



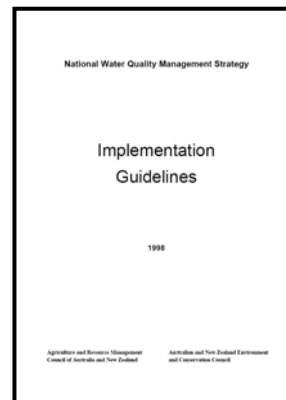
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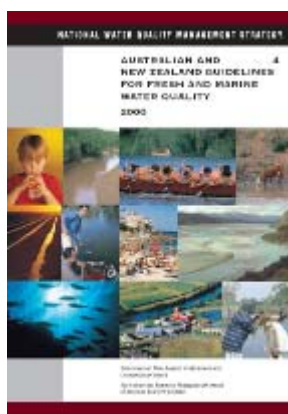


FINAL DISCUSSION PAPER

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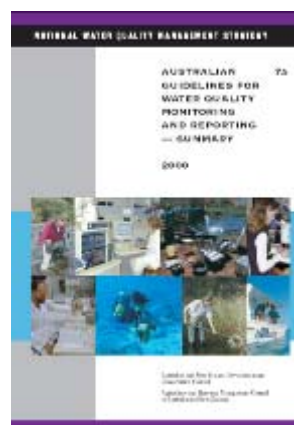


IMPLEMENTATION OF THE NATIONAL WATER QUALITY MANAGEMENT STRATEGY (NWQMS)



Prepared by

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in consultation with the NWQMS Contact Group

December 2008

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List of Abbreviations

ACT	Australian Capital Territory
ADWG	Australian Drinking Water Guideline
AETG	Aquatic Ecosystem Task Group
ANZECC	Australian and New Zealand Environment & Conservation Council
ARMCANZ	Agricultural & Resource Management Council of Australia and New Zealand
BoM	Bureau of Meteorology
BMP	Best management practice
CCI	Coastal Catchments Initiative
COAG	Council of Australian Governments
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DA	Development Assessment
DAFF	Department of Agriculture, Fisheries and Forestry
DEWHA	Department of Environment, Water, Heritage and the Arts
DSE	Department of Sustainability and Environment
EIA	Environmental Impact Assessment
EHO	Ecosystem Health Objective
EPA	Environment Protection Authority/Agency
EPBC	Environmental Protection and Biodiversity Conservation
EPHC	Environment Protection and Heritage Council
EV	Environmental value
FARWH	Framework for Assessing River and Wetland Health
FSANZ	Food Standards of Australia and New Zealand
HCVAE	High Conservation Value Aquatic Ecosystems
ICAG	Intergovernmental Coastal Advisory Group
ICZM	Integrated Coastal Zone Management
IUWCM	Integrated Urban Water Cycle Management
JSC	Joint Steering Committee
LG	Local Government
LWA	Land and Water Australia
M&E	Monitoring and Evaluation
MDB	Murray Darling Basin
NAP	National Action Plan for Salinity and Water Quality
NCP	National Competition Policy
NEN	National Estuaries Network
NHMRC	National Health and Medical Research Council
NHT	Natural Heritage Trust
NLWRA	National Land and Water Resource Audit
NRM	Natural Resource Management
NRMMC	Natural Resource Management Ministerial Council
NSW	New South Wales
NT	Northern Territory
NZ	New Zealand
NWC	National Water Commission
NWI	National Water Initiative
NWQMS	National Water Quality Management Strategy
QLD	Queensland
RHCG	River Health Contact Group
S&T	Standards and Targets
SA	South Australia
SEQ	South east Queensland
SoE	State of Environment
TAS	Tasmania
VIC	Victoria
WA	Western Australia
WG	Working Group
WQ	Water quality
WQIP	Water Quality Improvement Plan
WQO	Water Quality Objective
WSC	Water Sensitive Cities
WSUD	Water Sensitive Urban Design
WWTF	Wetlands and Waterbirds Taskforce

Executive Summary

Background - NWQMS to date

The National Water Quality Management Strategy (NWQMS) is the main mechanism for water quality management in Australia (see Appendix 1). The Strategy was jointly developed in the 1990s by the Agricultural & Resource Management Council of Australia and New Zealand (ARMCANZ) and the Australian and New Zealand Environment & Conservation Council (ANZECC). These two Ministerial Councils are now the Natural Resource Management Ministerial Council (NRMMC) and the Environment Protection and Heritage Council (EPHC). They continue to have responsibility for overseeing implementation of the NWQMS which is carried out by state and territory governments (and others).

The NWQMS and its **guideline documents** relate to various components of WQ Management and are broken down under the following headings:

- **Policies and Process** for Water Quality Management;
- Water Quality Benchmarks;
- Groundwater Management; and
- Guidelines for Diffuse and Point Sources.

The NWQMS document *Policies and Principles* is based on a strategy of high-status national guidelines with local implementation and emphasises the importance of:

- ecologically sustainable development;
- integrated (or total) catchment management; and
- best management practices, including the use of acceptable modern technology and waste minimisation and utilisation.

Fundamental to the relevance and success of the NWQMS is that it provides guidance that can be readily tailored to suit legislative and institutional arrangements across jurisdictions and the specific task being undertaken. Governments have made substantial progress in water quality management, using the NWQMS as a key reference and source of guiding policies and principles.

The process for water quality management starts with the community working in concert with government to develop a management plan for each catchment, aquifer, estuary, coastal water or other waterbody. The plan should take account of all existing and proposed activities and developments; it should contain feasible management options that aim to achieve the environmental values (EVs) that have been agreed for that waterbody. The process is outlined in NWQMS *Implementation Guidelines* and schematically represented in Figure 1 from a national perspective and in Figure 2 from a specific catchment perspective.

Purpose of this Review of Implementation of the NWQMS

The purpose of this project is to rapidly review implementation of the NWQMS across Australia and New Zealand and recommend a range of suggested actions to DEWHA and the NWQMS contact group for possible future developments to improve its implementation. The project scope does not include assessing the feasibility of the suggested actions.

This report represents one source of information to be used by DEWHA and the NWQMS contact group for their discussions on the need for and extent of a potential review of the NWQMS components.

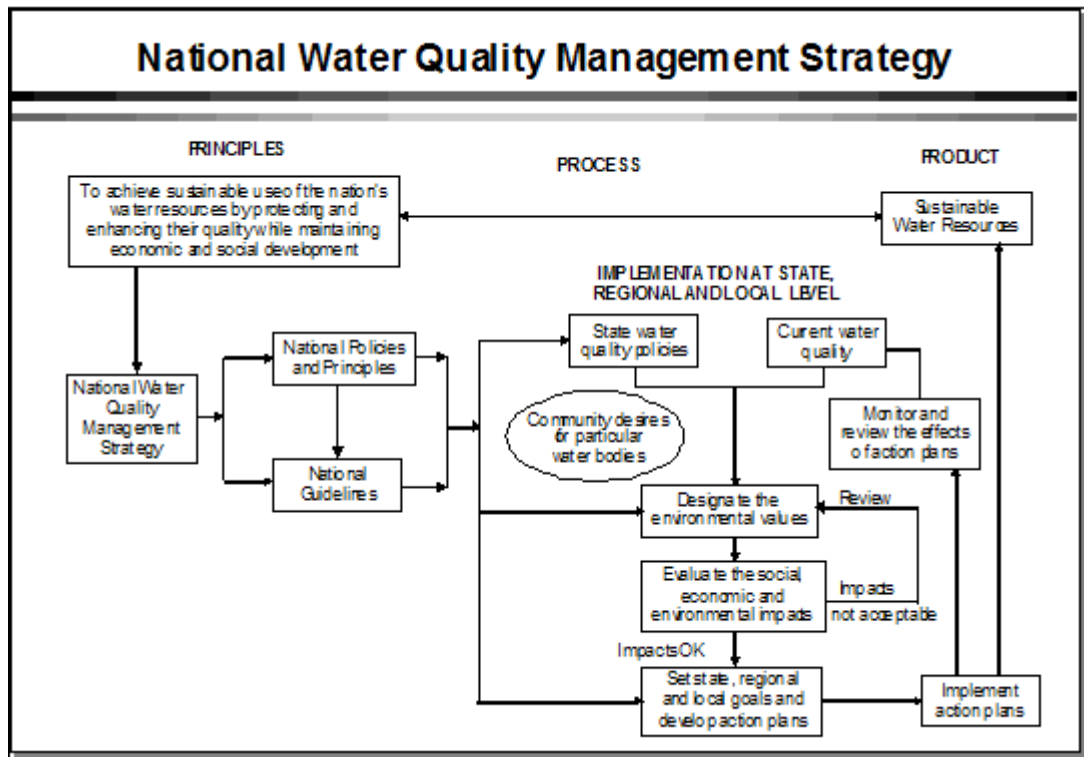


Figure 1. National Water Quality Management Strategy (NWQMS)

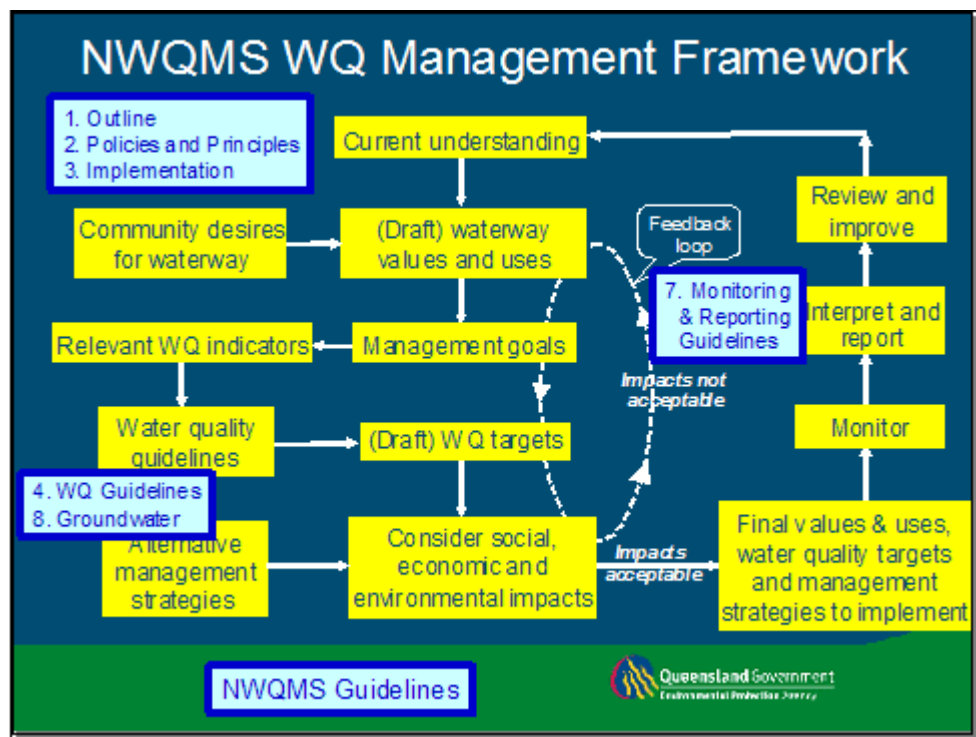


Figure 2. NWQMS Water Quality Management Framework

Review Methodology

The agreed process for this project included the following tasks:

- establish a network of key jurisdictional personnel involved with implementation of the NWQMS (based on the existing NWQMS contact group);
- review of the relevant NWQMS literature (NWQMS Guideline documents, jurisdictions' legislation/policies/regulations, 2005 Water Reform Assessment, selected regional / catchment NRM plans);
- design a survey / questionnaire (with DEWHA) based on the literature review;
- email the survey / questionnaire to the selected NWQMS network;
- follow up telephone interviews with the selected NWQMS network based on their response to the survey / questionnaire (plus some face to face interviews);
- draft report and workshop the findings with DEWHA and the NWQMS Contact Group;
- final report to DEWHA and the NWQMS Contact Group (this "discussion paper").

Context for the NWQMS Review

In order to both review NWQMS implementation to date and make recommendations for future directions and priorities, it is necessary to:

- understand the target audience ("users") and their needs;
- understand the changes in these "users" and their surrounding environment;
- consider the range of water types and the connectivity between them;
- understand the complementary national initiatives related to WQ management;
- understand the future threats to Australia's waterways;
- have an agreed vision for where the NWQMS fits into this environment; and
- be adaptive in both WQ management actions and the supporting processes (including the nature and content of the NWQMS).

The Review

The review examined the status of NWQMS implementation to date, recognising the flexibility to vary implementation approaches is part of the strength of the Strategy. The review focused on the contribution the strategy and its guideline documents has made to WQ management and achieving sustainable water resources. Through the literature review and the interviews and workshop with the NWQMS contact network, information was obtained on the successes and areas for improvement at the jurisdictional level (e.g. through legislation, policies, regulations, programs, etc.), as well as at the regional/catchment level where WQ management plans form the basis of NWQMS implementation.

Within that context, the review looked at specific WQ-related management actions (e.g. point sources, urban and rural diffuse sources), other sources of impacts on WQ/ecosystem health (environmental flow requirements, activities in-stream and in riparian areas), as well as actions supporting the development and implementation of successful catchment based WQ management plans (community engagement, scientific information and understanding, WQ guidelines, effective management strategies, decision support tools, economic measures, effective monitoring, evaluation and reporting).

Lastly, it also looked at emerging NWQMS-related activities including identification and protection of high conservation value aquatic ecosystems, off-stream wetland programs, climate change activities, total water cycle management, acid sulfate soils and improved groundwater management (linked to learnings from mining developments and their studies).

The following two sections provide a summary of the key finding of the review under the headings of “successes” and areas for “improvements”. Then the graphic (explained in detail in section 6) shows how this review fits into the strategic planning for future implementation of the NWQMS. Lastly, a summary table of the actions recommended (in sections 5 and 6) is provided under group headings of “outcomes sought”, as well as a table summarising the proposed action for each NWQMS guideline.

Key findings

“Successes”

The following are areas where the NWQMS has been the driver for “successes” in WQ management in Australia and some good lessons have been learnt:

Good Process

- The NWQMS WQ management framework (shown graphically in Figure 2) has provided a good, consistent WQ management process which has been firstly incorporated in jurisdictions’ legislation & policies and then used as the basis for catchment level WQ management plans;
- Most WQ management issues have been covered by the NWQMS guideline documents;
- Point sources of pollution are well managed, by firstly legislated approval processes, and then compliance monitoring and enforcement;

Good technical guidelines

- The WQ “benchmark” guidelines (water quality, drinking water, monitoring and reporting guidelines) have provided sound technical references to support WQ management;
- Jurisdictions have developed to various extents their own WQ guidelines (mainly based on a referential approach);
- The NWQMS has been reactive to some emerging WQ issues (e.g. wastewater recycling, water sensitive urban design).

Good progress at catchment level

- At the catchment scale, there is now a good range of examples of riverine & coastal catchment WQ management plans. These provide a wealth of information and knowledge that needs to be collated to provide case studies to share with relevant NWQMS users and improve WQ management across Australia. The components of these WQ management plans where case study material exists includes:
 - ✓ Conceptual (graphical) models;
 - ✓ Community engagement in planning & management (including establishing environmental values);
 - ✓ Reference sites-based WQ guidelines;
 - ✓ Effective management strategies;
 - ✓ Catchment and receiving water modelling;
 - ✓ Risk assessments;
 - ✓ Decision making tools; and
 - ✓ Designing, implementing, collating, assessing and reporting on WQ monitoring.

“Improvements”

The following are areas where the NWQMS could be “improved” so the NWQMS will be more effective in supporting future WQ management in Australia:

Better “linking” of water management activities and agreed role of NWQMS

- With the advent of the National Water Initiative, the NWQMS is not included in water reform assessments. A process is needed to keep the necessary links between management of water quantity and WQ and combine the assessments of their progress;
- Reviewing implementation of the NWQMS offers an opportunity to revise the “Vision” for NWQMS and define its key areas of responsibilities and its necessary links to other WQ-related activities;
- In defining these responsibilities and links, the opportunity should also be taken to group the relevant skill sets necessary for the range of complex WQ management issues and hence produce effective results. Working groups, etc. from both management and scientific perspectives need to be drawn from their areas of expertise e.g. ecosystem health [all water types], human health, industrial uses, etc.

Better access to NWQMS information

- With the advent of new information technologies and a more mobile workforce, it is critical to have a central, well maintained NWQMS website and provide information and capacity building in “user-friendly” manner. There are a number of recommendations that hinge on having such a website to disseminate their products;
- The wealth of information and knowledge from the “successes” in catchment WQ management plans needs to be collated and disseminated on the NWQMS website to provide case studies to share with relevant NWQMS users and improve WQ management across Australia;

Improved interactions and processes at the catchment level

- From a stakeholder’s perspective, there needs to be consistent “terminology” for all water resource management activities (including NWQMS, NWI and NRM programs)
- Again from a stakeholder’s perspective, each waterway needs a common value setting process (i.e. NWQMS’s environmental values) that supports all water resource management activities (WQ management, water quantity management, natural resource management). This common value setting for waterways would then assist better “integration” of all water resource planning & management;
- With the advent of improved catchment-based WQ management plans, the next challenge is to use these plans for jurisdiction/regional/local government planning e.g. proactively assisting with future “urban footprints” to ensure waterway environmental values are protected;
- A number of jurisdictions responsible for environmental impact and development assessment processes are detailing the processes for assessing impacts of new developments (e.g. new urban areas, new industries) on receiving waters. These methods could be consolidated and shared with other WQ managers;

Emerging issues and opportunities

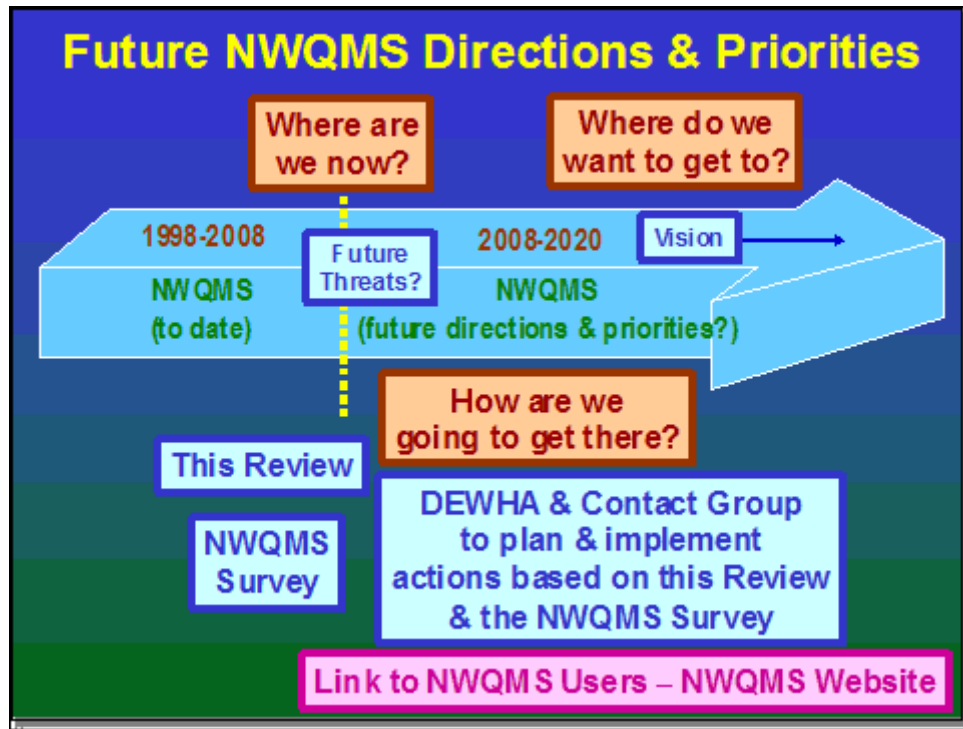
- Emerging activities in response to climate change and improvements in approaches to WQ management such as total water cycle management and water sensitive urban design provide opportunities to integrate WQ management-related matters with developments in these areas. These should be pursued in future NWQMS directions and priorities;
- Economic measures were espoused in NWQMS documents but it is only in recent times that these measures (e.g. market based instruments) are actively being assessed and

used for WQ management. These measures are likely to be more prominent in future NWQMS implementation;

- The NWQMS to date has had reasonable successes for riverine and coastal waterways with less focus on ground waters and off-stream wetlands, and even less success in considering the connectivity between these water types. Opportunities exist to improve in these areas and build on recent programs for off-stream wetlands, as well as the improved knowledge of groundwaters (principally from mining studies);
- A key component of WQ management is the identification and protection of high conservation value aquatic ecosystems. This work has recently got underway and needs to be incorporated into future implementation of the NWQMS;

Improved guidelines

- While the “technical” WQ and Monitoring & Reporting guidelines have provided a sound foundation for the NWQMS to date, they can be improved by incorporating the learnings from the last decade’s research and application, as well as developing more “user friendly” versions for the NWQMS website (and allow easier access to them for new and existing users).



Context of this Review in Planning for future NWQMS implementation

Recommended Actions

The following table provides a **summary of recommended actions (grouped by outcomes sought)**.

Outcome sought	Brief description	Section
Agree on next steps to progress NWQMS	DEWHA and the NWQMS Contact Group to continue to meet and, based on inputs including this report, develop and implement a plan for future NWQMS directions and priorities	6.3.1
Engage NWQMS practitioners in scoping future NWQMS directions	Survey other NWQMS users to determine their needs	5.1.2.2 6.1
Establish context of future issues for NWQMS	Undertake a rapid assessment of future threats to Australian waters (linked to climate change risk assessments)	6.2
Set core future direction for NWQMS	Agree on vision, role and process to manage NWQMS into the future	6.3.1&4
Map out and establish links to NWQMS related activities	Map out how national water management activities will be linked	6.3.4
	Establish appropriate NWQMS links to other WQ-related initiatives and documents	6.3.4
	DEWHA & NWQMS Contact Group to work with NWC to agree on a modification to the NWI to include an obligation to implement and report on the NWQMS	4.1
	Map out and maintain appropriate links with NHMRC's WQ-related working groups (WGs)	5.1.1.3
	NWQMS Contact Group consider formally engaging the NWC WSUD WG for NWQMS urban stormwater management matters	5.2.2
	Actively link the NWQMS with climate change programs (and update guidelines where necessary)	5.4.3
	Progress opportunities to get better connections between NWQMS and programs focusing on off-stream wetlands	5.4.2
A central, user-friendly NWQMS website that supports future NWQMS implementation	Develop and maintain a user-friendly NWQMS website	6.3.2
	Consider a web-based learning environment for key NWQMS technical guidelines	6.3.2
	Develop user-friendly interfaces for main NWQMS Guidelines, especially #4 and #7	5.3.3 5.3.6
	Addition of tools, documents, and links to other relevant resources on the NWQMS website, to meet the needs of those involved with total water cycle management	5.4.4
Collate and share	Hold a workshop to review CCI's WQIPs	5.1.3

Final Discussion Paper on Implementation of NWQMS

Outcome sought	Brief description	Section
“lessons” on establishing and using catchment based WQ management plans		
	Review Victorian riverine WQ Management Plans (with action #15)	5.1.3
	Collate case studies on community engagement and setting EVs (link with action #15)	5.3.1
	Collate case studies on consultation with traditional owners/indigenous people and establishing cultural and spiritual values	5.3.1
	Collate case studies on conceptual models	5.3.2
	Collate case studies on models, socio-economic assessments and decision support tools	5.3.4
	Continue to collate feedback on WQ case studies using economic measures	5.3.5
	Develop/collate case studies on use of Guideline #7	5.3.6
Improve on catchment based WQ planning & management	Develop consistent “terminology” for all WQ/NRM plans	5.1.3
	Align NWQMS rural diffuse matters with national NRM programs	5.2.3
	Establish a WG to consolidate management strategies for riparian and in-stream habitats	5.2.4.2
	Develop case studies in use of ICM plans for jurisdiction/LG planning	5.1.2.2
	Undertake SWOT (strengths, weaknesses, opportunities, threats) analysis re need for NRM legislation when appropriate	5.1.2.1
	Collate, and further develop if necessary, user guides for undertaking EIAs and receiving water assessments for discharges to waterways/water resources	5.1.2.2 5.2.1
Improve “integration” of WQ and water quantity management	Establish a WG to develop riverine value setting and threat assessment processes (to underpin both WQ and quantity management)	5.2.4.1
	After that, explore similar processes for other water types	5.2.4.1
Improve/update existing NWQMS guidelines	Then update Guidelines #1-3 (Policies and Processes). The update should include outcomes of AETG’s HCVAE work	5.1.3 5.4.1
	Establish a WG to develop a detailed strategy to update Guidelines #4 and #7	5.3.3 5.3.6
	Consider updating Guideline #7 to include simpler documents, case studies and latest knowledge as a component of updating Guideline #4	5.3.6
	Update Guideline #10 with the NWC WSUD WG’s outputs/outcomes	5.2.2
	Update Guideline #9 at appropriate stage	5.2.3
New guidelines	Scope the need for a new NWQMS Economic Measures Guideline	5.3.5

The table below provides a **summary of proposed actions for each NWQMS guideline**:

No.	NWQMS Guideline Title	Proposed Action
	Policies and Process for WQ Management	
1	<i>Water Quality Management — An Outline of the Policies (1994)</i>	Update these three guidelines after the case studies for catchment WQ management plans and HCVAE tasks are completed (and incorporate their findings)
2	<i>Policies and Principles — A Reference Document (1994)</i>	
3	<i>Implementation Guidelines (1998)</i>	
	Water Quality Benchmarks	
4	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)</i>	Establish a WG to develop a detailed strategy to update Guideline #4
6	<i>Australian Drinking Water Guidelines (2004)</i>	NHMRC (and NRMCC) continue with responsibility for updating this guideline
7	<i>Australian Guidelines for Water Quality Monitoring and Reporting (2000)</i>	Develop supporting simpler documents and case studies for Guideline #7. Update with Guideline #4.
	Groundwater Management	
8	<i>Guidelines for Groundwater Protection (1995)</i>	Update using risk based approach to management?
	Guidelines for Diffuse and Point Sources	
9	<i>Rural Land Uses and Water Quality — A Community Resource Document (2000)</i>	Align NWQMS rural diffuse matters with national NRM programs. Update at appropriate stage.
10	<i>Guidelines for Urban Stormwater Management (2000)</i>	NWC WSUD WG to advise if/when to update guideline to incorporate their recent work
11	<i>Guidelines for Sewerage Systems — Effluent Management</i>	Await feedback from LGs and wastewater utilities in survey re their needs for updates and new guidelines
12	<i>Guidelines for Sewerage Systems — Acceptance of Trade Waste (Industrial Waste) (1994)</i>	As for #11
13	<i>Guidelines for Sewerage Systems — Biosolids Management (2004)</i>	As for #11 and continue to use current “biosolids” working group
14	<i>Guidelines for Sewerage Systems — Use of Reclaimed Water (1999) – see #21</i>	Superseded by #21
15	<i>Guidelines for Sewerage Systems — Sewerage System Overflows (2004)</i>	As for #11
16a	<i>Effluent Management Guidelines for Dairy Sheds (1999)</i>	Await feedback from specific industries in survey re their needs for updates and new guidelines
16b	<i>Effluent Management Guidelines for Dairy Processing Plants (1999)</i>	
17	<i>Effluent Management Guidelines for Intensive Piggeries (1995)</i>	
18	<i>Effluent Management Guidelines for Aqueous Wool Scouring and Carbonising (1995)</i>	
19	<i>Effluent Management Guidelines for Tanning and Related Industries in Australia (1995)</i>	
20	<i>Effluent Management Guidelines for Australian Wineries and Distilleries (1998)</i>	
21	<i>Australian Guidelines For Water Recycling - Managing Health & Environmental Risks - Phase 1&2 (in prep)</i>	Continue with current development process

1. NWQMS History

The National Water Quality Management Strategy (NWQMS) is the main mechanism for water quality management in Australia (see Appendix 1). The Strategy was jointly developed in the 1990s by the Agricultural & Resource Management Council of Australia and New Zealand (ARMCANZ) and the Australian and New Zealand Environment & Conservation Council (ANZECC). These two Ministerial Councils are now the Natural Resource Management Ministerial Council (NRMCC) and the Environment Protection and Heritage Council (EPHC). They continue to have responsibility for overseeing implementation of the NWQMS which is carried out by state and territory governments (and others).

The Natural Resource Management Ministerial Council has main responsibility for implementation of the NWQMS. The Environment Protection and Heritage Council has put water quality (WQ) on its strategic plan and is also involved in certain Guidelines such as water recycling. The National Health and Medical Research Council (NHMRC) and the Australian Health Ministers' Conference are involved in aspects of the NWQMS which affect public health.

The NWQMS and its documents have three major elements: policies, process and national guidelines.

1.1 Policies

The main policy objective of the NWQMS is set out in NWQMS Document #2, Policies and Principles — A Reference Document (ANZECC/ARMCANZ 1994) and is:

to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.

This objective is being pursued through a strategy based on high-status national guidelines with local implementation. Document # 2, emphasises the importance of:

- ecologically sustainable development;
- integrated (or total) catchment management;
- best management practices, including the use of acceptable modern technology and waste minimisation and utilisation; and
- the role of economic measures, including 'user-pays' and 'polluter-pays' approaches.

1.2 Process

The process for water quality management starts with the community working in concert with government to develop a management plan for each catchment, aquifer, estuary, coastal water or other waterbody. The plan should take account of all existing and proposed activities and developments; it should contain feasible management options that aim to achieve the environmental values that have been agreed for that waterbody. The process is outlined in NWQMS Document #3, *Implementation Guidelines* (ANZECC/ARMCANZ 1998) and schematically represented in Figure 1 from a national perspective and in Figure 2 from a specific catchment perspective.

The NWQMS envisages use of both regulatory and market-based approaches. Management of water resources is mainly a State and Territory responsibility, but implementation of the NWQMS will be accomplished in the context of:

- the NWQMS guidelines;
- State and Territory water policies;
- community preferences on the use and values of local waters;
- the current water quality of local waters; and
- the economic and social impacts of maintaining current water quality or of meeting new local water quality goals.

Implementation of the NWQMS should include:

- catchment, groundwater and coastal water quality management plans;
- an appropriate level of water and sewerage services provided by water authorities; and
- further development of regulatory and market frameworks.

Community views form a crucial part of the NWQMS and public comment is sought during both the development and the implementation of the strategy.

1.3 National Guidelines

The national guidelines are technical documents providing guidance on many aspects of the water cycle including ambient and drinking water quality, monitoring, groundwater, rural land and water, urban stormwater, sewerage systems and effluent management for specific industries. These are discussed in Section 4.2.

2. Context for the NWQMS Review and Recommending Future Directions

2.1 Purpose of the NWQMS

The NWQMS aimed to assist with WQ management across Australia and New Zealand by providing:

- consistent principles, policies and processes;
- a process for integrated WQ management at a catchment scale, including the establishment of environmental values (EVs) and water quality objectives (WQOs) to protect them;
- technical guidelines for water quality to protect these environmental values;
- guidelines on management of key threats to water quality from point sources (sewage and industrial wastewaters) and diffuse sources from both urban and rural areas; and
- guidelines for monitoring and reporting on water quality.

The following sections of this report evaluate the strengths and weaknesses in implementing the NWQMS to date (including the use of the NWQMS documents) recognising that fundamental to the success of the NWQMS is that it provides guidance that can be readily tailored to suit legislative and institutional arrangements and has the flexibility to be relevant to specific tasks. This report suggests options for improved future directions and priorities for NWQMS, including any necessary adjustments and developments required for the NWQMS support mechanisms e.g. guidelines documents, information dissemination.

2.2 Context for Evaluation of NWQMS

In order to both review NWQMS implementation to date and make recommendations for future directions and priorities, it is necessary to:

- understand the target audience (“users”) and their needs;
- understand the changes in these “users” and their surrounding environment;
- consider the range of water types and the connectivity between them;
- understand the complementary national initiatives related to WQ management;
- understand the future threats to Australia’s waterways;
- have an agreed vision for where the NWQMS fits into this environment; and
- be adaptive in both WQ management actions and the supporting processes (including the nature and content of the NWQMS).

Target audience (“users”) and their needs

In the context of the target audience, Doolan (2000) outlined the roles in waterway management at different levels from the national government to individual landholders. Table 1 is adapted from those roles, by adding other “users” of the NWQMS, and also provides NWQMS-related examples. *[Note: Management approaches and institutional frameworks can vary significantly between jurisdictions, therefore the roles for waterway management presented in this table are indicative only].*

The better these roles and responsibilities are understood, agreed and coordinated, the better the management of WQ in our waterways will be. Also, the better the needs of the NWQMS “users” are known, the better the NWQMS products will meet their needs. The “users” that were involved in this rapid evaluation are highlighted in yellow in Table 1. *[Note: The ‘roles’ presented in this table are indicative only. This is because management approaches and institutional frameworks can vary between jurisdictions.]*

Table 1 - NWQMS “Users” roles & NWQMS-related examples

Roles	NWQMS-related examples
National role	
• funding to jurisdictions, groups and individuals to achieve national objectives	Caring for our Country, Natural Heritage Trust, National Action Plan for Salinity and WQ, Coastal Catchments Initiative
• facilitates inter-jurisdictional coordination	NRM Ministerial Council and committees, NWQMS Contact Group
• invests in development of national principles, best management practices, tools, research and development to facilitate improved management	NWQMS to date, Cooperative Research Centres
• ensures Australia meets its international obligations	Australia's National Program of Action for the Protection of Marine Environments; EPBC Act requirements
• monitoring & reporting	BoM, NLWRA, National SoE Report
State/Territory role	
• sets jurisdiction-wide policy and strategic directions	Environmental Protection Policies (Water)
• establishes legislative and regulatory frameworks	Environmental Protection Acts and Regulations
• establishes institutional arrangements	Regional NRM Bodies, Local Governments
• invests in provision of advice, research and monitoring, planning, extension, on-ground works and enforcement functions	Typically functions of jurisdictional level government (e.g. environmental protection, water resources, primary industry and planning agencies)
• implements jurisdiction responsibilities under nationally agreed strategies	Establishes environmental values (EVs) & water quality objectives (WQOs), Develops Water Resource Plans
• provides funding to groups and individuals to achieve jurisdiction and regional priorities	Cash and In-kind support for regional NRM bodies (e.g. NHT programs)
• monitoring & reporting	Jurisdiction's SoE Reports
Regional role	
• develops regional strategies and action plans	Regional NRM Plans, WQ Improvement Plans
• provides advice to jurisdiction on regional resourcing priorities	Regional Investment Strategies
• coordinates and implements work programs	Implements Regional NRM Plans
• provides incentives and support for groups and individuals	Funding actions in NRM Plan and providing extension services
• provides mechanisms for community involvement in natural resource management	Community involved in developing and implementing NRM Plans
• monitoring & reporting	State of Region Reports
Water Utilities' role	
• provide water supply, wastewater treatment and stormwater drainage services	Provides services that meet Water Quality Objectives and relevant NWQMS Guidelines
Local governments' (LG) role	
• incorporates waterway management objectives, priorities and actions into statutory planning processes	Incorporates Water Sensitive Urban Design into LG planning schemes and development assessment processes
• provides local support for local community groups	Support for local communities' waterway restoration projects
Developers' role	
• provides sustainable development	Plan and implement water sensitive urban design
Industries' role	
• provides sustainable industries	Incorporates industries' guidelines in its activities
Consultants' role	
• provides professional/technical services to developers, industries, government, etc.	Provides services that meet Water Quality Objectives and relevant NWQMS Guidelines
Peak Industry Bodies' (Industries, AWA, IEAust, SIA, etc) role	
• provides strategic support for their industry	Support development and implementation of industry guidelines
Landcare (community) groups' role	
• smaller-scale waterway and catchment management projects	NHT Envirofund projects
Landholders' role	
• land stewardship	Developing and implementing their farm management plans
Research institutions' role	
• provide supporting knowledge and tools	Scientific studies, models, best practices, WQ guidelines

Key features of where the NWQMS has had potential to assist to date are:

- providing direction to national and jurisdictional funding programs;
- facilitating inter-jurisdictional coordination through relevant council, committees and working groups;
- development of national principles, processes, best management practices, etc to facilitate improved planning, impact assessment and management;
- setting jurisdiction-wide legislation, policy, regulations and strategic directions;
- supporting institutional arrangements for regional NRM bodies;
- provision of process and advice on catchment-based WQ planning, including community involvement and scientific underpinning;
- provision of process and advice on management actions for specific point and diffuse pollution sources, as well as supporting actions such as monitoring, research and community capacity building.

[Note: The main target audience for this rapid evaluation of the NWQMS was the NWQMS Contact Group (i.e. state/territory government level) but feedback was also sought from this group on NWQMS implementation at the regional and local government level.]

Users and their changing environment

For this review of the NWQMS and to make recommendations for future directions, it is necessary to consider both the changes in the users of the NWQMS and their surrounding environment over time. This is particularly relevant in making future recommendations for the NWQMS to ensure that the revised products, processes and other support mechanisms best match the users needs and environments.

Given an understanding of the current context, matters that need to be considered in relation to future development and implementation of the NWQMS include:

- Users are more “mobile” in the employment now and are likely to continue to be into the future. This means that water management agencies need to better capture and document “corporate knowledge” to carry out their core functions, as well as being able to more easily “induct” and “skill” new employees into their roles;
- Information is much more readily available now, and will be in future, with the advent of technologies such as the internet;
- The “learning” environment is also changing from structured courses in academic institutions to more flexible options such as “online” courses;
- The institutional arrangements supporting implementation and continual improvement of the NWQMS are subject to change e.g. greater role for regional NRM bodies with programs such as Caring for our Country;
- “Water quality” management needs to be considered together with other major “water” initiatives that impact on it, including the National Water Initiative (including major changes with water quantity management), total water cycle management, integrated catchment/waterway management programs (e.g. regional NRM Plans), water sensitive urban design, wetland management programs, coastal management programs, etc..

Range of water types and their connectivity

In principle, the NWQMS should address all water types (see Figure 3) in all climatic regions in Australia. In practice, these are complex matters with catchments containing all water types. A key challenge that is still facing water managers is both the knowledge and tools for, and the management of, the connectivity between the water types. The management of these different water types falls to different agencies, with different management mechanisms to achieve their protection, as well as different scientific skills and personnel providing the understanding needed for management. In particular, management of off-stream wetlands has received “fragmented” coverage across Australia. Likewise, the treatment of groundwater issues needs further

attention. Future NWQMS directions will need to consider how to better link WQ management of all these water types and manage their important connectivity issues, both at the local catchment scale and with any necessary supporting national strategies.

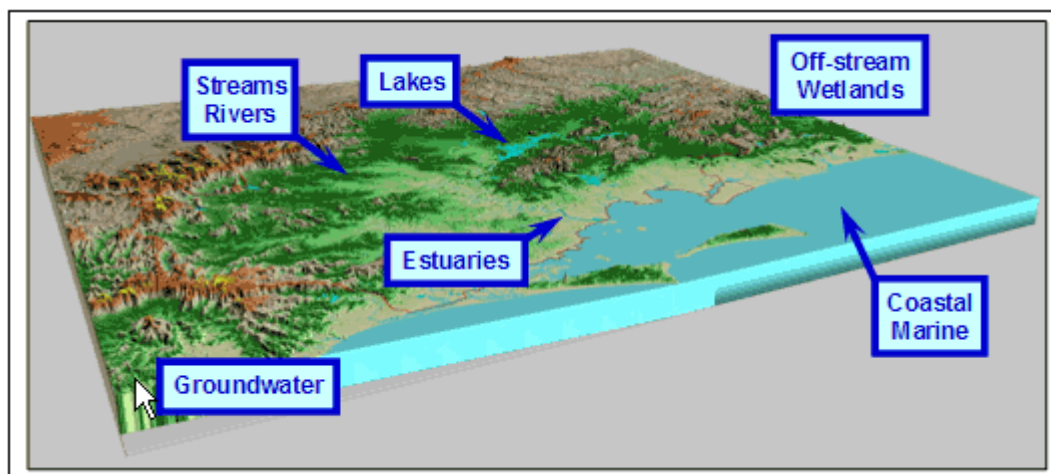


Figure 3 - Example of different water types (Adapted from SEQ Healthy Waterways graphic)

Understand the complementary national initiatives related to WQ management

The key to a successful NWQMS is to clearly define its role and how it will link to complementary WQ-related initiatives. These may take the form complementary strategies, programs, plans, working groups, etc. (see Table 2 for a list of these).

Table 2 - Key National WQ-related Strategies, Programs, Plans, Groups, etc

Complementary Initiatives	Principal Water Types Addressed	Focus	Comments
NWQMS	All	All WQ management processes and issues	Subject of this evaluation
NRM Plans (National S&T and M&E frameworks)	Potentially all water types	All NRM matters for targets including physical-chemical WQ and aquatic ecosystem integrity	Supported by Caring for our Country Program and associated jurisdictional programs
WQIPs (using Framework for marine and estuarine WQ)	Estuaries Coastal	Sustainable pollutant loads to protect coastal environmental values	Provides more detailed estuarine/coastal WQ management components to catchment NRM/WQ Plans
ICZM	Coastal Marine	National cooperative approach to coastal management	
ICAG	Coastal Marine	National cooperative approach to coastal management	Intergovernmental group to implement ICZM
NWI (NWC)	All water types	COAG framework for water reform	See Table 3 and Appendix 8
NWI JSC for Water Sensitive Cities	All water types	NWI Paragraph 92 – IUWCM, WSUD, WSUDev.	Sub - working groups including WSUD Technical Working Group
BoM	Rivers	Data on flow, physical-chemical WQ	
State of Environment / NLWRA	All water types	Consistent approach to water monitoring, assessment and reporting	
AETG	All water types	Identification and protection of HCVAE	
RHCG	Rivers	Technical support for river health monitoring	Sub-group of AETG
WWTF	Off-stream wetlands Lakes?	Technical support for wetland monitoring	Sub-group of AETG
NLWRA Estuaries Group / NEN	Estuaries	Technical support for wetland monitoring / Technical networking for estuary management	
Water-watch	All water types	Community based WQ monitoring	
Commonwealth Water Act 2007 / Basin Plan / MDBA / MDBC	Rivers Groundwater Off-stream wetlands	Water flows, salinity, fish	Formal management structures, committees, working groups

The above table is a starting point for discussion as there are also other national strategies, programs, plans, groups, etc. that have links to WQ management such as: National Rainwater and Grey Water Plan; National Biosolids Research Program; National Acid Sulfate Soils Management Plan and Water for Future.

An example of mapping out appropriate links with NHMRC's WQ-related working groups is provided in section 5.1.1.3 (see Figure 14). Such a "map" then provides a basis for establishing relevant roles of each group and maintaining appropriate links between their WQ management activities. Once such links, roles, etc. are agreed, they can be easily communicated to interested stakeholders.

