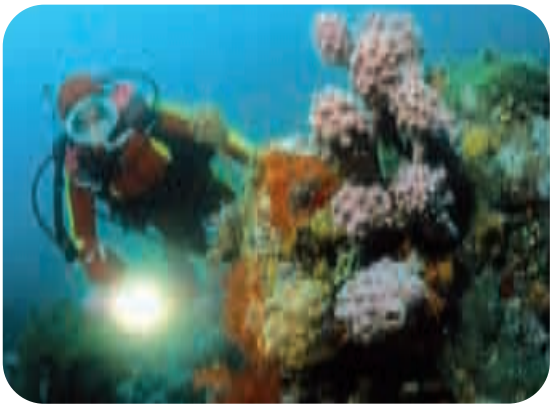
MARINE WATER QUALITY OBJECTIVES FOR NSW OCEAN WATERS

South Coast



Department of
Environment and Conservation (NSW)

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South Coast

Department of
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Department of Environment and Conservation NSW
59–61 Goulburn Street
PO Box A290
Sydney South 1232
Phone: (02) 9995 5000 (switchboard)
Phone: 131 555 (environment information and publications requests)
Phone: 1300 361 967 (national parks information and publications requests)
Fax: (02) 9995 5999
TTY: (02) 9211 4723
Email: info@environment.nsw.gov.au
Website: www.environment.nsw.gov.au

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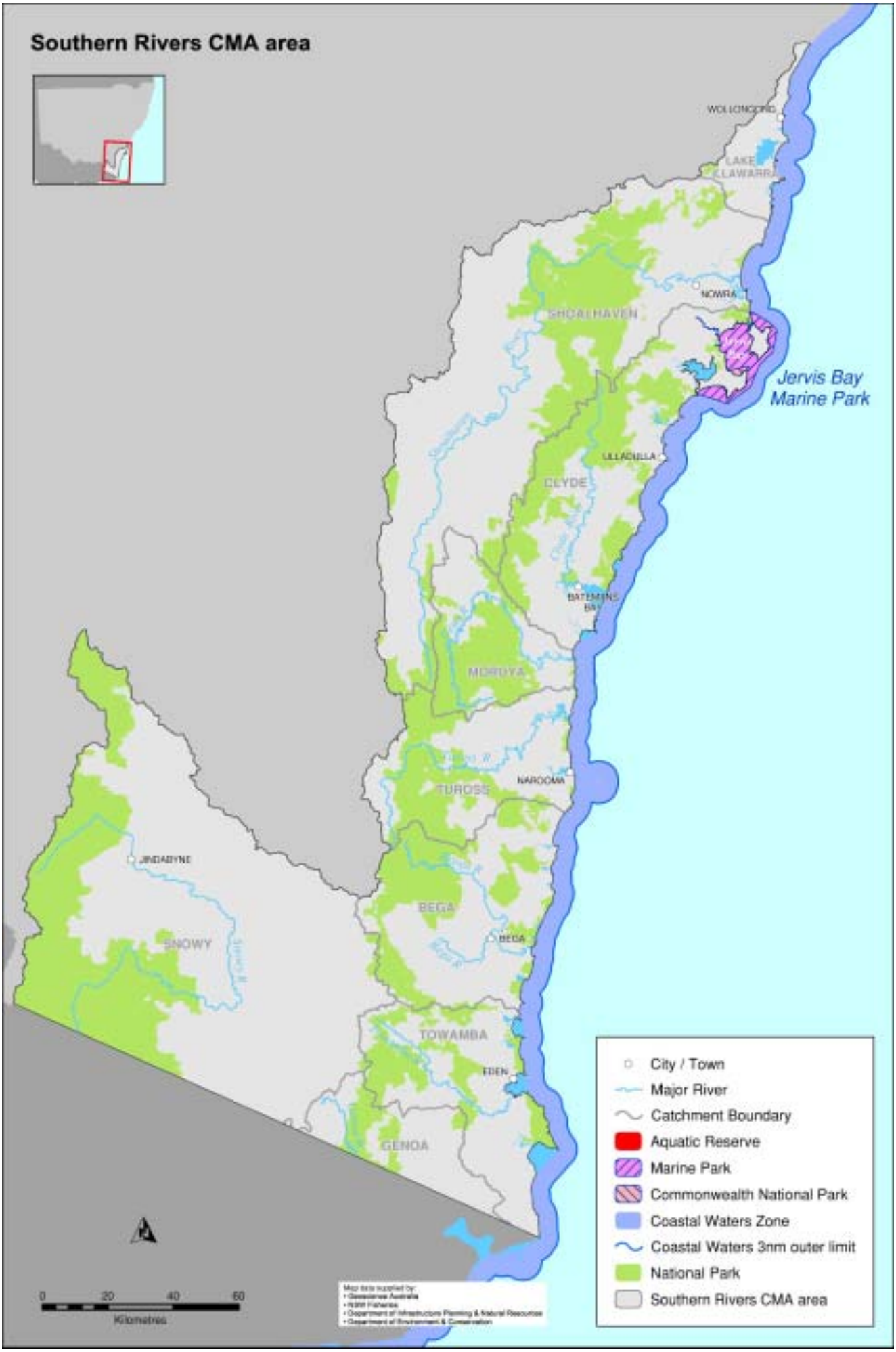
Southern Rivers CMA area
WOLLONGONG
LAKE ILLAWARRA
NOWRA
SHOALHAVEN
Jervis Bay Marine Park
ULLADULLA
CLYDE
BATEMANS BAY
MORUYA
NAROOMA
TUROSS
JINDABYNE
BEGA
SNOWY
TOWAMBA
EDEN
GENOA
City / Town
Major River
Catchment Boundary
Aquatic Reserve
Marine Park
Commonwealth National Park
Coastal Waters Zone
Coastal Waters 3nm outer limit
National Park
Southern Rivers CMA area
0
20
40
60
Kilometres

1. INTRODUCTION

Why do we need Marine Water Quality Objectives?

