



## Beachwatch

# State of the beaches 2022–23

Statewide summary and how to read this report

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Recreational water quality has been monitored in New South Wales by the Department of Planning and Environment's Beachwatch Program since 1989, and in partnership with coastal councils since 2002 under the Beachwatch Partnership Program. This report summarises the performance of 225 swimming sites along the NSW coast in 2022–2023, providing a long-term assessment of how suitable a site is for swimming. Monitored sites include ocean beaches, estuarine areas, lake, lagoon and freshwater swimming sites and ocean baths.

In 2022–2023 swimming sites in New South Wales performed well with 73% of monitored swimming sites graded as Good or Very Good, including 118 ocean beaches. These sites were suitable for swimming for most or almost all of the time. While this is a good result, it is a slight decline in performance from the previous year and reflects the wet weather conditions experienced in many coastal areas, including the wettest July on record and significant rainfall events. Many estuarine, lake, lagoon and freshwater swimming sites did not perform as well as ocean beaches, being more susceptible to impacts from wet weather conditions.

# State of the beaches statewide summary 2022– 2023



Queenscliff Beach  
Photo: Beachwatch/DPE

## Monitoring water quality for swimming in New South Wales

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 (2–4 years’ worth of data depending on the sampling frequency) and a risk assessment of potential pollution sources.

Recreational water quality has been monitored in New South Wales by the Department of Planning and Environment’s Beachwatch Program since 1989, and in partnership with councils since 2002 under the Beachwatch Partnership Program.

During 2022–2023, 225 swimming sites were monitored including ocean beaches, estuarine areas, lake, lagoon and freshwater swimming sites and ocean baths.

## Rainfall impacts

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 2022–2023 are based on water quality data collected over the last 2–4 years. Rainfall over this period has been diverse:

- 2019–2020: lengthy dry periods, with some isolated wet weather events and a significantly wet February
- 2020–2021: variable rainfall with significant wet weather events, including record wet months
- 2021–2022: extended periods of wet weather, including the wettest summer since 2012, record wet months and significant flooding events
- 2022–2023: variable rainfall, with some very wet months over winter and spring, including the wettest July on record in many coastal areas.

See the section on **How to read this report** on page 24 for an explanation of the graphs, tables and Beach Suitability Grades.

Winter 2022 was relatively wet with above average to average rainfall recorded along the NSW coast, except for the North Coast with June and August particularly dry in the Northern Rivers region. While June was very dry along the coast, total rainfall in July made it the wettest July on record in many coastal areas. Heavy rainfall resulted in major flooding in some areas including the Hawkesbury–Nepean catchment in Sydney. Drier conditions returned in August 2022 with below average rainfall recorded.

Wet conditions returned in spring 2022 in many coastal areas. Some areas on the South Coast had their highest spring total rainfall on record. The North Coast recorded well above average rainfall in September and October. Rainfall totals for October 2022 were up to 2 and a half times the long-term monthly average, with 245 mm, 247 mm and 242 mm recorded at Byron, Ballina and Evans Head respectively. Drier conditions followed in November with extended periods of dry weather in most coastal areas and below average rainfall recorded for the month.

Rainfall during summer was variable along the coast. Summer was drier than average in many areas including the North Coast and Mid-North Coast regions experiencing below average rainfall. Despite the dry conditions, significant rainfall events occurred during February, including daily rainfall totals of 64 mm and 136 mm recorded at Byron and Ballina respectively. Dry conditions were experienced in the Sydney, Illawarra and South Coast regions during December 2022 with well below average rainfall, and average to above average rainfall recorded during January and February 2023. Very heavy rainfall occurred on 9 February at Kiama and 10 February at Bellambi with daily totals of 127 mm and 116 mm respectively, when storms brought heavy rainfall to the region. Some areas on the South Coast received their highest summer daily rainfall total on record during

this time with 253 mm of rainfall recorded at Culburra on the South Coast.

Dry conditions extended along the coast in March with below average rainfall in many areas. Evans Head on the North Coast recorded a rainfall total of 66 mm, which was well below the long-term monthly average of 226 mm. Rainfall was close to average in most areas along the coast in April though above average rainfall was recorded on the South Coast, with Jervis Bay recording its highest total April rainfall on record.

Beach Suitability Grades at 6 swimming sites improved in 2022–2023. These sites included 4 ocean beaches upgraded from Good to Very Good and 2 ocean beaches upgraded from Poor to Good. Beach Suitability Grades at 20 swimming sites were downgraded from the previous year. While 6 ocean beaches and 2 estuarine swimming sites were downgraded from Very Good to Good, one ocean beach, 5 estuarine swimming sites, 3 lake/lagoon sites and one freshwater site crossed the threshold from Good to Poor. One estuarine swimming site was downgraded from fair to Poor and one estuarine site from Poor to Very Poor.

See the section on **Quality assurance** on page 33 for an explanation and results of the quality assurance program.

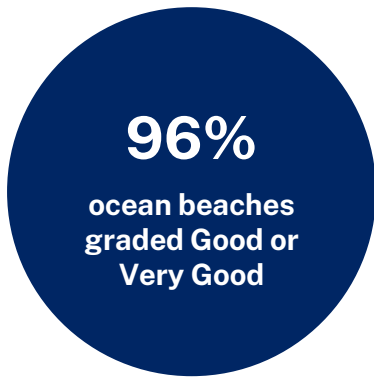
A quality assurance program ensures the information collected and reported by Beachwatch and our partners is accurate and reliable.

### 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.



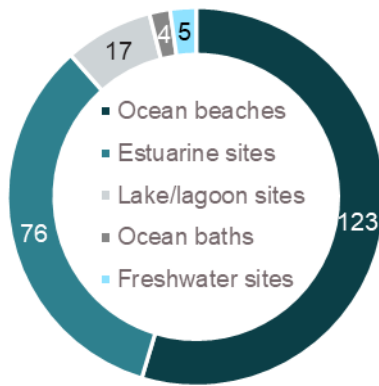
## Overall beach performance for 2022–2023

In 2022–2023, 165 of the 225 monitored swimming sites in New South Wales were graded as Very Good or Good, indicating they were suitable for swimming for most or almost all of the time, a slight decline in overall performance from the previous year when 80% of swimming sites were graded as Very Good or Good.

### Percentage of sites graded as Very Good or Good

	2020–2021	2021–2022	2022–2023	Trend
<b>Overall</b>	85% (210 sites)	80% (214 sites)	<b>73%</b> (225 sites)	
Ocean beaches	98% (118 sites)	94% (123 sites)	96% (123 sites)	
Estuarine sites	77% (71 sites)	68% (69 sites)	56% (75 sites)	
Lake/lagoon sites	24% (17 sites)	24% (17 sites)	6% (18 sites)	
Ocean baths	100% (4 sites)	100% (5 sites)	100% (4 sites)	
Freshwater sites	–	–	0% (5 sites)	





**Site types monitored in New South Wales by Beachwatch and partnership councils**

Changes in the percentage of sites graded as Very Good or Good reflect changes in water quality over time and may also be influenced by changes in the number of sites monitored each year. In 2022 Beachwatch expanded state-wide to include inland waterways and freshwater swimming sites in the monitoring program.

