

# Chapter 7

## New Recreational Water Quality Guidelines

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### Introduction

In February 2008, the National Health and Medical Research Council endorsed the new *Guidelines for Managing Risks in Recreational Water* (NHMRC 2008), which supersede the *Australian Guidelines for Use of Recreational Water* (NHMRC 1990) and the *Australian Water Quality Guidelines for Fresh and Marine Waters* (ANZECC 1992), on which the Beachwatch guidelines are based.

The new guidelines represent a major revision of the previous guidelines by focusing on the assessment and management of hazards to minimise health risks. Under the new guidelines, recreational water quality at swimming sites is no longer reported as percentage compliance based on microbial data, but classified from 'very poor' to 'very good' using a matrix based on sanitary inspection and microbial assessment categories. This approach provides information on possible sources of pollution and numerical data on the likely level of faecal pollution. It also grades beaches according to their suitability for swimming.

Beachwatch Programs will implement changes to the monitoring and reporting protocols, in line with the requirements of the new NHMRC guidelines, over the 2009–2010 reporting period, as recommended by NSW Health.

### Sanitary Inspection

The aim of a sanitary inspection is to identify all sources of faecal contamination that could affect a swimming location and assess the risk to public health posed by these sources. It is a qualitative assessment of bacterial water quality at the site, and should, to some degree, correlate with the

bacterial water quality results obtained from sampling.

Through the assessment process beaches are categorised to reflect the level of risk of exposure to faecal contamination. There are five categories (Very Low, Low, Moderate, High and Very High) which are to be reviewed annually.

The knowledge of the catchment, pollution sources and receiving water processes gained from the sanitary inspection provides beach managers with a good foundation for investigating pollution incidents, prioritising and implementing pollution abatement measures and providing sound advice to the community on where and when to swim.

### Microbial Water Quality Assessment

#### *Faecal indicator bacteria*

Quantitative microbial risk assessment using enterococci can be used to estimate indirectly the risk to human health by predicting infection or illness rates for given densities of particular pathogens. Although epidemiological studies do not show a clear dose–response relationship between faecal coliforms and bathers' disease outcomes, enterococci have shown a clear dose–response relationship to disease outcomes in temperate north European waters (WHO 2003).

From 1 May 2009, Beachwatch will no longer monitor for faecal coliforms, but will use enterococci as the single preferred faecal indicator as required by the new NHMRC guidelines and advocated by the World Health Organisation (NHMRC 2008, WHO 2003).

### Sampling program

The new swimming guidelines state that the sampling program should cover the range of conditions occurring while the recreational water environment is in use (NHMRC 2008). At most ocean beaches under the Beachwatch program, the highest use occurs during the summer swimming season (October to April), with some use also occurring during the winter period. Harbour swimming areas tend to operate only during the summer swimming season, with pools closed and shark nets removed during the winter.

Under the new guidelines, Beachwatch will continue to collect water samples every six days from ocean beaches throughout the year. Harbour sites will also continue to be monitored every six days over the summer season (October to May) with monthly surveillance sampling over the winter period (May to September) when the swimming sites are generally not in use.

### Microbial assessment category calculation

The Microbial Assessment Category is determined from the 95<sup>th</sup> percentile of a dataset of at least 100 enterococci data points. The four categories (A to D) relate to levels of risk of illness in adults undertaking whole-of-body contact in the swimming location being assessed, determined from key epidemiological studies (Table 24). NHMRC recommends that Microbial

Assessment Categories be calculated from a rolling five year dataset, with at least 20 samples collected each year.

A consideration in determining the Microbial Assessment Category is that the threshold enterococci levels for each of the four categories were determined by the World Health Organisation from a dose-response relationship applied to enterococci data collected at swimming locations across Europe. These threshold levels 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, Dr Richard Lugg (Department of Health, Western Australia) has developed a Microsoft® Excel tool for calculating a modified 95<sup>th</sup> percentile which uses a parametric approach and takes into account the distribution of data.