The NSW coast is undergoing significant changes as a result of the pressure from the growing population in coastal areas, and the increasing demand on resource utilisation. Government statistics show that between now and 2016, the greatest population increases in NSW are expected to be in coastal towns and cities. With this increase in population, it is inevitable that the pressures on our ocean waters will intensify.

At present, the ocean waters of NSW are considered to be in good condition compared to other water bodies situated adjacent to highly populated areas. This is reflected in the good reputation that NSW has for its beautiful beaches, coastal tourism destinations and high quality seafood. There are, however, areas of concern, especially around some urbanised areas where sewage outfalls, stormwater, or pollution in the form of pathogens and nutrients, can affect the quality of the water. It is important to recognise that the environmental quality of these waters in the future will strongly depend on the decisions we make now.

Government and non-government agencies involved in coastal planning and management have undertaken considerable work in recent years to address the pressures felt in the coastal zone. The introduction of the Marine Water Quality Objectives builds on this work and provides a mechanism for a more consistent and strategic approach to the protection of ocean waters. The Objectives also provide an important link to the Government's other coastal protection initiatives and natural resource planning processes currently underway.

Policy background

The introduction of the Marine Water Quality Objectives is part of the NSW Government's program to set water quality objectives for all its major waterways.

In 1999, water quality objectives for NSW rivers and estuaries were introduced in 31 catchments (EPA 2000c). To complement these, the Government has developed a set of Marine Water Quality Objectives for NSW ocean waters – a key initiative under the Government's Coastal Protection Package announced in June 2001.

The aim of the Marine Water Quality Objectives is to simplify and streamline the consideration of water quality in coastal planning and management. This will ensure that the values and uses that the community places on ocean waters are recognised and protected, now and into the future.

The process for setting Marine Water Quality Objectives was based on the national framework outlined in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ 2000). These guidelines are part of a **National Water Quality Management Strategy** (ANZECC & ARMCANZ 1994) introduced in 1992, in response to growing community concern about the condition of the nation's water bodies and the need to manage them in an environmentally sustainable way.

The Marine Water Quality Objectives apply to those ocean waters that adjoin the NSW coast and extend three nautical miles from the shore (the limit of the NSW jurisdiction).

A full suite of water quality objectives for NSW rivers, estuaries and ocean waters is available on the Department of Environment and Conservation's website at www.environment.nsw.gov.au/publications/epa/water.htm

What are Marine Water Quality Objectives?

The Marine Water Quality Objectives are a way of assessing the environmental values and uses that the community places on NSW oceans. They identify the steps required to protect these values and uses, now and in the future.

Five objectives apply. Each of these objectives is based on protecting the following environmental values and uses of ocean waters:

Aquatic ecosystems i.e. aquatic ecosystem health

Primary contact recreation i.e. swimming, surfing

Secondary contact recreation i.e. boating, wading

Visual amenity i.e. aesthetic qualities of waters

Aquatic foods i.e. water suitable for growing seafood.

These Marine Water Quality Objectives describe the water quality needed to protect each of the values and uses identified above, as recommended in the ANZECC Guidelines (ANZECC & ARMCANZ 2000). These water quality criteria act as **guideline levels** and /or reference levels to help guide planning and management to achieve and protect each of the values over time.

Section 4 of this booklet lists the Marine Water Quality Objectives for NSW ocean waters and provides guidance on their use.

How will the Marine Water Quality Objectives be used?

These booklets on marine water quality for the catchment areas of the Sydney Metropolitan and Hawkesbury–Nepean; Hunter and Central Coast; South Coast; and North Coast are intended for communities, local councils, Catchment Management Authorities (CMAs) and state agencies to use in catchment management and land use planning activities.

While the Marine Water Quality Objectives are not regulatory or mandatory, they are a useful tool for strategic planning and development assessment processes. For example, they will provide local councils with agreed **guideline levels** for water quality when considering coastal development assessments.

The Natural Resources Commission is using these Marine Water Quality Objectives to assist in their development of state-wide standards and targets.

Therefore, the Marine Water Quality Objectives will also support CMAs in regionalising standards and targets for coastal development, for inclusion in their Catchment Action Plans.

The Objectives can assist in the above processes by providing:

- values and uses of ocean waters agreed to by the community
- relevant indicators and guideline limits for assessing water quality impacts
- a framework for decision making that is consistent and transparent
- a better community understanding of water quality and the potential impacts on it.

Section 5 of this booklet provides an overview of how water quality objectives can be of practical help in decision-making.

How were the Marine Water Quality Objectives developed?

In 1999, the NSW Government released a set of water quality objectives for surface fresh and estuarine waters in 31 catchments throughout the State. The objectives were developed in consultation with the community across NSW from November 1997 to May 1998.

To complete this process and establish water quality objectives for NSW ocean waters, the Environment Protection Authority[1] released a discussion paper in November 2002, *Proposed Marine Water Quality Objectives for NSW Coastal Waters* (EPA 2002), as the basis for targeted community consultation.

The paper proposed a set of environmental values for NSW marine waters and associated water quality objectives as a basis for comment. The submissions received during the three-month consultation period indicated in-principle support for the proposed objectives and provided positive feedback on how the objectives could assist in strengthening the consideration of water quality in coastal planning and management. Other issues raised included questions regarding the proposed water quality indicators (from the ANZECC Guidelines 2000) and how the objectives would be implemented.

To address the issues of implementation, the Department of Environment and Conservation (DEC) and the NSW Coastal Council undertook a series of workshops with

[1] In September 2003, the Environment Protection Authority became part of the Department of Environment and Conservation (DEC).

stakeholders (primarily local councils) in Ballina, South West Rocks, Newcastle, Sydney and Ulladulla during October 2003. The workshops focused on how the objectives could assist with coastal planning and management.