While overall results are good, many lake/lagoon, estuarine and freshwater swimming locations did not perform as well as ocean beaches, primarily due to lower levels of flushing increasing the time needed to disperse and dilute pollution inputs. As ocean beaches, estuarine beaches, lake/lagoon and freshwater swimming sites and ocean baths have very different responses to rainfall-related impacts, the results for each type of swimming area are discussed separately.

### Ocean beaches



**Beach Suitability Grades for monitored ocean beaches in New South Wales**

The open ocean beaches of New South Wales had excellent water quality in 2022–2023 with 96% of 123 monitored ocean beaches graded as Very Good or Good. This indicates they were suitable for swimming most or almost all of the time. This performance is a slight improvement on the 2021–2022 result, when 94% of 123 ocean beaches were graded as Very Good or Good.

The impacts of rainfall on water quality are least apparent at ocean beaches with tidal flushing rapidly dispersing and diluting pollution inputs.

Four ocean beaches were upgraded to Very Good in 2022–2023:

- Coledale Beach in the Illawarra
- Fingal Beach and South Stockton Beach in the Hunter
- Malua Bay Beach on the South Coast.

Two ocean beaches were upgraded to Good in 2022–2023:

- Toowoan Bay on the Central Coast
- Caseys Beach on the South Coast.

Five ocean beaches were graded as Poor in 2022–2023:

- Hungry Head Beach on the Mid-North Coast
- Terrigal Beach on the Central Coast
- Coogee Beach and Malabar Beach in Sydney
- Surf Beach on the South Coast.

Hungry Head Beach was graded as Poor in 2022–2023. This grade is provisional due to limited bacterial data and was influenced by wet weather impacts. While this site was mostly suitable for swimming in dry weather conditions, elevated bacterial levels were recorded following rainfall. Water quality can be impacted from lagoon outflow when Dalhousie Creek mouth is open.

Terrigal Beach continued to be graded Poor. Water quality at this site was mostly suitable for swimming in dry weather conditions, however, elevated enterococci levels were often recorded after rainfall. The microbial water quality at Terrigal Beach remains close to the threshold between Good and Poor, and this site has fluctuated between Good and Poor in recent years.

During 2019–2020 Central Coast Council, the then Department of Planning, Industry and Environment (DPIE) and the University of Technology Sydney investigated the scale and extent of elevated bacterial levels at Terrigal Beach. Council is using the findings from the investigation to detect and resolve water quality issues in the catchment.

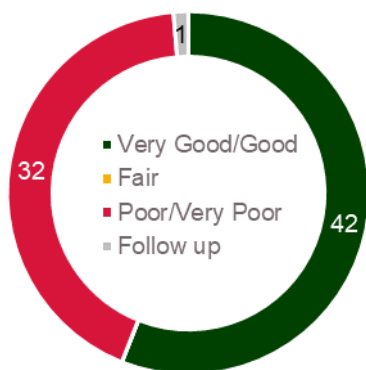
Coogee Beach continued to be graded Poor. The beach is generally suitable for swimming in dry weather conditions, but enterococci levels increase after rainfall. Microbial water quality can be impacted by stormwater discharging from a large drain at the northern end of the beach.

In 2019, the NSW Government committed \$2.5 million for the diversion of stormwater from Coogee Beach to improve water quality and the marine environment. In May 2022, with funding from the NSW Department of Planning and Environment (the department), a consultant was appointed and met with the Coogee Beach Stormwater Quality Working Group to investigate and design (including water harvesting assessment) a solution for stormwater diversion at Coogee Beach. The final detailed design for stormwater diversion was endorsed by the working group in June 2023.

Malabar Beach was downgraded to Poor from Good in the previous year. Microbial water quality is generally suitable for swimming in dry weather conditions, but enterococci levels increased following rainfall. This beach is located at the end of a long narrow bay and takes longer to recover from stormwater events than surrounding areas. Lower levels of flushing increase the time needed to disperse and dilute pollution inputs, with elevated bacteria levels often recorded up to 2 days after rainfall.

Surf Beach were graded as Poor in 2022–2023. Elevated bacterial levels were recorded during dry weather conditions and increased following rainfall. Microbial water quality at this beach has continued to decline for several years. Eurobodalla Shire Council is conducting investigations to identify the source of microbial contamination contributing to poor water quality at Surf Beach.

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



**Beach Suitability Grades for monitored estuarine beaches in New South Wales**

## Estuarine beaches

Forty-two (56%) of the 75 estuarine swimming sites were graded as Very Good or Good in 2022–2023. This is a decline in performance from the previous year when 68% of the 69 estuarine swimming sites were graded as Very Good or Good. While water quality at these sites was suitable for swimming most of the time, it was occasionally impacted by stormwater pollution following rainfall. These estuarine swimming sites are generally located in the well-flushed sections of the estuaries or had few potential sources of faecal contamination.

Thirty estuarine beaches were graded as Poor in 2022–2023:

- Shaws Bay North, Shaws Bay West, Missingham Beach, Evans River, Elms Street Bridge North (Evans River), Simpsons Creek and Torakina Beach on the North Coast
- Urunga Lido in Kalang River and Lavenders Bridge in Bellingen River on the Mid-North Coast
- Davistown Baths, Pretty Beach Baths, Woy Woy Baths and Yattalunga Baths in Brisbane Water on the Central Coast
- Bayview Baths in Pittwater, Rose Bay Beach, Tambourine Bay, Woolwich Baths, Gurney Crescent Baths, Northbridge Baths and Davidson Reserve in Sydney Harbour, Jew Fish Bay Baths, Como Baths, Oatley Bay Baths, Carss Point Baths, Dolls Point Baths, Kyeemagh Baths, Brighton-Le-Sands Baths, Yarra Bay and Frenchmans Bay in Botany Bay and lower Georges River, and Gunnamatta Bay Baths in Port Hacking in Sydney.

Water quality at these swimming sites was mostly suitable for swimming during dry weather conditions, with elevated bacterial levels recorded following rainfall. These sites were typically located in less well-flushed sections of the estuaries or had more significant pollution sources, with many impacted by significant rainfall events.

Beach Suitability Grades for Missingham Beach, Simpsons Creek and Torakina Beach on the North Coast and Urunga Lido and Lavenders Bridge on the Mid-North Coast are provisional with incomplete data available for the microbial assessment. Further monitoring is required to obtain the necessary data to provide a definite classification.

Elms Street Bridge North (Evans River) on the North Coast, Woolwich Baths in Sydney Harbour, Como Baths and Brighton Le Sands in Botany Bay and lower Georges River and Gunnamatta Bay Baths in Port Hacking were downgraded to Poor from Good in the previous year, due to a decline in microbial water quality. Gurney Crescent Baths in Sydney Harbour was downgraded from Fair to Poor.

