NSW GOVERNMENT

DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

State of the beaches 2018-2019

South Coast region

Beachwatch

www.environment.nsw.gov.au/beachwatch

Find out more about your environment at:

www.environment.nsw.gov.au

Front cover: Camel Rock Beach (Craig Cowgill /Bega Valley Shire Council)

Published by:

Environment, Energy and Science (EES)
Department of Planning, Industry and Environment
59 Goulburn Street, Sydney NSW 2000
PO Box A290, Sydney South NSW 1232
Phone: +61 2 9995 5000 (switchboard)
Phone: 1300 361 967 (Environment, Energy and Science enquiries)
TTY users: phone 133 677, then ask for 1300 361 967
Speak and listen users: phone 1300 555 727, then ask for 1300 361 967
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

Report pollution and environmental incidents
Environment Line: 131 555 (NSW only)
or info@environment.nsw.gov.au
See also www.environment.nsw.gov.au

ISBN 978 1 925974 55 3
EES 2019/0315
October 2019

Contents

Recreational water quality has been monitored in the South Coast region since 2002 by Shoalhaven City Council, Eurobodalla Shire Council and Bega Valley Shire Council under the Department of Planning, Industry and Environment's Beachwatch Partnership Program. This report summarises the performance of 36 swimming sites on the south coast of New South Wales, providing a long-term assessment of how suitable a site is for swimming. Monitored sites include ocean beaches, estuarine and lagoon swimming sites, and ocean baths.

In 2018–2019, 97% of swimming sites in the South Coast region were graded as Good or Very Good. These sites were suitable for swimming for most or almost all of the time. While this result was a slight decline in performance from the previous year, it was still an excellent result even with several significant rainfall events over summer.

South Coast region summary 2018–2019

Beach monitoring in New South Wales

Bawley Point Beach
Photo: Beachwatch/EES, DPIE

The water quality of beaches and other swimming locations is monitored under the NSW Government's Beachwatch programs to provide the community with accurate information on the cleanliness of the water and to enable individuals to make informed decisions about where and when to swim. Routine assessment also measures the impact of pollution sources, enables the effectiveness of stormwater and wastewater management practices to be assessed and highlights areas where further work is needed.

Swimming sites in New South Wales are graded as Very Good, Good, Fair, Poor or Very Poor in accordance with the National Health and Medical Research Council's 2008 *Guidelines for Managing Risks in Recreational Waters*. These Beach Suitability Grades provide a long-term assessment of how suitable a beach is for swimming. The grades are determined from the most recent 100 water quality results (two to four years' worth of data depending on the sampling frequency) and a risk assessment of potential pollution sources.

See the section on **Quality assurance** in the Statewide Summary for results of the quality assurance program.

Recreational water quality has been monitored on the South Coast by Shoalhaven Council and Eurobodalla Shire Council since 2002 and by Bega Valley Shire Council since 2004.

A **quality assurance** program ensures the information collected and reported by Beachwatch and its partners is accurate and reliable.

Rainfall impacts

During 2018–2019, 36 swimming sites were monitored including ocean beaches, estuarine and lagoon swimming sites, and ocean baths.

Rainfall is the major driver of pollution to recreational waters, generating stormwater runoff and triggering untreated discharges from the wastewater treatment and transport systems. Changes in rainfall patterns are reflected in beach water quality over time due to variation in the frequency and extent of stormwater and wastewater inputs.

The Beach Suitability Grades for 2018–2019 are based on water quality data collected over the last two to four years. Rainfall over this period has been diverse:

- 2015–2016: wet summer, with well above average rainfall during January, including significant storm events causing heavy rain and flooding in coastal areas
- 2016–2017: the wettest March on record for many coastal areas and intense storm activity over summer
- 2017–2018: variable rainfall with prolonged dry periods and a mostly wet summer with significant rainfall events
- 2018-2019: prolonged dry weather conditions broken by wet summer months.

See the section on **How to read this report** on page 56 for an explanation of the graphs, tables and Beach Suitability Grades.

Extended dry weather conditions were experienced on the South Coast during May to September 2018 with mostly below average monthly rainfall totals recorded.

Average to above average rainfall was recorded from October to December 2018 in the region. Ulladulla recorded its highest November rainfall total on record with 133mm. Rainfall was mostly average to below average between January and April 2019, except for a wet March.

Several significant wet weather events occurred in December 2018 and March 2019. Heavy rain fell from 13–17 December, when 83mm of rain fell at Merimbula, and 66mm at Bega. On 16–19 March many areas experienced heavy rainfall, with the heaviest rain falling on the 18th. Daily rain totals on 18 March at Batemans Bay and Ulladulla were 80mm and 68mm respectively.

Health risks

Contamination of recreational waters with faecal material from animal and human sources can pose significant health problems to beach users owing to the presence of pathogens (disease-causing micro-organisms) in the faecal material. The most common groups of pathogens found in recreational waters are bacteria, protozoans and viruses.

Exposure to contaminated water can cause gastroenteritis, with symptoms including vomiting, diarrhoea, stomach-ache, nausea, headache and fever. Eye, ear, skin and upper respiratory tract infections can also be contracted when pathogens come into contact with small breaks and tears in the skin or ruptures of the delicate membranes in the ear or nose.

Certain groups of users may be more vulnerable to microbial infection than others. Children, the elderly, people with compromised immune systems, tourists, and people from culturally and linguistically diverse backgrounds are generally most at risk.

Beach Suitability Grades for South Coast region

Swimming site	Site type	Beach Suitability Grade	Change
Shoalhaven City Council			
Shoalhaven Heads Beach	Ocean beach	VG	●
Tilbury Cove	Ocean beach	VG	●
Warrain Beach	Ocean beach	VG	●
Collingwood Beach	Ocean beach	VG	●
Cudmirrah Beach	Ocean beach	VG	●
Mollymook Beach	Ocean beach	VG	●
Rennies Beach	Ocean beach	VG	●
Racecourse Beach	Ocean beach	G	●
Bawley Point Beach	Ocean beach	VG	●
Merry Beach	Ocean beach	VG	●
Eurobodalla Shire Council			
Cookies Beach	Ocean beach	VG	●
Caseys Beach	Ocean beach	G	●
Surf Beach	Ocean beach	P	↓
Malua Bay Beach	Ocean beach	VG	●
Broulee Beach	Ocean beach	G	●
Bengello Beach	Ocean beach	VG	●
Shelley Beach (Moruya Heads)	Ocean beach	G	●
Tuross Main Beach	Ocean beach	G	●
Brou Beach	Ocean beach	VG	●
Wagonga Inlet	Estuarine	G	●
Narooma Main Beach	Ocean beach	VG	●
Bega Valley Shire Council			
Camel Rock Beach	Ocean beach	VG^	●
Bruce Steer Pool	Estuarine	G^	●
Horseshoe Bay (Bermagui)	Ocean beach	VG^	↑

Swimming site	Site type	Beach Suitability Grade	Change
Bega Valley Shire Council (continued)			
Big Blue Pool	Ocean baths	G^	↓
Beares Beach	Ocean beach	VG^	●
Mogareeka Inlet	Lake/Lagoon	G^	●
Mogareeka Lions Park*	Lake/Lagoon	VG^	–
Tathra Beach	Ocean beach	VG^	●
Short Point Beach	Ocean beach	G^	↓
Bar Beach	Estuarine	G^	●
Main Beach (Merimbula)	Ocean beach	VG^	●
Pambula Beach	Ocean beach	VG^	●
Pambula River Mouth	Estuarine	G^	●
Aslings Beach	Ocean beach	VG^	↑
Cocora Beach	Ocean beach	G^	●

Beach Suitability Grade					Change		
VG	G	F	P	VP	↑	●	↓
Very Good	Good	Fair	Poor	Very Poor	Improved	Stable	Declined

* New site

^ Provisional: Information required for the analysis is incomplete due to limited bacterial data or limited information on potential pollution sources in a beach catchment.

Shoalhaven City Council

Overall results

100%
swimming sites graded Good or Very Good

All 10 swimming sites were graded as Very Good or Good in 2018–2019. Excellent results were also recorded in previous years.

Percentage of sites graded as Very Good or Good:

- 2018–2019: 100%
- 2017–2018: 100%
- 2016–2017: 100%
- 2015–2016: 100%.

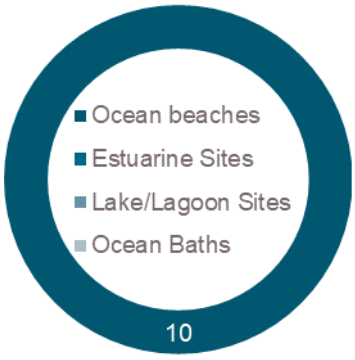
Ten swimming sites were monitored by Shoalhaven City Council. Samples were collected weekly between December and February and sampling and laboratory analysis was fully funded by the council.

See the section on **How to read this report** on page 56 for an explanation of the graphs, tables and Beach Suitability Grades.

Best beaches

Shoalhaven Heads Beach, Tilbury Cove, Warrain Beach, Collingwood Beach, Cudmirrah Beach, Mollymook Beach, Rennies Beach, Bawley Point Beach and Merry Beach.

These sites had excellent water quality and were suitable for swimming almost all of the time.



Site types in Shoalhaven City Council

Ocean beaches were the only site type monitored in the Shoalhaven region.

As a general precaution swimming should be avoided during and for at least one day after heavy rain at ocean beaches, or if there are signs of stormwater pollution such as discoloured water or floating debris.

Ocean beaches

Beach Suitability Grades for Shoalhaven City Council ocean beaches

Nine of the 10 ocean beaches were graded as Very Good in 2018–2019: Shoalhaven Heads Beach, Tilbury Cove, Warrain Beach, Collingwood Beach, Cudmirrah Beach, Mollymook Beach, Rennies Beach, Bawley Point Beach and Merry Beach. Water quality at these sites has been of a high standard for several years and was suitable for swimming almost all of the time. These sites have few potential sources of faecal contamination.

Racecourse Beach was graded Good, a similar result to the previous year. While most samples were suitable for swimming during dry weather conditions, elevated enterococci results were recorded following rainfall.

Tilbury Cove
Photo: Beachwatch/EES, DPIE

Management

Patrolled ocean beach
Photo: Beachwatch/EES, DPIE

A **Coastal Management Program** (CMP) outlines a long-term strategy for managing the coast, in line with the *Coastal Management Act 2016*.

The NSW Government provides guidance and funding through the Coastal and Estuary Grants Program for local councils to prepare and implement CMPs.

Under the previous *Coastal Protection Act 1979*, councils developed a **Coastal Zone Management Plan** (CZMP) to address coastal issues. Councils can continue to implement priority actions from certified CZMPs with funding assistance from the NSW Government's Coastal and Estuary Grants Program until 2021.

Shoalhaven City Council

The Shoalhaven River Estuary, Lake Conjola and Shoalhaven open coast coastal management programs (CMPs) are being prepared by Shoalhaven City Council in partnership with the Department of Planning, Industry and Environment, with funding provided under the NSW Government's Coastal and Estuary Grants Program. The CMPs will identify catchment pressures and prioritise management initiatives to manage issues relating to coastal and estuary health. Water quality management actions such as stormwater infrastructure improvements, restoring and maintaining riparian areas and strategic land-use planning will be considered during the process.

Council also has several management plans that guide the management of estuaries along the coast. Council has been implementing actions from these plans which include restoring and maintaining riparian corridors, coastal wetlands and eroding streams and foreshores, which will improve the water quality discharging to the estuaries.

As part of the Northern Shoalhaven Reclaimed Water Management Scheme (REMS), an average of 70% of treated wastewater from the Callala, Huskisson/Vincentia, Culburra/Greenwell Point and St Georges Basin sewage treatment plants (STPs) is recycled onto land, significantly reducing the amount of effluent released to the ocean. Previous discharge of treated effluent to Jervis Bay has been phased out as a result of the scheme. The next stage of REMS is currently under construction and is due for completion in 2019. This includes major upgrades to Nowra and Bomaderry STPs and connection into the existing REMS distribution network. This will significantly reduce the reclaimed water and nutrient discharge volumes to the Shoalhaven River and almost double the volume available for beneficial re-use through the REMS.

The sewerage network in the Milton–Ulladulla regions has been upgraded. The upgrades include improved disinfection of treated effluent and replacing the previous shoreline outfall with one 350m offshore. In 2008, the Conjola Regional Sewerage Scheme connected nine small villages within the vicinity of Lake Conjola to the reticulated sewerage system, replacing the existing septic systems in these villages. Properties in the Currarong area were connected to reticulated sewerage in December 2009 as part of the Currarong Sewerage Scheme.

Sampling sites and Beach Suitability Grades in Shoalhaven City Council

Shoalhaven Heads Beach

Beach grade: VG

See ‘How to read this report’ for key to map.

Shoalhaven Heads Beach is located towards the southern end of Seven Mile Beach at Shoalhaven Heads.

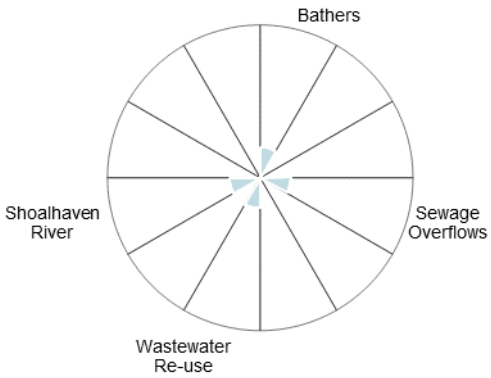
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels had little response to rainfall and generally remained below the safe swimming limit across all rainfall categories.

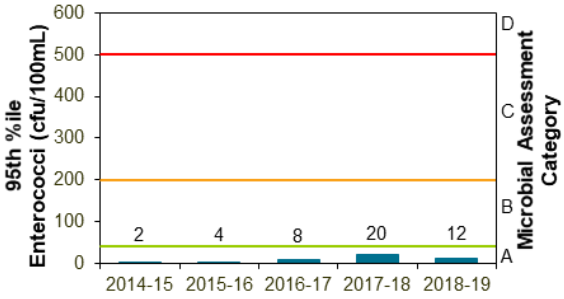
The site was monitored from 2003 to 2004 and since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	94%	51	Stable

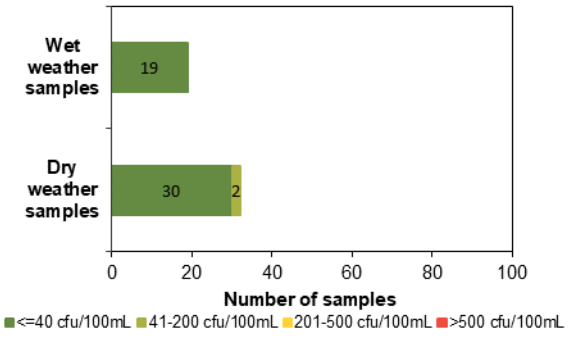
Sanitary inspection: Low



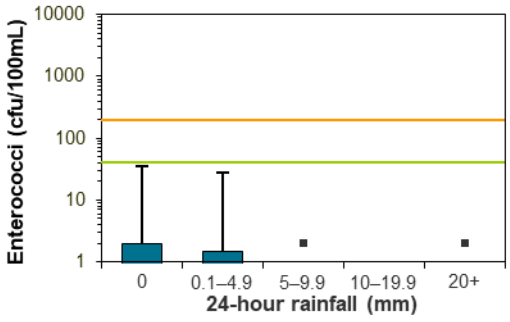
Microbial Assessment Category: A



Dry and wet weather water quality

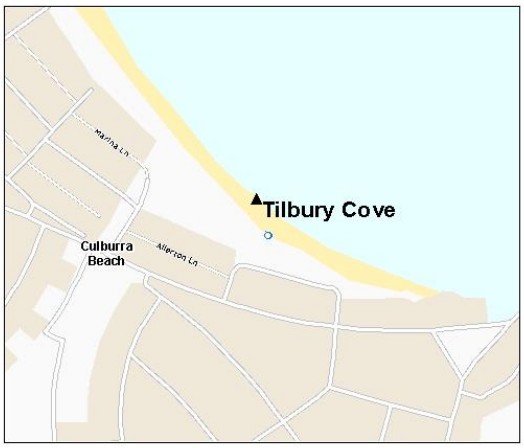


Water quality in response to rainfall



Tilbury Cove

Beach grade: VG



See ‘How to read this report’ for key to map.

Tilbury Cove is located towards the south-eastern corner of Culburra Beach.

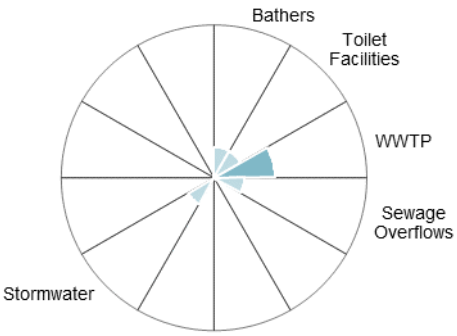
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few significant sources of faecal contamination.

Enterococci levels had little response to rainfall and generally remained below the safe swimming limit across all rainfall categories.

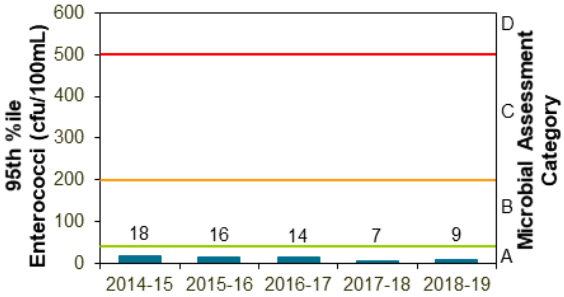
The site was monitored from 2002 to 2004 and since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	97%	52	Stable

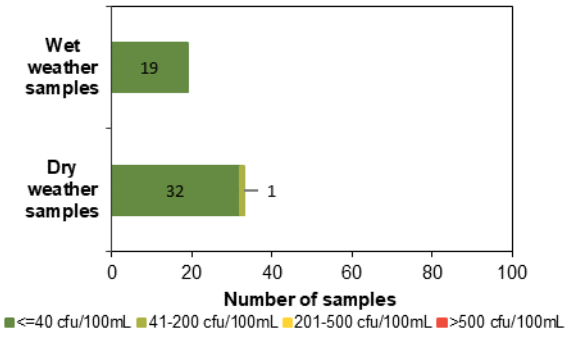
Sanitary inspection: Low



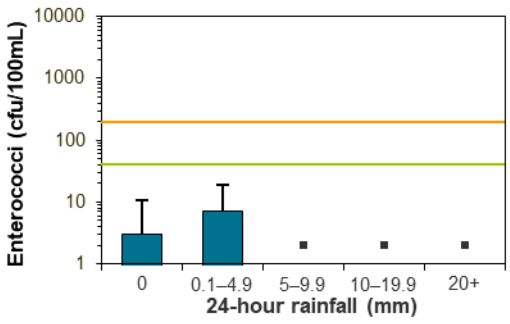
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Warrain Beach

Beach grade: VG

See ‘How to read this report’ for key to map.