The advice received from the workshops resulted in a better understanding by all participants on how the objectives could be used in a range of activities carried out by government agencies, local councils and other stakeholders. The discussions also highlighted the tools and guidance that would support the use of the objectives in coastal planning and management.

2. NSW OCEAN WATERS

What is the nature of the ocean waters of NSW?

NSW ocean waters are the waters that adjoin the NSW coast and extend three nautical miles from the shore (the limit of NSW jurisdiction).

NSW has a coastline of 1900 km, of which about 33% is rocky, 65% sandy, and includes over 700 beaches.

The offshore environment of NSW divides naturally into three regions based on broad oceanographic characteristics and geological structures. The northern region, influenced by the warm, East Australian Current, extends from the Queensland border south to Sugar Loaf Point near Port Stephens. The central region, which flanks the major urban areas of Newcastle, Sydney and Wollongong, is a mixed zone influenced by water from both warm northern and cool southern sources. The southern region is influenced by the cooler waters and currents from Bass Strait, and extends from the Victorian border north to Jervis Bay.

The marine environment of NSW is highly variable. Ocean waters are dynamic with a complex current structure. Oceanographic processes, including the complex currents associated with the East Australian Current, coastal trapped waves, local wind-driven currents and internal waves can change over months, weeks or minutes. These processes, together with episodic intrusions of water of differing temperatures and compositions, upwellings and discharges from estuaries, contribute to the variability of characteristics such as temperature and nutrient concentrations.

How do we use and value our ocean?

NSW's ocean waters are of significant natural and cultural importance and are home to an outstanding diversity of ecosystems, habitats and species. These ocean waters also support a range of commercial and recreational activities, making it one of the State's most valuable assets.

Healthy ocean waters are essential to sustain the many demands that we, as a community, place on the marine environment. The tourism industry in NSW (a significant contributor to the Australian and State economies) is largely dependent upon good water quality to support an array of marine based activities such as fishing, swimming, surfing, scuba diving, boating and sailing.

Furthermore, these waters are also an important resource in terms of **commercial and recreational fishing**. For example, the commercial fishing industry in NSW generates over $0.5 billion of economic activity each year and employs more than 4000 people. Similarly, recreational fishing is important for its social and economic benefits and is shown to be an extremely popular pastime – surveys show that approximately one-third of the population fish at least once a year.

The marine environment is of great cultural importance to Aboriginal communities. They have long established values and uses of the ocean environment, including some marine plants and animals, sacred sites, food gathering and a range of ceremonial, recreational and traditional activities.

What are some of the pressures influencing ocean water quality?

The quality of ocean waters can be affected by pollution from point and diffuse sources, spills from shipping accidents, land based spills or runoff that reaches ocean waters, and discharges from vessels. Pollution can also occur directly from or through rivers that flow into these ocean waters.

Many NSW beaches that were previously affected by pollution have become much cleaner in recent years, probably because of the commissioning of the Sydney deep ocean sewage outfalls in the early 1990s. Stormwater and sewage overflows during wet weather are shown to have the biggest influence on recreational water quality.

Estuaries and coastal lakes (being more sensitive than the ocean environment) are however under intense urban, industrial and recreational development pressure. This is because over 85 percent of the population lives in coastal areas.

Other pressures include runoff from disturbed acid sulfate soils, algal blooms, pollution incidents such as oil or chemical spills, release of sewage from vessels, and ballast water discharges that contain marine pests.

3. REGIONAL OVERVIEW

The South Coast includes coastal catchments that are part of the Southern Rivers Catchment Management Authority (CMA) region. These coastal catchments cover over 2,800,000 hectares of land and extend three nautical miles offshore. They are bounded on the west by the Snowy Mountains and Southern Highlands and extend east seaward to three nautical miles. They encompass alpine and sub-alpine areas, the legendary plains and the high country of the Monaro, the rich coastal belt from the Illawarra to the Victorian border, and major river and estuary systems. They include the urban centres of Wollongong, Shellharbour, Kiama, Nowra, Ulladulla, Batemans Bay, Narooma and Bega.

These coastal catchments have a population of around 400,000, which approximately doubles in summer with the high level of tourism to the coastal areas during this time. The catchments include a number of industrial areas, cities, ports, marine industries and heavily used boating and recreational areas.

There are a wide variety of ways in which the natural resources of the catchments are used. These include:

- grazing, dairy farming, horticulture and hobby farms
- tourism and recreation
- commercial fishing and aquaculture (e.g. mussel farming in Jervis Bay and Twofold Bay)
- urban and rural residential developments
- Aboriginal and cultural uses
- manufacturing industries including iron, steel, starch and paper processing
- forestry
- surface and underground mines
- rock, sand and gravel extraction.

Covering around 22,000 hectares is the Jervis Bay Marine Park, approximately 20 km south-east of Nowra, in the Batemans marine bioregion. The marine park spans over 100 km of coastline and adjacent ocean, extending from Kinghorn Point in the north to Sussex Inlet in the south and including most of Jervis Bay.

The marine park is a multiple-use park that aims to conserve marine biological diversity and marine habitats, while catering for a broad range of recreational and commercial activities.

Pressures on coastal waters

In the catchments of the South Coast there are a variety of pressures that may affect coastal water quality. While the Marine Water Quality Objectives are being met most of the time in the ocean waters of the catchments, there are some areas where degradation is occurring. Impacts are usually temporal and/or localised, and in most cases they are the result of sewage treatment plant discharges, stormwater, or pollution from rivers during wet weather. Many of these impacts are more evident in estuaries and coastal lakes, which are more significantly affected than ocean waters.

