

National Water Quality Management Strategy

No. 7

**AUSTRALIAN GUIDELINES FOR
WATER QUALITY MONITORING
AND REPORTING**



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**Do you want to comment on the Monitoring Guidelines?
Use the email and postal addresses on page xii.**



Preamble

The National Water Quality Management Strategy (NWQMS) is a nationally agreed set of policies, processes and 21 guidelines documents (Appendix 1). It is being developed jointly by the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and the Australian and New Zealand Environment and Conservation Council (ANZECC). The NWQMS has also been endorsed by the Council of Australian Governments (COAG), which represents all three levels of government in Australia.

This document, the *Australian Guidelines for Water Quality Monitoring and Reporting*, is an integral element of the NWQMS. It provides a comprehensive framework and guidance for the monitoring and reporting of fresh and marine waters and groundwater. The document does not discuss drinking water, waste water and effluents; they are covered by separate NWQMS guidelines.

Worldwide, the quality of surface and groundwater, estuarine and marine waters tends to decline because of human activities. Concerted management and action by government, community and industry can reduce or reverse the decline in water quality, and that is the basis of Australia's NWQMS. Water quality must be measured, i.e. monitored, regularly and the results analysed, interpreted, reported and acted upon to achieve effective concerted management.

The *Australian Guidelines for Water Quality Monitoring and Reporting* provides a comprehensive framework and guidance for monitoring and reporting, but it should be used in conjunction with other NWQMS technical papers, especially the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, paper no.4 in the NWQMS series. Standard reference works and documented in-house procedures should also be consulted and followed, subject to appropriate quality assurance and quality control criteria, and any monitoring programs resulting from the use of this guidelines document should be consistent with relevant local and state regulations and by-laws.

The *Australian Guidelines for Water Quality Monitoring and Reporting* describes the design, application, analysis and reporting of monitoring programs. Each chapter presents a flowchart and checklist of actions necessary for effective monitoring and reporting, as well as information about the various stages of the operation. Extra details are given in appendices and the whole text contributes to the index at the end of the volume. A shorter version, the *Australian Guidelines for Water Quality Monitoring and Reporting — Summary*, accompanies the main document. It comprises flowcharts and a summary of the text of the main document, but it does not include checklists: instead, there the text is arranged as a series of expanded checklists. Both versions contain a glossary of major terms and an index.

The *Australian Guidelines for Water Quality Monitoring and Reporting* has been developed with major input by environment and water agencies and other parties throughout Australia.

To be continuously relevant to its users, the *Australian Guidelines for Water Quality Monitoring and Reporting* (the Monitoring Guidelines), like other NWQMS benchmark documents, will require ongoing review and revision. The present version was current up to October 2000. Users are invited to comment on the *Australian Guidelines for Water Quality Monitoring and Reporting* by contacting the offices listed overleaf. These addresses can also receive comments on the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (the Water Quality Guidelines), so users should name the document to which their comments apply.

Disclaimer

The contents of this document have been compiled using a range of source materials, and, while reasonable care has been taken in its compilation, the member governments of ANZECC and ARMCANZ and the organisations and individuals involved with the compilation of this document shall not be liable for any consequences which may result from using the contents of this document.

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The *Australian Guidelines for Water Quality Monitoring and Reporting* has been developed in several stages. The completed document largely derives from a consultancy (see (i) below) to restructure and expand an earlier draft (see (iii) below) of the document. More recently, two editing consultancies (see (ii) below) have provided major input, including text for Chapter 6 and much of Appendix 5.

(i) Developing the *Australian Guidelines for Water Quality Monitoring and Reporting* — Expansion of an Earlier Draft

A peer review of the earlier draft (iii) had indicated the need for major restructuring and augmentation of the document, focusing on monitoring program design and related issues. This revision was undertaken by the Cooperative Research Centre for Freshwater Ecology (CRCFE) at the University of Canberra (UC). The consultancy was funded by Environment Australia (EA) and Agriculture, Fisheries and Forestry Australia (AFFA). The persons who undertook the work were:

Bill Maher (CRCFE project leader), CRCFE,
 Professor Peter Cullen, CRCFE,
 Ian Lawrence, CRCFE,
 Anthony Chariton, Applied Ecology, UC,
 Daniel Spooner, Applied Ecology, UC,
 David Judge, Applied Ecology, UC,
 Peter Liston, Planning and Land Management, Department of Urban Services, ACT.