Current and Future Threats to Australia's Water Environments

For NWQMS to be strategic and proactive in the future, it should be informed by both current and future threats to Australia's water environments. Existing information from audits, state of environment reports, etc provides an insight into the current state and management responses to current pressures on Australian waterways and wetlands. This information needs to be supplemented with risk assessments and predictions of impacts from major new emerging issues such as climate change, global fuel and food shortages, future requirements for food, fibre, water, mineral resources, etc. to shape the NWQMS needs for future strategic management. The future NWQMS directions therefore need to be informed by these assessments and be flexible in the strategies to incorporate any emerging WQ issues.

Vision

The current NWQMS has the following Policy Objective:

to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.

The future NWQMS would greatly benefit from both a long term "aspirational" vision, such as the following, as well as more specific medium term objectives for assessing its progress:

to help achieve healthy water bodies that support livelihoods, lifestyles and ecosystems, with sustainable use of the nation's water resources, by providing a flexible framework that can be applied for protecting and enhancing their quality while maintaining economic and social development.

This vision would allow users to clearly see where the NWQMS fits within all water-related initiatives and strategies. The medium term objectives such as:

- *High conservation value aquatic ecosystems are identified & protection mechanisms are in place;*
- *Water quality and water quantity management are integrated; and*
- *Urban areas are designed based on total water cycle management & water sensitive urban design;*

could be used to "plot" and adaptively manage future "core" and "integration/linking" directions for the NWQMS e.g. better integration of water quantity and water quality management at the catchment level.

Adaptive Management

The concept of adaptive management ("learning by doing") is now well established in natural resource management (NRM) and WQ management across Australia and New Zealand. This is reflected in the NWQMS WQ Management Framework shown at the national scale in Figure 1 and at the catchment scale in Figure 2. More broadly, it also underpins both the national NRM program and its monitoring and evaluation (M&E) framework, including the work of the National Land and Water Resources Audit (NLWRA) and its associated working groups for various water types (rivers, estuaries, coastal/marine). It also underpins

environmental protection legislation which typically incorporates the concept of state of environment (SoE) reporting informing future environmental management.

Adaptive management operates at a number of spatial and temporal scales and is based on progressively incorporating new learnings, tools, priorities, etc.. For example:

- At a sub-catchment scale, regional NRM bodies are reviewing their investment strategies annually;
- At a catchment/regional scale, these bodies are reviewing their NRM/WQ plans at about a 3-5 year period;
- At a jurisdictional level, related legislation, regulations, policies, plans, etc are being reviewed around a 5-10 year period; and similarly
- At a national scale, reviews of national legislation, strategies (e.g. this NWQMS), programs (e.g. NHT) are being reviewed on a 5-15 year period.

The NWQMS needs to ensure its supporting principles, policies, processes, guidelines, working groups, etc reflect the benefits of such adaptive learning and be periodically modified to suit. The NWQMS Contact Group and its working groups also need to be flexible and adapt to changing situations to best achieve the NWQMS vision and policy objectives.

Overall, this review and subsequent decisions for the future of the NWQMS need to recognise the above context and ensure that the products, processes and other future support mechanisms are effective in achieving its vision. This means the role of the NWQMS needs to be clearly defined, and be flexible in its future implementation, so that it best supports WQ management and integrates with the other water-related initiatives and strategies.

2.3 Project Scope

The Department of Environment, Water, Heritage and the Arts (DEWHA) has contracted this project to rapidly report on implementation of the NWQMS to date and recommend to DEWHA and the NWQMS contact group possible future developments to improve its implementation.

The Australian Government approach to this evaluation is to pursue nationally agreed perspectives and implement national strategies in collaboration with states and territories. As such, the DEWHA and NWQMS contact group can then further assess this report's recommendations, along with other inputs, and agree on subsequent actions to improve NWQMS implementation.

The services required of this project are detailed in Appendix 2. In summary, the project is to:

- assess current status of NWQMS implementation;
- identify issues where implementation was working well or not working well;
- recommend ways to improve implementation of the NWQMS; and
- assist develop future directions and priorities of the NWQMS.

2.4 Project Limitations

The following limitations have applied throughout this evaluation:

- interviews were limited to the NWQMS contact network (i.e. the NWQMS users highlighted in Table 1) and so was largely at the state/territory government level with their insights of other NWQMS "users" perspectives; and
- the report is based, in a large part, on information provided by the Contact Network, at interviews, in completed survey/questionnaires and in a Contact Group workshop.

3. Project Methodology

The aim of the project is to rapidly establish the status of implementation of the NWQMS across Australia and New Zealand and make recommendations for future developments to DEWHA and the NWQMS contact group for their further assessment and subsequent action. The initial agreed process for this project was:

- establish a network of key jurisdictional personnel involved with implementation of the NWQMS (based on the existing NWQMS Contact Group);
- review of the relevant NWQMS literature;
- design a survey / questionnaire (with DEWHA) based on the literature review;
- email the survey / questionnaire to the selected NWQMS network;
- follow up telephone interviews with the selected NWQMS network based on their response to the survey / questionnaire; and
- report on the findings to DEWHA.

Subsequently, DEWHA extended the project to have the NWQMS Contact Group review the draft report and then discuss it together at a two day workshop in Adelaide (19-20 August 2008). An outcome of the workshop was to rework this report incorporating comments and inputs from DEWHA and jurisdictions. The final steps were quick reviews of the final draft discussion paper (the “report”) by the DEWHA and contact group, and producing the final document to reflect the comments received. A key change was that the report is now titled a “discussion paper”, to reflect its purpose to stimulate discussions on future directions for the NWQMS. These discussions started at the August 2008 workshop and will continue through the NWQMS Contact group.

3.1 NWQMS Contact Network

There is an existing NWQMS Contact Group including representation from all jurisdictions (including New Zealand). This group was used as the core of the contact network for this project. Based on feedback from the contact group, this group was expanded to include other key contacts who have had significant involvement with the NWQMS since its inception in the 1990s. Appendix 3 is a list of the people contacted for the project.

DEWHA initially provided the contact network with a letter of introduction to the project and its process. The consultant then made initial contact with each member of the group to clarify any questions on the project, provide more detail on the process of using the survey / questionnaire and then follow up interviews, seek feedback on other key contacts and lastly their suggestions for regional natural resource management (NRM) plans to review. The group was subsequently provided with a survey / questionnaire (and associated thought provokers) to complete and return. Then they participated in either a face to face meeting or a telephone interview to assist in completing their detailed feedback (based on the survey / questionnaire). DEWHA subsequently extended the terms of reference for the project to include an initial review of the draft project report by the contact network, then consideration and discussion of its recommendations together at a two day workshop in Adelaide (19-20 August 2008) and finally a review of the final draft discussion paper.

3.2 Review of relevant NWQMS literature

The review of relevant NWQMS literature included the following:

1. the NWQMS documents (see Box 1 in Appendix 1);
2. all Australian Government, state, and local government level legislation, policy instruments and regulations addressing water quality management in Australia;

3. previous progress reports on the Council of Australian Governments' (COAG) water reforms to the National Competition Council (and more recently the National Water Commission [NWC]), which included reports on implementation of the NWQMS; and
4. a representative cross section of NRM plans developed by individual catchment management authorities and groups across Australia, including those funded by Natural Heritage Trust.

The NWC has developed an Australian Water Governance website (http://www.nwc.gov.au/nwi/water_governance/index.cfm) that includes a category for all jurisdictions on "water quality management". This has three sub-categories of: drinking water management, recycled water management and environmental health management. It has a graphic and 2-4 page summary of the environmental health management category that is an excellent summary of the principal WQ management legislation, policy instruments and regulations for each jurisdiction. After meeting with DEWHA and NWC officers, it was decided that this project would use, and then with jurisdictions' assistance, would update these summaries and graphics. This material also provided the basis for task 2 above.

On 20 April 2006, the Australian Government released the *2005 National Competition Policy Assessment of Water Reform Progress* (NWC 2006). The assessment was conducted by the National Water Commission and is the sixth and last National Competition Policy (NCP) assessment of governments' progress with implementation of water-related reforms. Previous assessments were undertaken by the National Competition Council. This is the most recent national review of jurisdictions' implementation of the NWQMS. NWC's *Water Reform Assessment Framework 2005* (NWC 2005) detailed the requirements for the jurisdictions' reports.

In future years, the NWC will assess governments' water reform performance through the biennial assessments of progress in implementing the National Water Initiative. The first biennial assessment for 2006–07 is scheduled for public release in 2008.

Following the consultant's meetings with NWC and DEWHA, DEWHA agreed that, while the 2005 NCP Assessment would be analysed to provide some information on implementation of the NWQMS, much more current and detailed information would result from the interviews with the contact network in this project. Hence, DEWHA decided that the review for task 3 would be limited to reporting on the 2005 NCP Assessment.

For task 4, the cross-section of NRM plans chosen for review was based on the feedback from the contact group and consultants involved in reviews of these plans. The links between Water Quality Improvement Plans (developed under the Coastal Catchments Initiative) and regional NRM plans were also considered.

In summary, the literature review aimed to inform and support the interviews in evaluating the NWQMS implementation, including jurisdictions' similarities and diversity of approaches to water quality management.

3.3 Link to NWQMS Capacity Building Workshops

The Department of Agriculture, Fisheries and Forestry (DAFF) and South Australian Environment Protection Authority/DEWHA funded ten NWQMS Capacity Building Workshops around Australia in 2005-2006 (see workshop locations in Figure 4). The Coastal CRC ran the workshops and Mackenzie et al (2005) reported on the outcomes of the first seven workshops.

A social evaluation of the 2005-2006 NWQMS workshop series (Urbis 2008) ran in parallel with this consultancy. As an input to the Urbis project, the consultant for this project was contacted and interviewed to provide additional information to that evaluation. It is envisaged that future NWQMS capacity building workshops commissioned by DEWHA will be enhanced by feedback from both the above social evaluation and this project.

The ***Evaluation of the 2005/06 NWQMS Workshop Series*** report (Urbis 2008) was provided to the consultant on 4 June 2008 i.e. during the review period for this report. It has a number of findings that support the outcomes of this review. The Urbis findings are shown in the following text box and the individual findings are repeated in shaded text boxes (like this one) in relevant sections of this report to complement the related findings from this project.

Opportunities to further support practitioners implementing the Guidelines

Although it is clear that the workshops have an important place in terms of supporting and promoting the uptake of the Guidelines and Strategy more broadly, there have been a number of other suggestions made about how practitioners and associated stakeholders working in the field might be better supported in their work.

It may be beneficial to consider the following:

- Producing a community supplement to the NWQMS and an accompanying 'how to' guide;
- Preparing a few simple case studies that describe how the NWQMS has been implemented;
- Creating an online forum for practitioners implementing the NWQMS;
- Producing a booklet or online resource for under-resourced organisations;
- Promoting the email list that updates subscribers on changes to the NWQMS;
- Articulating how the NWQMS fits with other policies and legislation that inform NRM requirements;
- Offering and promoting access to independent scientists and water quality management experts;
- Creating a community engagement supplement;
- Exploring ways in which to connect on-ground practitioners and NRM Boards to funding opportunities, and link use to NWQMS.

Considerations for the NWQMS

In terms of making the NWQMS more palatable to practitioners, and increasing its perceived currency and accessibility, the following might be considered:

- Engaging practitioners in any forthcoming review of the Guidelines; and
- Addressing ways in which data collection and management can be improved.

An outcome of the ten workshops and related Coastal CRC projects was an initial website with NWQMS-related material. With the wind-up of the CRC, Geoscience Australia inherited custodianship of that website and is still maintaining it at the following website:

http://www.ozcoasts.org.au/env_mgmt/index.jsp

3.4 Survey / Questionnaire Design, Assessments and Interviews

The project's brief and budget initially required the NWQMS evaluation be based on telephone interviews with the network of key NWQMS stakeholders described above. However, in conjunction with an AusAID project the consultant was participating in, and with limited supplementary funding from DEWHA, the consultant was able to have face to face meetings with contact network members in the ACT, WA, SA, Victoria, Queensland and NSW. Finally, the Adelaide workshop with the NWQMS contact group provided a final opportunity to discuss the draft report with all group members, and in particular those who had not previously had face to face interviews i.e. NT, TAS and New Zealand.

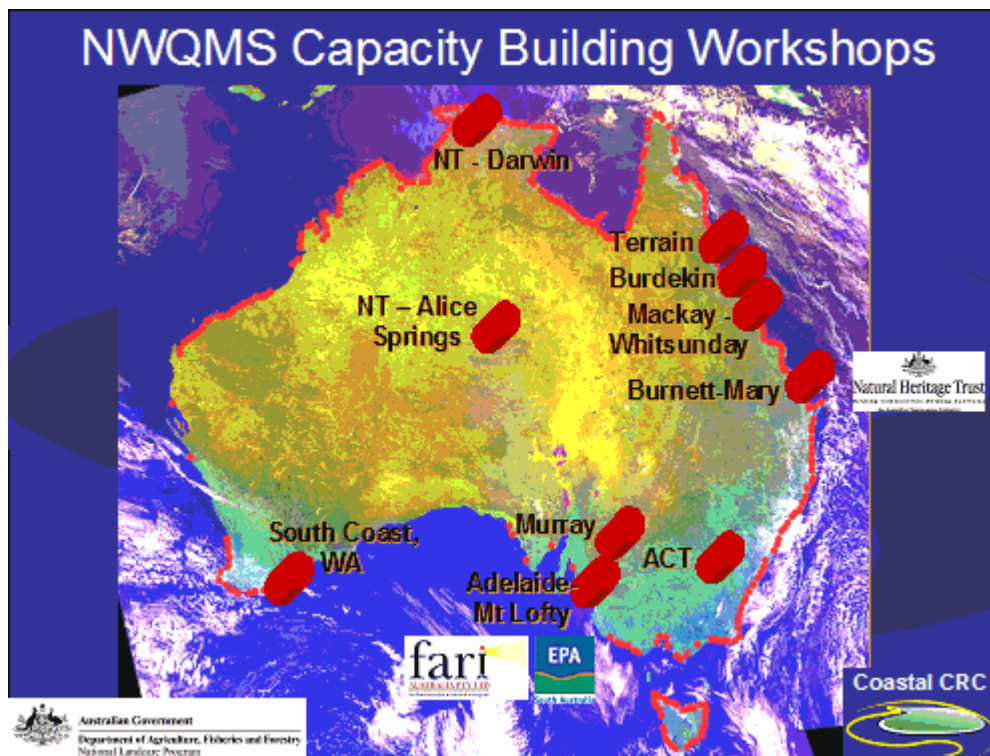


Figure 4 - Location of NWQMS Capacity Development Workshops (2005-6)

As a basis for the interviews, the consultant's first step was to develop a survey / questionnaire and thought provoker in consultation with and endorsement by DEWHA. The aim of the thought provoker (Appendix 4) and questionnaires [comprised of three pro-forma] (Appendices 5-7) was to get the maximum feedback prior to the interviews and to get some consistency in responses from the contact network. The thought provoker and questionnaires also encouraged respondents to provide additional feedback on implementation of the NWQMS and, in particular, recommendations for future directions of the NWQMS.

The questionnaires were developed to help detail and summarise jurisdictions' implementation of the NWQMS (see Appendices 5-7 and note that the appendix numbers shown in brackets below refer to the relevant pro-forma). These were focused on key components of the NWQMS, as shown in Figure 5. The figure shows the main components of the NWQMS, including:

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- the NWQMS guideline documents [policies, processes and technical guidelines] – (Appendix 5);
- the legislation, regulations and policy instruments – (Appendices 6 & 7);
- using the NWQMS process to develop WQ management plans at the catchment level – (Appendices 6 & 7);
- key implementation actions in these plans (e.g. managing point and diffuse sources) – (Appendix 6);
- monitoring and reporting on progress of these actions – (Appendix 6).

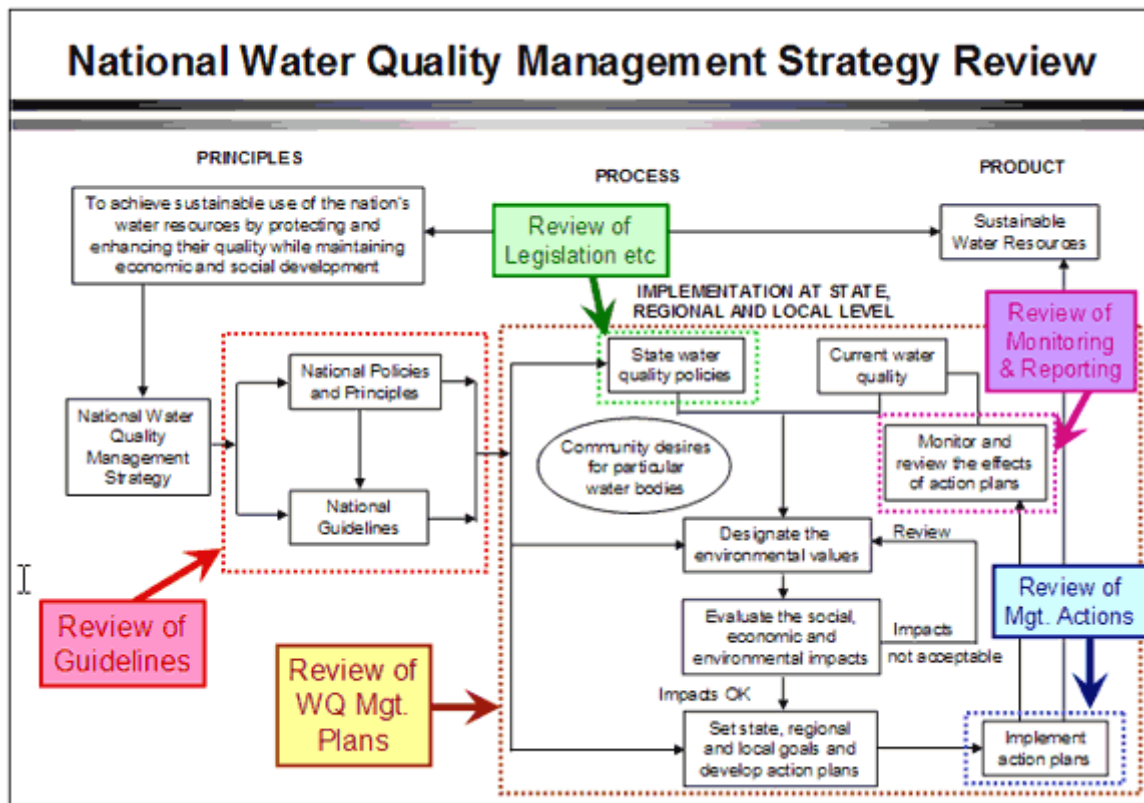


Figure 5 - Key NWQMS components addressed by questionnaires / pro-forma

The questionnaire / pro-forma on the NWQMS guidelines (Appendix 5) sought feedback on all guidelines, with specific questions including:

- How has your jurisdiction used the guideline?
- Who uses it?
- What value is it?
- Does it need updating?
- What needs to be added, updated?
- How can these be regularly updated?
- Any relevant jurisdiction guidelines?
- Any links to jurisdiction's guidelines?
- How to set priorities for new guidelines?
- How to link with Total Water Cycle Management/Water Sensitive Urban Design / Urban Stormwater Management?

The questionnaires / pro-forma were piloted in an initial meeting with ACT government staff. They were then revised and emailed to all the network members for them to complete and return prior to their face to face or telephone interviews. Appendices 4-7 are the final thought provoker and questionnaires / pro-forma.

It was envisaged that the completed questionnaires / pro-forma would be returned on time to assess for common feedback and ideas for future directions, prior to the interviews. In practice, the contact network are busy people and therefore the network members were taken through them in their interviews. Also, as indicated above, further discussions were held with contact group members in Adelaide in response to the draft report, both collectively in the workshop sessions and individually out of session.

The assessments of the information from the interviews provided constructive inputs to the levels of NWQMS implementation and future directions. This interview process allowed more comprehensive implementation information to be obtained and it greatly value-added to the information gained from the literature review. The results from all these tasks are presented in the next section.

4. Results

The results provided below are from the literature review and the interviews with the NWQMS contact network. They are discussed in the next two sections in the context of lessons learnt from NWQMS implementation to date and future directions and priorities for the NWQMS.

4.1 Review of NWQMS Implementation reports to COAG

Background

As outlined in section 3.2, it was agreed that the 2005 NCP Assessment (NWC 2006) would be analysed to provide historical information on implementation of the NWQMS but much more current and detailed information would result from the interviews in this project. Appendix 8 provides details of the NWQMS component of NWC's Water Reform Assessment Framework (NWC 2005), together with the related jurisdictions' responses in the Australian Government's 2005 National Competition Policy Assessment of Water Reform Progress (NWC 2006).

Key requirements of the Assessment Framework are "quoted" below. The comments in brackets show how the pro-forma in this project were designed to provide more recent supporting assessments of jurisdictions' NWQMS implementation.

"NWQMS sets out a national framework within which all stakeholders can contribute to better water quality management. The strategy is based on policies and principles for water quality management that apply nation-wide and includes guidelines covering the key elements of the water cycle, including groundwater, aquatic ecosystems, stormwater, agricultural water use and effluent management for specific industries (pro-forma on NWQMS guidelines – Appendix 5).

The NWQMS has been developed to assist jurisdictions in establishing appropriate environmental outcomes. The national guidelines have a shared national objective but allow flexibility in responding to different circumstances at regional and local levels (Appendices 6 & 7).

Water quality management should occur at the State and Territory level using water quality planning and policy instruments to set water quality goals and objectives that are in line with agreed national guidelines. These goals and objectives should form the basis for management strategies and actions (Appendices 6 & 7).

The process of implementing the NWQMS involves the community working in concert with government in setting and achieving local environmental values, which are designed to maintain good water quality and to progressively improve poor water quality (Appendix 7).

The 1994 Water Reform Framework calls for a mix of approaches including, but not limited to, regulatory and market-based approaches, monitoring, integrated catchment management, education and guidance. Implementation of the NWQMS has strong linkages to other water reform elements, such as water planning, providing water to achieve environmental outcomes, water trading, and the urban water reforms, as well as broader environment protection, planning and natural resource management activities (Appendix 6)."

The findings of the 2005 Assessment are discussed in conjunction with the feedback from interviews in section 5. In summary, jurisdictions have:

- developed legislation, policies and regulations to implement the NWQMS consistently around Australia (some states have state WQ management strategies to implement the NWQMS);
- established environmental values and water quality objectives for catchment waterways either using statewide or catchment based processes;
- developed state and catchment WQ management plans and actions to address point and diffuse sources of pollution;
- incorporated links to the NWQMS policies and principles in their water planning processes to protect EVs and establish environmental flow requirements;
- established links to land use planning and natural resource management plans;
- regulated point sources of pollution;
- developed best practice guidelines and codes of practice for diffuse sources;
- established WQ monitoring and reporting frameworks.

Table 3 shows the components of the NWC's Water Reform Assessment Frameworks for 2005 and 2007. **It shows that the latest framework does not have a requirement to report on the progress with implementing the NWQMS.** In future, this requirement could be reintroduced or another mechanism (e.g. through the NWQMS Contact Group, revisions to the NWI) introduced to periodically review NWQMS implementation.

Table 3 - National Water Commission's Water Reform Assessment Frameworks

NWC 2005	NWC 2007	Future NWC Option?
2005 National Competition Policy Water Reform Assessment (COAG 1994)	First Biennial Assessment of NWI (COAG 2004)	Second Biennial Assessment of National Water, Waterways and Wetlands Initiative?
NWC's Water Reform Assessment Framework Components	Elements of Water Management	Elements of Water, Waterway and Wetlands Management?
Implementation		
Water Access Entitlements and Planning Framework	Water access entitlements and planning framework	As for NWC2007
Water Markets and Trading	Water markets and trading	As for NWC2007
Best Practice Water Pricing and Institutional Arrangements	Best practice water pricing	As for NWC2007
Integrated Management of Water for Environmental and Other Public Benefit Outcomes	Integrated management of water for environmental and other public benefit outcomes	As for NWC2007
Water Resource Accounting	Water resource accounting	As for NWC2007
Urban Water Reform	Urban water reform	As for NWC2007
Community Partnership and Adjustment	Community partnerships and adjustment	As for NWC2007
Knowledge and Capacity Building	Knowledge and capacity building	As for NWC2007
National Water Quality Management Strategy		National Healthy Waterways and Wetlands Management Strategy?

Action Needed:

- *DEWHA and NWQMS Contact Group to work with NWC to agree on any necessary modification to the NWI to include an obligation to implement and report on the NWQMS, and at the appropriate time, forward the modification to Natural Resource Management Ministerial Council with a recommendation for endorsement.*

4.2 NWQMS Guideline Documents

The NWQMS guideline documents relate to various components of WQ Management and are broken down under the following headings:

- Policies and Process for Water Quality Management;
- Water Quality Benchmarks;
- Groundwater Management; and
- Guidelines for Diffuse and Point Sources.

The guidelines are used by a wide variety of people involved in WQ management and the Table 4 aims to show, generally, the NWQMS guidelines and environmental values of principal interest to the various groups of NWQMS “users”. This table will support the subsequent discussion of NWQMS implementation and scoping future NWQMS directions.

Table 4 - NWQMS Users & Guidelines and EVs of Principal Interest to them

NWQMS “User”	NWQMS Guidelines of Principal Interest ¹	Environmental Values of Principal Interest ²
Environment Protection Agencies	Most	All
Water Resource Management Agencies	3 – Implementation 4 – Water Quality 7 – Monitoring & Reporting 8 – Groundwater 9 – Rural Land Uses	Aquatic ecosystems Primary Industries Recreational uses
Primary Industries Agencies	3 – Implementation 4 – Water Quality 7 – Monitoring & Reporting 8 – Groundwater 9 – Rural Land Uses	Primary Industries
Health Agencies	6 – Drinking water 8 – Groundwater 13 – Biosolids Management 21 – Recycled Water Recreational Guidelines Food Standards Code	Drinking water Recreational uses (Primary & secondary contact) Human consumption
Water Supply Utilities (urban)	4 – Water Quality 6 – Drinking water 8 – Groundwater 21 – Recycled Water Recreational Guidelines Food Standards Code	Drinking water Recreational uses Human consumption
Water Supply Utilities (rural)	4 – Water Quality 6 – Drinking water 8 – Groundwater 9 – Rural Land Uses	Primary Industries Drinking water Recreational uses Human consumption

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NWQMS “User”	NWQMS Guidelines of Principal Interest ¹	Environmental Values of Principal Interest ²
	Recreational Guidelines Food Standards Code	
Wastewater Utilities	4 – Water Quality 7 – Monitoring & Reporting 11 – Sewage Effluent 12 – Trade Waste 13 – Biosolids Management 14 – Reclaimed Water 15 – Sewage Overflow 21 – Recycled Water	All EVs in waters receiving their treated effluent
Catchment Management Authorities	3 – Implementation 4 – Water Quality 6 – Drinking water 7 – Monitoring & Reporting 8 – Groundwater 9 – Rural Land Uses 10 – Urban Stormwater	All EVs
Local Governments	3 – Implementation 4 – Water Quality 6 – Drinking water 7 – Monitoring & Reporting 8 – Groundwater 10 – Urban Stormwater 13 – Biosolids Management 14 – Reclaimed Water 21 – Recycled Water	Aquatic ecosystems Recreational uses Drinking water Human consumption Cultural & spiritual values
Specific Industries	16a – Dairy Sheds 16b – Dairy Processing 17 – Piggeries 18 – Wool Scouring 19 – Tanning 20 – Wineries & Distilleries	Industrial Uses Primary Industries
Developers	3 – Implementation 4 – Water Quality 7 – Monitoring & Reporting 8 – Groundwater 10 – Urban Stormwater	Aquatic ecosystems Recreational uses Drinking water Human consumption Cultural & spiritual values
Consultants	All (depending on client)	All (depending on client)
Land Care Groups/Landholders	9 – Rural Land Uses	Aquatic ecosystems Primary Industries Drinking water Human consumption
General Public	1– Outline 2 – Policies & Principles 3 – Implementation 4 – Water Quality 6 – Drinking water 7 – Monitoring & Reporting 8 – Groundwater	Aquatic ecosystems Recreational uses Drinking water Human consumption Cultural & spiritual values

Notes: ¹ See Appendix 9 for full list of NWQMS and related guidelines and their short titles

² See Appendix 10 for full list of environmental values for waterways in the NWQMS

The contact network provided feedback on the use of the NWQMS guidelines by completing the pro-forma at Appendix 5. The information provided in completed pro-forma is combined in the detailed table in Appendix 11. As well as this feedback from Australian jurisdictions, two detailed submissions were received from New Zealand and the Australasian Society of Ecotoxicology in relation to future updates to Guideline #4 (i.e. the “Water Quality” guidelines). These submissions are included as Appendices 11-1 and 11-2 respectively.

4.3 WQ Management legislation, policy instruments and regulations

Information on jurisdictions’ WQ management legislation, policy instruments and regulations was initially sourced from the NWC’s literature, principally the “environmental health management” component of its website. These documents were updated with the assistance of feedback from the completed pro-forma from and interviews with jurisdictions and are included in Appendix 12. Further detailed information was also obtained from the jurisdictions’ information in completing the pro-forma in Appendices 6 & 7. The completed pro-forma based on Appendices 6 & 7 are in Appendices 13 & 14 respectively. These contain extensive information on the workings of Australian legislation, policy instruments and regulation, as well as more detailed information on catchment based WQ management.

Being a separate country, the New Zealand (NZ) WQ management arrangements naturally differ from the Australian situation. Firstly, it doesn’t come under the COAG requirements which provides overall direction to the Australian jurisdictions. Secondly, most water-related environmental management and regulation in NZ is conducted by sixteen regional councils, which have equivalent functions to those of Australian jurisdictions. Regional council boundaries are catchment-based. This assists WQ management at the catchment level by reducing cross-boundary issues at the regional level¹. Thirdly, NZ has a national *Resource Management Act* under which most regional councils develop regional water plans. These plans generally follow the NWQMS WQ management process and hence have a lot of similarities with WQ management plans in Australia. Appendix 15 provides a summary of WQ management in New Zealand.

4.4 Review of Selected Regional Natural Resource Management (NRM) Plans

Water Quality Management Plans at the catchment level are a key instrument for implementation of the NWQMS. Development and implementation of these plans are supported by a number of national and jurisdictional policies, programs, plans and projects. At the national level, regional NRM Plans have been supported over the last decade by the Natural Heritage Trust (NHT) programs and the National Action Plan for Salinity and Water Quality program (NAP). The NHT2 program included a Coastal Catchments Initiative (CCI) which supported development of Water Quality Improvement Plans (WQIPs) around Australia in key coastal “hotspot” areas. These WQIPs provided improvements primarily to the estuarine and coastal WQ management components of the regional NRM Plans.

Currently, the Caring for our Country national NRM program is continuing this support for regional NRM Plans and their investment strategies. The jurisdictions, through their bilateral arrangements with the Australian Government, are jointly steering and providing complementary support (cash and in-kind) for these programs. Appendices 13 & 14 show details of jurisdictions’ roles and responsibilities in water quality management planning.

¹ However, it should be noted that there are a number of smaller local authorities within each regional council boundary, who have land use control functions. This means there can be jurisdictional overlap in a region, particularly with regard to integrating water management with land use planning and control.

For this project, a cross-section of NRM plans was chosen for review based on the feedback from the contact group and consultants involved in reviews of these plans. The NRM plans included a cross section to show: improvements over time; plans for riverine and coastal waterways; and plans with different levels of detail. The plans reviewed were:

- Mackay-Whitsunday Region (QLD) NRM Plan 2005;
- Mackay-Whitsunday WQ Improvement Plan (May 2008) – to be incorporated in M-W NRM Plan;
- Hawkesbury Lower Nepean (NSW) Catchment Blueprint (2002);
- Hawkesbury-Nepean Catchment Action Plan (2008);
- South Australian Murray-Darling Basin NRM Region - Initial NRM Plan 2006-2007 – Water Quality Section;
- Goulburn Broken (VIC) Regional River Health Strategy (2005 – 2015); and
- Southeast Queensland Healthy Waterways Strategy (2007-2012).

Appendix 16 details key features of these selected plans, including establishing environmental values, water quality objectives/targets and management and monitoring actions to achieve those objectives/targets. These are discussed further in section 5.1.3. The Mackay-Whitsunday NRM Plan and the subsequent Mackay-Whitsunday WQIP was specifically chosen for review to show the links between WQIPs and regional NRM plans, including how the WQIP added more detail to the WQ management components of the previous NRM Plan. Similarly, the Hawkesbury-Nepean Catchment Action Plan has provided greater WQ management detail to the previous Catchment Blueprint. These examples are also relevant to the discussion on adaptive management in section 5.

In summary, the NWQMS WQ management framework has provided a consistent process for these catchment WQ management plans and there is now a good range of case studies available for riverine and coastal waters to review and share the lessons learnt with those people developing plan for other areas. These opportunities are discussed in section 5.

5. Discussion and actions needed

5.1 Status of NWQMS Implementation

The NWQMS Policies and Principles is based on a strategy of high-status national guidelines with local implementation and NWQMS document #2 emphasises the importance of:

- ecologically sustainable development;
- integrated (or total) catchment management;
- best management practices, including the use of acceptable modern technology and waste minimisation and utilisation.

This discussion will firstly overview the NWQMS guideline documents and then jurisdictions' legislation, policies and regulation for WQ management. Within that context, the discussion will then review catchment scale WQ planning, along with specific WQ management actions for point, diffuse and other sources of impacts on WQ. This section then finishes with a discussion on emerging NWQMS-related activities and future NWQMS directions.

5.1.1 NWQMS Guideline Documents

5.1.1.1 Overview of Guidelines

The development of the NWQMS and its associated guideline documents in the 1990s was timely to guide a consistent national approach to WQ management around Australia.

The review of all the guideline documents is detailed in Appendix 11. These documents relate to different components of the WQ management, namely:

- Policies and Process for Water Quality Management;
- Water Quality Benchmarks;
- Groundwater Management; and
- Guidelines for Diffuse and Point Sources.

Figure 6 shows the guidelines relevant to the catchment based WQ management framework (Figure 2). Figure 7 is a simplistic representation of the main "causes" of WQ impacts and the guidelines relevant to them. These latter guidelines in Figure 7 assist in developing, assessing and prioritising the "alternative management strategies" in Figure 6 to mitigate their impacts on WQ. This ability to use Figure 7 to expand on the components of the WQ management process is another of the strengths of the process. Along similar lines, jurisdictions are routinely using conceptual models to show their "current understanding" of WQ in their catchment (i.e. the first box in Figure 6), as shown in Figures 8, 9, 11 and 12.

There are a wide variety of users for the guideline documents and they require different "products" from these documents e.g. designers/engineers may just require a physical-chemical objective to base their design on, regional NRM bodies may require the process for developing a catchment WQ management plans and assistance with setting targets for ecosystem protection, utilities and others require a tool kit/decision support systems on how to implement the guidelines. Some of these users have limited time to undertake their tasks and, if the NWQMS documents and products are not easy to use, they will not get the best value out of them. Section 6.1 proposes a survey of other NWQMS users to add information on their needs (including the specific products they require from the guidelines) to the needs identified in this review. The following discussion in section 5 builds on the feedback in the Appendices to outline actions required to consolidate the lessons from NWQMS implementation to date into readily accessible products to support future NWQMS directions.

Guidelines 1-3 (i.e. the policies and processes) provide good support for WQ management at the catchment level by detailing a logical process (Figure 6) to follow, based on a simple "Plan-Act-Observe-Reflect" adaptive management approach. These processes have largely

been incorporated into jurisdictions' environmental protection legislation and policies around Australia. As well, these policies, principles and processes provide the context for all the remaining guidelines and should be summarised at the start of all of them to show where each guideline fits into the NWQMS.

Jurisdictions have found that, in implementing such legislation and policies at the catchment WQ planning level, the NWQMS WQ management framework (detailed in these guidelines) has proved to be one of its greatest strengths because it is such a sound and logical process.

Guidelines 4 and 7 have provided good supporting technical references to support development of WQ objectives and then monitoring and reporting on progress in achieving these objectives (in response to the management actions being implemented). Sections 5.3.3 and 5.3.6 discuss these guidelines (respectively) and recommend actions needed to update them.

Guideline 6 has a slightly different focus on drinking water quality with a "user" group more focused on the "health" agencies and therefore linked to the NHMRC. It has been updated and its risk based approach has been widely accepted and used by jurisdictions. Section 5.1.1.3 further discusses WQ and human health matters.

The groundwater management guideline (#8) has been "patchy" in its usefulness across the jurisdictions and the opportunity exists to improve it using a risk based approach to management and incorporating the findings of more detailed studies over the last decade (e.g. investigations associated with major mining activities).

The specific guidelines for diffuse and point sources (Figure 7) have had mixed use by jurisdictions as shown in Appendix 11. Most of the matters that the guidelines for sewerage systems address (trade wastes, effluent management, biosolids) have largely been controlled by legislation, policies and regulations. The use of reclaimed water has been recently overtaken by the new recycling guidelines. The value of these guidelines needs to be checked with the water utilities and local governments, who are the principal users of these documents (and not consulted as part of this project). Similarly, the value of the guidelines for specific industries needs to be checked with those industries and their consultants (see section 6.1).

The guidelines for urban stormwater management (#10) have similarly been complemented by the recent NWI activities on total water cycle management and water sensitive urban design and development. Opportunities exist for the NWC's working groups to support future directions with these guidelines and these are discussed in section 5.2.2.

Lastly, with the advent of national NRM programs, there has also been a marked improvement in efforts to address WQ impacts from rural land use and management. Section 5.2.3 discusses rural diffuse sources of pollution and opportunities to update guideline #9.

As shown above, the possibilities for improvement in these guidelines are discussed in the following sections and Table 5 provides a summary of the proposed actions for each of the NWQMS guidelines.

