

Hunter Region Beaches

Hunter Region Beaches



Summary

The good news from previous summer seasons continued for the Hunter region beaches during summer 2007–2008. Once again they were among the cleanest groups of beaches monitored as part of the Sydney, Hunter and Illawarra Beachwatch program.

Despite the above average rainfall in the region, 15 of the 17 Hunter beaches complied 100% with Beachwatch water quality criteria for both faecal coliforms and enterococci for the entire 2007–2008 summer season (Figure 12). Only Burwood North and Burwood South beaches did not comply 100% with the faecal coliform criteria, although compliance was still very high at 97%.

Hunter's cleanest beaches

The Hunter's cleanest beaches were Zenith, Box, Fingal, One Mile, South Stockton, Nobbys, Newcastle, Bar, Merewether, Glenrock Lagoon, Dudley, Redhead, Blacksmiths, Swansea Heads Little Beach and Caves Beach.

Port Stephens Council beaches

All four Port Stephens ocean beaches recorded 100% compliance with recreational water quality criteria for faecal coliforms and enterococci (Figure 12). These results were identical to the previous summer season.

Newcastle City Council beaches

Five of the seven Newcastle ocean beaches recorded 100% compliance with Beachwatch water quality criteria for faecal coliforms and enterococci (Figure 12). Burwood North and Burwood South beaches performed very well, complying with faecal coliform criteria 97% of the time, and 100% compliance for enterococci criteria.

Lake Macquarie City Council beaches

All of the six Lake Macquarie City Council beaches recorded 100% compliance with Beachwatch water quality criteria for faecal coliforms and enterococci (Figure 12). Swansea Heads Little Beach improved by six percentage points for the enterococci criteria from the previous summer season.

Plans for improvement

Hunter Water Corporation (HWC) operates 17 sewage treatment plants in the Hunter Region, with ocean outfall plants located at Boulder Bay, Belmont and Burwood Beach.

Hunter Water Corporation is preparing detailed Upgrade Management Plans for each of its reticulation systems relating to its Wastewater Treatment Works. The actions from these plans focus on improving overall system performance during wet weather periods and cater for growth in the area.

Upgrade works being undertaken or planned as part of these upgrade management plans include the coastal areas of Lake Macquarie, Newcastle and Port Stephens. Significant work is programmed for the Newcastle System wastewater catchment draining to Burwood Beach Wastewater Treatment Plant, including works to improve wet weather system performance in Mayfield, Adamstown and New Lambton over the next five years.

The Newcastle wastewater transportation system is being upgraded to include a wet weather pumping system. This system will operate during heavy rainfall to transfer flows from the wastewater transportation system directly to the Burwood Beach wastewater treatment plant. New pumping stations and larger pipes will enable the wastewater system to manage larger flows that occur in heavy rainfall. The section of pipeline below Merewether Hills has been constructed by using 'directional drilling'. The pipe is laid deep beneath the surface to avoid the need for pumping stations and reduce the energy requirements of the system. Design work on the remainder of the wet weather pumping station is in its final stages, with work expected to commence in 2008 (Hunter Water 2006).

Design work to upgrade the Burwood Beach Wastewater Treatment Plant has begun, and is due to be completed in mid 2010. The upgrade will improve plant reliability and provide capacity for growth.

The actions to improve beach water quality undertaken by Port Stephens Council, Newcastle City Council and Lake Macquarie City Council are outlined in the Hunter council summary pages of this report.

Figure 12: Compliance of Hunter Region Beaches during Summer 2007–2008

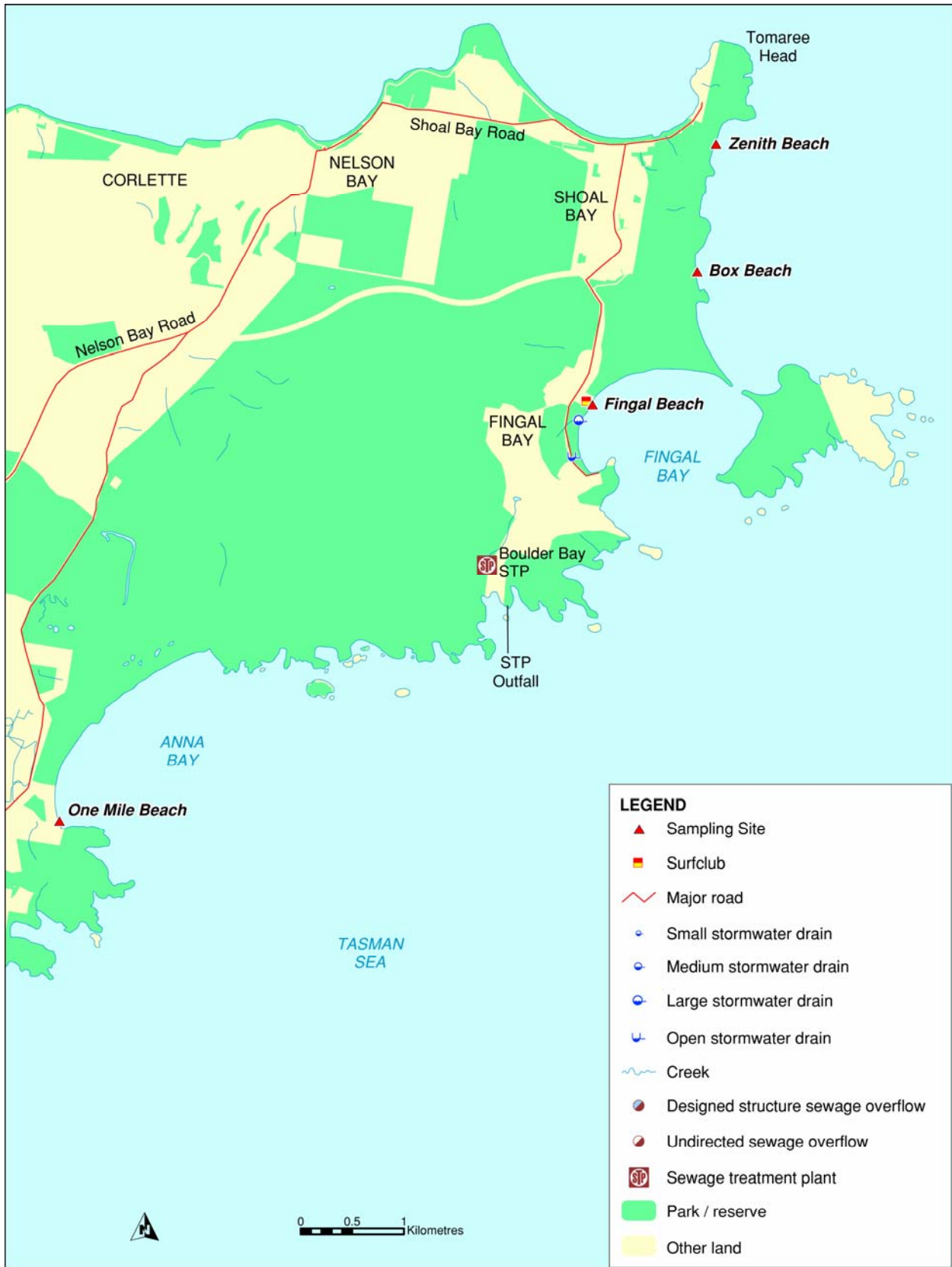


Hunter Region Beaches

Port Stephens Council

Port Stephens Council

Beaches: Zenith, Box, Fingal and One Mile



Location

Port Stephens Council covers an area of 979 square kilometres and has a population of approximately 64,700 people.

The Port Stephens Council beaches lie along a six-kilometre stretch of coastline from Zenith Beach in the north to Fern Bay in the south. Land uses within Port Stephens Council beach catchments include residential, commercial, recreational, rural and bushland.

Four of the beaches are monitored by Hunter Water Corporation. Monitoring at a further seven locations is undertaken by Port Stephens Council under the Beachwatch Partnership Program. The data are available in the *Beachwatch Partnership Program State of the Beaches* reports (DEC 2004b, DEC 2005b and DEC 2006b)

Compliance with guidelines

Compliance with the guidelines was excellent in the Port Stephens Council area during summer 2007–2008 (Table 9).

Faecal coliform and enterococci levels at all beaches complied with the guidelines 100% of the time.

The range of bacterial levels measured at Hunter Region beaches during summer 2007–2008 is shown in Figure 13, with Port Stephens beaches highlighted in grey. Levels of faecal coliforms and enterococci were consistently low.

Ranking of beaches

All monitored harbour and ocean beach swimming locations in the Hunter, Sydney and Illawarra regions were ranked on the basis of their compliance with swimming guidelines during summer 2007–2008. A total of 41 distinct ranks were determined for the 131 sites monitored for both faecal coliforms and enterococci, with many sites ranked equally.

All beaches within the Port Stephens Council area were ranked equal first (Table 9).

Actions to improve quality

Actions specific to individual swimming locations are included on the beach pages. Improvements in water quality will also be achieved as a result of the implementation of the various management plans and a number of other key projects.

Management Plans and Programs

Port Stephens Foreshore Management Plan:

This long-term plan promotes the sustainable use of the interface between the land and water along the estuary. The plan is a priority action arising from the Estuary Management Plan. Specific attention is given to stormwater outlets, erosion and physical processes, in addition to other issues such as recreational facilities, foreshore access, cultural heritage, economic activity and ecological communities.

Mambo Wetlands Plan of Management: Council has adopted and implemented the Mambo Wetlands Plan of Management, which should lead to an overall improvement in water quality in Nelson Bay, Salamander and Taylors Beach.

Educational Programs

Community education: Council conducts educational information sessions throughout the year as part of the Marine Discovery Series. The water quality of beaches and their catchments was a major component of information provided in the series.

Public Schools Education Program: Council, in conjunction with Waterwatch, participates in the Public Schools Environmental Education Program offering activities related to water quality, such as bug surveys to school children in the local government area.

Other Projects

Erosion protection works: Council continued to carry out erosion prevention works at Shoal Bay, Tanilba Bay, Lemon Tree Passage and Soldiers Point. This included numerous regeneration projects around the foreshores and stormwater drains.

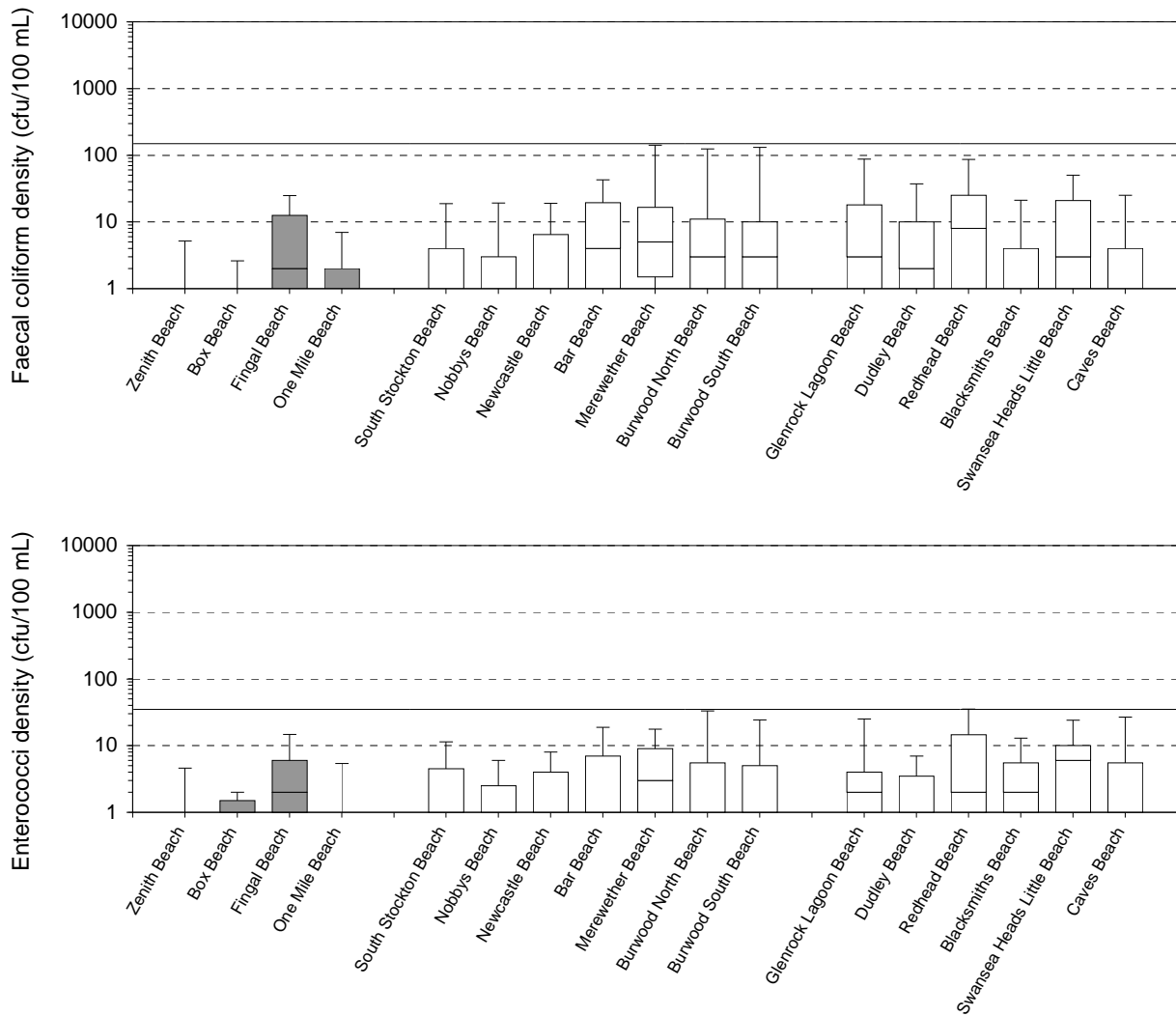
Tilligerry Creek project: This project focused on agricultural land use and changing land

management techniques to improve the water quality of the creek.

