Beachwatch

State of the beaches 2021–22

Statewide summary and how to read this report

Department of Planning and Environment

NSW GOVERNMENT

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Contents

Recreational water quality has been monitored in NSW 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 214 swimming sites along the NSW coast in 2021–2022, providing a long-term assessment of how suitable a site is for swimming. Monitored sites include ocean beaches, estuarine areas, lake and lagoon swimming sites and ocean baths.

In 2021–2022 swimming sites in NSW performed well with 80% of monitored swimming sites graded as Good or Very Good, including 116 ocean beaches. These sites were suitable for swimming for most or almost all of the time. While this is a great result, it is a slight decline in performance from the previous year and reflects the extended wet weather conditions experienced in many coastal areas, including the wettest summer in NSW since 2012 and significant flooding events. Many estuarine and lake and lagoon 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 2021–2022

Beach monitoring in NSW

Bilgola Beach
Photo: Beachwatch/DPE

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 NSW 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 NSW 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.

Rainfall impacts

During 2021–2022, 214 swimming sites were monitored including ocean beaches, estuarine areas, lake 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 2021–2022 are based on water quality data collected over the last 2–4 years. Rainfall over this period has been diverse:

- 2018–2019: extended dry conditions, with several wet months on the coast
- 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.

See the section on **How to read this report** on page 23 for an explanation of the graphs, tables and Beach Suitability Grades.

Winter 2021 was relatively dry with average to below average rainfall recorded along the NSW coast. Average to below average rainfall conditions continued through to October 2021 along the coast, except for the North Coast and Mid-North Coast, which received above average rainfall in October 2021. Coffs Harbour on the Mid-North Coast recorded the highest monthly rainfall in NSW for October 2021, with 342 mm.

November 2021 was very wet on the NSW coast, except for the North Coast. More than 2–3 times the long-term monthly average rainfall was recorded in the Hunter, Central Coast, Sydney, Illawarra and South Coast regions.

NSW experienced its wettest summer since 2011–2012, with above average summer rainfall totals recorded along the NSW coast except for in the Hunter region. Areas on the North Coast and South Coast received record summer rainfall, and Sydney had its wettest summer since 1991–1992.

March 2022 was significantly wet along the entire NSW coast. All regions recorded from 2 to more than 4 times the long-term monthly average rainfall for March, with areas in Sydney and on the South Coast receiving their highest monthly rainfall for March on record.

Consecutive days of significantly heavy rainfall fell in late February and during March 2022 along much of the coast. The extreme wet weather caused major flooding of rivers and coastal waterways, including the Richmond River on the North Coast and Hawkesbury–Nepean River in Sydney. Beachwatch issued an extreme wet weather pollution alert on the Hunter, Central Coast, Sydney and Illawarra daily beach pollution forecasts during March 2022, advising stormwater pollution and floodwaters may be impacting swimming sites for an extended period, with lifeguard reports of floating debris and discoloured water continuing after the rain had ceased. Councils in flood affected areas issued flooding alerts to advise of floodwater impacts at swimming sites. Significant debris and discolouration continued to impact many beaches on the NSW coast while floodwaters discharged to the ocean.

Rainfall during April 2022 was average to above average along the coast, except for on the North Coast, which received below average rainfall. The continued wet weather in April triggered more flooding in coastal waterways, including in the Georges, Woronora, Nepean and Hawkesbury rivers in Sydney. Beachwatch issued an extreme wet weather pollution alert on the Hunter, Central Coast, Sydney and Illawarra daily beach pollution forecasts until the flooding and stormwater impacts had subsided.

Debris and discoloured water at Queenscliff Beach following extreme wet weather and flooding in March 2022

Photo: Beachwatch/DPE

Flooding and water quality

Monitoring by Beachwatch and partner councils showed flooding events impacted swimming sites beyond the flood zones on the NSW coast, making microbial water quality unsuitable for swimming.

Routine monitoring at coastal swim sites on the North Coast, Central Coast, in Sydney and on the South Coast detected significantly elevated microbial counts, which posed an increased health risk to bathers. The most affected areas were in estuaries, lakes and lagoons, which have a lower level of flushing and took longer to recover from the floodwater events than the ocean beaches. Routine water quality testing showed some sites unsuitable for swimming for up to 4 weeks.

While microbial levels returned to normal at many swimming sites monitored by Beachwatch and partner councils, there was still a large amount of debris or other hazards, such as murky water, which posed a risk to recreational activities.

Beach Suitability Grades at 6 swimming sites improved in 2021–2022. These sites included 5 ocean beaches and one estuarine swimming site. Beach Suitability Grades at 28 swimming sites were downgraded from the previous year. While 13 ocean beaches and 2 estuarine swimming sites were downgraded from Very Good to Good, 3 ocean beaches and 9 estuarine swimming sites crossed the threshold from Good to Poor. One estuarine swimming side was downgraded from Poor to Very Poor.