Table 5 - Summary of proposed actions for each NWQMS guideline

No.	NWQMS Guideline Title	Proposed Action
	Policies and Process for WQ Management	
1	<i>Water Quality Management — An Outline of the Policies (1994)</i>	Update these three guidelines after the case studies for catchment WQ management plans and HCVAE tasks are completed (and incorporate their findings)
2	<i>Policies and Principles — A Reference Document (1994)</i>	
3	<i>Implementation Guidelines (1998)</i>	
	Water Quality Benchmarks	
4	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)</i>	Establish a WG to develop a detailed strategy to update Guideline #4
6	<i>Australian Drinking Water Guidelines (2004)</i>	NHMRC (and NRMCC) continue with responsibility for updating this guideline
7	<i>Australian Guidelines for Water Quality Monitoring and Reporting (2000)</i>	Develop supporting simpler documents and case studies for Guideline #7. Update with Guideline #4.
	Groundwater Management	
8	<i>Guidelines for Groundwater Protection (1995)</i>	Update using risk based approach to management?
	Guidelines for Diffuse and Point Sources	
9	<i>Rural Land Uses and Water Quality — A Community Resource Document (2000)</i>	Align NWQMS rural diffuse matters with national NRM programs. Update at appropriate stage.
10	<i>Guidelines for Urban Stormwater Management (2000)</i>	NWC WSUD WG to advise if/when to update guideline to incorporate their recent work
11	<i>Guidelines for Sewerage Systems — Effluent Management</i>	Await feedback from LGs and wastewater utilities in survey re their needs for updates and new guidelines
12	<i>Guidelines for Sewerage Systems — Acceptance of Trade Waste (Industrial Waste) (1994)</i>	As for #11
13	<i>Guidelines for Sewerage Systems — Biosolids Management (2004)</i>	As for #11 and continue to use current “biosolids” working group
14	<i>Guidelines for Sewerage Systems — Use of Reclaimed Water (1999) – see #21</i>	Superseded by #21
15	<i>Guidelines for Sewerage Systems — Sewerage System Overflows (2004)</i>	As for #11
16a	<i>Effluent Management Guidelines for Dairy Sheds (1999)</i>	Await feedback from specific industries in survey re their needs for updates and new guidelines
16b	<i>Effluent Management Guidelines for Dairy Processing Plants (1999)</i>	
17	<i>Effluent Management Guidelines for Intensive Piggeries (1995)</i>	
18	<i>Effluent Management Guidelines for Aqueous Wool Scouring and Carbonising (1995)</i>	
19	<i>Effluent Management Guidelines for Tanning and Related Industries in Australia (1995)</i>	
20	<i>Effluent Management Guidelines for Australian Wineries and Distilleries (1998)</i>	
21	<i>Australian Guidelines For Water Recycling - Managing Health & Environmental Risks - Phase 1&2 (in prep)</i>	Continue with current development process

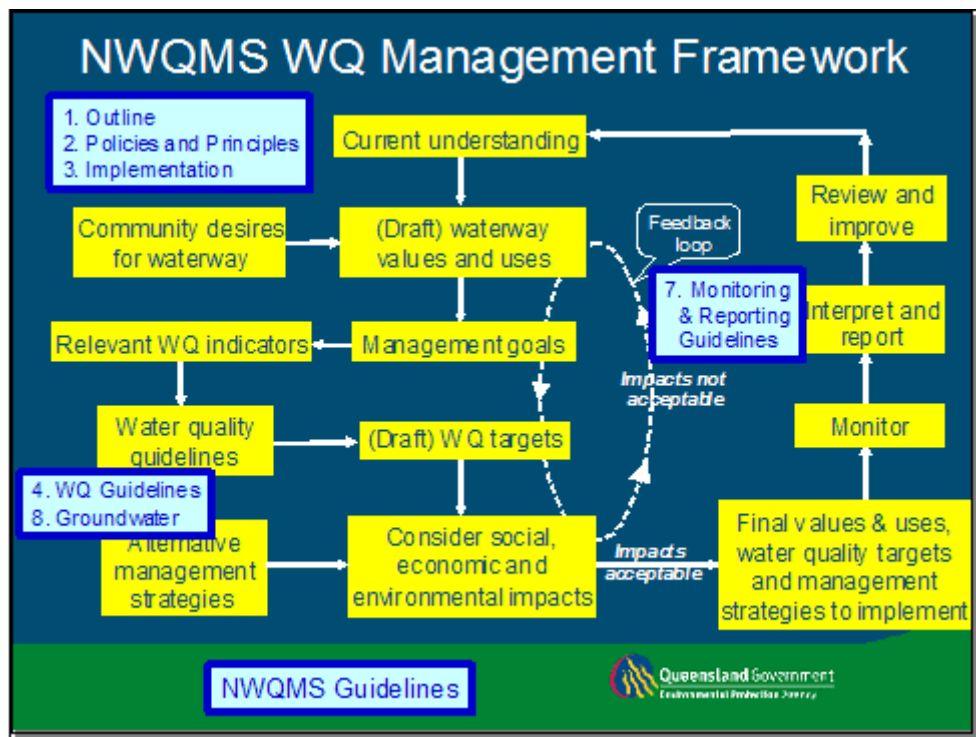


Figure 6 - NWQMS Guidelines related to the WQ Management Framework

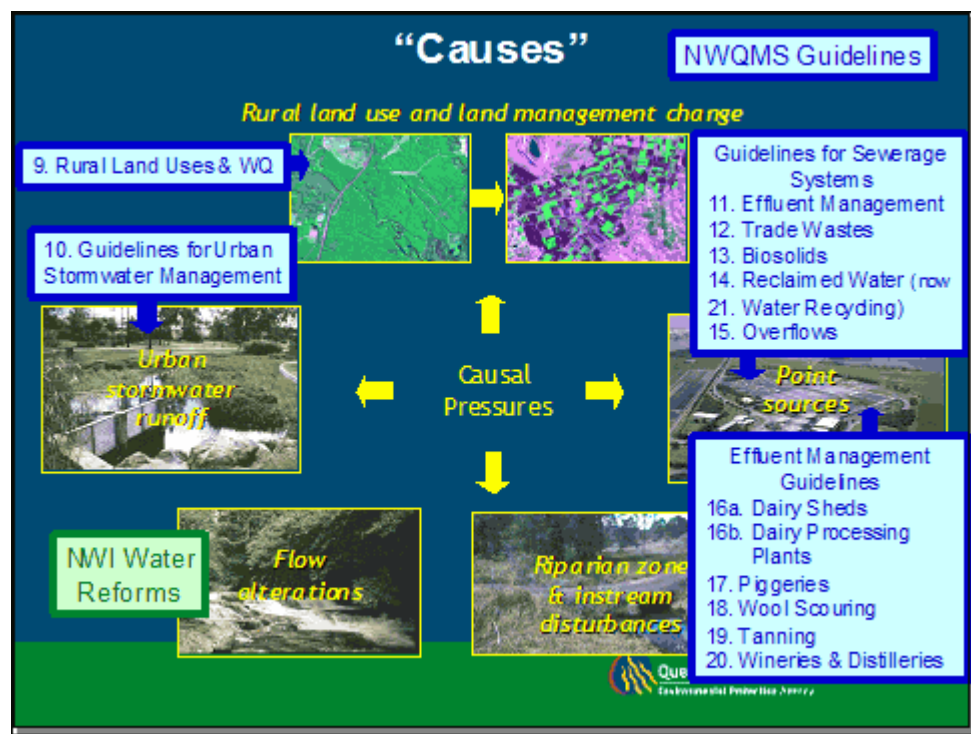


Figure 7 - NWQMS Guidelines related to the main "Causes" of WQ impacts
(Source of base graphics in Figs 6-9: Bennett and Moss [2005b], Bennett et al [2005a])

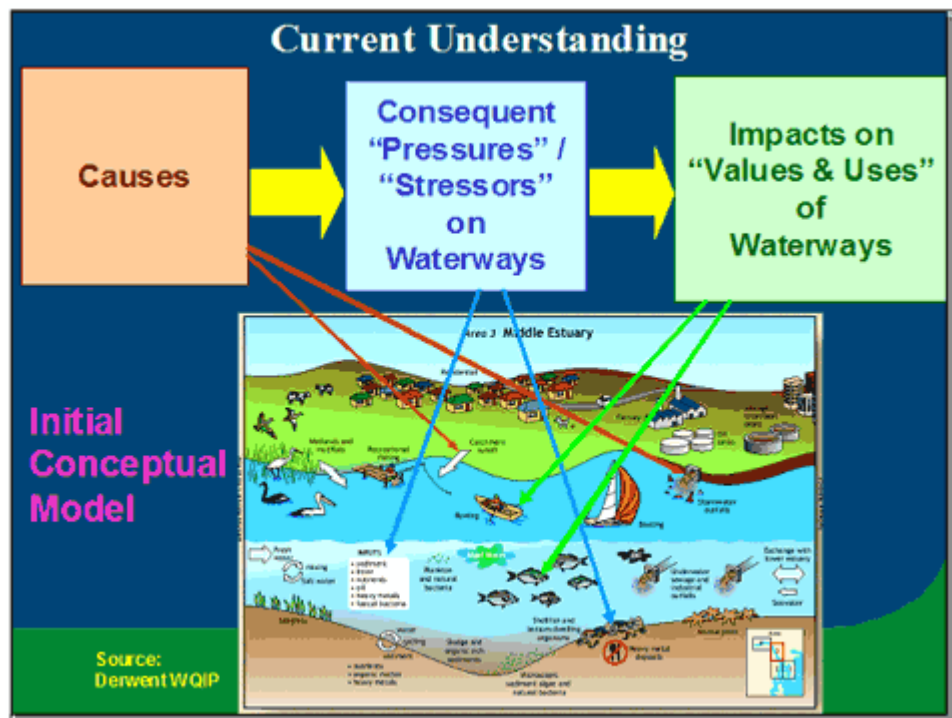


Figure 8 - Use of Conceptual Model to show Current Understanding
(Figures 11 and 12 are more examples of these conceptual models)

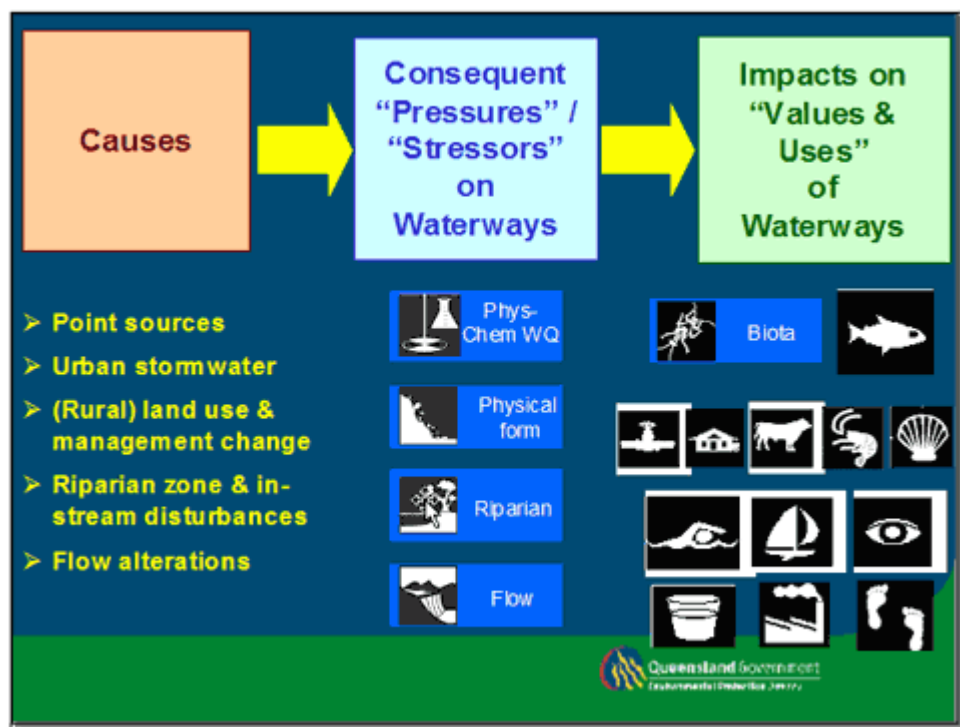


Figure 9 - Typical components represented in Conceptual Models
(see Figure 10 and Appendix 10 for more details on EVs (i.e. waterway values & uses))

5.1.1.2 Water quality and ecosystem health

An issue for future NWQMS directions is to resolve a potential misunderstanding by new users that it only relates to physical-chemical WQ. Experienced users understand that “water quality”, in its application to ecological values/uses, relates to all components of aquatic ecosystem health, including physical-chemical WQ.

Typically WQ objectives to protect the social/cultural and economic EVs are physical-chemical objectives and most of these are consistent across Australia and contained in the national WQ guidelines (ANZECC/ARMCANZ 2000a). For aquatic ecosystems, jurisdictions are progressively setting more detailed ecosystem health objectives for key components of these ecosystems (including physical-chemical WQOs). This is shown graphically in Figure 10. Figure 11 is an example of the typical components of freshwater ecosystems on a conceptual model of a Murray-Darling River ecosystem (CRC for Freshwater Ecology 2001).

For downstream waterways such as estuaries and coastal waters, ecosystem health objectives (EHOs) are also relevant to key components of these ecosystems (for example Figure 12). Figure 13 shows an example of seagrass depth range as an EHO. Physical-chemical WQOs to protect all EVs can also be established and, based on these, sustainable pollutant loads to achieve these WQOs can be derived based on catchment and receiving water models. These are the focus of the coastal WQIPs under the CCI (see Appendix 16).

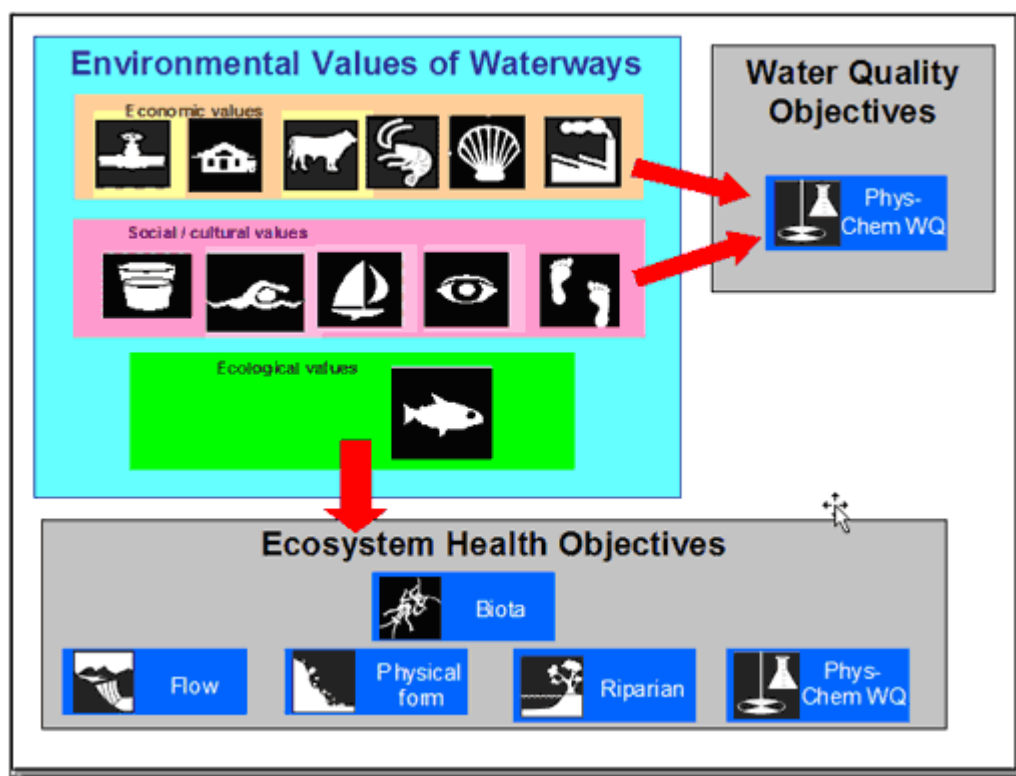


Figure 10 - NWQMS's environmental values (EVs) and related objectives

This misunderstanding could be resolved by incorporating “healthy waterways” in the vision for the NWQMS and its name (e.g. National (Healthy) Waterways Management Strategy). Other considerations would include the need to cover all water types and environmental values. This is discussed in the future directions in section 5.5.

Figures 3.1, 3.2

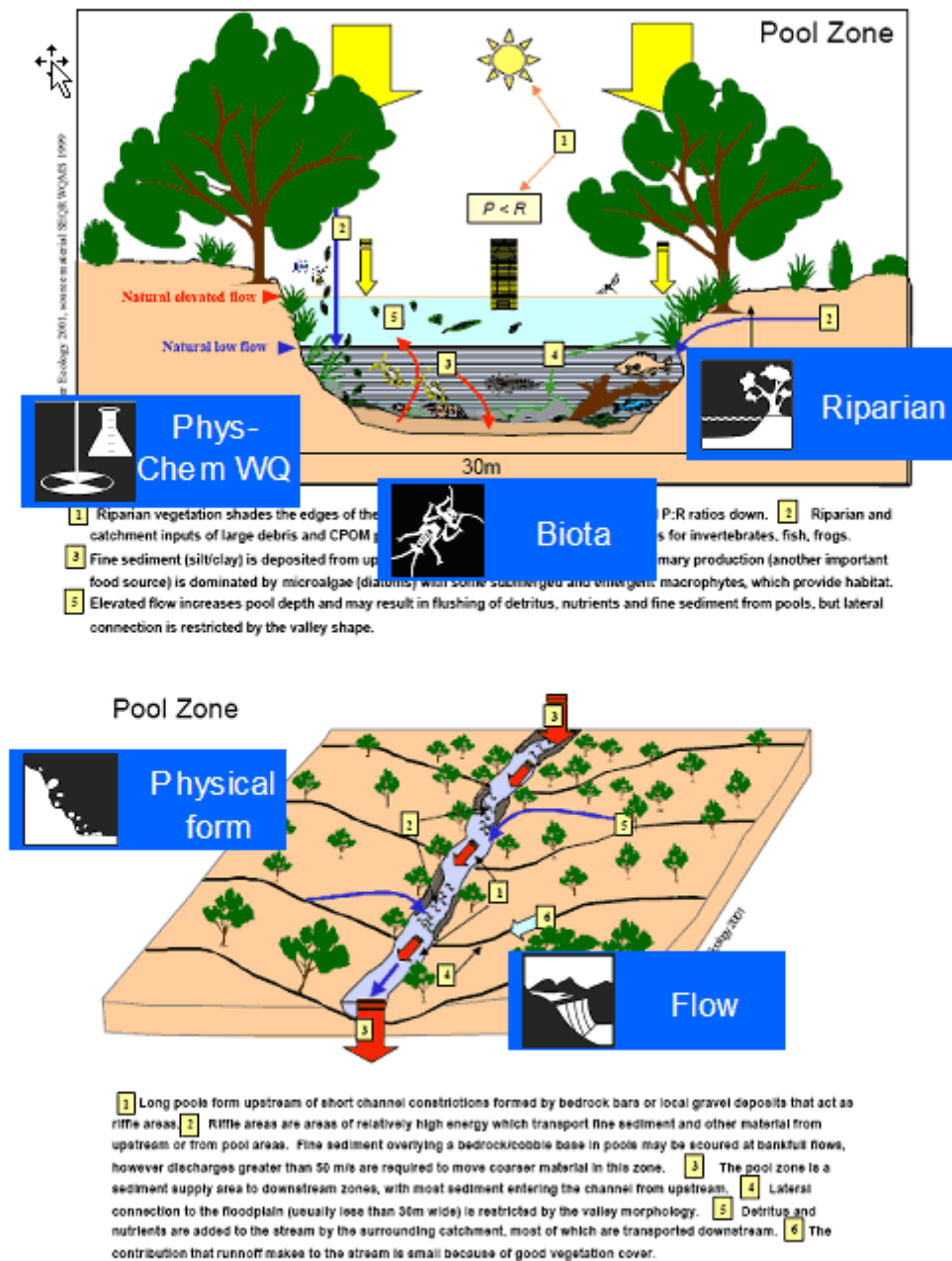


Figure 11 - Conceptual model for riverine pool zone (showing key ecosystem components) (CRC for Freshwater Ecology 2001)

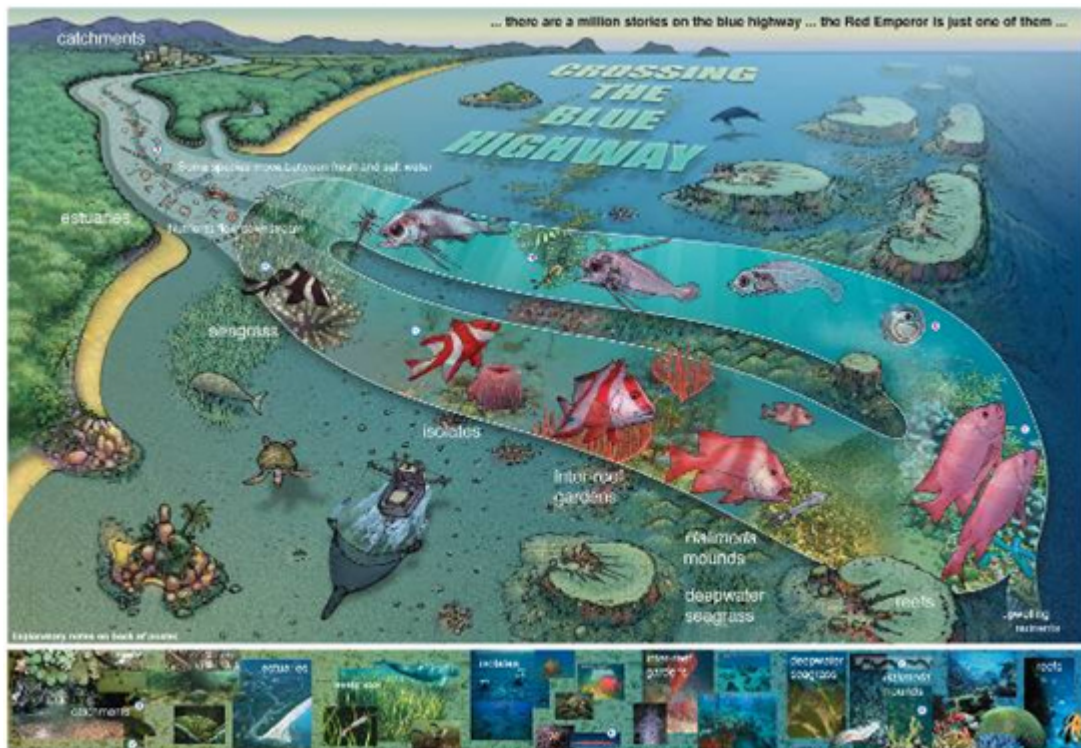
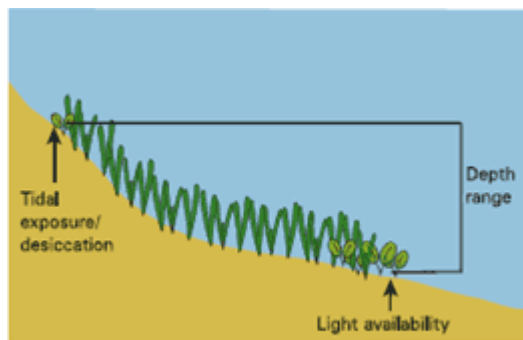


Figure 12 – Example of estuarine/coastal aquatic ecosystem related to the red emperor's life cycle (Poster produced by Australian Coral Reef Society)



Schematic diagram illustrating how seagrass depth range is measured



EPA staff measuring seagrass depth range at Crab Island in eastern Moreton Bay

Figure 13 - Example of an Ecosystem Health Objective i.e. Seagrass Depth Range (Source: SEQ Ecosystem Health Monitoring Program)

5.1.1.3 Water quality and human health

The NWQMS's environmental values include some which require management of water quality for human health reasons, namely drinking water, contact recreational uses and human consumption of aquatic foods. There is overlap in managing WQ for these EVs with the work of the NHMRC and other human health related management agencies. The following paragraphs discuss the three principal guidelines related to these EVs.

The *Australian Drinking Water Guidelines* (ADWG – Guideline #6) are intended to provide a framework for good management of drinking water supplies that, if implemented, will assure safety at point of use. They have been developed after consideration of the best available scientific evidence. They are designed to provide an authoritative reference on what defines safe, good quality water, how it can be achieved and how it can be assured. They are concerned both with safety from a health point of view and with aesthetic quality. The Guidelines have been endorsed by both the NHMRC and the Natural Resource Management Ministerial Council under the NWQMS Guideline series.

The primary aim of the *Guidelines for Managing Risks in Recreational Water* (NHMRC 2008) is to protect the health of humans from threats posed by the recreational use of coastal, estuarine and fresh waters. Threats may include natural hazards such as surf, rip currents and aquatic organisms, and those with an artificial aspect, such as WQ impacts from discharges of wastewater. These guidelines should be used to ensure that recreational water environments are managed as safely as possible so that as many people as possible can benefit from using the water.

The Australia New Zealand food standards system is a cooperative arrangement between Australia, New Zealand and the Australian States and mainland Territories to develop and implement uniform food standards. Within Australia, the system is based upon the initial 1991 Commonwealth, State and Territory Agreement in relation to the adoption of uniform food standards. This system continues in operation under the Food Regulation Agreement 2002, and is implemented by food legislation in each State and Territory and in New Zealand, and by the Food Standards Australia New Zealand Act 1991 (FSANZ Act) of the Commonwealth of Australia. The FSANZ Act establishes the mechanisms for the development and variation of joint food regulatory measures (a food standard or a code of practice) and creates Food Standards Australia New Zealand (the Authority) as the agency responsible for the development and maintenance of a joint *Australia New Zealand Food Standards Code*. The Code is a collection of individual food standards. Standards on related matters are grouped together into parts, those which apply to all foods, particular classes of foods, food hygiene issues, and standards dealing with the primary production of food in Australia.

NHMRC has its own management system including working groups on specific human health issues. The NWQMS needs to maintain effective links with those groups that deal with WQ related issues (discussed further below).

Action Needed:

- Map out NHMRC and other health agencies' working groups related to WQ management (example shown below) and maintain appropriate links with these groups, led by DEWHA officers.

This report contains a number of recommendations about mapping out groups as a basis of firstly establishing relevant roles and responsibilities. This would then assist in establishing (and implementing) both core roles of the NWQMS and activities with which the NWQMS should develop appropriate "links". Following the NWQMS workshop in Adelaide to discuss this report's draft recommendations, it was decided to develop a draft "map" to address the above action, as an example of how other "maps" could be developed.

With the assistance of Jan Bowman, Victorian Department of Human Services, Figure 14 was developed to show the key Ministerial Councils, Standing Committees and working groups associated with health-related WQ management issues. This clearly shows how the NWQMS Contact Group can then be involved with these groups.

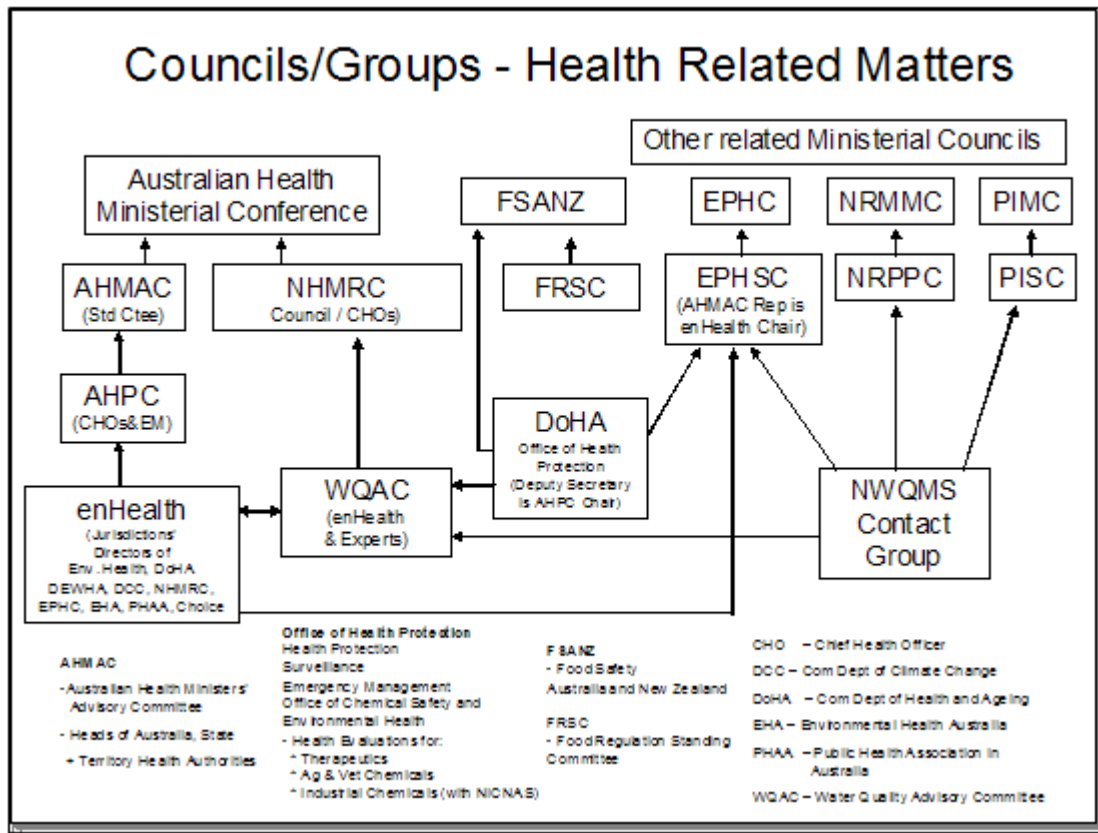


Figure 14 - Example of “map” of groups involved in health-related WQ matters

5.1.1.4 Water quality and other environmental values

These other environmental values are the remaining the social/cultural and economic EVs (primary and other industries, cultural and spiritual values). The WQ guidelines for primary industries are typically for physical-chemical indicators and most of these are consistent across Australia and contained in the national WQ guidelines (ANZECC/ARMCANZ 2000a). Some jurisdictions have developed specific local/state guidelines for some EVs e.g. aquaculture guideline values in the Queensland WQ Guidelines (QEPA 2006). There are no WQ guidelines for other industrial uses and these industries have a variety of WQ needs for their process waters. Typically, they will “pre-treat” input water to the quality they need.

While there has been significant consultation with traditional owners and indigenous people in developing WQ management plans, there are currently no detailed guidelines for these consultation processes nor any WQ guidelines for cultural and spiritual values.

Section 5.3.1 and 5.3.3 provide more discussion on these matters.

5.1.2 WQ Management legislation, policy instruments and regulations

5.1.2.1 WQ/NRM legislation

Appendix 12 details the “environmental health management” legislation, policy instruments and regulations for each jurisdiction and Appendix 15 includes the New Zealand context. The jurisdictions’ responses to the pro-forma for WQ management roles and responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting are in Appendix 13. These provide more detail about the relevant legislation, etc related to management of specific threats to WQ (i.e. the “causes” in Figure 7 above).

These instruments are discussed in detail in the following sections about specific water-related management actions. However, a specific issue for discussion is the need for legislation, such as the NZ *Resource Management Act*, to legislate the need for WQ/NRM Plans, their content, processes involved, funding details, etc. One issue that complicates this decision is the emergence of adaptive management and the flexibility needed to update processes, targets, management strategies, etc compared with the relative “rigidity” of legislation.

Action Needed:

- *Given the “infancy” of some jurisdictions with the NRM planning process, it may be worth reviewing the strengths, weaknesses, opportunities and threats of alternative forms of legislation to support NRM planning at an appropriate time in the future.*

5.1.2.2 Planning/Development Assessment

The “WQ planning” column in Appendix 13 shows the various jurisdictions’ response to WQ related planning. This includes planning for new developments with some jurisdictions having strong jurisdiction-wide planning responsibilities and some setting the broad planning and development assessment (DA) processes with local governments and other agencies delegated responsibilities for managing the planning and DA processes.

From a WQ management perspective, ideally a catchment based WQ management plan should inform regional/local government plans so that development can be firstly located suitably and then the DA process can condition acceptable development to ensure WQ objectives are met. This is an area where NWQMS in future might assist planners with case studies showing how this could be done. Based on the case studies, it may be appropriate to develop a protocol on how to do it.

Under legislation, most major developments have to undertake an environmental impact assessment (EIA) to demonstrate that their development is ecologically sustainable. It would be useful to get feedback from developers, their consultants, jurisdiction/LG planners and development assessment managers on their future NWQMS needs. For example, the tools for receiving water assessments discussed in section 5.2.1 would assist with EIAs.

Action Needed:

- *Develop case studies (and a protocol if considered necessary) to show how catchment WQ management plans can guide jurisdiction/LG planning and make them available on a central, publicly available NWQMS website;*
- *Consider developing user guides for undertaking environmental impact assessments and making these available on the NWQMS website.*
- *Survey other NWQMS users to ascertain their future NWQMS needs.*

5.1.2.3 Protection of High Value Aquatic Ecosystems

Another issue that the NWQMS addressed in part was the protection of high conservation value aquatic ecosystems [HCVAE] (by Guideline #4 introducing different levels of protection for different aquatic ecosystem conditions). Figure 15 shows this diagrammatically - with the general management intents for the three aquatic ecosystem conditions in Guideline #4 shown on the right hand side, as well as also some possible specific management intents for different current condition scenarios shown on the left hand side.

To put the HCVAE work in context, it is useful to consider WQ management needs under these three broad headings of “protection”, “sustainable use” and “repair”. For example, the work on high conservation value aquatic ecosystems [HCVAE] (discussed in section 5.4.1) and similar off-stream wetlands work with high value wetlands would fall under the “protection” component of WQ management strategies and activities. The work on planning, impact assessment, development assessment and licensing discharges to waterways would fall into the “sustainable use” component and, lastly, the NRM projects rehabilitating waterways (e.g. national NRM programs) would fall into the “repair/rehabilitate” component. At the catchment scale, a WQ management plan should incorporate and balance actions for all three components to protect its waterways’ environmental values.

The “protection and conservation” column in Appendix 13 includes jurisdictions’ responses to this “protection” agenda. These responses include whole of catchment legislative response (e.g. Queensland’s *Wild Rivers Act*), protection of components of waterways (e.g. riparian zones) with specific legislation (e.g. vegetation management acts) and a jurisdiction wide strategy (e.g. Victorian River Health Strategy). This work will be advanced by the current work being undertaken on the identification and management of HCVAEs (see section 5.4.1).

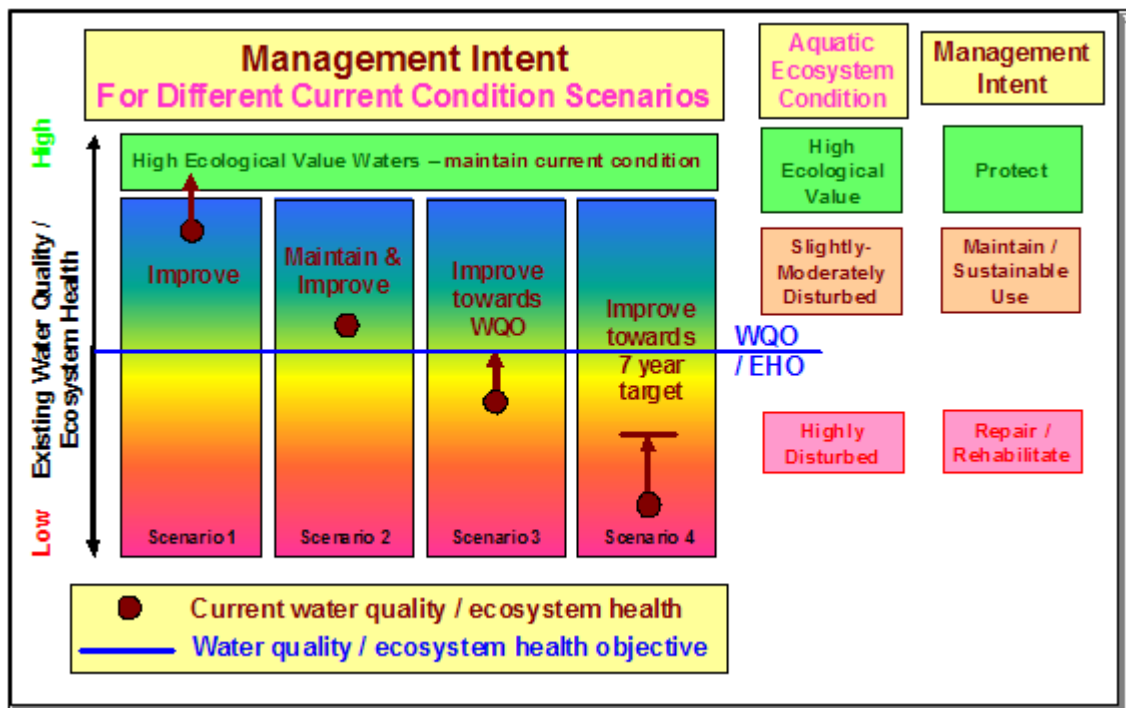


Figure 15 - Right hand side: NWQMS aquatic ecosystem conditions & management intent
Left hand side: Management intent for different current condition scenarios

5.1.3 WQ Management & Natural Resource Management (NRM) Plans

As discussed in section 5.1.2, the NWQMS Policies and Principles (Document #2) is based on local implementation, with:

- integrated (or total) catchment management plans setting the overall plan for protection, sustainable use and any repair/rehabilitation to protect the waterways' environmental values;
- ecologically sustainable development being achieved consistent with the catchment plan by complementary planning schemes setting the direction for sustainable development and DA/EIA process to shape this development and their environmental management plans to achieve it; and;
- all existing and future development achieving best management practices, including the use of acceptable modern technology and waste minimisation and utilisation.
- Section 5.1.2 also discusses the legislative basis for this planning, DA/EIA and identification and protection of HCVAEs.

The process for water quality management starts with the community working in concert with government to develop a management plan for each catchment, aquifer, estuary, coastal water or other waterbody. The plan should take account of all existing and proposed activities and developments; it should contain feasible management options that aim to achieve the environmental values that have been agreed for that waterbody. The process is outlined in NWQMS Document #3, *Implementation Guidelines* (ANZECC/ARMCANZ 1998) and schematically represented in Figure 1 from a national perspective and in Figure 2 from a specific catchment perspective.

WQ management plans at a catchment level are therefore a key implementation mechanism for the NWQMS. Across jurisdictions and in NZ, these integrated catchment plans have taken various directions (e.g. legislated requirement, voluntary) and the processes are at different levels of maturity. However, since the advent of NHT2, there are now regional NRM bodies covering all of Australia (and regional councils in NZ). In Australia, the regional NRM bodies vary from the long standing Catchment Management Authorities in Victoria (with a legislative basis) to the recently formed (in response to NHT) regional NRM bodies in other jurisdictions with and without a legislative basis.

Hence, all regional NRM bodies in Australia have been or are developing NRM plans for their regions which include WQ management components. As a minimum, these NRM plans are required to address the following water related matters for targets:

- Inland aquatic ecosystems integrity (rivers and other wetlands);
- Estuarine, coastal and marine habitats integrity;
- Nutrients in aquatic environments;
- Turbidity / suspended particulate matter in aquatic environments;
- Surface water salinity in freshwater aquatic environments;
- Significant native species and ecological communities;
- Ecologically significant invasive species.

Under the Australian Government's Coastal Catchments Initiative [CCI] (2002), some regions are also developing more detailed WQ Improvement Plans (WQIPs) focused on achieving sustainable pollutant loads to achieve WQ objectives for these downstream waters and hence protect coastal environmental values. Most regions are using the WQIP process to update (i.e. adaptively manage) the relevant WQ components of their NRM plans.

The matters for targets above reflect both the intent of protection of aquatic ecosystems and the achievement of key physical-chemical WQOs to protect all relevant EVs for particular waterways.

However, the advent of NHT “terminology” has caused some confusion with catchment stakeholders as it is different to the NWQMS terms (see Appendix 17 for a comparison of NWQMS and NHT/NAP terms). Section 5.2.4 has an action to develop a common value setting process for all water assets. This should assist with achieving consistent “terminology” for waterway management programs.

Action Needed:

- *Develop consistent “terminology” for NWQMS and other national WQ/NRM programs/initiatives (e.g. Caring for our Country, NHT, CCI) so as not to confuse stakeholders.*

Urbis (2008) Finding

Articulating how the NWQMS fits with other policies and legislation that inform NRM requirements.

Appendix 14 shows the jurisdictions’ responses with their specific processes, current state and future developments for WQ management plans and related components such as setting EVs, WQOs, environmental flow objectives and establishing high ecological value areas, together with development of WQ guidelines. As indicated above, the regional NRM plans and WQIPs are the key mechanism now for developing WQ management plans. The specific components of the WQ management plans are discussed in more detail in sections 5.2 and 5.3.

The review of selected NRM Plans/WQIPs (Appendix 16) shows firstly an improvement over time with the detail and hence likely effectiveness of these plans. It also shows the different stage of maturity of the various regions with WQ management, with the more mature regions providing the greater level of detail in their plans.

Nevertheless, as indicated above, the NWQMS WQ management framework (Figure 2) is basically an environmental management system/adaptive management framework and hence has been shown to be applicable to a diverse range of local situations addressed by these WQ management plans around Australia. This diversity relates to the diversity in both the nature of local catchments (climatically and water types) and their environmental values. Figure 3 showed the diversity of water types addressed by the NWQMS and Figure 10 (and Appendix 10) shows the breadth of waterway values and uses.

In summary, the review of selected NRM Plans/WQIPs (Appendix 16), and the feedback on catchment-based WQ management plans from jurisdictions (Appendices 13 & 14), shows that a lot of progress has been made in developing and implementing these plans around Australia. In particular, there are a number of components of these plans where it would be highly advantageous to consolidate and share learnings from these experiences, namely:

- Methods of community/stakeholder engagement;
- Use of conceptual models (e.g. Figures 8, 11 & 12) to develop and share understandings of natural catchment/waterway processes and impacts of catchment activities on these;
- Process for establishing environmental values;
- Developing local WQ guidelines and establishing WQ objectives;
- Effective management strategies e.g. water sensitive urban design, management of acid sulfate soils, nutrient trading, offsets, etc.;
- Methods of developing and assessing environmental impacts of alternative management scenarios (including catchment and receiving water models used to understand and predict these impacts);
- Associated methods of assessing social and economic impacts of these scenarios;
- Methods of deciding which scenarios are to be implemented;

- Design and implementation of monitoring programs to assess effectiveness of management strategies;
- Associated evaluation and reporting processes and methods used to adaptively manage the plans and investment strategies.

Action Needed:

- *A process to consolidate and share these experiences with the process and content of catchment WQ planning. Initially, a workshop to review the CCI's WQIPs would provide a consolidation of learnings from "coastal" WQ plans. To complement this for riverine WQ plans, a review of the Victorian WQ plans in association with the value setting and threat assessment actions in section 5.4.2.1 would provide case studies (and protocols if considered necessary) for these water types. Then consolidate and share these lessons on the NWQMS website.*
- *Further actions to progress key components of WQ management plans are detailed under the "Supporting Actions" in section 5.3 below.*
- *Once consolidated, update the "Policies and Processes for WQ Management" NWQMS documents to reflect the consolidated outcomes.*

5.2 Specific WQ-related Management Actions

5.2.1 Point Sources

Each jurisdiction has implemented very similar approaches to managing point sources of pollution using legislation, with supporting regulations and policies. This is based on listing activities that need to be regulated and requiring approval and ongoing management of these activities to meet approval conditions. Activities typically have to be firstly designed to achieve clean production, waste minimisation, water recycling/reuse and treatment before discharge. Then approval conditions require monitoring (and reporting to appropriate authorities) of discharge loads and receiving water impacts, as well as undergoing periodic compliance audits.

The NWQMS guidelines for managing sewage treatment and disposal have provided a good foundation for this work. Also, the NWQMS guidelines for industrial point sources have been either formally adopted by jurisdictions and/or used as supporting technical documents. The usefulness of these guidelines needs to be checked with "users" before making any decisions on the future of these documents.

Wastewater utilities, local governments, the specific industries and their consultants are key NWQMS users who should be consulted to establish their future needs. This should include their views on water recycling, trade wastes, biosolids and effluent management.

A number of jurisdictions have developed methods for assessing impacts of proposed discharges on the receiving water quality so that decisions can be made on whether its WQ objectives will be met. Development assessment managers and consultants doing impact assessment studies would benefit from tools to assist with these receiving water assessments. Such assessments would also benefit from having a catchment-based WQ management plan to provide the context for such assessments, as well as from the tools that support the catchment plans (see section 5.3).

Action Needed:

- See “Other Users” (section 6.1) for need to survey local governments, industries, utilities, their consultants, etc..
- Consider the need to update these guidelines (such as trade waste, overflows, effluent management) after the survey results from relevant “users” are evaluated.
- Consider collating, and further development if necessary, of user guides for undertaking receiving water assessments for discharges to waterways/water resources and making these available on the NWQMS website.

5.2.2 Urban Diffuse Sources

Over the period since the NWQMS was developed, all jurisdictions have recognised the need for better management of diffuse sources of pollution (both urban and rural) to achieve protection of water environmental values.

Urban stormwater management, in the context of total water cycle management, has been an area for significant activity in recent years. Jurisdictions have developed specific urban stormwater management policies (including requirements for urban planning and development assessment), requiring local governments, etc. to develop urban stormwater management plans, as well as providing supporting best practice guidelines for both water sensitive urban design, construction and ongoing operation and maintenance. Modelling tools (e.g. Model for Urban Stormwater Improvement Conceptualisation [MUSIC]) are being used for design and development assessment purposes. However, these focus on design for the post-construction period. Issues still remain with erosion and sediment control design and management during the construction phase of urban development (including ensuring compliance with approval conditions).

The NWC currently has a Joint Steering Committee for Water Sensitive Cities and associated working groups. The water sensitive urban design (WSUD) working group is progressing three NWI projects related to urban stormwater management (“icon” projects, incentives and guidelines for evaluating WSUD options). They are logically the groups that should be responsible for progressing national matters on urban stormwater management.

Action Needed:

- NWQMS Contact Group to consider formally engaging the NWC WSUD working group as the NWQMS urban stormwater management working group (see also section 6.3 re linking NWQMS related activities);
- Negotiate any necessary update/additions/replacements needed to NWQMS Guideline #10 with the outcomes from this working group.

5.2.3 Rural Diffuse Sources

In catchments with large rural areas, these sources are major contributors of pollution to surface and ground waters. Management of these sources is typically related to best land use allocation and best management practices (BMPs) for the land uses. These BMPs are typically incorporated into and partially funded by regional NRM processes and programs. The NHT program has formalised NRM regions around Australia, together with the development of NRM plans and associated investment strategies. These are presumably being continued in some form under the Caring for our Country program.

In summary, the common process for all these NRM plans is the identification and valuing of NRM assets, assessing their condition and threats to them, setting targets for resource condition and management actions, prioritising and implementing management actions

(based on resources available), then monitoring and evaluating the actions and response in resource condition and finally, based on the learnings, adapting the management actions. Rural industries, with support from national and other research and development corporations, have been active in developing best practice guidelines for their industries. These have been adapted to local situations and incorporated into regional NRM plans (see examples in Appendix 16). As well, jurisdictions usually have general environmental duty requirements in their environmental protection legislation which requires adherence to the minimum of these best practices and/or codes of practices based on them. Compliance with these practices/codes meets landholders' due diligence requirements to protect against prosecution. These minimum requirements, being covered by legislation, are then supported with incentive funding focusing on achieving the best practices that most cost-effectively achieve pollution reduction (i.e. least cost abatement).