Table 9: Compliance and Ranking of Port Stephens Beaches for Summer 2007–2008

Site	Compliance (%)		Overall rank (out of 41)
	Faecal Coliforms	Enterococci	
Zenith Beach	100	100	1
Box Beach	100	100	1
Fingal Beach	100	100	1
One Mile Beach	100	100	1

Figure 13: Range of Bacterial Levels at Hunter Beaches during Summer 2007–2008



Zenith Beach

See page 102 for key to map

Description

The beach is 400 metres long and is situated within Tomaree National Park. Beach conditions are usually safe, but rips run out against each headland. Zenith Beach is not patrolled by lifeguards.

Pollution sources

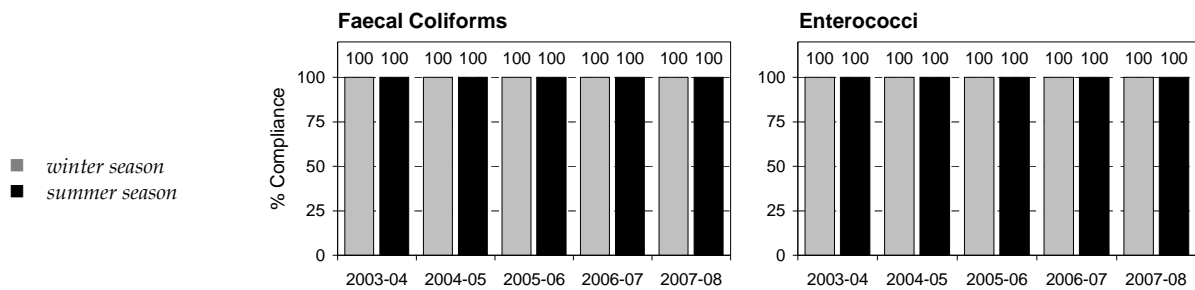
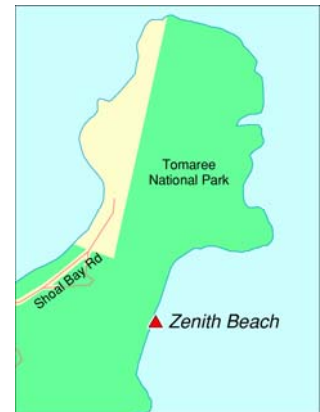
There are no known pollution sources for this beach.

Actions

There are no actions specific to this beach.

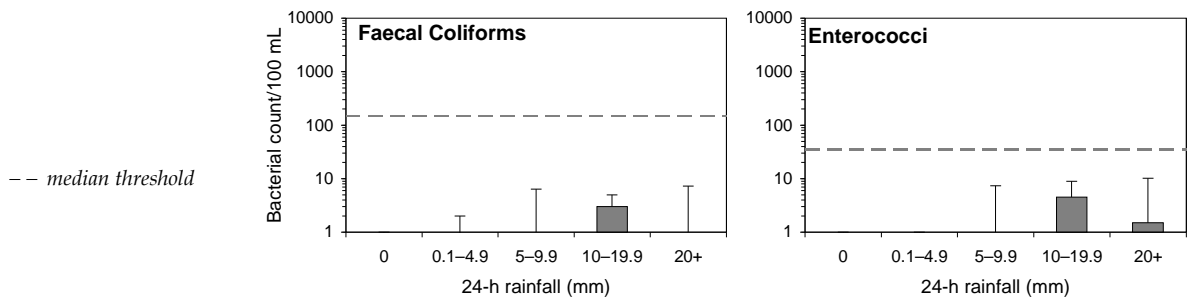
Compliance

Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.



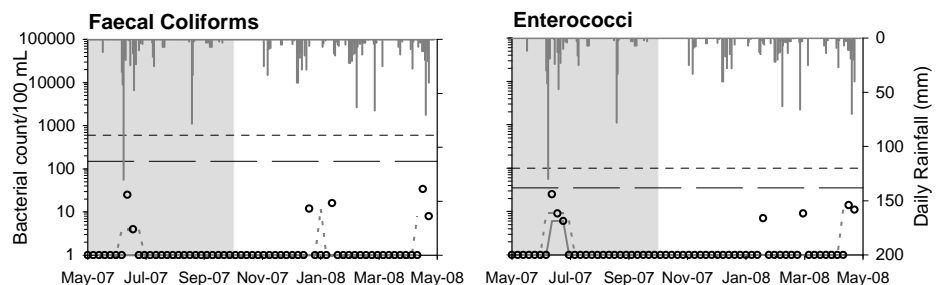
Response to rainfall

Faecal coliform and enterococci densities displayed little response to rainfall and generally remained well below the median guideline limits across all rainfall categories.



Season data

- | rainfall
 - o individual result
 - rolling median
 - - - rolling 80th percentile
- Guidelines (see 7 for details)
- median threshold
 - - - 80th percentile threshold



Box Beach

Description

Box Beach is 350 metres long and lies within Tomaree National Park. Beach conditions are usually safe, but rips run out against the headlands during large swells.

Pollution sources

There are no known pollution sources for this beach.

Actions

There are no actions specific to this beach.

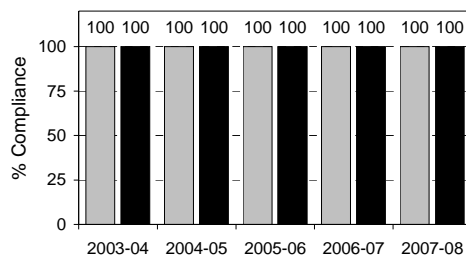
Compliance

Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.

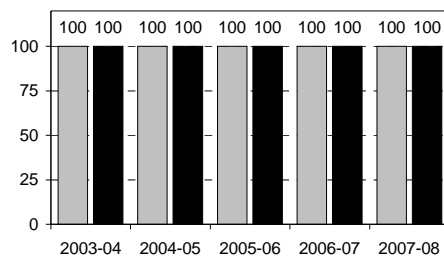
See page 102 for key to map



Faecal Coliforms



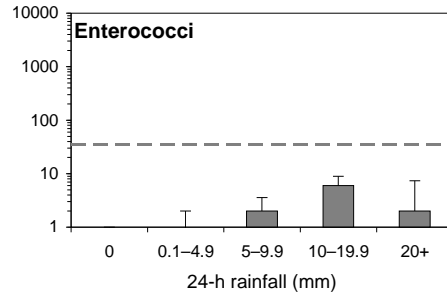
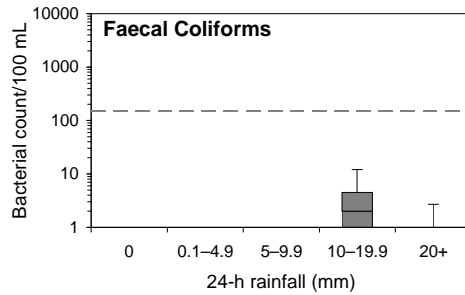
Enterococci



■ winter season
■ summer season

Response to rainfall

Faecal coliform and enterococci densities displayed little response to rainfall and generally remained well below the median guideline limits across all rainfall categories.

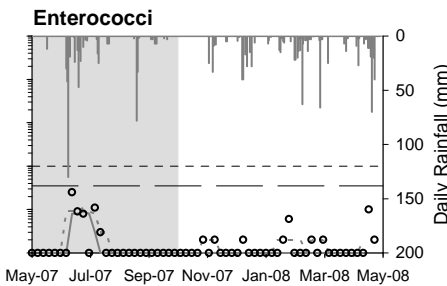
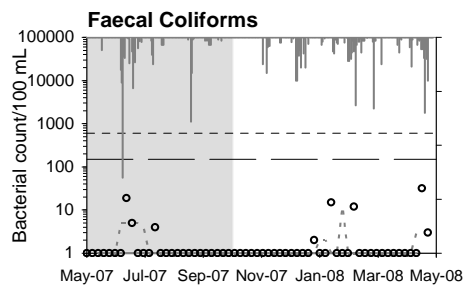


-- median threshold

Season data

| rainfall
o individual result
— rolling median
-- rolling 80th percentile

Guidelines
(see page 7 for details)
— median threshold
-- 80th percentile threshold



Fingal Beach

See page 102 for key to map

Description

This 2.7 kilometre stretch of beach is situated within Fingal Bay. Beach conditions are generally safe, with the best conditions in the patrolled area or towards the southern end of the beach.

Pollution sources

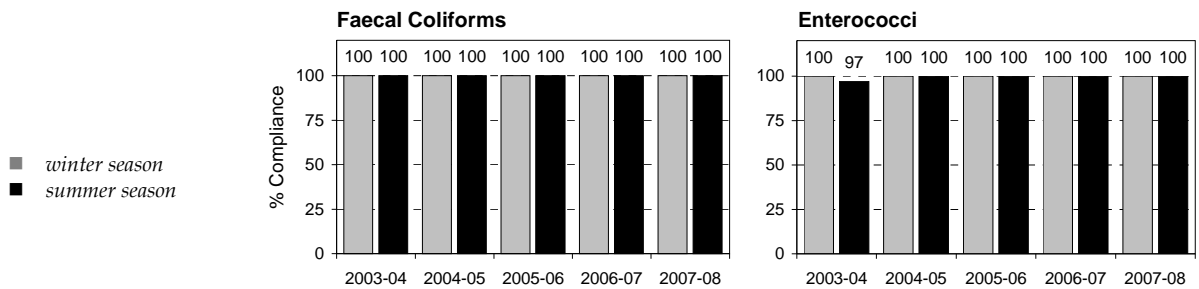
Stormwater drains discharge to the beach.

Actions

Fingal Beach won the 2008 regional Keep Australia Beautiful Litter Prevention, Young Legends and Community Partnership and Action awards.

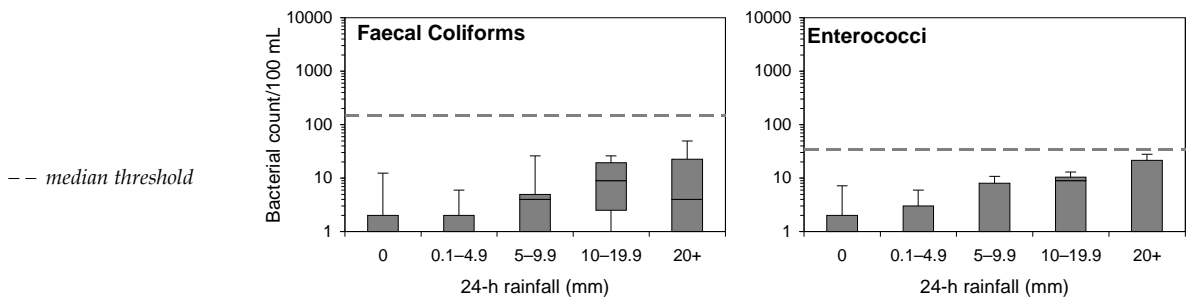
Compliance

Faecal coliform levels complied with swimming guidelines 100% of the time over the last five years. With the exception of summer 2003–2004, enterococci levels complied 100% of the time over the last five years.



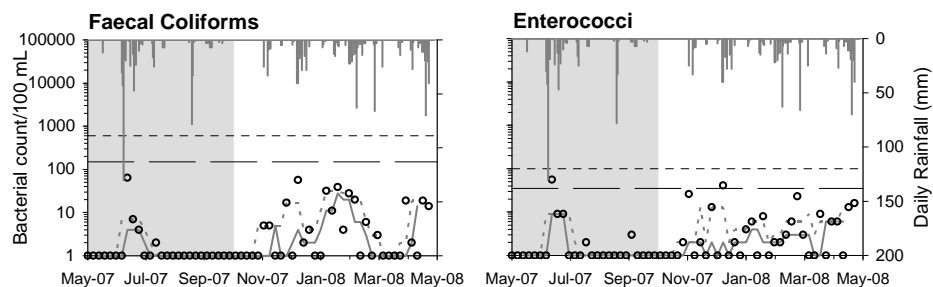
Response to rainfall

Faecal coliform and enterococci densities displayed little response to rainfall and generally remained below the median guideline limits across all rainfall categories.



