

Chapter 6

Special Studies

Introduction

The routine monitoring of bacterial water quality undertaken by the Beachwatch and Harbourwatch programs has established a good understanding of how receiving waters respond to changing pressures from adjacent catchments. However, targeted studies are from time to time required to investigate specific causes of poor water quality that may have aroused community concerns.

While Darling Harbour is not a swimming location and therefore not part of the Harbourwatch Program, it is a place of public significance where authorised water-based events are occasionally held. The study presented in this chapter addresses water quality at Darling Harbour.

Introduction

Darling Harbour has been monitored since 1996. The long, narrow embayment has a naturally low flushing rate, so pollution that enters the waterway is not diluted or dissipated as readily as in other areas of the Harbour. Sources of pollution in Darling Harbour are sewage overflows, leaky sewerage systems and stormwater discharges. Illegal waste discharges from recreational vessels may also contribute.

Swimming by the general public is not permitted in Darling Harbour. However the public may still be vulnerable to pollution via secondary contact while leisure boating or taking part in authorised water-based events, such as dragon boat racing or jet-boat rides.

Darling Harbour and Cockle Bay are the responsibility of the Sydney Harbour Foreshore Authority, which is currently developing strategies that will improve Darling Harbour in many aspects, with improved environmental performance a priority.

Sampling sites

The site from which water samples were collected is indicated in the map on page 254.

Method

Water samples were collected by boat every six days during the routine Harbourwatch sampling of harbour beaches.

Samples were collected at a depth of approximately 30 centimetres by using aseptic technique, placed immediately on ice, and then transported to the laboratory for analysis. Samples were analysed for faecal coliform and enterococci densities.

Secondary contact recreation guidelines

Secondary contact recreation includes activities such as boating, fishing and sailing, where there is some direct contact with water but less probability of the water being swallowed. The guideline levels for the indicator organisms are therefore higher than those for primary contact recreation.

Secondary contact guidelines, based on NHMRC (1990) and ANZECC (1992), require a minimum of five samples to be taken at regular intervals not exceeding one month. The guidelines are:

- **for faecal coliforms**, the median not exceeding 1000 cfu/100 mL, and four out of five samples less than 4000 cfu/100 mL
- **for enterococci**, the median not exceeding 230 cfu/100 mL, and four out of five samples less than 700 cfu/100 mL.

Results

The results of water quality monitoring at Darling Harbour are shown on page 315. The site page includes:

- a brief description of the site
- pollution sources
- compliance with secondary contact water quality guidelines
- response of bacterial density to rainfall
- a season graph showing data from the 2008–2009 season.

Compliance was calculated by using the secondary contact recreation guidelines.

Discussion

Compliance – secondary contact

Darling Harbour complied with the faecal coliform guidelines for secondary contact recreation 100% of the time during winter 2008, and 94% during summer 2008–2009. Over the last five years, compliances have ranged from 65% to 100%.

Darling Harbour complied with the enterococci criteria for secondary contact 83% of the time during winter 2008 and 84% of the time during summer 2008–2009. The range of enterococci compliances over the last five years was 60% to 100%.

Response to rainfall

Although high counts of both faecal coliform and enterococci were common in dry weather, there was a general trend towards increased counts with increasing rainfall in the previous 24 hours. The secondary contact recreation median guideline limits were often exceeded after more than 5 mm of rainfall in the previous 24 hours.

Specific actions in the Darling Harbour Catchment

SewerFix Program

Urban drainage systems constructed in the Victorian era commonly combined both stormwater and sewage. This situation has led to chronic poor harbour water quality near old suburbs in the inner city.

Sydney Water Corporation's 'SewerFix' program has rehabilitated old sewers and identified and fixed improper connections in the Darling Harbour catchment.

Stormwater management

Port Jackson Stormwater Management Plan:

The City of Sydney Council has implemented components of the Port Jackson South Stormwater Management Plan. Activities completed to date include regular maintenance and cleaning of stormwater quality improvement devices, channels and gully pits.

Sydney Harbour Foreshore Authority maintains an aquatic boom to block debris from entering Cockle Bay and conducts regular on-water sweeps of Cockle Bay to collect floating rubbish.

Water Harvesting Programs

Sydney Harbour Foreshore Authority will implement a new water harvesting/recycling project at Darling Harbour. This will capture stormwater and reuse it for irrigation and other purposes, with the added bonus of reducing run-off into Cockle Bay.

Plans include water harvesting and recycling and investigating the use of grey (recycled) water. The first part of the scheme, sub-surface irrigation at Tumbalong Park is already in place. The water harvesting will use purpose-built tanks in the Sydney Entertainment Centre car park. The tanks will store water collected from the roofs of both the Sydney Entertainment Centre car park and the Sydney Convention and Exhibition Centre, covering a combined total of 25,000 square metres. A total reduction in water usage of 41 kilolitres per day over ten years is estimated.

Sydney Water Corporation has backed the Foreshore Authority's plans and has provided a grant of \$45,000 towards the scheme.