Action Needed:

- *Future NWQMS directions with rural diffuse sources need to be closely linked to regional NRM planning and associated national and jurisdictional incentive programs;*
- *At the appropriate stage, consider the need for revision/additions to Guideline #9.*

5.2.4 Other Sources of Impacts on WQ/Ecosystem Health

5.2.4.1 Environmental Flow Requirements

As Figures 9 & 11 show graphically, flow is a key component in both maintaining WQ and protecting aquatic ecosystem health. The key pressures ("causes" in Figure 9) on WQ and aquatic ecosystem health are from both changes to flow regimes and impacts from point source discharges and polluted runoff for urban and rural areas. These pressures impact synergistically on WQ and ecosystem health.

Hence water quality and water quantity management needs to be linked. This relates to both setting WQ objectives/environmental flow requirements and better integrated management of all the pressures ("causes"). The NWQMS documents do not currently address this matter in any detail but setting environmental flow requirements² is a major component of the NWI and the work of water resource management agencies around Australia. Therefore, strong links need to be established and maintained between the NWQMS and this NWI work. In particular, improvements in methods for setting environmental flow requirements should be made available on the NWQMS website.

Victoria is addressing this integration of water quantity and WQ management at the riverine sub-catchment scale with its identification of waterway values and a risk assessment of all threats to these values (both flow change threats and WQ-related threats).

A common values setting process for waterways to underpin both water quantity and WQ management for particular waterways would provide a strong foundation for integrating this management. Figure 16 shows Victorian DSE's RiVERS(II) [River Value and Environmental Risk System]³ draft conceptual framework for this value setting process. It also shows how the process could be expanded for other water types ("secondary assets classes"). It is consistent with the NWQMS's EVs and is commended as a basis for further development.

² National Principles for the Provision of Water for Ecosystems exist but jurisdictions have developed more detailed methods of establishing these environmental flow requirements.

³ RiVERS is an acronym for River Value and Environmental Risk System. RiVERS(II) is the second generation of this database that updates RiVERS, and will add wetland and estuary ecosystems.

Further, the complementary threat assessment approach (to the established waterway values) [example at Figure 17] warrants support for further development in parallel with establishing the common value setting process.

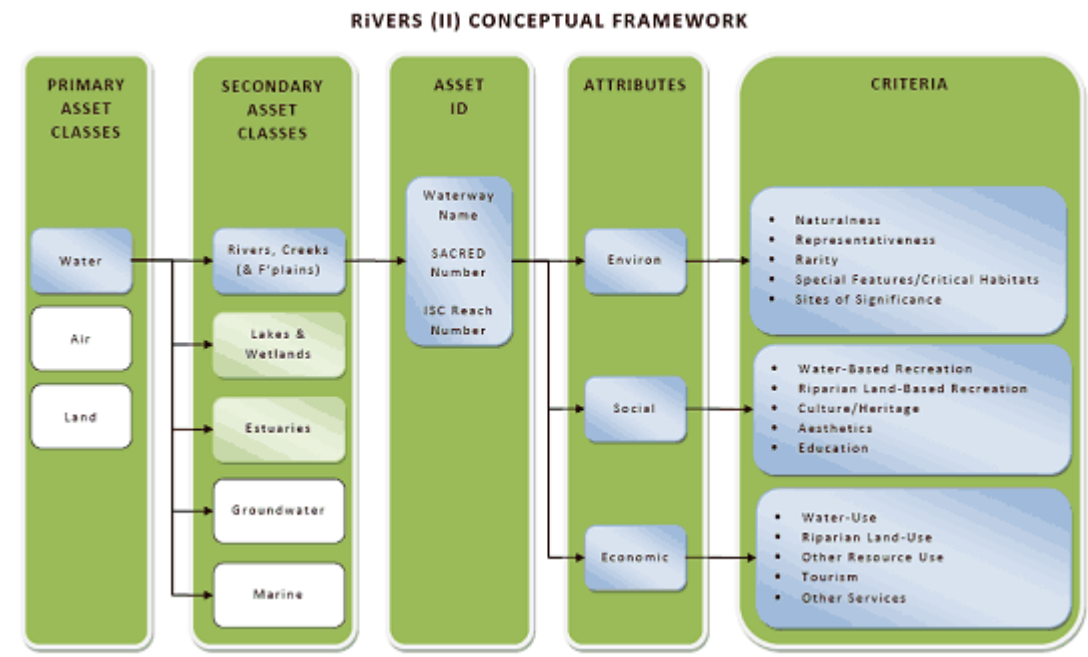


Figure 16 - Victorian DSE's RiVERS (II) draft Conceptual Framework

River Health Risk Assessment - Goulburn Broken

Table 6.2. Risk ratings for each threat in High Priority Reaches in the Goulburn Basin

		Goulburn River: Goulburn Weir to Murray River	Goulburn River: Eldon Res. to Goulburn Weir	Seven Creeks	Seven Creeks	Goulburn Creek	Hughes Creek	King Parrot Creek	Van Buren	Anderson River	Tungah River	Robson River	Goulburn River: Res. of Eldon Res.	Goulburn River: lower 60's of Eldon Res. upper	Big River lower	Big River upper	Hawqua River lower	Hawqua River upper	Doddie River	Doddie River
	Reach Number	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Physical Threats:	Bank erosion	H	VH					M2												M2
	Bed instability		VH	M2																H
	Channel modification	H	M2	M2																H
	Loss instream habitat	H	VH	M2																VH
Flow Threats:	Stock access	VH	VH	VH	VH	M2	VH	VH	VH	H										VH
	Flow deviation	VH	VH					M2				VH								
Water Quality Threats:	Wetland connectivity	VH																		
	Water quality	VH		VH	VH															
	Water quality SIGNAL	VH	VH	VH				VH												M2
	Water quality trend	H	H		H									H			H			H
Biological Threats:	Temperature	VH																		
	Algal blooms	VH																		
	Introduced flora	M2	VH	M2			M2	M2					M2	VH						H
	Introduced fauna	M2		M2	M2					M2										
	Fish barriers	VH	M2	M2			VH	H	H		H									VH
	Degraded riparian veg	VH	M2	M2										H						H

** - Reach 1 only

Key: VH - Very High; H - High; M1 - Medium 1; M2 - Medium 2 (see Table 6.1 for explanation).

Figure 17 - Goulburn Broken River Health Risk Assessment
(Source: Jane Doolan, Victorian DSE)

Action Needed:

- *Establish a short term working group of relevant practitioners from jurisdictions to review the Victorian and other related work in developing both a common value setting process for waterways and an associated threat assessment process. The group should therefore develop a preferred strategy to better link WQ and water quantity management. The value setting process should firstly include consideration of how the ecological values of rivers can best be quantified to support establishment of meaningful ecosystem health objectives/targets that can guide management actions. The threat assessment process should support development of complementary management actions for WQ and water quantity. The outcomes should also underpin the monitoring of the success or otherwise of these management actions;*
- *Based on the findings of the above “pilot” with rivers, then explore using similar processes for other water types;*
- *Incorporate findings into relevant WQ and quantity management processes in jurisdictions;*
- *Make the information available publicly on relevant websites.*

5.2.4.2 Riparian and In-stream Activities

Clearing and disturbance of riparian zones and in-stream activities (e.g. extractive industries, harvesting of biota) can have significant impacts on aquatic ecosystem health. The NWQMS’s management-related guidelines focused on point and diffuse sources. With the recognition of the value of riparian vegetation and the physical form/habitats to ecosystem health (see Figure 11), some jurisdictions are setting targets for these ecosystem components (e.g. MDB Sustainable Rivers Audit). There has also been significant research since the advent of the NWQMS on appropriate management actions related to these ecosystem components (e.g. LWA’s riparian programs). The national River Health Contact Group is developing protocols for indicators of these and other ecosystem components.

Action Needed:

- *Establish a short term working group with representatives of relevant practitioners and researchers from jurisdictions to review the related work on management actions and develop a compilation of related information sources and, if possible, a preferred management strategy and/or guideline on such management;*
- *Make the information available on a central, publicly available NWQMS website.*

5.3 Supporting Actions

Urbis (2008) Finding

- Preparing a few simple case studies that describe how the NWQMS has been implemented
- Offering and promoting access to independent scientists and water quality management experts

5.3.1 Community/stakeholder consultation/participation

Regional NRM plans are developed and implemented in consultation with the affected community and implemented by key stakeholders in the catchment. Various methods have been used to engage these catchment communities and this includes the process of working with the community to establish the environmental values of the catchment waterways.

In Australia and NZ, there has been significant consultation with traditional owners / indigenous people in developing WQ management plans. These experiences could be used to develop guidelines for these consultation processes. This would include details on how to identify the relevant stakeholders, how to establish cultural and spiritual values, how to set WQ guidelines for these values and the associated management actions to protect the values.

Action Needed:

- *Collate information / case studies (and a protocol if considered necessary) on these methods of community engagement, including the process of establishing environmental values. This needs to be linked with actions in section 5.2.4.1.*
- *Collate information / case studies (and a protocol if considered necessary) on the methods of consultation with traditional owners/indigenous people, including the process of establishing cultural and spiritual values.*
- *Make the information available on a central, publicly available NWQMS website.*

Urbis (2008) Finding

- Producing a community supplement to the NWQMS and an accompanying 'how to' guide;
- Creating a community engagement supplement.

5.3.2 Scientific Information and Understanding

Figures 8 & 9 “expand” on the “current understanding” box in Figure 2. Conceptual models (such as Figures 8, 11 & 12) have been successfully used in implementing the NWQMS at the catchment level. They assist with combining current information and understanding to:

- show how healthy ecosystems function;
- show how they respond to human disturbance;
- establish key ecological assets to be protected/rehabilitated and the desired ecological outcomes;
- highlight appropriate management actions for protection and rehabilitation; and
- indicate critical components in the ecosystem to set targets for and then monitor to check the effectiveness of management actions.

These models typically show firstly the conceptual understanding of natural waterway processes and then the impacts of human activities on these processes. Chapter 2 of the national Monitoring & Reporting guidelines [Guideline #7] includes a section on conceptual models. However, experience has shown their broader usefulness as shown above, especially in determining the indicators to set targets for and then designing the monitoring programs to check effectiveness of management actions. They are a very useful support tool in community consultation as they assist in visually explaining complex issues. For all these reasons, the use of conceptual models needs to be encouraged and all WQ managers would benefit from sharing others' experiences with their use.

Action Needed:

- *Collate information / websites / case studies on these conceptual models and supporting libraries and training courses in their use.*
- *Make the information available on a central, publicly available NWQMS website.*

5.3.3 WQ Guidelines

The national WQ guidelines [Guideline #4] (ANZECC/ARMCANZ 2000a) have provided a well used reference document for numerous NWQMS users. The feedback from Australian jurisdictions on future directions for this guideline is included in the table in Appendix 11. As well as this feedback, two detailed submissions were received from New Zealand and the Australasian Society of Ecotoxicology in relation to future updates to Guideline #4 (see Appendices 11-1 and 11-2 respectively). These matters raised include:

- the need for an organisation to take ownership of the document (organise revisions, set priorities, arrange necessary resources, ensure involvement of relevant people, manage web-based interface with users, etc.);
- the need for the document to be made more user-friendly and provide guidance to new users on their use;
- there is no need for a wholesale review but there is a need to update the document and its trigger values with more recent scientific studies (e.g. better information on trigger values; links between WQ and ecosystem health/integrity e.g. thresholds of concern, limits of acceptable change; biological monitoring, etc.), processes (e.g. toxicity testing, life cycle assessments), information on new chemicals, better derivation processes, minimum data requirements, regional/water type specific guidelines, etc.;
- to assist development of local guidelines, there needs to be a web-based link to relevant WQ databases (e.g. monitoring of reference sites);
- having a process for setting priority research needs (e.g. thresholds of concern for critical management issues) and for these priorities to influence the allocation of national and jurisdictional research funds (e.g. ARC research grants).

Action Needed:

- *Survey "users" needs (including new users) and develop required user-friendly interface(s) with the guideline for CD/web-based use;*
- *Establish a short term working group of relevant scientific practitioners from jurisdictions and key researchers to review the feedback in Appendix 11, recent scientific studies and processes and develop a preferred strategy to update the guidelines now and in the future. This process should be tightly managed by a working group from relevant management agencies (e.g. the NWQMS contact group) to ensure the revision process is staged and the scientific working group addresses priority issues and progressively meets the deliverables required by WQ managers.*

5.3.4 Decision Support Tools

In developing management strategies for WQ Management Plans, catchment and receiving water quality models have been developed and used extensively since the advent of the NWQMS to understand and assess WQ impacts of alternative point and diffuse management actions. The processes simulated in these models are based on the conceptual models described above. Practitioners need to be able to get information on these models, case studies where the models have been applied to catchments around Australia and NZ, and contacts for these studies, so that they can discuss these studies with the modellers and managers involved.

Similarly, social and economic assessments have also been undertaken at the catchment / regional level to complement the above WQ impact assessments. Then, decision support tools such as multiple criteria analyses and multiple objective decision support systems have been used to assist in combining these “triple bottom line” assessments and make decisions on which management strategies to implement, monitor and review. Practitioners also need access to these socio-economic assessments and decision making support tools.

Action Needed:

- *Collate information and case studies on these models, socio-economic assessments and decision support tools;*
- *Make the information available on a central, publicly available NWQMS website.*

5.3.5 Role of economic measures

Guideline #2 emphasised the importance of economic measures, including ‘user-pays’ and ‘polluter-pays’ approaches. Jurisdictions have adopted such principles in their legislation, policies and regulations. These relate mainly to management of point sources. With the maturing of national NRM programs, there is increasing research into and use of market based mechanisms to achieve least cost pollution abatement.

Opportunities to consolidate the lessons from use of these economic measures should be included in the evaluations of these programs. Such a review was undertaken as a joint Australian, State and Territory Government initiative under the NAP. It resulted in the *Designer Carrots Program* (‘market based instruments for NRM change’). It was developed to support the growing area of market-based instruments (MBIs) for natural resource management in the Australian, State and Territory governments.

<http://marketbasedinstruments.gov.au/Home/tabid/36/Default.aspx>

Action Needed:

- *Continue to collate feedback from WQ case studies using these economic measures;*
- *Link the information available to the NWQMS website;*
- *Contact Group to scope the need for a new NWQMS Economic Measures Guideline to provide a central, readily available resource that has been endorsed by state and territory NRM ministers.*

5.3.6 Monitoring, Evaluation and Reporting

NWQMS Guideline #7 (ANZECC/ARMCANZ 2000b) provides a good reference for monitoring and reporting activities. It has been used by jurisdictions to support their monitoring activities and development of further products for related activities e.g. community monitoring activities such as Waterwatch, water quality sampling methods to support compliance activities under legislation. One of its key strengths is in focusing the user to clearly define the objectives for any monitoring program and design the monitoring to achieve these objectives. Examples of such objectives are:

- Detecting change in waterway health e.g. Murray-Darling Basin Sustainable Rivers Audit;
- Assessing change in waterway condition due to specific management interventions.

However, the Guideline has been found to be complex to use for new users and needs supporting simpler documents to introduce the new user to specific topics before getting into the details of the topic. Consideration of updating the guideline to include simpler documents, case studies and latest knowledge should be progressed as a component of the Working Group's tasks for updating Guideline #4. WQ managers are now realising the benefits of combining the use of modelling and monitoring for WQ assessments. It would be timely to incorporate a discussion on the role of modelling and the links between monitoring and modelling in any revision of Guideline #7.

Action Needed:

- *Develop supporting simpler documents for Guideline #7 to introduce the user to specific topics and lead them into the details of the topic;*
- *Develop case studies in the use of the Guideline and make them and the simpler documents available on a central, publicly available NWQMS website;*
- *Consideration of updating the guideline - to include simpler documents, case studies, modelling and the links between monitoring and modelling and latest knowledge - should be progressed as a component of the Working Group's tasks for updating Guideline #4.*

Related Activities

Monitoring and evaluation of NRM plan "matters for targets" have received a lot of attention with the M&E Framework under the NHT program. Complementary work under the National Land and Water Resources Audit was being coordinated with these NHT M&E activities. For the water matters for targets, working groups have been established for rivers (River Health Contact Group), off-stream wetlands (Wetlands and Waterbirds Taskforce) and estuaries (NLWRA group) and coastal waters (ICAG).

These groups are developing conceptual models, relevant indicators and protocols for monitoring and assessment. This work also needs to be linked to the National Water Commission's work on a framework for assessments of river and wetland health (FARWH).

Urbis (2008) Finding

- Addressing ways in which data collection and management can be improved

5.4 Emerging NWQMS-related Activities

5.4.1 High Conservation Value Aquatic Ecosystems

The Aquatic Ecosystem Task Group (AETG) is a current national working group addressing a number of NWQMS-related activities. These relate to NWI's requirement to identify and acknowledge surface and groundwater systems of high conservation value and manage these systems to protect and enhance those values.

The AETG activities include the development of a draft national framework and pilot studies for the identification, classification and management of high conservation value aquatic ecosystems. The framework must complement and fulfil the requirements of existing and future jurisdictional initiatives including wise and multiple use concepts, for agreement by the Natural Resources Management Ministerial Council.

As introduced in section 5.1.2.3, Appendix 13 includes jurisdictions' response to "protection & conservation" activities to complement this national initiative. The current NWQMS processes include a higher level of protection to waterways with high ecological values and the outcomes of the AETG work need to be incorporated into updates of the principles, policies and processes in the NWQMS documents.

Action Needed:

- *When completed, incorporate the outcomes of the AETG HCVAE work into updates of the principles, policies and processes in the NWQMS documents.*

5.4.2 Off-stream wetlands

The AETG has two technical working groups reporting to it: the Wetlands and Waterbirds Task Force (focusing on off-stream wetlands) and the River Health Contact Group (focusing on river health). While the management of off-stream and in-stream wetlands have slightly different focus, there is a need to maintain a common management framework because of the connections between the two.

A number of programs around Australia are assisting with these connections, including the work of eWater, the Queensland Wetlands Program and the Victorian Department of Sustainability and Environment. Section 5.2.4.1 discussed, and Figure 16 shows conceptually, how the value setting process for all wetlands/waterways can be consistent and fit within the NWQMS WQ Management framework. Opportunities to use this common value setting process should be progressed.

To date, the national wetlands work has mostly focused on identifying and protecting high value wetlands. Some of the NWQMS guidelines can assist with management of off-stream wetlands, however, more work is needed. The opportunity exists to better integrate the NWQMS with the national wetlands programs, especially because of the importance of the connectivity between in-stream and off-stream wetlands. The NWQMS website can be used to list the various related programs (see also section 6.3.4).

Action Needed:

- *Using the work of existing programs, progress opportunities to get better connections between the NWQMS and the programs focusing on off-stream wetlands.*

5.4.3 Climate Change Activities

The Australian Government and jurisdictions are currently ramping up planning and management actions to address climate change. This is forcing governments to look for new approaches to water quantity and WQ management in response to climate change. The NWQMS provides a strong foundation on which to base adaptation to climate change for WQ issues. The challenge will be to link the work of the new climate change programs to the NWQMS to ensure it maintains currency and adds value to these programs. This will be an evolutionary process and mechanisms need to be established to assist with this integration and any additional components needed for the NWQMS. A logical first step will be to use the climate change risk assessments being developed by jurisdictions to assess the need for any changes and/or additions to NWQMS documents.

Action Needed:

- *NWQMS Contact Group to use the work of existing programs and working groups to examine climate change risk assessments and progress opportunities to get better connections between the NWQMS and the climate change programs*
- *Where necessary, develop additional and/or update existing NWQMS documents.*

5.4.4 Total water cycle management

In response to emerging drivers, such as limiting water sources and growing community support for environmental protection, leaders in the water industry (water utilities, developers, governments) are increasingly moving towards total water cycle management at the local / catchment / regional scale. The base graphic in Figure 18 (Shiroma Maheepala, CSIRO, pers.comm.) shows key components of future water cycles at the catchment scale. Opportunities also exist at the local scale for grey water reuse and decentralised sewage treatment and local reuse. Examples of the latter developments are already appearing in Australia (e.g. Rouse Hill, Sydney). These matters will influence the future NWQMS directions discussed in section 5.5.

Action Needed:

- *Addition of tools, documents, and links to other relevant resources on the NWQMS website, specifically tailored to meet the needs of those involved with total water cycle management at all levels.*

5.4.5 Acid sulfate soils

Since the emergence of knowledge and management of acid sulfate soils in coastal areas in the late nineties, most jurisdictions have developed processes to map and manage these areas. Some jurisdictions have developed planning policies to guide local governments in formulating their planning schemes and development assessment processes. Scientific studies have assisted with practical management practices to assist developers in firstly avoiding potential problems and then to include in their environmental management plans in areas where the soils are exposed.

While initially, water quality problems associated with coastal acid sulfate soils were seen as a NSW and Qld problem, since the January 2000 release of the [National Strategy for the Management of Coastal Acid Sulfate Soils](#), other states and the Northern Territory have begun dialogue on the problems faced by coastal acid sulfate soils at a national level.

With the recent drought conditions around Australia, extreme river and groundwater levels have also exposed acid sulfate soils in more inland areas. Historically, there have also been problems with acid mine drainage. There will be opportunities for transfer of scientific and management knowledge between practitioners in these areas.

5.4.6 Mining and improved groundwater management

With the mineral resources boom and associated mining development in remote areas of Australia, the mining industry is undertaking a lot of scientific studies to show that its allocation and use of regional groundwater resources is sustainable and not impacting on groundwater values. This includes environmental impacts on groundwater dependent ecosystems and stygofauna.

The opportunity exists to collate this knowledge and improve our understanding of these systems. The CRC Mining and other relevant research institutions could assist in these endeavours. A potential problem exists with some of the information being the intellectual property of mining companies. Future NWQMS implementation activities should have processes to explore such opportunities.

5.5 Future NWQMS directions

5.5.1 Background

Water management in Australia has evolved in response to key management needs. This started with providing water supplies to meet major urban and rural needs, then sewerage cities for public health reasons, drainage for flood mitigation, then managing point and diffuse sources of pollution to protect environmental values (hence the advent of the NWQMS) and, in recent times, a move towards total water cycle management to address limiting water sources together with environmental protection.

The move towards total water cycle management and adaptations to climate change are going to be key drivers for the next decade of WQ management and hence future directions for the NWQMS. These changes will also lead to institutional changes and hence new NWQMS users entering the WQ management field. The NWQMS and its guidelines must remain current to the issues involved and to NWQMS users.

Figure 18 and Figure 19 (Shiroma Maheepala, CSIRO, pers.comm.) show graphically a typical catchment water cycle with future possible changes in climate, water sources, use and recycling, together with the current associated NWQMS guidelines and users respectively.

These graphics can assist with scoping future NWQMS directions. For example the current development of the following guidelines reflects the evolving move towards water recycling, use of alternative water supplies and aquifer recharge:

- *Australian Guidelines For Water Recycling - Managing Health And Environmental Risks - Phase 1*
- *Australian Guidelines For Water Recycling - Phase 2*
 - Augmentation of Drinking Water Supplies – at penultimate draft stage for endorsement and publication.
 - Managed Aquifer Recharge – draft released for public consultation.
 - Stormwater Re-use – draft released for public consultation.

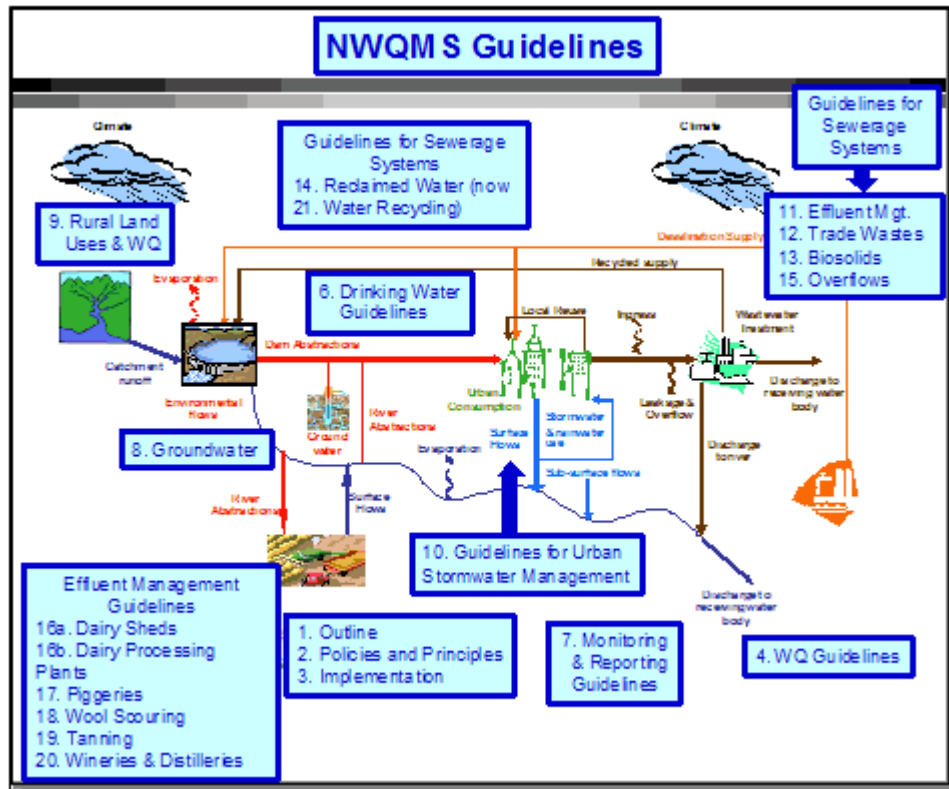


Figure 18 - Catchment Water Cycle & NWQMS Guidelines
(Source of base graphic: Shiroma Maheepala, CSIRO)

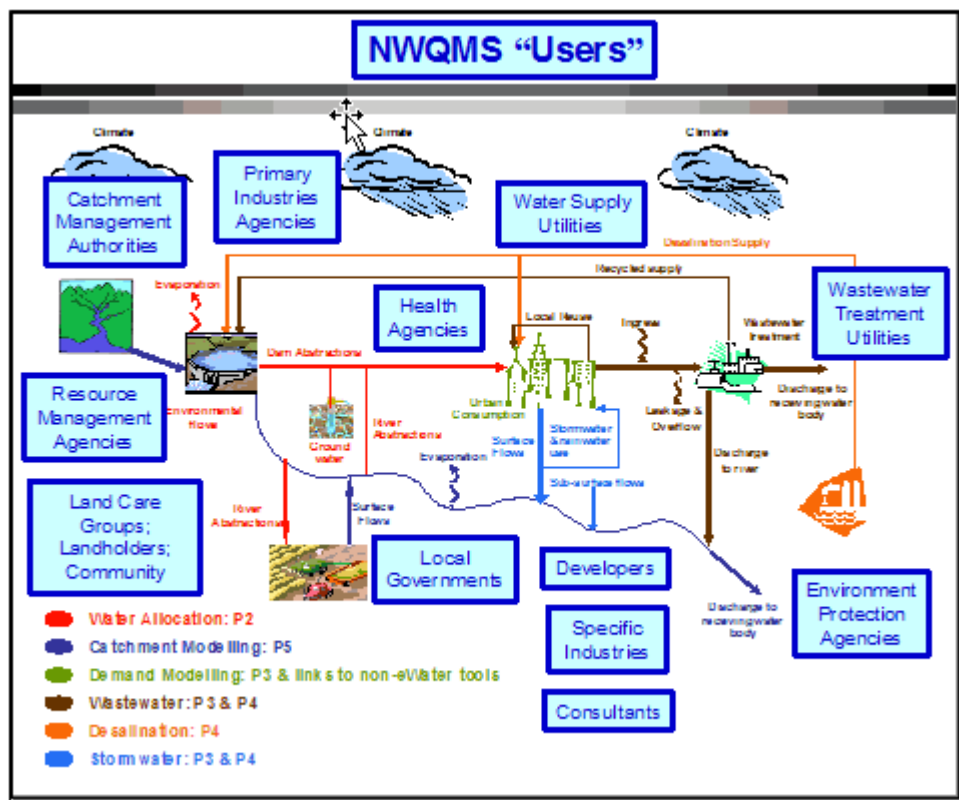


Figure 19 - Catchment Water Cycle & NWQMS "Users"
(Base graphic includes Shiroma Maheepala et al's projects P2-P5)

5.5.2 Reviewing contextual matters

Section 2.2 outlined the context for both reviewing NWQMS implementation to date and making recommendations for future NWQMS directions, including the need to address certain matters. As background to the recommendations in section 6, these matters are repeated below with summary comments on future directions (and the links to the relevant sections where they are discussed and relevant actions recommended in section 6):

- understand the target audience (“users”) and their needs:
 - this review has addressed jurisdictional level needs and it needs to be complemented with a survey of other users to determine their needs (see section 6.1);
- understand the changes in these “users” and their surrounding environment:
 - to assist with providing information and training to new and existing NWQMS users, a well managed NWQMS website is essential to deliver relevant information and training materials (see section 6.3.2). A number of the “actions needed” reported in the above sections will provide the content of such a website. These relate to both developing case studies, etc. based on successes in NWQMS implementation and making the existing NWQMS documents more user friendly (see section 6.3.3);
- consider the range of water types and the connectivity between them:
 - some water types have had more science and management focus than others with rivers, estuaries and coastal waters probably receiving more attention than groundwater and off-stream wetlands. The issue of connectivity between water types (both understanding the interactions and then synthesising management in particular catchments) is still a challenging issue. Future directions need to better address all water types and the connections between them (see section 6.3.4);
- understand the complementary national initiatives related to WQ management:
 - it will be important for the NWQMS’s role to be clearly defined, be adaptable and establish clear links with related water initiatives e.g. water quantity initiatives, coastal management approaches (see section 6.3.4). The NWQMS will need strong leadership to drive the necessary tasks and adapt as necessary (see section 6.3.1);
- understand the future threats to Australia’s waterways:
 - climate change risk assessments will form the basis of this but there are other potential threats to Australian waterways to be assessed (see section 6.2). The NWQMS will need to be flexible in its operation to address any emerging issues (sections 6.3.1 & 6.3.4);
- have an agreed vision for where the NWQMS fits into this environment:
 - part of the strong leadership and defining the role of the NWQMS will include establishing a vision for the NWQMS and possibly changing its name to better reflect the extent of its role (see section 6.3.1).
- be adaptive in both WQ management actions and the supporting processes (including the nature and content of the NWQMS):
 - for NWQMS to be successful into the future, the leaders (DEWHA and the Contact Group) will need to develop an implementation plan towards achieving the vision, which includes an auditing and review process to check progress and make any necessary changes to the plan [i.e. adaptive management] (see sections 6.3.1 & 6.3.4).

6. Recommendations of this NWQMS Evaluation

This rapid evaluation has identified actions needed for DEWHA and the NWQMS contact group to assess, prioritise and, where agreed, action future directions of the NWQMS. It has some limitations which could be addressed by the survey of other NWQMS users (see section 6.1). The real strength of the NWQMS has been that it is **strategic** (i.e. proactive and not reactive) and lays the foundation policy, principles, processes and guidelines for all supporting programs and activities (such as Caring for our Country, NHT and CCI programs). While this strength has applied to in-stream waterways, the review found that management of off-stream wetlands and groundwater was less strategic and more fragmented.

In order for the NWQMS to remain strategic into the future, at an opportune time, it should be guided by a risk assessment of the likelihood and consequences of current and future threats to the WQ / ecosystem health of Australian waterways over the next decade (see section 6.2). However, this report provides a strong basis for planning future NWQMS directions by providing a list of possible actions (section 6.3) to be assessed and developed further, prioritised and implemented as appropriate by DEWHA and the NWQMS contact group.

Figure 20 shows graphically the strategic planning directions for the NWQMS which is discussed below.

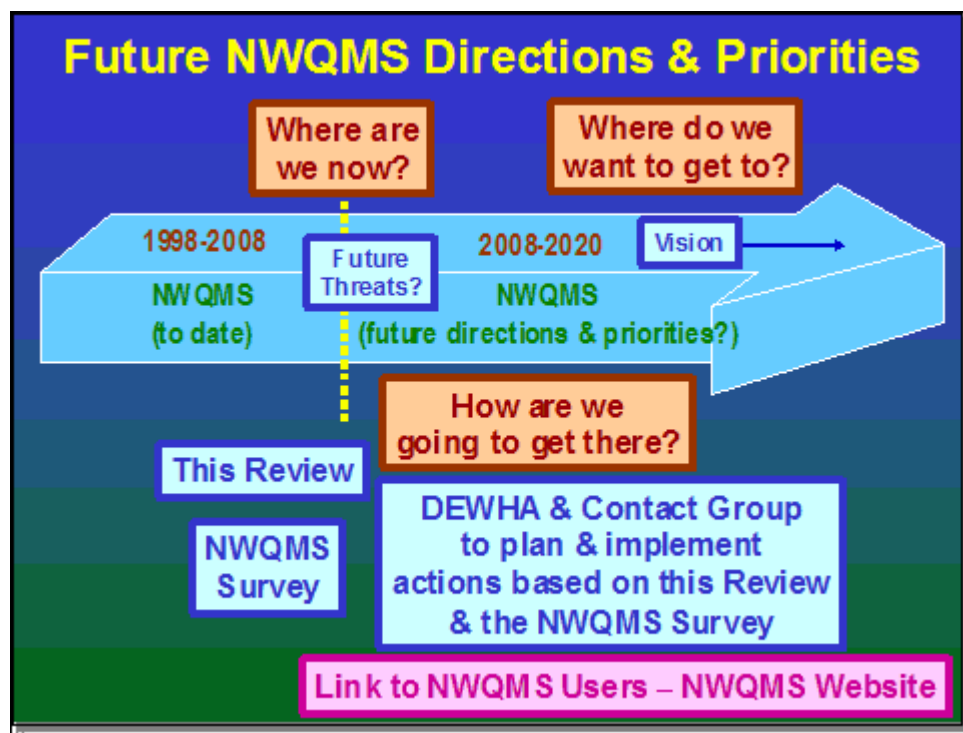


Figure 20 - Planning future NWQMS directions and priorities

6.1 Other NWQMS Users

As shown in Table 1, this rapid review has focused on feedback on the NWQMS at the jurisdictional level. The actions discussed in section 5 also relate to the needs of other NWQMS "users" such as local governments, the water and wastewater utilities, developers, their consultants and planners and development assessment managers. These people look to the NWQMS for guidance on process and technical details and they need easy access to this information. Materials like the case study information and tools like the NWQMS website discussed in section 5 will be of great assistance to these users. Before developing the products recommended in section 5, this review should be supported by this additional

information on future needs from the other “users” of the NWQMS. A survey of their needs would also provide an opportunity to not only refine the products needed but also the delivery mechanism (including training needs).

Action Needed:

- *A survey of other NWQMS “users” to add their needs (including definition of the products required) to the findings of this evaluation.*

Urbis (2008) Finding

- Engaging practitioners in any forthcoming review of the Guidelines

6.2 Future Threats to Australian waterways

As indicated above, in order to remain strategic and “ahead of the game”, future NWQMS directions need to be guided by an understanding of future threats to Australian waterways. Existing information from audits, state of environment reports, etc. provides an insight into the current state and management responses to current pressures on Australian waterways and wetlands. This information needs to be supplemented with risk assessments and predictions of impacts from major new emerging issues arising from climate change, global fuel and food shortages, future requirements for food, fibre, water, mineral resources, etc..

Section 5.4.3 discussed opportunities to link this with climate change risk assessments.

In the future, the NWQMS also needs to better address and/or link WQ/waterway management to improved management of off-stream wetlands and ground waters. The connectivity between these different water types will be a key future issue for the NWQMS and the risk assessment(s) and resulting strategies and actions will need to consider and address these issues.

Action Needed:

- *A rapid assessment of future threats to Australian waterways, wetlands and ground waters. This should build on the current “climate change” risk assessments (see section 5.4.3).*

6.3 Implementing Actions Needed

This report has identified actions that need to be further assessed to determine future NWQMS directions and priorities. They can be sub-divided into the following categories:

- Processes to manage future NWQMS activities;
- Providing user-friendly information and capacity building to NWQMS users;
- Updating NWQMS processes, documents, etc based on the discussion and actions needed in section 5; and
- Linking to other WQ-related initiatives.

6.3.1 Process to manage future NWQMS activities

Guiding Principles

Jurisdictions have provided the following guiding principles and processes to assist with managing future NWQMS activities. These are based on achieving efficient and effective outcomes for the NWQMS:

- Only undertake actions when it is clear the benefits exceed the costs (and build the business case and terms of reference through the Contact Group);
- Clearly define the tasks, timelines and the method to achieve the outcomes desired;

- Establish working groups with the skills and resources required to achieve the tasks and only for the time required to complete the tasks;
- Use the appropriate mechanism to achieve desired outcome e.g. only use the NRM Ministerial Council when its sanction of the outcomes is required (recognising that the process of endorsement by NRM Council does give the NWQMS guideline documents a national significance and/or budget). Technical tasks could have a process for sign off at the appropriate, agreed level;
- Be responsive to users' needs and be adaptive throughout the process;
- Build users' confidence in future NWQMS activities by getting results from priority actions out to users as quickly as possible, including a "user-friendly" website;
- Link to other WQ-related processes (e.g. NWI's WQ related projects);
- Establish a process to recognise and link to documents which value-add to the NWQMS, while not needing formal Ministerial Council recognition e.g. NWC's "[Waterlines](#)" (see also section 6.3.4);
- The DEWHA and NWQMS Contact Group should provide strong leadership for future NWQMS. This group needs to meet, discuss and prioritise actions from this report soon after it is completed [*Note: This process has already started with the Adelaide workshop*];
- To provide better links between WQ and water quantity management, the NWQMS Contact Group should consist of a representative from both the environmental protection and water resource management agencies from each jurisdiction and a representative from the National Water Commission.

Action Needed:

- *DEWHA and the NWQMS Contact Group (with appropriate representatives) to continue to meet, discuss and prioritise actions from this report into an implementation plan, then lead future implementation of the NWQMS;*
- *DEWHA, NWC and jurisdictions (through the Contact Group) to agree on the vision, role of and process to manage NWQMS into the future, including a process to adaptively review its progress and direction.*

6.3.2 Providing user-friendly information and capacity building to NWQMS users

As discussed in the context for this evaluation, the following matters need to be considered in relation to the future NWQMS directions and priorities:

- Users are more "mobile" in their employment now and are likely to continue to be into the future. This means that water management agencies need to better capture and document "corporate knowledge" to carry out their core functions, as well as being able to more easily "induct" and "skill" new employees into their roles;
- Information is much more readily available now, and will be in future, with the advent of technologies such as the internet;
- The "learning" environment is also changing from structured courses in academic institutions to more flexible options such as "online" courses.

The next two sub-sections discuss provision of / access to information and capacity building and then these are followed by recommendations for both components.

6.3.2.1 User-friendly Information

Jurisdictions strongly support the need for developing and maintaining a functional NWQMS website with links to individual jurisdictional website and related websites and information. This could build on existing DEWHA website and provide additional information developed in response to the actions in sections 5 & 6. It is recommended that this should be structured around the WQ management framework/process and show supporting tools and information (such as [the website the Coastal CRC developed](#) based on the first series of NWQMS capacity building workshops [see Figure 21]). This could also have a link to relevant jurisdictional sites along similar lines to the NWC's Australian Water Governance website (see Figure 22).

The proposed survey of NWQMS users needs could assist in defining the products required, improved methods of access to these products and any training needed in the use of the products.

The recommended NWQMS website would be a key component in achieving efficient and effective dissemination of information to WQ practitioners. The site should contain links to access the key NWQMS documents. However, some NWQMS documents would also need to be available in hard copy.

Urbis (2008) Finding

- Creating an online forum for practitioners implementing the NWQMS;
- Producing a booklet or online resource for under-resourced organisations;
- Promoting the email list that updates subscribers on changes to the NWQMS;
- Exploring ways in which to connect on-ground practitioners and NRM Boards to funding opportunities, and link use to NWQMS.



Figure 21 – NWQMS website developed by Coastal CRC (now on OzCoast website)

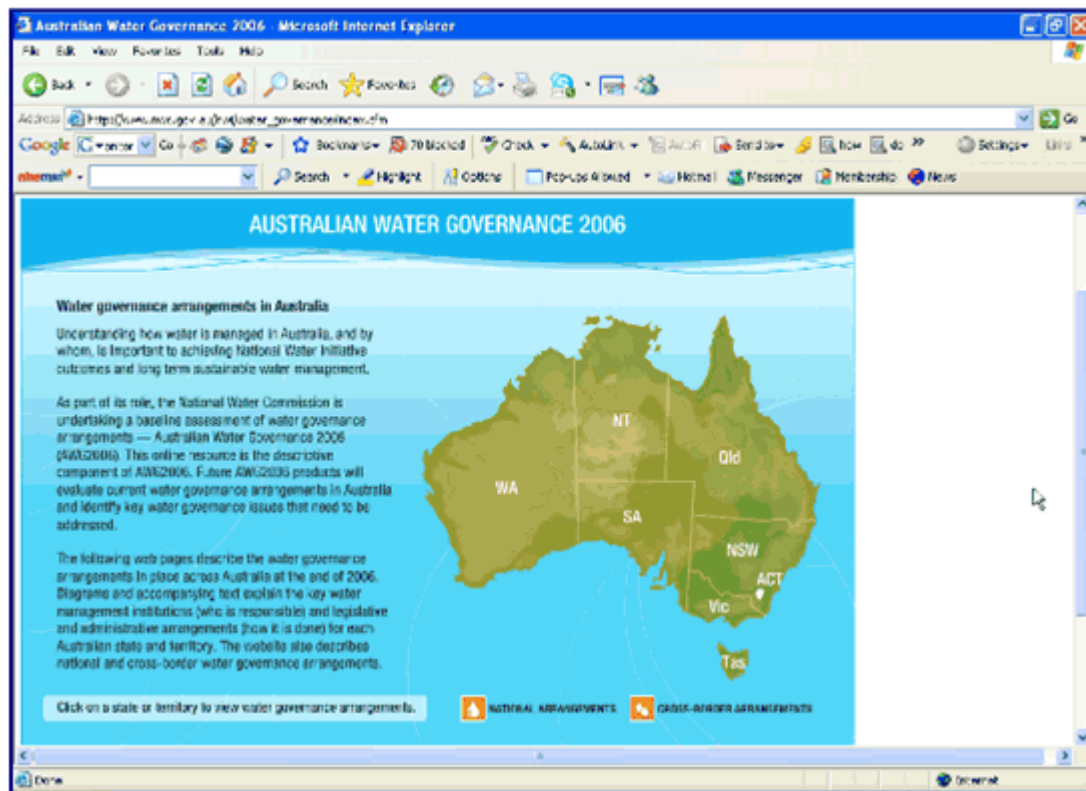


Figure 22 – NWC's Water Governance website with links to jurisdictions' information

6.3.2.2 Capacity building

DEWHA and others have invested in NWQMS capacity building workshops (see section 3.3) and are currently running another series of these workshops. These are providing valuable hands-on experience for regional NRM practitioners in the use of the NWQMS. There will continue to be a need for face to face training, with practical workshop sessions to “learn by doing”. These sessions need to cover all facets of the NWQMS and Mackenzie et al (2005) provides details on such workshop sessions. Urbis (2008) provides an evaluation of the first workshop series and it is a valuable reference document for future NWQMS capacity building activities (It should also be one of the reference documents placed on the NWQMS website).

