Department of
Environment and Conservation (NSW)

Beachwatch Partnership Pilot Program

State of the Beaches 2003–2004

Councils:
Ballina - Maclean – Pristine Waters – Bellingen – Great Lakes – Wyong – Shoalhaven

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BEACHWATCH

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Overview

In June 2001, Premier Carr announced the New South Wales Government's $11.7-million Coastal Protection Package. This package provides a holistic framework for the management of the coastal zone and includes a range of initiatives designed to ensure that the State's coastal environments are protected for future generations. The Beachwatch Partnership Pilot Program is a key component of this package. It aims to raise awareness of beach water quality issues, streamline testing along the New South Wales coast, and increase community access to beach water quality information.

Pilot beach water quality monitoring and reporting programs were initially run in partnership with 15 councils along the NSW coast between October 2002 and July 2003. This data has previously been reported (Department of Environment and Conservation 2004b).

Seven of the 15 councils elected to extend their programs to the 2003–2004 summer swimming season (October 2003 to April 2004). These councils were Ballina Shire Council, Maclean Shire Council and Pristine Waters Council (now combined in Clarence Valley Shire Council), Bellingen Shire Council, Great Lakes Council, Wyong Shire Council and Shoalhaven City Council.

All councils except Ballina received funding to continue monitoring. Ballina Council entirely funded its own program.

The pilot monitoring programs ranged in size from two to 30 sampling locations, and included ocean beaches, freshwater lakes, tidal pools, bays, rivers, lagoons, harbour sites and estuarine sites.

Data availability

The information in this report is supported by detailed results for each beach at www.environment.nsw.gov.au/beach/cpp. These beach pages provide a description of the swimming location, potential pollution sources, time series plots of water quality and rainfall data and (where assessed) guideline compliance results.

In addition, the data for each swimming location may be downloaded from www.soedirect.nsw.gov.au.

Water quality analyses and assessment

Two types of indicator bacteria, faecal coliforms and enterococci, were used to assess recreational water quality in the summer 2003–2004 pilot programs, as recommended by the National Health and Medical Research Council (NHMRC). These bacteria indicate the possible presence of waterborne pathogens, organisms that pose significant risks to human health.

The *NHMRC Australian Guidelines for Recreational Use of Water* (NHMRC 1990) were used to assess recreational water quality in the Beachwatch Partnership Pilot Program.

Overview of findings

Below is a summary of key findings for each council area. Detailed results for each council area are provided in Chapter 2. This information is also supported by individual beach pages for each site at www.environment.nsw.gov.au/beach/cpp.

Ballina Shire Council

Nine swimming locations were monitored in the Ballina Shire Council area between December 2003 and February 2004, the three busiest months in the summer swimming season. Faecal coliform and enterococci samples were collected from all locations to assess compliance with NHMRC (1990) swimming water quality guidelines. The sites were the ocean beaches of Seven Mile and Shelly, three sites in Lake Ainsworth, one site in The Serpentine and three sites in Shaws Bay.

The cleanest swimming sites in the Ballina Shire Council area were:

- the ocean beaches of Seven Mile and Shelley
- Lake Ainsworth South (the main swimming area) and Lake Ainsworth East
- all three sites in Shaws Bay
- The Serpentine.

These eight locations passed the NHMRC (1990) swimming guidelines in December 2003, January and February 2004.

A lower level of compliance with NHMRC (1990) swimming guidelines was measured at Lake Ainsworth West, which complied only in February 2004. The site failed the swimming guidelines in December 2003 and January 2004 due to elevated levels of enterococci.

Maclean and Pristine Waters councils

Maclean and Pristine Waters councils jointly implemented their program. The councils have since been incorporated into the Clarence Valley Council.

Eight swimming locations were monitored in the Maclean Shire Council area: two ocean beaches, two estuarine beaches, a coastal lagoon, two sites on the Clarence River and one rock pool. Samples were collected between November 2003 and April 2004 to assess compliance with the NHMRC (1990) swimming water quality guidelines.

The cleanest beaches in the Maclean Shire Council area were:

- the ocean beaches of Main Beach Yamba and Brooms Head Beach
- Whiting Beach and Iluka in the Clarence River
- Kolora Lake
- Blue Pool.