### Beach classification

Under the new guidelines beaches are classified on the outcome of the sanitary inspection and the microbial water quality assessment (Table 25). The beach classification is a long term assessment of water quality at each swimming location. It is reviewed annually using rolling datasets including the most recent microbial results, as well as updated information on potential sources of faecal contamination.

**Table 24: Microbial assessment categories (NHMRC 2008)**

Category	95 <sup>th</sup> Percentile of enterococci (cfu/100 ml)	Basis of derivation	Estimation of probability
<b>A</b>	≤40	No illness seen in most epidemiological studies	GI* illness risk <1% AFRI** risk <0.3%
<b>B</b>	41–200	Upper level is above the threshold of illness transmission reported in most studies	GI illness risk 1%–5% AFRI risk 0.3%–1.9%
<b>C</b>	201–500	Represents a substantial elevation in the probability of adverse health outcomes	GI illness risk 5%–10% AFRI risk 1.9% – 3.9%
<b>D</b>	>500	Above this level there may be a significant risk of high levels of illness transmission	GI illness risk >10% AFRI risk >3.9%

\* GI = gastrointestinal

\*\* AFRI = acute febrile respiratory illness

The five level classification for recreational waters ranges from Very Good to Very Poor (Table 25). There is also a requirement for follow-up where there is a potential discrepancy between the results of the microbial water quality assessment and the sanitary inspection. In this situation a review of both the sanitary survey and water quality data is required.

The beach grades provide an indication of the susceptibility of the water body to faecal pollution and guidance to users on the relative suitability for recreation. The classification grades are further defined as:

- **Very Good** – Consistently excellent water quality with very few potential faecal pollution sources. Water is considered safe for swimming at all times.
- **Good** – Generally good water quality with few potential faecal pollution sources. Water is considered safe for swimming most of the time but may be susceptible to pollution after heavy rain.
- **Fair** – Water body is occasionally susceptible to faecal pollution, usually

triggered by heavy rainfall. Swimming should be avoided during and following heavy rainfall for one day at ocean beaches and up to three days in harbour swimming sites.

- **Poor** – Water body is susceptible to faecal pollution, particularly after heavy rain. Swimming should be avoided during and after heavy rain and if there are signs of pollution such as discoloured water, fast-flowing or strong-smelling drains or street litter floating in the water or on the tide line.
- **Very Poor** – Water body is very susceptible to faecal pollution with many potential pollution sources. Water quality results indicate that this location is not suitable for swimming most of the time and should be avoided at all times.

Beach classification also provides the basis for regulatory requirements and assessment of compliance with them. Importantly, information collated for the beach classification feeds into the risk assessment and risk management process.

**Table 25: Classification matrix for faecal pollution of recreational waters (NHMRC 2008)**

		Microbial Assessment Category			
		(95 <sup>th</sup> percentile enterococci cfu/100 ml)			
		A	B	C	D
		≤40	41–200	201–500	>500
Sanitary Inspection Category  (susceptibility to faecal contamination)	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

## Provisional beach classification

The NHMRC (2008) guidelines recognise that there will be occasions when there is a need to issue advice on the classification of a recreational water environment, even though the information required is incomplete. In view of this, provisional beach classifications have been determined for all sites monitored under the Beachwatch Program to enable comparison between the old and new guidelines and to highlight the fact that beach water quality has not changed, just the way it is reported.

Microbial Assessment Categories were determined for both overall and dry-weather conditions using 100 enterococci data points collected every six days over the 2007–2008 summer, 2008 winter and 2008–2009 summer seasons. The overall classification was determined by using water samples collected in both wet and dry weather conditions. The dry weather classification was determined by removing all data associated with rainfall (>0 mm in the previous 24 hours). The 95<sup>th</sup> percentile was determined by using the calculation tool developed by Dr Richard Lugg (Department of Health, Western Australia). Classifying beaches under both dry-weather and overall conditions can indicate whether water quality is affected by stormwater only or whether the swimming site has possible dry weather contamination problems.