However, other mechanisms are also available to build capacity in use of the NWQMS. In developing the above website material, it would be opportune to also consider the use of a web-based “learning” environment for the key technical NWQMS documents (e.g. Guidelines #4, 6 & 7). Such an environment has already been created for new users of the AUSRIVAS program (see Figure 23)

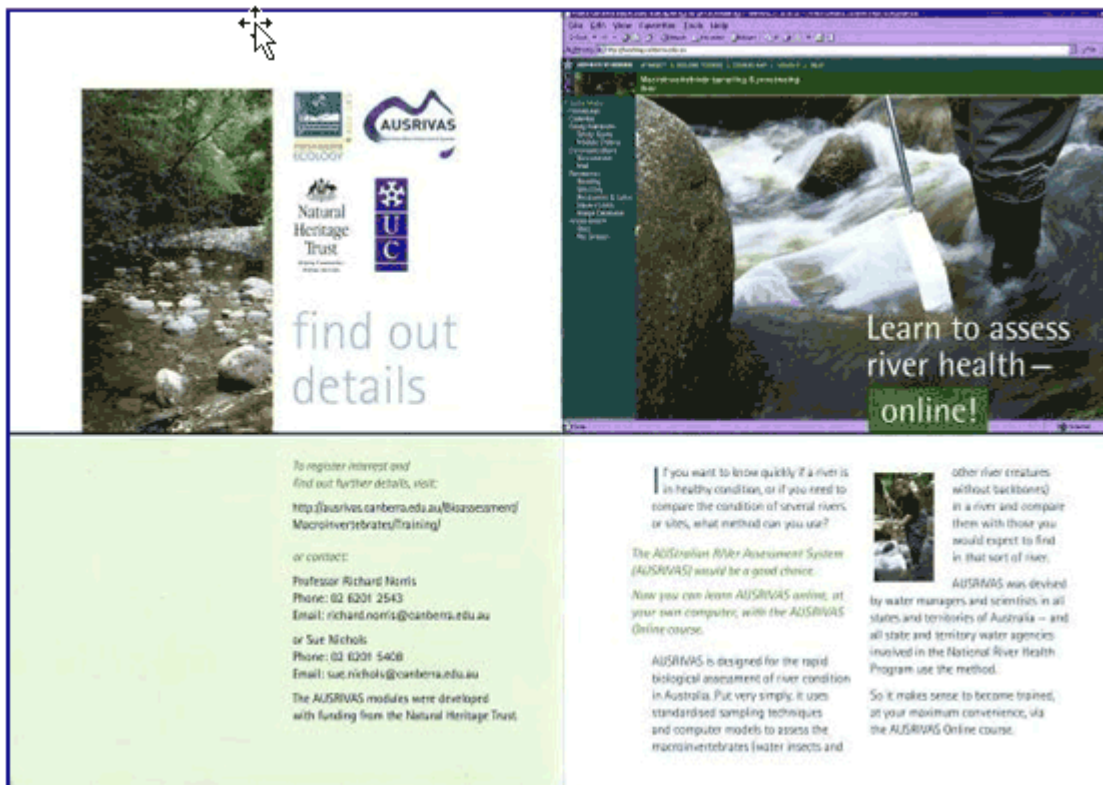


Figure 23 - AUSRIVAS online training program

Action Needed:

- Develop and maintain a user-friendly NWQMS website with links to individual jurisdictional websites and other related websites and information;
- Establish and fund a website manager and a process to manage additions, modifications, deletions, etc. to the website;
- Use this website to achieve relevant actions recommended in this evaluation;
- In developing the above website material, also consider the use of a web-based “learning” environment for the key technical NWQMS documents (e.g. Guidelines #4, 6 & 7).

6.3.3 Updating NWQMS processes, documents, etc. based on the discussion and actions needed in section 5

The recommended actions needed are detailed in sections 5 and 6 and summarised in that order in Table 6.

Table 6 - Summary of Recommended Actions (grouped in the order in section 5)

No.	Section	Brief description
1	4.1	DEWHA & NWQMS Contact Group to work with NWC to agree on any necessary modification to the NWI to include an obligation to implement and report on the NWQMS
2	5.1.1.3	Map out and maintain appropriate links with NHMRC's WQ-related working groups
3	5.1.2.1	Undertake SWOT analysis re need for NRM legislation when appropriate
4	5.1.2.2	Develop case studies in use of ICM plans for jurisdiction/LG planning
5	5.1.2.2 5.2.1	Collate, and further develop if necessary, user guides for undertaking EIAs and receiving water assessments for discharges to waterways/water resources
6	5.1.2.2 6.1	Survey other NWQMS users to determine their future NWQMS needs
7	5.1.3	Develop consistent "terminology" for all WQ/NRM plans
8	5.1.3	Hold a workshop to review CCI's WQIPs
9	5.1.3	Review Victorian riverine WQ Management Plans (with action #15)
10	5.1.3 5.4.1	Then update Guidelines #1-3 (Policies and Processes), The update should include outcomes of AETG's HCVAE work
11	5.2.2	NWQMS Contact Group consider formally engaging the NWC WSUD WG for NWQMS urban stormwater management matters
12	5.2.2	Update Guideline #10 with the NWC WSUD WG's outputs/outcomes
13	5.2.3	Align NWQMS rural diffuse matters with national NRM programs
14	5.2.3	Update Guideline #9 at appropriate stage
15	5.2.4.1	Establish a working group (WG) to develop riverine value setting and threat assessment processes (to underpin both WQ and quantity management)
16	5.2.4.1	After that, explore similar processes for other water types
17	5.2.4.2	Establish a WG to consolidate management strategies for riparian and in-stream habitats
18	5.3.1	Collate case studies on community engagement and setting EVs (link with action #15)
19	5.3.1	Collate case studies on consultation with traditional owners/indigenous people and establishing cultural and spiritual values
20	5.3.2	Collate case studies on conceptual models
21	5.3.3&6	Develop user-friendly interfaces for main NWQMS Guidelines, especially #4 and #7
22	5.3.3&6	Establish a WG to develop a detailed strategy to update Guideline #4 and #7
23	5.3.4	Collate case studies on models, socio-economic assessments and decision support tools
24	5.3.5	Continue to collate feedback on WQ case studies using economic measures
25	5.3.5	Scope the need for a new NWQMS Economic Measures Guideline
26	5.3.6	Develop/collate case studies on use of Guideline #7
27	5.3.6	Consider updating Guideline #7 as a component of the WG's tasks for updating #4
28	5.4.2	Progress opportunities to get better connections between NWQMS and programs focusing on off-stream wetlands
29	5.4.3	Actively link the NWQMS with climate change programs (and update guidelines where necessary)
30	5.4.4	Addition of tools, documents, and links to other relevant resources on the NWQMS website, to meet the needs of those involved with total water cycle management
31	6.2	Undertake a rapid assessment of future threats to Australian waters (linked to climate change risk assessments)
32	6.3.1	DEWHA and the NWQMS Contact Group to continue to meet and, based on this report, develop and implement a plan for future NWQMS directions and priorities
33	6.3.1&4	Agree on vision, role and process to manage NWQMS into the future
34	6.3.2	Develop and maintain a user-friendly NWQMS website
35	6.3.2	Consider a web-based learning environment for key NWQMS technical guidelines
36	6.3.4	Map out how national water management activities will be linked
37	6.3.4	Establish appropriate NWQMS links to other WQ-related initiatives and documents

Table 7 then presents a strategic view of all of the actions by sorting and grouping the above summary of actions under the key outcomes sought. The context for some actions are shown graphically in Figures 24 and 25.

Table 7 - Summary of recommended actions (grouped by outcomes sought)

Outcome sought	Brief description	Section
Agree on next steps to progress NWQMS	DEWHA and the NWQMS Contact Group to continue to meet and, based on inputs including this report, develop and implement a plan for future NWQMS directions and priorities	6.3.1
Engage NWQMS practitioners in scoping future NWQMS directions	Survey other NWQMS users to determine their needs	5.1.2.2 6.1
Establish context of future issues for NWQMS	Undertake a rapid assessment of future threats to Australian waters (linked to climate change risk assessments)	6.2
Set core future direction for NWQMS	Agree on vision, role and process to manage NWQMS into the future	6.3.1&4
Map out and establish links to NWQMS related activities	Map out how national water management activities will be linked	6.3.4
	Establish appropriate NWQMS links to other WQ-related initiatives and documents	6.3.4
	DEWHA & NWQMS Contact Group to work with NWC to agree on a modification to the NWI to include an obligation to implement and report on the NWQMS	4.1
	Map out and maintain appropriate links with NHMRC's WQ-related working groups (WGs)	5.1.1.3
	NWQMS Contact Group consider formally engaging the NWC WSUD WG for NWQMS urban stormwater management matters	5.2.2
	Actively link the NWQMS with climate change programs (and update guidelines where necessary)	5.4.3
	Progress opportunities to get better connections between NWQMS and programs focusing on off-stream wetlands	5.4.2
A central, user-friendly NWQMS website that supports future NWQMS implementation	Develop and maintain a user-friendly NWQMS website	6.3.2
	Consider a web-based learning environment for key NWQMS technical guidelines	6.3.2
	Develop user-friendly interfaces for main NWQMS Guidelines, especially #4 and #7	5.3.3 5.3.6
	Addition of tools, documents, and links to other relevant resources on the NWQMS website, to meet the needs of those involved with total water cycle management	5.4.4

Final Discussion Paper on Implementation of NWQMS

Outcome sought	Brief description	Section
Collate and share “lessons” on establishing and using catchment based WQ management plans	Hold a workshop to review CCI’s WQIPs	5.1.3
	Review Victorian riverine WQ Management Plans (with action #15)	5.1.3
	Collate case studies on community engagement and setting EVs (link with action #15)	5.3.1
	Collate case studies on consultation with traditional owners/indigenous people and establishing cultural and spiritual values	5.3.1
	Collate case studies on conceptual models	5.3.2
	Collate case studies on models, socio-economic assessments and decision support tools	5.3.4
	Continue to collate feedback on WQ case studies using economic measures	5.3.5
	Develop/collate case studies on use of Guideline #7	5.3.6
Improve on catchment based WQ planning & management	Develop consistent “terminology” for all WQ/NRM plans	5.1.3
	Align NWQMS rural diffuse matters with national NRM programs	5.2.3
	Establish a WG to consolidate management strategies for riparian and in-stream habitats	5.2.4.2
	Develop case studies in use of ICM plans for jurisdiction/LG planning	5.1.2.2
	Undertake SWOT (strengths, weaknesses, opportunities, threats) analysis re need for NRM legislation when appropriate	5.1.2.1
	Collate, and further develop if necessary, user guides for undertaking EIAs and receiving water assessments for discharges to waterways/water resources	5.1.2.2 5.2.1
Improve “integration” of WQ and water quantity management	Establish a WG to develop riverine value setting and threat assessment processes (to underpin both WQ and quantity management)	5.2.4.1
	After that, explore similar processes for other water types	5.2.4.1
Improve/update existing NWQMS guidelines	Then update Guidelines #1-3 (Policies and Processes). The update should include outcomes of AETG’s HCVAE work	5.1.3 5.4.1
	Establish a WG to develop a detailed strategy to update Guidelines #4 and #7	5.3.3 5.3.6
	Consider updating Guideline #7 to include simpler documents, case studies and latest knowledge as a component of updating Guideline #4	5.3.6
	Update Guideline #10 with the NWC WSUD WG’s outputs/outcomes	5.2.2
	Update Guideline #9 at appropriate stage	5.2.3
New guidelines	Scope the need for a new NWQMS Economic Measures Guideline	5.3.5

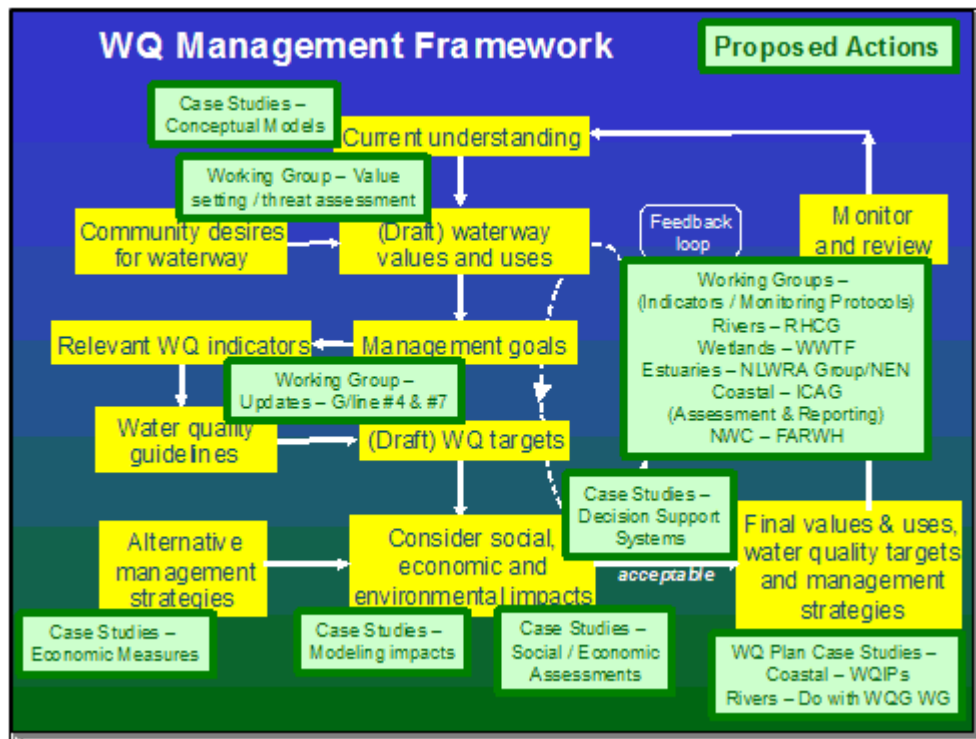


Figure 24 - Relationship of selected actions to WQ Management Framework

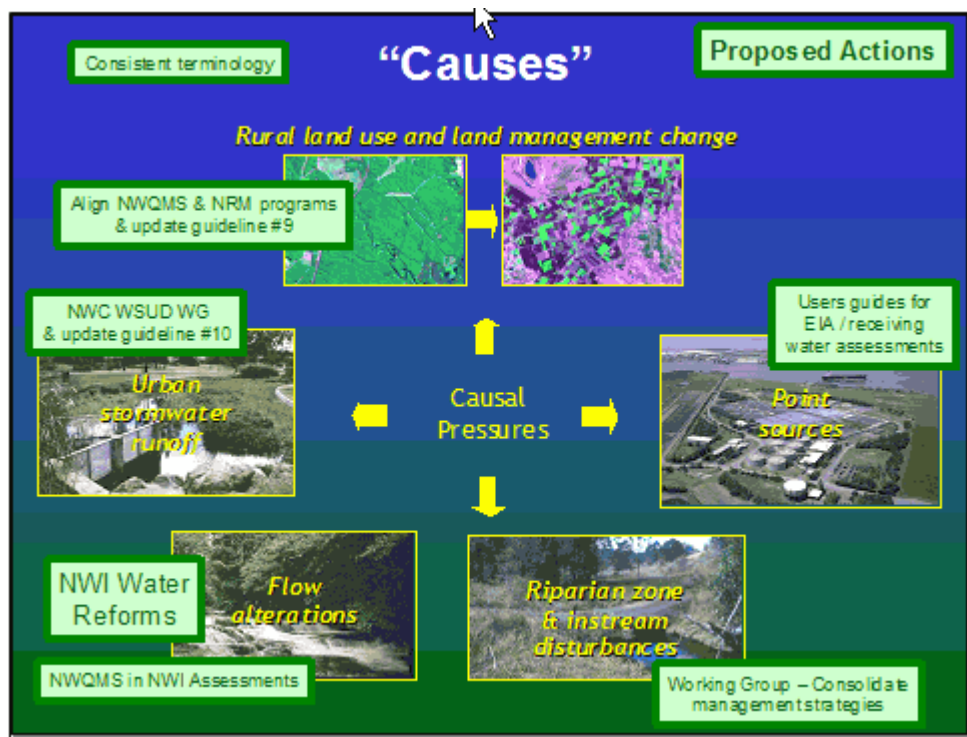


Figure 25 - Relationship of selected actions to "Causes" to be managed

6.3.4 Linking to other WQ-related initiatives

A key to the future success of the NWQMS will be to focus on key WQ-related matters that the NWQMS should lead and also to establish strong links to complementary WQ-related initiatives. These initiatives include:

- Climate change programs;
- Water quantity management initiatives e.g. NWI programs, current review of water resource planning across Australia, Total Water Cycle Management initiatives;
- Land use planning processes;
- Off-stream wetland programs;
- Major regional programs e.g. Murray-Darling Basin, Great Barrier Reef;
- The cooperative approach to integrated coastal zone management activities;
- Identification and protection of high conservation value aquatic ecosystems;
- NHMRC's work with drinking and recreational water guidelines; and
- Relevant approval processes for potential toxins/contaminants (agricultural and vet. chemicals, pharmaceuticals, genetically modified organisms, etc.)

A component of this "linking" will be appropriate linking of the working groups supporting these initiatives. Table 2 outlines some of these key groups and initiatives. This needs to be considered by DEWHA, NWC and jurisdictions to identify necessary links between these and possible future directions.

Another component of this "linking" that is easily achievable in the short term, as well as by a simple ongoing process, is to establish links to "approved" non-NWQMS documents on the NWQMS website. These links will be a key practical action to assist NWQMS users to see the relationship of WQ management to other WQ-related initiatives. In some cases, the NWQMS Contact group may wish to seek endorsement for these documents as part of the NWQMS guideline series

Action Needed:

- *Key national agencies involved in water management (including DEWHA, DAFF, NWC, NLWRA, BoM) to meet and map out how water management activities will be linked, including the relevant committees, working groups, etc. (a pro-forma like Appendix 6 and the example in section 5.1.1.3 could assist with this task);*
- *Using this information, DEWHA, NWC and jurisdictions (through the Contact Group) to agree on the vision, role of and process for future management of the NWQMS, including its links to relevant water management activities and a process to adaptively review its progress and direction;*
- *Formulate a process to capture "approved" non-NWQMS documents on the NWQMS website. In some cases the NWQMS Contact Group may wish to seek endorsement for these documents as part of the NWQMS guideline series.*

7. Acknowledgements

The author gratefully acknowledges contributions from the NWQMS Contact Network and their support of this project. The quality of outputs of this project are directly related to their efforts in firstly completing details of NWQMS implementation for their jurisdiction, then in providing time for interviews and the workshop to discuss these inputs and scope future directions for the NWQMS, and lastly in adding value to the final report by providing comments on and further inputs to the draft reports.

The Australian Government Department of Environment, Water, Heritage and the Arts is also acknowledged for funding this project and for the assistance provided by their project managers, Charles Lewis and James Hill. The Queensland EPA is also acknowledged for allowing the author to take leave to complete this project. Finally, thanks to Dane Moulton for proof reading the draft reports.

8. References

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Appendix 1 – National Water Quality Management Strategy

The Natural Resource Management Ministerial Council has been developing the National Water Quality Management Strategy (NWQMS). The Environment Protection and Heritage Council is also involved in certain Guidelines such as water recycling. The National Health and Medical Research Council and the Australian Health Ministers Conference are involved in aspects of the NWQMS which affect public health. The NWQMS has three major elements: policies, process and national guidelines.

Policies

The main policy objective of the NWQMS is set out in NWQMS Document No. 2, Policies and Principles — A Reference Document (ANZECC/ARMCANZ 1994) and is; *to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development*. This objective is being pursued through a strategy based on high-status national guidelines with local implementation. Document No. 2, emphasises the importance of:

- ecologically sustainable development;
- integrated (or total) catchment management;
- best management practices, including the use of acceptable modern technology and waste minimisation and utilisation; and
- the role of economic measures, including 'user-pays' and 'polluter-pays' approaches.

Process

The process for water quality management starts with the community working in concert with government to develop a management plan for each catchment, aquifer, estuary, coastal water or other waterbody. The plan should take account of all existing and proposed activities and developments; it should contain feasible management options that aim to achieve the environmental values that have been agreed for that waterbody. The process is outlined in NWQMS Document No. 3, *Implementation Guidelines* (ANZECC/ARMCANZ 1998) and schematically represented in Figure 1 (below). The NWQMS envisages use of both regulatory and market-based approaches. Management of water resources is mainly a State and Territory responsibility, but implementation of the NWQMS will be done in the context of:

- the NWQMS guidelines;
- State and Territory water policies;
- community preferences on the use and values of local waters;
- the current water quality of local waters; and
- the economic and social impacts of maintaining current water quality or of meeting new local water quality goals.

Implementation of the NWQMS should include:

- catchment, groundwater and coastal water quality management plans;
- an appropriate level of water and sewerage services provided by water authorities; and
- further development of regulatory and market frameworks.

Community views form a crucial part of the NWQMS and public comment is sought during both the development and the implementation of the strategy.

National Guidelines

The national guidelines are technical documents providing guidance on many aspects of the water cycle including ambient and drinking water quality, monitoring, groundwater, rural land and water, urban stormwater, sewerage systems and effluent management for specific industries. The full list of NWQMS documents, with their current status (19 out of 21 released so far) is in Box 1. The list, together with other information, is also on the NWQMS website at,

<http://www.environment.gov.au/water/publications/quality/index.html#nwqmsguidelines>

Environmental values and water quality guidelines are described in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000) (see Box 1).

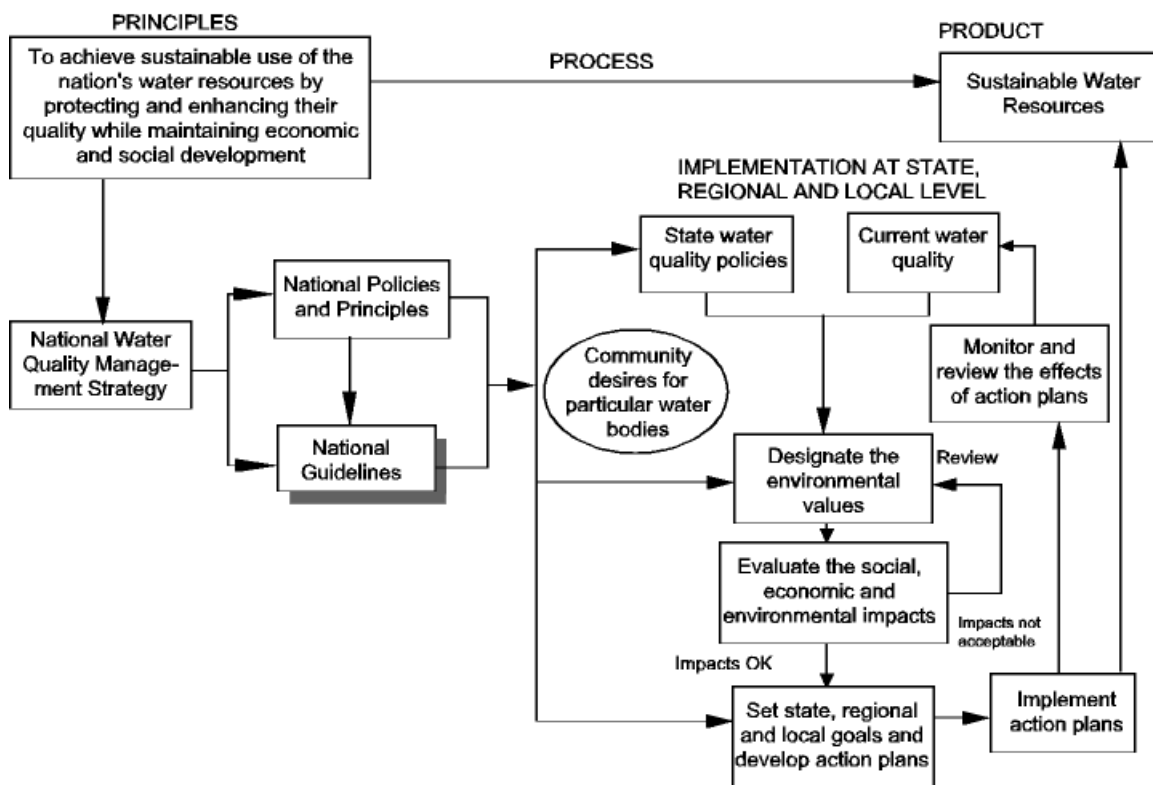


Figure 1. National Water Quality Management Strategy

Box 1. Documents of the National Water Quality Management Strategy

Document No.	Title
	Policies and Process for Water Quality Management
1	<i>Water Quality Management — An Outline of the Policies</i>
2	<i>Policies and Principles — A Reference Document</i>
3	<i>Implementation Guidelines</i>
	Water Quality Benchmarks
4	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i>
5	<i>Australian Drinking Water Guidelines — Summary</i>
6	<i>Australian Drinking Water Guidelines</i>
7	<i>Australian Guidelines for Water Quality Monitoring and Reporting</i>
	Groundwater Management
8	<i>Guidelines for Groundwater Protection</i>
	Guidelines for Diffuse and Point Sources*
9	<i>Rural Land Uses and Water Quality — A Community Resource Document</i>
10	<i>Guidelines for Urban Stormwater Management</i>
11	<i>Guidelines for Sewerage Systems — Effluent Management</i>
12	<i>Guidelines for Sewerage Systems — Acceptance of Trade Waste (Industrial Waste)</i>
13	<i>Guidelines for Sewerage Systems — Biosolids Management</i>
14	<i>Guidelines for Sewerage Systems — Use of Reclaimed Water</i>
15	<i>Guidelines for Sewerage Systems — Sewerage System Overflows</i>
16a	<i>Effluent Management Guidelines for Dairy Sheds</i>
16b	<i>Effluent Management Guidelines for Dairy Processing Plants</i>
17	<i>Effluent Management Guidelines for Intensive Piggeries</i>
18	<i>Effluent Management Guidelines for Aqueous Wool Scouring and Carbonising</i>
19	<i>Effluent Management Guidelines for Tanning and Related Industries in Australia</i>
20	<i>Effluent Management Guidelines for Australian Wineries and Distilleries</i>
21	<i>Australian Guidelines For Water Recycling - Managing Health And Environmental Risks - Phase 1</i>

*The guidelines for diffuse and point sources are national guidelines that aim to ensure high levels of environmental protection that are broadly consistent across Australia

Appendix 2 – Terms of Reference

The NWQMS is the main mechanism for water quality management in Australia (see Appendix 1). Implementation of the NWQMS is largely by state and territory governments under the national competition policy. Jurisdictions have previously reported progress on the Council of Australian Governments (COAG) on water reforms including implementation of the NWQMS to the National Competition Council and more recently the National Water Commission (the latest report was for 2005, but an updated review from an expert practitioner's perspective is needed that also has recommendations to improve implementation).

The Department requires these services to evaluate the rates of adoption of the NWQMS implementation. The Review will:

- assess current status of implementation
- identify issues involved where implementation was working well or not, and
- recommend ways to improve national and state implementation including improving the 20 new 2008 workshops on the NWQMS being funded through the Department, and
- help develop Phase 2 of the NWQMS (Phase 2 is expected to focus on national and state implementation, development of new and revised guidelines and possible accreditation of the non NWQMS documents).

The services will need to include:

- conducting a Literature Review
- conducting telephone interviews with a range of key NWQMS stakeholders to help verify the literature and gain further information and,
- produce a Draft and Final Report with recommendations on how to improve NWQMS implementation and future NWQMS investment strategies to achieve its stated outcomes.

1.1 Literature Review. The Review of the NWQMS literature will help establish the extent of implementation of both jurisdictional and institutional adoption of the NWQMS across Australia. The Review will need to:

- review all Australian Government, state, and local government level legislation, policy instruments and regulations addressing water quality management in Australia. This will establish the extent to which various jurisdictions and organisations have recognised and adopted the NWQMS as part of their approach to water quality management.
- examine previous reviews of the implementation of the NWQMS by the National Competition Council and the National Water Commission as part of National Competition Policy payments in relation to the COAG 1994 National Competition Policy and the National Water Initiative.
- assess a representative cross section of natural resource management plans developed by individual catchment management authorities and groups across Australia, including those funded by Natural Heritage Trust. This will help enable assessment of the role of such groups in NWQMS implementation.

- (a) A social evaluation of the 2005 and 2006 NWQMS workshop series will run parallel to this consultancy. The consultant may be contacted and interviewed to provide additional information to that evaluation.

Final Discussion Paper on Implementation of NWQMS

- (b) Telephone Interviews. Telephone Interviews will be undertaken with key NWQMS stakeholders. The NWQMS Contact group comprising jurisdictional representatives which oversees development of the NWQMS, will be a first point of contact. Other key NWQMS stakeholders will be sourced from conversations with NWQMS contact group members. Interviews will provide another dimension to the levels of identifying implementation as well as helping to verify the literature. The consultant should liaise with the 2005 and 2006 NWQMS workshop social evaluator on possible survey design.

1.2 Final Report. The Final Report will need to include:

- the results of the literature review
- the findings of the telephone interviews
- the identification of those approaches which have led to the successful implementation of the policies, principles and guidelines of the NWQMS both for water quality management and its integration into the wider sustainable NRM management, attitudes and behaviour
- the identification of barriers to implementation of the policies, principles and guidelines of the NWQMS
- recommendations for future approaches to assist with the implementation of the policies, principles and guidelines of the NWQMS both for water quality management and its integration into the wider sustainable NRM management, attitudes and behaviour including development of Phase 2 of the NWQMS.

Appendix 3 - Contact Network used for this NWQMS Review

(based on NWQMS CONTACT GROUP of 14 August 2007)

ORGANISATION	CONTACT NETWORK	ADDITIONAL NWQMS WORKSHOP ATTENDEES
DEWHA	Charles Lewis, James Hill	Christine Schweizer, Paul Marsh
NHMRC	Heather Bishop	
NWC		Paul Smith
NSW Department of Water and Energy	Bruce Cooper Adrian Langdon	
NSW Department of Environment and Climate Change	Peter Marczan Barbara Richardson	Penny Vella
NSW Department of Health	Paul Byleveld, Kaye Power	
VIC Environment Protection Authority	Leon Stackpole, Di Rose	
VIC Department of Sustainability and Environment	Jane Doolan, Sarina Loo	Peter Vollebergh
VIC Department of Human Services		Jan Bowman
QLD Environmental Protection Agency	Stephen Fisher, Peter Macdonald, Andrew Moss	
QLD Department of Natural Resources and Water	Greg Long, Glen Moller, Marc Seifert, Nina Polaschek	Fred Tromp
SA Environment Protection Authority	David Duncan, Rachel Barrett, Geoff Bradford, Peter Newland	
SA Dept Water, Land, Biodiversity Conservation	Adam Sincock	
WA Department of Environment and Conservation	Victor Talbot, Brad Jakowyna	
WA Department of Water	Malcolm Robb, Nigel Mantle, Peter Ryan	
TAS Department of Primary Industries, Water & Environment	Greg Dowson	
ACT Environment Protection Authority	Stewart Chapman, Lucy Vincent, Heath Chester	
NT Environment Protection Agency	David Dettrick, Michael Lawton	
NZ Ministry for the Environment	Amanda Hunt	
Australian Water Association	Diane Wiesner	
Ex- SA EPA	John Cugley	
eWater	Richard Norris, Sue Nichols	
CSIRO	Michael Warne, Simon Apte	
ERISS		Rick van Dam
Consultant		John Bennett

Note: The highlighted contacts attended the Adelaide workshop (19-20 August 2008)

Appendix 4 - Thought Provoker

“Thought Provoker”

Implementation of the National Water Quality Management Strategy (NWQMS)

These questions are only guides to your jurisdiction's response to how you have implemented the NWQMS.

Feel free to add further information, especially at the end with your suggestions for future directions and priorities for the NWQMS.

Emerging issues related to future NWQMS directions: (Further thought provokers on these questions are provided in the following pages)

- How does it integrate/link to total water cycle management?
- How well or otherwise has it been used with the national NRM programs (e.g. NHT, NAPSWQ, Coastal Catchments Initiative)
- How could it be linked to future national and other NRM programs?
- Do people think it is mainly “physical-chemical” WQ management?
- Is its focus on water quality management too narrow? Should it be integrated waterway management?
- Should it be called a “healthy waterways management strategy” - which more closely relates to community aspirations and catchment scale environmental objectives? If so, how does it integrate with water quantity management activities?

Is it timely to review the NWQMS Vision?

Current Vision (Policy Objective):

to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development

Future Vision?? - Add your thoughts - Here's one example:

to achieve healthy waterways that support livelihoods and lifestyles, with sustainable use of the nation's water resources, by protecting and enhancing their quality through collaboration with stakeholders and community

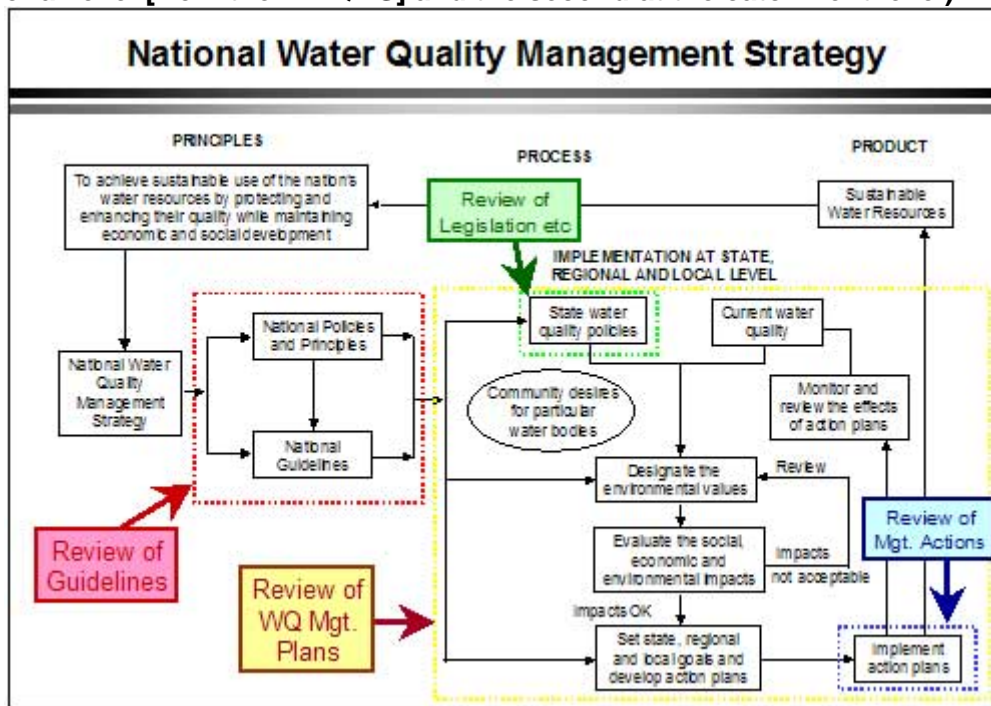
Background Thought Provokers

Total water Cycle Management

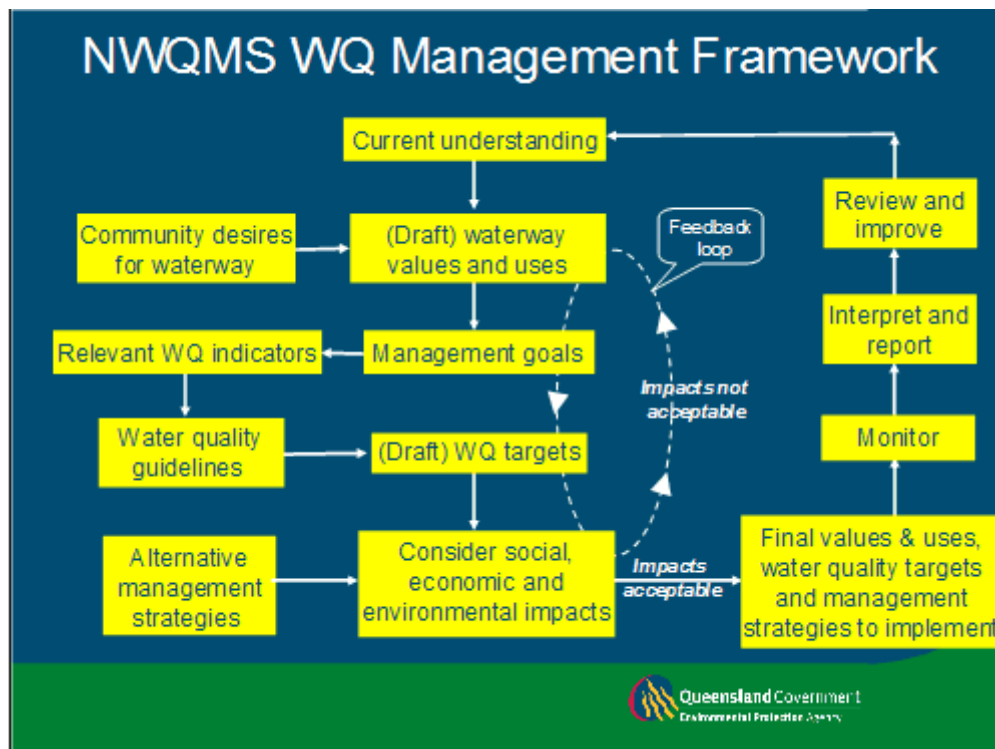


(Source: Queensland Waterwise Program)

Two Graphical Representation of the NWQMS WQ Management Framework (the first at the national level [from the NWQMS] and the second at the catchment level)



The coloured boxes aim to show where the groups of specific questions on pages 8-9 fit in



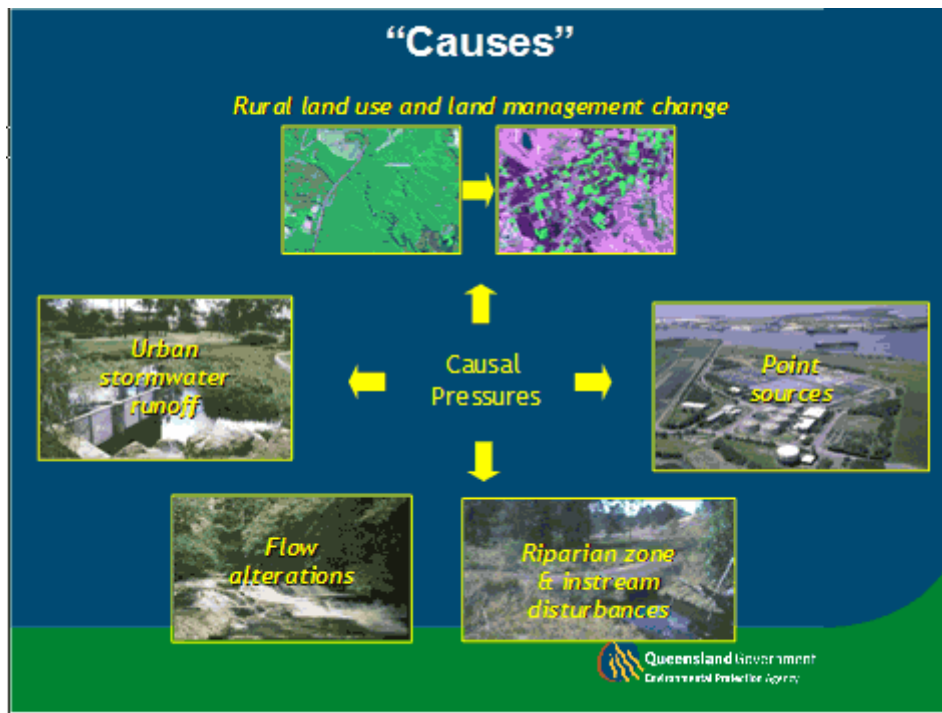
NWQMS Documents 2&3 describe the whole WQ management process above

NWQMS Document #4 relates to the "WQ Guidelines" box above

NWQMS Document #7 relates to the "Monitoring & Reporting" boxes above

Does this fit with the WQ management processes implemented in your jurisdiction?

What needs to be managed to protect waterway values and uses?



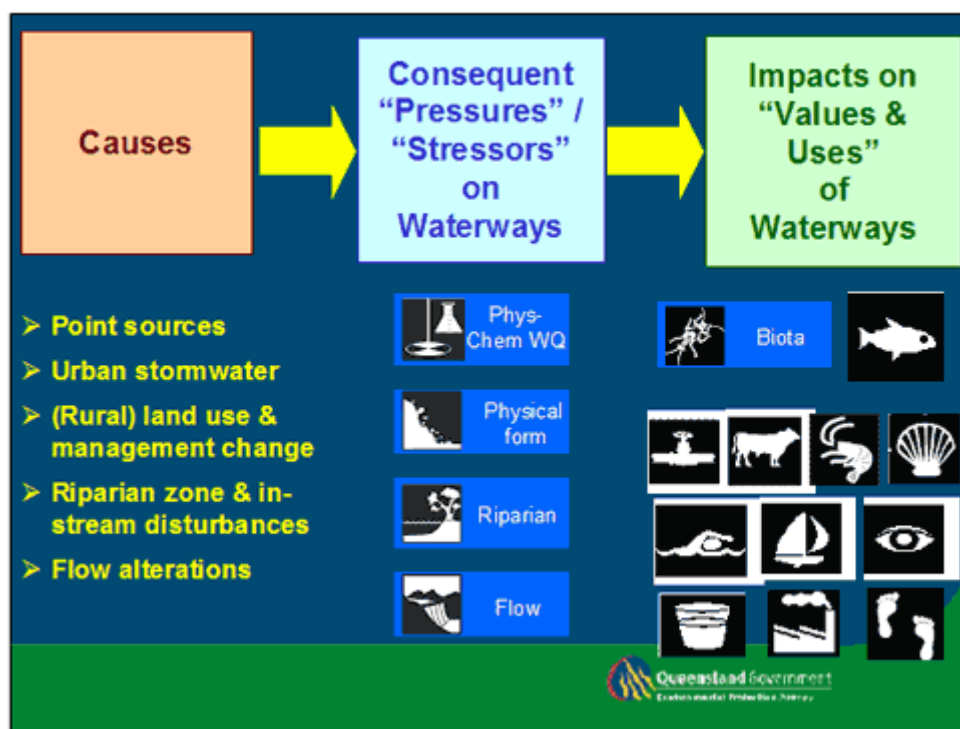
Who is responsible for managing the “causes” of deterioration in waterway health?

