constructed wetlands in operation within the local government area (Port Macquarie-Hastings Council 2008)

Management plans

Port Macquarie-Hastings Council has estuary management plans for the Hastings River and the Lake Cathie/Innes system. These plans outline key issues and management actions. Other management strategies include the Town Beach Coastal Management Plan, the Hastings Effluent Management Strategy, the Lake Cathie Opening Strategy, the Urban Stormwater Management Plan, and the Port Macquarie-Hastings Council Dredging Strategy.

Lifeguard service

Port Macquarie-Hastings Council provides a professional beach patrol service at six main beaches: Town, Flynns, Lake Cathie, Lighthouse, North Haven and Rainbow.

Flynns Beach is patrolled throughout the year, Lighthouse, North Haven and Rainbow beaches are patrolled during the NSW school holidays and Lake Cathie is patrolled during Christmas school holidays only.

Lake Cathie

Beach Suitability Grade: **Poor**

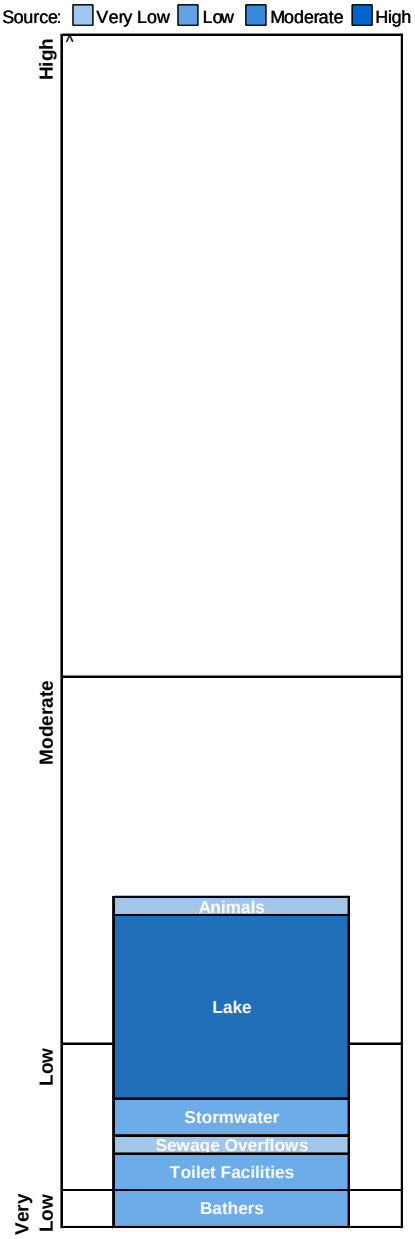
The Lake Cathie swimming site is located at the lagoon entrance near the town of Lake Cathie. The lagoon is usually only open to the ocean following heavy rainfall. The swimming site is popular with the young and elderly and is backed by a park with a playground and toilet facilities.

The Beach Suitability Grade of Poor indicates that the microbial water quality is influenced by faecal pollution, with a number of potential sources of faecal contamination, including poor water quality from other parts of the lake.

The response to rainfall graph indicates that enterococci levels increased slightly with increasing rainfall, often exceeding the safe swimming limit after light rainfall.

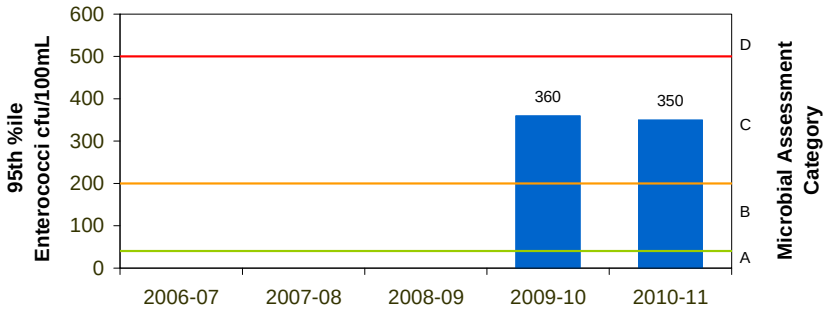
The site has been monitored since December 2009.

Sanitary Inspection: **Moderate**



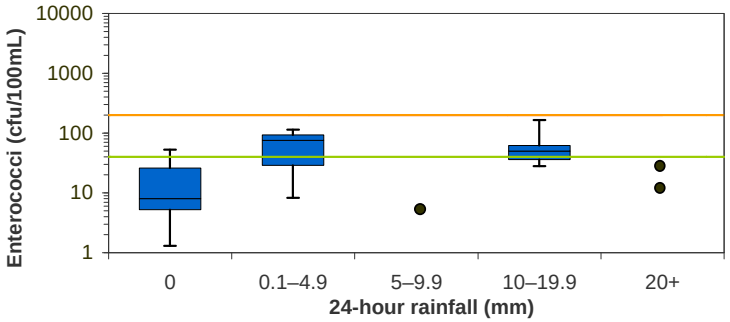
Microbial Assessment: **C**

Monitoring period for 2010–11 result is December 2009 to March 2011.



Response to rainfall

Rainfall from Port Macquarie rain gauge



Trends in enterococci data through time

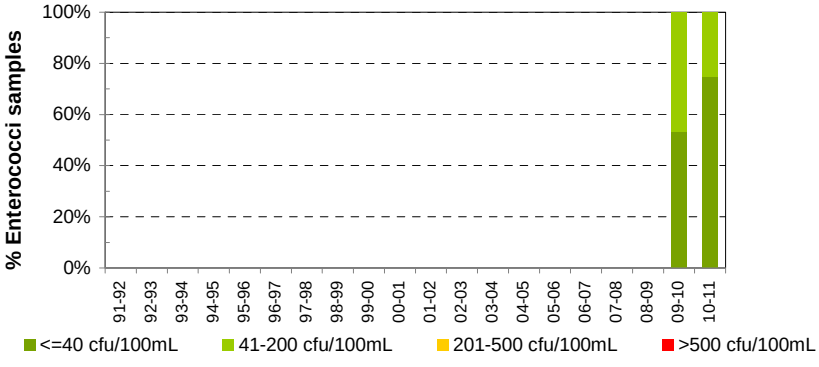


Figure 14: Councils and sampling locations in the Hunter region