Although data were available for the microbial water quality assessment, data for the sanitary inspections of each beach were incomplete. In order to determine the provisional beach classification a preliminary sanitary inspection category was determined for swimming locations in the Sydney, Hunter and Illawarra regions as follows:

- Each swimming location was initially assigned a 'moderate' category. This category assumes that the swimming location has an urban catchment and has one or more stormwater drains but few direct sources of sewage contamination (large overflow points).

- The category for swimming locations with less urbanised catchments was then dropped one level to 'low'.
- The category for swimming locations with densely populated catchments and/or with impacts from lagoon outflows or sewage overflows was increased one level to 'high'.

It should be noted that the sanitary inspection categories for each beach require further investigation and beach classifications are provisional until all necessary data are obtained to provide a definite classification. Further investigation of all sources of faecal contamination at swimming sites will be carried out over the 2009–2010 season to provide a definite beach classification to be reported in the State of the Beaches 2009–2010 annual report.

### *Sydney metropolitan beaches*

Provisional beach classifications are presented for 37 Sydney ocean beaches in Table 26. All but three beaches (92% of sites) are classified as Good or Very Good in both overall and dry weather conditions. Correspondingly, most sites recorded 100% compliance in at least two of the three previous seasons, justifying their higher classifications.

Boat Harbour in the Sutherland Shire and Birdwood Park in Narrabeen Lagoon are classified as Good and Fair in dry weather conditions only, indicating faecal contamination in response to rainfall. These swimming sites also recorded low levels of compliance with swimming guidelines (65% and 71%, respectively) during the wet 2007–2008 summer season.

Malabar Beach was graded Poor in both overall and dry weather conditions, indicating possible dry weather contamination problems. This is consistent with low levels of compliance with swimming guidelines recorded over the previous two summer seasons. Although Malabar Beach complied 100% with enterococci guidelines during winter 2008, low compliance was recorded during the 2007–2008 and 2008–2009 summer seasons, complying 29% and 56% of the time respectively.

**Table 26: Provisional classification of Sydney ocean beaches in overall and dry weather conditions**

	Preliminary Sanitary Inspection category	OVERALL			DRY WEATHER		
		95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification	95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification
Palm Beach	Low	50	B	Good	18	A	Very Good
Whale Beach	Low	28	A	Very Good	18	A	Very Good
Avalon Beach	Low	18	A	Very Good	32	A	Very Good
Bilgola Beach	Low	38	A	Very Good	3	A	Very Good
Newport Beach	Low	60	B	Good	18	A	Very Good
Bungan Beach	Low	36	A	Very Good	18	A	Very Good
Mona Vale Beach	Low	24	A	Very Good	30	A	Very Good
Warriewood Beach	Moderate	45	B	Good	18	A	Good
Turimetta Beach	Moderate	30	A	Good	9	A	Good
North Narrabeen Beach	Moderate	50	B	Good	26	A	Good
Birdwood Park	High	220	C	Poor	150	B	Fair
Collaroy Beach	Moderate	70	B	Good	30	A	Good
Long Reef Beach	Moderate	40	A	Good	32	A	Good
Dee Why Beach	Moderate	55	B	Good	20	A	Good
North Curl Curl Beach	Moderate	70	B	Good	16	A	Good
South Curl Curl Beach	Moderate	50	B	Good	34	A	Good
Freshwater Beach	Moderate	90	B	Good	30	A	Very Good
Queenscliff Beach	Moderate	155	B	Good	95	B	Good
North Steyne Beach	Moderate	75	B	Good	50	B	Good
South Steyne Beach	Moderate	120	B	Good	75	B	Good
Shelly Beach (Manly)	Moderate	60	B	Good	60	B	Good
Bondi Beach	Moderate	100	B	Good	70	B	Good
Bronte Beach	Moderate	120	B	Good	75	B	Good
Tamarama Beach	Moderate	195	B	Good	140	B	Good
Clovelly Beach	Moderate	85	B	Good	22	A	Good
Coogee Beach	Moderate	200	B	Good	145	B	Good
Maroubra Beach	Moderate	80	B	Good	45	B	Good
Malabar Beach	Moderate	480	C	Poor	220	C	Poor
Little Bay	Moderate	150	B	Good	85	B	Good
Boat Harbour	Moderate	230	C	Poor	200	B	Good
Greenhills	Low	50	B	Good	20	A	Very Good
Wanda Beach	Low	50	B	Good	18	A	Very Good
Elouera Beach	Low	34	A	Very Good	14	A	Very Good
North Cronulla Beach	Moderate	45	B	Good	26	A	Good
South Cronulla Beach	Moderate	60	B	Good	32	A	Good
Shelly Beach	Moderate	65	B	Good	30	A	Good
Oak Park	Moderate	115	B	Good	60	B	Good