Some of the issues/pressures influencing coastal water quality include:

- **population expansion and resulting urban development** in some parts of the catchments. For example, Batemans Bay currently has a population of 13,000 which is expected to double in the next 15 years.
- **localised problems arising from stormwater discharges** in wet weather. This is more of an issue in more urbanised areas such as Wollongong.
- **impacts from acid sulfate soil discharges to estuaries and coastal waters,** particularly around the Shoalhaven floodplains (i.e. Broughton Creek) and the potential impacts to local oyster-farming, fishing and tourism industries
- **effluent disposal in unsewered areas** having adverse impacts on water quality. Failing on-site sewage systems have been identified as an issue for many coastal villages in the catchment area.
- **planning and managing sewage** – for example, Bega Valley Shire Council is seeking to upgrade its wastewater treatment systems across the Shire to meet environmental obligations and cater for population growth over a planning horizon of 20 years. The Bega Valley Sewerage Program consists of upgrading

the majority of the sewage treatment infrastructure in the Shire, which includes the construction of new sewerage schemes in the villages of Cobargo, Wolumla, Candelo, Kalaru and Wallaga Lake, and upgrades to five existing sewage treatment plants at Bega, Tathra, Tura Beach, Merimbula and Bermagui.

- the **Illawarra Wastewater Strategy (IWWS)** which is also addressing wastewater management in the Wollongong area. The project is being undertaken by Sydney Water and will, among other things, deliver water quality improvements at many Illawarra beaches, particularly those near the Bellambi, Wollongong and Port Kembla sewage treatment plants.
- **recreation and tourism pressures,** particularly in popular areas such as Batemans Bay, Ulladulla, Merimbula and Narooma in the high season
- **commercial shipping,** which is presently high and with inherent risks of oil spills, introduced marine pests and waste management problems
- the **upgrade of Port Kembla Harbour,** potentially resulting in an increase in shipping movements and associated impacts.

State of coastal waters

Beaches

Information on ocean water quality in the coastal catchments of the South Coast is mostly limited to the monitoring of recreational waters. This data provides the community with information on the risks of sewage and stormwater pollution in particular beaches. While recreational water quality data does not provide an assessment of overall water quality and ecosystem health, the changes over time will enable the assessment of the effectiveness of stormwater and wastewater management in particular areas.

The results below are from the Beachwatch program and the Beachwatch Partnership Program, and give a snapshot of water quality at some of the ocean beaches in these coastal catchments. Information about the programs can be found at: www.environment.nsw.gov.au/beach/. Water quality data is available at www.soedirect.nsw.gov.au

Wollongong City Council

The water quality at Wollongong beaches was overall very good to support swimming during the 2004–05 summer swimming season.

Austinmer, Thirroul, Bulli, Woonoona, North Wollongong, Wollongong City and Coniston beaches had bacterial levels below the swimming guideline levels 100% of the time.

Bacterial levels at Bellambi Beach, Corrimal Beach, Fishermans Beach and Port Kembla Beach were below guideline levels 94% or more of the time.

Shellharbour City Council

Water quality to support swimming was variable during 2004–05 summer swimming season in the Shellharbour City Council area.

Water quality at Shellharbour Beach was excellent, with bacterial levels below the guideline levels 100% of the time. At Warilla Beach, faecal coliform and enterococci were below the guideline levels 100% and 87% of the time respectively.

Lake Illawarra Entrance was below the guideline levels for faecal coliforms 100% of the time, but below the enterococcal guideline level only 48% of the time. This is probably because of stormwater runoff from urban and industrial areas within the Lake Illawarra Catchment during rainfall, and the lack of tidal flushing by ocean waters when the lagoon is closed to the ocean.

Kiama Municipal Council

Water quality to support swimming was excellent for the beaches in the Kiama Municipal Council area.

Faecal coliform and enterococcal levels were below the guideline levels 100% of the time during the 2004–05 summer swimming season.

Shoalhaven City Council

Six ocean beaches were monitored in the Shoalhaven over five months of the 2003–04 summer swimming season. These were Shoalhaven Heads, Tilbury Cove, Barfleur Beach, Nelson Beach, Cudmirrah Beach and Racecourse Beach.

Water quality to support swimming was excellent at ocean beaches in the Shoalhaven. All beaches except Barfleur Beach had bacterial levels below the guideline levels

100% of the time in all five months. Levels of faecal coliforms and enterococci measured at these beaches were generally low throughout the monitoring period, providing no evidence of sewage contamination in wet or dry weather.

While levels of faecal coliforms were generally low at Barfleur Beach, elevated levels of enterococci were measured in January 2004, causing the beach to fail the swimming guidelines in this month.

Tilbury Cove, Barfleur Beach and Racecourse Beach were also monitored during the 2002–03 summer swimming season. Bacterial levels at all three sites were below guideline levels 100% of the time during this period.

Eurobodalla Shire Council

Ten ocean beaches in the Eurobodalla Shire were monitored over six months of the 2004–05 summer swimming season. Bacterial water quality at all beaches was excellent, with faecal coliform and enterococcal levels below guideline levels in all six months.

Monitoring during the 2002–03 summer swimming season also revealed generally low levels of indicator bacteria during dry weather conditions. Elevated levels of enterococci were measured on one or two occasions following heavy rainfall at Broulee Beach, Bengello Beach, Shelley Beach and Brou Beach.

Bega Valley Shire Council

Recreational water quality monitoring was conducted at nine ocean beaches during the 2004–05 summer swimming season. The beaches were Camel Rock, Horseshoe Bay, Beares, Tathra, Short Point, Merimbula Main, Pambula, Aslings and Cocora. Monitoring was confined to December 2004 and January 2005, the two busiest months of the swimming season.

Water quality to support swimming was excellent, with faecal coliform levels consistently low and below the guideline levels 100% of the time.