**Integrated Waterway Management
- Roles & responsibilities (Qld example)**

		Categories for Management (based on Bennett and Moss [2005] & HWS2007)					
		Point source management	Urban stormwater management	Rural land use & land management	Flow management	Riparian and in-stream management	Protection & Conservation
‘Partners’ in Waterway Management	Environmental Protection Agency	✓✓	✓	✓			✓
	NR & W		✓	✓	✓✓	✓✓	✓✓
	Primary Industries & Fisheries	✓		✓		✓	✓
	OUM		✓	✓	✓	✓	✓
	DLGP		✓	✓		✓	✓
	SEQ Catchments			✓✓		✓	✓
	Local Governments	✓	✓✓			✓	✓
	Rural Industry Bodies			✓✓		✓	✓
	MBW&CP						✓

Note: ✓✓ is used to indicate the ‘lead agency’ for each management category

Some of the complexities of water quality /ecosystem health management:



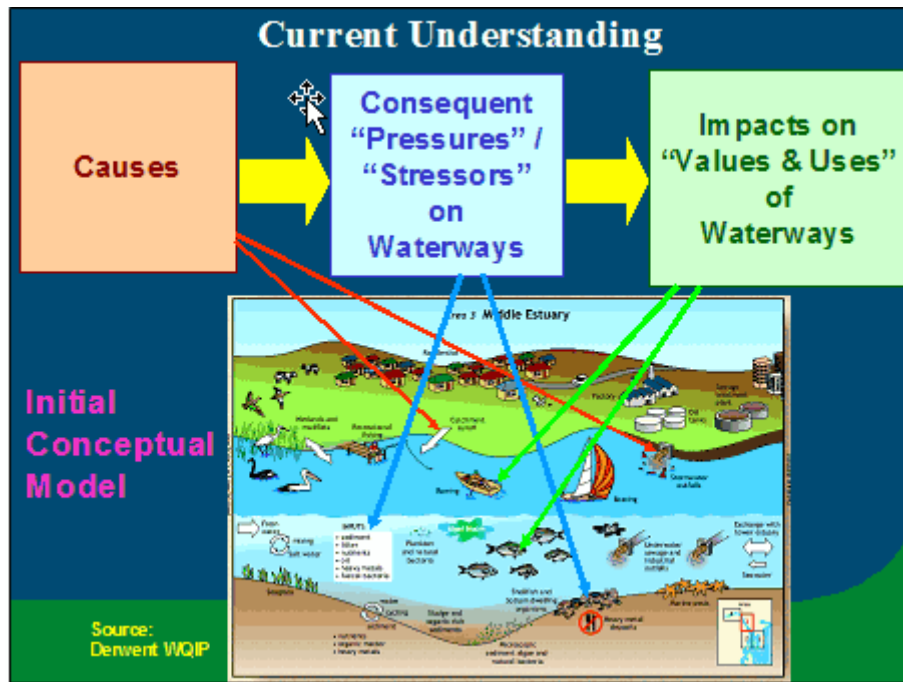
Environmental values (as defined in NWQMS), shown with the symbols on the right hand side above, incorporate ecological, economic (e.g. primary industries), social (e.g. recreational) and cultural values? For these same waterway values and uses, NAP/NHT documents use the terms - values of "critical assets" (where the assets are the lakes, rivers, wetlands, estuaries, etc).

Human values and uses (i.e. economic and social values) are reasonably easy to establish and the "physical-chemical" WQ guidelines in the national WQ guidelines (i.e. Document #4) are reasonably well known for these.

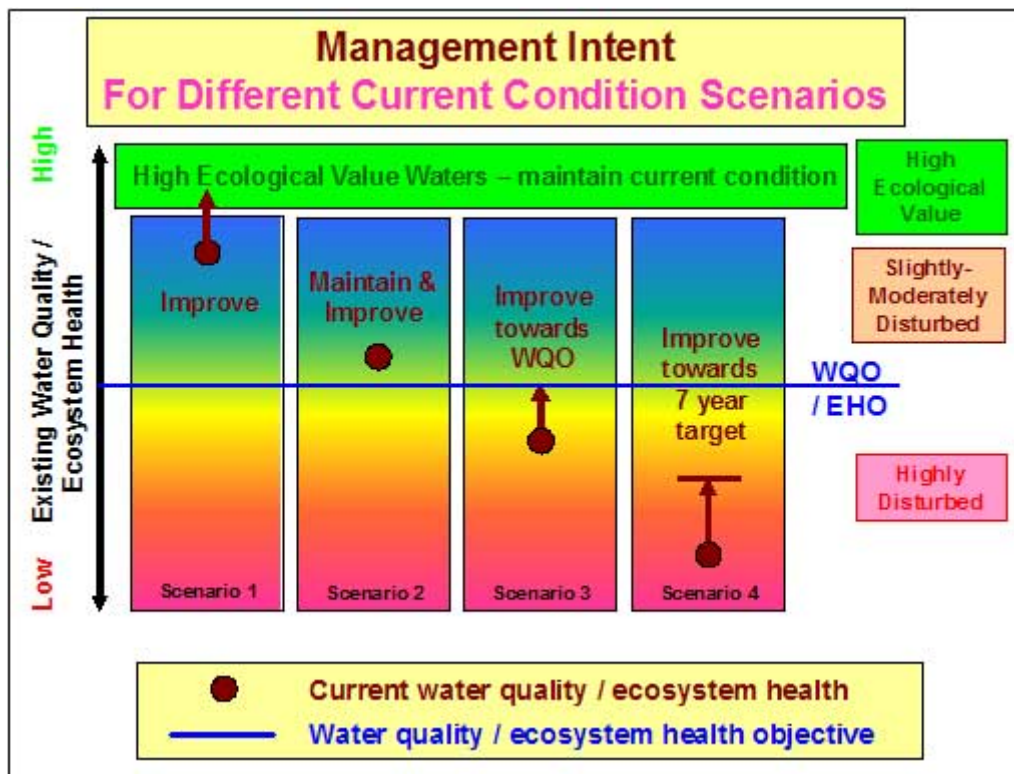
Ecological values relate to the key components of aquatic ecosystems (e.g. biota, physical form, riparian vegetation, flow and physical-chemical water quality – see the "blue" symbols above) and are more difficult to define. We need to set environmental management goals/outcomes for these components of ecosystem, use appropriate indicators for these outcomes, then ideally set levels of acceptable change to these indicators to achieve ecosystem protection (i.e. ecological health objectives = water quality objectives [WQOs]). The ecological values vary depending on water type (e.g. lake, river, estuary, coastal areas, marine).

For ecological values, physical-chemical WQOs need to be considered as a component of ecosystem health objectives. In some cases, the physical-chemical WQOs are used as surrogates for specific ecosystem health objectives. For downstream waters, these physical-chemical WQOs (concentrations) are used to derive "sustainable" loads of pollutants. These then form the basis for prioritising actions to reduce loads to these "sustainable" levels and achieve the protection of downstream aquatic ecosystems.

What use has been made of conceptual models in WQ management in your jurisdiction?



NWQMS includes three levels of protection for three aquatic ecosystem conditions (shown symbolically on the right hand side of the graphic below)



DEWHA through its Aquatic Ecosystems Task Group is leading discussions about identification and appropriate protection/management of high ecological value (HEV) waterways.

Has your jurisdiction done any assessments of the relative values of aquatic ecosystems, either statewide or catchment wide (e.g. based on criteria such as diversity, rarity, representativeness, naturalness, special features, etc) and taking actions to protect high value waterways (e.g. by using the HEV level of protection in the NWQMS)?

Water quality objectives / targets

The graphic above shows possible management intents for different scenarios of current water quality/ecosystem health. Has your jurisdiction got any formal/informal policies on management intent for different current WQ scenarios?

The terms WQ objective and WQ target can be confusing to stakeholders. Have you any definitions for either/both of these terms?

Specific questions/issues related to how NWQMS has been and could be better implemented in your jurisdiction

Legislation, policies, regulation (also see attached NWC “pdf” file for your jurisdiction)

- Does the attached file (Appendix 12) accurately represent your jurisdiction’s legislation, policy instruments, regulations for water quality management?
- If not, please update it to reflect your current situation.
- How well do these instruments fit with the NWQMS?
- What are the strengths and weaknesses of these instruments?
- What role do local governments have in WQ management and how is it linked to State/Territory legislation?
- What role do regional NRM bodies/catchment management authorities have in WQ management and how is it linked to State/Territory legislation?
- If possible, fill in the attached roles and responsibilities matrix (see Qld example on page 67, Appendix 4-1 and the attached ACT example of a draft matrix)

Ecological value assessments and protection of high value waterways (also see p7)

- Has your jurisdiction a program to assess ecological values of waterways? Is this done opportunistically?
- Has your jurisdiction got processes in place to identify and protect high value waterways?

Water quality management plans (also see Appendix 4-2)

What approach has your jurisdiction taken to developing catchment/region based WQ management plans:

- State/Territory led? On a prioritised basis?
- Opportunistic? e.g. with NRM Plans, WQ Improvement Plans, etc.
- How well do your regional NRM Plans establish EVs, WQOs and management actions to protect them (simply indicate in attached table in Appendix 4-2)
- Alternatively, have you focused on establishing environmental values (EVs) and water quality objectives (WQOs) as a basis for all relevant planning in the catchment/region?
- Are there key cross-jurisdictional/cross-regional plans (e.g. Murray-Darling Basin, Great Barrier Reef)?
- Have these plans covered all waterways – lakes, ground waters, rivers, estuaries, coastal (or has there been a priority focus on a particular water type e.g. rivers)
- How do you involve stakeholders in developing and implementing the plans?
- What social, economic and environmental assessments are undertaken in developing the plans?
- How are the plans implemented? Who leads/coordinates?
- Do the plans result in monitoring programs that can be used to evaluate, report and adaptively manage waterway health? How well do these monitoring programs link to Statewide monitoring programs? What are the Statewide monitoring programs?

NWQMS Guideline Documents (also see attached table [Appendix 5] with questions for each one)

Please complete the attached table for each of the NWQMS documents and provide your best assessment/answers to the questions raised, for example:

- How has your jurisdiction used each of the NWQMS documents?
- What types of information would you like to see updated in each of these documents (e.g. scientific methods, policy, program information)?
- Who are the key users of each document?
- What other documents are needed?

Management of key causes of WQ deterioration

- Outline your jurisdictions' approach to managing point sources of pollution
- Outline your jurisdictions' approach to urban stormwater management
- Outline your jurisdictions' approach to managing runoff from non-urban areas
- Outline your jurisdictions' approach to managing riparian areas
- Outline your jurisdictions' approach to establishing and managing environmental flows
- Outline your jurisdictions' approach to groundwater management

Specific NWQMS-related documents developed by your jurisdiction

Please list any documents that your jurisdiction has developed to assist with implementation of the NWQMS.

Future directions, needs, etc - (also see attached draft priority table [Appendix 4-3] previously developed by the NWQMS contact group)

Please feel free to give us your jurisdictions' ideas, priorities, etc for future directions for the NWQMS, based on all the above thoughts and feedback, your own experiences, knowledge of strategies successfully applied to other areas or to WQ management overseas, etc:

Please include your ideas on all issues, including:

- Legislation, policy instruments, regulation e.g. need for a National Environmental Protection Measure (NEPM)?
- WQ Management Planning/Plans
- New/updated guidelines
- Better coordination/knowledge sharing across jurisdictions
- Stakeholder engagement in WQ management
- Better community education and awareness programs
- Dedicated website to provide information, training, etc.
- Incentive based programs for improved WQ management

Appendix 4-1 – Waterway Management Roles

In the context of the Victorian River Health Strategy, Doolan (2000) outlined the following roles at different levels of waterway management.

This could be considered in conjunction with the matrix on page 67, which relates to the roles and responsibilities from the State to the Community Group (as well as subdividing the roles relative to the “causes” being addressed).

National role

- funding to States, groups and individuals to achieve national objectives;
- facilitates interstate coordination;
- invests in development of national principles, best management practices, tools, research and development to facilitate improved management; and
- ensures Australia meets its international obligations.

State role

- sets State-wide policy and strategic directions;
- establishes legislative and regulatory frameworks;
- establishes institutional arrangements;
- invests in provision of advice, research and monitoring, planning, extension, on-ground works and enforcement functions;
- implements State responsibilities under nationally agreed strategies; and
- provides funding to groups and individuals to achieve State and regional priorities.

Regional role

- develops regional strategies and action plans;
- provides advice to State on regional resourcing priorities;
- coordinates and implements work programs;
- provides incentives and support for groups and individuals; and
- provides mechanisms for community involvement in natural resource management.

Local government role

- incorporates waterway management objectives, priorities and actions into statutory planning processes; and
- provides local support for local action groups.

Landcare (community) groups’ role

- smaller-scale waterway and catchment management projects.

Landholders’ role

- land stewardship.

Reference

Doolan, J. 2000, *Integrating science and policy – the Victorian river health strategy* Paper presented to Riversymposium, Brisbane, 6–8 September 2000.

Appendix 4-2

Inclusion of NWQMS elements in NRM Plans - NHT and NAP regions across Australia

NHT Region (see map)	EVs	WQOs	Management actions to protect EVs	State / Territory
Torres Strait				Queensland
Cape York				
Northern Gulf				
Southern Gulf				
Desert Channels				
Wet Tropics				
Mackay – Whitsunday				
Burdekin*				
Fitzroy*				
Burnett – Mary*				
South East*				
Border Rivers				
Condamine				
Balonne – Maranoa				
South West*				
Western				New South Wales
Central West				
Northern Rivers				
Border Rivers - Gwydir				
Namoi				
Hunter – Central Rivers				
Hawkesbury – Nepean				
Sydney Metro				
Lachlan				
Murrumbidgee				
Murray				
Southern				
Lower Murray Darling				
Murray Darling Basin (SA)*				South Australia
South East				
Northern and Yorke Agricultural District*				
Kangaroo Island				
Mt Lofty Ranges and Greater Adelaide				
Eyre Peninsula				
Rangelands				
Aboriginal Lands				
Mallee				Victoria
Wimmera				
North Central				
Goulburn Broken				
Glenelg Hopkins				
Corangamite				
Port Phillip and Western Port				
North East				
West Gippsland				Tasmania
East Gippsland				
North*				
South*				Western Australia
North West				
Rangelands (WA)				
South Coast Region*				
Avon				
South West Region				
Swan*				
Northern Agricultural Region*				
Ord				NT
Northern Territory				
ACT				ACT

* Denotes only part of NHT catchment included in NAP region

Appendix 4-3 Draft Priority Table Developed By NWQMS Contact Group
(summarises the report into the TOR and Work Plan for the NWQMS)

Priority	Action
1: Implementation of the National Water Quality Management Strategy	
1 (a)	Develop a communication strategy that incorporates: <ul style="list-style-type: none"> NWQMS website with links to other sites Advertise the NWQMS and new tools Develop flyers and handouts on the Strategy
1 (b)	Assist regional delivery by providing regional workshops
1 (c)	Develop easy to use tools, such as an 'water quality targets online' Develop a draft decision support system to enable easy extraction of information from NWQMS document 4.
1 (d)	Develop easy to use fact sheets or guides and short summary documents on key issues from Documents 4 and 7 eg assessing compliance with guidelines, sampling requirements for specified detectable change in water quality and the NWQMS water quality management framework.
1 (e)	Produce and maintain a register of Environmental Values of waters in Australia
1 (f)	Improved regionalisation of Water Quality Guidelines
1 (g)	Evaluate NWQMS outcomes of 2003 NCC assessment
1 (h)	Evaluate the relationship between the NWQMS and the Standards and Targets and Monitoring and Evaluation Frameworks of NHT/NAP
1 (i)	Assessment of current NWQMS implementation – This project!
2: Additional guidelines for new and expanding industries and additional issues	
2 (a)	Review existing documents, identify gaps, develop a process and prioritise those areas where guidelines for new industries are needed and provide recommendations on their development
2 (b)	Workshop to identify the need for regional/national water quality guidelines for particular industries eg aquaculture and viticulture
2 (c)	Investigate approaches to encourage industries to fund and/or develop industry specific guidelines suitable for inclusion in the NWQMS
3: Revision of Some Existing Guidelines	
3 (a)	Development of water reuse/recycling guidelines to supersede NWQMS documents 10 and 14.
3 (b)	Prioritise NWQMS guidelines potentially requiring revision eg rolling revision, complete revision and timelines.
4: Accreditation of Other, Non-NWQMS Guidelines	
4 (a)	Identify a process for assessing guidelines documents that are not part of the NWQMS for possible accreditation under the NWQMS i.e. additional list that meet certain requirements such as consistency with the NWQMS, quality of information, presentation, currency and relevance.

Appendix 5 - Pro-forma seeking feedback on all NWQMS Guidelines

No.	Title	How has your jurisdiction used this document?	Examples of other feedback required
	Policies and Process for Water Quality Management		
1	<i>Water Quality Management — An Outline of the Policies</i>		<i>Need updating? What needs to be added, updated?</i>
2	<i>Policies and Principles — A Reference Document</i>		<i>Need updating? What needs to be added, updated?</i>
3	<i>Implementation Guidelines</i>		<i>Need updating? What needs to be added, updated?</i>
	Water Quality Benchmarks		
4	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i>		<i>What needs to be added, updated? How can these be regularly updated? Better links to jurisdictions guidelines? How to set priorities for new guidelines?</i>
6	<i>Australian Drinking Water Guidelines (currently being revised)</i>		<i>What needs to be added, updated? How can these be regularly updated? Any links to jurisdictions guidelines? How to set priorities for new guidelines?</i>
7	<i>Australian Guidelines for Water Quality Monitoring and Reporting</i>		<i>What needs to be added, updated? How can these be regularly updated? Any links to jurisdictions guidelines? How to set priorities for new guidelines?</i>
	Groundwater Management		
8	<i>Guidelines for Groundwater Protection</i>		<i>What needs to be added, updated? How can these be regularly updated? Any links to jurisdictions guidelines? How to set priorities for new guidelines?</i>

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	Guidelines for Diffuse and Point Sources		
9	<i>Rural Land Uses and Water Quality — A Community Resource Document</i>		<i>Who uses it?</i> <i>What value is it?</i> <i>What needs to be added, updated?</i> <i>Any relevant jurisdictions guidelines?</i>
10	<i>Guidelines for Urban Stormwater Management</i>		<i>How to link with TWCM/WSUD/USWM?</i> <i>Any relevant jurisdictions guidelines?</i>
11	<i>Guidelines for Sewerage Systems — Effluent Management</i>		<i>Who uses it?</i> <i>What value is it?</i> <i>What needs to be added, updated?</i> <i>Any relevant jurisdictions guidelines?</i>
12	<i>Guidelines for Sewerage Systems — Acceptance of Trade Waste (Industrial Waste)</i>		<i>Who uses it?</i> <i>What value is it?</i> <i>What needs to be added, updated?</i> <i>Any relevant jurisdictions guidelines?</i>
13	<i>Guidelines for Sewerage Systems — Biosolids Management</i>		<i>Who uses it?</i> <i>What value is it?</i> <i>What needs to be added, updated?</i> <i>Any relevant jurisdictions guidelines?</i>
14	<i>Guidelines for Sewerage Systems — Use of Reclaimed Water</i>		<i>Replaced by new recycling guidelines?</i>
15	<i>Guidelines for Sewerage Systems — Sewerage System Overflows</i>		<i>Who uses it?</i> <i>What value is it?</i> <i>What needs to be added, updated?</i> <i>Any relevant jurisdictions guidelines?</i>
16a	<i>Effluent Management Guidelines for Dairy Sheds</i>		<i>Who uses it?</i> <i>What value is it?</i> <i>What needs to be added, updated?</i> <i>Any relevant jurisdictions guidelines?</i>
16b	<i>Effluent Management Guidelines for Dairy Processing Plants</i>		<i>Who uses it?</i> <i>What value is it?</i> <i>What needs to be added, updated?</i> <i>Any relevant jurisdictions guidelines?</i>

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17	<i>Effluent Management Guidelines for Intensive Piggeries</i>		Who uses it? What value is it? What needs to be added, updated? Any relevant jurisdictions guidelines?
18	<i>Effluent Management Guidelines for Aqueous Wool Scouring and Carbonising</i>		Who uses it? What value is it? What needs to be added, updated? Any relevant jurisdictions guidelines?
19	<i>Effluent Management Guidelines for Tanning and Related Industries in Australia</i>		Who uses it? What value is it? What needs to be added, updated? Any relevant jurisdictions guidelines?
20	<i>Effluent Management Guidelines for Australian Wineries and Distilleries</i>		Who uses it? What value is it? What needs to be added, updated? Any relevant jurisdictions guidelines?
21	<i>Australian Guidelines For Water Recycling - Managing Health And Environmental Risks - Phase 1</i>		Who uses it? What value is it? What needs to be added, updated? Any relevant jurisdictions guidelines?
21a	<i>Australian Guidelines For Water Recycling - Phase 2</i> • <i>Augmentation of Drinking Water Supplies</i> – penultimate draft for endorsement and publication. • <i>Managed Aquifer Recharge</i> – draft for release for public consultation. • <i>Stormwater Re-use</i> – draft for release for public consultation.		
	Recommendations for new documents		

Appendix 6 - Pro-forma - WQ Management roles & responsibilities, incl. relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ Planning	Point source management ^a	Urban stormwater management ^a	Rural land use and land management ^a	Flow Management ^a	Riparian & in-stream management ^a	Protection & Conservation	Ambient WQ Monitoring	Reporting
General Comments										
Partners' in Waterway Management	Environment Agency									
	Water Resource Agency									
	Primary Industry / Agricultural Agency									
	Planning Agency									
	Regional NRM Body									
	Local Governments									
	Add new rows for other partners??									

Notes: ^a Categories for Management (based on Bennett & Moss (2005))

Appendix 7 - Pro-forma to Evaluate Status of Key Components of Jurisdictions' WQ Catchment Management Plans

State / Territory	WQ Management Plans	High Ecological Values	Environmental Values	WQ Guidelines	WQ Objectives	Environmental Flow Objectives
Jurisdiction						
Process	Are there formal requirements to develop plans that follow the NWQMS WQ Management Framework?	Has any process been used to establish high ecological value areas as set out in the NWQMS?	How are environmental values established for specific catchments?	Have any specific WQ guidelines been established for the jurisdiction e.g. using direct impact studies, reference sites, etc.?	How are WQ objectives established for specific catchments?	How are environmental flow objectives established for specific catchments?
Current Status	What Catchment Management Plans have been developed to date?	If so, where has this process been used?	What catchments have had environmental values established?	Where have these WQ guidelines been established?	What catchments have had WQ objectives established?	What catchments have had environmental flow objectives established?
Under Development	What Catchment Management Plans are under development?	If so, where is this process currently being used?	What catchments are currently having environmental values established?	Are any other WQ guidelines currently being established?	What catchments are currently having WQ objectives established?	What catchments are currently having environmental flow objectives established?

Appendix 8 - 2005 Assessment of National Water Quality Management Strategy

NWC's 2005 Assessment Framework

The NWC's Water Reform Assessment Framework document (NWC 2005):

- outlines the scope of the 2005 National Competition Policy (NCP) assessment of governments' progress with implementing the water reforms agreed by the Council of Australian Governments and identifies the information that governments are expected to provide, to guide their reports to the National Water Commission; and
- outlines the additional information the National Water Commission is seeking from States and Territories for the baseline assessment of governance arrangements.

This document included the following requirements for reporting on jurisdictions' implementation of the NWQMS.

COAG water reform commitment

Governments are to support the development of the National Water Quality Management Strategy, by adopting market-based and regulatory measures, water quality monitoring, catchment management policies, town wastewater and sewage disposal measures, and community consultation and awareness.

Governments are to demonstrate a high level of political commitment and a jurisdictional response to the ongoing implementation of the principles contained in the National Water Quality Management Strategy guidelines, including on-the-ground action to achieve the policy objectives.

Continued implementation of the National Water Quality Management Strategy will complement the outcomes of the National Water Initiative. In the event that there is any inconsistency between the agreements, the National Water Initiative should take precedence. [*Reference: COAG Water Reform Framework (clauses 8(b) and 8(d); and National Water Initiative (paragraph 7)*).

The development and implementation of the National Water Quality Management Strategy (NWQMS) is a 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 NWQMS has been jointly developed by all governments through the Natural Resource Management Ministerial Council.

Guided by the principle of ecologically sustainable development, the NWQMS aims to deliver a nationally consistent approach to water quality management of a high standard. The main policy objective is "to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development."

The NWQMS sets out a national framework within which all stakeholders can contribute to better water quality management. The strategy is based on policies and principles for water quality management that apply nation-wide and includes guidelines covering the key elements of the water cycle, including groundwater, aquatic ecosystems, stormwater, agricultural water use and effluent management for specific industries.

The NWQMS has been developed to assist jurisdictions in establishing appropriate environmental outcomes. The national guidelines have a shared national objective but allow flexibility in responding to different circumstances at regional and local levels.

Water quality management should occur at the State and Territory level using water quality planning and policy instruments to set water quality goals and objectives that are in line with agreed national guidelines. These goals and objectives should form the basis for management strategies and actions.

The process of implementing the NWQMS involves the community working in concert with government in setting and achieving local environmental values, which are designed to maintain good water quality and to progressively improve poor water quality.

The 1994 Water Reform Framework calls for a mix of approaches including, but not limited to, regulatory and market-based approaches, monitoring, integrated catchment management, education and guidance. Implementation of the NWQMS has strong linkages to other water reform elements, such as water planning, providing water to achieve environmental outcomes, water trading, and the urban water reforms, as well as broader environment protection, planning and natural resource management activities.

In 2001, the National Competition Council released an NCP discussion paper '*Implementing the National Water Quality Management Strategy*'. The paper was prepared as a guide to the assessment of governments' compliance with this water reform commitment. Governments agreed in 2001 to a two-yearly review and the 2003 NCP assessment examined implementation of the NWQMS guidelines, consistent with this timeframe. That assessment evaluated jurisdictions' application of a broad water quality management framework, and expected governments to show a consistent and systematic approach to implementing the key elements of the NWQMS. The assessment also looked to governments to have initiated activities that give effect to the NWQMS where guidelines had been finalised.

Since the 2003 NCP assessment, the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* have been revised, and the guidelines on biosolids management and sewerage systems overflow have been completed. For the 2005 NCP assessment, the Commission will look for governments to demonstrate continued and active implementation of the NWQMS. In undertaking this assessment, the Commission will be guided by the expectations identified in the 2001 paper on implementation and the approach taken in previous NCP assessments. These are summarised at Appendix B (not included in this report). The Commission will consider the extent to which the implementation of other water reform commitments recognises and gives effect to the NWQMS. The 2005 NCP assessment will consider jurisdictions' implementation of guidelines that have been finalised since the last assessment.

Specific NCP matters by jurisdiction

The 2003 NCP assessment found that the majority of jurisdictions were making satisfactory progress in implementing policies that reflect the NWQMS. It also detailed issues that have been identified in previous NCP assessments as requiring further attention in order to fully satisfy COAG requirements. The Commission expects governments to show they have addressed them in their 2005 report on NCP implementation.

Jurisdictions' NWQMS Responses to NWC's 2005 Assessment Framework

New South Wales

Catchment Blueprints, produced for New South Wales catchments in 2002, are being incorporated into catchment action plans by Catchment Management Authorities. Most catchment action plans address water quality problems and set targets for river health outcomes.

New South Wales advised that water sharing plans provide a sufficient amount of flow for the environment.

Property Vegetation Plans (between government and farmers) aimed at maintaining and protecting native vegetation at an on-farm level, also have a component aimed at the improvement of water quality (through maintenance and extension of riparian vegetation).

Building Sustainability Index is a web-based planning tool that measures the potential performance of new residential dwellings against sustainability indices (reduction in mains potable water consumption).

Best Practice Management Guidelines for New South Wales local water utilities (local government water and sewerage businesses) to encourage further implementation of the strategy by local water utilities.

The Natural Resources Commission is developing a set of statewide targets for natural resource management in New South Wales. A number of these targets will aim to maintain or improve the water quality and ecosystem.

The Metropolitan Water Plan for Sydney outlines a major strategy to improve river water quality in the greater Sydney area (includes improved environmental flows and recycling).

Marine water quality objectives have been to identify broad goals to achieve the long-term health of New South Wales' coastal and marine waters.

Explanatory booklets are expected to be produced for the information of local councils and Catchment Management Authorities. Guidelines have already been published for Catchment Management Authorities on how to use existing water quality objectives for freshwaters and estuaries in planning and setting investment priorities.

Water Quality Monitoring:

New South Wales Treasury is conducting a review of water monitoring (both quantity and quality), with a view to assessing the effectiveness, efficiency and costs of this monitoring making recommendations on the needs for future state water quality and aquatic ecological health assessment programs.

Compliance with the Australian Drinking Water Guidelines:

Compliance of water utilities with the Australian Drinking Water Guidelines (NHMRC & NRMCC, 2004) is monitored by New South Wales Health. New South Wales Health provides input into the Department of Energy, Utilities and Sustainability's annual report which essentially shows compliance of non-metropolitan water utilities with the Australian Drinking Water Guidelines.

Victoria

Victoria has continued to implement the key elements of the NWQMS through a range of mechanisms:

- the Victorian River Health Strategy—this provides an integrated framework for managing river health to achieve ecologically healthy rivers that are managed within healthy catchments
- regional catchment strategies, regional river health strategies, water quality action plans. Through these, Catchment Management Authorities identify the environmental, social and economic values of water, and in consultation with the community, set priorities for water quality management in water quality related plans and programs, and
- the revised State Environmental Protection Policy (Waters of Victoria) 2003—this sets environmental quality objectives that inform; water quality and biological requirements for ecologically healthy rivers, and protection of various environmental, economic and social assets. This policy recognises the water quality management targets set in regional catchment strategies.

Victoria has developed the RiVERS Assets Register, which draws on the environmental values in the NWQMS as well as social and economic assets identified by the Catchment Management Authorities for incorporation into the regional river health strategies. Supporting the regional river health strategies are a number of additional supporting, specific issue plans developed by the Catchment Management Authorities as part of a three-year rolling regional activity plan.

Victoria has a number of frameworks for monitoring water quality, including:

- the Victorian Water Quality and Quantity Monitoring Network
- the Index of Stream Condition, and
- the Catchment Condition Indicators project, reported by the Victorian Catchment Management Council.

Development and Implementation of Risk-based Environmental Objectives for Catchments
Victoria's management approach, through the Victorian River Health Strategy, is based on four key elements:

- protecting the rivers that are of highest community value from any decline in condition
- maintaining the condition of ecologically healthy rivers
- achieving an 'overall improvement' in the environmental condition of the remainder of the state's rivers, and
- preventing damage from future management activities.

A risk-based assessment is used to determine the threats to the identified assets and priority waters, identified by Catchment Management Authorities in the regional river health strategies using the RiVERS register as a decision support tool. The assessment determines the threats of most significance and thus those requiring management actions to be undertaken.

Development of Catchment-based Nutrient and Water Quality Plans⁴:

Through the *Victorian River Health Strategy*, Catchment Management Authorities will be required to develop a number of sub-strategies to support their regional river health strategy. One of these is the catchment water quality action plan, which will encompass actions to deal with nutrients, salinity (if not covered by a separate plan) and other water quality issues.

⁴ Update from Victorian DSE: Catchment Water Quality Action Plans **have been** completed as a requirement of the VRHS (2002). The plans **were** developed by CMAs in consultation with key stakeholders and regional communities. They will no longer be required into the future and this is important to note. In the future, the second generation regional river health strategies will deal with WQ issues within them.

These plans will be developed by the Catchment Management Authorities in consultation with key stakeholders and regional communities.

Victoria's Water Quality Monitoring Arrangements:

From 1 March 2005, water quality monitoring that was previously conducted by a number of agencies across the state has been integrated through the establishment of regional water resource monitoring partnerships. These partnerships have been established for the Gippsland, North East, North West and South West regions.

Implementation of Frameworks to Control Point and Diffuse Source Pollution:

Control of point and diffuse source pollution in waterways for surface water is managed through the State *Environmental Protection Policy (Waters of Victoria) 2003*, which is subordinate legislation under the *Environment Protection Act 1970*.

Point source pollution of Victorian waterways is controlled by the Victorian Environment Protection Authority, mostly through a range of regulatory mechanisms.

Diffuse pollution of Victorian waterways is controlled through a range of frameworks including:

- urban stormwater best practice environmental management guidelines
- landuse planning
- best management practices, and
- strategies and frameworks prepared by Catchment Management Authorities addressing integrated catchment management.

The State Environmental Protection Policy was updated in June 2003 to reflect current scientific knowledge and approaches and Victoria's catchment management arrangements. Schedules to this policy provide special measures for sensitive areas such as Western Port, the Gippsland Lakes and Port Phillip Bay.

Queensland

The Environmental Protection (Water) Policy 1997 adopts the NWQMS approach of establishing the environmental values of waterways for protection, water quality objectives to protect environmental values, and protocols for sampling, measurement, analysis and reporting.

The Queensland Environmental Protection Agency is currently working with catchment communities to establish environmental values and water quality objectives for Moreton Bay – South-East Queensland, the Mary River Basin – Great Sandy Region, and the waters of Douglas Shire (EPA, 2004).

For the remainder of Queensland's waters, the Environmental Protection Agency is working with regional natural resource management bodies and local governments to establish arrangements for water quality target-setting.

Environmental values are considered in the development of water resource plans.

The Environmental Protection Agency has developed the *Draft Queensland Water Quality Guidelines* (EPA Queensland, 2005) that complement the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* (ANZECC & ARMCANZ, 2000).

The South East Queensland Regional Water Quality Management Strategy *The South East Queensland Regional Water Quality Management Strategy* (Healthy Waterways, 2001) was developed in cooperation with local government, community and industry groups

Reef Water Quality Protection Plan - joint approach to protecting the Great Barrier Reef from land-based pollution; with a particular focus on diffuse pollution.

Water Quality Monitoring

- development of a conceptual framework for a stream and estuary assessment
- providing water quality science for priority regions in Queensland through the National Water Quality State Investment Program.
- implementation of the sustainable rivers audit for the Murray-Darling Basin.
- water quality and river health data available through publications and on websites

Western Australia

State Water Quality Management Strategy

Western Australia reported that during 2004-05 its six Natural Resource Management regions developed Regional Natural Resource Management Strategies that deal with water quality and on ground implementation of the State Water Quality Management Strategy (SWQMS), including SWQ6, which encompasses implementation of NWQMS papers 4 and 7. These regions manage water quality, and associated assessment and reporting issues for Western Australia's inland waters.

With regard to the management of water quality in coastal waters, Western Australia reported its recent progress implementing SWQ6 in the Pilbara, through the Pilbara Coastal Waters project. Community and stakeholder views on environmental values and environmental quality objectives for the Exmouth Gulf and Pilbara marine environments were obtained. These will guide development of goals for environmental quality to manage the effects of diffuse and point source pollution, and to maintain marine health.

The next major phase of the Pilbara Coastal Waters project will be to develop specific criteria for water and sediment quality indicators. The Department has completed a survey of background water quality and is currently conducting a survey of background sediment quality for the region. These regional data will be used together with approaches recommended by the Australia Water Quality Guidelines to develop the criteria. Once developed, the criteria will be used as benchmarks against which to assess the results of monitoring programs and to determine whether the environmental quality objectives are being achieved and the environmental values protected.

SWQ6 has also been implemented in Cockburn Sound, Western Australia's most intensively used marine embayment. Western Australia released the *State Environmental (Cockburn Sound) Policy 2005* in January 2005. The policy, which will be implemented through existing statutory powers under the *Environmental Protection Act 1986*, has the primary aim of declaring, protecting and maintaining the environmental values of Cockburn Sound.

The policy also provides for the:

- implementation of the *Environmental Management Plan for Cockburn Sound and its Catchment*, which outlines on-ground actions for implementing the policy, and establishes the particular roles and responsibilities of managers and user groups; and
- investigation and monitoring of Cockburn Sound, as described in the *Manual of Standard Operating Procedures for Environmental Monitoring against the Cockburn Sound Environmental Quality Criteria (2003 – 2004)*.

Implementation of NWQMS Guidelines:

WA reported the following progress in implementing the NWQMS guidelines:

Drinking Water Guidelines (NWQMS paper 6):

Western Australia incorporated the Australian Drinking Water Guidelines (NHMRC & NRMCC, 2004) into its government policy in the *State Water Strategy 2003* and *State Sustainability Strategy 2003*.

Western Australia reported that it has prepared an overarching *Public Drinking Water Resource Policy* that reflects existing custom and practice and the new catchment to consumer framework approach promoted in the Australian Drinking Water Guidelines.

Western Australia also expects the release of the 2004 Australian Drinking Water Guidelines to provide an opportunity to promote its State Water Quality series document 3 (SWQ3). SWQ3 is planned to promote the Australian Drinking Water Guidelines through Western Australia Government agencies to ensure the significance of drinking water catchments are properly reflected in all government agency decision making processes.

Groundwater Protection (NWQMS paper 8)

Western Australia advised that its groundwater protection program is consistent with NWQMS Guideline 8. To assist with implementation of the NWQMS guideline, Western Australia is preparing a Water Quality Protection Note, which will recommend best management practices for various land uses that have a strong likelihood of impacting upon the quality of Western Australia's groundwater resources.

In addition, the Department of Water is continuing to work with Western Australia's planning agencies to ensure that groundwater protection requirements are integral within the land-use planning process.

Urban Stormwater (NWQMS paper 10)

The *Stormwater Management Manual for Western Australia* will provide coordinated guidance on current best management practice for stormwater management in Western Australia.

Effluent Management (NWQMS paper 11)

Western Australia advised that this guideline represents an overview for all sewerage system guidelines (Guidelines 11 to 15). As such the work previously completed on each guideline 12 to 15 means a separate implementation plan for Guideline 11 is not needed, but it may be progressed if interest from other agencies is received in 2006. Additionally, effluent management is subject to the Environmental Protection Authority's licence assessment and condition setting process that inherently considers the NWQMS series of documents.

Western Australia also indicated that a 'Wastewater Management Framework' is being progressed to enhance existing sewerage system processes and practices in Western Australia.

Reclaimed Water (NWQMS paper 14)

Western Australia's *State Water Strategy* considers reclaimed waste and deals with greywater recycling and scheme-based reclamation and its use for industry, parks, gardens and horticulture. Western Australia indicated that the development of implementation plans will be considered under this framework.

Western Australian is progressing reclaimed/ recycled water issues for industry, parks/ ovals and agriculture use. The Environmental Protection Authority in Western Australia held six 'Managed Aquifer Recharge – using recycled water' workshops and finalised its report to government in October 2005.

The Premier has also approved projects to further progress Western Australia's knowledge of the chemicals of concern to the environment and people. The Premier's *State Water Strategy* Taskforce is overseeing ongoing progress of this project.

Dairy sheds and processing plant effluent (NWQMS papers 16a and 16b)

Western Australia reported that a 1998 dairy farm effluent guideline titled *Environmental management for animal based industries – Dairy farm wastewater 1998* exists, which considers NWQMS outcomes. In addition, regulations for effluent management that will apply to dairying are being progressed. Western Australia is also preparing a best management practice manual for dairying.

With regard to dairy processing sheds, Western Australia reported that they are subject to licensing under the *Environmental Protection Act 1986*. The licences use NWQMS outcomes to set conditions to protect water quality. In addition, a Dairy Processing Plant Water Quality Protection Note was released in July 2004.

Water Reform Commitments

The *Environmental Water Provisions Policy for Western Australia* describes the approach to be followed by the Department of Water in determining how water will be provided to protect ecological values when allocating the rights to use water in Western Australia. Under the policy, water quality issues need to be considered in four main areas when establishing environmental water requirements and environmental water provisions. These are where:

- part of an environmental water requirement may be required to address water quality problems that are mostly caused by surface water diversions or groundwater abstraction (e.g. where river pools were previously oxygenated by continuous flow or low oxygen levels in wetlands have been caused by lower than normal water depths)
- water regimes identified as environmental water provisions may need to have associated water quality parameters to ensure appropriate protection of ecological and social values (e.g. when water is released from a reservoir or water is pumped into a wetland from a deep aquifer)
- there is a need to establish mitigation water requirements, as defined in the policy, to provide for the flushing of algal blooms or the dilution of saline systems affected by dryland salinity or similar, and
- the implementation of environmental water provisions would not make a significant improvement to wetland or river health unless other actions were taken to improve water quality problems associated with catchment or waterway management.

South Australia

South Australia implements the NWQMS framework through the Environment Protection (Water Quality) Policy 2003. This policy, which is a statutory instrument under the *Environment Protection Act 1993*, came into operation on 1 October 2003. It applies to all inland surface water, groundwater, and marine waters. It covers a range of issues, including:

- establishment of protected environmental values and water quality objectives
- management and control of point and diffuse sources of pollution
- obligations relating to particular activities, and
- water quality criteria, discharge limits and listed pollutants.

South Australia's recent activities under the Environment Protection (Water Quality) Policy 2003 include the following:

- developing the *Port Waterways Water Quality Improvement Plan* (EPA, 2005), which identifies environmental values and water quality objectives in consultation with the community.

- undertaking a catchment risk assessment of pollutants entering the Murray River. A catchment risk assessment is planned for the Mount Lofty Ranges watershed and for Gulf St Vincent
- a decision-support tool has been used to determine sustainable loads from these main point sources entering the Port Waterways,
- ambient water quality monitoring is continuing across the state including the Port River.

State of Environment reporting, and reporting on statutory regional natural resource management plans, will be used to report on the effectiveness of actions taken to achieve water quality objectives under the Environment Protection (Water Quality) Policy 2003.

The *Natural Resources Management Act 2004* requires all regional natural resource management plans to be consistent with the Environment Protection (Water Quality) Policy 2003. For example, regional water management planning should be based on environmental values, as advocated in the NWQMS, and identified by the community and government.

The *Draft State Natural Resources Management Plan* expects regional Natural Resource Management Boards to seek assistance from the Environment Protection Authority to ensure future planning activities are consistent with the Environment Protection (Water Quality) Policy 2003.

Implementation of NWQMS Guidelines:

The Environment Protection (Water Quality) Policy 2003 uses codes of practice and guidelines to describe how a person undertaking a particular activity can comply with their general environmental duty. South Australia adopts NWQMS guidelines as a basis for these codes and guidelines, but makes some variations to meet local requirements.

The Environment Protection Authority has used the *Guidelines for Sewerage Systems – Sewerage System Overflows* (ANZECC & ARMCANZ, 2000b) to develop the *Draft Code of Practice for Wastewater Overflow Management: For Public Consultation* (EPA, 2003) that can be enforced through the Environment Protection (Water Quality) Policy 2003.