**Table 27: Provisional classification of Hunter ocean beaches in overall and dry weather conditions**

	Preliminary Sanitary Inspection category	OVERALL			DRY WEATHER		
		95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification	95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification
Zenith Beach	Low	2	A	Very Good	2	A	Very Good
Box Beach	Low	2	A	Very Good	2	A	Very Good
Fingal Bay	Low	9	A	Very Good	7	A	Very Good
One Mile Beach	Low	2	A	Very Good	6	A	Very Good
Stockton South Beach	Low	34	A	Very Good	6	A	Very Good
Nobbys Beach	Low	12	A	Very Good	4	A	Very Good
Newcastle Beach	Low	14	A	Very Good	3	A	Very Good
Bar Beach	Low	36	A	Very Good	14	A	Very Good
Merewether Beach	Low	55	B	Good	18	A	Very Good
Burwood North Beach	Low	32	A	Very Good	26	A	Very Good
Burwood South Beach	Low	28	A	Very Good	12	A	Very Good
Glenrock Lagoon Beach	Low	26	A	Very Good	14	A	Very Good
Dudley Beach	Low	22	A	Very Good	8	A	Very Good
Redhead Beach	Low	32	A	Very Good	16	A	Very Good
Blacksmiths Beach	Low	3	A	Very Good	28	A	Very Good
Swansea Heads Beach	Low	32	A	Very Good	2	A	Very Good
Caves Beach	Low	4	A	Very Good	2	A	Very Good

**Table 28: Provisional classification of Illawarra ocean beaches in overall and dry weather conditions**

	Preliminary Sanitary Inspection category	OVERALL			DRY WEATHER		
		95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification	95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification
Austinmer Beach*	Low	26	A	Very Good	16	A	Very Good
Thirroul Beach*	Low	70	B	Good	16	A	Very Good
Bulli Beach	Low	125	B	Good	20	A	Very Good
Woonona Beach	Low	28	A	Very Good	6	A	Very Good
Bellambi Beach	Moderate	95	B	Good	30	A	Good
Corrimal Beach	Moderate	95	B	Good	22	A	Good
Coniston Beach	Moderate	12	A	Very Good	12	A	Very Good
North Wollongong Beach	Low	16	A	Good	14	A	Good
Wollongong City Beach	Low	12	A	Very Good	14	A	Very Good
Fishermans Beach	Moderate	18	A	Good	20	A	Good
Port Kembla Beach	Moderate	80	B	Good	30	A	Good
Entrance Lagoon Beach	High	220	C	Poor	145	B	Good
Warilla Beach	Low	14	A	Very Good	14	A	Very Good
Shellharbour Beach	Moderate	12	A	Good	12	A	Good
Boyd's Jones Beach	Low	18	A	Very Good	3	A	Very Good
Bombo Beach	Moderate	9	A	Good	8	A	Good
Surf Beach, Kiama*	Low	65	B	Good	16	A	Very Good
Werri Beach	Low	30	A	Very Good	22	A	Very Good

\* Only 82 and 78 data points were used to calculate MAC in overall and dry weather conditions, respectively

### ***Hunter ocean beaches***

Provisional beach classifications are presented for 17 Hunter ocean beaches in Table 27. Hunter beaches are among the cleanest beaches monitored in the Beachwatch Program and the least affected by rainfall and the stormwater it produces. All sites are classified as good or very good in both overall and dry weather conditions and have recorded a high level of compliance over the last three seasons despite heavy rainfall during the 2007–2008 monitoring period.