Warrain Beach is located to the south of Penguin Headland. The beach is patrolled over the summer months.

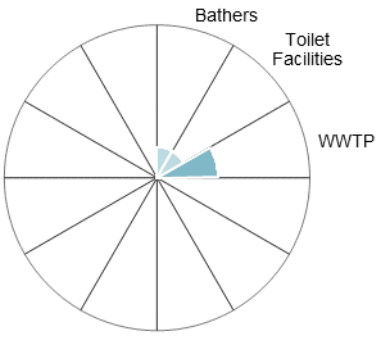
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels had little response to rainfall and remained below the safe swimming limit across all rainfall categories.

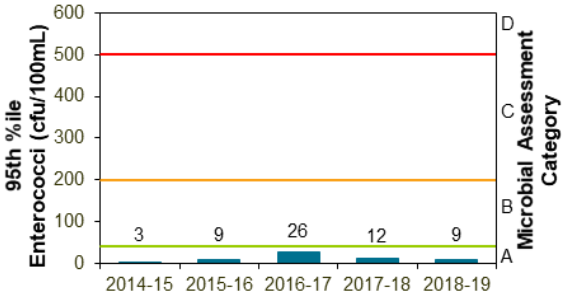
The site has been monitored since 2007.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	100%	52	Stable

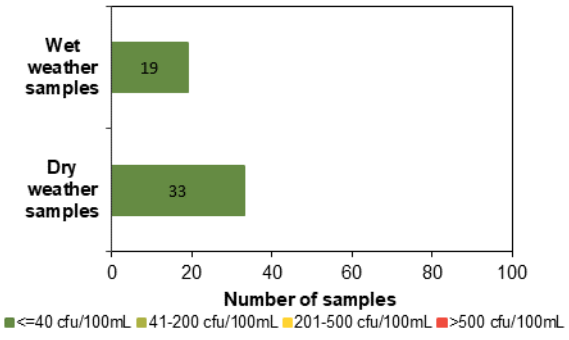
Sanitary inspection: Low



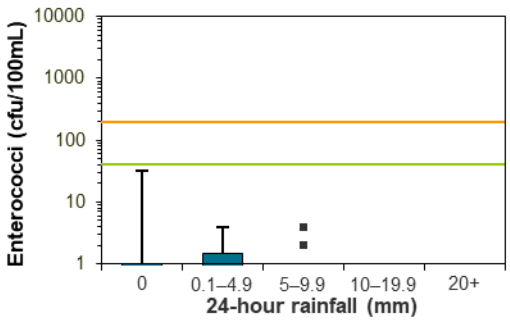
Microbial Assessment Category: A



Dry and wet weather water quality

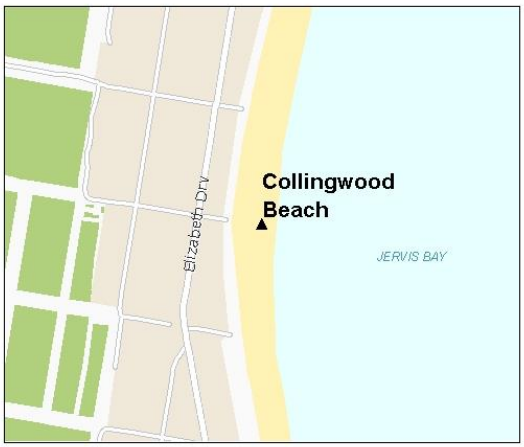


Water quality in response to rainfall



Collingwood Beach

Beach grade: VG



See ‘How to read this report’ for key to map.

Collingwood Beach is located in Jervis Bay, adjacent to the town of Vincentia. The beach is approximately two kilometres long.

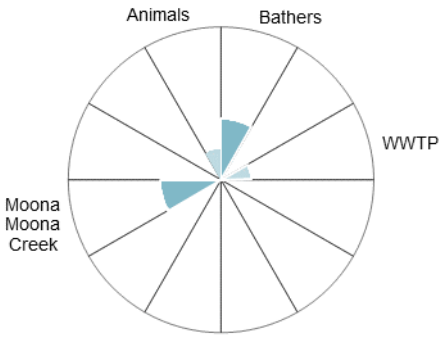
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to 10mm or more of rainfall.

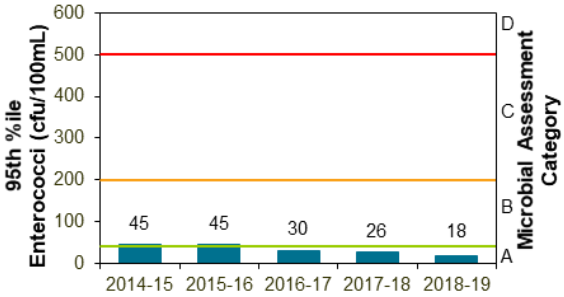
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	100%	52	Stable

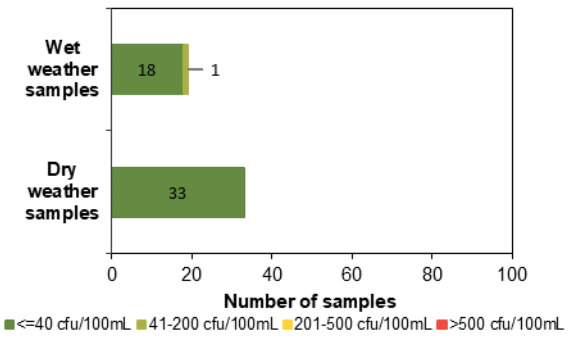
Sanitary inspection: Low



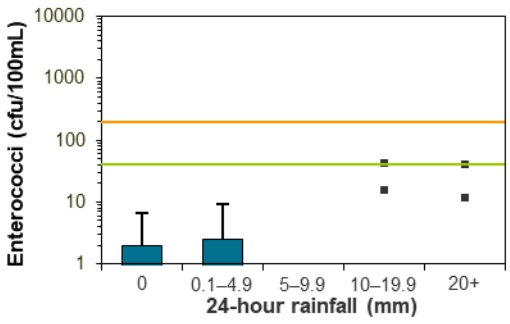
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Cudmirrah Beach

Beach grade: VG

See ‘How to read this report’ for key to map.

Cudmirrah Beach is the main surf beach for the township of Sussex Inlet. The beach is approximately three kilometres long.

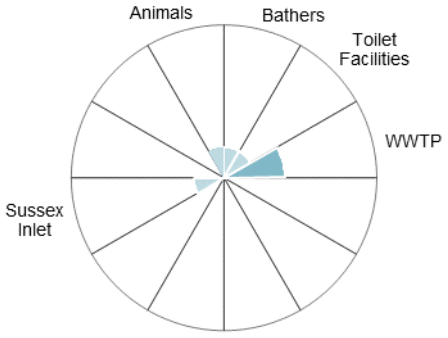
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few significant sources of faecal contamination.

Enterococci levels had little response to rainfall and remained below the safe swimming limit across all rainfall categories.

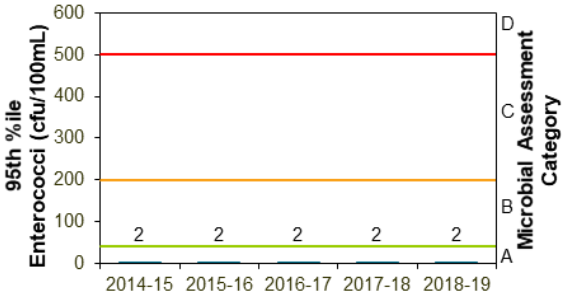
The site was monitored from 2003 to 2004 and since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	100%	52	Stable

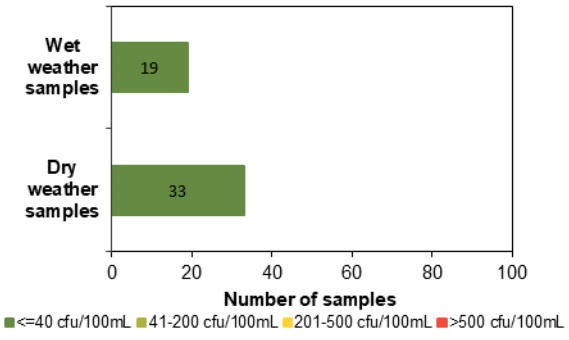
Sanitary inspection: Low



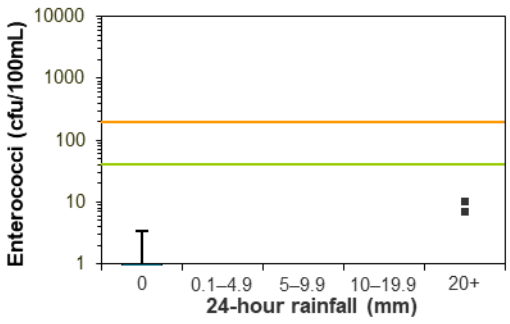
Microbial Assessment Category: A



Dry and wet weather water quality

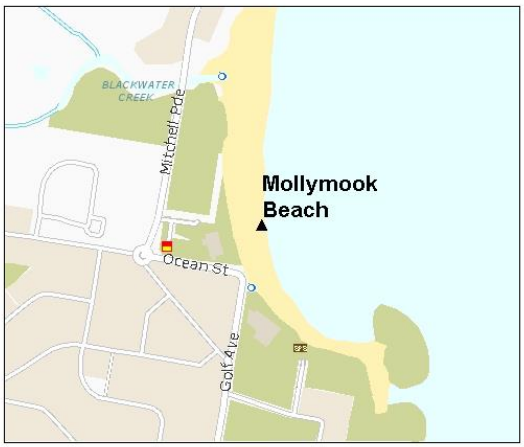


Water quality in response to rainfall



Mollymook Beach

Beach grade: VG



See 'How to read this report' for key to map.

Mollymook Beach is a popular beach that stretches for approximately two kilometres. The beach is patrolled during the warmer months.

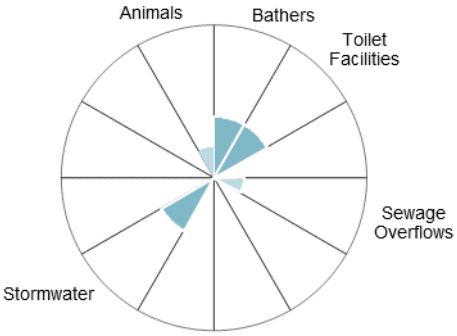
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few significant sources of faecal contamination.

Enterococci levels had little response to rainfall and remained below the safe swimming limit across all rainfall categories.

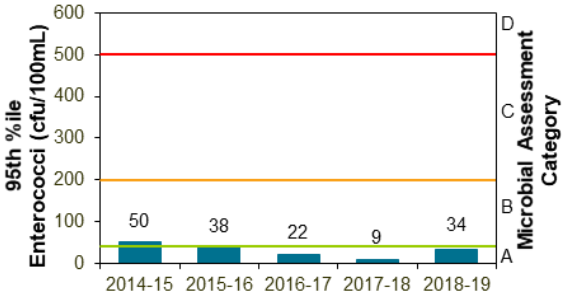
The site was monitored from 2002 to 2003 and since 2008.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	100%	52	Stable

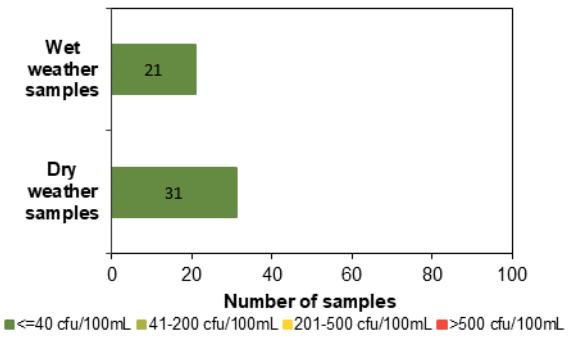
Sanitary inspection: Low



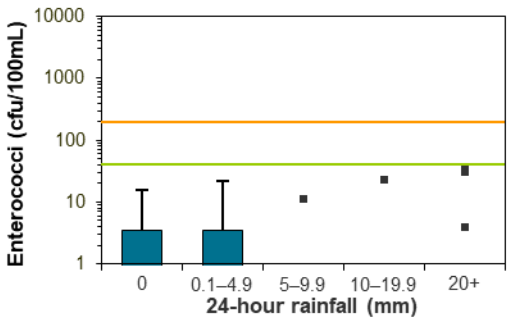
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Rennies Beach

Beach grade: VG

Rennies Beach is located near the town of Ulladulla. The beach is approximately 600 metres long.

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

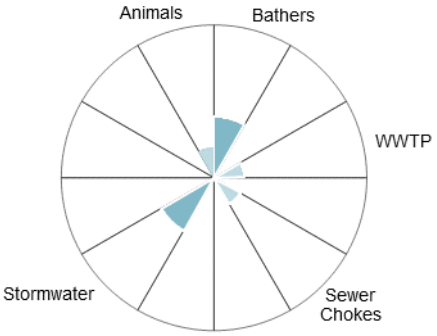
Enterococci levels had little response to rainfall and generally remained below the safe swimming limit across all rainfall categories.

The site has been monitored since 2006.

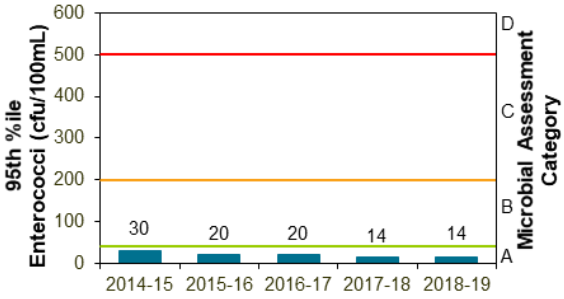
See 'How to read this report' for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	97%	52	Stable

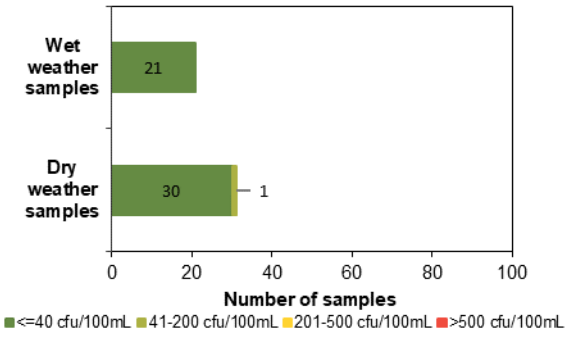
Sanitary inspection: Low



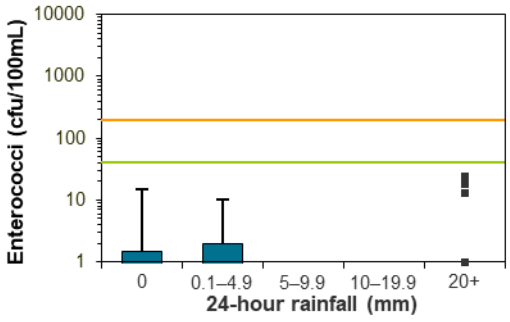
Microbial Assessment Category: A



Dry and wet weather water quality

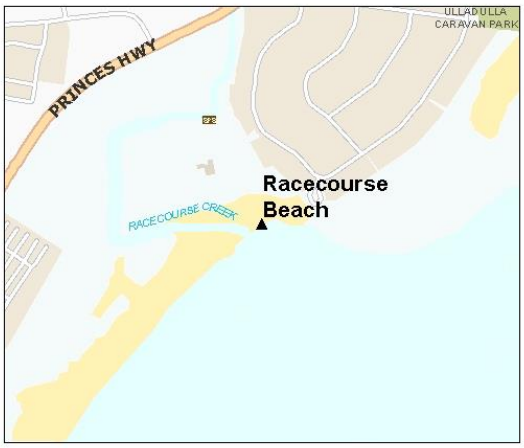


Water quality in response to rainfall



Racecourse Beach

Beach grade: G



See ‘How to read this report’ for key to map.

Racecourse Beach is located near the town of Ulladulla. The beach is approximately one kilometre long.

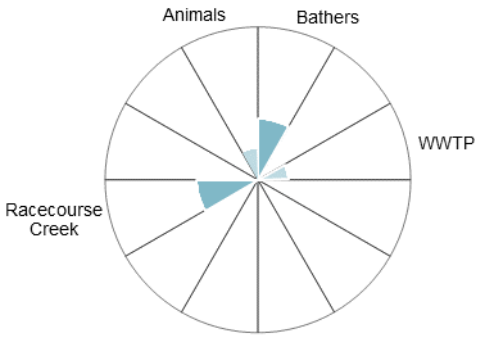
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with few potential sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to 10mm or more of rainfall.

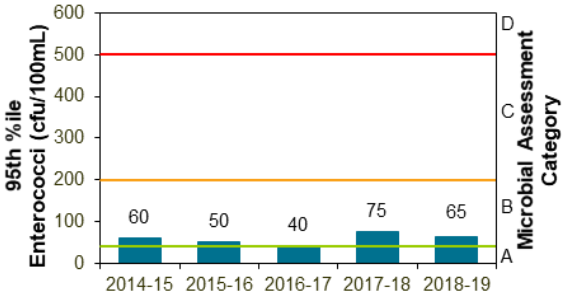
The site was monitored from 2002 to 2004 and since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	94%	52	Stable

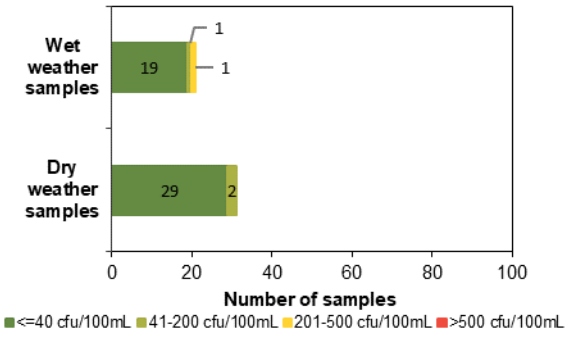
Sanitary inspection: Low



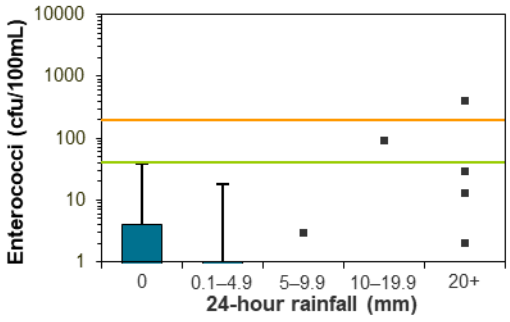
Microbial Assessment Category: B



Dry and wet weather water quality

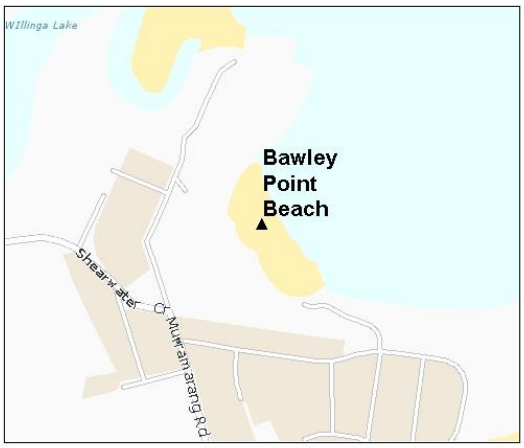


Water quality in response to rainfall



Bawley Point Beach

Beach grade: VG



See 'How to read this report' for key to map.