The City of Sydney Council has implemented several rainwater and stormwater harvesting and reuse projects throughout its area of operation. The following projects will specifically reduce the stormwater discharge within the Darling Harbour Catchment.

- *Barcom Avenue Park:* Stormwater is harvested from a retention tank at the adjacent St Vincent's Hospital and transferred to a 100-kilolitre underground storage tank in the park. Permeable road pavements are used with subterranean drainage and a bio-retention system. This is designed to collect runoff and remove pollutants prior to water reuse or before the water enters the stormwater system. Rainwater tanks have also been installed to irrigate the reserve. The project provides 3.3 kilolitres/day or 1.2 megalitres/year for reuse.
- *Harmony Park:* Roof water is collected from an Energy Australia substation adjacent to the park, filtered through a gross pollutant trap, and stored in a 240-kilolitre underground tank for irrigation. Hard-paved surface areas have been minimised to increase water infiltration and reduce stormwater flows. This initiative provides 7.8 kilolitres/day or 2.8 megalitres/year of stormwater.
- *Beare Park:* Roof water is collected from the amenities building for toilet flushing and stormwater was harvested from Ithaca Rd to irrigate the park.
- *Water Police Site:* Investigations have commenced to collect water from the surrounding catchment and run-off from within the park to be stored in a 300-kilolitre tank and used for irrigation. In addition, a 200-kilolitre tank to store harvested stormwater may be situated adjacent to the park. Excess water may be used to drought-proof adjacent parkland and for toilet flushing. Planted bio-swales and permeable paving are also planned to improve stormwater quality and reduce runoff.

Community Education

The City of Sydney Council continued to raise awareness of water pollution and other environmental issues through education programs including:

- *Zero Waste Partners*: A waste education program for business to help prevent littering illegal dumping, encourage correct bin presentation, and increase recycling and waste minimisation.
- *Butt Blitzes*: These are regular anti-littering awareness days during which the City's Waste Educators and City Rangers educate smokers by handing out free personal ashtrays and postcards. They also stencil stormwater drains with stormwater pollution messages in hotspot areas and at City events.
- *Green Clean Chinatown*: A business program to reduce littering and illegal dumping in Chinatown and to recruit more Zero Waste Partners.

Darling Harbour

See page 254 for key to map

Description

The sample site is in the centre of Cockle Bay, directly in front of the Harbourside Festival Market Place.

Pollution sources

A large proportion of the stormwater drains of the southern Sydney CBD and parts of Ultimo discharge to Darling Harbour. Sewage overflows in the Darling Harbour catchment and illegal sewage discharges from visiting recreational vessels may affect water quality in the bay.

Actions

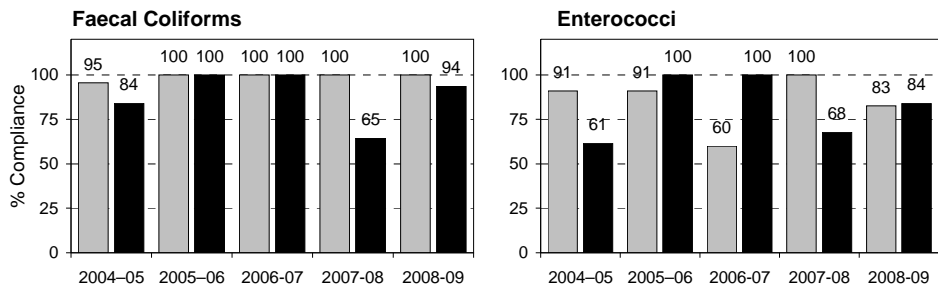
DECCW, Sydney Water, the City of Sydney, the Sydney Harbour Foreshore Authority, NSW Maritime and Sydney Ports Authority are addressing possible sources of faecal contamination in Darling Harbour.



Secondary contact

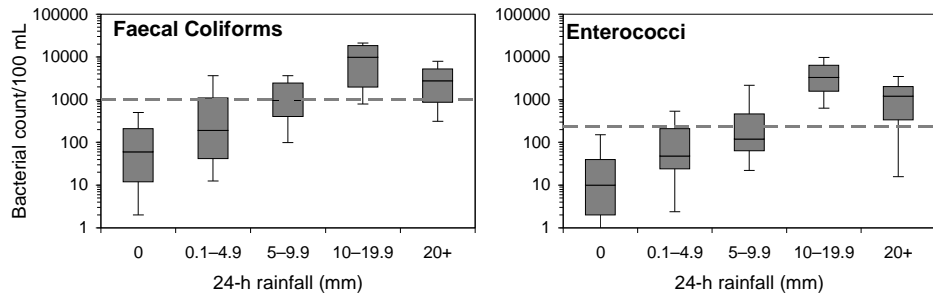
Compliance

- winter season
- summer season



Response to rainfall

-- median threshold (secondary contact)



Season Data

- | rainfall
 - o individual result
 - rolling median
 - - - rolling 80th percentile
- Secondary contact guidelines (see page 312 for details)
- median threshold
 - - - 80th percentile threshold