### ***Illawarra ocean beaches***

Provisional beach classifications are presented for all 18 Illawarra ocean beaches in Table 28. Three sites (Austinmer Beach, Thirroul Beach and Surf Beach) have been monitored for enterococci only over the last three summer swimming seasons. As a result only 82 and 78 data points were available to calculate a 95<sup>th</sup> percentile for overall and dry weather conditions, respectively, at these beaches.

All but one site (94% of beaches) are classified as Good or Very Good in both overall and dry weather conditions and have generally recorded high levels of compliance over the last three seasons.

Entrance Lagoon Beach is classified as Good only in dry weather conditions indicating faecal contamination in response to rainfall. Corresponding low levels of compliance (57% and 52%) were recorded at Entrance Lagoon Beach during the 2007–2008 and 2008–2009 summer seasons, respectively.

### ***Sydney Harbour beaches***

Provisional beach classifications are presented for all 29 sites in Sydney Harbour in Table 29.

Despite heavy rainfall over the 2007–2008 swimming season affecting water quality data used in the assessment, 23 of the 29 sites (67% of swimming locations) were classified as Good in both overall and dry weather conditions. Although some of these sites recorded less than 90% compliance with swimming guidelines over the 2007–2008 annual season, the lower levels of

seasonal compliance were caused by enterococci levels just exceeding the NHRMC (1990) guideline threshold values (35 and 100 cfu/100 ml) but not exceeding the 'B' Microbial Assessment Category threshold (200 cfu/100 ml).

Of the five sites classified Poor in overall weather conditions, all five swimming sites were classified as Good or Fair in dry weather conditions, indicating faecal contamination in response to rainfall. These sites also recorded low percent compliance with swimming guidelines over the wet 2007–2008 swimming season. Sewage overflows upstream of these locations often affect water quality after heavy rain. As a precaution swimming should be avoided for up to three days in harbour swimming sites because of the possibility of pollution from stormwater.

Darling Harbour was classified as Very Poor and Poor in overall and dry weather conditions, respectively. This site is affected by discharges from a section of combined sewer-stormwater and has a naturally low flushing rate, so pollution that enters the bay is not diluted or dissipated as readily as in other areas of the Harbour. Swimming by the general public is not permitted in Darling Harbour and should be avoided at all times.

### ***Botany Bay, lower Georges River and Port Hacking beaches***

Provisional beach classifications are presented for all 20 sites in Botany Bay, lower Georges River and Port Hacking in Table 30.

Fourteen of the 20 sites (70% of swimming locations) were classified as Good in both overall and dry weather conditions. Although most of these sites recorded less than 90% compliance with swimming guidelines over the 2007–2008 assessment period, the lower levels of seasonal compliance were caused by enterococci levels just exceeding the NHRMC (1990) guideline threshold values (35 and 100 cfu/100 ml) but not exceeding the 'B' Microbial Assessment Category threshold (200 cfu/100 ml).

During dry weather, most sites in Botany Bay, lower Georges River and Port Hacking are generally suitable for swimming. None of the six sites classified as Poor in overall weather conditions remained Poor in dry weather conditions, indicating that faecal contamination was usually triggered by rainfall.

#### **Pittwater beaches**

Provisional beach classifications are presented for all 11 beaches in Pittwater in Table 31. All sites were classified as Good or Very Good in both wet and dry weather conditions and have generally recorded high levels of compliance over the assessment period.