Season data

- | rainfall
 - o individual result
 - rolling median
 - - - rolling 80th percentile
- Guidelines
(see page 7 for details)
- median threshold
 - - - 80th percentile threshold



One Mile Beach

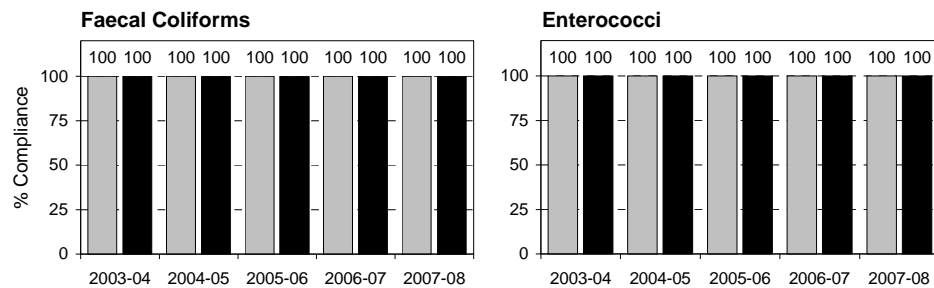
See page 102 for key to map

Description This 1.3 kilometre stretch of beach is situated at the southern end of Anna Bay. Beach conditions are relatively safe, with lifeguards patrolling the southern end of the beach between late September and mid-April.

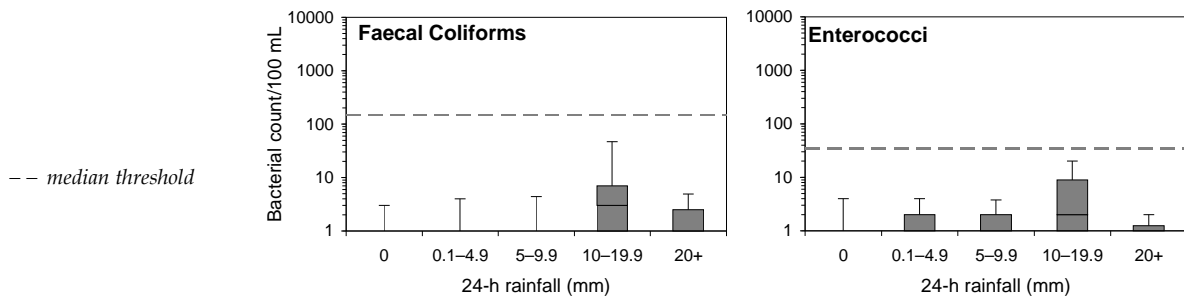
Pollution sources Runoff from urban areas drains to the beach.

Actions Council received \$100,000 in funding to conduct regeneration of the dune vegetation system along One Mile Beach, commencing in May 2008.

Compliance Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.



Response to rainfall Faecal coliform and enterococci densities displayed no clear response to rainfall and generally remained below the median guideline limits across all rainfall categories.

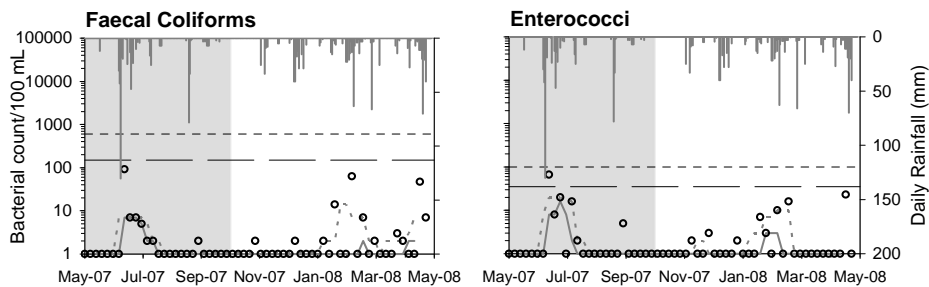


Season data

- | rainfall
- o individual result
- rolling median
- rolling 80th percentile

Guidelines
(see page 7 for details)

- median threshold
- 80th percentile threshold



Hunter Region Beaches

Newcastle City Council

Beaches: South Stockton, Nobbys, Newcastle, Bar, Merewether, Burwood North and Burwood South



Location

Newcastle City Council covers an area of 183 square kilometres and has a population of approximately 141,700 people.

The Newcastle beaches lie along a 20-kilometre stretch of coastline from Fern Bay in the north to Burwood South Beach in the south. Land uses within the Newcastle City Council ocean beach catchments are varied and include residential, rural, commercial, recreational, industrial and bushland.

The Hunter Water Corporation monitors seven of the beaches within the Council area. Four ocean pools are monitored by Newcastle City Council under the Beachwatch Partnership Program. The data are available in the *Beachwatch Partnership Program State of the Beaches* reports (DEC 2004b, DEC 2005b, DEC 2006b and DECC 2007).

Compliance with guidelines

Compliance with the guidelines was excellent in the Newcastle City Council area during summer 2007–2008 (Table 10).

Bacterial levels at five of the seven beaches complied with both guidelines 100% of the time. Burwood North and Burwood South beaches complied with the faecal coliform criteria 97% of the time, and 100% of the time with enterococci criteria.

The range of indicator bacteria levels measured at Hunter Region beaches during summer 2007–2008 is shown in Figure 14, with Newcastle City beaches highlighted in grey. Levels of faecal coliforms and enterococci were consistently low and similar to those at other Hunter region beaches.

Ranking of beaches

All monitored harbour and ocean beach swimming locations in the Hunter, Sydney and Illawarra regions were ranked on the basis of their compliance with swimming guidelines during summer 2007–2008. A total of 41 distinct ranks were determined

for the 131 sites, with many sites ranked equally.

South Stockton, Nobbys, Newcastle, Bar and Merewether beaches were ranked equal first and Burwood North and Burwood South beaches were ranked equal second (Table 10).

Actions to improve water quality

Actions specific to individual swimming locations are included on the beach pages. Improvements in water quality will also be achieved as a result of various management plans and a number of key projects.

Management Plans and Programs

Newcastle Coastline Management Plan: Under the guidance of the Hunter Coast and Estuary Management Committee, the Newcastle Coastline Management Plan continued to guide planning and management activities on the coastline. Community education is an important component of the Plan.

Stockton Coastal Processes Study: In partnership with the State Government and the Newcastle Port Corporation, Newcastle Council is overseeing the Stockton Coastal Processes Study and the development of a revised Coastline Management Plan. The study aims to identify the key coastal processes that are leading to the loss of sand from Stockton Beach and to identify and test a range of potential management options.

Hunter Estuary Processes Study: Newcastle Council, in partnership with the State Government, Port Stephens Council and Maitland Council, is finalising the Hunter Estuary Processes Study, which will guide the development of an Estuary Management Plan for the Hunter.

Grant Funding

Blue Gum Hills Arts and Environment Program: This community engagement project worked with residents in the western suburbs of Maryland, Fletcher and Minmi, adjacent to the Hexham Swamp. The project aims to improve residents' behaviour in order to reduce pollution and sediment

loads into Hexham Swamp and Ironbark Creek. The project is delivered by Newcastle Council through Hunter-Central Rivers Catchment Management Authority, National Heritage Trust and Hunter Water grants and sponsorships.

Sustainable City-Kotara: Residential and business education activities promoting positive behaviour change to improve the quality of stormwater flowing onto these beaches has been integrated into this overall 'sustainability' program. The projects are delivered by Newcastle Council and funded by an Environmental Trust grant for the 2007–2008 financial year.

Educational Programs

Newcastle Council Coastcare Program: The program delivered a range of educational

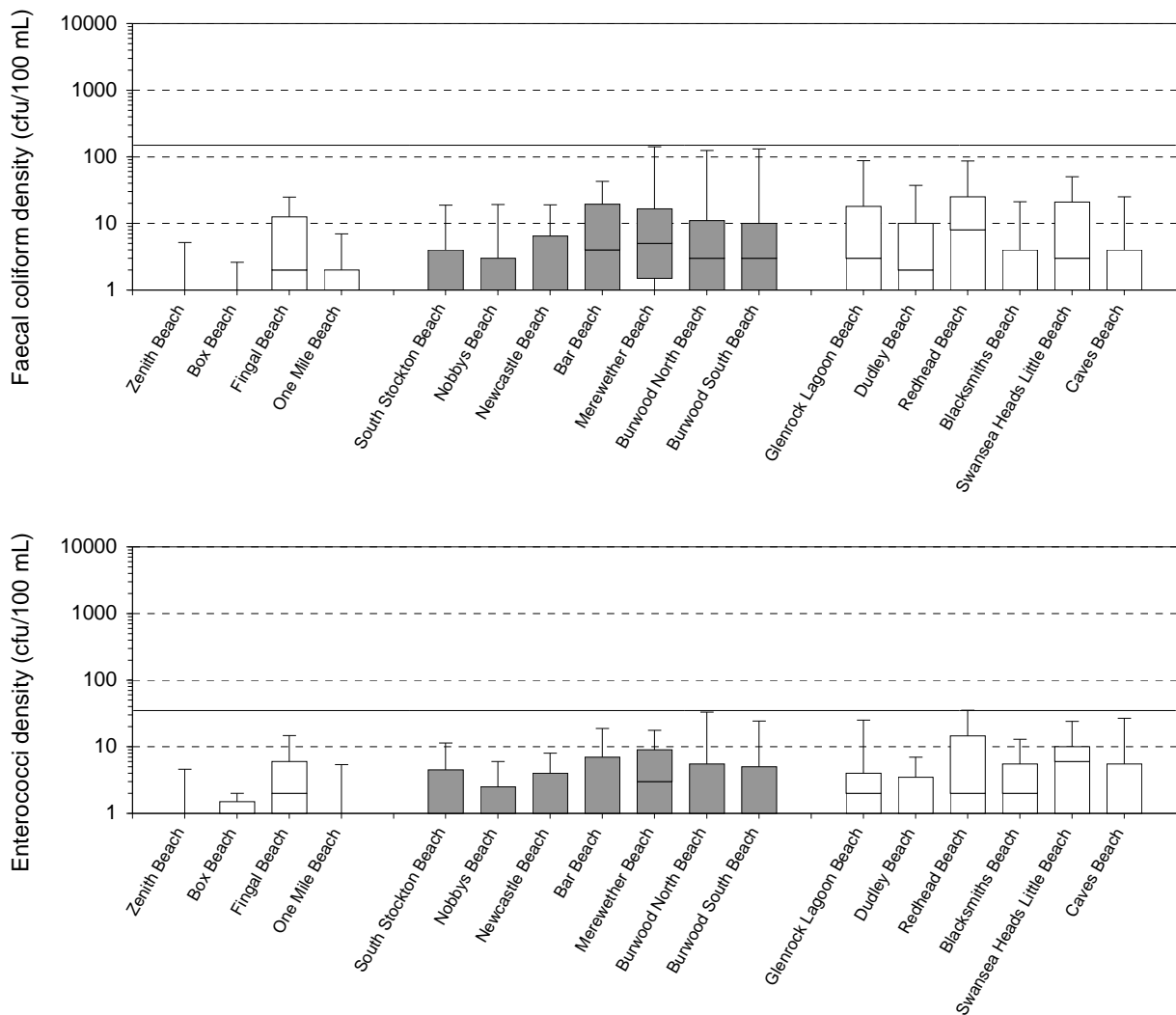
and operational projects for the coast including restoration and protection of important riparian vegetation adjacent to the wetlands in Hexham. The program also delivered a Rocky Shores Education Resource Folder aimed at engaging the community in intertidal monitoring and increasing awareness of coastal environment issues.

Marine Discovery Talks: A range of marine discovery talks have been held to increase knowledge of the marine and coastal environment. Similarly, a Summer Coastal Activities Festival was delivered to increase awareness and promote connectivity to the marine and coastal environment.

Table 10: Compliance and Ranking of Newcastle Beaches for Summer 2007–2008

Site	Compliance (%)		Overall rank (out of 41)
	Faecal Coliforms	Enterococci	
South Stockton Beach	100	100	1
Nobbys Beach	100	100	1
Newcastle Beach	100	100	1
Bar Beach	100	100	1
Merewether Beach	100	100	1
Burwood North Beach	97	100	2
Burwood South Beach	97	100	2

Figure 14: Range of Bacterial Levels at Hunter Beaches during Summer 2007–2008



South Stockton Beach

Description

The beach is located at the southern end of a 32 kilometre stretch of beach that extends north to Birubi Point. Beach conditions are generally safe and lifeguards patrol the beach year round.