Two estuarine beaches were graded as Very Poor in 2022–2023: Foreshores Beach in Botany Bay and Gymea Bay Baths in Port Hacking in Sydney

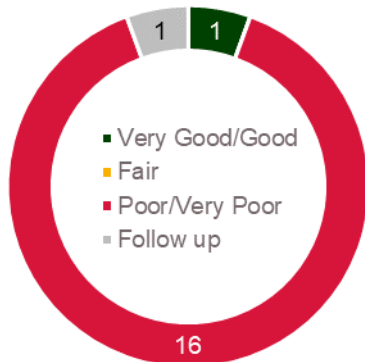
Foreshores Beach continued to be graded Very Poor, as in the previous year. Water quality at this site is significantly impacted by faecal contamination during and following rainfall, and occasionally during dry weather. The site is very susceptible to faecal contamination from the sewage overflows that periodically discharge into Mill Stream. Sydney Water has placed permanent signage to advise the public to avoid swimming 3 days after rainfall due to the risk from sewage overflows that may impact water quality at this site.

Gymea Bay Baths was downgraded to Very Poor from Poor in the previous year due to a decline in microbial water quality.

Estuarine sites are generally not as well flushed as ocean beaches, and so the time for pollution to disperse and dilute is longer. Pollution inputs are retained at some swimming sites when they are located in the upper reaches away from the main channels. As a precaution, avoid swimming in estuaries during and for up to 3 days following rainfall, or if there are signs of pollution such as discoloured water, flowing stormwater drains or floating debris.

The sanitary inspection at Mylestom Baths on the Mid-North Coast indicates low risk, but microbial water quality assessment data indicate times of poor quality water, which suggests that there are sources of diffuse pollution that have not been identified. This swimming site is in a well-flushed section of the estuary however the large catchment upstream has many potential sources of faecal contamination. Follow up is needed with further assessment required to assign a definite Beach Suitability Grade.

### Lake/lagoon swimming sites



**Beach Suitability Grades for monitored lake/lagoon swimming sites in New South Wales**

One (6%) of the 18 lake and lagoon swimming sites continued to be graded as Good in 2022–2023. This is a decline in performance from the previous year when 24% of the 17 lake/lagoon swimming sites were graded as Very Good or Good.

A Good grade was recorded at one lake swimming site: Lake Ainsworth South on the North Coast.

Water quality at this site was mostly suitable for swimming during dry weather, with elevated bacterial levels recorded following rainfall.

Sixteen lake and lagoon swimming sites were graded as Poor in 2022–2023:

- Lake Ainsworth North, Lake Ainsworth East and Lake Ainsworth West on the North Coast
- 10 swimming sites on the Central Coast: Gwandalan, Chain Valley Bay, Summerland Point Baths and Mannering Park Baths in Lake Macquarie; Lake Munmorah Baths in Lake Munmorah; Canton Beach in Tuggerah Lakes and 4 coastal lagoons at Wamberal, Terrigal, Avoca and Cockrone
- Birdwood Park and Bilarong Reserve in Narrabeen Lagoon in Sydney
- Entrance Lagoon Beach in Lake Illawarra in the Illawarra.

Lake Ainsworth East was downgraded to Poor from Good in the previous year, due to a decline in microbial water quality. Water quality at this site was mostly suitable for swimming in dry weather conditions but elevated bacterial levels were recorded following rainfall.

The sanitary inspection at Dalhousie Creek on the Mid-North Coast indicates low risk, but microbial water quality assessment data indicate times of poor quality water, which suggests that there are sources of diffuse pollution

that have not been identified. Follow up is needed with further assessment required to assign a definite Beach Suitability Grade.

Microbial water quality at most of these sites was often elevated during dry weather conditions, and bacterial levels continued to increase following rainfall. These sites are susceptible to the impacts of wet weather during and for up to 3 days after rain.

In 2019, Ballina Shire Council investigated the poor water quality at Lake Ainsworth, with preliminary results showing the main contributor to elevated bacteria levels is avian (bird) sources. Since 2019, Central Coast Council has been investigating poor water quality at Canton Beach and the 4 coastal lagoons, and the findings are assisting to detect and resolve water quality issues in these catchments.

The water quality at lake/lagoon sites often depends on how close the swimming area is to the ocean and whether the entrance is open to the ocean. When the entrance is open and the site is near that opening, the site can be well flushed by clean ocean water, and water quality is often of a high standard. If the site is not near the entrance, or the entrance is closed, pollution inputs are retained, and the water quality can be affected by contamination from stormwater runoff to the lake/lagoon.

As a general precaution, it is recommended that swimming at lake and lagoon swimming sites be avoided during and for up to 3 days after rainfall or if there are signs of stormwater pollution such as discoloured water or floating debris.

## Freshwater swimming sites

All 5 freshwater swimming sites were graded as Poor or Very Poor in 2022–2023.

Four freshwater swimming sites were graded as Poor:

- Arthur Keough Reserve in the Never Never River on the Mid-North Coast
- Megalong Creek, Wentworth Falls Lake Jetty and Wentworth Falls Lake Beach in the Blue Mountains in Western Sydney.

One freshwater swimming site was graded as Very Poor: Yosemite Creek – Minnehaha Falls in the Blue Mountains in Western Sydney.



**Beach Suitability Grades for monitored freshwater swimming sites in New South Wales**

The Beach Suitability Grade for Arthur Keough Reserve on the Mid-North Coast is provisional with incomplete data available for the microbial assessment. Further monitoring is required to obtain the necessary data to provide a definite classification.

Low levels of flushing in shallow pools and freshwater creeks can 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 up to 3 days in freshwater creeks and shallow pools, or if there are signs of stormwater pollution such as discoloured water or floating debris.

## Ocean baths

All 4 ocean baths were graded as Good in 2022–2023:

- Cabbage Tree Bay Rockpool, The Entrance Ocean Baths and Pearl Beach Rockpool on the Central Coast
- South Maroubra Rockpool in Sydney.

Microbial water quality at the ocean baths was mostly suitable for swimming after little or no rain, with elevated bacterial levels recorded following higher levels of rainfall.

The water quality at ocean baths often depends on the flushing regime. While The Entrance Ocean Baths is regularly cleaned by council, other ocean baths are flushed irregularly, relying on the natural exchange of ocean water over the rocks and pool walls. It is recommended that swimming be avoided during and for up to one day after rainfall, or if there are signs of pollution such as discoloured water or floating debris.



**Beach Suitability Grades for monitored ocean baths in New South Wales**

## The Beachwatch programs



Sampling in Sydney Harbour  
Photo: Beachwatch/DPE

### Beachwatch

The Beachwatch Program was established in 1989 to monitor Sydney’s ocean beaches and was expanded to ocean beaches in the Hunter and Illawarra regions in 1996.

Monitoring of estuarine beaches commenced in 1994, with the addition of Sydney Harbour, Botany Bay and lower Georges River to the program. Pittwater was added in 1996 and most sites in Port Hacking were added in 1999.