Bawley Point Beach is approximately 250 metres long and is located on the northern side of Bawley Point.

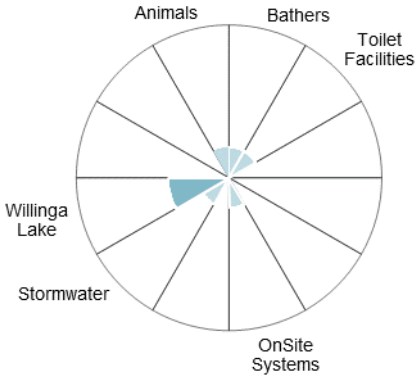
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few significant sources of faecal contamination.

Enterococci levels had little response to rainfall and remained below the safe swimming limit across all rainfall categories.

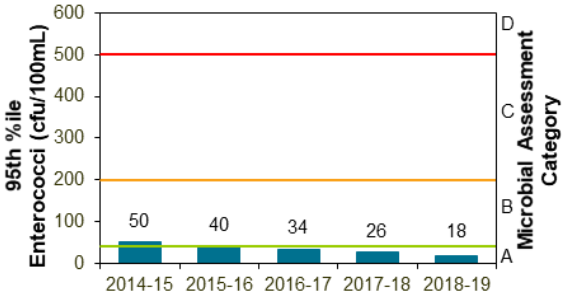
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	100%	52	Stable

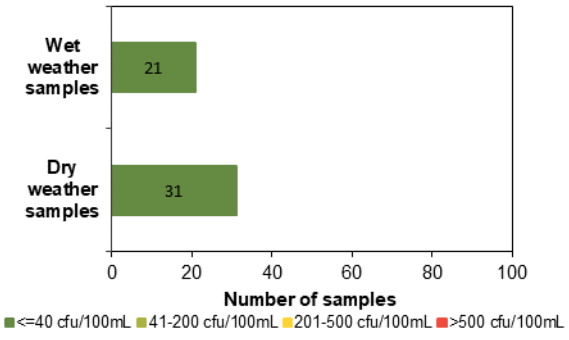
Sanitary inspection: Low



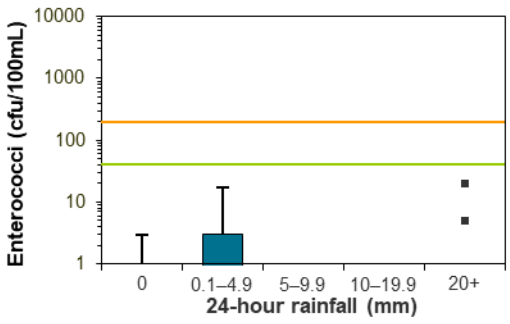
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Merry Beach

Beach grade: VG

See ‘How to read this report’ for key to map.

Merry Beach is located south of the town of Kioloa. The beach is approximately 400 metres long and is backed by a reserve and caravan park.

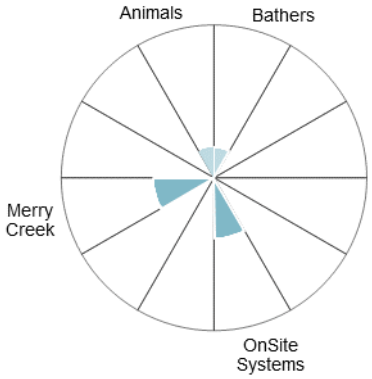
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels had little response to rainfall and generally remained below the safe swimming limit across all rainfall categories.

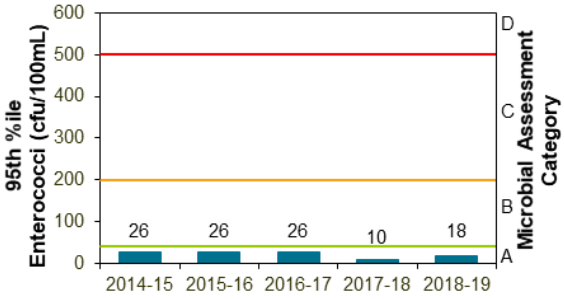
The site has been monitored since 2006.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2014 to Feb 2019	100%	52	Stable

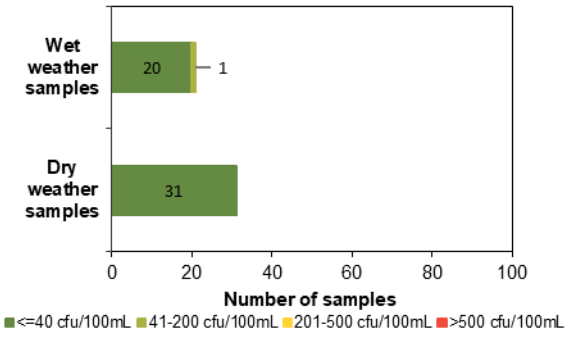
Sanitary inspection: Low



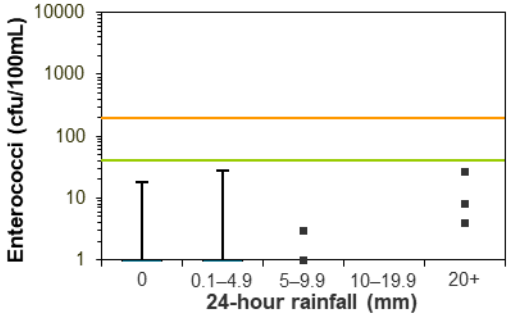
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Eurobodalla Shire Council

91%
swimming sites graded Good or Very Good

Eleven swimming locations were monitored by Eurobodalla Shire Council. Samples were collected weekly between November and March and sampling and analysis was fully funded by the council.

Overall results

Ten of the 11 swimming sites were graded as Very Good or Good in 2018–2019, a slight decline in performance from the previous year.

Percentage of sites graded as Very Good or Good:

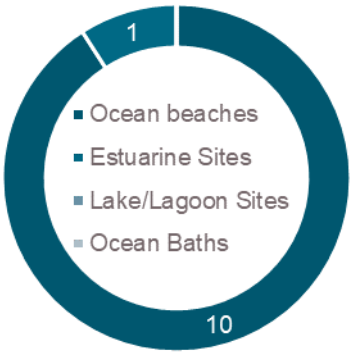
- 2018–2019: 91%
- 2017–2018: 100%
- 2016–2017: 100%
- 2015–2016: 100%.

See the section on **How to read this report** on page 56 for an explanation of the graphs, tables and Beach Suitability Grades.

Best beaches

Cookies Beach, Malua Bay Beach, Bengello Beach, Brou Beach and Narooma Main Beach.

These sites had excellent water quality and were suitable for swimming almost all of the time.



Site types in Eurobodalla Shire Council

Swimming sites monitored in the Eurobodalla region include ocean beaches and an estuarine area in Wagonga Inlet, with each site type having a different response to rainfall-related impacts.

In general, estuarine swimming sites do not perform as well as ocean beaches, due to lower levels of flushing increasing the time needed to disperse and dilute pollution inputs, taking longer to recover from stormwater events.

As a general precaution swimming should be avoided during and for at least one day after heavy rain at ocean beaches, and for up to three days in estuarine areas, or if there are signs of stormwater pollution such as discoloured water or floating debris.

Ocean beaches

Beach Suitability Grades for Eurobodalla Shire Council ocean beaches

Five of the 10 ocean beaches continued to be graded Very Good in 2018–2019: Cookies Beach, Malua Bay Beach, Bengello Beach, Brou Beach and Narooma Main Beach. Water quality at these sites was suitable for swimming almost all of the time.

Caseys Beach, Broulee Beach, Shelley Beach and Tuross Main Beach were graded as Good, a similar result to the previous year. While water quality at these sites was mostly suitable for swimming during dry weather conditions, elevated enterococci levels sometimes exceeded the safe swimming limit following rain.

Surf Beach was downgraded to Poor in 2018–2019, from a Good grade in the previous year. Elevated enterococci levels were occasionally measured during dry weather conditions and often after rainfall. While the microbial water quality has declined from the previous year, it is only slightly above the threshold between Good and Poor. It is recommended to avoid swimming during and for at least one day following rainfall or if there are signs of stormwater pollution such as discoloured water and floating debris.

Estuarine beaches

Beach Suitability Grades for Eurobodalla Shire Council estuarine beaches

Wagonga Inlet was graded as Good in 2018–2019, a similar result to the previous years. While water quality at this site was suitable for swimming most of the time, elevated enterococci results were occasionally recorded after little or no rainfall. Pollution inputs from elsewhere within Wagonga Inlet may impact water quality at this site. Swimming should be avoided during and for up to three days after rainfall, or if there are signs of pollution such as discoloured water or floating debris.

Management

Patrolled ocean beach
Photo: Beachwatch/EES, DPIE

A **Coastal Management Program** (CMP) outlines a long-term strategy for managing the coast, in line with the *Coastal Management Act 2016*.

The NSW Government provides guidance and funding through the Coastal and Estuary Grants Program for local councils to prepare and implement CMPs.

Under the previous *Coastal Protection Act 1979*, councils developed a **Coastal Zone Management Plan** (CZMP) to address coastal issues. Councils can continue to implement priority actions from certified CZMPs with funding assistance from the NSW Government's Coastal and Estuary Grants Program until 2021.

Eurobodalla Shire Council

A coastal management program (CMP) is being prepared by Eurobodalla Shire Council in partnership with the Department of Planning, Industry and Environment for Moruya River, Mummuga Lake and Wagonga Inlet. The CMP will identify catchment pressures and prioritise management initiatives for issues relating to estuary health. Water quality management actions such as stormwater infrastructure improvements, restoring and maintaining riparian areas and strategic land-use planning will be considered during the process.

Council also has several management plans that guide the management of estuaries along the coast. Council and Local Land Services have been implementing actions from these plans that include restoring and maintaining riparian corridors, coastal wetlands, eroding streams and foreshores, which will improve the water quality discharging to the estuaries.

During 2018–2019 Eurobodalla Shire Council continued to implement its capital works program as developed through the revised Integrated Water Cycle Management Strategy (IWCMS) adopted in 2016. The strategy aims to provide improved water supply and sewerage services to all villages by 2036, depending on community consultation and funding.

Recent capital works include the construction of a low-pressure sewer scheme for Bodalla and the Bodalla STP which is now operational. Funding has been received for sewering both Potato Point and Nelligen, with design works ongoing and construction completion anticipated in 2020–2021 and 2021–2022 respectively.

Council has undertaken actions to lessen the impact of stormwater ingress into the sewer system. This included CCTV inspections and smoke testing, sewer main relining and replacement, junction sealing, manhole renewals and upgrade of sewer mains.

Council's Public and Environmental Health Team undertakes a wide range of water quality monitoring projects, which includes continued participation in the Beachwatch Program and ongoing monthly water quality monitoring of six major estuaries in the Eurobodalla region. In 2018 council, with the support of the then NSW Office of Environment and Heritage, engaged a local environmental consultant to undertake mapping of key estuarine vegetation communities including mangroves, seagrass and saltmarsh. The results of this

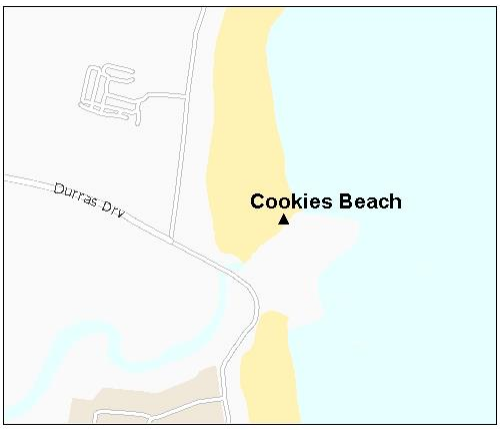
Malua Bay Beach
Photo: Beachwatch/EES, DPIE

mapping have been used to produce updated Estuary Health Report Cards for the six main estuaries in the Eurobodalla.

Sampling sites and Beach Suitability Grades in Eurobodalla Shire Council

Cookies Beach

Beach grade: VG



See ‘How to read this report’ for key to map.

Cookies Beach is located near the town of South Durras. Murramarang National Park lies to the south.

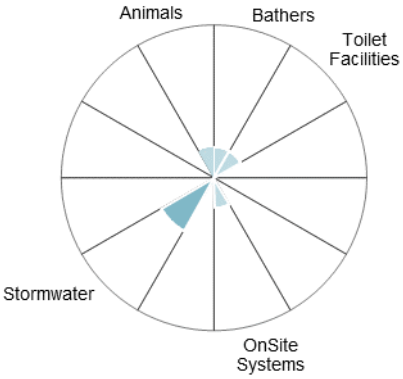
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few significant sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall but generally remained below the safe swimming limit across all rainfall categories.

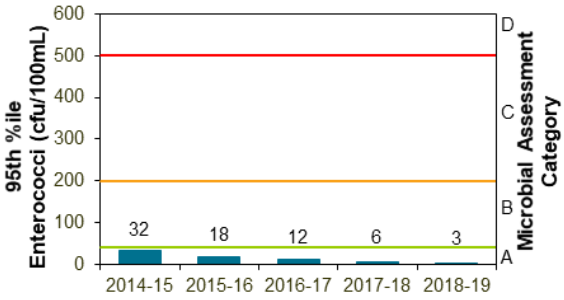
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	98%	100	Stable

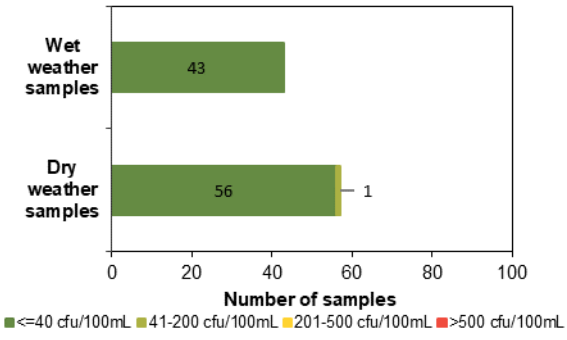
Sanitary inspection: Low



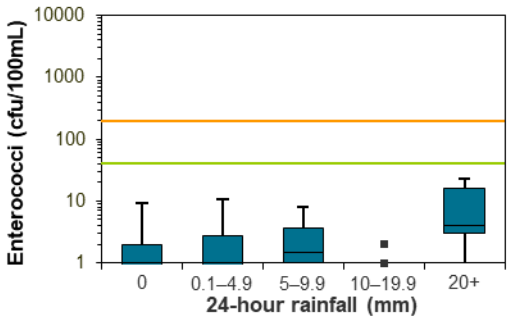
Microbial Assessment Category: A



Dry and wet weather water quality

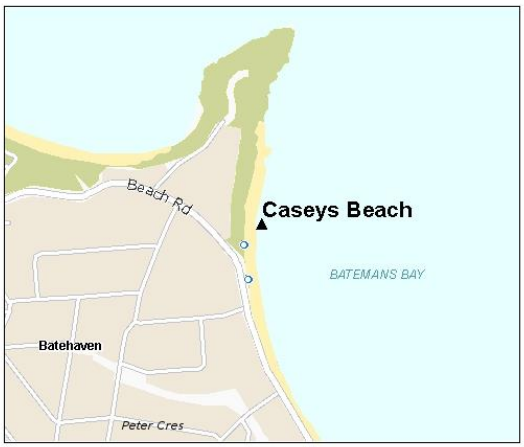


Water quality in response to rainfall



Caseys Beach

Beach grade: G



See ‘How to read this report’ for key to map.

Caseys Beach is approximately 800 metres long and is located to the south of Observation Point.

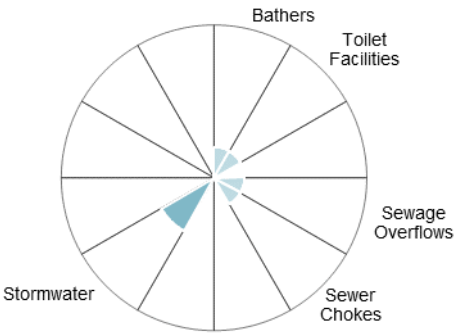
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of minor faecal contamination.

Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit in response to little or no rain, and regularly after 20mm or more of rainfall.

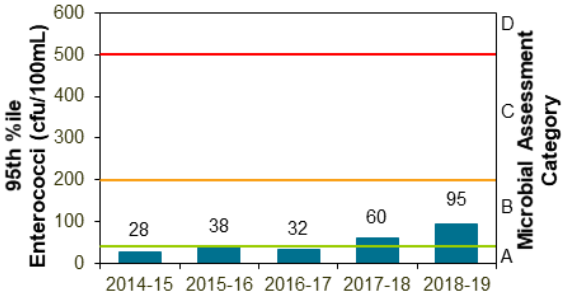
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	91%	100	Stable

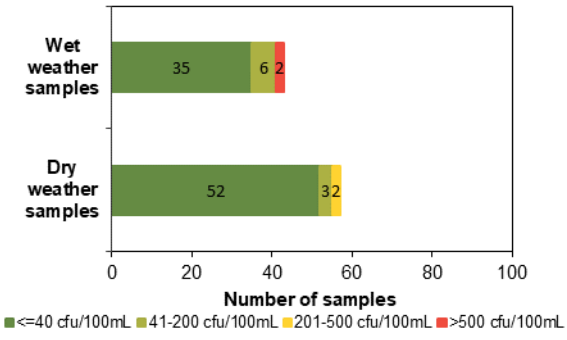
Sanitary inspection: Low



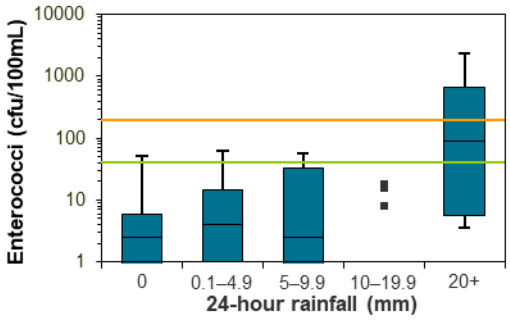
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Surf Beach

Beach grade: P

See ‘How to read this report’ for key to map.

Surf Beach is a popular beach approximately 350 metres long and is patrolled in the warmer months.

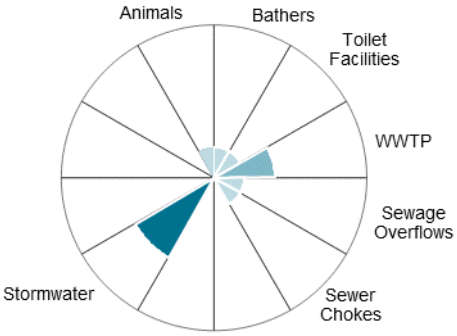
The Beach Suitability Grade of Poor indicates microbial water quality is susceptible to faecal pollution, particularly after rainfall and occasionally during dry weather conditions, with potential faecal contamination from stormwater.