The EA Project Officer was Charles Lewis.

(ii) Editing and Finalising the *Australian Guidelines for Water Quality Monitoring and Reporting*

Following the expansion consultancy, two consultancies were let to CSIRO Environmental Projects Office to augment, edit and finalise the whole document. These major consultancies were funded by EA. The persons who undertook the work were:

Graeme Batley (lead reviewer), CSIRO,
 David Fox (statistical aspects), CSIRO,
 Jenny Stauber (biological monitoring), CSIRO,
 Bill Maher (reviewer), CRCFE,
 Ann Milligan (editing), Science Text Processors Canberra.

Robert Molloy of CSIRO Environmental Projects Office was the CSIRO Project Coordinator.

The EA Project Officer was Charles Lewis. Sharon Rees was also a project officer for the letting of the consultancy. John Anderson (EA) also worked as a project officer from March to June 2000.

Transfer of parts of the monitoring component of the draft *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* to the draft *Australian Guidelines for Water Quality Monitoring and Reporting*, with rationalising, was undertaken by Leon Barmuta, Department of Zoology, University of Tasmania, in conjunction with Graeme Batley and David Fox, CSIRO, Bill Maher, CRCFE, Chris Humphrey, Environmental Research Institute of the Supervising Scientist, *eriss*, and Charles Lewis, EA. The transferred material was initially prepared by Chris leGras, *eriss*.

Rob Donohue, Waters and Rivers Commission, Western Australia, provided input to the discussion on monitoring in relation to water quality guidelines.

(iii) Earlier Development of the *Australian Guidelines for Water Quality Monitoring and Reporting*

The earlier development of the draft *Australian Guidelines for Water Quality Monitoring and Reporting* was based on the *Water Quality Investigations Manual: Preferred Methods for Sampling and Analysis* (1995) compiled by the NSW Environment Protection Authority (EPA) and based on a consultancy by ICF Pty Ltd, with principal consultants David Garman and Turlough Guerin. The NSW Manual was edited by Rob Mann of the NSW EPA, with significant contribution from other NSW EPA staff, especially Evelyn Goodwin, and from the EPA Chemical Laboratory.

Development of the *Australian Guidelines for Water Quality Monitoring and Reporting* was initially undertaken by a Working Group drawn from Commonwealth and state environment protection and water resource management agencies. The Working Group comprised: Lionel Wood (AFFA) (Chair), Charles Lewis (EA), Graham Rooney (Melbourne Water), Ross Higginson (NSW EPA) and Voytek Poplawski (Department of Natural Resources, Queensland).

Lance Woods was engaged by EA and AFFA to prepare additional material and edit the document that then went to a peer review. Comments received were incorporated into the document by Mary Taylor, Patty Please, Kwame Asumadu and Nick Ladner (AFFA).

For all stages of the development of the *Australian Guidelines for Water Quality Monitoring and Reporting*, comments, contributions and guidance were received from members of the ARMCANZ and ANZECC Contact Group, which oversees the development of the NQWMS. Most environment and water agencies in Australia have significantly contributed to the development of the document through comments on drafts, but special mention is made of the extensive and valuable comments provided by NSW agencies. A number of other organisations also commented on drafts of the document.

David Lambert, Stephen Clark and Rachael Gregson provided support from AFFA for the development and operation of the expansion and editing consultancies.

As the project neared completion, Richard Norris (CRCFE) and Peter Liston checked details of many references. In a consultancy for the final editing and design phase, funded by EA, Eileen Dallwitz, TechType, improved the appearance and electronic characteristics of the diagrams and the worked examples; Vern Verass, Design Direction, guided the page design of the final document; Ann Milligan, Science Text Processors Canberra, was responsible for the resulting page layout, and the index.

Clare Nolan, Clockwork Communicators, designed the front covers and spine.

Cover photographs

The photographs on the front cover, in the top row, left–right, were supplied by: CRC Freshwater Ecology (CRCFE); Bureau of Rural Sciences (BRS); BRS; CRCFE; and in the bottom row, left–right, by: BRS, Great Barrier Reef Marine Park Authority (GBRMPA); CRCFE; GBRMPA.