These six swimming locations passed the NHMRC (1990) guidelines in all six months of the 2003–2004 summer swimming season in which samples were collected.

A lower level of compliance was recorded at Maclean Jetty on the Clarence River near the town of Maclean. Sufficient samples to calculate compliance were collected in December 2003 and February, March and April 2004. The site passed the swimming guidelines in three of the four months, failing in March 2004 due to elevated levels of enterococci.

Four sites were monitored in the Pristine Waters Shire: three ocean beaches and one estuarine swimming location. Samples were collected between November 2003 and February 2004, the four busiest months of the swimming season. Faecal coliform and enterococci levels were assessed at all locations to determine compliance with NHMRC (1990) swimming water quality guidelines.

The cleanest swimming locations in the Pristine Waters Shire were:

- the ocean beaches of Minnie Water Main Beach and Wooli Back Beach.

These two sites complied with the NHMRC (1990) guidelines in all four months in which samples were collected.

A lower level of compliance was recorded at Corindi Beach and Red Rock Estuary. Both sites failed the swimming guidelines in January and February of the 2003–2004 swimming season due to elevated levels of enterococci.

Previous monitoring has revealed high levels of bacteria in the stormwater outflow to Corindi Beach. It is recommended that swimming in the vicinity of the stormwater drain at Corindi Beach be avoided at all times.

Bellingen Shire Council

Two swimming locations were monitored in the Bellingen Shire Council area between December 2003 and February 2004, the three busiest months in the summer swimming season. These sites were Mylestom Pool on the Bellinger River and Sea Lido in Urunga Lagoon.

Faecal coliform and enterococci samples were collected from both locations during dry and wet weather conditions to assess the impact of rainfall on water quality. Due to the lack of rainfall over the monitoring period, sampling during January focused on

assessment of compliance with NHMRC (1990) swimming water quality guidelines.

Samples were also collected from a stormwater drain upstream of Mylestom Pool and two creeks in the Urunga Lagoon catchment. These sites were monitored to as potential sources of pollution to the swimming locations.

Sea Lido was the cleanest swimming site in the Bellingen Shire Council area, passing the NHMRC (1990) guidelines in January 2004.

Mylestom Pool failed the NHMRC (1990) guidelines in January 2004 due to elevated levels of enterococci. Monitoring of the stormwater drain upstream of the swimming site indicated that it was a potential source of bacterial contamination.

Great Lakes Council

Five swimming locations were monitored in this council area: two ocean beaches (One Mile and Forster Main Beach), two rock pools (Tuncurry Rock Pool and Forster Rock Pool) and a tidal pool in Wallis Lake (Little Street Tidal Baths).

Faecal coliform and enterococci samples were collected from all sites between October 2003 and March 2004 to assess compliance with NHMRC (1990) swimming water quality guidelines. At Little Street Tidal Baths, insufficient samples to assess compliance were collected in October 2003.

All five swimming locations passed the NHMRC (1990) swimming guidelines in all months in which sufficient samples were collected to assess compliance.

Wyong Shire Council

Thirty swimming locations were monitored in the Wyong Shire Council area during the 2003–2004 summer swimming season. These sites included 17 ocean beaches, nine coastal lake sites, a tidal pool and three estuarine river sites in the Tuggerah Lakes catchment.

Faecal coliform and enterococci samples were collected from all locations to assess compliance with NHMRC (1990) swimming water quality guidelines.

The cleanest swimming sites in the Wyong Shire Council area were:

- the ocean beaches of Frazer, Birdie, Budgewoi, Lakes, Hargraves, Jenny Dixon, Cabbage Tree, Lighthouse, Gravelly, Soldiers, North Entrance, The Entrance, Blue Bay, Toowoon Bay, Shelly, Blue Lagoon and Bateau Bay
- Chain Valley Bay in Lake Macquarie
- Long Jetty and Pelican in Tuggerah Lake
- Cabbage Tree Rock Pool.

These swimming sites passed the NHMRC (1990) guidelines in all seven months of the 2003–2004 swimming season.