### Beachwatch Partnership Program

The Beachwatch Partnership Program was established in 2002 and included 10 local councils monitoring 93 swimming sites along the NSW coast during 2022–2023:

- Byron Shire Council
- Ballina Shire Council
- Richmond Valley Council
- Bellingen Shire Council
- Central Coast Council
- Blue Mountains Council
- Wollongong City Council
- Kiama Municipal Council
- Shoalhaven City Council
- Eurobodalla Shire Council

In 2022, Beachwatch Partnership Program expanded state-wide to support NSW councils to deliver water quality monitoring to more swim sites across New South Wales including inland and regional areas.

The water quality sampling and laboratory analysis are fully funded by each local council. The department provides quality assurance support and assistance with community reporting.

Hunter Water Corporation and Sydney Water monitor ocean beaches in the Hunter and Illawarra regions respectively.

### Beach pollution forecasts

Beachwatch issues daily pollution forecasts to enable beach goers to make informed decisions about where and when to swim. The forecasts are available from 6:00 am and updated during the day if conditions change. They cover swimming sites in the Sydney, Hunter, Central Coast and Illawarra regions.






Beach pollution forecasts can be accessed via the Beachwatch website, email subscription, Twitter and Facebook.






Sampling sites and areas monitored in New South Wales under the Beachwatch programs

**Beach Suitability Grades for North Coast region**

Swimming site	Site type	Beach Suitability Grade	Change
<b>Byron Shire Council</b>			
South Golden Beach*	Ocean beach	 ^	-
New Brighton Beach*	Ocean beach	 ^	-
Torakina Beach	Estuarine	 ^	-
Simpsons Creek	Estuarine	 ^	-
Main Beach (Byron Bay)	Ocean beach	 ^	-
Clarkes Beach*	Ocean beach	 ^	-
Tallow Beach (Suffolk Park)	Ocean beach	 ^	-
<b>Ballina Shire Council</b>			
Seven Mile Beach	Ocean beach		
Lake Ainsworth North	Lake/Lagoon		
Lake Ainsworth East	Lake/Lagoon		
Lake Ainsworth South	Lake/Lagoon		
Lake Ainsworth West	Lake/Lagoon		
Shelly Beach	Ocean beach		
Lighthouse Beach	Ocean beach		
Shaws Bay North	Estuarine		
Shaws Bay East	Estuarine		
Shaws Bay East Arm	Estuarine		
Shaws Bay East Beach	Estuarine		
Shaws Bay West	Estuarine		
The Serpentine	Estuarine		
Missingham Beach*	Estuarine	 ^	-
<b>Richmond Valley Council</b>			
Airforce Beach	Ocean beach		
Main Beach	Ocean beach		






Swimming site	Site type	Beach Suitability Grade	Change
<b>Richmond Valley Council (continued)</b>			
Shark Bay	Ocean beach		
Evans River	Estuarine		
Elm Street Bridge North (Evans River)	Estuarine		

Beach Suitability Grade					Change		
							
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.

**Beach Suitability Grades for Mid-North Coast region**

Swimming site	Site type	Beach Suitability Grade	Change
<b>Bellingen Shire Council</b>			
Arthur Keough Reserve * (Never Never River)	Freshwater	 ^	-
Lavenders Bridge* (Bellingen River)	Estuarine	 ^	-
Dalhousie Creek*	Lagoon	Follow Up	-
Hungry Head Beach*	Ocean beach	 ^	-
Urunga Lido* (Kalang River)	Estuarine	 ^	-
Mylestom Baths* (Bellingen River)	Estuarine	Follow Up	-
North Beach*	Ocean beach	 ^	-

Beach Suitability Grade					Change		
							
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.

Follow Up: Sanitary inspection and water-quality data produce potentially incongruent results; further assessment will be required.



















**Beach Suitability Grades for Hunter region**




Swimming site	Site type	Beach Suitability Grade	Change
<b>Port Stephens Council</b>			
Zenith Beach	Ocean beach	VG	○
Box Beach	Ocean beach	VG	○
Fingal Beach	Ocean beach	VG	↑
One Mile Beach	Ocean beach	VG	○
<b>City of Newcastle Council</b>			
South Stockton Beach	Ocean beach	VG	↑
Nobbys Beach	Ocean beach	VG	○
Newcastle Beach	Ocean beach	VG	○
Bar Beach	Ocean beach	VG	○
Merewether Beach	Ocean beach	VG	○
Burwood North Beach	Ocean beach	VG	○
Burwood South Beach	Ocean beach	VG	○
<b>Lake Macquarie City Council</b>			
Glenrock Lagoon Beach	Ocean beach	VG	○
Dudley Beach	Ocean beach	VG	○
Redhead Beach	Ocean beach	VG	○
Blacksmiths Beach	Ocean beach	VG	○
Swansea Heads Little Beach	Ocean beach	G	○
Caves Beach	Ocean beach	VG	○

Beach Suitability Grade					Change		
							
Very Good	Good	Fair	Poor	Very Poor	Improved	Stable	Declined

**Beach Suitability Grades for Central Coast region**

Swimming site	Site type	Beach Suitability Grade	Change
<b>Central Coast Council</b>			
Lakes Beach	Ocean beach	G	<input type="radio"/>
Cabbage Tree Bay Rockpool	Ocean baths	G	<input type="radio"/>
Soldiers Beach	Ocean beach	G	<input type="radio"/>
North Entrance Beach	Ocean beach	VG	<input type="radio"/>
The Entrance Beach	Ocean beach	G	<input type="radio"/>
The Entrance Ocean Baths	Ocean baths	G	<input type="radio"/>
Toowoan Bay	Ocean beach	G	↑
Shelly Beach	Ocean beach	G	<input type="radio"/>
Gwandalan	Lake/Lagoon	P	<input type="radio"/>
Summerland Point Baths	Lake/Lagoon	P	↓
Chain Valley Bay	Lake/Lagoon	P	<input type="radio"/>
Mannering Park Baths	Lake/Lagoon	P	<input type="radio"/>
Lake Munmorah Baths	Lake/Lagoon	P	<input type="radio"/>
Canton Beach	Lake/Lagoon	P	<input type="radio"/>
Wamberal Beach	Ocean beach	G	<input type="radio"/>
Wamberal Lagoon	Lagoon	P	<input type="radio"/>
Terrigal Beach	Ocean beach	P	<input type="radio"/>
Terrigal Lagoon	Lagoon	P	<input type="radio"/>
North Avoca Beach	Ocean beach	G	<input type="radio"/>
Avoca Beach	Ocean beach	G	<input type="radio"/>
Avoca Lagoon	Lagoon	P	<input type="radio"/>
Copacabana Beach	Ocean beach	G	<input type="radio"/>
Cockrone Lagoon	Lagoon	P	<input type="radio"/>











































Swimming site	Site type	Beach Suitability Grade	Change
<b>Central Coast Council (continued)</b>			
MacMasters Beach	Ocean beach		
Killcare Beach	Ocean beach		
Ocean Beach	Ocean beach		
Umina Beach	Ocean beach		
Pearl Beach Rockpool	Ocean baths		
Davistown Baths	Estuarine		
Pretty Beach Baths	Estuarine		
Woy Woy Baths	Estuarine		
Yattalunga Baths	Estuarine		