Glossary of terms and acronyms

Acidity

the quantitative capacity of a water to react with a strong base to a designated pH

Acute toxicity

rapid adverse effect (e.g. death) caused by a substance in a living organism. Can be used to define either the exposure or the response to an exposure (effect).

AFFA

Agriculture, Fisheries and Forestry Australia

Algae

comparatively simple chlorophyll-bearing plants, most of which are aquatic, and microscopic in size

Alkalinity

the acid-neutralising capacity of an aqueous system; the sum of all titratable bases

Ambient

surrounding

ANCA

Australian Nature Conservation Agency

Anion

a negatively-charged ion

ANZECC

Australian and New Zealand Environment and Conservation Council

Aquatic ecosystem

any water environment from small to large, from pond to ocean, in which plants and animals interact with the chemical and physical features of the environment

Aquifer

an underground layer of permeable rock, sand or gravel that carries water, allowing it free passage through pore spaces

ARMCANZ

Agriculture and Resource Management Council of Australia and New Zealand

AUSRIVAS

Australian River Assessment Scheme

BACI

Before–after, control–impact

Benchmark

a standard or point of reference

Benthic

referring to organisms living in or on the sediments of aquatic habitats

Bioaccumulation

a general term describing a process by which chemical substances are accumulated by aquatic organisms from water directly or through consumption of food containing the chemicals

Bioassay

a test used to evaluate the relative potency of a chemical by measuring its effect on a living organism relative to a control

Bioavailable

able to be taken up by organisms

Biochemical oxygen demand (BOD)

the decrease in oxygen content in a sample of water that is brought about by the bacterial breakdown of organic matter in the water

Bioconcentration

a process by which there is a net accumulation of a chemical directly from water into aquatic organisms, resulting from simultaneous uptake (e.g. by gill or epithelial tissue) and elimination

Biomagnification

the result of the processes of bioconcentration and bioaccumulation by which tissue concentrations of bioaccumulated chemicals increase as the chemical passes up through two or more trophic levels. The term implies an efficient transfer of chemicals from food to consumer so that the residue concentrations increase systematically from one trophic level to the next.

Bivalve

mollusc with a shell in two parts, hinged together

Bloom

an unusually large number of organisms of one or a few species, usually algae, per unit of water

BOD

Biochemical oxygen demand or biological oxygen demand

BOD test

an empirical test that measures the relative oxygen requirements of waste-waters, effluents and contaminated waters by incubating samples in the dark at a certain temperature for a fixed number of days usually designated by a subscript, e.g. BOD₅ test

Cation

a positively-charged ion

Chemical oxygen demand (COD)

the oxygen equivalent of the organic matter content of a sample that is susceptible to oxidation by a strong chemical oxidant

Chronic toxicity

toxicity that acts over a long period of time and that typically affects a life stage (e.g. reproductive capacity); it can also refer to toxicity resulting from a long-term exposure

COAG

Council of Australian Governments

COD

Chemical oxygen demand

Community

assemblage of organisms characterised by a distinctive combination of species occupying a common environment and interacting with one another

Community composition

all the types of taxa present in a community

Concentration

the quantifiable amount of a substance in water, food or sediment

Contaminants

biological or chemical substances or entities, not normally present in a system, capable of producing an adverse effect in a biological system, seriously injuring structure or function

Control

part of an experimental procedure that is ideally exactly like the treated part except that it is not subject to the test conditions. It is used as a standard of comparison, to check that the outcome of the experiment is a reflection of the test conditions and not of some unknown general factor.

CRCFE

Cooperative Research Centre for Freshwater Ecology

Criteria (water quality)

scientific data evaluated to derive the recommended quality of water for different uses

CSIRO

Commonwealth Scientific and Industrial Research Organisation

DEST

Department of Environment, Sport and Territories

Detection limit

method detection limit is the concentration of a substance that when processed through the complete analytical method produces a signal that has a 99% probability of being different from the blank

DO

Dissolved oxygen

DOC

Dissolved organic carbon

Duplicate samples

obtained by dividing a sample into two or more subsamples, to reveal the sizes of random and/or systematic errors due to contamination

EA

Environment Australia

EC

Electrical conductivity

Ecologically sustainable development

development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends

Electrical conductivity

the ability of water or soil solution to conduct an electric current; commonly used as a measure of salinity or total dissolved salts

Environmental values

particular values or uses of the environment that are important for a healthy ecosystem or for public benefit, welfare, safety or health and that require protection from the effects of contaminants, waste discharges and deposits. Several environmental values may be designated for a specific waterbody.