See the section on **Quality assurance** on page 23 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.

94%

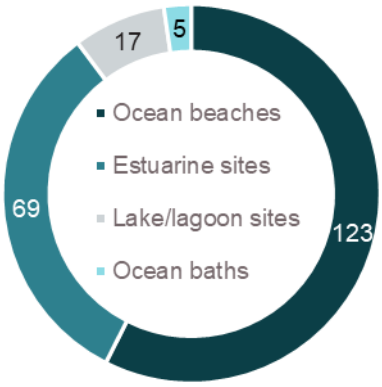
ocean beaches graded Good or Very Good

Overall beach performance for 2021–2022

In 2021–2022, 172 of the 214 monitored swimming sites in NSW 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 85% of swimming sites were graded as Very Good or Good.

Percentage of sites graded as Very Good or Good

	2019–2020	2020–2021	2021–2022	Trend
Overall	89% (228 sites)	85% (210 sites)	**80%** (214 sites)	
Ocean beaches	98% (126 sites)	98% (118 sites)	94% (123 sites)	
Estuarine sites	85% (78 sites)	77% (71 sites)	68% (69 sites)	
Lake/ lagoon sites	42% (19 sites)	24% (17 sites)	24% (17 sites)	
Ocean baths	100% (5 sites)	100% (4 sites)	100% (5 sites)	



Site types monitored in NSW by Beachwatch and partnership councils

Beach Suitability Grades for monitored ocean beaches in NSW

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.

While this is a great result, many lake/lagoon and estuarine 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 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

The open ocean beaches of NSW had excellent water quality in 2021–2022 with 94% 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 decline on the 2020–2021 result, when 98% of 118 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.

Five ocean beaches were upgraded to Very Good in 2021–2022:

- North Entrance Beach on the Central Coast
- Merewether Beach, Burwood South Beach and Glenrock Lagoon Beach in the Hunter
- Werri Beach in the Illawarra.

Seven ocean beaches were graded as Poor in 2021–2022:

- Woolgoolga Main Beach and Emerald Beach on the Mid-North Coast
- Toowoon Bay and Terrigal Beach on the Central Coast
- Coogee Beach in Sydney
- Caseys Beach and Surf Beach on the South Coast.

Woolgoolga Main Beach and Emerald Beach were graded as Poor in 2021–2022. While these sites were mostly suitable for swimming after little or no rain, elevated bacterial levels were recorded following heavy rainfall. These grades are provisional due to limited bacterial data and were heavily influenced by wet weather impacts. Elevated enterococci levels were recorded more often due to the large proportion of samples collected during and following rainfall in the 2021–2022 assessment.

Toowoon Bay was downgraded from Good in the previous year and Terrigal Beach continued to be graded Poor. Water quality at these sites was mostly suitable for swimming in dry weather conditions, however, elevated enterococci levels were occasionally recorded following little or no rain, and often after light rain.

The microbial water quality at Toowoon Bay and Terrigal Beach remains close to the threshold between Good and Poor, and these sites have fluctuated between Good and Poor in recent years. The decline in water quality reflects a slightly higher proportion of samples collected at these sites during wet weather compared to the 2020–2021 assessment period.

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 was downgraded to Poor from Good in the previous year. Elevated enterococci levels were occasionally recorded during dry weather conditions and increased following rainfall. The decline in water quality reflects a higher proportion of samples collected during wet weather compared to the 2020–2021 assessment.

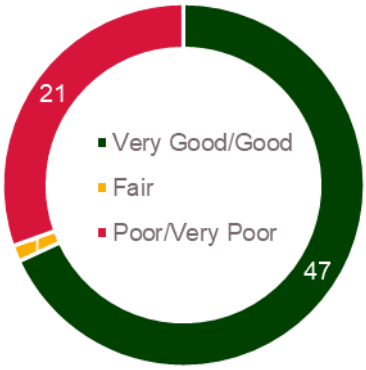
In 2019, the NSW Government committed $2.5 million for the diversion of stormwater from Coogee Beach to improve water quality and the marine environment. In May 2022, Randwick Council, with funding from the Department of Planning and Environment (DPE), appointed a consultant to investigate and design a solution for stormwater diversion at Coogee Beach.

Caseys Beach and Surf Beach were graded as Poor in 2021–2022. Elevated bacterial levels were recorded during dry weather conditions, and increased following rainfall. Microbial water quality at these beaches has continued to decline for several years, with microbial water quality at Caseys Beach crossing the threshold from Good to Poor. While there was a slightly higher proportion of samples collected during wet weather when compared to the 2020–2021 assessment, the continued decline in microbial water quality requires further investigation.