Enterococci levels generally increased with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rain, and often after 5mm or more of rain.

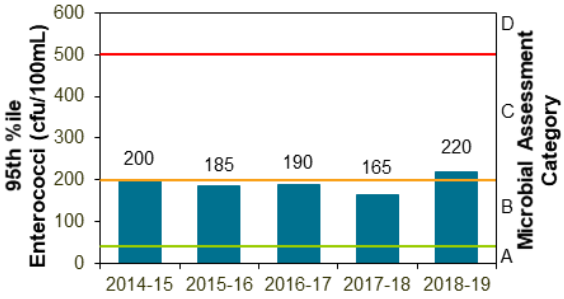
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	81%	100	Declined

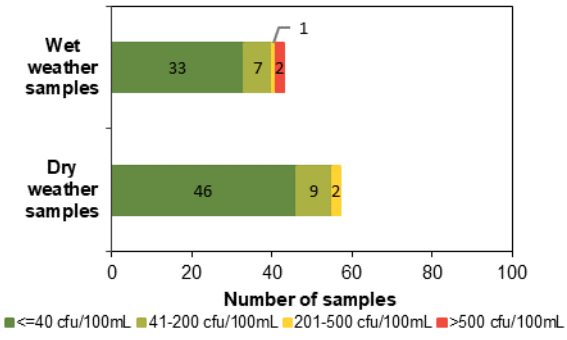
Sanitary inspection: Moderate



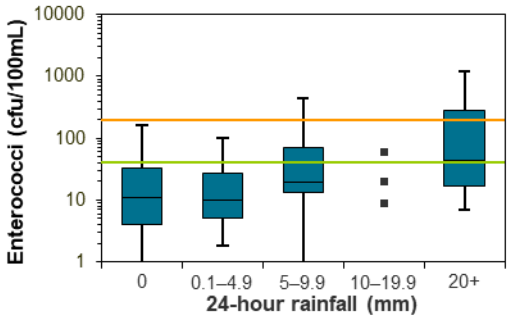
Microbial Assessment Category: C



Dry and wet weather water quality



Water quality in response to rainfall



Malua Bay Beach

Beach grade: VG

See ‘How to read this report’ for key to map.

Malua Bay Beach is approximately 500 metres long and is patrolled during the warmer months.

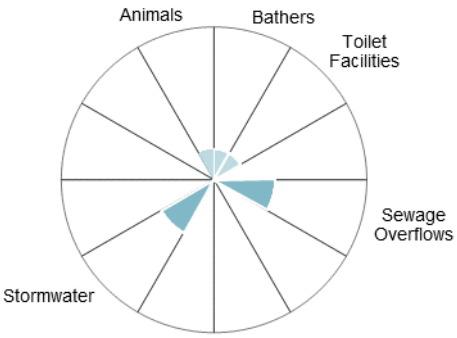
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and often in response to 20mm or more of rainfall.

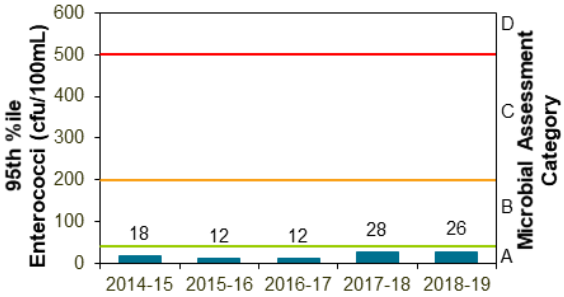
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	98%	100	Stable

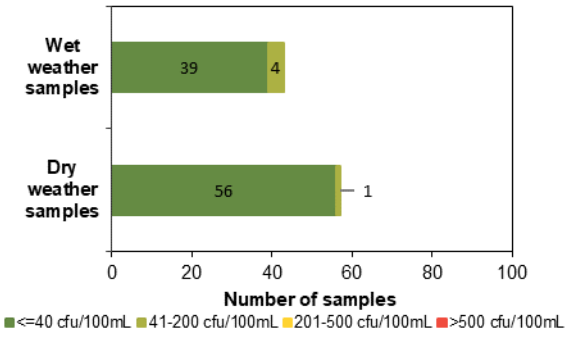
Sanitary inspection: Low



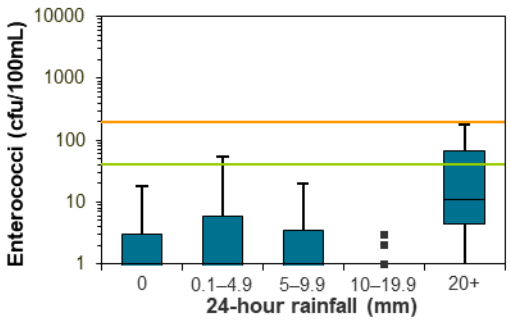
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Broulee Beach

Beach grade: G

See ‘How to read this report’ for key to map.

Broulee Beach extends from Candlagan Creek in the north to Broulee Island in the south.

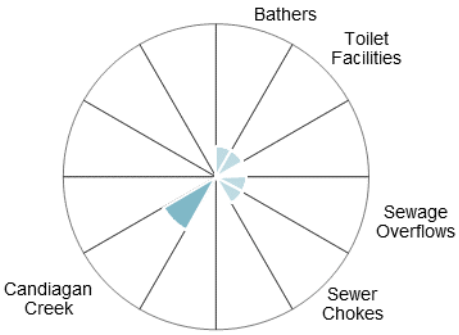
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of minor faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and often after 20mm or more of rainfall.

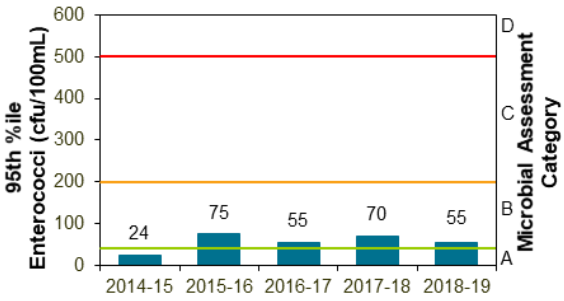
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	98%	100	Stable

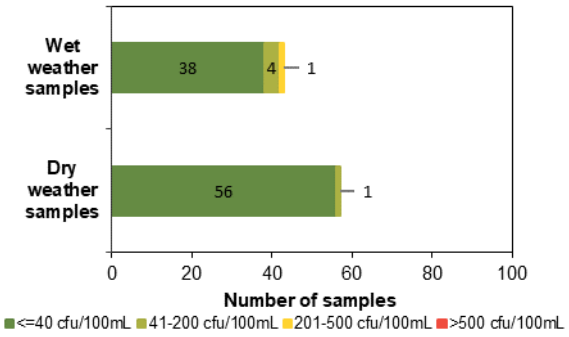
Sanitary inspection: Low



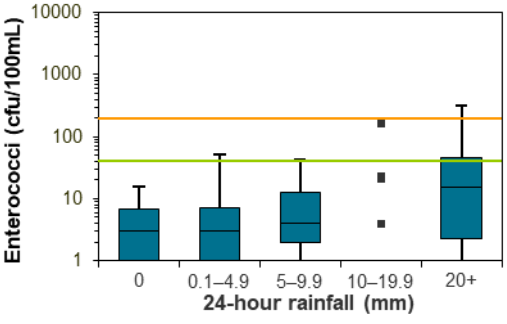
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Bengello Beach

Beach grade: VG

See ‘How to read this report’ for key to map.

Bengello Beach extends from Broulee Head to the mouth of the Moruya River. The beach is patrolled during the summer months.

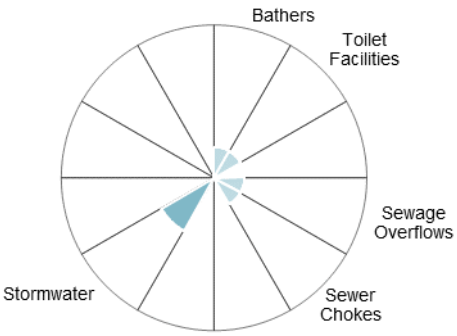
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after light rain, and often after 20mm or more of rainfall.

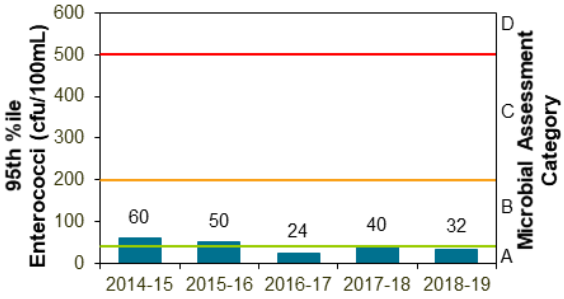
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	95%	100	Stable

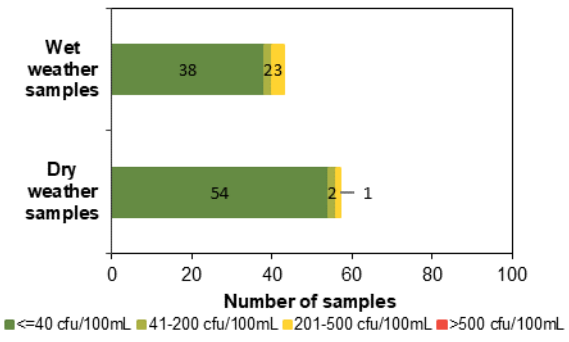
Sanitary inspection: Low



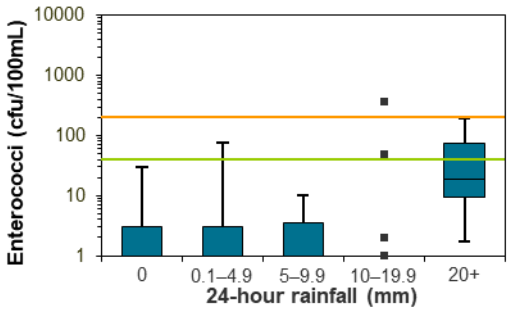
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Shelley Beach

Beach grade: G

See 'How to read this report' for key to map.

Shelley Beach is located near the mouth of the Moruya River and backed by Eurobodalla National Park.

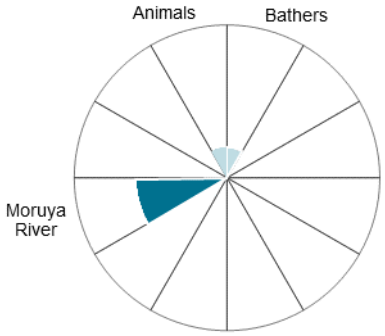
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including the Moruya River.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to rainfall.

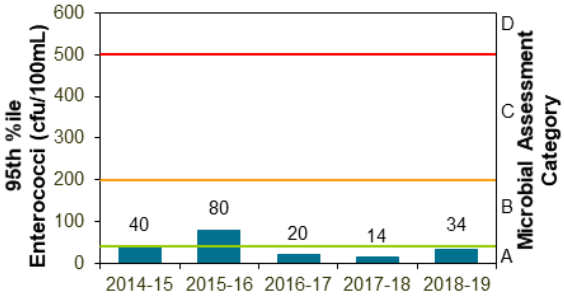
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	98%	100	Stable

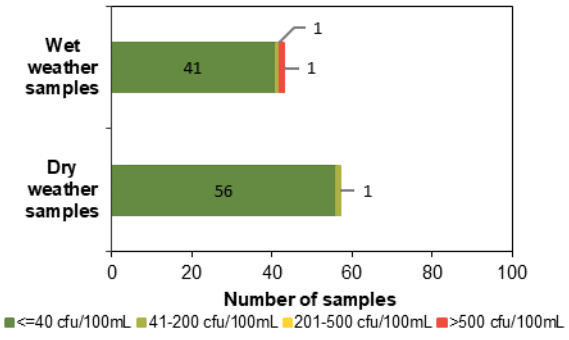
Sanitary inspection: Moderate



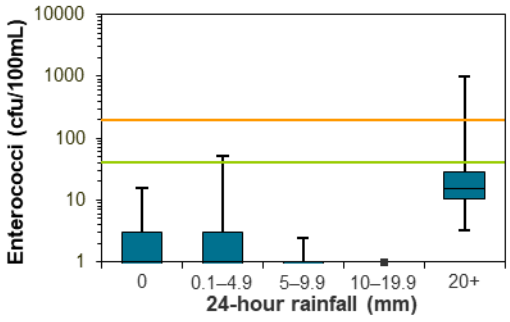
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Tuross Main Beach

Beach grade: G

See 'How to read this report' for key to map.

Tuross Main Beach is a 250-metre long beach located between Tuross Headland in the north and Tuross Lake in the south.

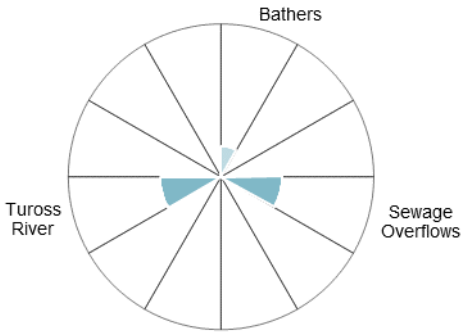
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of faecal contamination including the Tuross River.

Enterococci levels increased slightly with increasing rainfall, often exceeding the safe swimming limit after 20mm or more of rainfall.

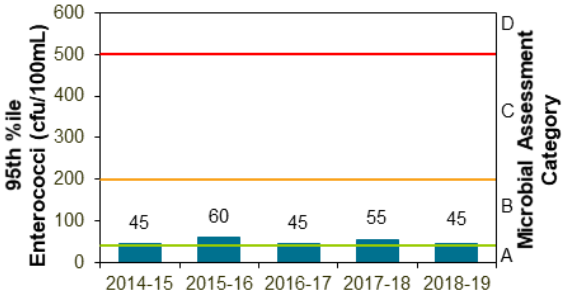
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	97%	100	Stable

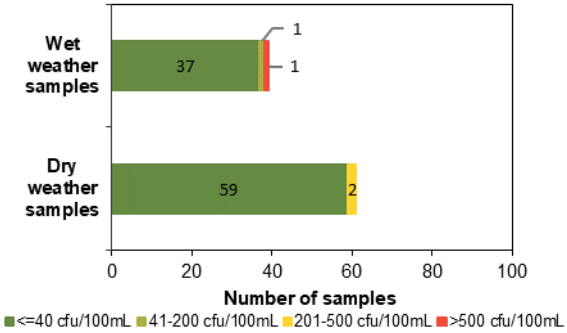
Sanitary inspection: Low



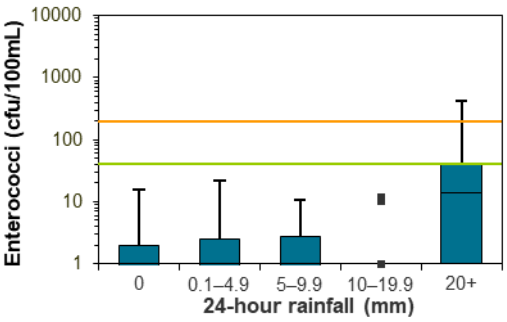
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Brou Beach

Beach grade: VG

See 'How to read this report' for key to map.

Brou Beach is located to the north of Dalmeny. The beach is approximately 6.5 kilometres long and is backed by Eurobodalla National Park.

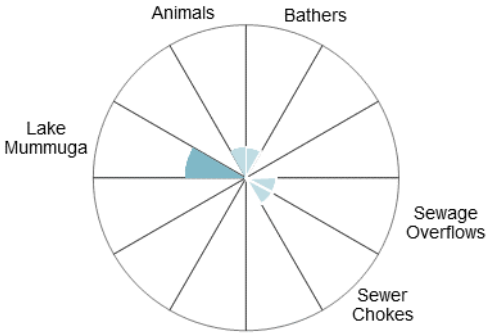
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after 20mm or more of rainfall.

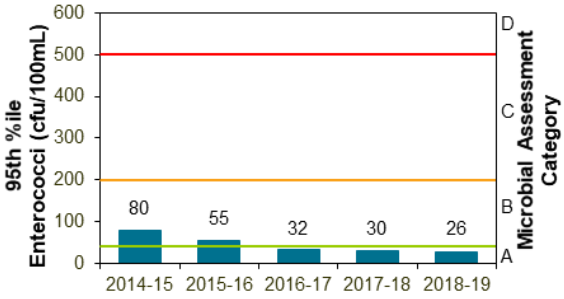
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	100%	100	Stable

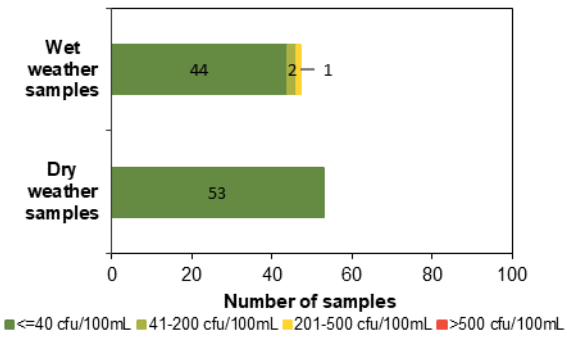
Sanitary inspection: Low



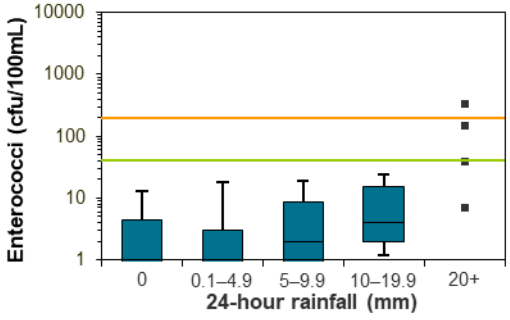
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Wagonga Inlet

Beach grade: G

See 'How to read this report' for key to map.

The swimming site is a netted enclosure at the mouth of Wagonga Inlet. The town of Narooma is located on the southern side of the inlet.

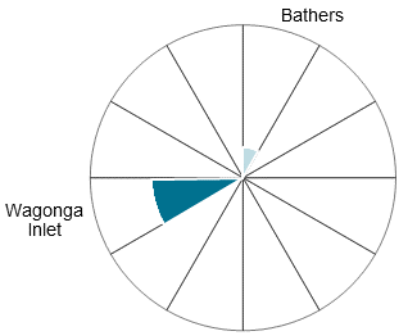
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time may be susceptible to pollution after rain, with potential faecal contamination from upstream sources in Wagonga Inlet.

Enterococci levels showed little response to rainfall, but occasionally exceeded the safe swimming limit after little or no rainfall.