South Coast – Recreational Water Quality Monitoring
NSW
Wollongong City Council
Ocean beaches monitored under the Beachwatch program:
Austinmer
Bellambi
Bulli
Coniston
Corrimal
Fishermans
Port Kembla
Thirroul
North Wollongong
Wollongong City
Woonona
Shellharbour City Council
Ocean beaches monitored under the Beachwatch program:
Shellharbour
Lake Illawarra Entrance
Warilla
Kiama Municipal Council
Ocean beaches monitored under the Beachwatch program:
Bombo
Boyds Jones
Surf
Werri
Wollongong
Shellharbour
Kiama
Shoalhaven City Council
Jervis Bay Marine Park
Shoalhaven City Council
Ocean beaches monitored under the BPP program:
Barfleur
Cudmirrah
Nelson
Racecourse
Tilbury Cove
Shoalhaven Heads
Eurobodalla Shire Council
Ocean beaches monitored under the BPP program:
Bengello
Brou
Broulee
Casseys
Cookies
Malua Bay
Narooma Main
Shelly
Surf
Turpes Main
Eurobodalla Shire Council
Bega Valley Shire Council
Ocean beaches monitored under the BPP program:
Aslings
Beares
Camel Rock
Cocora
Horseshoe Bay
Main
Pambula
Short Point
Tathra
Bega Valley Shire Council
NSW
VICTORIA
0
20
40
Kilometres
Major River
Marine Park
Commonwealth National Park
Coastal Zone for Marine Water Quality Objectives
Coastal Waters 3 nm limit – NSW waters only
LGAs according to Beachwatch program:
Beachwatch only
BPP only
Other LGA in Southern Rivers CMA area

4. MARINE WATER QUALITY OBJECTIVES

This section lists the Marine Water Quality Objectives for the South Coast. The Objectives provide guideline levels and/or reference levels to guide planning and management decisions affecting marine water quality.

The Marine Water Quality Objectives are broad goals for protecting the long-term health of NSW's ocean waters, so that those waters support the values and uses our community has for them.

The Marine Water Quality Objectives consist of three parts – *environmental values*, their *indicators* and their *numerical criteria*. For example, if the objective is to protect primary contact recreation (the environmental value), we need to maintain the faecal coliform levels in the water (the indicator) on average below a specified number (the criterion).

Environmental values: the values or uses we wish to protect.

Indicator: a parameter used to provide a measure of the quality of the water or condition of an ecosystem.

Numerical criteria: numerical criteria or descriptive statements that must be met in order to protect and maintain environmental values.

Supporting information

The following pages list the Marine Water Quality Objectives that apply to NSW ocean waters. These Objectives should be used in conjunction with the supporting information provided by the ANZECC Guidelines (ANZECC & ARMCANZ 2000). DEC can also provide supporting material to assist in the application of these Guidelines.

Section 5 lists the guiding principles to be applied when implementing the Marine Water Quality Objectives in catchment and land use planning and in individual development assessment.