Eurobodalla Shire Council is conducting investigations to identify the source of microbial contamination contributing to poor water quality at Surf Beach, and will be undertaking investigations at Caseys Beach in the near future.

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.

Estuarine beaches



Beach Suitability Grades for monitored estuarine beaches in NSW

Forty-seven (68%) of the 69 estuarine swimming sites were graded as Very Good or Good in 2021–2022. This is a decline in performance from the previous year when 77% of the 71 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.

Elvina Bay in Pittwater in Sydney improved to Very Good from Good in the previous year. The microbial water quality at this site is close to the threshold between Good and Very Good and has changed between these grades over recent years.

Gurney Crescent Baths in Sydney Harbour continued to be graded as Fair in 2021–2022. While this site was frequently suitable for swimming during dry weather conditions, enterococci levels increased following rainfall. Several potential sources of faecal contamination have been identified in the sanitary inspection, including stormwater and impacts from upstream sources in Middle Harbour.

Twenty estuarine beaches were graded as Poor in 2021–2022:

- Shaws Bay North, Shaws Bay West and Evans River on the 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, Northbridge Baths and Davidson Reserve in Sydney Harbour, Jew Fish Bay Baths, Oatley Bay Baths, Carss Point Baths, Dolls Point Baths, Kyeemagh Baths, Yarra Bay and Frenchmans Bay in Botany Bay and lower Georges River, and Gymea 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 floodwaters during significant flooding events.

Bayview Baths in Pittwater, Rose Bay Beach and Northbridge Baths in Sydney Harbour, Jew Fish Bay Baths, Oatley Bay Baths, Carss Point Baths, Dolls Point Baths, Kyeemagh Baths and Yarra Bay in Botany Bay and lower Georges River were downgraded to Poor from Good in the previous year, due to a decline in microbial water quality.

Foreshores Beach was downgraded to Very Poor from Poor. 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.

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.

Beach Suitability Grades for monitored lake/lagoon swimming sites in NSW

Lake/lagoon swimming sites

Four (24%) of the 17 lake and lagoon swimming sites continued to be graded as Good in 2021–2022. This is a similar performance to the previous year.

Good grades were recorded at 4 lake and lagoon swimming sites:

- Lake Ainsworth East and Lake Ainsworth South on the North Coast
- Summerland Point Baths in Lake Macquarie on the Central Coast
- Entrance Lagoon Beach in Lake Illawarra in the Illawarra.

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

Thirteen lake and lagoon swimming sites continued to be graded as Poor this year. These are:

- Lake Ainsworth North and Lake Ainsworth West on the North Coast
- 9 swimming sites on the Central Coast: Gwandalan, Chain Valley Bay 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.

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 highly 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.

Ocean baths

All 5 ocean baths were graded as Good in 2021–2022. These are:

- Sawtell Rockpool on the Mid-North Coast
- 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.

Beach Suitability Grades for monitored ocean baths in NSW

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.

The Beachwatch programs

Sampling in Sydney Harbour
Photo: Beachwatch/DPE

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

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 8 local councils monitoring 82 swimming sites along the NSW coast during 2021–2022:

- Ballina Shire Council
- Richmond Valley Council
- Coffs Harbour City Council
- Central Coast Council
- Wollongong City Council
- Kiama Municipal Council
- Shoalhaven City Council
- Eurobodalla Shire Council.

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

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 before 7:30am during the swimming season (October to April) and before 8am between May and September, and cover swimming sites in the Sydney, Hunter, Central Coast and Illawarra regions.

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

Sampling sites and areas monitored in NSW under the Beachwatch programs

Beach Suitability Grades for North Coast region

Swimming site	Site type	Beach Suitability Grade	Change
Ballina Shire Council			
Seven Mile Beach	Ocean beach	VG	○
Lake Ainsworth North	Lake/Lagoon	P	○
Lake Ainsworth East	Lake/Lagoon	G	○
Lake Ainsworth South	Lake/Lagoon	G	○
Lake Ainsworth West	Lake/Lagoon	P	○
Shelly Beach	Ocean beach	VG	○
Lighthouse Beach	Ocean beach	VG	○
Shaws Bay North	Estuarine	P	○
Shaws Bay East	Estuarine	G	○
Shaws Bay East Arm	Estuarine	G	○
Shaws Bay East Beach	Estuarine	G	○
Shaws Bay West	Estuarine	P	○
The Serpentine	Estuarine	G	○
Richmond Valley Council			
Airforce Beach	Ocean beach	G	○
Main Beach	Ocean beach	G	○
Shark Bay	Ocean beach	VG	○
Evans River	Estuarine	P	○
Elm Street Bridge North (Evans River)	Estuarine	G	○

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

Beach Suitability Grades for Mid-North Coast region

Swimming site	Site type	Beach Suitability Grade	Change
Coffs Harbour City Council			
Safety Beach*	Ocean beach	G^	–
Woolgoolga Main Beach*	Ocean beach	P^	–
Emerald Beach*	Ocean beach	P^	–
Diggers Beach*	Ocean beach	G^	–
Park Beach*	Ocean beach	G^	–
Jetty Beach (Coffs Harbour)*	Ocean beach	G^	–
Sawtell Beach*	Ocean beach	VG^	–
Sawtell Rockpool*	Ocean baths	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.