A relatively high level of compliance was also recorded at Summerland Point in Lake Macquarie, which complied with the swimming guidelines in six of the seven months of the swimming season.

Sites which failed the NHMRC (1990) swimming guidelines in two or months were Gwandalan in Lake Macquarie, Elizabeth Bay in Lake Munmorah, Toukley Aquatic in Lake Budgewoi, Canton Beach in Tuggerah Lake and Wyong River.

The following sites failed the swimming guidelines in all seven months of the 2003–2004 summer swimming season, and swimming should be avoided at these locations at all times:

- San Remo in Lake Budgewoi
- Tumbi Umbi Creek and Ourimbah Creek, which flow to Tuggerah Lake.

Shoalhaven City Council

Nine swimming locations were monitored in the Shoalhaven City Council area between November 2003 and March 2004, the four busiest months in the summer swimming season. The sites were six ocean beaches, two sea pools and a coastal lake. Faecal coliform and enterococci samples were collected from all locations to assess compliance with NHMRC (1990) swimming water quality guidelines.

The cleanest swimming sites in the Shoalhaven were:

- the ocean beaches of Shoalhaven Heads, Tilbury Cove, Nelson, Cudmirrah and Racecourse
- Huskisson Sea Pool.

These swimming locations passed the swimming guidelines in all five months in which compliance was assessed.

A high level of compliance was also recorded at Barfleur Beach and Ulladulla Sea Pool. These two sites complied with the NHMRC (1990) guidelines in four or the five months, failing the guidelines in January 2004 due to elevated levels of enterococci.

Compliance with swimming guidelines at Lake Tabourie was poor during summer 2003–2004. This site failed the guidelines in all but one month (February 2004), with elevated levels of enterococci measured in November and December 2003 and January and March 2004. Elevated levels of faecal coliforms were also measured in November 2003. High levels of indicator bacteria were measured in Lake Tabourie in dry and wet weather conditions. Shoalhaven Council commenced investigations to locate the source of faecal contamination at the site.

Response to rainfall

While monitoring during the 2003–2004 swimming season focused on the assessment of guideline compliance, where possible, an assessment of the impact of rainfall on recreational water quality was also made. These trends are discussed on the individual beach pages, and on the council summary pages in Chapter 2.

Slightly elevated bacterial levels (values above median and geometric mean guideline limits) were measured at most ocean beaches following heavy rainfall. However, these results were not indicative of sewage contamination (indicated by levels of 1000 cfu/100 mL or more).

However, rainfall during summer 2003–2004 was below average, with few large or extended wet weather events in most council areas. A greater response to rainfall may be recorded during periods of higher rainfall. Until more data is collected, it is recommended that swimming at ocean beaches be avoided during and for at least 24 hours after rainfall.

A greater response to rainfall was apparent at estuarine and coastal lake swimming locations. Elevated levels of indicator bacteria were measured during and after rainfall at many sites, indicating varying degrees of sewage contamination. As a precaution, it is recommended that swimming in estuaries and coastal lakes be avoided during and up to three days after rainfall.

Quality assurance

Quality assurance and quality control procedures were incorporated into all aspects of the pilot monitoring programs, including:

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

The results of these assessments indicate that councils collected samples according to procedures, the microbiological data is reliable, and the information reported to the community during the pilot programs was accurate.

Appendixes

There are three appendixes to this report.

- **Appendix A** details the indicators and guidelines used to assess recreational water quality.
- **Appendix B** outlines monitoring strategies and priority evaluation methods employed by local councils.
- **Appendix C** lists further reading and information sources.

Chapter 1 Introduction

Overview

In June 2001, Premier Carr announced the New South Wales Government's $11.7-million Coastal Protection Package. This package provides a holistic framework for the management of the coastal zone and includes a range of initiatives designed to ensure that the State's coastal environments are protected for future generations. The Beachwatch Partnership Pilot Program is a key component of this package. It aims to raise awareness of beach water quality issues, streamline testing along the New South Wales coast and increase community access to beach water quality information.

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All councils except Ballina received funding to continue monitoring. Ballina Council entirely funded its own program.

The pilot monitoring programs ranged in size from two to 30 sampling locations, and included ocean beaches, freshwater lakes, tidal pools, bays, rivers, lagoons, harbour sites and estuarine sites.