Pollution sources

There are no known pollution sources for this beach.

Actions

There are no actions specific to this beach.

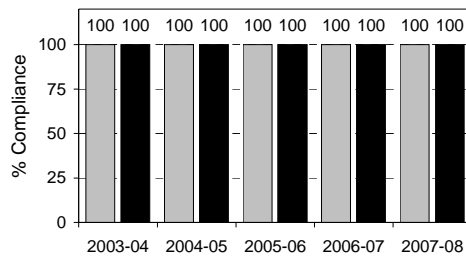
Compliance

Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.

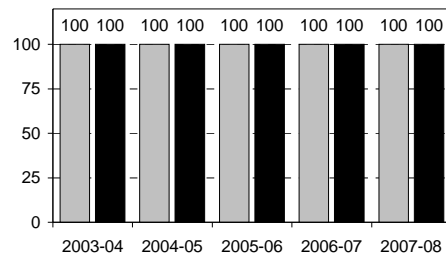
See page 110 for key to map



Faecal Coliforms



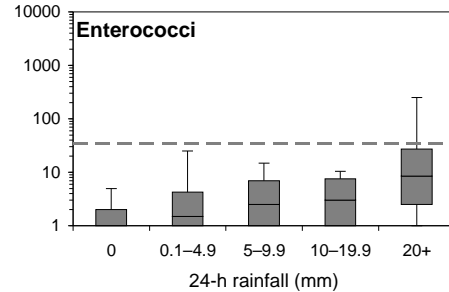
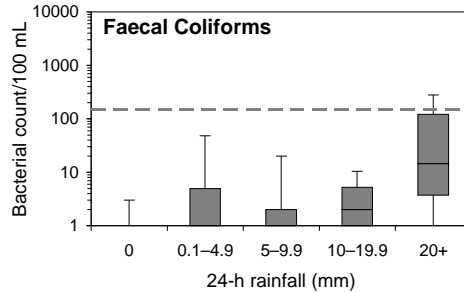
Enterococci



■ winter season
■ summer season

Response to rainfall

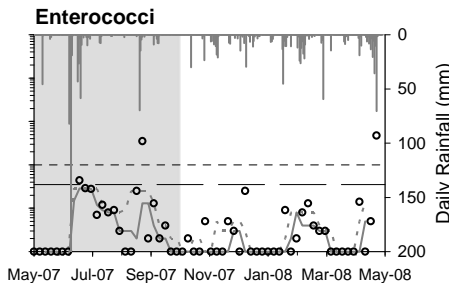
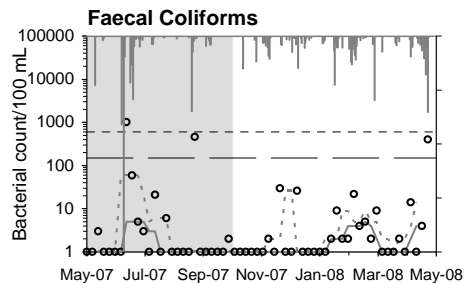
Faecal coliform and enterococci densities increased slightly with increasing rainfall, occasionally exceeding the median guideline limits after 20 millimetres of rain or more in the previous 24 hours.



Season data

| rainfall
o individual result
— rolling median
-- rolling 80th percentile

Guidelines
(see page 7 for details)
— median threshold
-- 80th percentile threshold



Nobbys Beach

See page 110 for key to map

Description

The beach is one kilometre long. Swimming conditions are safest at the southern end. Lifeguards patrol the beach all year round.

Pollution sources

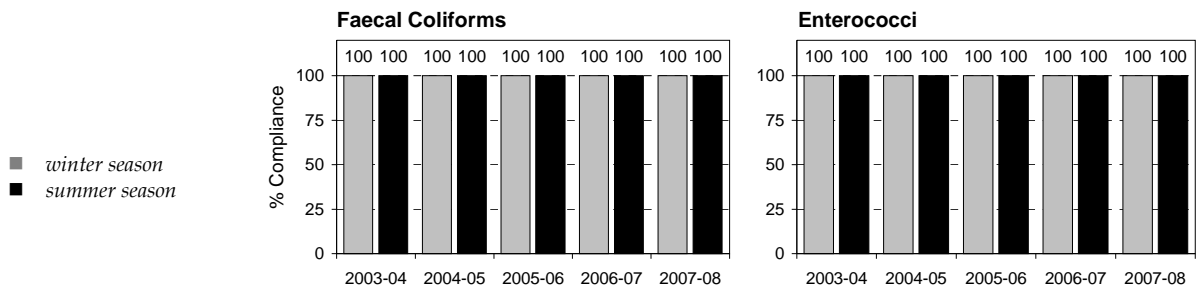
Stormwater drains discharge to the beach. Occasional pollution problems occur when coal ships release ballast water containing oil and other materials offshore. Rubbish discarded by crew from the waiting vessels may also compromise beach water quality.

Actions

Nobbys Beach won the 2008 state Keep Australia Beautiful Friendly Beach award and was highly commended in the Water Conservation award.

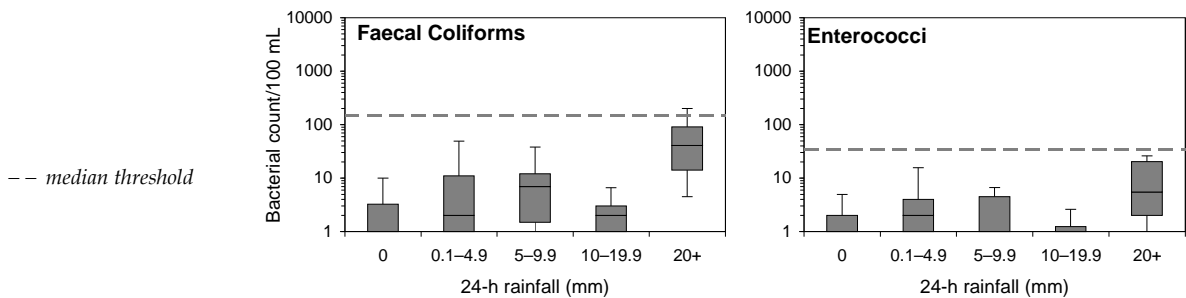
Compliance

Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.



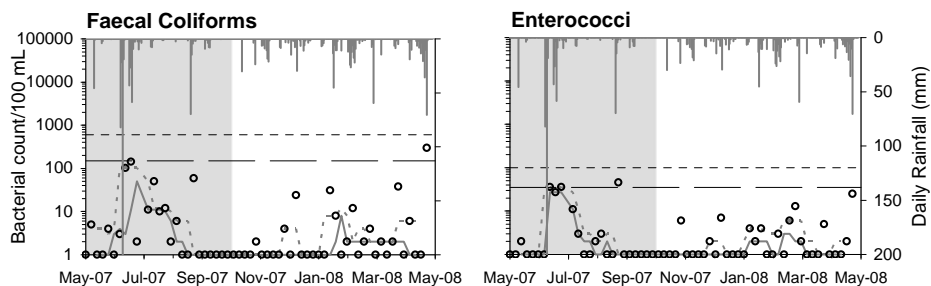
Response to rainfall

Faecal coliform and enterococci densities displayed no clear response to rainfall. Faecal coliform densities occasionally exceeded the median guideline limit in response to 20 millimetres of rain or more in the previous 24 hours. Enterococci densities generally remained below the median guideline limit across all rainfall categories.



Season data

- | rainfall
 - o individual result
 - rolling median
 - - - rolling 80th percentile
- Guidelines
(see page 7 for details)
- median threshold
 - - - 80th percentile threshold



Newcastle Beach

Description

The beach is 650 metres long. Swimming can be dangerous as there are three permanent rips along the length of the beach. Lifeguards patrol the beach from September to April.

Pollution sources

Stormwater drains discharge to the beach. Occasional pollution problems arise when coal ships release ballast water containing oil and other materials offshore. Rubbish discarded by crew from the waiting vessels may also compromise beach water quality.

Actions

There are no actions specific to this beach.

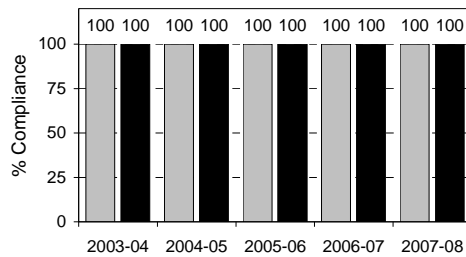
Compliance

Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.

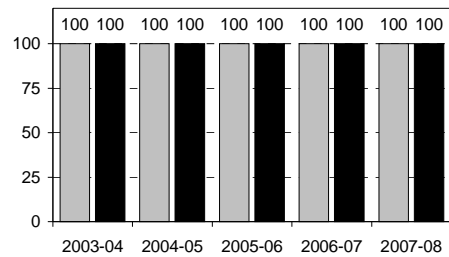
See page 110 for key to map



Faecal Coliforms



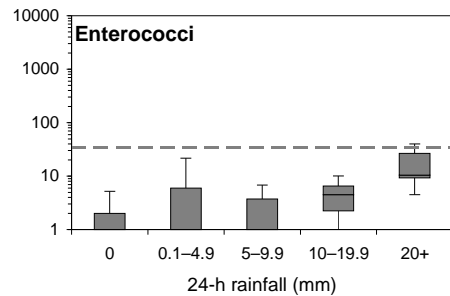
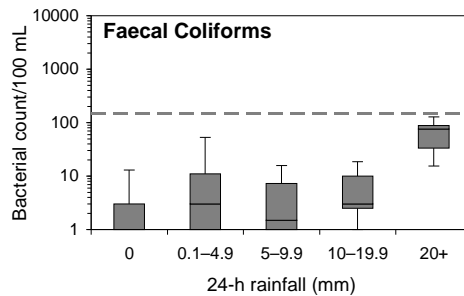
Enterococci



■ winter season
■ summer season

Response to rainfall

Faecal coliform and enterococci densities tended to increase slightly with increasing rainfall. Faecal coliform densities generally remained below the median guideline limit across all rainfall categories. Enterococci levels occasionally exceeded the median guideline limit in response to 20 millimetres of rain or more in the previous 24 hours.

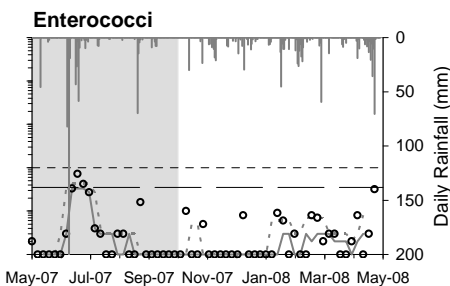
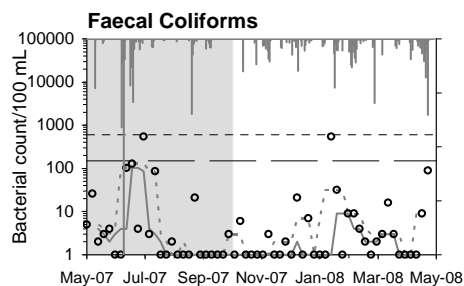


-- median threshold

Season data

| rainfall
o individual result
— rolling median
-- rolling 80th percentile

Guidelines
(see page 7 for details)
— median threshold
-- 80th percentile threshold



Bar Beach

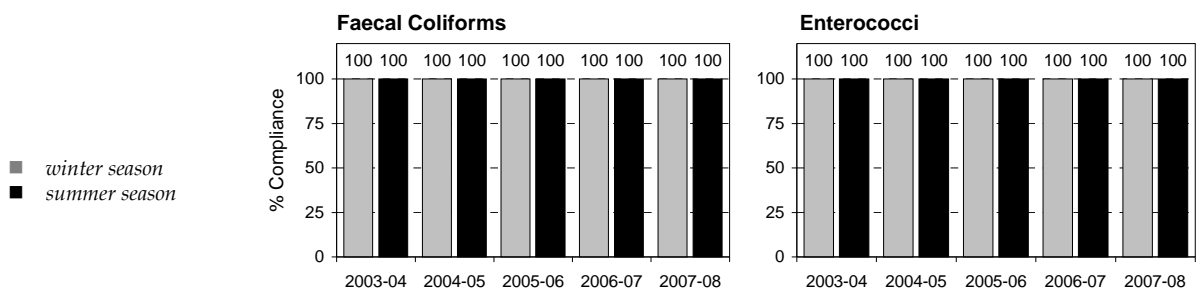
See page 110 for key to map

Description The beach is approximately 500 metres long and is bordered by rock platforms. Conditions can be hazardous as it is an open beach with numerous rips. Lifeguards patrol the beach all year round.