Beach Suitability Grade					Change		
							
Very Good	Good	Fair	Poor	Very Poor	Improved	Stable	Declined



















































**Beach Suitability Grades for Sydney region**

Swimming site	Site type	Beach Suitability Grade	Change
<b>Northern Sydney – Ocean beaches</b>			
Palm Beach	Ocean beach	VG	<input type="radio"/>
Whale Beach	Ocean beach	VG	<input type="radio"/>
Avalon Beach	Ocean beach	VG	<input type="radio"/>
Bilgola Beach	Ocean beach	G	<input type="radio"/>
Newport Beach	Ocean beach	G	<input type="radio"/>
Bungan Beach	Ocean beach	G	<input type="radio"/>
Mona Vale Beach	Ocean beach	G	↓
Warriewood Beach	Ocean beach	G	<input type="radio"/>
Turimetta Beach	Ocean beach	G	<input type="radio"/>
North Narrabeen Beach	Ocean beach	G	<input type="radio"/>
Narrabeen Lagoon (Birdwood Park)	Lagoon	P	<input type="radio"/>
Bilarong Reserve	Lagoon	P	<input type="radio"/>
Collaroy Beach	Ocean beach	G	<input type="radio"/>
Long Reef Beach	Ocean beach	G	<input type="radio"/>
Dee Why Beach	Ocean beach	G	<input type="radio"/>
North Curl Curl Beach	Ocean beach	G	<input type="radio"/>
South Curl Curl Beach	Ocean beach	G	↓
Freshwater Beach	Ocean beach	G	<input type="radio"/>
Queenscliff Beach	Ocean beach	G	<input type="radio"/>
North Steyne Beach	Ocean beach	G	<input type="radio"/>
South Steyne Beach	Ocean beach	G	<input type="radio"/>
Shelly Beach	Ocean beach	G	<input type="radio"/>

Swimming site	Site type	Beach Suitability Grade	Change
<b>Northern Sydney – Pittwater</b>			
Barrenjoey Beach	Estuarine		
Paradise Beach Baths	Estuarine		
Clareville Beach	Estuarine		
Taylors Point Baths	Estuarine		
Bayview Baths	Estuarine		
Elvina Bay	Estuarine		
North Scotland Island	Estuarine		
South Scotland Island	Estuarine		
The Basin	Estuarine		
Great Mackerel Beach	Estuarine		
<b>Central Sydney – Ocean beaches</b>			
Bondi Beach	Ocean beach		
Tamarama Beach	Ocean beach		
Bronte Beach	Ocean beach		
Clovelly Beach	Ocean beach		
Gordons Bay	Ocean beach		
Coogee Beach	Ocean beach		
Maroubra Beach	Ocean beach		
South Maroubra Beach	Ocean beach		
South Maroubra Rockpool	Ocean baths		
Malabar Beach	Ocean beach		
Little Bay Beach	Ocean beach		

Swimming site	Site type	Beach Suitability Grade	Change
<b>Central Sydney – Sydney Harbour</b>			
Camp Cove	Estuarine		
Watsons Bay	Estuarine		
Parsley Bay	Estuarine		
Nielsen Park	Estuarine		
Rose Bay Beach	Estuarine		
Murray Rose Pool	Estuarine		
Dawn Fraser Pool	Estuarine		
Chiswick Baths	Estuarine		
Cabarita Beach	Estuarine		
Woolwich Baths	Estuarine		
Tambourine Bay	Estuarine		
Woodford Bay	Estuarine		
Greenwich Baths	Estuarine		
Hayes St Beach	Estuarine		
Clifton Gardens	Estuarine		
Balmoral Baths	Estuarine		
Edwards Beach	Estuarine		
Chinamans Beach	Estuarine		
Northbridge Baths	Estuarine		
Davidson Reserve	Estuarine		
Gurney Crescent Baths	Estuarine		
Clontarf Pool	Estuarine		
Forty Baskets Pool	Estuarine		

Swimming site	Site type	Beach Suitability Grade	Change
<b>Central Sydney – Sydney Harbour (continued)</b>			
Fairlight Beach	Estuarine		
Manly Cove	Estuarine		
Little Manly Cove	Estuarine		
<b>Southern Sydney – Ocean beaches</b>			
Boat Harbour	Ocean beach		
Greenhills Beach	Ocean beach		
Wanda Beach	Ocean beach		
Elouera Beach	Ocean beach		
North Cronulla Beach	Ocean beach		
South Cronulla Beach	Ocean beach		
Shelly Beach	Ocean beach		
Oak Park	Ocean beach		
<b>Southern Sydney – Botany Bay and lower Georges River</b>			
Silver Beach	Estuarine		
Como Baths	Estuarine		
Jew Fish Bay Baths	Estuarine		
Oatley Bay Baths	Estuarine		
Carss Point Baths	Estuarine		
Sandringham Baths	Estuarine		
Dolls Point Baths	Estuarine		
Ramsgate Baths	Estuarine		
Monterey Baths	Estuarine		
Brighton-Le-Sands Baths	Estuarine		
Kyeemagh Baths	Estuarine		

Swimming site	Site type	Beach Suitability Grade	Change				
<b>Southern Sydney – Botany Bay and lower Georges River (continued)</b>							
Foreshores Beach	Estuarine	VP	○				
Yarra Bay	Estuarine	P	○				
Frenchmans Bay	Estuarine	P	○				
Congwong Bay	Estuarine	G	○				
<b>Southern Sydney – Port Hacking</b>							
Jibbon Beach	Estuarine	G	○				
Horderns Beach	Estuarine	G	○				
GyMEA Bay Baths	Estuarine	VP	↓				
Lilli Pilli Baths	Estuarine	G	○				
Gunnamatta Bay Baths	Estuarine	P	↓				
<b>Western Sydney – Blue Mountains Council</b>							
Megalong Creek	Freshwater	P	○				
Yosemite Creek – Minnehaha Falls	Freshwater	VP	○				
Wentworth Falls Lake – Jetty	Freshwater	P	○				
Wentworth Falls Lake – Beach	Freshwater	P	↓				
<b>Beach Suitability Grade</b>		<b>Change</b>					
							
Very Good	Good	Fair	Poor	Very Poor	Improved	Stable	Declined

**Beach Suitability Grades for Illawarra region**

Swimming site	Site type	Beach Suitability Grade	Change
<b>Wollongong City Council</b>			
Stanwell Park Beach	Ocean beach	VG	○
Coledale Beach	Ocean beach	VG	↑
Austinmer Beach	Ocean beach	VG	○
Thirroul Beach	Ocean beach	G	○
Bulli Beach	Ocean beach	G	○
Woonona Beach	Ocean beach	VG	○
Bellambi Beach	Ocean beach	G	○
Corrimal Beach	Ocean beach	G	○
North Wollongong Beach	Ocean beach	G	○
Wollongong City Beach	Ocean beach	VG	○
Coniston Beach	Ocean beach	G	↓
Fishermans Beach	Ocean beach	VG	○
Port Kembla Beach	Ocean beach	G	○
<b>Shellharbour City Council</b>			
Entrance Lagoon Beach	Lake/Lagoon	P	↓
Warilla Beach	Ocean beach	G	○
Shellharbour Beach	Ocean beach	VG	○
<b>Kiama Municipal Council</b>			
Boyds Jones Beach	Ocean beach	G	○
Bombo Beach	Ocean beach	G	○
Surf Beach Kiama	Ocean beach	G	○
Werri Beach	Ocean beach	G	↓
Seven Mile Beach (Gerroa)	Ocean beach	G	○