Beach Suitability Grades for Hunter region

Swimming site	Site type	Beach Suitability Grade	Change
Port Stephens Council			
Zenith Beach	Ocean beach	VG	○
Box Beach	Ocean beach	VG	○
Fingal Beach	Ocean beach	G	↓
One Mile Beach	Ocean beach	VG	○
City of Newcastle Council			
South Stockton Beach	Ocean beach	G	↓
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	↑
Lake Macquarie City Council			
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		
VG	G	F	P	VP	↑	○	↓
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
Central Coast Council			
Lakes Beach	Ocean beach	G	
Cabbage Tree Bay Rockpool	Ocean baths	G	
Soldiers Beach	Ocean beach	G	
North Entrance Beach	Ocean beach	VG	↑
The Entrance Beach	Ocean beach	G	
The Entrance Ocean Baths	Ocean baths	G	
Toowoon Bay	Ocean beach	P	↓
Shelly Beach	Ocean beach	G	
Gwandalan	Lake/Lagoon	P	
Summerland Point Baths	Lake/Lagoon	G	
Chain Valley Bay	Lake/Lagoon	P	
Mannering Park Baths	Lake/Lagoon	P	
Lake Munmorah Baths	Lake/Lagoon	P	
Canton Beach	Lake/Lagoon	P	
Wamberal Beach	Ocean beach	G	
Wamberal Lagoon	Lagoon	P	
Terrigal Beach	Ocean beach	P	
Terrigal Lagoon	Lagoon	P	
North Avoca Beach	Ocean beach	G	
Avoca Beach	Ocean beach	G	
Avoca Lagoon	Lagoon	P	
Copacabana Beach	Ocean beach	G	
Cockrone Lagoon	Lagoon	P	
MacMasters Beach	Ocean beach	G	
Killcare Beach	Ocean beach	G	

Swimming site	Site type	Beach Suitability Grade	Change
Central Coast Council (continued)			
Ocean Beach	Ocean beach	G	○
Umina Beach	Ocean beach	G	○
Pearl Beach Rockpool	Ocean baths	G	○
Davistown Baths	Estuarine	P	○
Pretty Beach Baths	Estuarine	P	○
Woy Woy Baths	Estuarine	P	○
Yattalunga Baths	Estuarine	P	○

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

Beach Suitability Grades for Sydney region

Swimming site	Site type	Beach Suitability Grade	Change
Northern Sydney – Ocean beaches			
Palm Beach	Ocean beach	VG	○
Whale Beach	Ocean beach	VG	○
Avalon Beach	Ocean beach	VG	○
Bilgola Beach	Ocean beach	G	↓
Newport Beach	Ocean beach	G	↓
Bungan Beach	Ocean beach	G	↓
Mona Vale Beach	Ocean beach	VG	○
Warriewood Beach	Ocean beach	G	○
Turimetta Beach	Ocean beach	G	○
North Narrabeen Beach	Ocean beach	G	○
Narrabeen Lagoon (Birdwood Park)	Lagoon	P	○
Bilarong Reserve	Lagoon	P	○
Collaroy Beach	Ocean beach	G	○
Long Reef Beach	Ocean beach	G	○
Dee Why Beach	Ocean beach	G	↓
North Curl Curl Beach	Ocean beach	G	○
South Curl Curl Beach	Ocean beach	VG	○
Freshwater Beach	Ocean beach	G	○
Queenscliff Beach	Ocean beach	G	○
North Steyne Beach	Ocean beach	G	○
South Steyne Beach	Ocean beach	G	○
Shelly Beach	Ocean beach	G	○
Northern Sydney – Pittwater			
Barrenjoey Beach	Estuarine	G	○
Paradise Beach Baths	Estuarine	G	○