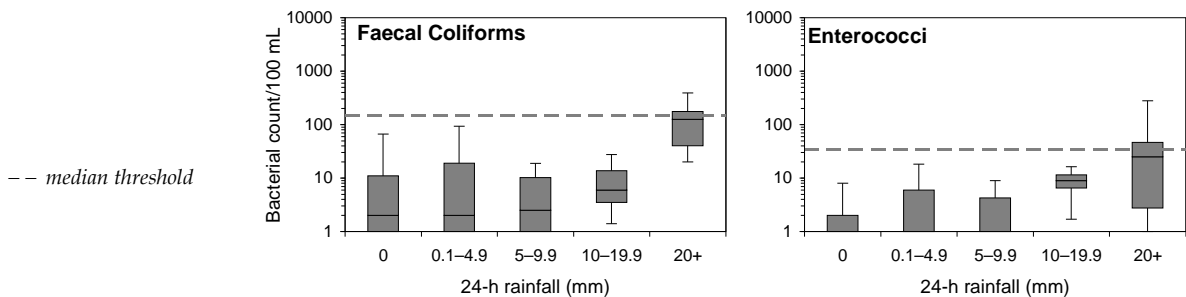
Pollution sources Stormwater drains discharge to the beach.

Actions Council's Dixon-Bar Beach Clean Streets – Clean Beach Project promoted stormwater management actions with local residents to improve stormwater quality in the catchment.

Compliance Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.



Response to rainfall Faecal coliform and enterococci densities tended to increase slightly with increasing rainfall, often exceeding the median guideline limits after 20 millimetres of rain or more in the previous 24 hours.

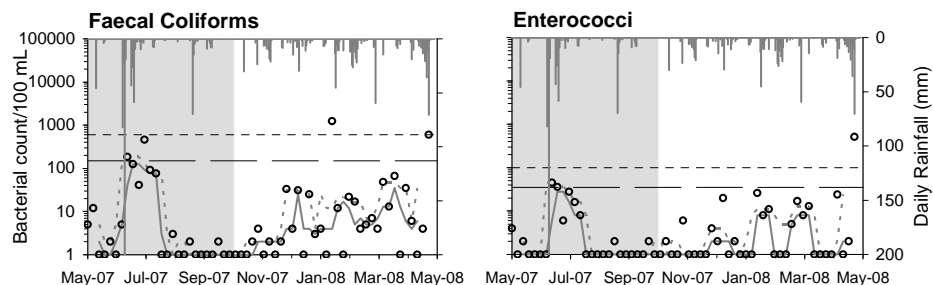


Season data

- | rainfall
- o individual result
- rolling median
- - - rolling 80th percentile

Guidelines (see page 7 for details)

- median threshold
- - - 80th percentile threshold



Merewether Beach

See page 110 for key to map

Description

Merewether Beach is located at the southern end of a 900 metre stretch of beach that extends north to Dixon Park Beach. There are two ocean pools on the southern rock platform. The beach is patrolled from October to April.



Pollution sources

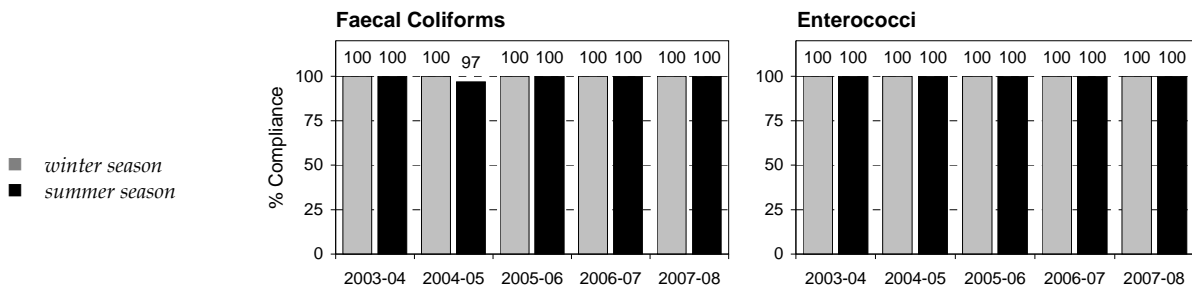
Stormwater drains discharge to the beach and stormwater from residential land behind the beach may be contaminated.

Actions

Merewether Landcare, with the support of Newcastle Council, is conducting long-term dune regeneration. Merewether Beach won the 2008 regional Keep Australia Beautiful Environment Protection award, and was highly commended in the Overall and Community Partnership and Action award.

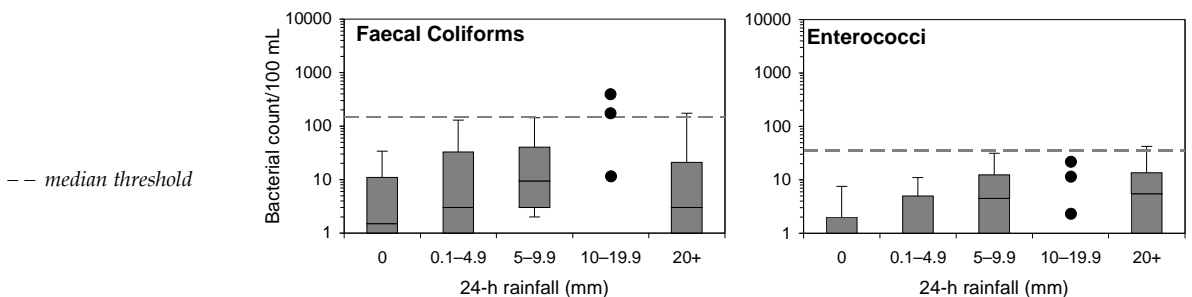
Compliance

With the exception of summer 2004–2005, faecal coliform levels complied 100% of the time over the last five years. Enterococci levels complied with swimming guidelines 100% of the time over the last five years.



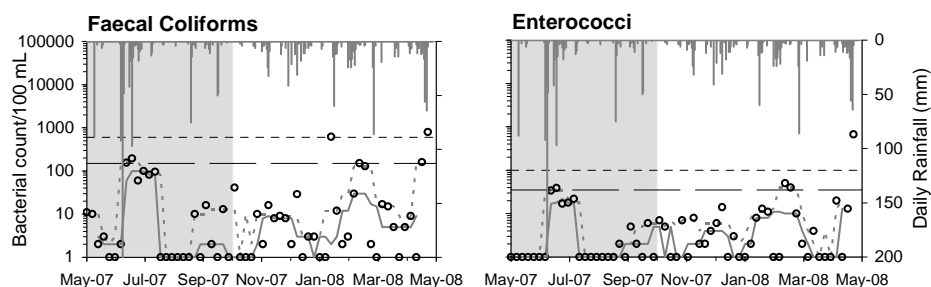
Response to rainfall

Bacterial densities tended to increase slightly with increasing rainfall. Faecal coliform densities occasionally exceeded the median guideline limit after five millimetres of rain or more in the previous 24 hours. Enterococci densities occasionally exceeded the median guideline limit in response to 20 millimetres of rain or more in the previous 24 hours.



Season data

- | rainfall
 - o individual result
 - rolling median
 - rolling 80th percentile
- Guidelines (see page 7 for details)
- median threshold
 - 80th percentile threshold



Burwood North Beach

See page 110 for key to map

Description

This beach is located toward the northern end of an 800 metre stretch of beach. It is backed by Glenrock State Recreation Area and Burwood STP.

Pollution sources

A small, intermittently open lagoon is located at the site. The lagoon receives stormwater from the catchment and may discharge stormwater to the beach following heavy rain. In the middle of the beach Burwood STP discharges secondary treated effluent via an outlet 500 metres offshore and may be a potential pollution source during bypass and overflow conditions.

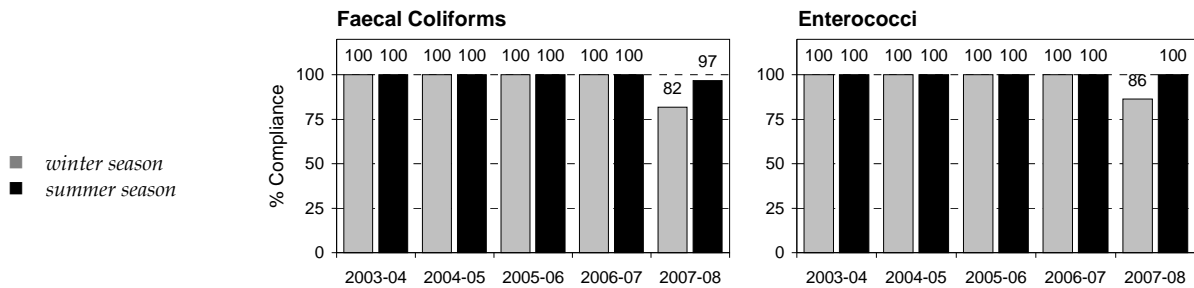


Actions

There are no actions specific to this beach.

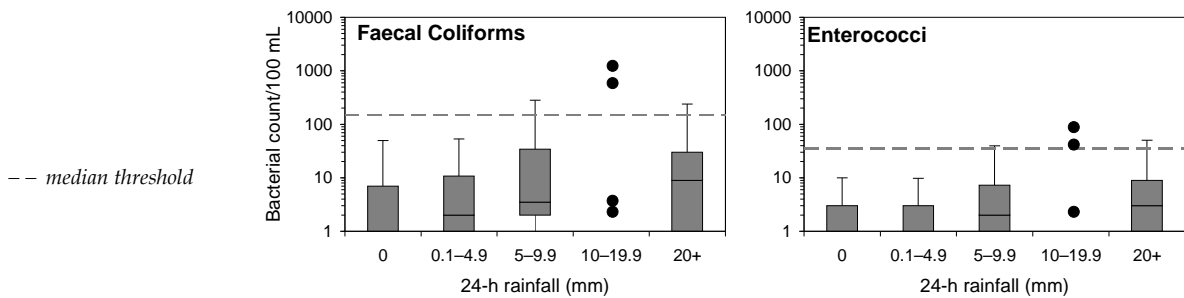
Compliance

Faecal coliform compliance with swimming guidelines has varied recently, ranging from 82% to 100% over the last five years. With the exception of winter 2007–2008, enterococci levels complied with swimming guidelines 100% of the time over the last five years.



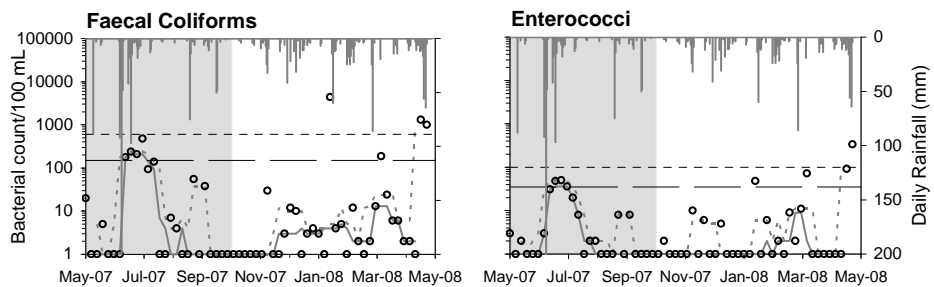
Response to rainfall

Faecal coliform and enterococci densities tended to increase with increasing rainfall, occasionally exceeding the median guideline limits in response to five millimetres of rain or more in the previous 24 hours.



Season data

- | rainfall
 - o individual result
 - rolling median
 - rolling 80th percentile
- Guidelines
(see page 7 for details)
- median threshold
 - 80th percentile threshold



Burwood South Beach

See page 110 for key to map

Description

The beach is located toward the southern end of an 800 metre stretch of beach. It is backed by Glenrock State Recreation Area and Burwood STP.

Pollution sources

A small, intermittently open lagoon is located at the site. The lagoon receives stormwater from the catchment and may discharge stormwater to the beach following heavy rain. In the middle of the beach Burwood STP discharges secondary treated effluent via an outlet 500 metres offshore and may be a potential pollution source during bypass and overflow conditions.

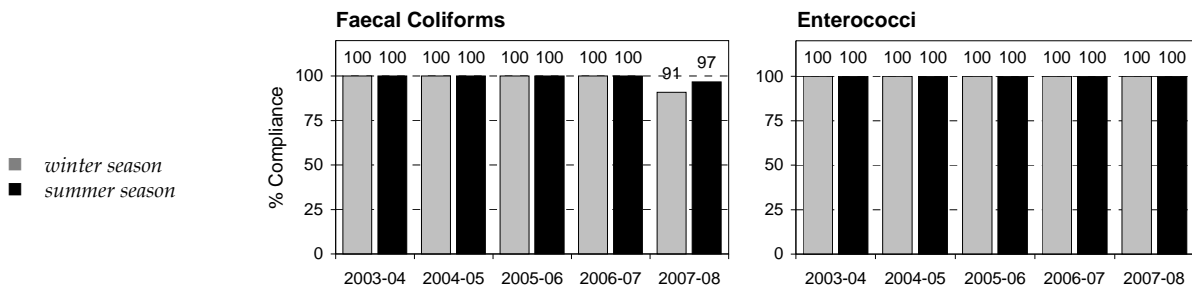


Actions

There are no actions specific to this beach.