**Table 29: Provisional classification of Sydney Harbour beaches in overall and dry weather conditions**

	Preliminary Sanitary Inspection category	OVERALL			DRY WEATHER		
		95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification	95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification
<b>Port Jackson</b>							
Hayes St Beach	Moderate	320	C	Poor	60	B	Good
Little Sirius Cove	Moderate	230	C	Poor	45	B	Good
Clifton Gardens	Moderate	80	B	Good	32	A	Good
Redleaf Pool	Moderate	140	B	Good	50	B	Good
Rose Bay Beach	Moderate	170	B	Good	95	B	Good
Nielsen Park	Moderate	50	B	Good	10	A	Good
Parsley Bay	Moderate	135	B	Good	20	A	Good
Watsons Bay	Moderate	90	B	Good	14	A	Good
<b>North Harbour</b>							
Forty Baskets Pool	Moderate	70	B	Good	18	A	Good
Fairlight Beach	Moderate	38	A	Good	10	A	Good
Manly Cove	Moderate	50	B	Good	10	A	Good
Little Manly Cove	Moderate	95	B	Good	30	A	Good
<b>Middle Harbour</b>							
Davidson Reserve	High	370	C	Poor	90	B	Fair
Gurney Cr Baths	Moderate	170	B	Good	38	A	Good
Sangrado Baths	High	390	C	Poor	75	B	Fair
Northbridge Baths	Moderate	175	B	Good	40	A	Good
Clontarf Pool	Moderate	120	B	Good	20	A	Good
Chinamans Beach	Moderate	75	B	Good	18	A	Good
Edwards Beach	Moderate	65	B	Good	16	A	Good
Balmoral Baths	Moderate	110	B	Good	36	A	Good
<b>Lane Cove River</b>							
Woodford Bay	Moderate	125	B	Good	30	A	Good
Tambourine Bay	Moderate	320	C	Poor	75	B	Good
Woolwich Baths	Moderate	190	B	Good	60	B	Good
<b>Lower Parramatta River</b>							
Cabarita Beach	Moderate	120	B	Good	45	B	Good
Chiswick Baths	Moderate	110	B	Good	45	B	Good
Dawn Fraser Pool	Moderate	120	B	Good	60	B	Good
Henley Baths	Moderate	105	B	Good	50	B	Good
Greenwich Baths	Moderate	115	B	Good	40	A	Good
Darling Harbour	High	740	D	Very Poor	330	C	Poor

**Table 30: Provisional classification of Botany Bay, lower Georges River and Port Hacking beaches in overall and dry weather conditions**

	Preliminary Sanitary Inspection category	OVERALL			DRY WEATHER		
		95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification	95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification
<b>Lower Georges River</b>							
Jew Fish Bay Baths	Moderate	120	B	Good	105	B	Good
Como Baths	Moderate	165	B	Good	115	B	Good
Oatley Bay Baths	Moderate	260	C	Poor	150	B	Good
Carss Point Baths	Moderate	240	C	Poor	100	B	Good
Sandringham Baths	Moderate	130	B	Good	75	B	Good
Dolls Point Baths	Moderate	80	B	Good	55	B	Good
<b>Botany Bay</b>							
Congwong Bay	Moderate	65	B	Good	50	B	Good
Frenchmans Bay	Moderate	270	C	Poor	195	B	Good
Yarra Bay	Moderate	290	C	Poor	195	B	Good
Foreshores Beach	High	390	C	Poor	175	B	Fair
Kyeemagh Baths	Moderate	200	B	Good	105	B	Good
Brighton Le Sands Baths	Moderate	125	B	Good	85	B	Good
Monterey Baths	Moderate	75	B	Good	45	B	Good
Ramsgate Baths	Moderate	105	B	Good	70	B	Good
Silver Beach	Moderate	85	B	Good	90	B	Good
<b>Port Hacking</b>							
Gunnamatta Bay Baths	Moderate	200	B	Good	115	B	Good
Jibbon Beach	Moderate	45	B	Good	45	B	Good
Horderns Beach	Moderate	125	B	Good	110	B	Good
Lilli Pilli Baths	Moderate	50	B	Good	50	B	Good
GyMEA Bay Baths	Moderate	290	C	Poor	150	B	Good