Marine Water Quality Objectives	**Aquatic ecosystem health** **To maintain or improve the ecological condition of ocean waters.**	**Primary contact recreation** **To maintain or improve ocean water quality so that it is suitable for activities such as swimming and other direct water contact sports.**	**Secondary contact recreation** **To maintain or improve ocean water quality so it is suitable for activities such as boating and fishing where there is less bodily contact with the waters.**	**Visual amenity** **To maintain or improve ocean water quality so that it looks clean and is free of surface films and debris.**	**Aquatic foods** **To maintain or improve ocean water quality for the production of aquatic foods for human consumption (whether derived from aquaculture or recreational, commercial or indigenous fishing).**
Examples of indicative guideline levels for environmental (ambient) water quality The indicative guideline levels (indicators and numerical criteria) listed are examples only of some of the relevant water quality guideline levels recommended in the ANZECC & ARMCANZ Guidelines 2000. For a full list, refer to the appropriate tables as referenced in the ANZECC & ARMCANZ Guidelines 2000. These are available at www.deh.gov.au/water/quality/nwqms/index.html	**Biological** • Frequency of algal blooms – no change from natural conditions • Bioaccumulation of contaminants – no change from natural conditions. **Physico-chemical** • **Nutrients** Total Nitrogen < 120 µg/L Total Phosphorous < 25 µg/L • **Turbidity** 0.5–10 NTU* **Toxicants in coastal waters** • **Metals** Copper < 1.3 µg/L Lead < 4.4 µg/L Zinc < 15 µg/L • **Pesticides** Chlorpyrifos < 0.009 µg/L **Toxicants in bottom sediments** • **Metals** Copper < 65 mg/kg dry weight Lead < 50 mg/kg dry weight Zinc <200 mg/kg dry weight Mercury < 0.15 mg/kg dry weight • **Organochlorines** Chlordane < 0.5 µg/kg dry weight Total PCBs < 23 µg /kg dry weight	**Biological** • **Faecal coliforms** Median over bathing season of less than 150 faecal coliforms/100 mL with 4 out of 5 samples < 600/100 mL (minimum of 5 samples taken at regular intervals not exceeding one month). • **Enterococci** Median over bathing season of less than 35 enterococci/100 mL; (maximum number in any one sample: 100 organisms/100 mL) **Physico-chemical** • **Visual clarity** A 200-mm diameter black disc should be able to be sighted horizontally from a distance of more than 1.6 metres (approximately 6 NTU**).	**Biological** • **Faecal coliforms** Median bacterial content in marine waters of <1000 faecal coliforms per 100 mL, with 4 out of 5 samples <4000/100 mL (minimum of 5 samples taken at regular intervals not exceeding one month) • **Enterococci** Median bacterial content in marine waters of < 230 enterococci per 100 mL (maximum number in any one sample: 450–700 organisms per 100 mL)	**Indicators to ensure water looks clean and free from pollutants** • **Surface films and debris** Oils and petrochemicals should not be noticeable as a visible film on the water, nor should they be detectable by odour. Waters should be free from floating debris and litter. • **Nuisance organisms** Macrophytes, phytoplankton scums, filamentous algal mats, blue-green algae, and sewage fungus should not be present in unsightly amounts.	**Biological (as applied to the consumption of aquatic foods)** • **Faecal coliforms** The median faecal coliform concentration should not exceed 14 MPN#/100mL, with no more than 10% of the samples exceeding 43 MPN/100mL. Standard in *edible tissue*: Fish destined for human consumption should not exceed a limit of 2.3 MPN *E Coli*/g of flesh with a standard plate count of 100,000 organisms/g. **Toxicants (as applied to aquaculture activities)** • **Metals** Copper < 5 µg/L Mercury < 1 µg/L Zinc < 5 µg/L • **Organochlorines** Chlordane < 0.004 µg/L PCBs < 2 µg/L **Physico chemical (as applied to aquaculture activities)** • **Suspended solids** < 5 µg/L • **Temperature** < 2 degrees Celsius change over one hour
Notes & references in the ANZECC & ARMCANZ Guidelines 2000.	• The ANZECC & ARMCANZ 2000 Guidelines recognise three levels of protection based on ecosystem condition. These are: high conservation value; slightly to moderately disturbed; highly disturbed. The default level of protection is generally regarded as 'slightly to moderately disturbed'. Any decision or proposal to revise the level of protection should be carefully considered in the context of the guidelines and NSW Government policy. • For protection of aquatic ecosystems in NSW, the ANZECC & ARMCANZ 2000 Guidelines provide default 'trigger values' for major physical and chemical stressors in Tables 3.3.2 and 3.3.3 (pp. 3.3–10 &11), and for Toxicants in Table 3.4.1 (p. 3.4–5). * NTU – Nephelometric turbidity units.	• For indicators for primary contact recreation see Table 5.2.2: *Summary of water quality guidelines for recreational users* in ANZECC & ARMCANZ Guidelines 2000. ** NTU – Nephelometric turbidity units	• For protection of secondary contact recreation in NSW see Table 5.2.2: *Summary of water quality guidelines for recreational users*, in ANZECC & ARMCANZ Guidelines 2000.	• For indicators for visual amenity see Table 5.2.2: *Summary of water quality guidelines for recreational waters*, in ANZECC & ARMCANZ Guidelines 2000.	• To protect the health of human consumers of aquatic foods the ANZECC & ARMCANZ Guidelines 2000 are intended to be used in conjunction with the Food Standards Code (FSANZ 2005). Updates available at www.anzfa.gov.au • For indicators of water quality suitable for aquaculture and aquatic foods see Section 4.4 in the ANZECC & ARMCANZ Guidelines 2000. • In the case of commercial harvesting and cultured species the relevant requirements of NSW SafeFood and the *NSW Shellfish Projects Operations Manual* (SafeFood NSW 2001) need to be met. NSW Health recommends against the consumption of raw shellfish harvested on a non-commercial basis. # MPN = Most probable number.

5. PRACTICAL HELP FOR DECISION MAKING AND PLANNING

This section gives a broad overview of how the water quality objectives can provide practical help in decision making and planning for activities affecting water quality. The section outlines the key principles underpinning water quality objectives and identifies their applications in catchment and strategic planning and in development assessment activities.

Key principles

The Marine Water Quality Objectives can be used as a tool for monitoring water quality and supporting decision making on the management of activities affecting coastal marine waters in NSW. They apply to ambient waters (i.e. the receiving waters) and should not be regarded as individual discharge criteria. They should be used to:

- **identify the community's values for marine waters and the water quality required to support those values** – these values include protection of aquatic ecosystems and recreational activities associated with the use of marine waters, such as swimming, boating and fishing
- **provide guideline levels and goals** to assess marine water quality
- **help to protect our ocean waters** – the areas where the objectives are being met should be protected. Where they are not being met, planning and management of these areas should move towards achieving the objectives over time
- **assist the community** to understand water quality and the impacts upon it
- **consider marine water quality and manage potential pressures** – the framework that is used is nationally recognised and provides transparency
- **support decision making, but not determine development proposals** – to be considered as a factor in any decision-making process along with other environmental, social and economic considerations
- **encourage good practice and innovation** in planning and design.

The application of Marine Water Quality Objectives

Catchment and strategic planning

The Marine Water Quality Objectives can be used as a tool to assist in the various strategic planning processes influencing coastal water quality. Such plans include:

- Natural Resource Plans, such as Catchment Actions Plans, Coastal and Estuary Management Plans
- Council Management Plans, i.e. Stormwater Management Plans
- regional strategies
- land-use planning instruments (i.e. Local Environment Plans and Development Control Plans).

Using the Marine Water Quality Objectives can assist in strategic planning by:

- defining community values for water quality
- providing indicators and **guideline levels** of the water quality that supports those values
- helping planners to identify priority pollutants and their likely sources
- providing a framework for developing priority actions that address water quality.

Assessing impacts of individual activities

Consent and approval authorities (such as councils) already make decisions about activities and development proposals in terms of their impact on water quality (along with other environmental impacts). The Marine Water Quality Objectives provide practical help for these decisions such as:

- councils can assess the activity against agreed marine water quality **guideline levels**
- communities can better understand the impacts on marine water quality in terms of their agreed values and uses
- proponents can transparently present their case for their preferred options for development in terms of impact on or contribution to agreed objectives.

Environmental monitoring and reporting

Environmental monitoring and reporting enables water quality managers to assess whether management actions in a particular area are achieving, or moving towards, the water quality objectives.