Swimming site	Site type	Beach Suitability Grade	Change
Northern Sydney – Pittwater (continued)			
Clareville Beach	Estuarine	G	
Taylors Point Baths	Estuarine	G	
Bayview Baths	Estuarine	P	↓
Elvina Bay	Estuarine	VG	↑
North Scotland Island	Estuarine	G	
South Scotland Island	Estuarine	G	
The Basin	Estuarine	VG	
Great Mackerel Beach	Estuarine	VG	
Central Sydney – Ocean beaches			
Bondi Beach	Ocean beach	G	
Tamarama Beach	Ocean beach	G	
Bronte Beach	Ocean beach	G	
Clovelly Beach	Ocean beach	VG	
Gordons Bay	Ocean beach	G	↓
Coogee Beach	Ocean beach	P	↓
Maroubra Beach	Ocean beach	G	↓
South Maroubra Beach	Ocean beach	VG	
South Maroubra Rockpool	Ocean baths	G	
Malabar Beach	Ocean beach	G	
Little Bay Beach	Ocean beach	G	
Central Sydney – Sydney Harbour			
Camp Cove	Estuarine	G	↓
Watsons Bay	Estuarine	G	
Parsley Bay	Estuarine	G	
Nielsen Park	Estuarine	VG	
Rose Bay Beach	Estuarine	P	↓

Swimming site	Site type	Beach Suitability Grade	Change
Central Sydney – Sydney Harbour (continued)			
Murray Rose Pool	Estuarine	G	
Dawn Fraser Pool	Estuarine	G	
Chiswick Baths	Estuarine	G	
Cabarita Beach	Estuarine	G	
Woolwich Baths	Estuarine	G	
Tambourine Bay	Estuarine	P	
Woodford Bay	Estuarine	G	
Greenwich Baths	Estuarine	G	
Hayes St Beach	Estuarine	G	
Clifton Gardens	Estuarine	G	
Balmoral Baths	Estuarine	G	
Edwards Beach	Estuarine	G	
Chinamans Beach	Estuarine	G	
Northbridge Baths	Estuarine	P	↓
Davidson Reserve	Estuarine	P	
Gurney Crescent Baths	Estuarine	F	
Clontarf Pool	Estuarine	G	
Forty Baskets Pool	Estuarine	G	
Fairlight Beach	Estuarine	G	
Manly Cove	Estuarine	G	
Little Manly Cove	Estuarine	G	
Southern Sydney – Ocean beaches			
Boat Harbour	Ocean beach	G	
Greenhills Beach	Ocean beach	VG	
Wanda Beach	Ocean beach	VG	
Elouera Beach	Ocean beach	VG	

Swimming site	Site type	Beach Suitability Grade	Change
Southern Sydney – Ocean beaches (continued)			
North Cronulla Beach	Ocean beach	VG	○
South Cronulla Beach	Ocean beach	G	↓
Shelly Beach	Ocean beach	VG	○
Oak Park	Ocean beach	VG	○
Southern Sydney – Botany Bay and lower Georges River			
Silver Beach	Estuarine	G	○
Como Baths	Estuarine	G	○
Jew Fish Bay Baths	Estuarine	P	↓
Oatley Bay Baths	Estuarine	P	↓
Carss Point Baths	Estuarine	P	↓
Sandringham Baths	Estuarine	G	○
Dolls Point Baths	Estuarine	P	↓
Ramsgate Baths	Estuarine	G	○
Monterey Baths	Estuarine	G	○
Brighton-Le-Sands Baths	Estuarine	G	○
Kyeemagh Baths	Estuarine	P	↓
Foreshores Beach	Estuarine	VP	↓
Yarra Bay	Estuarine	P	↓
Frenchmans Bay	Estuarine	P	○
Congwong Bay	Estuarine	G	○
Southern Sydney – Port Hacking			
Jibbon Beach	Estuarine	G	↓
Horderns Beach	Estuarine	G	○
Gymea Bay Baths	Estuarine	P	○
Southern Sydney – Port Hacking (continued)			
Lilli Pilli Baths	Estuarine	G	○

Swimming site	Site type	Beach Suitability Grade	Change
Gunnamatta Bay Baths	Estuarine	G	

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

Beach Suitability Grades for Illawarra region

Swimming site	Site type	Beach Suitability Grade	Change
Wollongong City Council			
Stanwell Park Beach	Ocean beach	VG	○
Coledale Beach	Ocean beach	G	○
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	VG	○
Fishermans Beach	Ocean beach	VG	○
Port Kembla Beach	Ocean beach	G	○
Shellharbour City Council			
Entrance Lagoon Beach	Lake/Lagoon	G	○
Warilla Beach	Ocean beach	G	↓
Shellharbour Beach	Ocean beach	VG	○
Kiama Municipal Council			
Boyds Jones Beach	Ocean beach	G	○
Bombo Beach	Ocean beach	G	↓
Surf Beach Kiama	Ocean beach	G	○
Werri Beach	Ocean beach	VG	↑
Seven Mile Beach (Gerroa)	Ocean beach	G	↓