EPA

Environment Protection Authority

Epilimnion

the uppermost layer of water in a lake, characterised by an essentially uniform temperature that is generally warmer than elsewhere in the lake, and by relatively uniform mixing by wind and wave action

eriss

Environmental Research Institute of the Supervising Scientist

ESD

Ecologically sustainable development

Euphotic

surface waters to a depth of approximately 80–100 m; the lit region that extends virtually from the water surface to the level at which photosynthesis fails to occur because of reduced light penetration

Eutrophication

enrichment of waters with nutrients, primarily phosphorus, causing abundant aquatic plant growth and often leading to seasonal deficiencies in dissolved oxygen

Fate

disposition of a material in various environmental compartments (e.g. soil or sediment, water, air, biota) after transport, transformation and degradation

FNARH

First National Assessment of River Health

Guideline

numerical concentration limit or narrative statement recommended to support and maintain a designated water use

Guideline trigger levels

the concentrations (or loads) for each water quality parameter, below which there exists a low risk that adverse biological (or ecological) effects will occur. They are the levels that trigger some action, either continued monitoring in the case of low risk situations or further ecosystem-specific investigations in the case of high risk situations.

Hardness

a measure of the sum of the concentrations of calcium and magnesium ions in water, both expressed as mg/L calcium carbonate equivalent

Humic substances

heterogeneous yellow-black organic materials that include most of the naturally dissolved organic matter in water. They are classified as humin (not soluble at any pH), humic acid (not soluble at pH <2) and fulvic acid (soluble at all pH values).

Hydrograph

graphical representation of either surface stream discharges or water-level fluctuations in wells

Hypolimnion

the region of a waterbody that extends from below the thermocline to the bottom of a lake; it is thus removed from much of the surface influence, and is usually cold and relatively undisturbed

Hypothesis

supposition drawn from known facts, made as a starting point for further investigation

Index (indices)

composite value(s) that can give a quick ranking to a waterbody or other ecosystem feature, derived via a formula that combines measurements of important ecosystem characteristics; typically used to rank 'health' or naturalness

Indicator

measurement parameter or combination of parameters that can be used to assess the quality of water

Invertebrates

animals lacking a dorsal column of vertebrae or a notochord

Ion

an electrically charged atom

Leaching

the dissolution of a material, by water or another solvent mixing with a solid phase, and its downward or outward movement from the solid in solution

ICM

Integrated catchment management

Level of protection

the acceptable level of change from a defined reference condition

Management goals

long-term management objectives that can be used to assess whether the corresponding environmental value is being maintained. They should reflect the desired levels of protection for the aquatic system and any relevant environmental problems.

MBACI

Multiple before–after, control–impact

MBACIP

Multiple before–after, control–impact, paired

MDBC

Murray-Darling Basin Commission

Measurement parameter

any parameter or variable that is measured to find something out about an ecosystem

Methylation

the introduction of methyl (CH₃) groups into organic and inorganic compounds

NATA

National Association of Testing Authorities of Australia

NHMRC

National Health and Medical Research Council

Not detectable

below the limit of detection of a specified method of analysis

NRC

National Research Council

NRHP

National River Health Program

NWQMS

National Water Quality Management Strategy

OH&S

occupational health & safety

Organism

any living animal or plant; anything capable of carrying on life processes

Oxidation

the combination of oxygen with a substance, or the removal of hydrogen from it, or, more generally, any reaction in which an atom loses electrons

PAHs

polycyclic aromatic hydrocarbons

Parameter

a measurable or quantifiable characteristic or feature

Pathogen

an organism capable of eliciting disease symptoms in another organism

Pelagic

term applied to organisms of the plankton and nekton which inhabit the open water of a sea or lake

Performance indicators

indicators used to assess the risk that a particular issue will occur (they are used in the guideline packages to compare against the trigger levels). They are generally median (or mean) concentrations in the ambient water, and may be stressor and/or condition indicators.