The water quality objectives and the ANZECC Guidelines 2000 can be used to provide guidance to those undertaking water quality monitoring programs by providing key water quality indicators that can be monitored over time. Measured water quality can be compared with the criteria to determine whether management goals are being achieved or where management action is required.

For example, if the management goal is to protect primary contact recreation, then the presence of excessive bacteria could compromise that objective. Management goals, actions and decisions must therefore aim to maintain or improve water quality and keep bacterial levels in the water below the criteria specified in the ANZECC Guidelines (ANZECC & ARMCANZ 2000).

6. HYPOTHETICAL CASE STUDY:
Using Marine Water Quality Objectives in strategic planning

Planning development to protect our waterways

A council is reviewing its strategic plans, including its Local Environmental Plans (LEPs) and Development Control Plans (DCPs). In this process, the council considers many issues. This example shows how the council can consider the protection of water quality.

The council wants to promote a development that will support the values the community holds for local marine and estuarine waters, such as swimming, oyster growing and protection of aquatic ecosystems.

The council uses the available water quality data[2] to look at whether the water quality objectives are currently being achieved, using the indicators and trigger values established in the ANZECC Guidelines (ANZECC & ARMCANZ 2000). The council establishes that sediment is a priority pollutant that needs to be managed to achieve the water quality that supports community values.

The council then looks at what are the likely sources of sediment. These include development close to waterways, poorly managed construction and increased stormwater volumes scouring creeks (if stormwater is not retained).

The council then looks at options to protect water quality.

The LEP can influence the protection of waterways by the location and zoning of development to:

- protect riverine corridors and wetlands
- consider land capability, soil type and slope
- use water sensitive urban design in planning urban growth subdivisions.

The DCP can influence priority sources of pollutants by requiring performance standards that reflect sustainable contemporary stormwater management practices and technology. The specifications for complying development are also a means to encourage these practices. The Building and Sustainability Index (BASIX) will also provide guidance on performance standards for stormwater management.

The water quality objectives themselves are NOT regulatory. They provide a consistent framework to help strategic planning to consider which options best protect the community values for marine and estuarine waters.

[2] Sources of marine water quality data may include:

- Beachwatch and Harbourwatch reports (EPA 2003, DEC 2004, 2005)
- State of the Environment reports (EPA 2000a, 2000b, DEC 2003)
- Data from research projects, e.g. CSIRO reports.

Example: How a council can plan a development to protect waterways.

Information for assessing water quality
1. Describe water quality environment 1.1 Are the water quality objectives currently achieved for waterways in the planning area? 1.2 Which indicators are above the trigger values provided by the Water Quality Guidelines?
2. Assess priority pollutants 2.1 What are the priority pollutants affecting water quality? 2.2 What are the major existing and potential sources of priority pollutants? 2.3 Are there other drivers of poor water quality in these waters (e.g. river flows, estuary flushing, riverine ecosystem health and quality)?
Consideration of strategic planning options
3.1 How can strategic planning influence and/or protect *waterways*? • i.e. location and zoning of development in LEPs 3.2 How can strategic planning influence the *priority sources of pollutants* and other drivers of poor water quality? • i.e. stormwater performance standards for sustainability in DCPs and through BASIX.
Implementation and review
4.1 Communication: Which agencies, utilities, developers and stakeholders need to know about the water quality protection settings in the plan? 4.2 Review: The effectiveness of the plan needs to be reviewed over time and the settings adapted to reflect experience.

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8. GLOSSARY

Acid sulfate soils: include *actual acid sulfate soils* and *potential acid sulfate soils*. Actual and potential acid sulfate soils are often found in the same soil profile, with actual acid sulfate soils generally overlying potential acid sulfate soil horizons.

– **actual acid sulfate soils:** are soils containing highly acidic soil horizons or layers resulting from the aeration of soil materials that are rich in iron sulfides, primarily sulfide. This oxidation produces hydrogen ions in excess of the sediment's capacity to neutralise the acidity resulting in soils of pH of 4 or less when measured in dry season conditions. These soils can usually be identified by the presence of pale yellow mottles and coatings of jarosite.

– **potential acid sulfate soils:** are soils which contain iron sulfides or sulfidic material which have not been exposed to air and oxidised. The field pH of these soils in their undisturbed state is pH 4 or more and may be neutral or slightly alkaline. However, they pose a considerable environmental risk when disturbed, as they will become severely acid when exposed to air and oxidised.

Ambient waters: All surrounding waters, generally of largely natural occurrence.

ANZECC: Australian and New Zealand Environment and Conservation Council.

Aquaculture: Commonly termed fish farming, but broadly refers to the commercial growing of marine (mariculture) freshwater animals and aquatic plants.

ARMCANZ: Agriculture and Resource Management Council of Australia and New Zealand.

Ballast water: Water carried in tanks to maintain stability when a ship is lightly loaded; normally discharged to the sea when the ship is loaded with cargo.

Bioaccumulate: The process by which chemical substances are taken up by living things and retained and concentrated as they move up through the food chain.

Biodiversity (biological diversity): The variety of all life forms, comprising genetic diversity (within species), species diversity and ecosystem diversity.

Biota: All living things, including micro-organisms, plants and animals.

Blue-green algae (cyanobacteria): Naturally occurring, microscopic, primitive photosynthetic bacteria. Under certain conditions (including high nutrients, warm still water, strong sunlight into the water) they can bloom into a dense and visible growth and may become toxic.

BPPP – Beachwatch Partnership Pilot Program: Recreational water quality monitoring conducted by councils with guidance from Beachwatch (Department of Environment and Conservation).

Catchment: The area of land drained by a river and its tributaries.

Criteria: The recommended water quality limits for protecting water uses and values, derived from the evaluation of scientific data. Under the NWQMS, ANZECC criteria are the national reference levels.