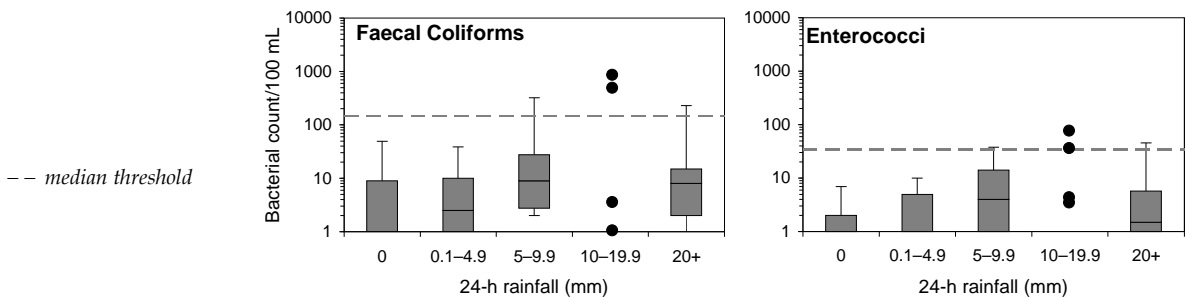
Compliance

Faecal coliform compliance has varied recently, ranging from 91% to 100% over the last five years. Enterococci levels complied with swimming guidelines 100% of the time over the last five years.



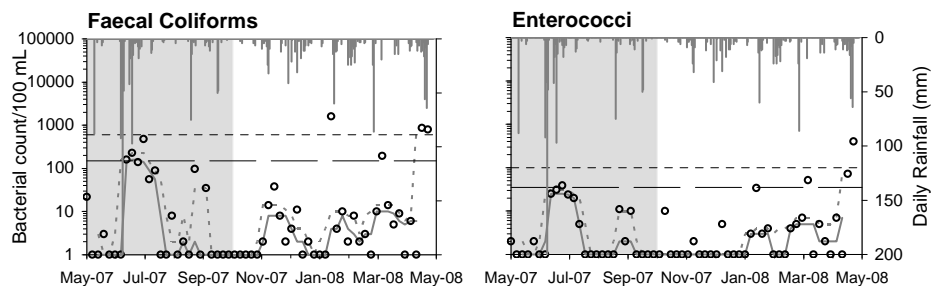
Response to rainfall

Faecal coliform and enterococci densities generally increased with increasing rainfall and occasionally exceeded the median guideline limits in response to five millimetres of rain or more in the previous 24 hours.



Season data

- | rainfall
 - o individual result
 - rolling median
 - - - rolling 80th percentile
- Guidelines
(see page 7 for details)
- median threshold
 - - - 80th percentile threshold



Hunter Region Beaches

Lake Macquarie Council

Lake Macquarie City Council

Beaches: Glenrock Lagoon, Dudley, Redhead, Blacksmiths, Swansea Heads Little Beach and Caves



Location

Lake Macquarie City Council covers an area of 750 square kilometres and has a population of approximately 190,320 people.

The Lake Macquarie City Council ocean beaches run along a 28 kilometre stretch of coastline from Leggy's Point in the north to Catherine Hill Bay in the south. Lake Macquarie boasts a wide range of shorelines including rocky headlands, bluffs, sandy beaches, rock platforms and coastal lagoons.

Land uses within the ocean beach catchments include residential, commercial, recreational, rural, industrial and bushland.

Six beaches are monitored by Hunter Water.

Compliance with guidelines

Compliance with swimming guidelines was excellent in the Lake Macquarie City Council area during summer 2007–2008 (Table 11).

Bacteria levels at all six Lake Macquarie Council ocean beaches complied with the guidelines 100% of the time. Enterococci compliance at Swansea Heads Little Beach improved by 6 percentage points from the previous summer season.

The distribution of bacterial levels measured at Hunter Region beaches during summer 2007–2008 is shown in Figure 15, with Lake Macquarie beaches highlighted in grey. Levels of both faecal coliforms and enterococci were generally low. These levels were similar to those measured at Newcastle and Port Stephens Council beaches.

Ranking of beaches

All monitored harbour and ocean beach swimming locations in the Hunter, Sydney and Illawarra regions were ranked on the basis of their compliance with swimming guidelines during summer 2007–2008. A total of 41 distinct ranks were determined for the 131 sites monitored for both faecal coliforms and enterococci, with many sites ranked equally.

All of the six beaches in the Lake Macquarie City Council area were ranked equal first (Table 11).

Actions to improve water quality

Actions specific to individual swimming locations are included on the beach pages. Improvements in water quality will also be achieved as a result of various management plans and other projects.

Management Plans and Programs

Lake Macquarie Stormwater Management Plan: The majority of stormwater runoff in the Council area flows into Lake Macquarie and, as a result, the Stormwater Management Plan principally addresses stormwater issues within the Lake Macquarie catchment. Stormwater improvement activities within the Lake's catchment area will ultimately result in improved water quality at ocean beaches in the vicinity of the Lake's entrance. The plan continues to implement initiatives such as design and construction of stormwater treatment devices and wetlands, community and industry education and regulation programs, policy development, stormwater maintenance, monitoring and research programs.

Development Control Plan: Council has adopted Development Control Plan No. 1, which applies new regulations to new developments in the area of stormwater management and also encourages water-sensitive urban design.

Grant Funding

Dudley, Belmont Lagoon and Salts Bay Coastal Rehabilitation Projects: Council received funding from the Hunter Central Rivers Catchment Management Authority to undertake weed control and bush regeneration activities in these coastal areas. Bitou Bush and other weed species were targeted and removed. Works commenced in 2007 and aim to improve the biodiversity, recreational amenity and future water quality at Dudley, Belmont and Salts Bay Beaches. Projects will be completed in June

2008, with a provision for follow-up maintenance at each site for the next 5 years.

Naturalising Flaggy Creek: Council continues to manage the Naturalising Flaggy Creek project (funded by the Environmental Trust). It aims to regenerate a degraded section of Flaggy Creek, which flows via Glenrock Lagoon to Burwood Beach. To date the project has undertaken bush regeneration and weed control works within the riparian zone, creek stabilisation and stormwater quality improvement works, and community education programs.

Adopt-a-SQID: Council continued to fund the program in 2007–2008, with assistance from Hunter-Central Rivers Catchment Management Authority, Hunter Water Corporation and Eraring Energy. The primary aim of the program is to involve the community in protecting the health of local waterways. The program encourages existing and new community based groups, including schools, to adopt their local Stormwater Quality Improvement Devices (SQIDs) and local waterways.

There are around 40 active Adopt-a-SQID groups across the city, with over 1,000 residents and school children involved.

The objectives of the project are to:

- engage Lake Macquarie residents in adopting their local SQIDs
- educate the community about protecting stormwater and local waterways
- measure how effectively SQIDs are working, with a view to improving environmental quality and the health of downstream waterways.

Estuary Watch: In 2006 council commenced a monitoring and education program for the foreshore and estuary environments around Lake Macquarie. Estuary Watch includes water testing for temperature, salinity, acidity, turbidity and oxygen levels, and relates these measurements to environmental health. Assessments of foreshore and estuarine health are also made by observing foreshore vegetation, locating areas prone to erosion, and identifying the

animals living in the mangroves, saltmarsh, seagrass wrack, and seagrass meadows. The Estuary Watch program is supported by grant funding from the Hunter Central Rivers Catchment Management Authority's Environmental Education Grant Program (funded through the Commonwealth Government's National Heritage Trust).

CLAMS (Communities Learning About Marine Shores) Project: Council received funding from the Hunter Central-Rivers Catchment Management Authority to undertake this project designed to increase awareness of marine shores in Lake Macquarie. A number of projects have been delivered under the CLAMS Project, including Project Aware on the Rocks, Our Coast Our Stories (Photographic Competition and Exhibition), Rock Platform Rambles and Marine Discovery Talks.

Educational Programs

Waste education: Ongoing community education activities, indirectly aimed at improving water quality, have been running during the past 12 months. These include the 'Don't be a Tosser' and the 'Give Your Dog a Hand' campaigns to include dog poo bag dispensers in all dog exercise areas in Lake Macquarie. The State Surf Lifesaving titles at Blacksmiths Beach were a waste wise event this year with recycling, 'Don't be a tosser' announcements over the PA and giveaways of personal ashtrays and bumper stickers with the 'Don't be a tosser' message. A number of Public Place Recycling stations were installed at popular beach areas, and the project has recently been extended. Council also participates in a regional plastic bag reduction campaign, 'Bag Yourself a Better Environment', involving a variety of education resources and activities.

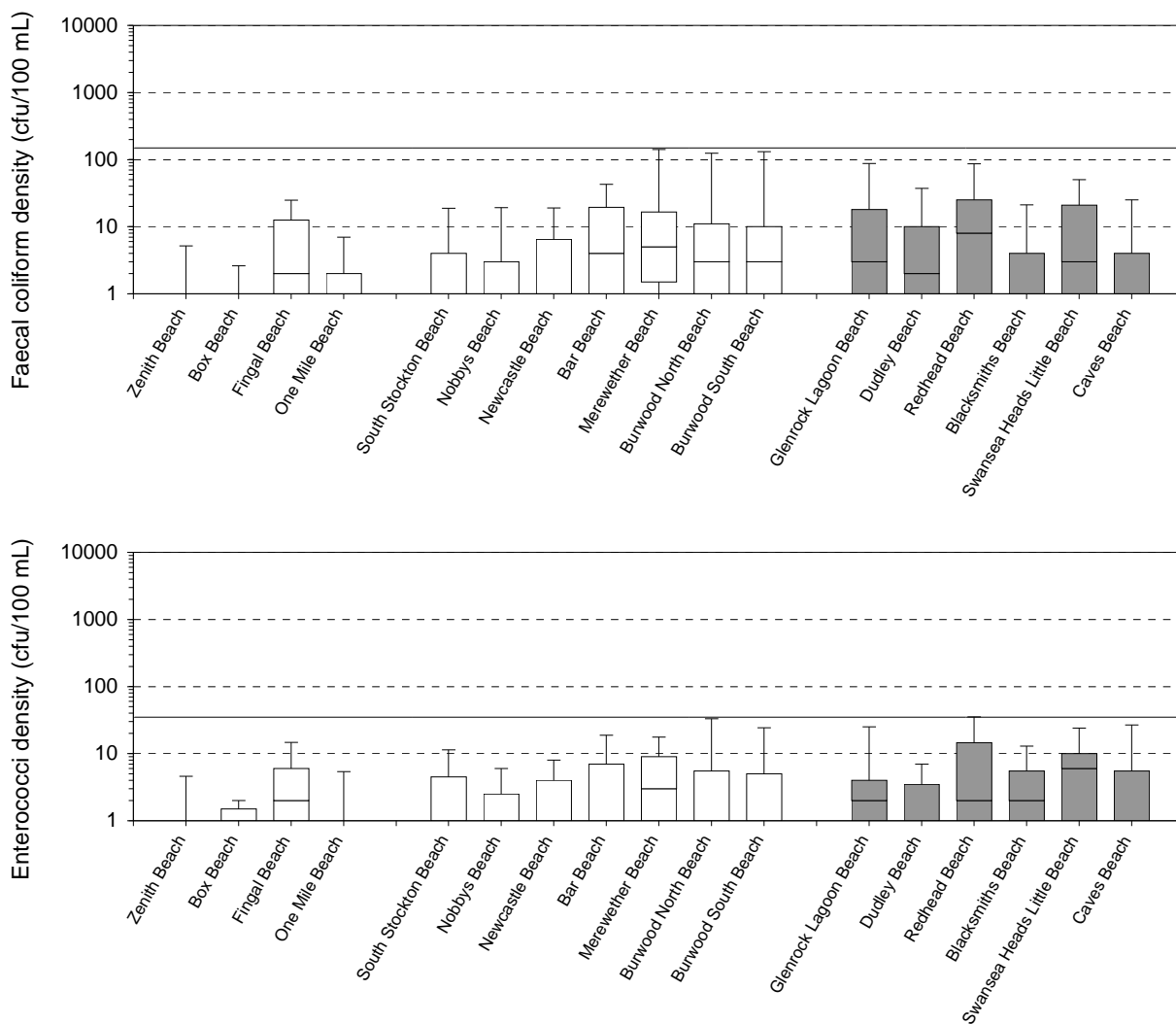
Other Projects

Swansea Litter Basket Project: Council has recently installed approximately 30 gross pollutant traps to intercept litter, sediment and other contaminants before they enter Swansea Channel.