Beach Suitability Grade					Change		
							
Very Good	Good	Fair	Poor	Very Poor	Improved	Stable	Declined

**Beach Suitability Grades for South Coast region**

Swimming site	Site type	Beach Suitability Grade	Change
<b>Shoalhaven City Council</b>			
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	V	○
Rennies Beach	Ocean beach	VG	○
Racecourse Beach	Ocean beach	VG	○
Bawley Point Beach	Ocean beach	VG	○
Merry Beach	Ocean beach	VG	○
<b>Eurobodalla Shire Council</b>			
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	○
South Broulee (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	G	○

Beach Suitability Grade					Change		
							
Very Good	Good	Fair	Poor	Very Poor	Improved	Stable	Declined

# 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 5 grades ranging from Very Good to Very Poor:

### 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

### 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 3 days at estuarine sites

### 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 3 days following rainfall or if there are signs of pollution such as discoloured water or odour or debris in the water

### 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 3 days following rainfall

### 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 (NHMRC 2008) 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 (WA Department of Health 2007).

### Enterococci

**The national guidelines advocate the use of enterococci as the single preferred faecal indicator in recreational 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 (Standards Australia 2007).

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

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

\* Follow up occurs when sanitary inspection and water quality data produce potentially incongruent results; further assessment will be required.

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 4 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 (Wyer et al. 1999).

### Risk of illness associated with Microbial Assessment Categories

Category	Enterococci (cfu/100 mL)	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 4 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.

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. The WA Department of Health recommends a minimum of 65 samples, collected from a particular site over 5 consecutive years, to provide sufficient confidence and reliability in the 95th percentile data output. 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 the WA Government's 'Environmental waters publications' webpage, under *Forms and templates*.

## Sanitary Inspection Category (SIC)

More information about the **sanitary inspection** process is available in the Beachwatch Protocol for assessment and management of microbial risks in recreational waters, found on the department's website.

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 5 categories: Very Low, Low, Moderate, High and Very High.



Stormwater drain flow  
Photo: Beachwatch/DPE

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.

## 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

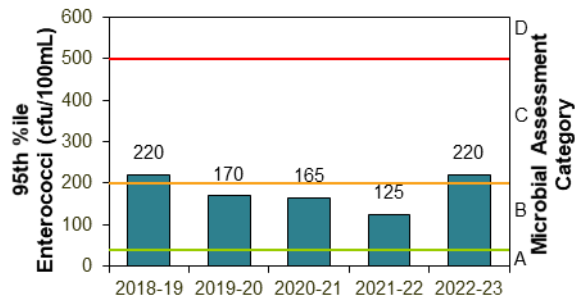
A provisional grade indicates the assessment is based on limited data collected during the assessment period and should not be compared to the beach grade from the previous year.

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

### Microbial Assessment Category (MAC) chart

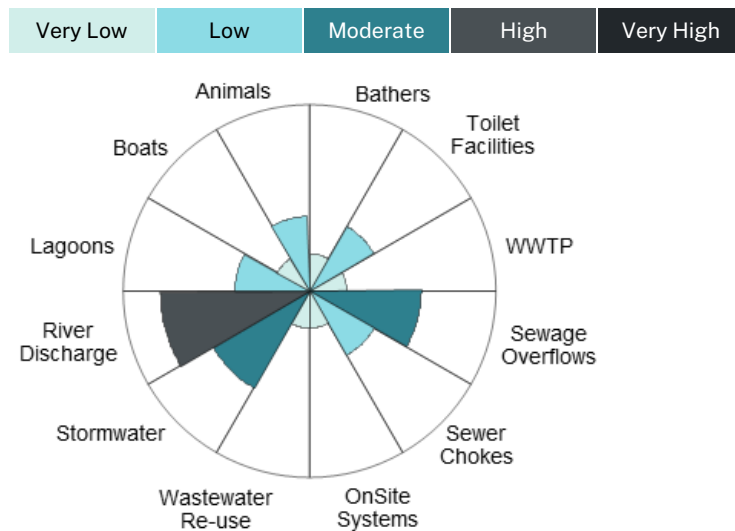
On each beach page, the MACs for the last 5 years are displayed on a simple bar chart. The MAC for the current year is based on enterococci data collected during the assessment period. The bars are labelled with the 95th

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

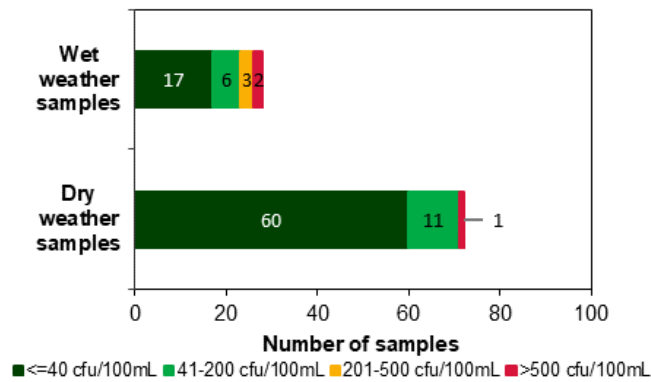
The results of the sanitary inspection for each swimming location are presented in a radar pie chart. The chart shows the likelihood that each identified pollution source will contribute to faecal contamination at a swimming site, as indicated by the size and colour of the segment, ranging from very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



### 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 40 cfu/100 mL, between 41 and 200 cfu/100 mL, between

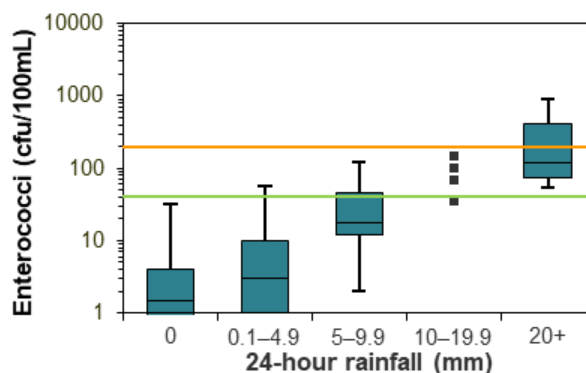
201 and 500 cfu/100 mL and greater than 500 cfu/100 mL. These categories reflect the Microbial Assessment Category thresholds and are coloured on the graph as dark green, light green, amber and red respectively.