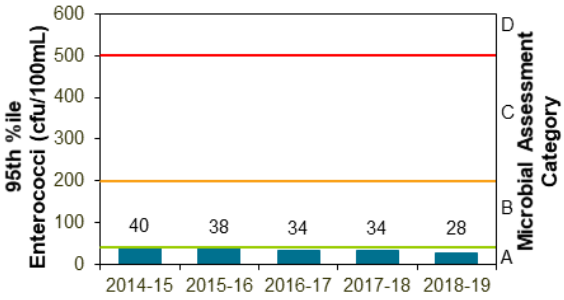
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Mar 2015 to Mar 2019	91%	100	Stable

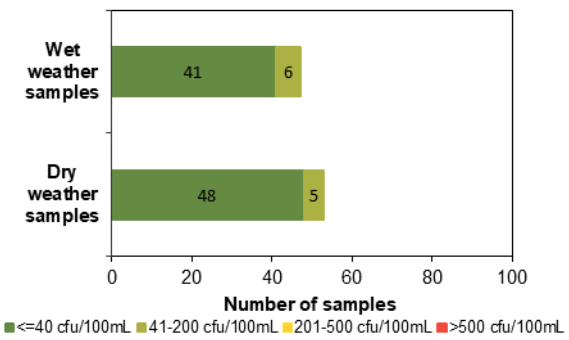
Sanitary inspection: Moderate



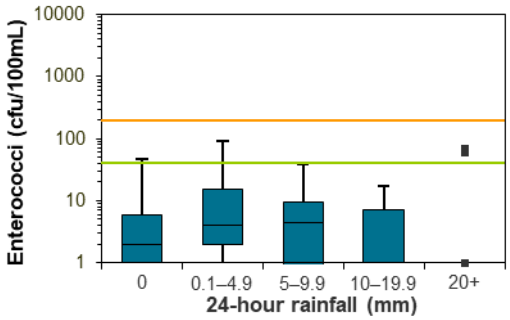
Microbial Assessment Category: A



Dry and wet weather water quality

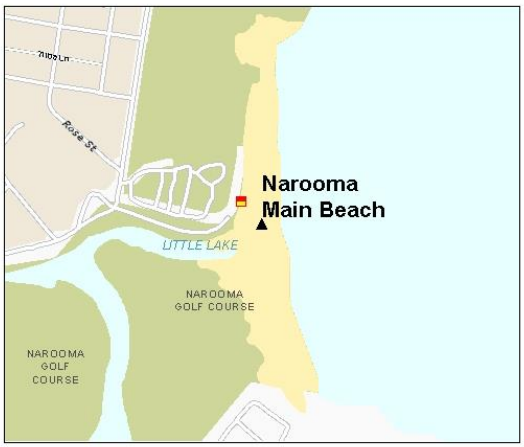


Water quality in response to rainfall



Narooma Main Beach

Beach grade: VG



See ‘How to read this report’ for key to map.

Narooma Beach is approximately 750 metres long and is patrolled on weekends and holidays during the summer months.

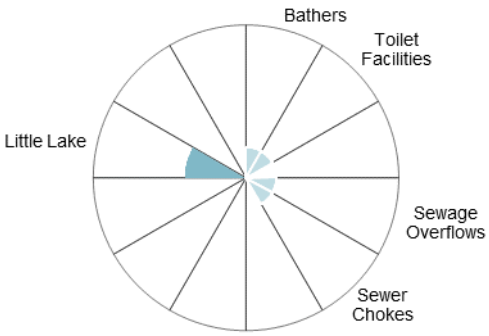
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

Enterococci levels had little response to rainfall, but occasionally exceeded the safe swimming limit after 5mm or more of rainfall.

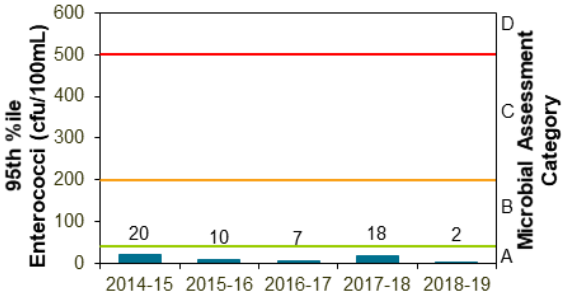
The site has been monitored since 2002.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Mar 2015 to Mar 2019	100%	100	Stable

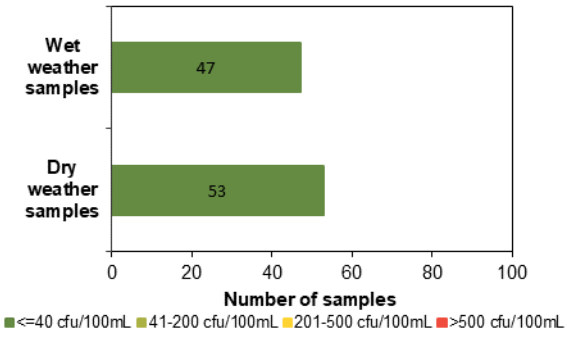
Sanitary inspection: Low



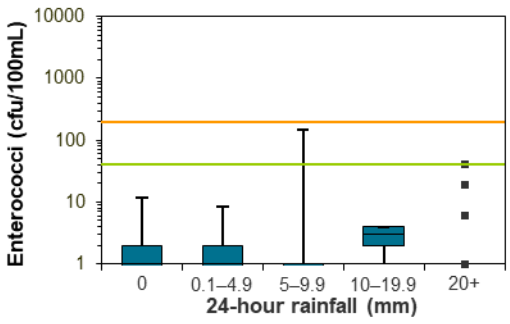
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Bega Valley Shire Council

Overall results

100%
swimming sites graded Good or Very Good

All 15 swimming sites were graded as Very Good or Good in 2018–2019. This performance is consistent with previous years.

Percentage of sites graded as Very Good or Good:

- 2018–2019: 100%
- 2017–2018: 100%
- 2016–2017: 100%.

Fifteen swimming sites were monitored by Bega Valley Shire Council. Samples were collected weekly between November and March, and sampling and analysis was fully funded by the council.

Mogareeka Lions Park was added to council's monitoring program in the 2018–2019 summer season. The beach grades for all of Bega Valley Shire Council's monitored swimming sites are provisional as the information required for the analysis is incomplete due to limited bacterial data. Further monitoring will provide an improved understanding of water quality at these sites.

Proficiency testing for Bega Valley Shire Council laboratory indicates greater confidence can be placed in their results from 2016–2017 than in previous years. As a result, only data collected since 2016 have been included in the assessment to provide greater accuracy in reporting.

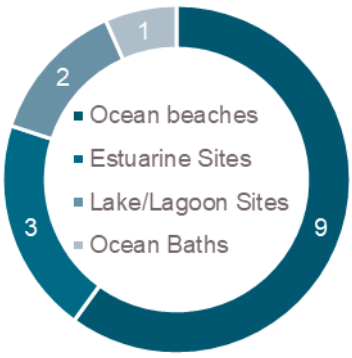
See the section on **Quality assurance** in the Statewide Summary for results of laboratory proficiency testing.

See the section on **How to read this report** on page 56 for an explanation of the graphs, tables and Beach Suitability Grades.

Best beaches

Camel Rock Beach, Horseshoe Bay (Bermagui), Beares Beach, Mogareeka Lions Park, Tathra Beach, Main Beach (Merimbula), Pambula Beach and Aslings Beach.

These sites had excellent water quality and were suitable for swimming almost all of the time.



Site types in Bega Valley Shire Council

Swimming sites monitored in the Bega Valley region include ocean beaches, estuarine areas in Bermagui River, Merimbula Lake and Pambula River, a lagoon/lake swimming site in Bega River and an ocean baths, with each site type having a different response to rainfall-related impacts.

In general, estuarine and lake/lagoon swimming sites do not perform as well as ocean beaches and ocean baths, due to lower levels of flushing which increase the time needed to disperse and dilute pollution inputs, taking longer to recover from stormwater events.

As a general precaution swimming should be avoided during and for at least one day after heavy rain at ocean beaches, and for up to three days in estuarine areas, or if there are signs of stormwater pollution such as discoloured water or floating debris.

Ocean beaches

Beach Suitability Grades for Bega Valley Shire Council ocean beaches

Seven of the nine ocean beaches were graded as Very Good: Camel Rock Beach, Horseshoe Bay (Bermagui), Beares Beach, Tathra Beach, Main Beach (Merimbula), Pambula Beach and Aslings Beach. Water quality at these sites was suitable for swimming almost all of the time.

Short Point Beach and Cocora Beach were graded as Good. Short Point Beach was downgraded to Good in 2018–2019, from Very Good in the previous year. While water quality at these sites was suitable for swimming most of the time, slightly elevated enterococci levels were occasionally recorded following rainfall.

While water quality has been of a good standard at the ocean beaches, the grades are provisional as the assessment is based on limited bacterial data. Continued monitoring will provide a clearer indication of the water quality at these sites.

Estuarine beaches

Beach Suitability Grades for Bega Valley Shire Council estuarine beaches

Bruce Steer Pool, Bar Beach and Pambula River Mouth continued to be graded as Good in 2018–2019, a similar result to the previous year. Water quality at these sites was suitable for swimming most of the time, with elevated enterococci levels occasionally recorded following rainfall. These sites can be impacted by upstream river sources and are not as well flushed as ocean beaches.

The grades are provisional at these sites as the assessment is based on limited bacterial data. Ongoing monitoring will continue to provide information about the water quality at the estuarine sites.

Lake/lagoon swimming sites

Beach Suitability Grades for Bega Valley Shire Council lake/lagoon swimming sites

Mogareeka Lions Park was graded as Very Good. Water quality was of a high standard, with all samples within the safe swimming limit in the 2018–2019 summer season. Sampling at Mogareeka Lions Park recommenced in late 2018; it was previously monitored from 2004 until 2010.

Mogareeka Inlet was graded as Good, similar to the previous year. While water quality at this site was suitable for swimming most of the time, slightly elevated enterococci levels were occasionally recorded following little or no rain. Water quality at this site can be impacted from upstream sources within the Bega River.

While water quality has been of a good standard for Mogareeka Lions Park and Mogareeka Inlet this year, the grades are provisional as the assessment is based on limited bacterial data. Further monitoring will provide a clearer indication of the water quality at these sites.

Ocean baths

Beach Suitability Grades for Bega Valley Shire Council ocean baths

Big Blue Pool was graded as Good in 2018–2019, downgraded from Very Good in the previous year. While the grade has declined, water quality was suitable for swimming most of the time. Slightly elevated results have been recorded on two occasions since 2016, associated with rainfall in the previous two days.

The Good grade for Big Blue Pool is provisional, as the assessment is based on limited bacterial data. Continued monitoring will improve understanding of water quality at this site.

Management

Patrolled ocean beach
Photo: Beachwatch/EES, DPIE

Bega Valley Shire Council

Coastal management programs (CMPs) are being prepared by Bega Valley Shire Council in partnership with the Department of Planning, Industry and Environment for Bermagui, Wallaga Lake, Merimbula, Back Lake and Curalo estuaries, with funding provided under the NSW Government's Coastal and Estuary Grants Program. The CMPs will identify catchment pressures and prioritise management initiatives for issues relating to estuary health. Water quality management actions such as stormwater infrastructure improvements, restoring and maintaining

riparian areas and strategic land-use planning will be considered during the process.

Council also has a Coastal Zone Management Plan (CZMP) for Pambula estuary, rapid catchment assessment for Nelson, Middle and Cuttagee estuaries, an estuary management plan for Bega River as well as older plans for several other estuaries. Council and Local Land Services have been implementing actions from these plans focused on improving estuary health. This has included riparian restoration, bank stabilisation and sealing dirt roads.

Bega Valley Shire Council is responsible for the stormwater drainage network of 109km in the urban areas. Wastewater is collected and treated from 13,500 customers across the shire.

Council undertakes a range of activities to minimise the risk of sewer overflows and associated impacts on water quality. These include investigation, planning, operational and asset management activities. In 2017 council commenced a review of the sewerage system risk-based environmental management plan. This work ensures sewerage system infrastructure near beaches and waterways is classified as high risk, and both operational and capital works programs are implemented to focus on these areas. The council is committed to reducing the industry metric of number of sewer chokes and overflows per 1000 connected properties through these measures. In 2019, council Environmental Health and Water and Sewer staff continued to meet with NSW Food Authority Shellfish Program officers to seek and attain best practice with respect to sewage system management, for the prevention of sewer overflow events.

Poorly performing onsite sewage management systems are a known risk to council and this is managed through ongoing inspections and approvals. Sites identified as having critical risk systems are inspected annually.

Environmental studies have concluded the preliminary stages of a proposed ocean outfall pipe project in Merimbula Bay. The proposed $25 million project will pump treated effluent from the Merimbula STP approximately 4km out to sea where the study has found that deep water currents will prevent the effluent washing back to shore. The outfall pipe will significantly reduce pressure on the sewage system, which can become inundated at times of heavy rain or increased use during peak tourist season. The outcome will reduce the impact to local industry and the environment, which includes a tidal lake, oyster and mussel leases, and Merimbula Bay, a popular tourist spot. Currently the treated effluent is pumped into the bay from a beach-located outlet pipe.

A **Coastal Management Program** (CMP) outlines a long-term strategy for managing the coast, in line with the *Coastal Management Act 2016*.

The NSW Government provides guidance and funding through the Coastal and Estuary Grants Program for local councils to prepare and implement CMPs.

Under the previous *Coastal Protection Act 1979*, councils developed a **Coastal Zone Management Plan** (CZMP) to address coastal issues. Councils can continue to implement priority actions from certified CZMPs with funding assistance from the NSW Government's Coastal and Estuary Grants Program until 2021.

Cocora Beach
Photo: Beachwatch/EES, DPIE

Council has worked with planning consultants to develop masterplans for the Bruce Steer Pool area in Bermagui, Short Point in Merimbula and the Pambula Surf Club. NSW Government funding has been secured, with the plans focusing on increasing accessibility, upgrading amenities, and revegetation of the sites.

A review of planned biosolids and treatment process upgrades for council's STPs has been undertaken. Proposed upgrades to Bermagui STP are planned to be completed by the end of 2019. Council is currently in the planning phase to upgrade Tura Beach STP and it is hoped these works will be completed in 2022.

Council opened the Bega River mouth to the ocean north of Tathra in February 2019. This was to reduce the river height and allow flushing of the system.

Sampling sites and Beach Suitability Grades in Bega Valley Shire Council

Camel Rock Beach

Beach grade: VG^

See ‘How to read this report’ for key to map.

Camel Rock Beach is located to the north of Bermagui and is backed by a reserve.

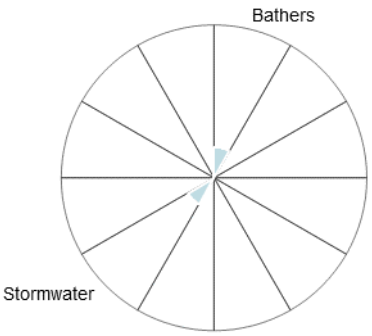
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with very few potential sources of faecal contamination.

Enterococci levels had little response to rainfall and remained below the safe swimming limit across all rainfall categories.

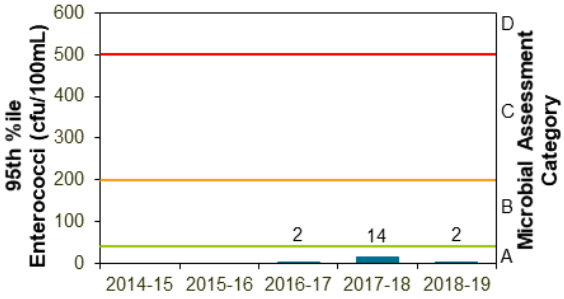
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2016 to Mar 2019	100%	35	Stable

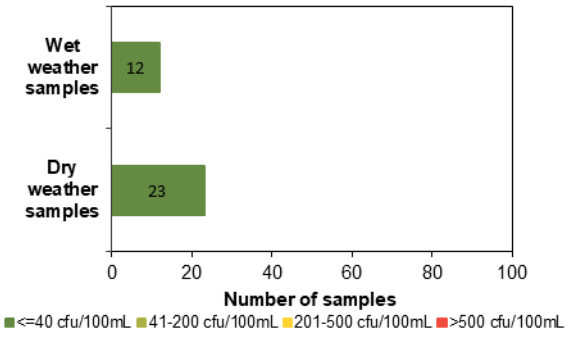
Sanitary inspection: Low



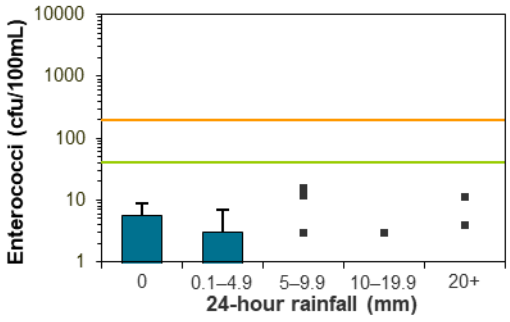
Microbial Assessment Category: A



Dry and wet weather water quality

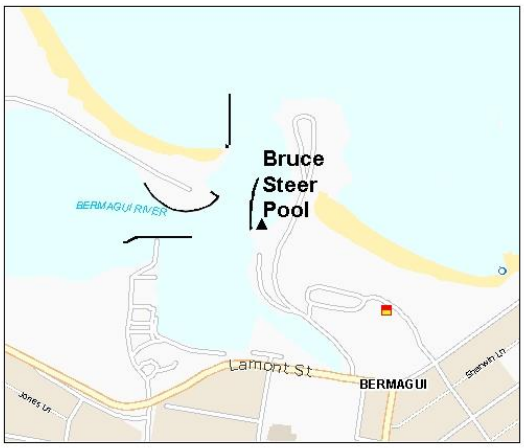


Water quality in response to rainfall



Bruce Steer Pool

Beach grade: G^



See ‘How to read this report’ for key to map.

Bruce Steer Pool is a netted enclosure located in protected waters near the entrance to Bermagui Harbour.

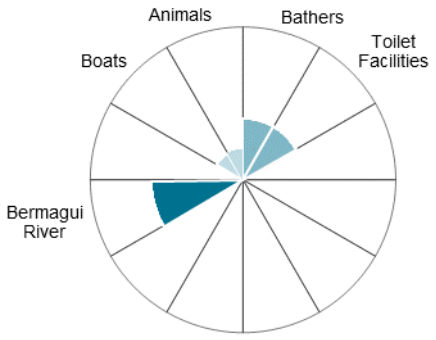
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including river discharge.

Enterococci levels increased slightly with increased rainfall, but generally remained below the safe swimming limit across all rainfall categories.