Beach Suitability Grade					Change		
VG	G	F	P	VP	↑	○	↓
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
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	VG	○
Bawley Point Beach	Ocean beach	VG	○
Merry Beach	Ocean beach	VG	○
Eurobodalla Shire Council			
Cookies Beach	Ocean beach	VG	○
Caseys Beach	Ocean beach	P	↓
Surf Beach	Ocean beach	P	○
Malua Bay Beach	Ocean beach	G	↓
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		
VG	G	F	P	VP	↑	○	↓
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:

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 3 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 3 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 3 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 (NHMRC 2008) were adopted for use in NSW 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 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 (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

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 NSW 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. 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 on the DPE 'Sanitary inspection of beaches' webpage.

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

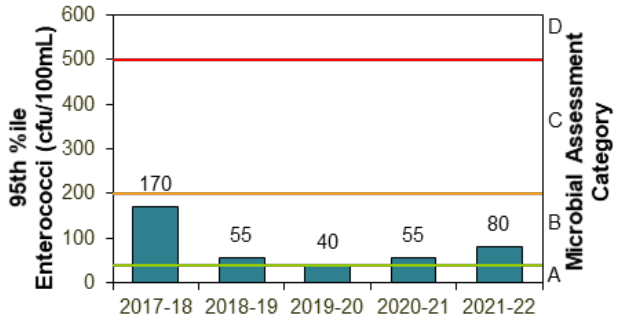
Declined

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

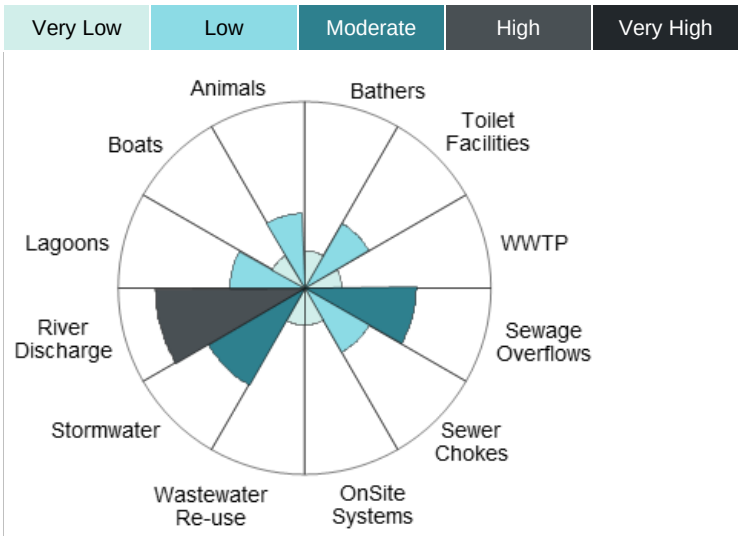
On each beach page, the MACs for the last 5 years are displayed on a simple bar chart. The MAC for the current year is based on enterococci data collected during the assessment period. The bars are labelled with the 95th percentile value for each year and the thresholds dividing the A, B, C and D categories are marked in green, amber and red for reference.



Sanitary Inspection Category (SIC) chart

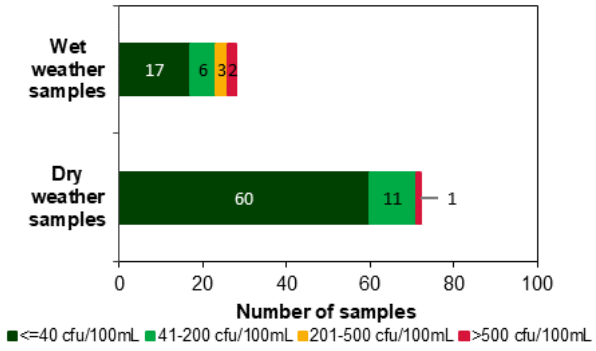
The results of the sanitary inspection for each swimming location are presented in a radar pie chart. The chart shows the likelihood that each identified pollution source will contribute to faecal contamination at a swimming site, as indicated by the size and colour of the segment, ranging from

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

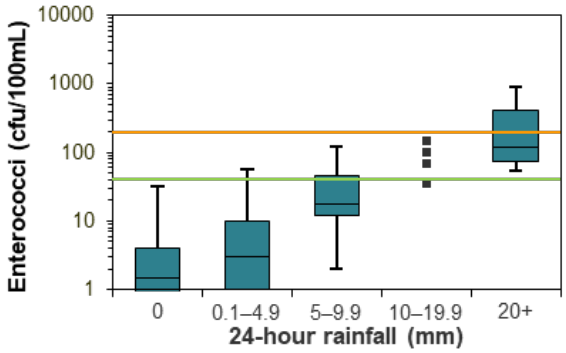
Enterococci levels in wet and dry weather conditions are presented for each swimming location as a bar graph. All data collected during the assessment period is included in the analysis. Dry weather is defined as no rainfall recorded in the previous 24 hours. Each bar is colour coded to show the number 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.