Crustaceans: Invertebrate animals that have segmented legs and hard shells, e.g. crabs, yabbies, prawns.

Deoxygenated: With most or all oxygen removed. Water becomes deoxygenated (i.e. loses its dissolved oxygen) for a number of reasons including stagnation, eutrophication and rising temperatures.

DIPNR: NSW Department of Infrastructure, Planning and Natural Resources (now Department of Natural Resources and Department of Planning).

Dissolved oxygen: Oxygen in the water (which may be used by aquatic animals).

Ecosystem: Any system in which living organisms and their immediate physical, chemical and biological environment are interactive and interdependent. Examples are ponds, forests and wetlands.

Electrical conductivity (or EC units): A measure of the ability of water to conduct an electric current between electrodes placed in the water; the value obtained relates to the nature and amount of salts present.

Environment: *The Protection of the Environment Administration Act 1991* sets out a meaning of 'environment' as: 'Components of the earth, including:

(a) land, air and water

(b) any layer of the atmosphere

(c) any organic or inorganic matter and any living organism

(d) human-made or modified structures and areas, and includes interacting natural ecosystems that include components referred to in (a)–(c).'

Environmental flows: Flows, or characteristics of the flow pattern, that are either protected or created for an environmental purpose.

Environmental impact statement: A document which describes a proposed development or activity, predicts the possible or certain effects of the activity on the environment, and outlines safeguards to mitigate or control environmentally damaging effects.

Environmental value: A particular value or use of the environment that is conducive to public welfare, safety or health, and which requires protection.

Escherichia (E.) coli: A type of faecal coliform bacteria (see below) which is found in large numbers in the faeces of humans and other mammals. It serves as a reliable indicator of recent faecal contamination of water.

Estuary: The part of a river in which water levels are affected by sea tides, and where fresh water and salt water mix.

Eutrophication: Excessive levels of aquatic plant growth (including algae) resulting from raised levels of nutrients and other factors.

Faecal coliform: A type of bacteria found in faecal material of humans and other mammals. Faecal coliforms themselves generally do not make people sick. High levels indicate that water is likely to contain other micro-organisms that make people sick.

Floodplain: Flat land beside a river that is inundated when the river overflows its banks during a flood.

Floods: Flows that are high enough at their peak to overrun river banks or cause flow through high-level anabranches, floodrunners or to wetlands.

Guideline trigger values: These are the concentrations (or loads) of the indicators, that if exceeded indicate a potential for harmful environmental effects to occur, and therefore further investigation is ‘triggered’ for the indicator concerned. If the values are not exceeded, a very low risk of environmental damage can be assumed (providing no evidence to the contrary).

Habitat: The type of environment in which a given animal or plant lives and grows, including physical and biological conditions.

Indicator (e.g. water quality, biological, ecological): Any physical, chemical or biological characteristic used as a measure of environmental quality.

Introduced species: Species of plants or animals that are not native to Australia (also referred to as exotic or alien species).

Invertebrates: Animals without backbones, including worms, insects, shrimps, crabs, snails, shellfish and zooplankton. Macroinvertebrates are large enough to be seen without the aid of magnification; microinvertebrates need to be viewed through a microscope.

Median: The median is the middle value in a data set ranked from lowest to highest.

Microbiological quality: In these booklets, refers to the quality of water in terms of the level of disease-causing organisms it contains.

NHMRC: National Health and Medical Research Council.

Non-point source pollution: See Point-source pollution.

NTU: Nephelometric turbidity unit (a unit of measurement for turbidity).

Nutrients: Nutritional substances. Unnaturally high levels of nutrients, such as in a river below a sewage treatment plant, can encourage abnormally fast and prolific growth of algae in the water, or weed growth in the bush.

NWQMS: National Water Quality Management Strategy. A joint initiative of the state and federal governments, to pursue sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.

Pathogen: Disease-causing organism.

Point-source pollution: A single, identifiable source of pollution, such as a drain from an industrial site or sewage treatment plant (as opposed to non point-source or diffuse-source pollution-coming from many small sources over a large area).

Primary Contact Recreation: recreational activities in which the user comes into frequent direct contact with water e.g. swimming, surfing

Riparian zone: The area along the bank of a river or a stream, which often has water-dependent vegetation.

Secondary Contact Recreation: recreational activities in which the user has infrequent contact with water e.g. boating, fishing

State Environmental Planning Policy (SEPP) 14: NSW Government policy to ensure that the coastal wetlands are preserved and protected; prepared under the *Environmental Planning and Assessment Act 1979*.

Stormwater: the runoff from rainfall events

Surface water: Water on the surface of the land, for example in rivers, creeks, lakes and dams.

Suspended solids: The smaller, lighter material such as clay, silt and fine sand carried in suspension in water.

Sustainable: (As applied to water resource management) Management that will meet current needs while conserving natural ecosystems so they can also meet future needs.

Target (water quality): A level of water quality to be achieved in a specified time frame as a step towards the desired long-term objectives. It is derived from comparing available water quality data/information with the water quality objectives, and considers social and economic factors.

Turbidity: A measure of the amount of the light-scattering properties of water. It indicates how much silt, algae and other material is suspended in water. Highly turbid waters may look muddy, stain clothes, block irrigation sprays and pipes or harm aquatic organisms.

Upwelling: divergence of water currents or the movements of surface water away from land leading to a 'welling-up' of deeper water that commonly is richer in nutrients than surface waters.

Water quality goal: A desired water quality outcome to help develop strategies for managing human activities that may affect the environment. Under the NWQMS, a chosen suite of environmental values for a catchment would constitute the water quality goals for that catchment.

Water quality objective: Numerical concentration limits or requirements established to support and protect the designated environmental values of water at a specified site. Under the NWQMS, they are the locally established **guideline levels** for water quality derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000).

our environment it's a living thing