Table 11: Compliance and Ranking of Lake Macquarie Beaches for Summer 2007–2008

Site	Compliance (%)		Overall rank (out of 41)
	Faecal Coliforms	Enterococci	
Glenrock Lagoon Beach	100	100	1
Dudley Beach	100	100	1
Redhead Beach	100	100	1
Blacksmiths Beach	100	100	1
Swansea Heads Little Beach	100	100	1
Caves Beach	100	100	1

Figure 15: Range of Bacterial Levels at Hunter Beaches during Summer 2007–2008



Glenrock Lagoon Beach

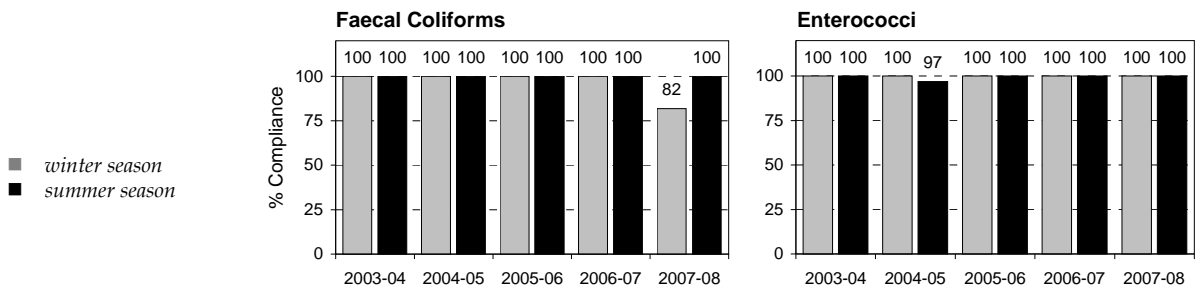
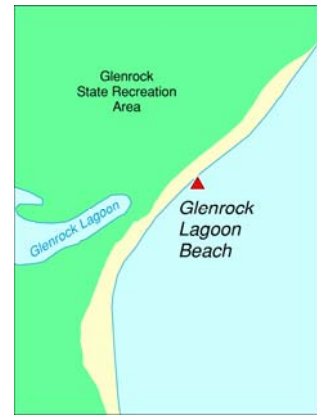
See page 122 for key to map

Description Glenrock Lagoon Beach is 300 metres long and is located at the southern end of Burwood Beach. The beach is backed by Glenrock State Recreation Area.

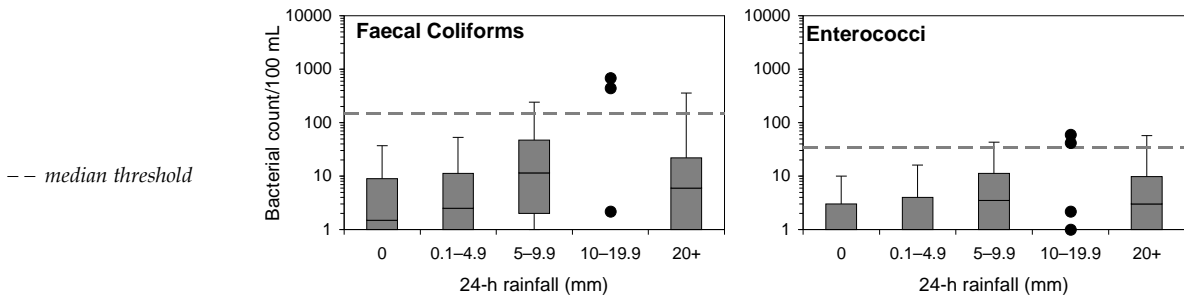
Pollution sources An intermittently open lagoon is located at the site. It receives stormwater from the catchment and may discharge contaminated stormwater to the beach following heavy rain.

Actions In accordance with the Flaggy Creek Stormwater Management Plan, Council carried out stormwater improvement and streambank rehabilitation works.

Compliance With the exception of winter 2007–2008, faecal coliform levels complied with swimming guidelines 100% of the time over the last five years. With the exception of summer 2004–2005, enterococci levels complied with swimming guidelines 100% of the time over the last five years.



Response to rainfall Faecal coliform and enterococci densities generally increased with increasing rainfall, with bacterial densities occasionally exceeding the median guideline limits in response to five millimetres of rain or more in the previous 24 hours.

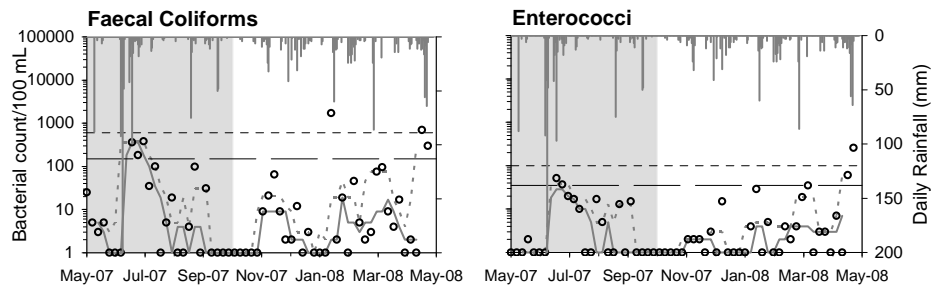


Season data

- | rainfall
- o individual result
- rolling median
- - - rolling 80th percentile

Guidelines
(see page 7 for details)

- median threshold
- - - 80th percentile threshold



Dudley Beach

See page 122 for key to map

Description

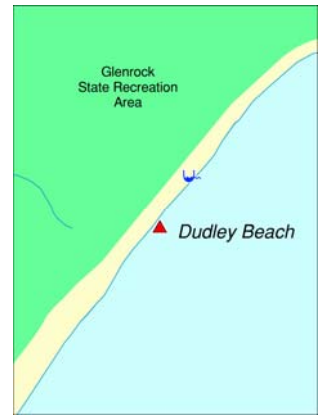
The beach is one kilometre long. It is situated in the Glenrock State Recreation Area and is backed by bushland.

Pollution sources

Much of the catchment is State Recreation Area and contains remnant bushland. Stormwater from two small creeks discharges to the northern and southern ends of the beach.

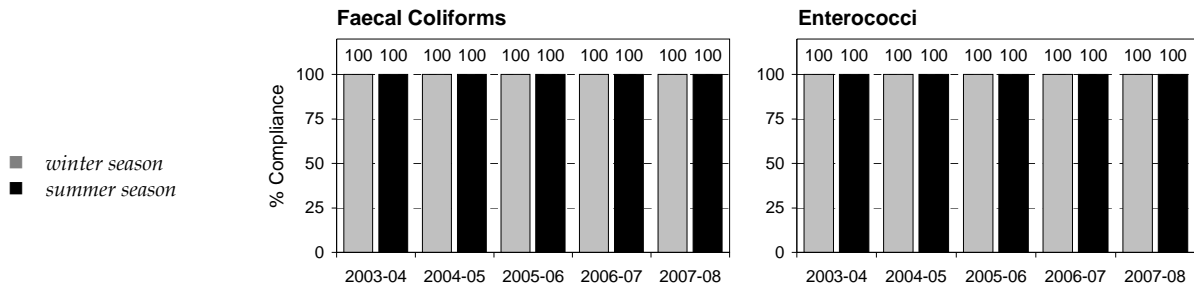
Actions

Council is continuing to stabilise, revegetate and reshape the sand dune system adjacent to Dudley Beach. Council is also undertaking bush regeneration adjacent to the beach to improve the biodiversity, recreational amenity and water quality.



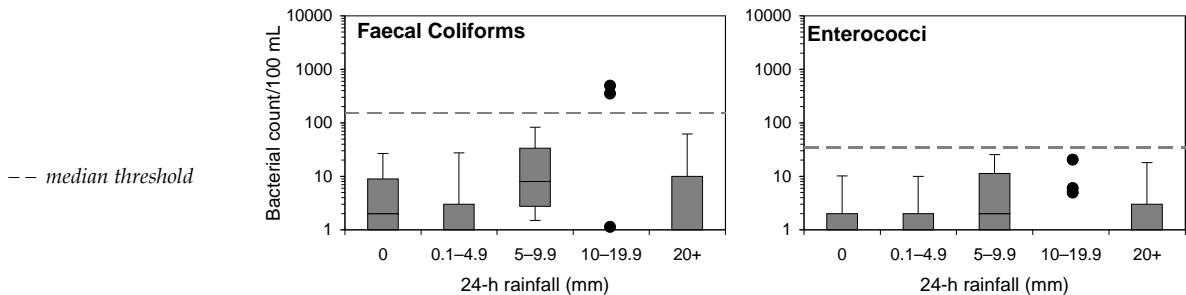
Compliance

Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.



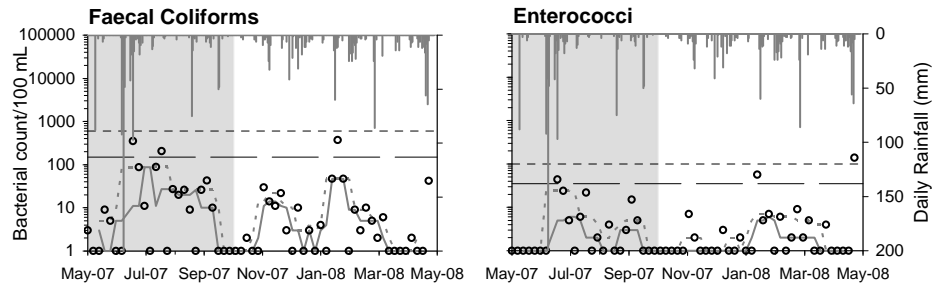
Response to rainfall

Faecal coliform and enterococci densities tended to increase slightly with increasing rainfall and generally remained below the median guideline limits across all rainfall categories.



Season data

- | rainfall
 - o individual result
 - rolling median
 - - - rolling 80th percentile
- Guidelines
(see page 7 for details)
- median threshold
 - - - 80th percentile threshold



Redhead Beach

See page 122 for key to map

Description Redhead Beach is located at the northern end of a ten kilometre stretch of beach and is backed by extensive sand dunes and a grassy reserve.

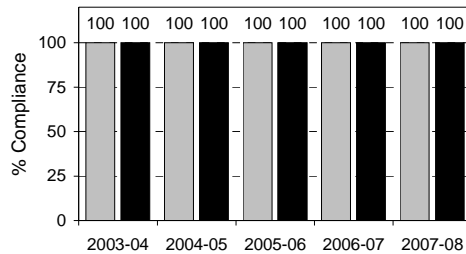
Pollution sources Second Creek and a stormwater drain discharge to the beach.

Actions Council installed 40 gross pollutant traps in stormwater pits in the Lower Jewells Creek catchment, reducing the amount of litter and sediment being deposited on this beach.

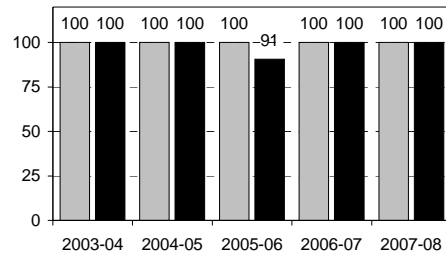
Compliance Faecal coliform levels complied with swimming guidelines 100% of the time over the last five years. With the exception of summer 2005–2006, enterococci levels complied with swimming guidelines 100% of the time over the last five years.



Faecal Coliforms

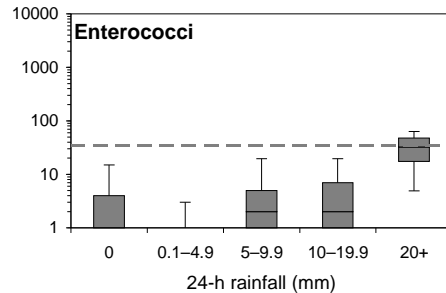
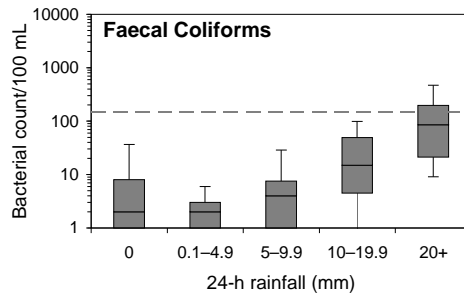


Enterococci



■ winter season
■ summer season

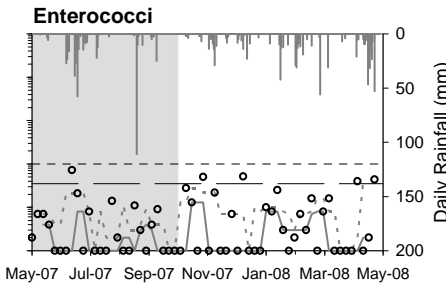
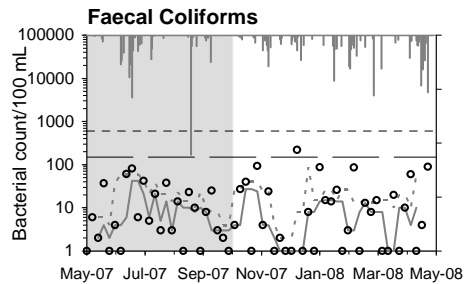
Response to rainfall Faecal coliform and enterococci densities generally increased with increasing rainfall and often exceeded the median guideline limit in response to 20 millimetres of rain or more in the previous 24 hours.