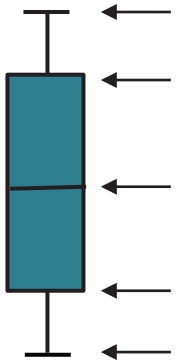
It is expected that swimming sites with lower levels of flushing will show some elevated bacterial results in dry weather samples (no rainfall in the previous 24 hours) due to the longer time needed to recover from a rainfall event. At some estuarine and lake/lagoon swimming locations the impacts of 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 9am 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:



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

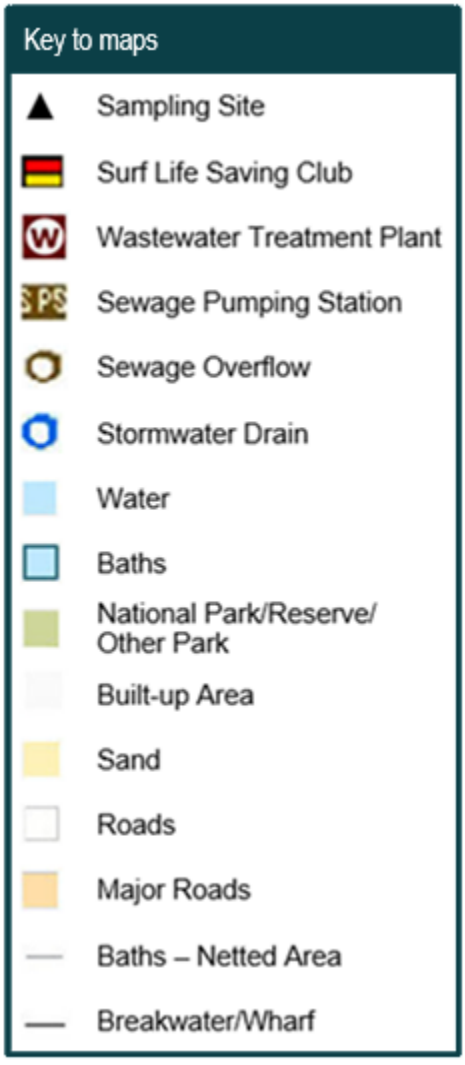
Information bars on each beach page provide a summary of details about the swimming site.

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 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.



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. Due to travel restrictions placed on Beachwatch staff during the COVID-19 pandemic, one Sydney Water field audit, one Hunter Water and one Beachwatch field audit could not be conducted in August 2021. Field audits were not completed for 3 of the 8 partnership councils due to COVID-19 travel restrictions, and council unavailability during the 2021–2022 sampling season. These councils are experienced in field sampling and have performed very well in previous field audits.

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 99%. During one Hunter Water field audit, it was identified that the water samples were not stored appropriately due to a faulty refrigerated esky. The issue was resolved by acquiring ice to store the samples, which ensured the integrity of the samples collected. 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

Ballina Shire Council, Richmond Valley Council, Coffs Harbour City Council, Central Coast Council, Wollongong City Council, Kiama Municipal Council, Shoalhaven City Council and Eurobodalla Shire Council collect samples at 82 popular swimming locations in their respective local government areas.