Periphyton

organisms attached to submerged plants

Pesticide

substance or mixture of substances used to kill unwanted species of plants or animals

pH

the intensity of the acidic or basic character of a solution, defined as the negative logarithm of the hydrogen ion concentration of a solution

Plankton

plants (phytoplankton) and animals (zooplankton), usually microscopic, floating in aquatic systems

Precipitation

the settling out of water from cloud, in the form of rain, hail, fog, snow, etc. (also the formation and settling out of solid particles in solution)

Producers

organisms that can build up their body substance from inorganic materials

Protocol

a formally agreed method and procedure for measuring an indicator, including sampling, sample handling procedures and sample analysis

Pseudoreplication

replication in which the samples are not independent but instead are from sub-populations of a population: replicates that are actually subsamples of one sample are pseudoreplicates; and samples from various sites along a stretch of river are pseudoreplicates because the water is the same, moving between sites

QA/QC

quality assurance/quality control

Quality assurance (QA)

the implementation of checks on the success of quality control (e.g. replicate samples, analysis of samples of known concentration)

Quality control (QC)

the implementation of procedures to maximise the integrity of monitoring data (e.g. cleaning procedures, contamination avoidance, sample preservation methods)

Redox

simultaneous (chemical) reduction and oxidation: reduction is the transfer of electrons to an atom or molecule; oxidation is the removal of electrons from an atom or molecule

Reference condition

an environmental quality or condition that is defined from as many similar systems as possible and used as a benchmark for determining the environmental quality or condition to be achieved and/or maintained in a particular system of equivalent type

Risk

a statistical concept defined as the expected frequency or probability of undesirable effects resulting from a specified exposure to known or potential environmental concentrations of a material, organism or

condition. A material is considered safe if the risks associated with its exposure are judged to be acceptable. Estimates of risk may be expressed in absolute or relative terms. Absolute risk is the excess risk due to exposure. Relative risk is the ratio of the risk in the exposed population to the risk in the unexposed population.

RIVPACS

River Invertebrate Prediction and Classification System

SAA

Standards Association of Australia

Salinity

the presence of soluble salts in water or soils

Sediment

unconsolidated mineral and organic particulate material that has settled to the bottom of aquatic environments

SOE

State of the Environment

Solution concentration

concentration of contaminants in the liquid phase

Speciation

measurement of different chemical forms or species of an element in a solution or solid

Species

generally regarded as a group of organisms that resemble each other to a greater degree than members of other groups and that form a reproductively isolated group that will not normally breed with members of another group. (Chemical species are differing compounds of an element.)

Species richness

the number of species present (generally applied to a sample or community)

Stakeholder

a person or group (e.g. an industry, a government jurisdiction, a community group, the public, etc.) that has an interest or concern in something

Standard, e.g. water quality standard

an objective that is recognised in environmental control laws enforceable by a level of government

Stressors

the physical, chemical or biological factors that can cause an adverse effect on an aquatic ecosystem as measured by the condition indicators

Sub-lethal

involving a stimulus below the level that causes death

Suspension

very small particles (solid, semi-solid, or liquid) more or less uniformly dispersed in a liquid or gaseous medium

Taxon (taxa)

any group of organisms considered to be sufficiently distinct from other such groups to be treated as a separate unit (e.g. species, genera, families)

Taxa richness

number of taxa present

TCM

Total catchment management

TDS

Total dissolved solids

Thermocline

a region or layer of water in a lake, between the well-mixed surface layer and the cold still bottom layer, where the temperature changes rapidly with respect to depth

TIE

Toxicity identification and evaluation

Toxicant

a chemical capable of producing an adverse response (effect) in a biological system, seriously injuring structure or function or producing death. Examples include pesticides, heavy metals and biotoxins (i.e. domoic acid, ciguatoxin and saxitoxins).

Toxicity

the inherent potential or capacity of a material to cause adverse effects in a living organism

Toxicity test

the means by which the toxicity of a chemical or other test material is determined. A toxicity test is used to measure the degree of response produced by exposure to a specific level of stimulus (or concentration of chemical).