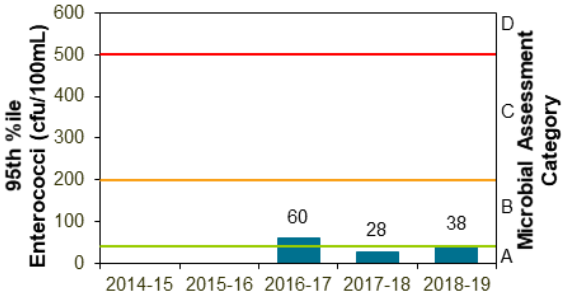
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Nov 2016 to Mar 2019	100%	38	Stable

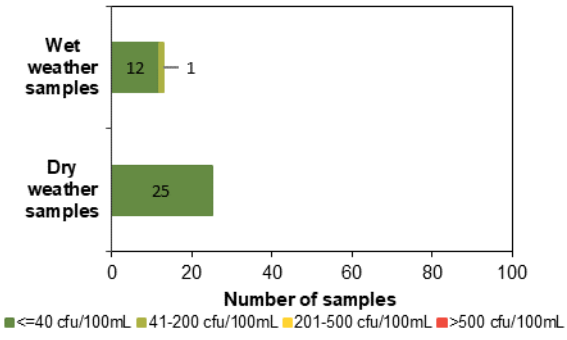
Sanitary inspection: Moderate



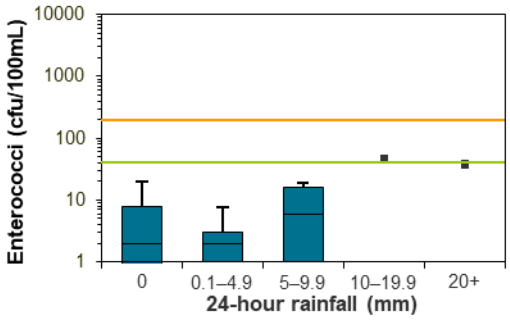
Microbial Assessment Category: A



Dry and wet weather water quality

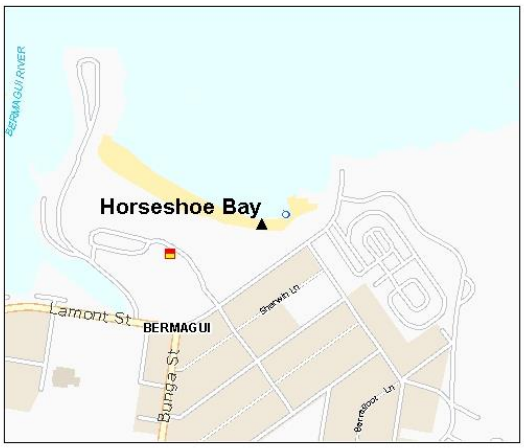


Water quality in response to rainfall



Horseshoe Bay (Bermagui)

Beach grade: VG^



Horseshoe Bay is approximately 300 metres long and is patrolled during the summer months.

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

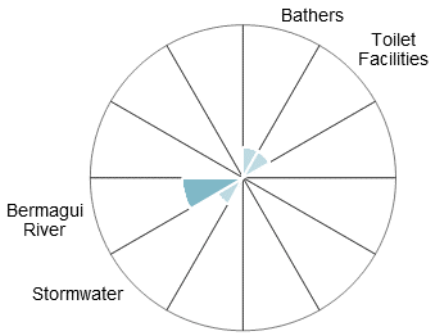
Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to 5mm or more of rain.

The site has been monitored since 2004.

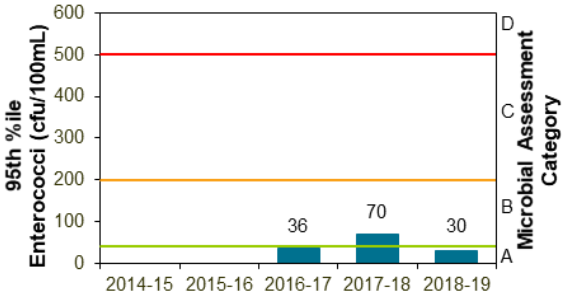
See ‘How to read this report’ for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2016 to Mar 2019	96%	37	Improved

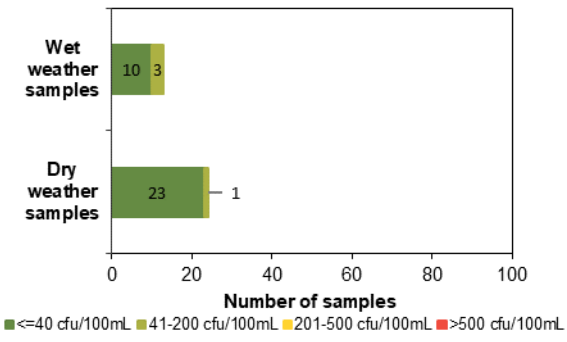
Sanitary inspection: Low



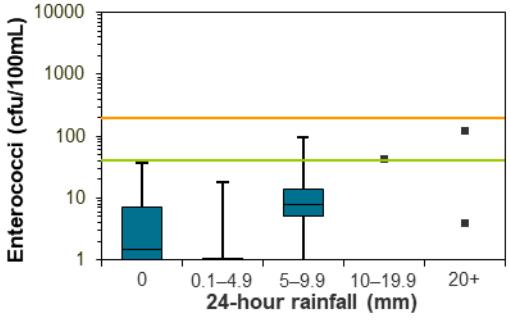
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Big Blue Pool

Beach grade: G^

See ‘How to read this report’ for key to map.

Big Blue Pool is a historic swimming area located on the headland to the south of Horseshoe Bay.

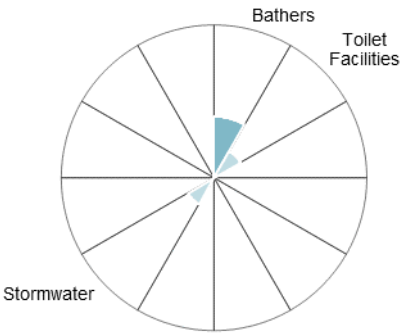
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of faecal contamination.

Enterococci levels had little response to rainfall and generally remained below the safe swimming limit across all rainfall categories.

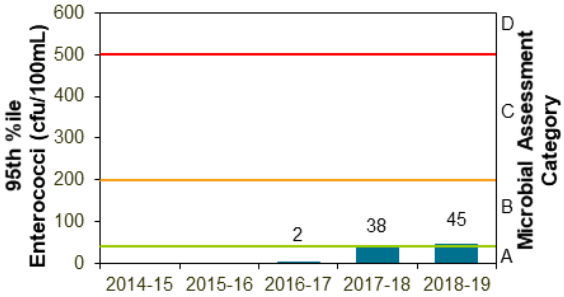
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean baths	Nov 2016 to Mar 2019	96%	36	Declined

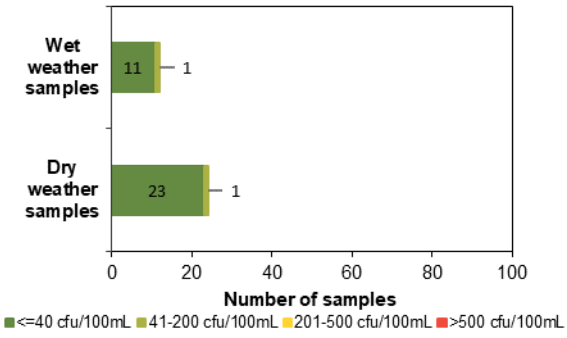
Sanitary inspection: Low



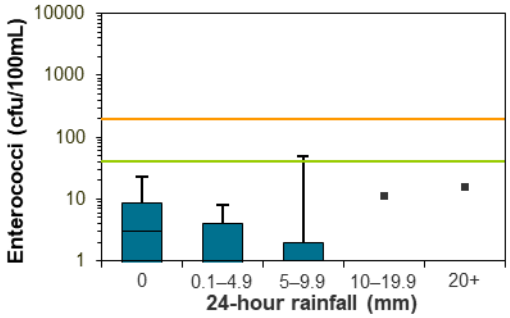
Microbial Assessment Category: B



Dry and wet weather water quality

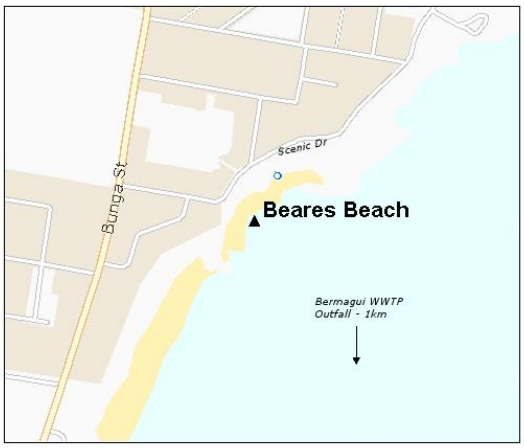


Water quality in response to rainfall



Beares Beach

Beach grade: VG^



Beares Beach is a small, exposed beach located just south of the town of Bermagui.

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

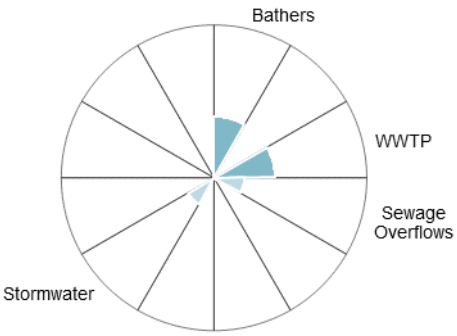
Enterococci levels had little response to rainfall and remained below the safe swimming limit across all rainfall categories.

The site has been monitored since 2004.

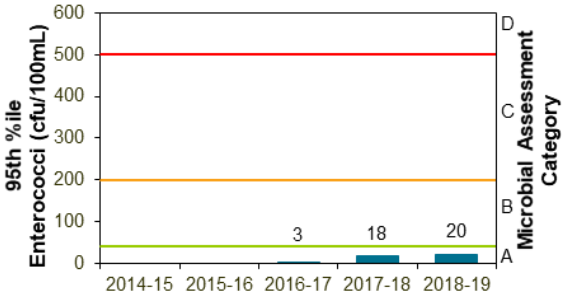
See ‘How to read this report’ for key to map.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2016 to Mar 2019	100%	34	Stable

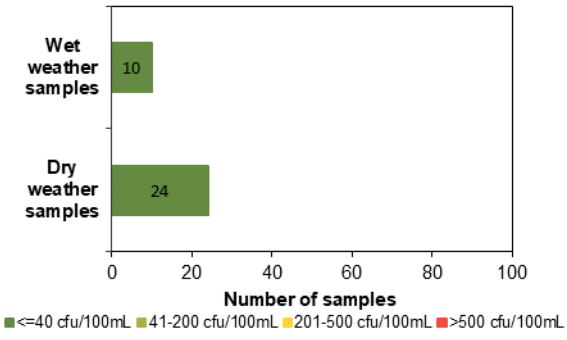
Sanitary inspection: Low



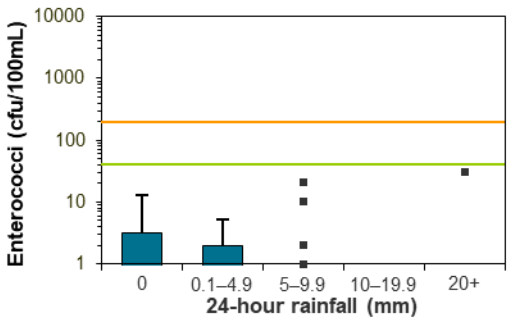
Microbial Assessment Category: A



Dry and wet weather water quality

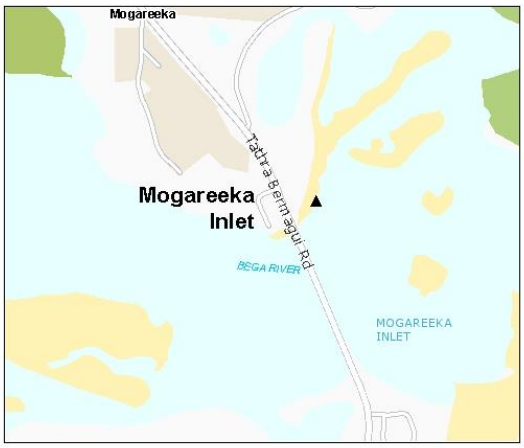


Water quality in response to rainfall



Mogareeka Inlet

Beach grade: G^



See ‘How to read this report’ for key to map.

Mogareeka Inlet is on the northern side of the Bega River estuary, about 500 metres upstream of the entrance. The inlet is intermittently open to the ocean.

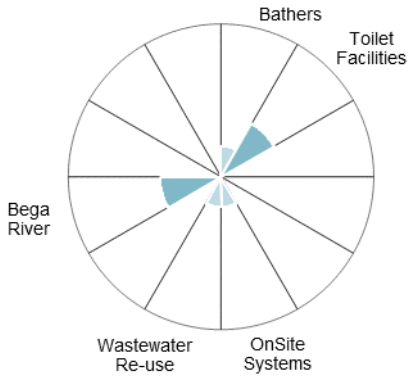
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination.

Enterococci levels increased with increasing rainfall, occasionally exceeding the safe swimming limit after no rain, and after 20mm or more of rainfall.

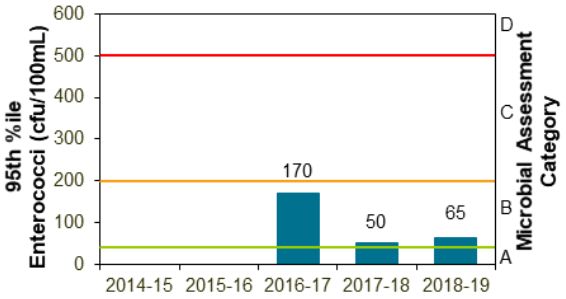
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Nov 2016 to Mar 2019	90%	37	Stable

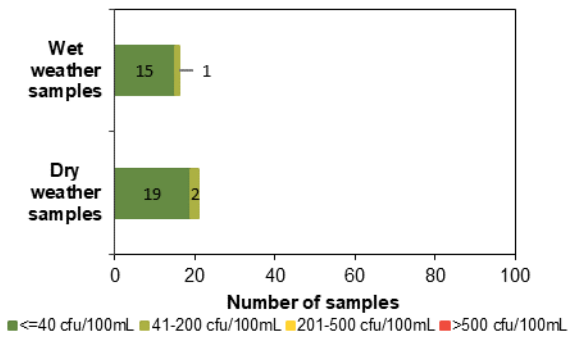
Sanitary inspection: Low



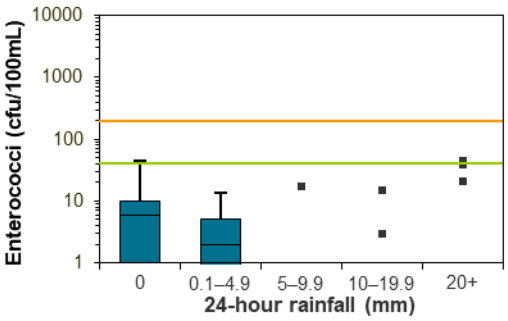
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Mogareeka Lions Park

Beach grade: VG^

See ‘How to read this report’ for key to map.

Mogareeka Lions Park is located on the southern side of the Bega River estuary, about 500 metres upstream of the entrance. The inlet is intermittently open to the ocean.

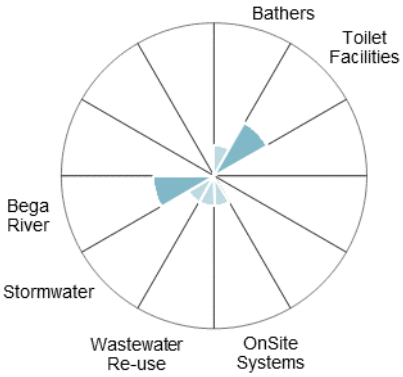
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

Enterococci levels had little response to rainfall and remained below the safe swimming limit across all rainfall categories.

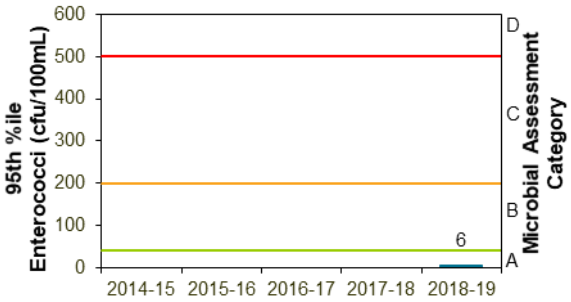
The site was monitored in 2004 until 2010, and since 2018.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Lake/Lagoon	Nov 2018 to Mar 2019	100%	14	–

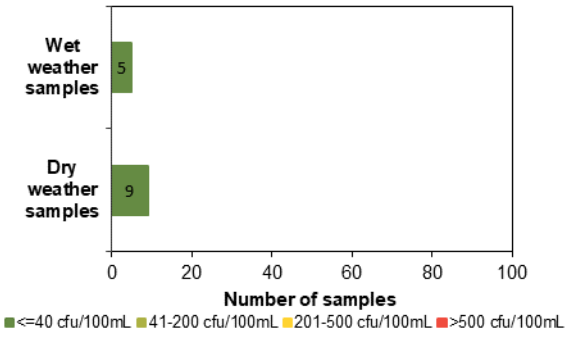
Sanitary inspection: Low



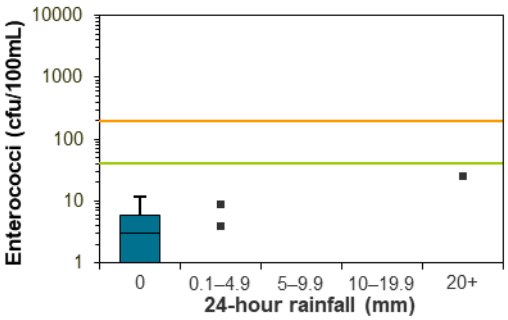
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Tathra Beach

Beach grade: VG^

See ‘How to read this report’ for key to map.

Tathra Beach is a popular beach stretching for approximately five kilometres. The beach is patrolled during the summer months.

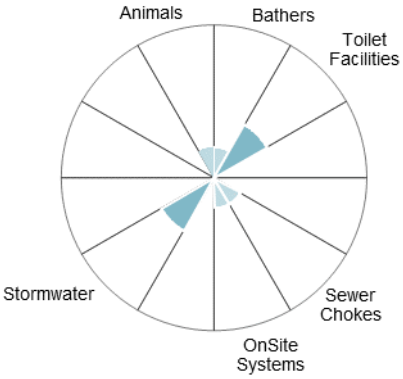
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

Enterococci levels increased slightly with increasing rainfall but generally remained below the safe swimming limit across all rainfall categories.