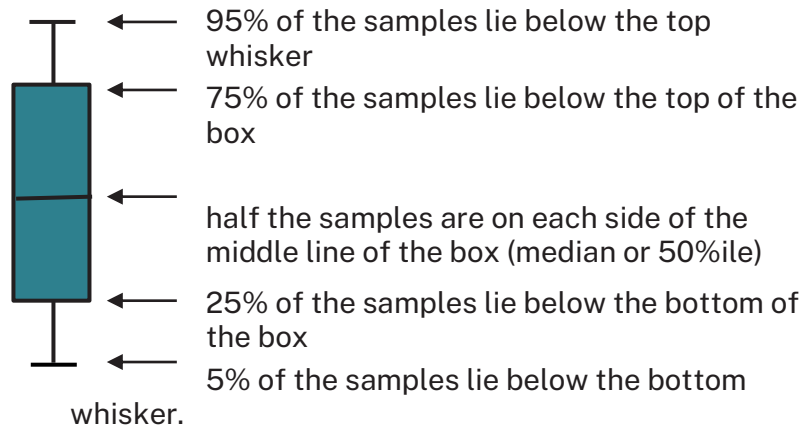
It is expected that swimming sites with lower levels of flushing will show some elevated bacterial results in dry weather samples (no rainfall in the previous 24 hours) due to the longer time needed to recover from a rainfall event. At some estuarine and lake/lagoon swimming locations the impacts of stormwater pollution on beach water quality may be detected up to 3 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 40 cfu/100 mL and 200 cfu/100 mL are indicated with a green and orange line, respectively. The 40 cfu/100 mL level is referred to as the ‘safe swimming limit’. The enterococci data were obtained from the last 5 years of monitoring. Rainfall data were obtained from rain gauges situated close to the sample site and are 24-hour totals to 9 am on the day of sampling. If there are fewer than 5 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 (1 cfu/100 mL), 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:



## 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 5-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 40 cfu/100 mL. 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 3 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.

Key to maps	
	Sampling Site
	Surf Life Saving Club
	Wastewater Treatment Plant
	Sewage Pumping Station
	Sewage Overflow
	Stormwater Drain
	Water
	Baths
	National Park/Reserve/ Other Park
	Built-up Area
	Sand
	Roads
	Major Roads
	Baths – Netted Area
	Breakwater/Wharf



# Quality assurance



Water sample collection  
Photo: Beachwatch/DPE

## The quality assurance program

To ensure that data reported by Beachwatch is accurate and reliable, quality assurance is included in all parts of the program:

- field sampling (equipment preparation, sample collection, sample storage and sample transport)
- laboratory analysis
- data management
- community reporting.

## Field sampling

Hunter Water, Sydney Water and Beachwatch collect samples throughout the year and are audited quarterly. Councils in the Beachwatch Partnership Program usually sample for part or all of the swimming season (October to April) and are audited once during this period. There were 22 field audits completed during the 2022–2023 sampling season.

Audits include an assessment of field officer performance according to established Beachwatch Programs sampling protocols, including aseptic sampling techniques, sample collection, sample storage and documentation of field observations. These protocols are based on internationally recognised methods for the collection of water samples in recreational bathing areas (APHA 1998).

Sample collection by Beachwatch, Hunter Water and Sydney Water complied well with established sampling protocols, with a compliance of 100%. Councils in the Beachwatch Partnership Program achieved an overall compliance of 100% with Beachwatch sampling protocols.

## Who samples where?

### Beachwatch

Collects samples at 97 ocean and harbour beaches in Sydney.

### Hunter Water

Collects samples at 17 ocean beaches in Port Stephens, Newcastle and Lake Macquarie.

### Sydney Water

Collects samples at 18 ocean beaches in Wollongong, Shellharbour and Kiama.

### Partner councils

Byron Shire Council, Ballina Shire Council, Richmond Valley Council, Bellingen Shire Council, Blue Mountains Council, Central Coast Council, Wollongong City Council, Kiama Municipal Council, Shoalhaven City Council and Eurobodalla Shire Council collect samples at 93 popular swimming locations in their respective local government areas.

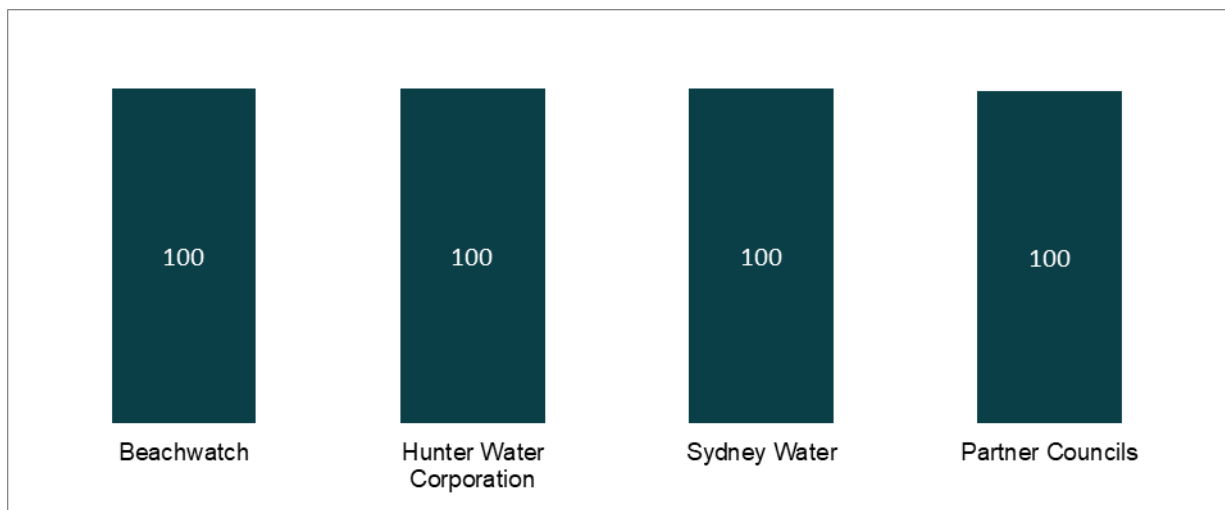


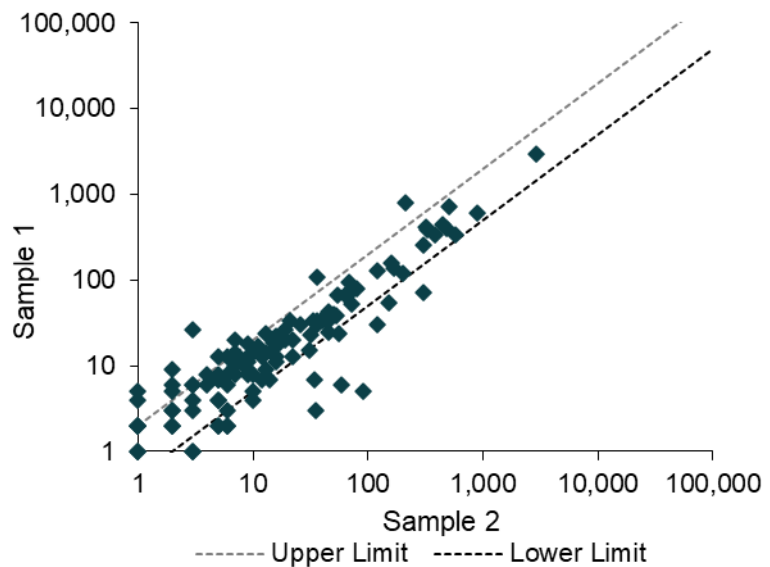
Figure 1 Percentage compliance with Beachwatch sampling protocols in 2022–2023

## Laboratory analysis

### Beachwatch program

To assess the reliability of laboratory data, Beachwatch sends duplicate water samples to our contracted microbiological laboratory, which is accredited by the National Association of Testing Authorities (NATA). Duplicate samples are collected from the same site at the same time and the laboratory is unaware that the samples are collected from a single location. The results are expected to be similar.