Trophic level

a notional stage in the 'food chain' that transfers matter and energy through a community; primary producers, herbivores, carnivores and decomposers each occupy a different trophic level

True colour

the colour of water resulting from substances that are totally in solution; not to be mistaken for apparent colour which includes the effect of colloidal or suspended matter

UC

University of Canberra

Uptake

a process by which materials are absorbed and incorporated into a living organism

USEPA

United States Environmental Protection Agency

UWRAA

Urban Water Research Association of Australia

WHO

World Health Organization

WMO

World Meteorological Organization

Zooplankton

see plankton

Executive Summary

The *Australian Guidelines for Water Quality Monitoring and Reporting* has been developed as a benchmark document of the National Water Quality Management Strategy. It relates closely to the revised *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ 2000), known as the Water Quality Guidelines, and provides the guidance necessary for designing monitoring programs with which to assess water quality in freshwater, marine waters and groundwaters.

The *Australian Guidelines for Water Quality Monitoring and Reporting* (the Monitoring Guidelines) encourages a national, coordinated, efficient, quality-assured and consistent approach to water quality monitoring. The resulting data should be able to be compared across regions and through time, and integrated or collated to report trends, and the resulting information should be able to be trusted to form a sound basis from which to manage water quality and the Australian environment.

Monitoring consists of a systematic and planned series of measurements or observations that are appropriately analysed and reported, with the aim of providing information and knowledge about a water body. Monitoring (and reporting) of water quality is important for environmental protection policies and programs, and for managing water resources and controlling contaminants. It underpins State of the Environment reporting, and National Audit reporting. The information that water quality monitoring generates not only describes changes in water quality but also helps explain how ecosystems function.

The Monitoring Guidelines sets out an overall framework that embraces all aspects of a monitoring program. It discusses (and illustrates by case studies) methods and routines for, and mental approaches to, the setting of monitoring program objectives, study design, field sampling, laboratory analyses, data analysis, and reporting and information dissemination. The chosen objectives of a monitoring program should answer carefully defined questions about specific issues. The objectives should be chosen after a conceptual model has been agreed upon: that is, a description of the system as it is understood at that time, based on available information and discussion with all stakeholders. The validity of the model should be tested through a number of hypotheses that form the basis of the detailed study design. The model should be continually refined and the hypotheses should be continually restated as the information collected by the study is evaluated.

Some studies are designed to be descriptive, gathering and analysing data to document the state of a system. Other studies are designed to increase our understanding of a system or to measure its reaction to change. In the latter case, appropriate statistical designs and ways of assessing cause and effect must be decided upon. The spatial boundaries, the scale of the study and its duration are fundamental, as are the detailed issues: for example, site selection, finer spatial and temporal considerations, and the required number of samples to detect change. Measurement parameters must be agreed upon, for assessing the system's physical, chemical and biological characteristics consistent with the new Water Quality Guidelines approach to integrated monitoring. Biological assessment includes ecotoxicological methods, and ecological methods such as AUSRIVAS, based on biotic indices.

Before the start of field sampling programs, the most suitable sampling methods and sampling equipment must be chosen, for surface waters, groundwaters, sediments or aquatic biota. Suitable types of containers must be selected and prepared, together with methods for sample preparation and preservation. Quality assurance and quality control (QA/QC) considerations, and issues relating to occupational health and safety should be given considerable attention, as should cost-effectiveness and the practical aspects of sampling from a wide range of water and flow conditions.

The details of laboratory analysis must also be planned; the substances or organisms to be analysed or counted determine the methods and laboratory equipment used, and the cost. Here QA/QC considerations are especially important.

The analysis of monitoring data can require expertise in statistics. The approach taken by the Monitoring Guidelines is to provide adequate information to guide a technically qualified person in analysing data. For assessing water quality in comparison with a guideline, or evaluating trends, or establishing cause and effect, differing approaches and analytical tools are needed.

Finally, the information that the monitoring program has generated must be reported. This can be done in a variety of ways, suited to various audiences, starting from a primary report in an accepted format, leading to less technical vehicles that address all possible user groups. Reporting can involve Internet web pages, media releases, newsletters or other scientific or industry publications, as appropriate.

The Monitoring Guidelines has been prepared in consultation with Commonwealth, state and territory environment and water agencies. It should provide valuable and unified guidance to the many bodies involved in, or planning, water quality monitoring throughout Australia.