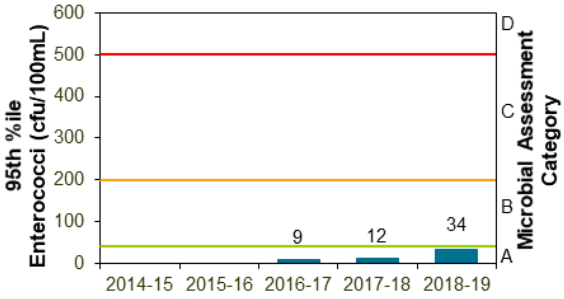
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2016 to Mar 2019	95%	37	Stable

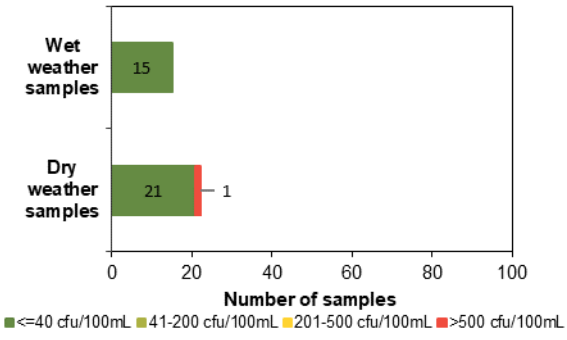
Sanitary inspection: Low



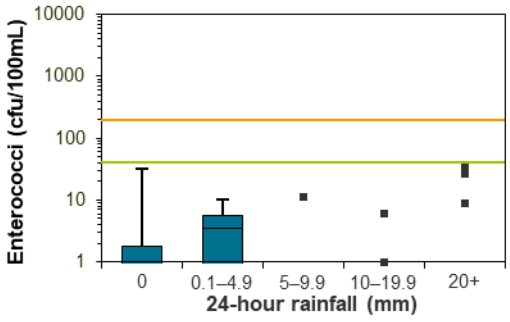
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Short Point Beach

Beach grade: G^

See ‘How to read this report’ for key to map.

Short Point Beach is located between the towns of Merimbula and Tura. It is patrolled during summer holidays.

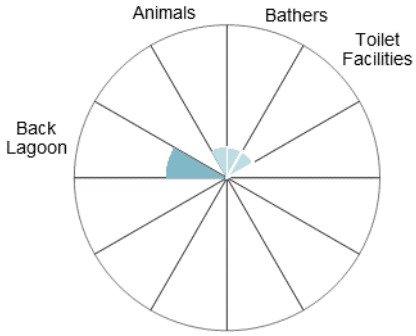
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but can be susceptible to pollution after rain, with several potential sources of minor faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to light rain.

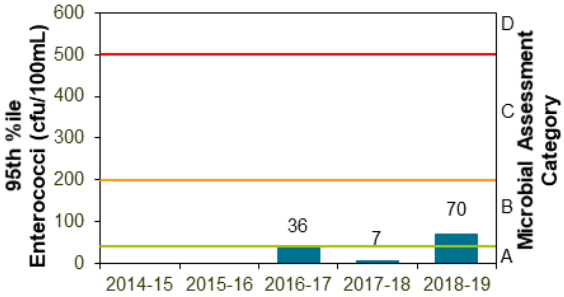
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2016 to Mar 2019	96%	38	Declined

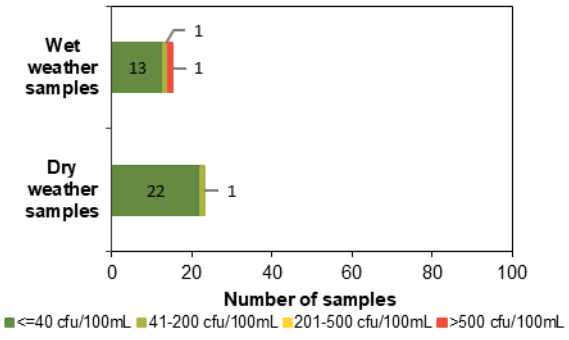
Sanitary inspection: Low



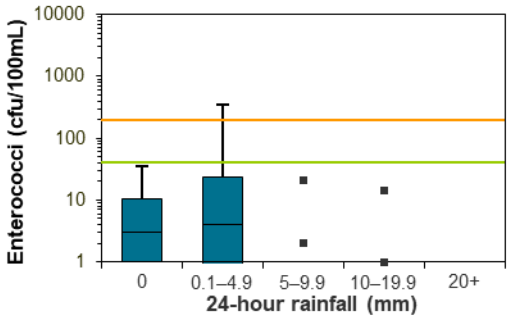
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Bar Beach

Beach grade: G^

See ‘How to read this report’ for key to map.

Bar Beach is located on the northern side of the inlet to Merimbula Lake. The beach is patrolled during the summer holidays.

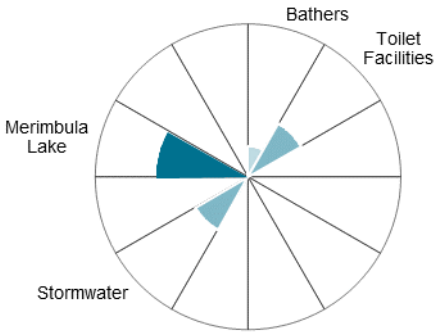
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including outflow from Merimbula Lake.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit in response to light rainfall.

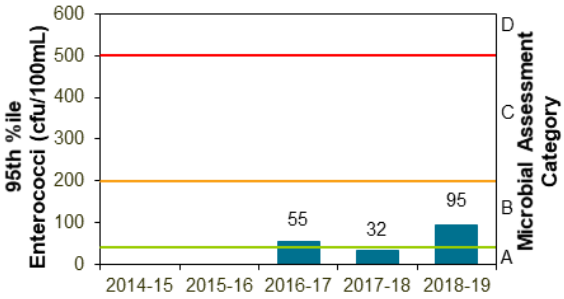
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Nov 2016 to Mar 2019	100%	37	Stable

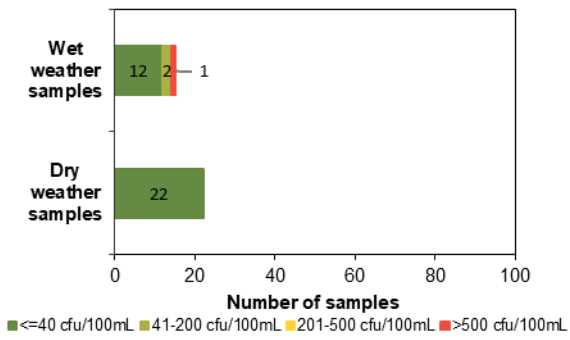
Sanitary inspection: Moderate



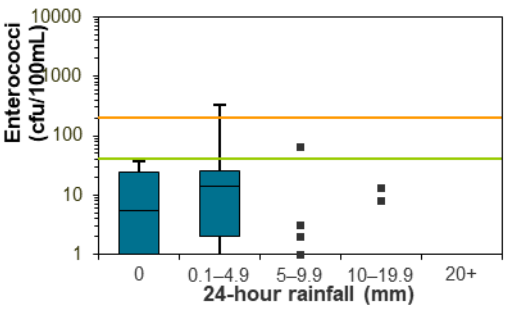
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



Main Beach (Merimbula)

Beach grade: VG^

See 'How to read this report' for key to map.

Merimbula Main Beach is located on the southern side of Merimbula Lake. It is patrolled during the summer holidays.

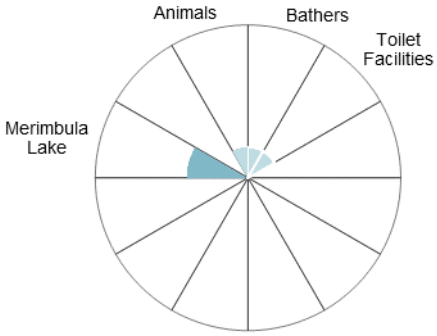
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of faecal contamination.

Enterococci levels increased slightly with increasing rainfall but generally remained below the safe swimming limit across all rainfall categories.

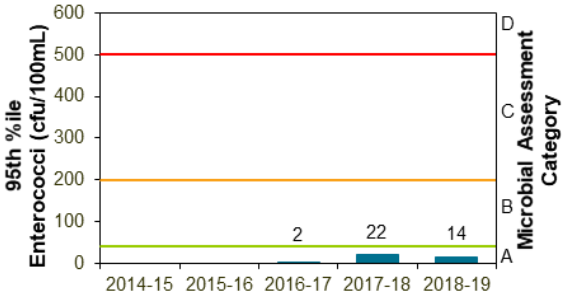
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Dec 2016 to Mar 2019	100%	38	Stable

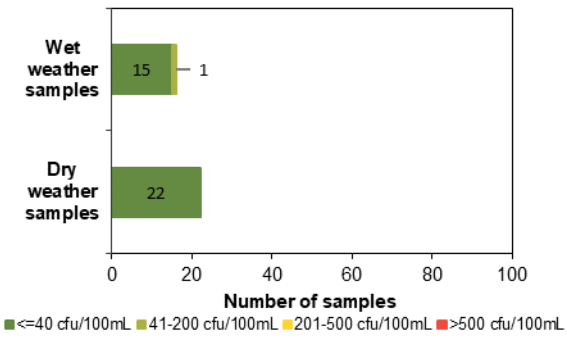
Sanitary inspection: Low



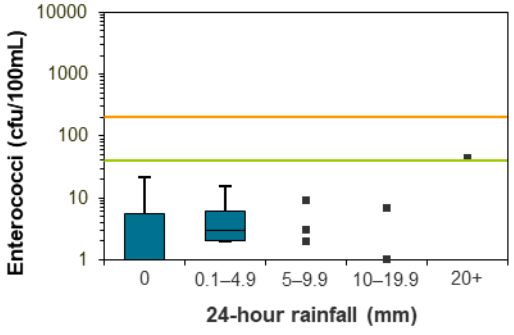
Microbial Assessment Category: A



Dry and wet weather water quality

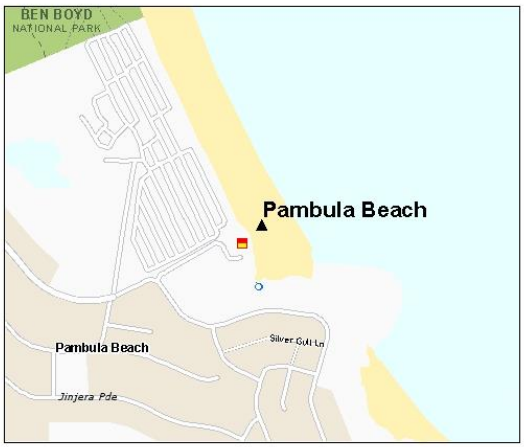


Water quality in response to rainfall



Pambula Beach

Beach grade: VG^



See ‘How to read this report’ for key to map.

Pambula Beach is located to the north of Pambula River and is patrolled during the summer months.

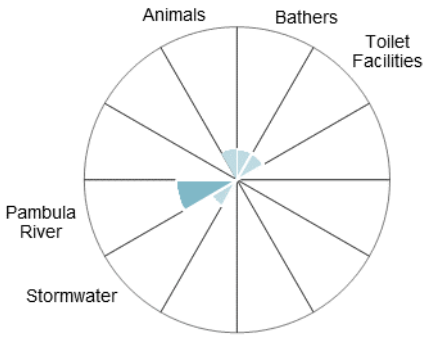
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with few potential sources of significant faecal contamination.

Enterococci levels increased slightly with increasing rainfall but remained below the safe swimming limit across all rainfall categories.

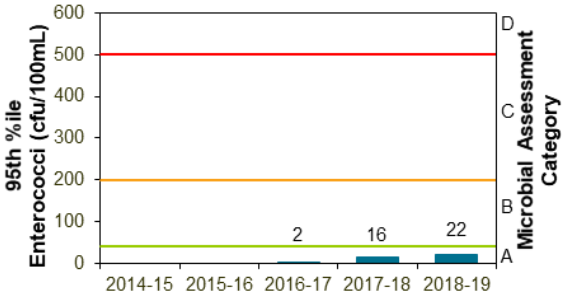
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2016 to Mar 2019	100%	39	Stable

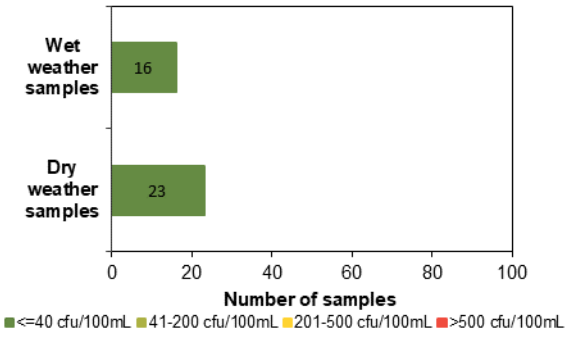
Sanitary inspection: Low



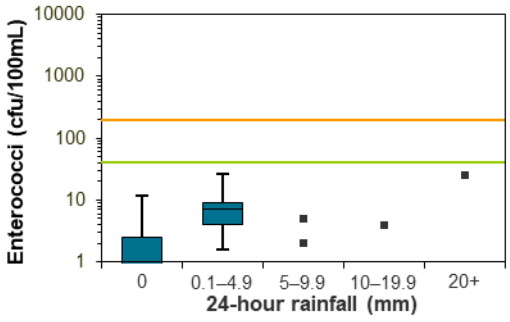
Microbial Assessment Category: A



Dry and wet weather water quality

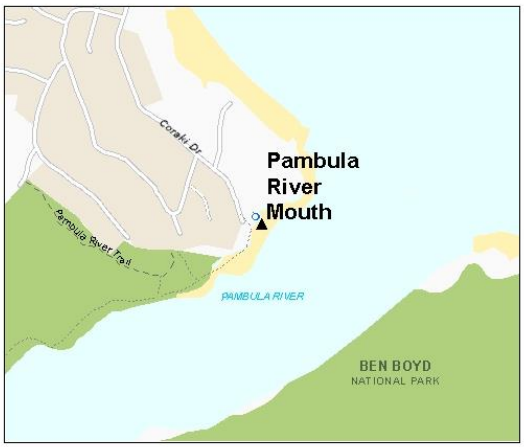


Water quality in response to rainfall



Pambula River Mouth

Beach grade: G^



See 'How to read this report' for key to map.

The mouth of Pambula River is a shallow sandy tidal flat. The river is well-flushed.

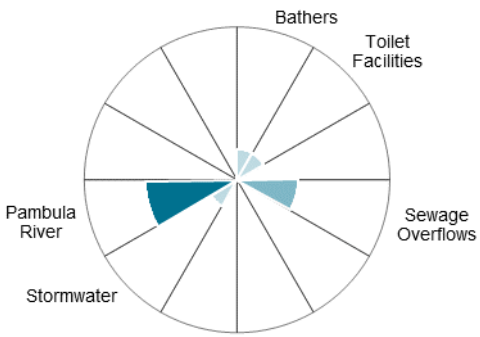
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination including outflow from Pambula River.

Enterococci levels had little response to rainfall, occasionally exceeding the safe swimming limit after little or no rain.

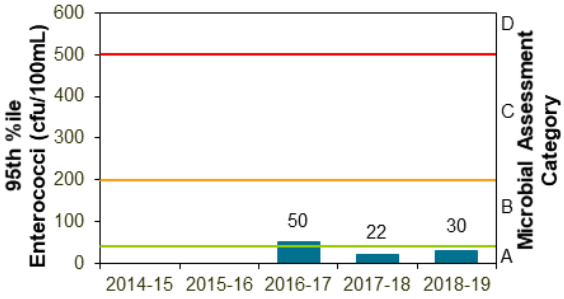
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Estuarine	Nov 2016 to Mar 2019	92%	40	Stable

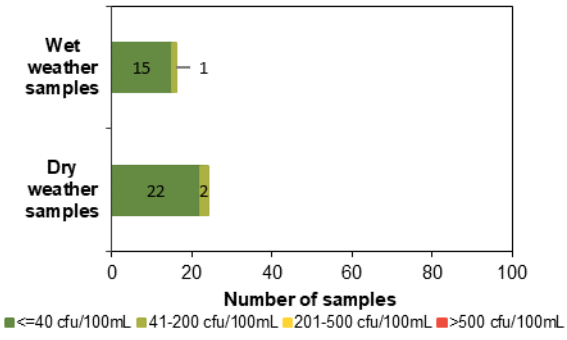
Sanitary inspection: Moderate



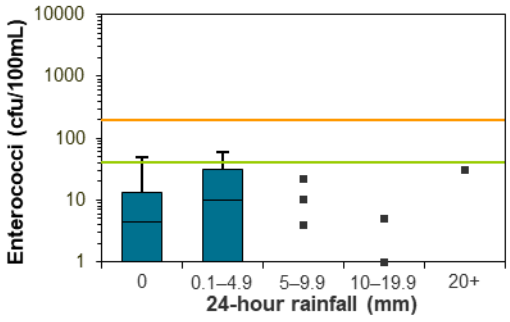
Microbial Assessment Category: A



Dry and wet weather water quality

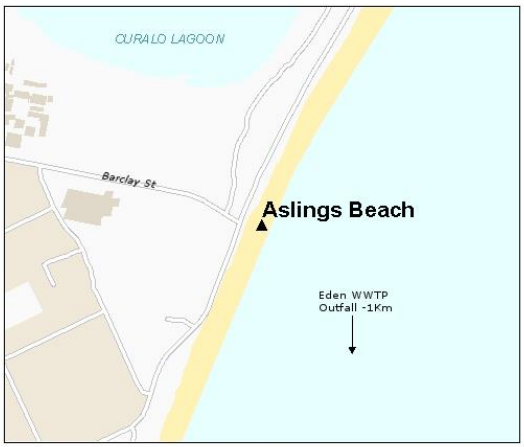


Water quality in response to rainfall



Aslings Beach

Beach grade: VG^



See ‘How to read this report’ for key to map.

Aslings Beach is the main surf beach in Eden. The southern end of the beach is patrolled during the summer months.

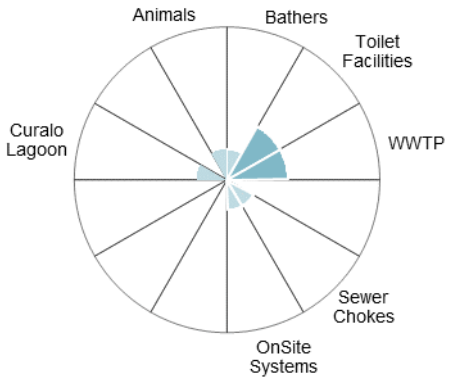
The Beach Suitability Grade of Very Good indicates microbial water quality is considered suitable for swimming almost all of the time, with several potential sources of minor faecal contamination.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after little or no rainfall.