Due to the inherent variability of bacterial levels in environmental samples, duplicate results that are within 0.3 log-units of each other (equivalent to a halving or doubling of density on a linear scale) are considered to be acceptable. Most duplicate samples were within the acceptable limits; however, some enterococci results were outside this range, with most of these at very low bacterial densities that were below the safe swimming limit.



**Figure 2** Distribution of duplicate enterococci (cfu/100 mL) results for the contracted laboratory, May 2022 to April 2023

## Beachwatch Partnership Program

Council laboratories in the Beachwatch Partnership Program are required to undertake proficiency testing to determine the reliability of data. This year, most laboratories were NATA accredited or participated in regular proficiency testing programs to demonstrate competence in enterococci analysis.



Confirmed colonies of enterococci on plate  
Photo: Silliker Australia

Water samples for Byron Shire Council, Bellingen Shire Council, Blue Mountains Council, Wollongong City Council, Kiama Municipal Council, Shoalhaven City Council and Eurobodalla Shire Council were tested by NATA accredited laboratories that comply with strict assessments.

The proficiency testing for Ballina, Richmond Valley and Central Coast councils' laboratories was conducted by IFM Quality Services Pty Ltd. IFM Quality Services despatches samples in freeze dried form that require reconstitution prior to testing. The council laboratories underwent regular proficiency testing during October 2022 to April 2023 and recorded good results with enterococci counts reported within defined limits. Confidence can be placed in the accuracy of data from these laboratories and water quality results reported in the Ballina, Richmond Valley and Central Coast local government areas.

Water quality results for swimming sites in the Sydney, Hunter and Illawarra regions are regularly forwarded electronically to the Beachwatch program from the contracted laboratory, and by Hunter Water and Sydney Water laboratories. The water quality data are uploaded to the Beachwatch water quality database (BACTO) for storage and data evaluation.

### Download data

Beachwatch data is available online on the Beachwatch 'Water quality data' webpage.

All partnership councils transferred water quality data to Beachwatch on a regular basis, for centralised storage on the BACTO database. In some cases, data were emailed directly from the analysing laboratory.

Quality assurance procedures for the storage of data on the centralised database followed a rigorous protocol that was developed as part of the Beachwatch program. This includes data validation procedures to identify anomalous results, restricting user access to the database, using fixed templates for upload of data, and database settings to prevent duplicate entries.

Beachwatch data is uploaded to our website and can be downloaded online from the 'Water quality data' webpage.

## Community reporting

### Subscribe

Daily beach pollution forecast emails are available from the Beachwatch 'Subscribe' webpage

Providing the community with current beach water quality information is a core function of the Beachwatch programs, so reporting has been incorporated into the quality assurance program. This enables Beachwatch to measure the accuracy, consistency of content (quality) and punctuality (timeliness) of all reports released. When necessary, this information is used to improve the reporting process.

There are 2 main types of Beachwatch reports: Beach pollution forecasts and star rating reports.

### Beach pollution forecasts

Beach pollution forecasts provide advice to assist beach users on deciding when and where to swim. The forecasts are generated daily to report on the likelihood of bacterial contamination at swimming sites in the Hunter, Central Coast, Sydney and Illawarra regions. This information can be accessed by the public through the Beachwatch webpage and is reported on Twitter and Facebook. The information is also sent by email to subscribers.

The forecasts are based on telemetered rainfall data and any reported pollution incidents that could affect beach water quality. The forecasts include a prediction of the likelihood of pollution at ocean beaches and estuarine swimming areas, as well as daily weather, tides and coastal conditions, based on the Australian Bureau of Meteorology's Metropolitan Forecast and Coastal Waters Forecast. Forecasts are updated throughout the day if conditions change, using information provided by the Bureau of Meteorology, local councils, lifeguards, the Environment Protection Authority or Sydney Water.

#### *Accuracy of beach pollution forecast predictions*

The daily pollution forecast scenarios are analysed against bacterial data to track the accuracy of predictions. During 2022–2023, 93% of overall predictions were correct. The Hunter, Illawarra and Central Coast beaches forecasts were the most accurate with 98%, 95% and 94% of scenarios correctly predicted, respectively.

During extreme wet weather and flooding events, pollution advisories were extended despite microbial water quality returning to levels suitable for swimming, to account for other hazards such as debris and murky water, which posed a risk to recreational activities.

When the accuracy of the pollution predictions for a swimming site declines, the prediction models are reassessed and adjusted to incorporate the changes in water quality. Regular tracking of the accuracy of pollution scenarios ensures a high level of overall accuracy is maintained.

#### *Quality and timeliness of beach pollution forecast reports*

Forecast reports are audited weekly to assess the quality and punctuality of information issued on the Beachwatch website and in emails:

- The quality of the forecasts is checked for formatting, spelling, punctuation and incorrect pollution scenarios or weather information to ensure the information provided is clear and concise.
- The timeliness of the forecasts issued to the website and sent by email is assessed to ensure punctuality of our service.

In 2022–2023 an overall compliance of 99% was achieved with the beach pollution forecast reporting protocols for quality and timeliness. The breakdown of compliance performance for forecast reports on the Beachwatch website and by email is shown in Figure 3.

The results from the quality assurance audits are stored in an electronic database, with a weekly summary of any detected errors distributed to Beachwatch staff for their attention and action, if necessary.



**Figure 3** Percentage compliance with beach pollution forecast reporting protocols in 2022–2023

## Star ratings reports



Beach warning signs  
Photo: Beachwatch/DPE

The star ratings provide an indication of recent bacterial water quality, based on NHMRC (2008) guidelines, with one star indicating poor water quality, through to a 4-star rating indicating excellent water quality. The latest result is generated for each swim site based on the number of bacteria (*enterococci*) in the most recent water sample. Ratings are published automatically for each site on the Beachwatch website once quality assured data has been uploaded to the Beachwatch database.

Most star ratings are updated weekly throughout the year for swimming sites in the Sydney, Hunter and Illawarra regions and during the summer season for regional partner councils, where the frequency of sampling is reduced during winter when sites are not regularly used. All historical enterococci water quality data is available on the Beachwatch website.

## References

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## More information

- [About star ratings for beach water quality](#)
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