Season data

| rainfall
o individual result
— rolling median
-- rolling 80th percentile

Guidelines
(see page 7 for details)
— median threshold
-- 80th percentile threshold



Blacksmiths Beach

See page 122 for key to map

Description

Blacksmiths Beach is located toward the southern end of a ten kilometre stretch of beach. A sea wall runs along the southern end at the mouth of Lake Macquarie.

Pollution sources

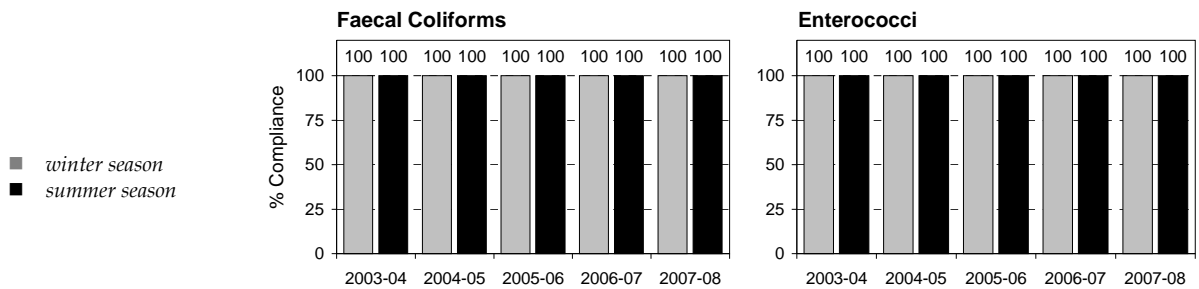
Discharge from the lake entrance during periods of heavy rain is a potential source of beach pollution.

Actions

Council is undertaking bush regeneration at Belmont Lagoon, adjacent to the beach, aiming to improve biodiversity, recreational amenity and future water quality.

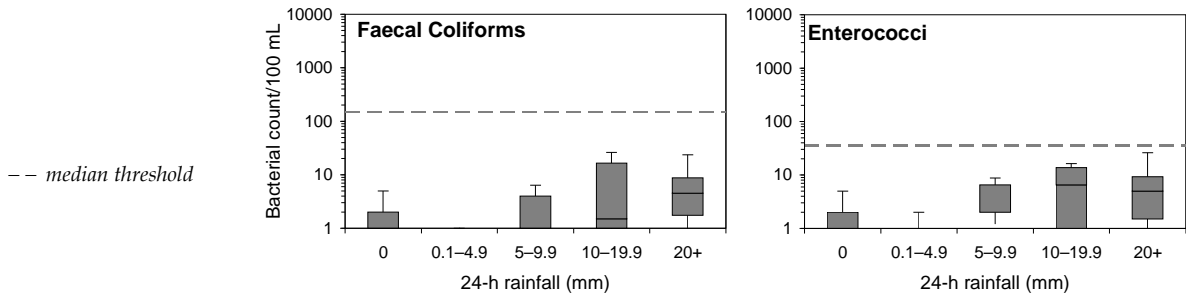
Compliance

Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.



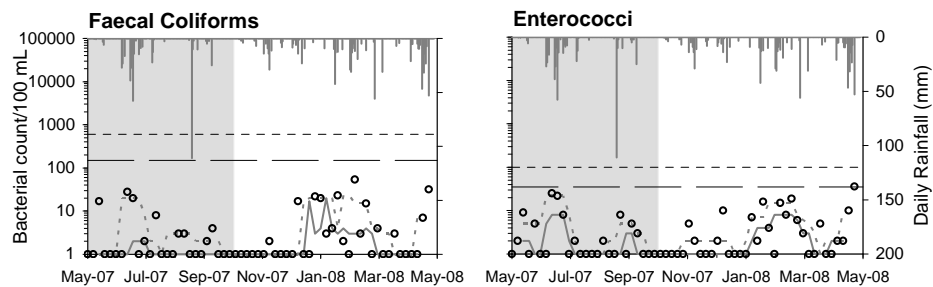
Response to rainfall

Faecal coliform and enterococci densities tended to increase slightly with increasing rainfall and generally remained below the median guideline limits across all rainfall categories.



Season data

- | rainfall
 - o individual result
 - rolling median
 - - - rolling 80th percentile
- Guidelines (see page 7 for details)
- median threshold
 - - - 80th percentile threshold



Swansea Heads Little Beach

See page 122 for key to map

Description

This 60 metre long beach is located directly south-east of the entrance to Lake Macquarie. It is bounded by a sea wall to the north-west and by a rock platform backed by steep vegetated bluffs to the south-east.

Pollution sources

Discharge from the lake entrance during periods of heavy rain is a potential source of beach pollution.

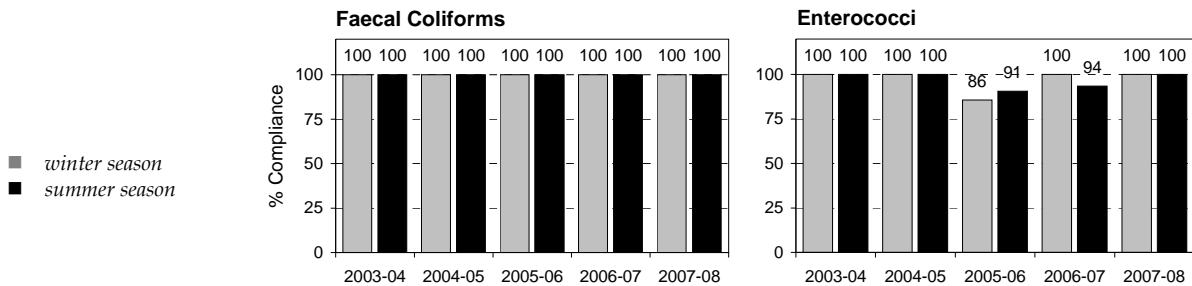
Actions

Council installed approximately 30 gross pollutant traps to prevent litter, sediments and other contaminants from reaching Little Beach. Council is undertaking bush regeneration at Salts Bay, adjacent to the beach, aiming to improve biodiversity, recreational amenity and future water quality.



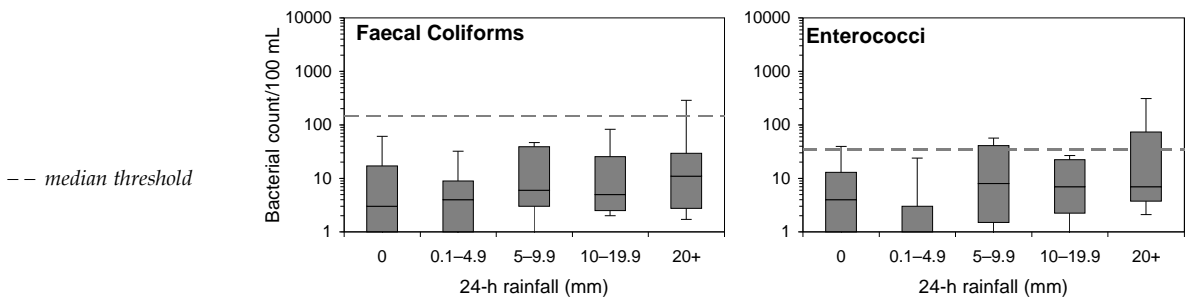
Compliance

Faecal coliform levels complied with swimming guidelines 100% of the time over the last five years. Enterococci compliance with swimming guidelines has ranged from 86% to 100% over the last five years.



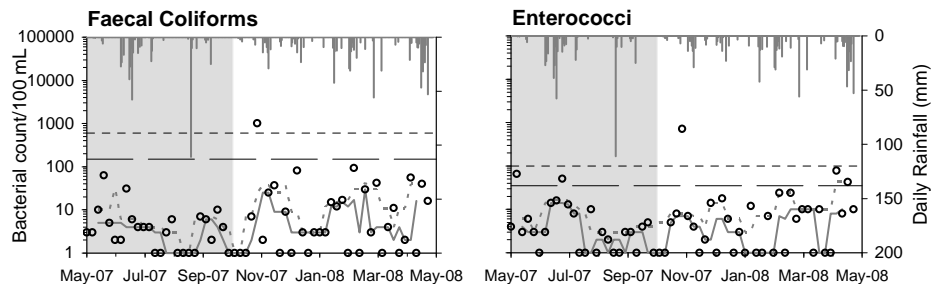
Response to rainfall

Bacterial densities tended to increase slightly with increasing rainfall. Faecal coliform densities occasionally exceeded the median guideline limit in response to 20 millimetres of rain or more in the previous 24 hours. Enterococci densities occasionally exceeded the median guideline limit in response to no rain, indicating a possible dry-weather contamination problem. Enterococci densities often exceeded the median guideline limit in response five millimetres of rain or more in the previous 24 hours.



Season data

- | rainfall
 - o individual result
 - rolling median
 - - - rolling 80th percentile
- Guidelines
(see page 7 for details)
- median threshold
 - - - 80th percentile threshold



Caves Beach

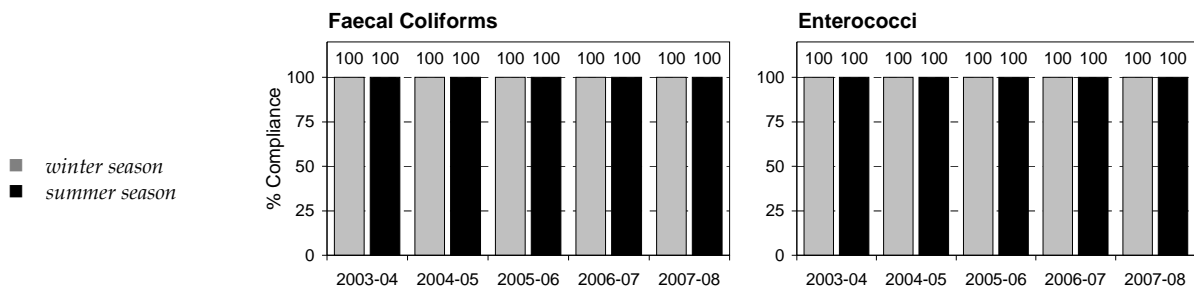
See page 122 for key to map

Description Caves Beach is located at the southern end of a 1.8 kilometre long beach that stretches north toward Swansea Heads.

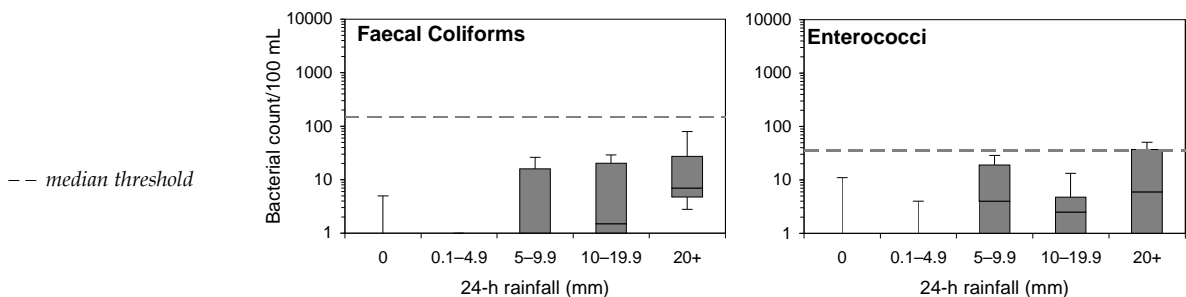
Pollution sources Open stormwater drains discharge to the beach.

Actions There are no actions specific to this beach.

Compliance Faecal coliform and enterococci levels complied with swimming guidelines 100% of the time over the last five years.



Response to rainfall Faecal coliform and enterococci densities tended to increase with increasing rainfall. Faecal coliform levels generally remained below the median guideline limit across all rainfall categories. Enterococci levels often exceeded the median guideline limit in response to 20 millimetres of rain or more in the previous 24 hours.



Season data

- | rainfall
- o individual result
- rolling median
- rolling 80th percentile

Guidelines
(see page 7 for details)

- median threshold
- 80th percentile threshold