Water Quality Monitoring:

South Australia has instituted reviews of water monitoring at statewide, regional and catchment scales. All reviews are coordinated through the State Water Monitoring Coordinating Committee.

At the state level, the Environment Protection Authority conducted an internal review of the ambient water quality monitoring program in 2003, which resulted in a number of changes in, and expansion of, the previous program. The state government committed an additional \$370,000 per annum to the program. The additional funding supported increased monitoring to include additional rivers and streams, aquifers under stress, and an expansion of the marine monitoring program.

Reports on the ambient water quality monitoring program are published on the Environment Protection Authority website (www.epa.sa.gov.au). The program has since been reviewed, and is now being internally reviewed, before being subjected to external peer review.

Tasmania

Tasmania has continued to implement the key elements of the NWQMS through its State Policy on Water Quality Management 1997. The policy establishes a water quality management framework with the setting of environmental values and water quality objectives. It also provides a framework for the management of point and diffuse sources of pollution.

Protected environmental values have now been set for the majority of Tasmania's fresh and estuarine waters, and are publicly at www.dpiwe.tas.gov.au. The process of setting protected environmental values for fresh and estuarine waters has involved community consultation and negotiated agreements between the board of the Environmental Management and Pollution Control Board (an independent statutory body) and relevant planning authorities.

The Commission understands that protected environmental values will be incorporated into park management plans, used for natural resource management, and considered in water management planning.

Tasmania has indicated that a lack of data, and a lack of appropriate ecosystem-based protected environmental values have both caused difficulties with the value-setting process for groundwaters and coastal waters. Tasmania intends to address these issues in the 2006 review of the *State Policy on Water Quality Management 1997*. A public consultation process to set protected environmental values for coastal waters and to establish interim protected environmental values for groundwater will commence once the review is complete.

Water Reform Commitments

The Department of Primary Industries, Water and Environment is developing statutory water management plans to determine future water allocations for watercourses, lakes and groundwater areas. Protected environmental values and water quality objectives developed under the *State Policy on Water Quality Management 1997* inform the development of environmental objectives, and the subsequent environmental water provisions within these plans.

Implementation of Guidelines

Tasmania has indicated that it expects that the *State Policy on Water Quality Management 1997* will undergo a full review in 2006, and be amended to align protected environmental values with those in the revised *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

Water Quality Objectives

According to Tasmania, water quality objectives, as defined in its *State Policy on Water Quality Management 1997*, broadly equate to long term targets in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000*. In un-impacted catchments, the water quality objectives will reflect existing ambient conditions; in highly stressed catchments they will represent long-term targets.

Tasmania has developed a process for setting water quality objectives. It has been tested in one west coast catchment. Tasmania expects that, except where required on a case-by-case basis, water quality objectives will be set for catchments through the natural resource management framework established in Tasmania in a manner and timeframe that is consistent with the requirements of the National Resources Management National Monitoring and Evaluation framework and the *State Policy on Water Quality Management 1997*.

State Water Quality Monitoring Strategy

The Tasmanian Surface Water Quality Monitoring Strategy, adopted in 2003, underpins the Tasmanian Government's role in coordinating water quality monitoring and reporting activities across the state. A key objective of the strategy is to develop and maintain partnerships with local government, industry and community groups by developing and maintaining a centralised Tasmanian water quality database.

Tasmania has made recent progress towards this objective by:

- assisting the development of a centralised database for community monitoring programs such as Waterwatch
 - partnering with relevant councils to audit their water quality monitoring activities and associated data to identify opportunities for integrated water quality monitoring and data sharing.
 - progressing the establishment of memorandums of understanding with key industry stakeholders regarding sharing water information and reporting of this information
 - increasing the baseline water quality monitoring network to 54 stations.
 - training community groups in water quality monitoring, and
 - improving access to water related data for all stakeholders
- www.water.dpiwe.tas.gov.au/wist/ui

Australian Capital Territory

NWQMS initiatives are principally incorporated through codes of practice covering water quality, water monitoring and wastewater management.

In particular, the Australian Capital Territory has:

- refined national and regional guidelines for site specific applications within various catchments of the Australian Capital Territory. This tailored approach addressed the primary management aims for each catchment including the water quality objectives, then provided appropriate guideline values for relevant indicators as determined from an assessment of site specific data. This approach allowed for different levels of protection in different catchments, depending on the values identified in the territory's *Water Resources Management Plan 2004*
- reviewed the Australian Capital Territory water quality standards set out in Schedule 4 of the Environment Protection Regulations 1997, and
- reviewed its water monitoring and assessment program before issuing any new monitoring contracts. The program includes water quality, streamflow and biological monitoring. The results of this analysis are published in an annual *Australian Capital Territory Water Report*.

Water Reform Commitments

As the Draft *Environmental Flow Guidelines*⁵ explain, implementation of the *Water Resources Act 1998* needs to be consistent with *Think water, act water*.

Three types of water use catchments are identified in *Think water, act water* — 'conservation', 'water supply', and 'drainage and open space'. The plan specifies the primary environmental and use values of waterbodies in the Australian Capital Territory for each of these types of catchment.

Under the general principles and policies, *Think water, act water* requires that planning be guided by the principles of ecological sustainability and exclude catchment land and water uses that impact on the sustainability of environmental or water use values. It is therefore necessary that appropriate flows be provided to protect the environmental and use values of Australian Capital Territory waterbodies.

Think water, act water has four principles to achieve protection of environmental values of downstream waters, namely:

- land use and management practice shall be cognisant of streamflow and water quality impacts downstream
- streamflow diversions shall be restricted to authorised diversions
- lake and reservoir releases shall be consistent with the protection of downstream ecology and water uses, and

⁵ Update from ACT: The Environmental Flow Guidelines have now been finalised.

- groundwater abstraction shall be consistent with authorised abstraction.
- Implementing these policies necessitates defining quantitative *Environmental Flow Guidelines* for all streams, rivers, lakes and aquifers in the Australian Capital Territory.

Northern Territory

Beneficial Use Declarations

Under the *Water Act 2004*, water quality in the Northern Territory is currently protected by the adoption of community-based beneficial use declarations and environmental values for each water body. Declaring beneficial uses provides legal recognition of the values of a water resource and determines how water may be used, managed and protected. This beneficial use framework is identical to the environmental values framework of the NWQMS.

Water quality monitoring—to assess whether water quality values and beneficial uses are being maintained—is undertaken in the Northern Territory as a partnership between industry, government and the community.

Ilparpa Swamp is one example of an area in the Northern Territory that has declared beneficial uses under the *Water Act 2004*. A community consultation process identified environmental and cultural use as priority values of the area. A programme to rehabilitate the swamp, and protect its environmental and cultural beneficial uses, was subsequently established.

Industry Codes of Practice and Environmental Guidelines

Point-source pollution produced by large industries is regulated by waste discharge licences that set discharge limits, and establish mixing zones and environmental monitoring programs to verify the discharge limits are being met. Draft environmental guidelines for waste discharge management are available on request to the Environmental Protection Agency to provide a framework for risk management, mixing zone management and environmental monitoring. Diffuse source pollution is managed through industry codes of practice and environmental guidelines.

Water Reform Commitments

The *Water Act 2004* provides the primary statute for all matters associated with the sustainable use and protection of water quality of surface water resources and groundwater resources. The Act applies the beneficial use framework discussed above to the management of both surface water and groundwater. For example, water resources are allocated to consumptive water users according to the beneficial use categories. A beneficial use must first be declared prior to any allocation being determined for any particular use. An entitlement to extract water for any particular purpose is then provided through a water extraction licence, which is issued for particular beneficial uses.

Implementation of NWQMS Guidelines

Regulatory agencies in the Northern Territory recognise and use the NWQMS guidelines on point and diffuse source pollution where their use is considered appropriate.

Drinking Water Monitoring Programme

The Power and Water Corporation reviews its Drinking Water Quality Monitoring Program continuously in conjunction with the Department of Health and Community Services. The corporation publishes the review results in its annual Water Quality Reports, which are publicly available on the corporation's website.

Recent modifications to the Drinking Water Quality Monitoring Program have included:

- introducing additional sampling programs in Tennant Creek to enhance the ability to identify potential problems

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- introducing additional sampling locations in Alice Springs to incorporate system expansion, and
- reducing the frequency of radiological and pesticide sampling to account for previous results.

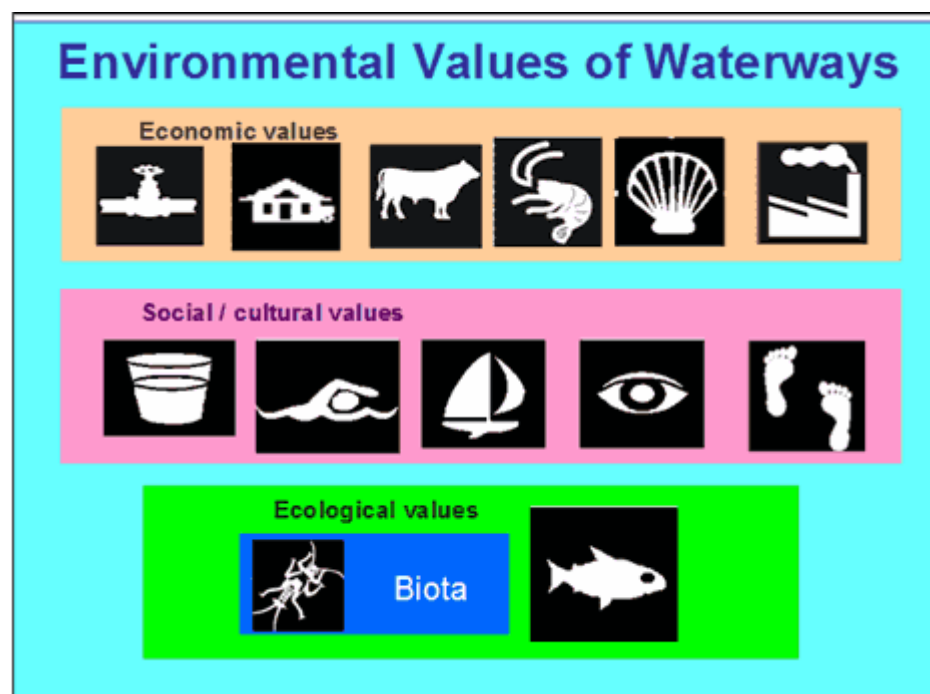
The Power and Water Corporation (in conjunction with the Department of Health and Community Services) will be undertaking a major review of the Drinking Water Quality Monitoring Program during 2006, with regard to newly released National Health and Medical Research Council guidelines.

Appendix 9 - NWQMS and related Guidelines (and short titles)

No.	Title	Short Title
	Policies and Process for Water Quality Management	
1	<i>Water Quality Management — An Outline of the Policies</i>	1– Outline
2	<i>Policies and Principles — A Reference Document</i>	2 – Policies & Principles
3	<i>Implementation Guidelines</i>	3 – Implementation
	Water Quality Benchmarks	
4	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i>	4 – Water Quality
6	<i>Australian Drinking Water Guidelines</i>	6 – Drinking water
7	<i>Australian Guidelines for Water Quality Monitoring and Reporting</i>	7 – Monitoring & Reporting
	Groundwater Management	
8	<i>Guidelines for Groundwater Protection</i>	8 – Groundwater
	Guidelines for Diffuse and Point Sources*	
9	<i>Rural Land Uses and Water Quality — A Community Resource Document</i>	9 – Rural Land Uses
10	<i>Guidelines for Urban Stormwater Management</i>	10 – Urban Stormwater
11	<i>Guidelines for Sewerage Systems — Effluent Management</i>	11 – Sewage Effluent
12	<i>Guidelines for Sewerage Systems — Acceptance of Trade Waste (Industrial Waste)</i>	12 – Trade Waste
13	<i>Guidelines for Sewerage Systems — Biosolids Management</i>	13 – Biosolids Management
14	<i>Guidelines for Sewerage Systems — Use of Reclaimed Water</i>	14 – Reclaimed Water
15	<i>Guidelines for Sewerage Systems — Sewerage System Overflows</i>	15 – Sewage Overflow
16a	<i>Effluent Management Guidelines for Dairy Sheds</i>	16a – Dairy Sheds
16b	<i>Effluent Management Guidelines for Dairy Processing Plants</i>	16b – Dairy Processing
17	<i>Effluent Management Guidelines for Intensive Piggeries</i>	17 – Piggeries
18	<i>Effluent Management Guidelines for Aqueous Wool Scouring and Carbonising</i>	18 – Wool Scouring
19	<i>Effluent Management Guidelines for Tanning and Related Industries in Australia</i>	19 – Tanning
20	<i>Effluent Management Guidelines for Australian Wineries and Distilleries</i>	20 – Wineries & Distilleries
21	<i>Australian Guidelines For Water Recycling - Managing Health & Environmental Risks - Phase 1</i>	21 – Recycled Water
	<i>Guidelines for Managing Risks in Recreational Waters (NHMRC 2008)</i>	Recreational Guidelines
	<i>Australia & New Zealand Food Standards Code (FSANZ 2007)</i>	Food Standards Code

Appendix 10 - NWQMS's Environmental Values (EVs)

	Maintaining aquatic ecosystems
	Primary industries (irrigation, farm use, stock watering, aquaculture, human consumption of fish/shellfish)
	Recreational uses (primary recreation, secondary recreation, visual appreciation)
	Drinking water
	Industrial use
	Maintaining cultural and spiritual values



Appendix 11 - NWQMS Guideline Documents – Jurisdictions’ and other responses to Appendix 5 pro-forma

No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
	Policies and Process for Water Quality Management		
1	<i>Water Quality Management — An Outline of the Policies</i>	<i>Reference document (NSW, WA, VIC, QLD, NT, TAS, ACT)</i>	<i>Needs to incorporate overview on initiatives that have occurred since publication NWI, NRM etc (WA)</i>
2	<i>Policies and Principles — A Reference Document</i>	<i>Translated into “Principles and Policies for Managing the Quality of WA’s water resources” draft 2007(WA)</i> <i>Reference document (NSW, VIC, QLD, NT, TAS, ACT)</i>	<i>Useful document for resolving recurring policy questions (NSW)</i> <i>OK as is (WA)</i>
3	<i>Implementation Guidelines</i>	<i>Reference document (NSW, WA, VIC, NT, TAS, ACT)</i> <i>Basis of EPP (Water) & WQ Mgt Plans (QLD)</i>	<i>Not relevant for NSW as we already have Catchment Action Plans (NSW)</i> <i>Case studies?? (WA, QLD)</i>
	Water Quality Benchmarks		
4	<i>Australian and New Zealand Guidelines for Fresh and Marine Water Quality</i>	<i>Reference guide used to establish WQOs. Used to assess development applications as part of EIA. Refer stakeholders to them. Have developed guidance material (NSW)</i> <i>Routinely used to benchmark water quality criteria to sustain EVs (WA)</i>	<i>Needs to be more user-friendly (NSW)</i> <i>Too bulky - better set up for research than water resource manager- needs separation into 3 distinct segments-</i> <i>1. Reference criteria to sustain EVs,</i> <i>2. Application framework and practice and</i> <i>3. Appendices on derivation of recommendation (WA)</i> <i>DEWHA to provide feedback area on NWQMS on its</i>

⁶ The NHMRC document ‘Guidelines for Managing Risks in Environmental Waters (2008)’ has slipped out of Document #4 where this sort of guidance once lived and now has a new face. What will be done with this in terms of NWQMS? If Document 4 gets updated, then perhaps it can point to the NHMRC? The NT has used this NHMRC document to develop local guidelines - see: http://www.health.nt.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/20/29.pdf&siteID=1&str_title=NT%20Recreational%20Microbiological%20Water%20Quality%20Guidelines%20.pdf

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
		<p><i>Reference document and referenced in State Environment Protection Policy (VIC)</i></p> <p><i>QLD WQ Guidelines based on the process outlined in this document.t</i> <i>Developed user-friendly version.</i> <i>Used in part to guide some of the biological assessment processes.</i> <i>Used to assess WQ for the State of Environment and SWAN reporting.</i> <i>Used as a basis for the development of WQ objectives for WQIPs and WRPs.</i> <i>Recommended to our external stakeholders (regional NRM bodies and community groups) as a key reference document for interpreting water quality monitoring data (where Qld-specific guidelines not available).</i> <i>Strongly referred to in the new Queensland Community Waterway Monitoring Manual and related training activities undertaken by the Department. (QLD)</i></p> <p><i>Reference document - extensively used and referenced by stakeholders/consultants, especially for toxicants. A persistent culture exists that defaults to the guideline values and doesn't get the message about regional/local data (NT)⁶</i></p> <p><i>Reference guide for stakeholders.</i> <i>Used to establish WQOs and for assessing development applications (TAS)</i></p>	<p><i>website</i> <i>Section 3.3 in NWQMS#4 (Tables 3.3.2 to 3.3.11) provide generic data on ecosystem qualities than can be locally misleading. If practical it would be useful to provide links to water quality databases maintained by catchment management agencies, NRM groups and environmental reporting authorities on the qualities of Australian and New Zealand waters (inclusive of sampling times and statistical attributes such as 90 percentiles and medians) to determine trigger values in specific waters. (WA)</i></p> <p><i>Integrating the management of soil and WQ;</i> <i>A targeted revision of the current WQ guidelines;</i> <i>Development of an over-arching protocol for determining which chemicals should have trigger values;</i> <i>Establishment of a centralised electronic storage facility for site-specific assessments; and</i></p> <p><i>Creation of a web-based system for continual updating of the WQ guidelines (CSIRO)</i></p> <p><i>Include NHMRC recreational water quality standards (VIC)</i></p> <p><i>Needs to be more user-friendly.</i> <i>The emphasis that development of local guidelines are 1st recommendation needs highlighting more.</i> <i>Collection of more information targeted for guideline development is the only way of updating these and this will cost some funding so therefore is highly unlikely.</i></p>

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
		<i>Reference document incorporated into the Environment Protection Regulations (ACT)</i>	<p><i>Timely to review the science behind the Water Quality guidelines and update them as necessary. (QLD)</i></p> <p><i>Needs to be reviewed in light of contemporary information and subsequent updates of principal reference documents such as NHMRC Australian Drinking Water Guidelines 2006 and Guidelines for Managing Risk in Recreational Waters 2005 (TAS).</i></p>
6	<i>Australian Drinking Water Guidelines (currently being revised)</i>	<p><i>Reference document and benchmark (NSW)</i></p> <p><i>Framework (Chapters 2 & 3) used to manage proclaimed drinking water catchments; reference for water quality criteria. (WA)</i></p> <p><i>Reference document and referenced in State Environment Protection Policy, Water Act and Drinking Water Act (VIC)</i></p> <p><i>Used by Water Utilities (QLD)</i></p> <p><i>Reference document - endorsed by Health/DHCS for potable supplies (NT)</i></p> <p><i>Reference document - referred to in the Public Health Act 1997 – Drinking Water Quality Guidelines (TAS)</i></p>	<i>Section 3.2.3 -provide a system of undertaking risk assessment that is less subjective -so that risks can be ranked in a reproducible manner -consider a points scoring system relating to likelihood, consequence and impact of interventions. (WA)</i>
7	<i>Australian Guidelines for Water Quality Monitoring and Reporting</i>	<p><i>Reference document (NSW, WA, VIC, NT, TAS, ACT)</i></p> <p><i>Used in part to guide some of the biological assessment processes.</i></p> <p><i>Stands as the primary reference document</i></p>	<i>Too bulky & unfriendly for average user. Better if partitioned into short distinct sections on how, when, what and why to sample; ensuring sampling and analytical accuracy; making statistical sense of gathered data, reporting of data in a manner that is standardised for all jurisdictions, & detailed</i>

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
		<i>for the planning and design of WQ monitoring programs at NRW such as SWAN, Loads (GBR & SEQ). Also recommend this to our external stakeholders (such as regional bodies and community groups) who are involved in local scale water monitoring activities. It was used as the basis for the new Queensland Community Waterway Monitoring Manual and related training activities undertaken by NRW (QLD).</i>	<p><i>theory/technical info in appendices. (WA)</i></p> <p><i>In working with regional NRM bodies, community groups and other local NRM organisations, we have found that documents 4 and 7 are both fairly complex and difficult to use without complementary training and materials that simplify the content of the resource. Document 7 much more user friendly than document 4 (better structure). Would be better if water quality guidelines values in document 4 were easier to find. Uptake of both these documents has been enhanced by recent capacity building activities of the Department (eg. Community Waterway Monitoring Manual and associated training), the NAP WQ SIP program (eg. regional training workshops on how to compare data to guideline values) and the federal government (eg. 1st round of National Water Quality Management Strategy regional training workshops). Therefore, further resources should be directed towards training/capacity building activities to enhance uptake of the documents by all NRM stakeholders. (QLD)</i></p>
	Groundwater Management		
8	<i>Guidelines for Groundwater Protection</i>	<i>Reference document (NSW, VIC, QLD, NT, TAS, ACT)</i>	<p><i>We have a NSW State Groundwater Policy that we use. (NSW)</i></p> <p><i>Pretty good document (WA)</i></p>

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
	Guidelines for Diffuse and Point Sources		
9	<i>Rural Land Uses and Water Quality — A Community Resource Document</i>	<p><i>Reference document in producing state based guidance documents on specific topics (WA)</i></p> <p><i>Reference document (NSW, VIC, QLD, NT, TAS, ACT)</i></p>	
10	<i>Guidelines for Urban Stormwater Management</i>	<p><i>Not used, we have state guidelines (NSW)</i></p> <p><i>Reference document in producing state based guidance document : Stormwater management manual (WA)</i></p> <p><i>Considered during development of best practice environmental management guidelines for urban stormwater (VIC)</i></p> <p><i>Reference document (QLD, ACT)</i></p> <p><i>Reference document - used as basis for draft NT stormwater strategy (NT)</i></p> <p><i>Reference document - State Policy on Water Quality Management references these guidelines in the preparation of stormwater management plans</i></p> <p><i>Used in the preparation of the Draft State Stormwater Strategy and Model Stormwater Management Plans (TAS)</i></p>	<i>Phase I of review of new state guideline is nearing completion (has involved other states) (VIC)</i>
11	<i>Guidelines for Sewerage Systems — Effluent Management</i>	<p><i>Reference document in producing state based guidance document (WA)</i></p> <p><i>Likely to be replaced by more detailed water</i></p>	<i>Soil parameters that are currently monitored under effluent re-use licensing to assess risk of off-site nutrient movement and on-site heavy metal</i>

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
		<p><i>reuse guidelines (WA)</i></p> <p><i>Considered during development of reclaimed water and biosolids guidance (VIC)</i></p> <p><i>Reference document (NSW, QLD, NT, TAS)</i></p>	<p><i>accumulation from effluent application need to be reviewed in the light of recent data obtained in the National Biosolids Program.(QLD)</i></p>
12	<i>Guidelines for Sewerage Systems — Acceptance of Trade Waste (Industrial Waste)</i>	<p><i>Not used, we have state guidelines (NSW)</i></p> <p><i>Considered during development of reclaimed water and biosolids guidance. Considered by DSE in trade waste review (VIC)</i></p> <p><i>Reference document (QLD, NT, TAS)</i></p>	<p><i>Water Services providers & environmental regulators use doc.(WA)</i></p>
13	<i>Guidelines for Sewerage Systems — Biosolids Management</i>	<p><i>Not used, we have state guidelines (NSW)</i></p> <p><i>Reference document in producing state based guidance documents on specific topic (WA)</i></p> <p><i>Considered during development of reclaimed water and biosolids guidance (VIC)</i></p> <p><i>Reference document (QLD, NT, TAS)</i></p>	<p><i>Needs to consider CSIRO work and Australian Biosolids Partnership [AWA] (VIC)</i></p> <p><i>Biosolid parameters that are currently used in the guidelines to determine loading rates for land application need to be reviewed in the light of recent data obtained in the National Biosolids Program. Soil parameters that are currently monitored to assess risk of off-site nutrient movement and on-site heavy metal accumulation from biosolid application need to be reviewed in the light of recent data obtained in the National Biosolids Program. (QLD)</i></p>
14	<i>Guidelines for Sewerage Systems — Use of Reclaimed Water</i>	<p><i>Superseded (NSW, NT)</i></p> <p><i>See comments on doc 11(WA)</i></p> <p><i>Considered during development of reclaimed water and biosolids guidance (VIC)</i></p>	

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
		<i>Reference document (QLD)</i> <i>Used during the development of State reclaimed guidelines (TAS)</i>	
15	<i>Guidelines for Sewerage Systems — Sewerage System Overflows</i>	<i>Not used (NSW)</i> <i>Considered during development of SEPP criteria for sewerage system overflows (VIC)</i> <i>Reference document (QLD)</i> <i>Reference document - used to broker wetwell design criteria for developers/consultants (NT)</i> <i>Considered during development of State based sewerage overflow guidelines (TAS)</i>	<i>Water services providers (WA)</i>
16a	<i>Effluent Management Guidelines for Dairy Sheds</i>	<i>Reference document in producing state based guidance documents on specific topic (in WA Dairy catch initiative) (WA)</i> <i>Considered during development of guidelines for dairy shed management (VIC)</i> <i>Reference document (NSW, QLD)</i> <i>Not relevant (NT, ACT)</i> <i>Reference document - referenced in the preparation of wastewater management emission limit guidelines for intensive animal husbandry (TAS)</i>	<i>The guidelines are generally good, however there are some issues with full adoption across industry. Intensification of agricultural industries (e.g., dairies & piggeries) in WA is presenting problems with managing their off-site impacts. Some semi contained industries are regulated as prescribed premises under the Environmental Protection Regulations 1987. Solutions needed on waste reduction and use, buffers to sensitive land uses and tools for predicting impacts on local environmental values. (WA)</i>

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
16b	<i>Effluent Management Guidelines for Dairy Processing Plants</i>	<p><i>Reference document in producing state based guidance documents on specific topic (WA)</i></p> <p><i>Considered during development of guidelines for dairy processing plants (VIC)</i></p> <p><i>Reference document (NSW, QLD, TAS)</i></p> <p><i>Not relevant (NT, ACT)</i></p>	
17	<i>Effluent Management Guidelines for Intensive Piggeries</i>	<p><i>Reference document in producing state based guidance documents on specific topic (WA)</i></p> <p><i>Considered during development of piggery code of practice (VIC)</i></p> <p><i>Reference document (NSW, QLD)</i></p> <p><i>Not relevant (NT, ACT)</i></p> <p><i>Reference document - referenced in the preparation of wastewater management emission limit guidelines for intensive animal husbandry (TAS)</i></p>	
18	<i>Effluent Management Guidelines for Aqueous Wool Scouring and Carbonising</i>	<p><i>Reference document in producing state based guidance documents on specific topics (WA)</i></p> <p><i>Reference document (NSW, VIC, QLD, TAS)</i></p> <p><i>Not relevant (NT, ACT)</i></p>	
			<i>Not a growth activity in WA - Doesn't warrant update (WA)</i>

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
19	<i>Effluent Management Guidelines for Tanning and Related Industries in Australia</i>	<p><i>Reference document in producing state based guidance documents on specific topic (WA)</i></p> <p><i>Reference document (NSW, VIC, QLD, TAS)</i></p> <p><i>Not relevant (NT, ACT)</i></p>	<i>Not a growth activity in WA - Doesn't warrant update (WA)</i>
20	<i>Effluent Management Guidelines for Australian Wineries and Distilleries</i>	<p><i>Reference document in producing state based guidance documents on specific topic (WA)</i></p> <p><i>Reference document (NSW, VIC, QLD, TAS)</i></p> <p><i>Not relevant (NT)</i></p>	
21	<i>Australian Guidelines For Water Recycling - Managing Health And Environmental Risks - Phase 1</i>	<p><i>Used where there is no state guideline (NSW)</i></p> <p><i>New document -still being assessed. Used as a platform for development of state policy and guidance docs (WA, QLD, NT, ACT)</i></p> <p><i>To be considered during review of legislation and guidance for on-site systems and wastewater reuse.(VIC)</i></p> <p><i>Reference document (TAS)</i></p>	
21a	<p><i>Australian Guidelines For Water Recycling - Phase 2</i></p> <ul style="list-style-type: none"> <i>• Augmentation of Drinking Water Supplies – penultimate draft for endorsement and publication.</i> <i>• Managed Aquifer Recharge(MAR) – draft for release for public consultation.</i> 	<p><i>Used where there is no state guideline (NSW)</i></p> <p><i>New document -still being assessed (WA, QLD, NT, TAS)</i></p> <p><i>Currently being used for the development of state MAR and stormwater guidance. Augmentation of Drinking Water Supplies is</i></p>	

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
	• <i>Stormwater Re-use</i> – draft for release for public consultation.	<i>generally considered to be state position on this issue.(VIC)</i>	
	Recommendations for new documents		
	<i>Process and practice for determining fate and impact of contaminants applied to land on environmental values for surface waters and groundwater (WA)</i>	<i>Standard model for predicting impact of contaminants e.g. nutrients, metals, oxygen scavengers and petroleum residues entering environment and impacting on water resources located at a distance downstream. Similar to CSIRO's Pesticide Impact rating index PIRI (WA)</i>	<i>Allows for water resource managers to assess land use impacts resulting from land use intensification/ development applications (WA)</i>
	<i>Process and practice for determining form and extent of sustainable vegetated buffers to sensitive waters considering land morphology, soil type, meteorology, land use practice & vegetation sustainability/density to act as a contaminant filter. (WA)</i>	<i>Definition of reservoir protection zones, conservation valued waterway & wetland buffers; protection of agricultural water supply sources and aesthetic/recreation values of water bodies (WA)</i>	<i>Refer to WQPN on Vegetated buffers to sensitive water resources on www.water.wa.gov.au select water quality > publications > water quality protection notes. (WA)</i>
	<i>Guidelines for wood processors (TAS)</i>		<i>Guidelines needed for managing risks of both natural and process produced chemicals derived from timber processing industry (TAS)</i>
	<i>Guidelines for terrestrial based aquaculture (TAS)</i>		<i>Guidelines needed for managing pollutants such as nutrient and potential biosecurity pathogens (TAS)</i>
	General Comments		
			<i>Need a good system for updating the guidelines and maintaining version control on the guidelines (NSW)</i> <i>The ever increasing interest in off-stream wetlands generally rather than just in-stream waterways is an important issue to consider in the context of these documents. (QLD)</i>

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No.	Title	How has your jurisdiction used this document?	Feedback from Contact Network
			<i>Improve updating mechanisms and dissemination systems incorporating living electronic documentation, tracking system for changes, and targeted information modules (TAS).</i>

Appendix 11-1 New Zealand Comments on Review of NWQMS Guideline #4

Comments from practitioners in NZ (May 2008) on ANZECC (2000) Water Quality Guidelines

NOT AN OFFICIAL NZ GOVERNMENT DOCUMENT

[Comments collated by: Mike Thompson (Ministry for the Environment), Ph ++64 (0)4 4397552, Email: mike.thompson@mfe.govt.nz]

Purpose and status of this document

This document contains a summary of comments and suggestions from resource managers in New Zealand about the implementation and perceived efficacy of the ANZECC (2000) water quality guidelines (the “Guidelines”). The purpose of the document is to act as a live (i.e. updateable) repository of views that can be used to prompt and inform discussions if, and when, the ANZECC guidelines (or parts thereof) are reviewed.

The comments collated in this document have not been generated via a formal or official survey. They have been collected via an informal email survey by the Ministry for the Environment.

Contributors

To May 2008, the following agencies have provided comment:

Environment Southland (Southland Regional Council)
Greater Wellington Regional Council
Environment Canterbury (Canterbury Regional Council)

Note that the comments in this document do not necessarily reflect each agency’s complete range of views on the Guidelines; just those that are ‘front-of-mind’ for some of the science and planning staff and that could be readily collated given staff time constraints.

Structure of the document

General comments about Guideline concerns are provided first, followed by a table that lists more specific concerns and suggestions for review or improvement.

Any information provided in support of comments made is appended at the end of the document.

General comments

Comments received relate primarily to water quality trigger values presented in Volume 1 of the Guidelines; Chapters 3 (Aquatic Ecosystems), 4 (Primary Industries) and 5 (Recreational Water Quality and Aesthetics).

Particular emphasis has been given to the following concerns:

- there is some nervousness about Guideline trigger values –primarily the NZ-specific ones– finding their way into resource management plans and legislation as it is sometimes difficult to defend the values being used.
- there is a feeling that the complex layout of the existing Guidelines makes it difficult to understand the purpose and derivation of the trigger values and, therefore, to correctly apply these values in planning and regulation.
- there is a widely held view that some trigger values are often not particularly relevant or meaningful because the data sets used to derive the values are too small (i.e. not representative of a wide enough range of environments).

Suggestions for Guideline review/improvements focus on:

- providing clearer guidance and explanation about appropriate use of existing trigger values,
- validating existing trigger values by (a) reviewing the breadth of data used for initial trigger value derivations and making use of data that has subsequently become available and (b) reviewing the level of conservatism/stringency afforded by the values
- updating and adding cross-references to other NZ-specific guidelines

Specific concerns

Section	Title	Subject	Comments	Priority for action	Agency
3.3	Physical and chemical stressors	Marine and estuarine waters	<p>There are no relevant trigger values for NZ marine and estuarine waters (as there are for Australia). Australian values are not relevant to NZ conditions.</p> <p>There is a considerable amount of marine and estuarine water quality data available from around NZ that should be collated and examined. A review of research is needed to understand</p>	HIGH	ES, ECan

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Section	Title	Subject	Comments	Priority for action	Agency
			the impacts of nutrient concentrations on phytoplankton and zooplankton productivity, abundance and species presence.		
Tables 3.3.3.10 and 3.3.3.11	Default trigger values for physical and chemical stressors in slightly disturbed ecosystems in New Zealand.	Robustness of trigger values	<p>The default trigger values are based upon too small a data set to be robust enough for state of environment reporting and other management responsibilities (e.g. the lowland waterway nitrate value is based on only about 6 data points). The values do not represent all river or stream types, especially smaller and/or urban streams. And there are no values for each of the following ecosystem conditions: <i>high conservation/ecological value</i>, <i>slightly to moderately disturbed systems</i> and <i>highly disturbed systems</i>.</p> <p>A larger and more representative data set should be used to substantiate and refine trigger values. Triggers should be provided for a greater variety of ecosystem types and levels of protection.</p> <p>Detailed information on ecosystem impacts when trigger values are exceeded is required. Consideration should be given to developing a sliding scale of trigger values and associated likely impacts. For nutrients, consideration should be given to N and P species individually as well as combined concentrations of N and P.</p> <p>Presently the dissolved nutrient guidelines in Table 3.3.11 don't necessarily relate to concentrations that lead to periphyton proliferations; perhaps we need a reference to the NZ Periphyton Guidelines to make an explicit link between nutrient</p>	<p>HIGH</p> <p>MEDIUM</p>	All

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Section	Title	Subject	Comments	Priority for action	Agency
			concentrations and nuisance periphyton growth.	MEDIUM	
		Methodologies are questionable and/or subjective	<p>Visual clarity. The visual clarity trigger values in Table 3.3.11 afford no protection to pristine, or even moderately pristine streams, because they are based upon 20th percentile data. These values should be reviewed and updated.</p> <p>Total Suspended Solids would be a better measure of clarity than Black Disc.</p>	HIGH	GW, ES
Table 3.4.1	Trigger values for toxicants at alternative levels of protection	Reviews of methodologies, updates and corrections	<p>Ammonia. The trigger value for ammonia is considered overly conservative and has been challenged in at least one plan hearing (see evidence appended) for the way in which it has been used. Concern relates mainly to the lack of a temperature conversion factor such as that used by the USEPA (1999).</p> <p>Nitrate. Recalculated toxicity trigger values should be incorporated in updated Guidelines. See: http://www.mfe.govt.nz/publications/water/anzecc-water-quality-guide-02/anzecc-nitrate-correction-sep02.pdf</p> <p>Boron, Zinc, Selenium. Recent review work on these particular metals (see appended evidence) raises questions about the appropriateness of the data selected to derive their trigger values.</p>	HIGH	ES, GW

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Section	Title	Subject	Comments	Priority for action	Agency
			<p>Dieldrin. The low-reliability trigger value (based on an interim data set) is very low for NZ conditions (section 8.3.7.15). Can this be refined with more recent data sets?</p> <p>There are lots of gaps in Table 3.4.1 and the footnotes to the table contain important information that is easily overlooked, e.g. the effect of pH and hardness on some toxicants.</p>	MEDIUM	
3.5	Sediment Quality Guidelines	Update with NZ data	It would be good to see some modification of these guidelines based on NZ data. For example, there is extensive marine sediment contaminant data for the Auckland region and some data suitable for comparative purposes in the Wellington region.		GW
4.3.2.2	Stock drinking water guidelines – pathogens and parasites	Questionable guideline and/or ambiguous guidance for application	ANZECC (2000) guideline of 100 faecal coliforms per 100 mL is seen as overly conservative and currently unachievable in many waterways in NZ; therefore can lead to difficulties when incorporating in regulation. However there is some ambiguity over how the guideline should be applied; the Guideline wording is <i>“It is recommended that a median value of thermotolerant coliforms is used, based on a number of readings generated over time from a regular monitoring program. Investigations of likely causes are warranted when 20% of results exceed four times the median trigger value”</i> .	HIGH	All

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Section	Title	Subject	Comments	Priority for action	Agency
			Review and clarification of this guideline and clear guidance on application is urgently needed.		
General comments	<p>Linkage with other guideline documents</p> <p>Definition of terms</p>		<p>The following suggestions have been made for cross-referencing or updating ANZECC (2000) with other NZ guidelines:</p> <p>Section 3.3. NZ Periphyton Guidelines (Biggs et al 2000). http://www.mfe.govt.nz/publications/water/nz-periphyton-guide-jun00.html</p> <p>Section 5.1. NZ Microbiological Water Quality Guidelines for Marine and Freshwater Areas (MfE/MoH 2003). http://www.mfe.govt.nz/publications/water/microbiological-quality-jun03/</p> <p>Section 6.1. NZ Drinking Water Standards (MoH 2005).</p> <p>A succinct differentiation/determination in the Guidelines for the terms acute and chronic is needed.</p> <p>A justification of differences between ANZECC and USEPA for</p>	MEDIUM	All

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Section	Title	Subject	Comments	Priority for action	Agency
	Comparison with USEPA		some trigger values (e.g. ammonia) is needed.		
	Training		Training courses provided to users of the Guidelines to clarify their intended use/applicability and strengths/weaknesses would be useful.		
	Updates		Regular (e.g. 5 yearly) reviews and updates of the ANZECC Guidelines are necessary.		

Appendix 11-2 ASE's Comments on Review of NWQMS Guideline #4

Recommendations of an Australasian Society of Ecotoxicology (ASE) Sponsored Workshop on The Need to Revise the Australian and New Zealand WQ Guidelines

PREAMBLE

A meeting of approximately 35 members of the Australasian Society for Ecotoxicology and other interested scientists was held on Friday 7th August. Many of the attendees were involved in developing the current water quality guidelines (WQGs) or have appropriate expertise in the area of water quality and ecotoxicology. They represented academic, regulatory, commercial and research organisations. The purpose of the meeting was to seek the opinions of these experts on how the current water quality guidelines could be improved and to provide our collective recommendations to the review of the National Water Quality Management Strategy.

The workshop consisted of a series of presentations by invited speakers that was followed by open discussion to obtain additional suggestions. The recommendations were then collated and the views of the attendees sought on their priority. Given the expertise of the attendees the recommendations arising from the workshop focus predominantly on toxicants rather than physical-chemical parameters of waters (e.g. pH, turbidity, dissolved oxygen).

GENERAL COMMENTS

It was the collective opinion of the workshop attendees that:

1. There needs to be an organisation that is responsible for and takes ownership of the WQGs and to fund or conduct the ongoing revision of the water quality guidelines;
2. There is no need for a wholesale review of the WQGs but a targeted revision of the water quality guidelines is needed.
3. While we appreciate the complexity of the situation there does appear to be a need to improve communication. For example, most of the scientists who were involved in deriving the current guidelines were not aware that this review was being undertaken. There also appears to be poor communication within some of the regulatory authorities with other members not having been informed by the Contact Group members that the review was occurring. Given this there is the potential that not all stakeholders have had adequate opportunity to express their views.
4. We believe that the existing derivation process is fundamentally fine. It does not require replacement rather it requires some updating and fine tuning.
5. Similarly, we believe that the existing framework is fundamentally fine and requires only fine tuning and updating.

RECOMMENDATIONS FOR REVISION OF THE WATER QUALITY GUIDELINES

The recommendations of the workshop were classed as: Essential within the next three years; Highly desirable within three to five years; or Desirable but with a longer term timeframe. Within these three classifications the recommendations are not provided in any specific order of preference. Broadly speaking the recommendations cover three main areas; the derivation process; the implementation process; and the management of the WQGs.

Essential within the next three years

1. A targeted revision of the WQGs is needed, including a review of the appropriateness of the current TVs to determine if any require revision. Examples of chemicals for which revision may be warranted include (a) chemicals for which the current TV is 'low reliability' should be reviewed, (b) total petroleum hydrocarbons, (c) some metals as there are reports from NZ of errors in the derivation and the issue of essential elements which can cause toxic effects from deficiency and from excess, (d) selenium based on bioaccumulation, (e) total chromium, cobalt, arsenic, aluminium, hydrogen sulphide, chlorine and surfactants in marine waters.

2. Determine which new chemicals should have TVs derived. Chemicals for which new TVs could be derived include:
 - (a) Endocrine disrupting chemicals e.g. 17 β -estradiol, bisphenolA
 - (b) New pesticides – e.g. insect growth regulators
 - (c) Personal care products e.g. trichlosan, surfactants, fragrances
 - (d) Pharmaceuticals e.g. ibuprofen, erythromycin
 - (e) Persistent, bioaccumulating toxicants (PBTs) e.g. PBDEs, fluorinated compounds, dioxins, furans
 - (f) Compounds that cause salinity issues (e.g. salts and magnesium sulphate)
 - (g) Fluoride.
3. Update the hardness algorithm to reflect the latest Australian research.
4. Improve the method used to derive TVs (i.e. increase the number and type of statistical distributions in BurrliOZ that can be fitted to the species sensitivity distribution, to use more of the toxicity data rather than having a single value per species, and develop a better test of the goodness of fit of the distributions to the data).
5. Update the list of toxicity tests which are considered acute and chronic.
6. Review and potentially update the types of toxicity data that are deemed appropriate for deriving WQGs. For example (a) hypothesis based toxicity data no observed effect concentration (e.g. NOEC and LOECs) and point estimate toxicity data (b) sub-cellular endpoints (e.g. toxypam, enzyme inhibition) (c) incorporation of greater than and less than toxicity data (d) pulsed exposure toxicity data (e) rapid toxicity test data.
7. Better guidance (education) on how guidelines are to be used (i.e. they trigger site-specific investigations, they should not be included in town plans, regulations or applied as licence conditions for ecosystems for which they were not designed).
8. Develop a better name for “low reliability” trigger values for example assessment factor based trigger values.
9. Review the current position that mixtures are only considered in the implementation phase. Could WQGs be derived for mixtures of chemicals with the same mechanism of action e.g. PAHs, dioxins, PCBs, pesticides, endocrine disruptors.
10. Expand and clarify the text on the role of the ‘weight of evidence’ approach.
11. Expand the guidance provided on the use of direct toxicity assessment (DTA) in site specific assessments and place this earlier in the guidelines, including appropriate quality assurance/quality control procedures, suitable endpoints and test species, minimum dataset required to derive site-specific TVs, species for which there are DTA methods established.
12. Expand and provide context on how to deal with the issue of mixing zones.
13. Include worked examples of some successful site-specific assessments that have been conducted in Australia.
14. Develop a scientifically based method for identifying and prioritising which chemicals should have TVs derived or alternatively a Technical Advisory Panel could be established to do this. This should link up with existing assessment schemes being run by NICNAS / APVMA, ERMENZ.