Report structure

This **Introduction** provides background information on the Beachwatch Partnership Pilot Program, the development of the monitoring programs in partnership with local councils, water quality indicators and guidelines used to assess beach water quality.

Chapter 2 presents the findings from water quality monitoring in the seven regional council areas in New South Wales.

Chapter 3 describes the quality assurance (QA) program included in the Beachwatch Partnership Pilot Program to ensure that the data collected and presented is accurate and reliable. This includes QA of field sampling and microbiological analysis of beach water samples.

There are three appendixes to this report.

- **Appendix A** gives details of the indicators and guidelines used to assess recreational water quality.
- **Appendix B** outlines monitoring strategies and priority evaluation methods employed by local councils.
- **Appendix C** lists further reading and information sources. It is intended to point the reader towards other information relating to both bacterial pollution of waterways used for recreation, and human health risks.

About the Beachwatch Partnership Pilot Program

The Department of Environment and Conservation's Beachwatch Programs section was given the responsibility of delivering the objectives of the Beachwatch Partnership Pilot Program over a two and a half-year period.

The objectives were:

1) to raise awareness and understanding of water quality impacts associated with recreational water use;
2) to improve the consistency and quality of recreational water quality monitoring undertaken by local government and other water resource managers in New South Wales; and
3) to increase community access to information on recreational water quality.

To accomplish these objectives, the program was designed around three principal components: a protocol for monitoring and reporting recreational water quality, council pilot programs, and a training program.

Protocol for monitoring and reporting

A protocol for monitoring and reporting coastal recreational water quality was developed by the then Environment Protection Authority in May 2002. The document was a step-by-step guide to the development and implementation of a targeted recreational water quality monitoring program.

It included information on water-borne pathogens and their health effects, water quality guidelines, indicator organisms, a risk-based methodology for prioritising swimming locations, monitoring strategies, sampling and analysis procedures, quality assurance requirements, and community reporting plans.

The protocol was provided to all coastal councils for review in May 2002, and feedback was sought during a series of workshops conducted in June and July 2002.

The protocol was then implemented and tested by the 15 councils participating in pilot programs between October 2002 and July 2003. Feedback from councils was used to refine and finalise the protocol.

The final protocol, which is entitled *Monitoring and Reporting Coastal Recreational Water Quality: Information Package and Field Manual* (DEC 2004a), was released in March 2004 and is available at www.environment.nsw.gov.au/beach/cpp.

Pilot monitoring programs

In August 2002, all coastal councils in New South Wales were invited to apply for grant funding to implement pilot recreational water quality monitoring and reporting programs over the 2002–2003 summer swimming season.

To apply for grant funding, local councils were required to:

1) identify all swimming locations in their local area;
2) develop a conceptual model for each swimming location based on potential pollution sources and beach use information;
3) prioritise swimming locations as high, medium or low;
4) select appropriate monitoring strategies based on the beach prioritisations and the availability of council resources to undertake monitoring; and
5) develop an appropriate reporting strategy to convey beach water quality information to their community.

The methodology for each of the above steps is detailed in the protocol. Appendix B of this document outlines the procedures for the development of conceptual models and beach prioritisation, and also provides an overview of monitoring strategies.

Fifteen local councils received a total of more than $500,000 in grant funding to conduct the pilot monitoring and reporting programs. The grant funding covered the cost of sample analysis, sample transport and community reporting activities such as newspaper advertisements and website development.

The grants did not cover staff costs and existing council officers were required to take on the extra duties of managing the programs, undertaking sample collection and co-ordinating reporting.

The pilot programs were extended until July 2003 in some council areas to obtain more detailed information on the impact of

wet weather sources of pollution. Where grant funding remained, monitoring was further extended to cover the 2003–2004 summer swimming season.

Training

The final component of the Beachwatch Partnership Pilot Program was the development of a training program for monitoring and reporting recreational water quality. The training program was based on the *Monitoring and Reporting Coastal Recreational Water Quality: Information Package and Field Manual* (DEC 2004a).