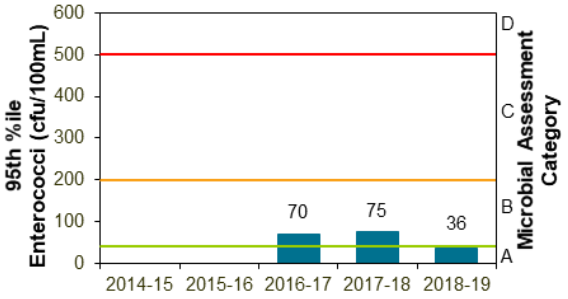
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2016 to Mar 2019	93%	39	Improved ↑

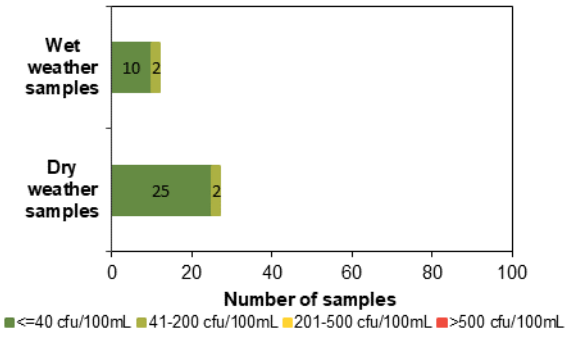
Sanitary inspection: Low



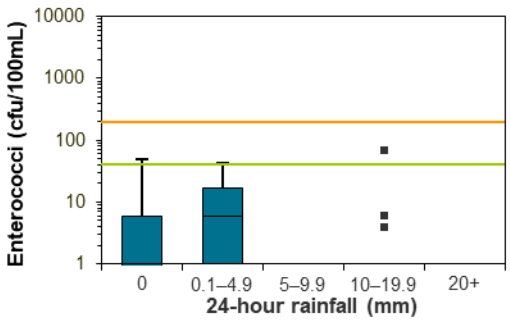
Microbial Assessment Category: A



Dry and wet weather water quality



Water quality in response to rainfall



Cocora Beach

Beach grade: G^

See ‘How to read this report’ for key to map.

Cocora Beach is a protected ocean beach in the north of Twofold Bay.

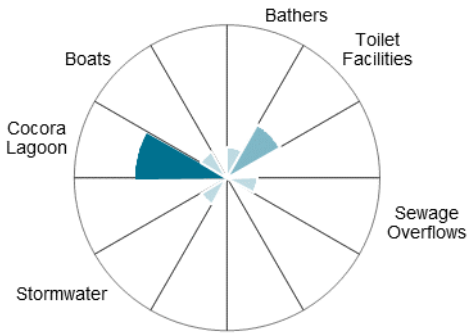
The Beach Suitability Grade of Good indicates microbial water quality is considered suitable for swimming most of the time but may be susceptible to pollution after rain, with several potential sources of faecal contamination, including outflow from Cocora Lagoon.

Enterococci levels increased slightly with increasing rainfall, occasionally exceeding the safe swimming limit after little rainfall.

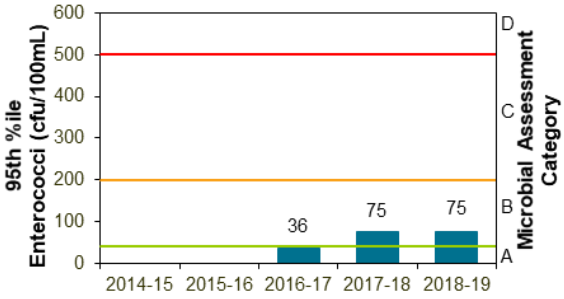
The site has been monitored since 2004.

Site type	Assessment period	Dry weather samples suitable for swimming	Water samples	Beach grade status
Ocean beach	Nov 2016 to Mar 2019	96%	39	Stable

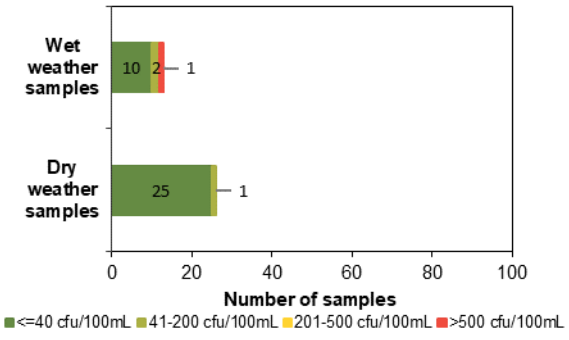
Sanitary inspection: Moderate



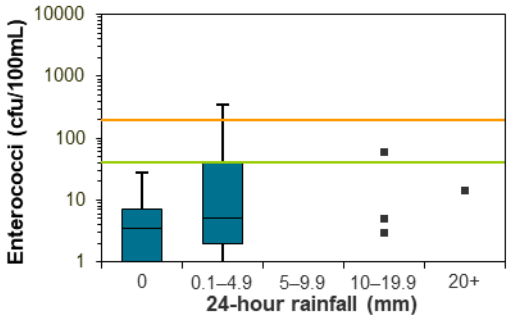
Microbial Assessment Category: B



Dry and wet weather water quality



Water quality in response to rainfall



How to read this report

Beach Suitability Grades

Beach Suitability Grades provide an assessment of the suitability of a swimming location for recreation over time and are based on a combination of sanitary inspection (identification and rating of potential pollution sources at a beach) and microbial assessment (water quality measurements gathered over previous years). There are five grades ranging from Very Good to Very Poor:

VG Very Good

Location has generally excellent microbial water quality and very few potential sources of faecal pollution. Water is considered suitable for swimming almost all of the time

G Good

Location has generally good microbial water quality and water is considered suitable for swimming most of the time. Swimming should be avoided during and for up to one day following heavy rain at ocean beaches and up to three days at estuarine sites

F Fair

Microbial water quality is generally suitable for swimming, but because of the presence of significant sources of faecal contamination, extra care should be taken to avoid swimming during and for up to three days following rainfall or if there are signs of pollution such as discoloured water or odour or debris in the water

P Poor

Location is susceptible to faecal pollution and microbial water quality is not always suitable for swimming. During dry weather conditions, ensure that the swimming location is free of signs of pollution, such as discoloured water, odour or debris in the water, and avoid swimming at all times during and for up to three days following rainfall

VP Very Poor

Location is very susceptible to faecal pollution and microbial water quality may often be unsuitable for swimming. It is generally recommended to avoid swimming at these sites almost all of the time

Some of the Beach Suitability Grades in this report are **provisional**, as the information required for the analysis is incomplete due to limited bacterial data or limited information on potential pollution sources in a beach catchment.

The guidelines

The National Health and Medical Research Council's *Guidelines for managing risks in recreational water*[1] were adopted for use in New South Wales in May 2009. These guidelines have been adopted in all Australian states and territories and are supported by guidance notes developed by the Department of Health Western Australia[2].

---

[1]NHMRC 2008, *Guidelines for managing risks in recreational water*, National Health and Medical Research Council, Australian Government Publishing Service, Canberra, ACT.

[2]Department of Health, Western Australia 2007, *Microbial quality of recreational water guidance notes in support of chapter 5 of the National Health and Medical Research Council guidelines for managing risks in recreational water, 2006*, Department of Health, Western Australia and The University of Western Australia, October 2007, available at ww2.health.wa.gov.au/Articles/A_E/Environmental-waters-publications, accessed on 17/06/19.

Enterococci

The national guidelines advocate the use of enterococci as the single preferred faecal indicator in marine waters.

These bacteria are excreted in faeces and are rarely present in unpolluted waters. Enterococci have shown a clear dose–response relationship to disease outcomes in marine waters in the northern hemisphere. In accordance with the guidelines, Beachwatch tests for enterococci only. The enterococci density in water samples is analysed in the laboratory using method AS/NZS 4276.9:2007.

AS/NZS 4276.9:2007, *Water microbiology Method 9: Enterococci – Membrane filtration method (ISO 7899-2:2000, MOD)*, Standards Australia International Ltd, Sydney and Standards New Zealand, Wellington.

Enterococci are measured in colony forming units per 100mL of sample (cfu/100mL).

Beach Suitability Grades are determined by using the following matrix:

		Microbial Assessment Category			
		A	**B**	**C**	**D**
Sanitary Inspection Category	Very Low	Very Good	Very Good	Follow Up	Follow Up
	Low	Very Good	Good	Follow Up	Follow Up
	Moderate	Good	Good	Poor	Poor
	High	Good	Fair	Poor	Very Poor
	Very High	Follow Up	Fair	Poor	Very Poor

Using the Beach Suitability Grade classification matrix, sites assigned a moderate Sanitary Inspection Category can only be rated as Good or Poor with no option of Fair grades. This can create the impression of a large change in water quality when in fact there need only be a slight increase in bacterial counts to push it over the threshold, with no significant increase in the risk to public health.

Microbial Assessment Category (MAC)

There are four Microbial Assessment Categories (A to D) and these are determined from the 95th percentile of an enterococci dataset of at least 100 data points. Each MAC is associated with a risk of illness determined from epidemiological studies. The risks of illness shown below are not those associated with a single data point but are the overall risk of illness associated with an enterococci dataset with that 95th percentile[1].

Risk of illness associated with Microbial Assessment Categories

Category	Enterococci (cfu/100mL)	Illness risk*
A	≤40	GI illness risk: <1% AFR illness risk: <0.3%
B	41–200	GI illness risk: 1–5% AFR illness risk: 0.3–1.9%
C	201–500	GI illness risk: >5–10% AFR illness risk: >1.9–3.9%
D	>500	GI illness risk: >10% AFR illness risk: >3.9%

* GI = gastrointestinal illness; AFR = acute fever and rash

Calculating the MAC

The 95th percentile is a useful statistic for summarising the distribution of enterococci data at a site. It embodies elements of both the location of the distribution (how high/low the enterococci counts are) and the scale of the distribution (how variable the enterococci counts are).

The 95th percentile values for each of the four Microbial Assessment Categories were determined by the World Health Organization using enterococci data collected from swimming locations across Europe. These values will represent different probabilities of illness if the distribution of enterococci data from swimming locations in New South Wales differs from the European distribution.

[1] Wyer MD, Kay D, Fleisher JM, Salmon RL, Jones F, Godfree AF, Jackson G and Rogers A 1999, An experimental health related classification for marine waters, *Water Research* 33(3), pp.715–722.

In recognition of this issue, Dr Richard Lugg (Department of Health, Western Australia) has developed a Microsoft® Excel tool for calculating a modified 95th percentile that takes into account the distribution of data. This tool has been used to calculate the 95th percentile values presented in this report and has been adopted for use by other state governments in Australia.

The tool can be downloaded from: http://ww2.health.wa.gov.au/Articles/A_E/Environmental-waters-publications under *Forms and templates* [accessed 17/06/19].

Sanitary Inspection Category (SIC)

More information about the **sanitary inspection** process is available at:

www.environment.nsw.gov.au/topics/water/beaches/reporting-beach-water-quality/guidelines/sanitary-inspection.

The aim of a sanitary inspection is to identify all sources of faecal contamination that could affect a swimming location and assess the risk to public health posed by these sources. It is an assessment of the likelihood of bacterial contamination from identified pollution sources and should, to some degree, correlate with the bacterial water quality results obtained from sampling.

The main sources of faecal contamination considered in the sanitary inspection are: bathers, toilet facilities, wastewater treatment plants (WWTPs), sewage overflows, sewer chokes, onsite systems, wastewater re-use, stormwater, river discharge, lagoons, boats and animals.

Rivers, lakes and estuaries themselves can be potential sources of faecal contamination to sites located in these waterbodies, with contaminated water from upstream or surrounding areas impacting water quality at the swimming location. This source is captured in river discharge or lagoon category, and shown as the waterbody in the sanitary inspection charts.

Through the sanitary inspection process, beaches are categorised to reflect the overall likelihood of faecal contamination. There are five categories: Very Low, Low, Moderate, High and Very High.

Stormwater at Coogee Beach
Photo: Beachwatch/EES, DPIE

Stormwater in urban areas often contains sewage from leakages, overflows or sewer chokes when the sewerage system fails.

Sewage overflows can occur in wet weather when the network has exceeded capacity due to rainwater entering the system. The mix of sewage and rainwater discharges from designated overflow points and drains to waterways, usually via the stormwater system. Overflows from the sewerage system can also occur in dry weather due to mechanical failure or power outage.

Sewer chokes occur due to blockages in the pipes usually due to tree roots, oil, grease or debris. This causes sewage to back up and escape via sewer inspection points, designed overflow structures or cracks in the pipes, then drain to waterways, usually via the stormwater system.

Where there is a known history or evidence of sewage overflows or sewer chokes in the catchment they are identified as sources of potential faecal contamination, particularly if they are located close to the swimming location. In these instances, the risk posed by stormwater is adjusted accordingly to ensure the overall risk to public health is not overestimated.

Explanation of tables

Each region contains tables listing all monitored swimming sites including site type, beach grade and change in grade from the previous year.

The following symbols are used to show the change in beach grade from the previous year:

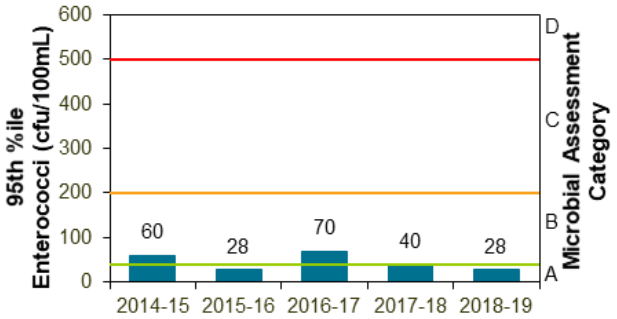
- Stable
- Improved
- Declined

A provisional grade indicates the assessment is based on limited data collected during the assessment period and should not be compared to the beach grade from the previous year.

Explanation of graphs, charts, and information bars on beach pages

Microbial Assessment Category (MAC) chart

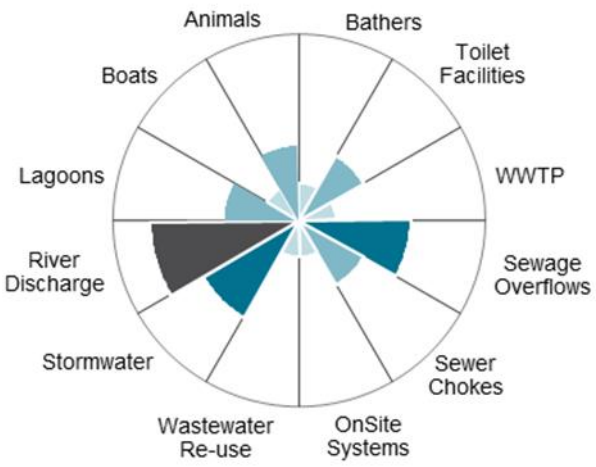
On each beach page, the MACs for the last five years are displayed on a simple bar chart. The MAC for the current year is based on enterococci data collected during the assessment period. The bars are labelled with the 95th percentile value for each year and the thresholds dividing the A, B, C and D categories are marked in green, amber and red for reference.



Sanitary Inspection Category (SIC) chart

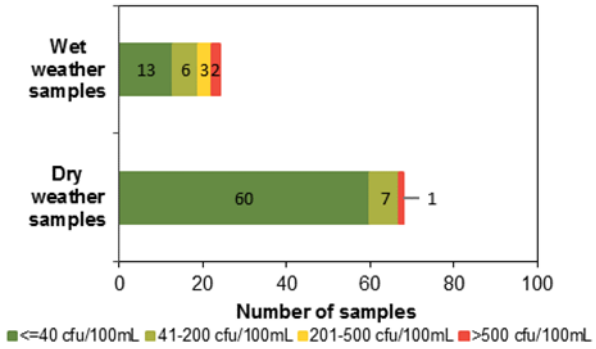
The results of the sanitary inspection for each swimming location are presented in a radar pie chart. The chart shows the likelihood that each identified pollution source will contribute to faecal contamination at a swimming site, as indicated by the size and colour of the segment, ranging from very low (lightest colour) to very high (darkest colour) as shown below. The sum of these contributions is the overall likelihood, or Sanitary Inspection Category.

Very Low	Low	Moderate	High	Very High



Wet and dry weather water quality chart

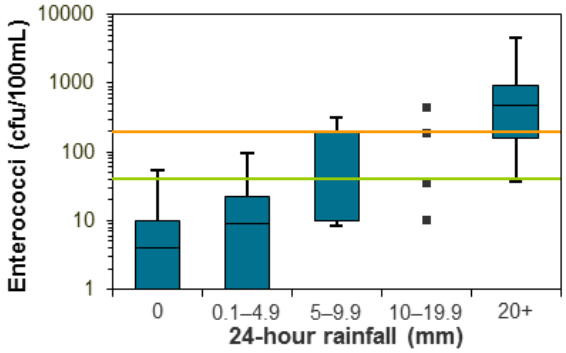
Enterococci levels in wet and dry weather conditions are presented for each swimming location as a bar graph. All data collected during the assessment period is included in the analysis. Dry weather is defined as no rainfall recorded in the previous 24 hours. Each bar is colour coded to show the number of enterococci results up to 40cfu/100mL, between 41 and 200cfu/100mL, between 201 and 500cfu/100mL and greater than 500cfu/100mL. These categories reflect the Microbial Assessment Category thresholds and are coloured on the graph as dark green, light green, amber and red respectively.



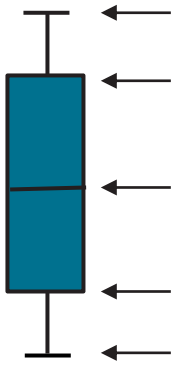
It is expected that swimming sites with lower levels of flushing show some elevated bacterial results in dry weather samples (no rainfall in the previous 24 hours) due to the longer time needed to recover from a rainfall event. At some estuarine and lake/lagoon swimming locations the impacts of stormwater pollution on beach water quality may be detected up to three days after rainfall.

Water quality in response to rainfall

Trends in enterococci levels in response to rainfall are shown using a box plot. For reference, enterococci levels of 40cfu/100mL and 200cfu/100mL are indicated with a green and orange line, respectively. The 40cfu/100mL level is referred to as the ‘safe swimming limit’. The enterococci data were obtained from the last five years of monitoring. Rainfall data were obtained from rain gauges situated close to the sample site and are 24-hour totals to 9am on the day of sampling. If there are fewer than five enterococci data points in a rainfall category, individual data points are presented instead of a box plot. At sites where many results are below the detection limit (1cfu/100mL), only the upper portion of the box plots will be visible.



Each part of the box plot represents a significant percentile value of the sample population:



95% of the samples lie below the top whisker

75% of the samples lie below the top of the box

half the samples are on each side of the middle line of the box (median or 50%ile)

25% of the samples lie below the bottom of the box

5% of the samples lie below the bottom whisker.

Information bars

Information bars on each beach page provide a summary of details about the swimming site.

The **assessment period** shows the timeframe in which the water samples were collected. The NHMRC guidelines state beach grades should be determined from the most recent 100 water quality results collected within a five-year period. The assessment period varies between sites depending on sampling frequency.

Dry weather samples suitable for swimming (**dry weather swimmability**) shows the percentage of water samples with enterococci levels below 40cfu/100mL. Dry weather is defined as no rainfall in the previous 24 hours. Swimming sites with lower levels of flushing often have a lower percentage of dry weather samples within the safe swimming limit due to the impacts of rainfall detected up to three days after the event.

Explanation of maps

A map of individual swimming locations is presented on each beach page. The scale of the maps is 1:10,000. Each map shows the location of the sampling site, land use and features such as surf lifesaving clubs. Potential pollution sources such as stormwater drains, sewage pumping stations, wastewater treatment plants, lagoons, rivers and creeks, are shown where accurate data is held.