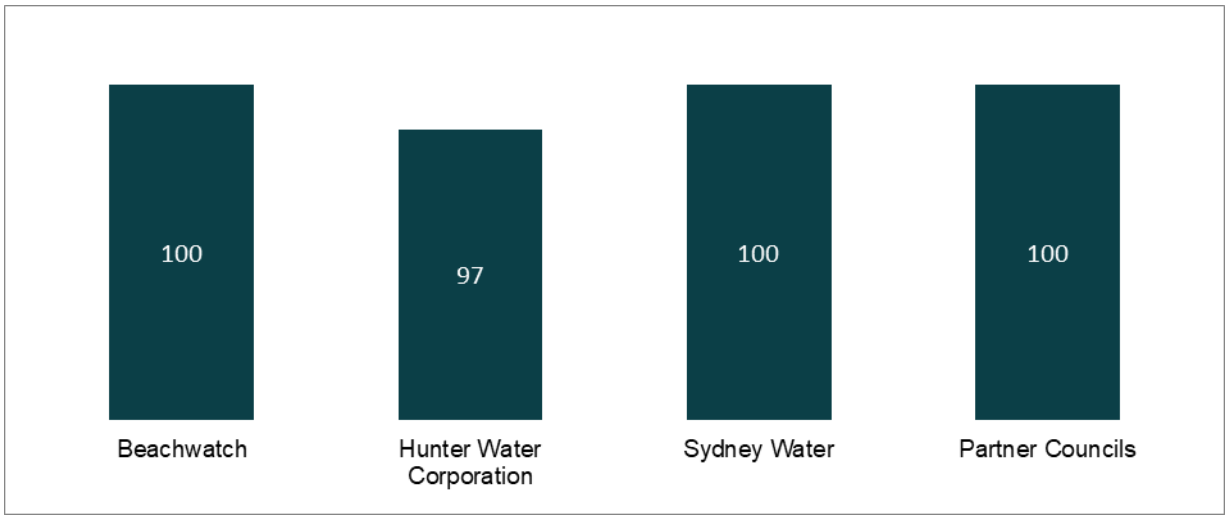


Figure 1 Percentage compliance with Beachwatch sampling protocols in 2021–2022

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. Out of the 128 sets of duplicate samples, there were only 8 values outside the acceptable range and above the safe swimming limit; 2 results were below the replicate, and 6 were higher than the replicate. This indicates that results were rarely underestimated.

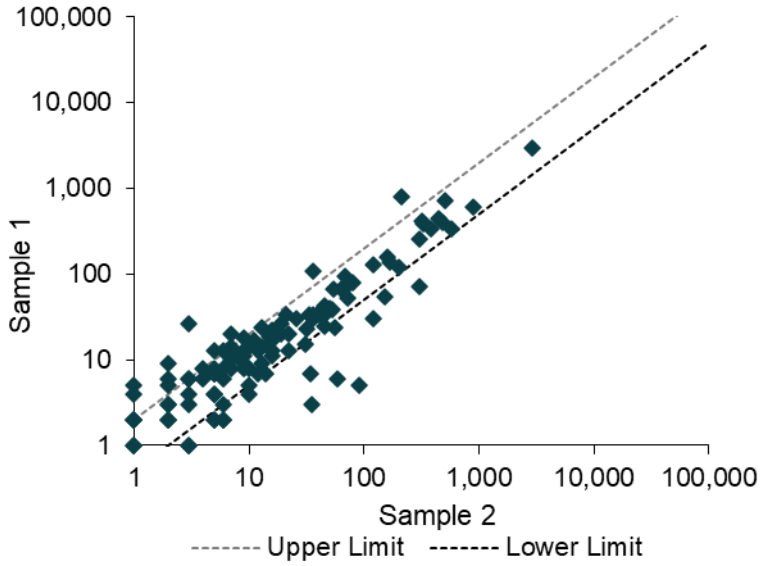
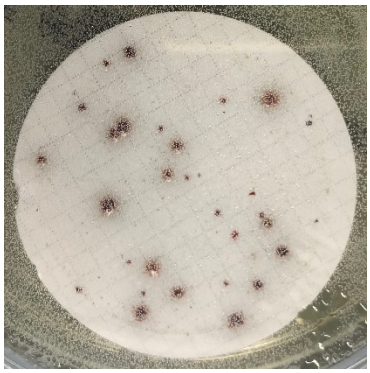


Figure 2 **Distribution of duplicate enterococci (cfu/100 mL) results for the contracted laboratory, May 2021 to April 2022**

Beachwatch Partnership Program



Confirmed colonies of enterococci on plate
Photo: Silliker Australia

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.

Water samples for Coffs Harbour City 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 2021 to April 2022 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 'Enterococci data download' 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 'Enterococci data download' webpage.

Community reporting

Subscribe

Daily beach pollution forecast emails are available from the DPE 'Subscribe to environment and heritage newsletters' 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 harbour 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 2021–2022, 92% of overall predictions were correct. The Hunter and Sydney beaches forecasts were the most accurate with 97% and 94% of scenarios correctly predicted, respectively.

During the 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 2021–2022 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 2021–2022

Star ratings reports

Beach warning signs
Photo: Beachwatch/DPE

The star ratings provide an indication of recent bacterial water quality results, based on NHMRC (2008) guidelines, with one star indicating poor water quality, through to a 4-star rating indicating excellent water quality. The star ratings are calculated using a spreadsheet, and are quality assured prior to reporting on the Beachwatch website, with any errors in calculations detected before publishing. Star ratings are published under each region on the Beachwatch websites, see the ‘About weekly star ratings for beach water quality’ webpage.

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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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):715–722.

More information

- About weekly star ratings for beach water quality
- Beachwatch NSW on Twitter
- Beachwatch NSW on Facebook
- Beachwatch webpage
- Enterococci data download
- Sanitary inspection of beaches
- Subscribe to environment and heritage newsletters
- WA Government environmental water publications