**Table 31: Provisional classification of Pittwater beaches in overall and dry weather conditions**

	Preliminary Sanitary Inspection category	OVERALL			DRY WEATHER		
		95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification	95 <sup>th</sup> Percentile Enterococci	Microbial Assessment Category	Beach Classification
Barrenjoey Beach	Low	26	A	Very Good	28	A	Very Good
Paradise Beach Bath	Moderate	45	B	Good	28	A	Good
Salt Pan Cove Baths	Moderate	135	B	Good	70	B	Good
Clareville Beach	Moderate	105	B	Good	45	B	Good
Bayview Baths	Moderate	160	B	Good	120	B	Good
Winji Jimmi Bay	Moderate	140	B	Good	50	B	Good
North Scotland Island	Moderate	75	B	Good	40	A	Good
South Scotland Island	Moderate	65	B	Good	28	A	Good
Elvina Bay	Moderate	65	B	Good	38	A	Good
The Basin	Low	30	A	Very Good	22	A	Very Good
Great Mackerel Beach	Low	30	A	Very Good	34	A	Very Good

## Overall

Despite some very heavy rainfall affecting water quality during the assessment period (October 2007 to May 2009), 89% of sites were classified as either Good or Very Good in overall weather conditions.

A comparison of beach classifications in both overall and dry weather conditions indicates that some sites are susceptible to stormwater pollution after heavy rain. Swimming sites in the Lane Cove River, Middle Harbour, west Port Jackson, lower Georges River, Botany Bay and Port Hacking are the most affected by rainfall and the stormwater it produces.

Both stormwater pollution and sewer overflows triggered by rainfall are major pollution sources, particularly in harbour and estuarine swimming sites. As a precaution swimming should be avoided during and up to one day after heavy rain at ocean beaches and up to three days after heavy rain at harbour sites because of the possibility of pollution from stormwater.

## Beach categories vs percent compliance

The results of the two reporting methods were compared as overall statistics to determine the level of agreement between the methods.

Of the 131 swimming sites monitored in the Sydney, Hunter and Illawarra regions, 30 sites were classified as Very Good, 86 sites were classified as Good and 15 sites were classified as Poor. Darling Harbour, which is not a swimming site, was classified as Very Poor.

The majority of swimming sites (89%) were rated either Good or Very Good and therefore suitable for swimming most of the time from October 2007 to May 2009.

Under the Beachwatch guidelines method of reporting percent compliance, the number of sites complying more than 90% of the time was:

- 66 percent for the 2007–2008 summer season
- 85 percent for the 2008 winter season
- 92 percent for the 2008–2009 summer season.

Generally there is good agreement between the two reporting methods, although some discrepancies can arise when lower levels of seasonal compliance are caused by enterococci levels just exceeding the Beachwatch guideline threshold values (35 and 100 cfu/100 ml) but not exceeding the 'B' Microbial Assessment Category threshold (200 cfu/100 ml). Some beaches recorded slightly elevated enterococci levels in response to heavy rainfall over the 2007–2008 summer season, resulting in less than 90% compliance with swimming guidelines while still being classed as Good.

Of the swimming locations classified as Poor, all recorded low levels of compliance (less than 90%) in two or more of the three seasons in the assessment period.

Whereas the NHMRC (1990) guidelines provide an indication of the probability of swimmers developing an illness, the new NHMRC (2008) guidelines provide information on the local influences on recreational water quality, as well as information on the likely level of contaminants. The results from the new guidelines can be used to:

- classify beaches to support informed personal choice
- provide on-site guidance to users on the relative safety of the water
- assist in identifying and promoting effective management interventions
- provide a basis for regulatory requirements, and an assessment of compliance with such requirements.

Implementation of new monitoring and reporting protocols by Beachwatch Programs, to be in line with the NHMRC (2008) Guidelines for Managing Risks in Recreational Waters, will ensure recreational water environments are managed as safely as possible so that people and local economies that rely on water-associated recreational activities can continue to benefit into the future.