The training of local council officers will help ensure that any future monitoring of recreational waters is undertaken in a scientifically rigorous and credible manner. The Department of Environment and Conservation (NSW) will offer training to local coastal councils on a needs basis.

Data availability

The data for each swimming location may be downloaded from www.soedirect.nsw.gov.au.

Water quality analyses

Two types of indicator bacteria, faecal coliforms and enterococci, were used to assess recreational water quality in the pilot programs, as recommended by the National Health and Medical Research Council (NHMRC). These bacteria indicate the possible presence of waterborne pathogens, organisms that pose significant risks to human health (Appendix A).

Faecal coliforms generally survive in marine waters for between 24 and 48 hours. When elevated faecal coliform levels are detected in a water sample, this indicates the presence of recent sewage contamination at the swimming site.

Enterococci survive for much longer periods in marine waters than faecal coliforms. Elevated levels of enterococci, in conjunction with low levels of faecal coliforms, may indicate the presence of aged sewage contamination.

If neither faecal coliform nor enterococci levels are elevated, contamination of bathing waters by sewage is not indicated.

Recreational water quality guidelines

Recreational water quality guidelines provide an indication of the probability of swimmers developing illnesses derived from the water, but the actual risk depends on many factors. These factors include, in particular, the bacterial indicator to pathogen ratio, which varies with time and is usually unknown.

The *NHMRC Australian Guidelines for Recreational Use of Water* (NHMRC 1990) were used to assess recreational water quality in the Beachwatch Partnership Pilot Program. These guidelines are currently being reviewed by NHMRC and draft guidelines were released in May 2004 for public consultation.

Under the existing NHMRC (1990) guidelines, waters are considered to be unsuitable for swimming if, for five samples taken at regular intervals over a month:

- the median faecal coliform density exceeds 150 cfu/100 mL; or
- the second highest faecal coliform density is equal or greater than 600 cfu/100 mL; or
- the geometric mean enterococci density exceeds 33 cfu/100 mL.

Guideline compliance was assessed on a monthly basis for each site, with compliance recorded as a pass or fail for the period.

Interpretation of results

The findings in this report focus on bacterial results, which are indicators of the possible presence of sewage contamination. Data are interpreted in terms of guideline compliance and response to rainfall.

Guideline compliance assessment

Compliance with NHMRC (1990) swimming water quality guidelines is reported as a pass or a fail for each month. Guideline compliance assessments are useful for comparing sites and looking at trends over a long period of time:

- Beaches that consistently pass the guidelines generally have excellent water quality and are affected by few sources of sewage pollution.
- Beaches that pass the guidelines in most months generally have good water quality but are affected by intermittent sources of pollution, generally related to rainfall.
- Beaches that consistently fail the guidelines have poor water quality and are generally subject to ongoing sewage pollution, such as sewage treatment plant discharges or leachate from septic tanks.

Beach water quality can vary significantly over short periods of time due to the impact of intermittent sources of pollution, such as those related to wet weather. These impacts may not be apparent from the guideline compliance results for several years, depending on the prevailing weather conditions. Guideline compliance results therefore tell only part of the story.

Response to rainfall

In order to assess the impact of wet weather related pollution sources on swimming water quality, bacterial results were compared to daily rainfall measurements through time. Where elevated bacterial results were recorded during or immediately after rainfall, this is noted for each site.

Explanation of maps

Maps have been provided in this report to indicate the locations of beaches, sampling sites, surf clubs, roads, coastal sewage treatment plants and sewage pumping stations. The maps also include land-use classifications such as parks and reserves and built-up areas, giving an indication of developed and undeveloped areas in each council region.

Explanation of compliance graphs

Compliance graphs have been generated for each council area to summarise compliance with NHMRC (1990) swimming water quality guidelines at each site. Compliance data is presented as the number of months complying with the guidelines out of the total number of months in which sufficient samples were collected to calculate compliance.

A site is considered to pass only if levels of both faecal coliforms and enterococci meet the guidelines. If either bacterial indicator exceeds the guideline limits, then the site has failed for that month.

Compliance results for each month for both faecal coliforms and enterococci are presented on the individual beach pages for each site, which are available at www.environment.nsw.gov.au/beach/cpp.