15. Develop (a) a web-based central database for all site-specific assessments that have been conducted in Australia and quality checked by a state/territory agencies and the toxicity data they generate and (b) a web-based system for delivery of new revisions of the WQGs with a verification mechanism approved by the environment and resource ministries.

16. Incorporate the findings from Hobbs et al on the differences in relative sensitivity of Australian and northern hemisphere species to metals and Leung et al on the relative sensitivity of tropical species into the derivation of WQGs.

Highly desirable within three to five years

17. Investigate the appropriateness of incorporating the biotic ligand model as a suitable method for deriving WQGs for copper and nickel in freshwater.

18. Determine whether new quantitative relationships between the toxicity of chemicals and biotic and abiotic stressors (similar to the hardness correction) can be incorporated into the WQGs – so that site specific TVs can be derived.

19. Review the current method for deriving TVs for bioaccumulating compounds to see if it is still appropriate.

20. Update text on biological monitoring methods to reflect developments of methodologies and acknowledge the appropriateness of site specificity of biological monitoring methods.

21. Add text on the potential role of passive samplers and other chemical approaches to site specific assessment and estimating bioavailability.

22. Include text on how to deal with the issue of organisms potentially developing tolerance and its implications for conducting site specific assessments.

23. The WQGs should be a living document (with ongoing review) not a static document. A review of how to best achieve this may be necessary.

24. Assess the appropriateness of using new models and approaches in deriving WQGs (e.g. interspecies conversion equations, plant community sensitivity index and simultaneous multispecies toxicity equations).

Desirable but with a longer term timeframe

25. Expand the suite of organisms in these ecosystems for which we have toxicity tests: groundwater, tropical; sub-polar and polar; marine; and temporary water bodies.

26. Consider adopting the 'added risk' approach for metals and metalloids. In this approach the TVs take into account the background concentration (this would overcome the problem of some marine TVs being below the background concentration).

We appreciate the opportunity to provide our input to the review of the National Water Quality Management Strategy. The Australasian Society of Ecotoxicology and individual attendees are willing to provide additional comment to the review process should it be requested.

On behalf of the workshop attendees

Dr Michael Warne
Senior Research Scientist
CSIRO

Appendix 12 - Updated NWC Environmental Health Management website pages for each jurisdiction (legislation, policies and regulations)

New South Wales

Victoria

Queensland

Western Australia

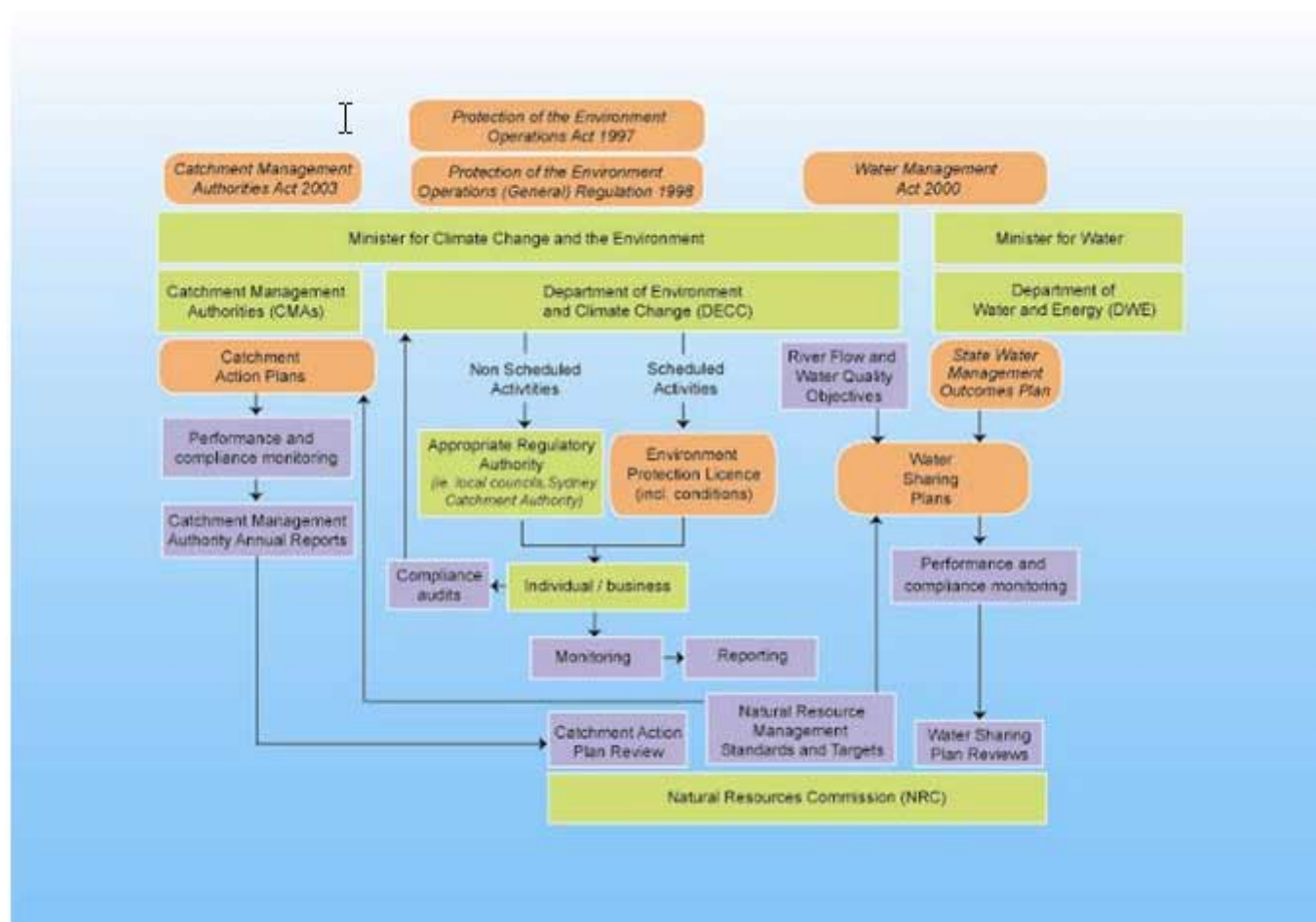
South Australia

Tasmania

Australian Capital Territory

Northern Territory

New South Wales



New South Wales⁷

Legislation / Regulation / Statutory Instruments / Licences	
<i>Protection of the Environment Operations Act 1997</i>	NSW's primary environmental protection legislation. The Act provides a statutory framework for preventing pollution and licensing waste discharges. Schedule 1 of the Act specifies scheduled activities which require a licence. www.legislation.nsw.gov.au
<i>Protection of the Environment Operations (General) Regulations 1998</i>	Provide support to the <i>Protection of the Environment Operations Act 1997</i> and define appropriate regulatory authorities for non-scheduled activities.
Scheduled activities	Listed in Schedule 1 of the Protection of the Environment Operations Act 1997 . The schedule identifies those activities with the greatest potential to harm the environment. These include heavy industry, sewage treatment, electricity generation, waste facilities. These activities are regulated by the Environment Protection Authority.
Non-scheduled activities	An activity which has the potential to cause harm to the environment but is not listed in Schedule 1 of the Protection of the Environment Operations Act 1997 .
<i>Water Management Act 2000</i>	The key piece of NSW water legislation that provides the basis for the sustainable management of water. The Act provides a legal basis for water planning, the allocation of water resources and water access entitlements. One of the objects of this Act is to protect and restore water quality.
<i>State Water Management Outcomes Plan</i>	A statutory document under the <i>Water Management Act 2000</i> that sets the overarching policy, targets and strategic outcomes for the development, conservation, management and control of NSW water sources. The Plan must be consistent with government policy in relation to the environmental objectives for water quality and river flow. Note: this expired in 2007. Resolution on a method for review / replacement is under consideration.
Water Sharing Plans	Under the <i>Water Management Act 2000</i> , water management plans (ie. water sharing plans) must be consistent with government policy in relation to the environmental objectives for water quality and river flow.
<i>Catchment Management Authorities Act 2003</i>	Establishes Catchment Management Authorities and their roles and responsibilities, including the development of catchment action plans. www.legislation.nsw.gov.au
Catchment Action Plans	Strategic, statutory plans under the <i>Catchment Management Authorities Act 2003</i> that provide a framework for natural resource management in a catchment. Plans include provisions that relate to water quality.
Environment Protection Licences (incl. conditions)	Statutory instruments issued by the Environment Protection Authority under the Protection of the Environment Operations Act 1997 that set operating and waste discharge limits for all scheduled activities. Environment protection licences usually include conditions. Examples of these include requirements to monitor, to provide certification of compliance with a licence, to undertake and comply with a mandatory environmental audit program and pollution studies, reduction programs and financial assurances.
Non-statutory documents and activities	
Monitoring	Environment Protection Licences issued by the Environment Protection Authority for scheduled premises may require monitoring of discharges and/or receiving waters to ensure compliance with licence conditions and assess the impact on the environment.
Reporting	Environment Protection Licences issued by the Environment Protection Authority for scheduled premises require reports on the results of monitoring.
Compliance audits	The Environment Protection Authority undertakes compliance audits under Industry Sector Audit Programs and an Out of Sector Audit Program. The Industry Sector Audit Program consists of compliance audits conducted on a sample of premises within a targeted industry sector. The Out of Sector Program consists of compliance audits conducted on any enterprise that the EPA regulates and is conducted in conjunction with the Sector Audit Program.

⁷ This information has been taken from the Natural Resources Commission website. A rapid review has been undertaken to reflect recent ministerial and departmental changes, to assist this current evaluation process. The NWC is currently undertaking a more thorough review of this information to ensure that the recent ministerial and departmental changes are accurately reflected.

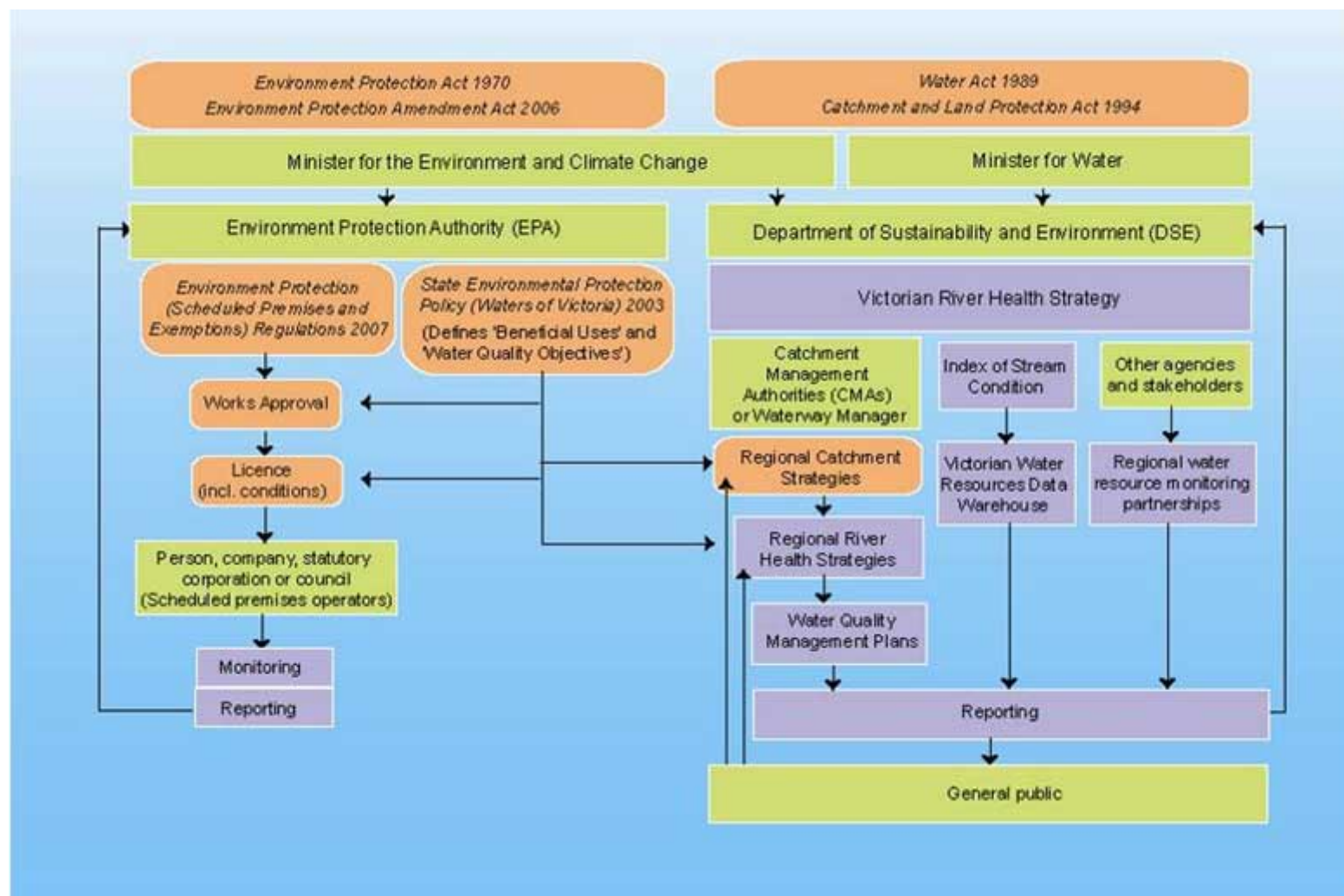
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NSW State Plan	The NSW State Plan sets priorities for government actions and targets for improvements. The intent is to guide government decision making and resource allocation by setting out how Government will work to deliver on the targets in the Plan. The plan identifies that providing an 'environment for living' is a core area of activity for the NSW Government. A particular priority that the Plan identifies (that is relevant to the NWQMS) is "better outcomes for native vegetation, biodiversity, land, rivers, and coastal waterways".
Natural Resource Management standards and targets	The Natural Resources Commission (NRC) has produced a recommended set of 13 standards and targets for resource condition that identify important elements for healthy functioning landscapes and specific natural resource management issues. The NRC will audit each Catchment Management Authority's progress against these targets. The State Plan nominates the statewide natural resource management (NRM) standard and targets as key deliverables.
Catchment Action Plan / Water Sharing Plan Reviews	<p>Catchment action plan reviews: Under the <i>Catchment Management Authorities Act 2003</i>, the Minister for Climate Change and the Environment is to ensure that a catchment action plan is audited at intervals of not more than 5 years, to ascertain whether its provisions are being given effect to. This audit is to be carried out by the Natural Resources Commission or by an independent audit panel appointed by the Minister.</p> <p>Water sharing plan reviews: The <i>Water Management Act 2000</i> establishes that water sharing plans must be reviewed as soon as possible after year 5 by the NRC in the context of catchment health.</p> <p>The NRC will address environmental, socio-economic and education aspects of each water sharing plan. The NRC will determine the extent to which the water sharing plan provisions contribute to the achievement of the standard and targets of catchment action plans.</p> <p>Following the review, the NRC must advise the Minister for Water on whether a water sharing plan should be remade or extended.</p> <p>The Minister for Water, in conjunction with the Minister for Climate Change and the Environment, must consider the NRC's review to assess whether the plan is still adequate and appropriate in implementing the water management principles set out in the <i>Water Management Act 2000</i>.</p>
Catchment Management Authority Annual Reports	Catchment Management Authorities (CMAs) will report annually to the NRC on progress on achieving the results set out in its CAP and progress in achieving compliance with the state-wide NRM standard and targets.
Performance and compliance monitoring	Information and data for the review of each water sharing plan and catchment action plan is provided to the Natural Resources Commission by Catchment Management Authorities, the Department of Primary Industries, Department of Environment and Climate Change and Department of Water and Energy.
River Flow and Water Quality Objectives	Measurable indicators of physical, chemical or biological characteristics that need to be achieved to protect the environmental values of a waterway. Objectives are consistent with <i>ANZECC 2000</i> and the <i>National Water Quality Management Strategy</i> . Water sharing plans and Natural Resources Commission Standards and Targets must be consistent with these water quality objectives. In addition water quality objectives must be considered in the administration and enforcement of the <i>Protection of the Environment Operations Act 1997</i> .
Minister / Department / Authority / Organisation / Individual	
Minister for Climate Change and the Environment	The Minister for Climate Change and the Environment has overall responsibility for the protection of the environment of NSW. The Minister is supported by the Department of Environment and Climate Change.
Department of Environment and Climate Change (Environment Protection Authority)	<p>The Department of Environment and Climate Change (DECC) is a state government department incorporating National Parks and Wildlife Service, Botanic Gardens Trust and the Environment Protection Authority (EPA).</p> <p>The EPA is responsible for administering the Protection of the Environment Operations Act 1997 and statutory functions and powers in the Act continue to be exercised in the name of the EPA.</p> <p>EPA responsibilities include monitoring and regulating wastewater discharges that may impact the water quality of NSW streams, rivers, coastal waters or groundwater, for example sewerage systems operated by water utilities.</p> <p>DECC regulates vegetation clearing (including riparian zone and wetlands). DECC is accountable for State of the Environment Reporting.</p> <p>www.environment.nsw.gov.au</p>
Appropriate regulatory authority	An authority specified in the Regulations which regulates businesses undertaking non-scheduled activities.
Minister for Water	Is partly responsible for the management of NSW's freshwater resources. The Minister is supported by the Department of Water and Energy.

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Department of Water and Energy	<p>DWE is the lead agency for the implementation of the <i>Water Management Act 2000</i>; and regulating water access and water use. DWE has a key role in groundwater management and holds the best expertise, monitoring and modelling capability for river and groundwater hydrology. DWE is responsible for leading integrated water cycle management across local water utilities and for the administration of the Country Towns Water Supply and Sewerage Program</p> <p>www.dwe.nsw.gov.au</p>
Catchment Management Authorities	<p>Thirteen statutory Catchment Management Authorities (CMAs) have been established across NSW under the <i>Catchment Management Authorities Act 2003</i>. They each report to the Minister for Climate Change and the Environment. Each CMA board consists of a chairperson and up to six board members, who together provide a range of experience, skills and knowledge in areas such as primary production, cultural heritage, biodiversity conservation, business administration and governance. Each CMA also has a general manager and a small team of professional staff.</p> <p>CMAs are responsible for coordinating natural resource management in each catchment and preparing Catchment Action Plans and supporting investment strategies to deliver on-ground works around the State.</p> <p>www.cma.nsw.gov.au</p>
Natural Resources Commission	<p>An independent body established by the <i>Natural Resources Commission Act 2003</i> that reports to the Premier. The NRC is responsible for providing the NSW Government with independent advice on a range of natural resource management issues, including state-wide standard and targets for natural resource management that are included in catchment action plans. The NRC is also responsible for auditing Water Sharing Plans.</p> <p>www.nrc.nsw.gov.au</p>

Victoria



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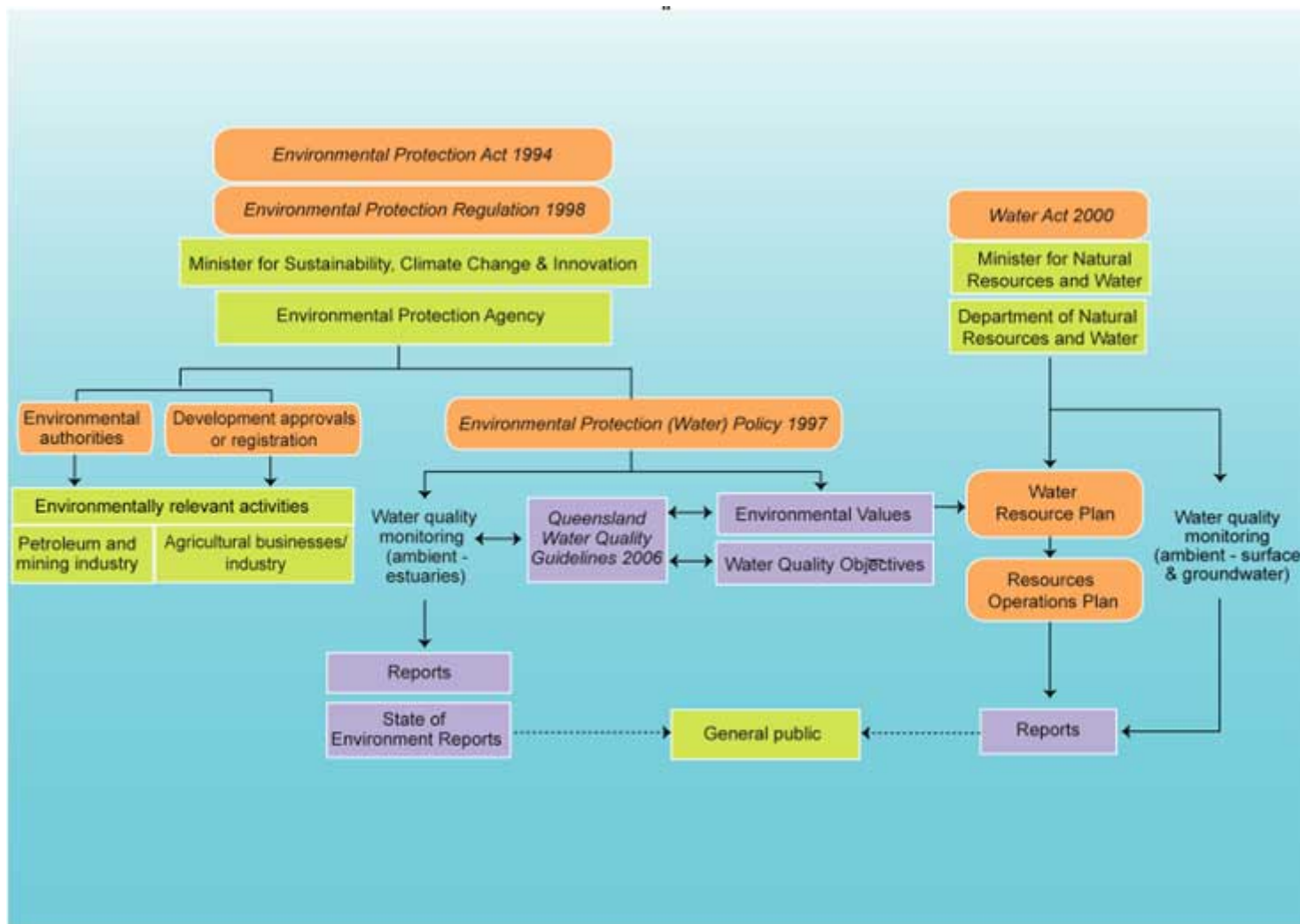
Victoria

Legislation / Regulation / Statutory Instruments / Licences	
<i>Environmental Protection Act 1970</i>	Victoria's primary environmental protection legislation. The Act provides for the establishment of the Environment Protection Authority and a statutory framework for preventing pollution and licensing waste discharges. The Act also allows for the development of State Environmental Protection Policies. www.legislation.vic.gov.au
<i>Environment Protection (Scheduled Premises and Exemptions) Regulations 2007</i>	Subordinate legislation to the <i>Environment Protection Act 1970</i> . The regulation provides a definition of scheduled premises and mechanisms for effective management of these premises.. www.legislation.vic.gov.au
<i>State Environment Protection Policy (Waters of Victoria) 2003</i> subordinate legislation to the <i>Environment Protection Act 1970</i> (defines 'Beneficial Uses' and Water Quality Objectives') and associated schedules (F3, F5, F6, F7 F8)	A statutory framework for the protection of Victoria's surface water quality which has been prepared in accordance with the National Water Quality Management Strategy. The policy defines beneficial uses (environmental values and uses) and water quality objectives for Victoria's waterways. Beneficial Uses are the uses and values of the waterway which need to be protected from pollution. These are defined in the <i>State Environment Protection Policy (Waters of Victoria) 2003</i> as aquatic plants and animals, aquaculture and edible seafood, recreation, human consumption, cultural and spiritual values, industry and shipping and agriculture. Water Quality Objectives are measurable indicators of physical, chemical or biological characteristics which need to be achieved to protect the beneficial uses of a waterway. Objectives are prescribed in the <i>Waters of Victoria Policy 2003</i> and are consistent with ANZECC 2000. Water quality objectives must be considered in the administration and enforcement of the <i>Environmental Protection Act 1970</i> . www.legislation.vic.gov.au
Works approval	Under the <i>Environment Protection Act 1970</i> a works approval must be obtained from the Environment Protection Authority before a premises becomes a scheduled premises or for an existing industry that is proposing to change the waste discharged to the environment.
Licence (incl. conditions)	A statutory instrument issued by the Environment Protection Authority that sets operating and waste discharge limits for all scheduled premises. Applications for licences can only be made once works have been completed in accordance with the works approval. Licence conditions specify requirements for the operation of a particular scheduled premises to ensure there is no environmental harm. Conditions may include monitoring and annual reporting requirements.
Catchment and Land Protection Act 1994 Regional Catchment Strategies	Prepared by Catchment Management Authorities to set regional priorities across catchments and issues including river health.
Planning and Environment Act 1987	Environment Effects Statements and reviews for major projects including setting environmental management plans and guideline values.
Water Act 1989	Water way management and extractions, flows etc
Health Act 1958	Water reuse
Non-statutory documents and activities	
Monitoring	Licences issued by the Environment Protection Authority for scheduled premises require monitoring of discharges and/or receiving waters to ensure compliance with licence conditions and assess the impact on the environment.
Reporting	Licences issued by the Environment Protection Authority (EPA) for scheduled premises require reports on the results of monitoring. Under the <i>Environmental Protection Amendment Act 2006</i> the EPA will require annual reporting.

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Victorian River Health Strategy	A framework for the long-term management of Victoria's Rivers. The strategy outlines a regional planning process for implementation by Catchment Management Authorities to address water quality.
River Health Strategies	Sub-strategies of the regional catchment strategy that identifies assets, threats, and action plans required for each major river reach or subcatchments to improve or maintain river health and water quality. They provide implementation and resource condition targets and a monitoring and reporting program to assess performance of the strategy against these targets.
Water Quality Management Plans	Address a specific water quality issue and identify priority actions, cost-sharing arrangements, targets and a timetable for implementation of actions
Index of Stream Condition	A standard system to assess the health of a river reach or sub-catchments based on the results of water quality and river health monitoring. This assessment produces a 'health' index and is reported via the Victorian Resources Data Warehouse.
Victorian Resources Data Warehouse	A centralised web-based database which contains the Index of Stream Condition data. The database is managed by Department of Sustainability and Environment. Raw and summary data, and published documents are available on this site.
Regional water resource monitoring partnerships	Partnerships among agencies and stakeholders involved in water quality monitoring to facilitate an integrated statewide monitoring program which fulfils the monitoring requirements of each party. As a result duplication of effort is minimised, monitoring is undertaken by a single contractor and the arrangement allows for transparent cost-sharing arrangements among all parties.
Reporting	The results of monitoring programs are reported to management agencies and are available in web based, summary and report formats to the general public.
Minister / Department / Authority / Organisation / Individual	
Minister for the Environment and Climate Change	Responsible for the protection of Victoria's environment. The Minister is supported by the Environmental Protection Authority and the Department of Sustainability and Environment, Sustainability Victoria.
Minister for Water	Responsible for managing Victoria's water resources. The Minister is supported by the Department of Sustainability and Environment. www.dse.vic.gov.au
Environmental Protection Authority (EPA)	Independent statutory authority with responsibility under the <i>Environment Protection Act 1970</i> for the protection of water quality, and regulation of waste disposal and pollution in Victoria. www.epa.vic.gov.au
Department of Sustainability and Environment (DSE)	State Government agency responsible for promoting and managing the sustainability of the natural and built environments in Victoria. www.dse.vic.gov.au
Catchment Management Authorities (CMAs)	Catchment Management Authorities have been established for each of ten catchment regions in Victoria. They are responsible for the development and coordination of implementation of regional catchment strategies. www.dse.vic.gov.au/DSE/nrenlwm.nsf/childdocs/-E9B6826F3AB828F64A2567D7000B1BA6-82A6DD30CA52A8C0CA256E69002F506C-C35E39DE033300D24A25679E00010C1F?open (each CMA has an individual web address which can be accessed via the DSE web page)
Other agencies and stakeholders	Agencies and organisations involved in water quality management and monitoring in Victoria. These include Water Authorities, Murray Darling Basin Commission, Local Government, Department of Primary Industries, and industry.
Person, company, statutory corporation or council (Scheduled premises operators)	Scheduled premises are usually industrial activities that discharge waste to the environment. Scheduled premises are listed in <i>Environment Protection (Scheduled Premises and Exemptions) Regulations 1996</i> and must be licensed under the <i>Environmental Protection Act 1970</i> .

Queensland



Queensland

Legislation / Regulation / Statutory Instruments / Licences

<i>Environmental Protection Act 1994</i>	Provides a regulatory framework for the protection of the environment and also promotes an environmental stewardship approach. The Act regulates environmentally relevant activities and outlines procedures for environmental assessment. www.legislation.qld.gov.au
<i>Environmental Protection Regulations 1998</i>	Details local government responsibilities in the administration and enforcement of the Act relating to environmentally relevant activities. Schedule 1 of the Environmental Protection Regulations lists all environmentally relevant activities. www.legislation.qld.gov.au
<i>Environmental Protection (Water) Policy 1997</i>	Subordinate legislation that supports the <i>Environmental Protection Act 1994</i> . The policy provides a framework for the development of environmental values and water quality objectives for all Queensland waters in accordance with the National Water Quality Management Strategy. The policy details matters that the Environmental Protection Agency must consider when making an environmental management decision and directs local government and the Department of Natural Resources and Water to develop Environmental Management Plans. www.legislation.qld.gov.au
Environmental authorities	Issued to the petroleum or mining industries for any activity defined as an environmentally relevant activity under the <i>Environmental Protection Act 1994</i> or its Regulations. Environmental authorities regulate the type, frequency and amount of discharge from point sources depending on the waterway use.
Development approvals or Registration	Issued to individuals, businesses or companies other than petroleum or mining industries, undertaking any activity defined as an environmentally relevant activity under the <i>Environmental Protection Act 1994</i> or its Regulations. Approvals or registration regulate the type, frequency and amount of discharge from point sources depending on the waterway use.
Environmentally relevant activities	Industrial and agricultural activities listed in Schedule 1 of the <i>Environmental Protection Regulations 1998</i> that have the potential to release contaminants to the environment. The administration and enforcement of environmentally relevant activities is shared between the Environmental Protection Agency and local governments as per arrangements outlined in <i>Environmental Protection Regulations 1998</i> .
<i>Water Act 2000</i>	Provides for the sustainable management and allocation water to meet Queensland's future water requirements including the protection of natural ecosystems and security of supply to water users through the development of water resource plans, and other activities. Under the Water Act the Department of Natural Resources and Water is required to regularly measure the quality of water in Queensland for planning purposes, and make these findings available to the public. www.legislation.qld.gov.au
Water Resource Plans (WRPs)	Under the <i>Water Act 2000</i> , the Minister for Natural Resources and Water is required to prepare water resource plans. These plans provide a framework for the sustainable management of water resources by providing for sustainable water allocation while protecting ecological values. Monitoring must be undertaken to assess the performance of each plan. The Minister must take account of the environmental values outlined in the <i>Environmental Protection (Water) Policy 1997</i> when preparing water resource plans. www.legislation.qld.gov.au
Resource Operations Plans (ROPs)	Under the <i>Water Act 2000</i> , the Department of Natural Resources and Water is required to prepare resource operation plans to support the implementation of water resource and water use plans. Resource operations plans must detail the water and ecosystem monitoring that will apply in the plan area.
Environmental Values	Environmental values (EVs) are the qualities of waterways that need to be protected from pollution to support healthy aquatic ecosystems and social and economic uses. EVs are developed and scheduled under the <i>Environmental Protection (Water) Policy 1997</i> in accordance with the National Water Quality Management Strategy.(e.g. for Moreton Bay/south east Queensland, Mary River Basin/Great Sandy Region and Douglas Shire waters). Otherwise, default EVs apply. Environmental values must be considered in the development of environmental plans, water resource and water use plans.

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Water Quality Objectives	Water quality objectives (WQOs) are measurable indicators of physical, chemical, biological or catchment characteristics that need to be achieved to protect the environmental values of a waterway. WQOs are developed and scheduled under the <i>Environmental Protection (Water) Policy 1997</i> in accordance with the National Water Quality Management Strategy (e.g. for Moreton Bay/south east Queensland, Mary River Basin/Great Sandy Region and Douglas Shire waters). Otherwise, default WQOs apply.
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Waterway objectives must be considered in the development of environmental plans, water resource and water use plans.

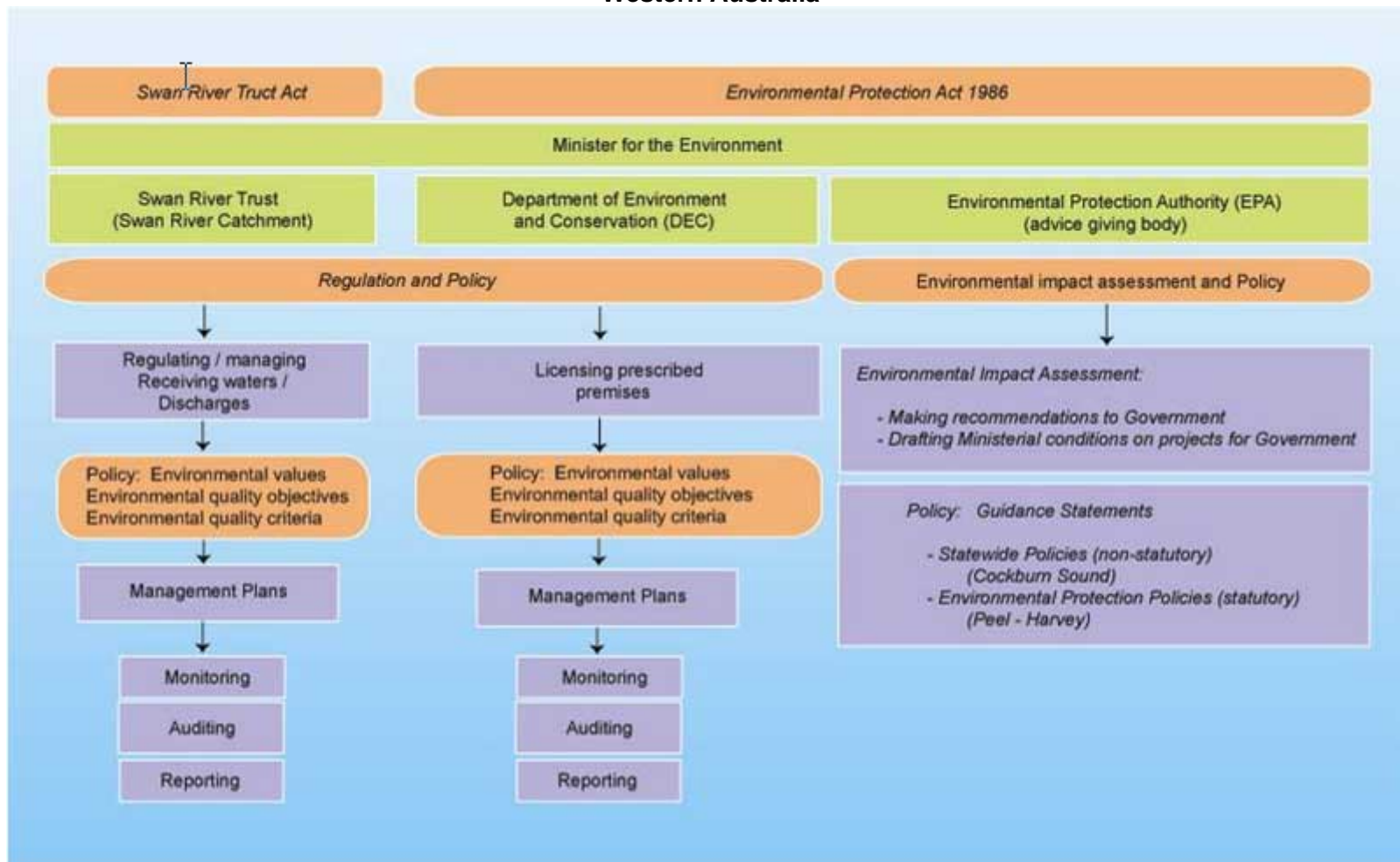
Non-statutory documents and activities

<i>Queensland Water Quality Guidelines 2006</i>	Technical guidelines prepared by the Environmental Protection Agency consistent with the National Water Quality Management Strategy and the <i>Australian and New Zealand Environment and Conservation Council 2000 Guidelines for Fresh and Marine Water Quality</i> . The guidelines provide more locally relevant values for water quality that can be applied to different regions in Queensland, and must be used as a benchmark against which ambient and regulatory water quality monitoring results are compared where possible.
Water Quality Reports	Under the <i>Environment Protection (Waters) Policy 1998</i> , the results of any ambient water quality monitoring undertaken by the Environmental Protection Agency must be reported to the general public.
State of Environment Reports	Produced by the Environmental Protection Agency at least every four years. The reports describe the pressures on the environment, the state or condition of the environment; and the responses by society to reduce pressures and protect and conserve the state's natural and cultural heritage. Summaries of water quality data must be included in these reports.

Minister / Department / Authority / Organisation / Individual

Minister for Sustainability, Climate Change and Innovation	Responsible for the protection of Queensland's environment. The Minister is supported by the Environmental Protection Agency.
Environmental Protection Agency (EPA)	State Government agency that administers the <i>Environmental Protection Act 1994</i> and subordinate legislation including Regulations and Environmental Protection Policies. The Agency licenses environmentally relevant activities through the issuing of environmental authorities, development approvals or registration certificates. Under the <i>Environmental Protection (Water) Policy 1997</i> the Agency has also developed environmental values and water quality objectives for Queensland water bodies in accordance with the National Water Quality Management Strategy. www.epa.qld.gov.au
Minister for Natural Resources and Water	Responsible for the management of natural resources and water in Queensland. Under the <i>Water Act 2000</i> , the Minister must prepare water resource plans and water use plans to ensure the sustainable use of water resources and provide for future uses. The Minister is supported by the Department of Natural Resources and Water.
Department of Natural Resources and Water	State Government agency that manages and allocates the state's land and water resources. It is responsible for the oversight and implementation of the <i>Water Act 2000</i> under which the Department must prepare Resource Operations Plans to implement Water Resource Plans and Water Use Plans. Under the <i>Environment Protection (Water) Policy 1997</i> , the Department must also prepare certain Environmental Plans relating to water allocation and groundwater quality. www.nrw.qld.gov.au

Western Australia



Western Australia

Legislation / Regulation / Statutory Instruments / Licences

<i>Environmental Protection Act 1986</i>	Provides for the formation of the Environmental Protection Authority (EPA). It also provides for the prevention, control and abatement of pollution and environmental harm and for the conservation, preservation, protection, enhancement and management of the environment. www.slp.wa.gov.au/statutes/swans.nsf
<i>Environmental Protection Regulations 1987</i>	Provides further detail on the administration and enforcement of licences and licence conditions including monitoring requirements. Schedule 1 of the Regulations lists prescribed premises that must be registered and licensed under the <i>Environmental Protection Act 1986</i> . www.slp.wa.gov.au/statutes/swans.nsf
Licences (incl. conditions)	Issued by the Environmental Regulation Branch of the Department of Environment and Conservation under the <i>Environmental Protection Act 1986</i> to businesses operating prescribed premises. The Department of Environment and Conservation may specify conditions in licences to ensure compliance with <i>the Environmental Protection Act 1986</i> and relevant best practice for that industry. Conditions may include regular audits, monitoring and reporting or compliance with a standard or code of practice.
<i>State Environmental (Cockburn Sound) Policy 2005</i>	State Environmental Policies are instruments developed by the EPA with public consultation under provisions within the <i>Environmental Protection Act 1986</i> . A State Environmental Policy provides for the establishment of environmental values and environmental quality objectives for a particular environment and identifies a framework for implementation using existing statutory mechanisms, and defines environmental performance criteria against which to audit environmental performance. A state environmental policy developed under the <i>Environmental Protection Act 1986</i> establishes the basis for protection of Cockburn Sound and adjacent land. The policy defines the area to which the policy applies, specifies environmental values, environmental quality objectives and environmental quality criteria and reporting arrangements for the results of water quality monitoring.
Environmental Protection Policies	Developed by the EPA under the <i>Environmental Protection Act 1986</i> to provide for the protection of specific areas.
Environmental values / Beneficial Uses	Values or uses of the waterway that need to be protected from pollution or other impacts. These are defined in individual environmental protection policies.
Environmental Quality Objectives	Measurable indicators of physical, chemical or biological characteristics that need to be achieved to protect the beneficial uses of a waterway.

Non-statutory documents and activities

Management Plan (incl. water quality monitoring)	Outlines actions and management strategies to achieve and maintain environmental quality objectives for the waterway to which the policy applies.
Annual Reports	The <i>State Environment (Cockburn Sound) Policy 2005</i> specifies that the Cockburn Sound Management Council must provide annual reports on the implementation of the management plan to the Minister for the Environment and make these publicly available.

Minister / Department / Authority / Organisation / Individual

Minister for the Environment	Has responsibility for the protection of Western Australia's environment through the administration and enforcement of the <i>Environment Protection Act 1986</i> . The Minister is supported by Department of Environment and Conservation.
Department of Environment and Conservation (DEC) (Environmental Regulation Branch)	Responsible for the protection of Western Australia's environment. The Environmental Regulation Branch of the Department of Environment and Conservation has responsibility under the <i>Environmental Protection Act 1986</i> for the licensing and registration of prescribed premises. The branch also monitors and audits compliance with licence conditions and regulations, takes enforcement actions as appropriate, and develops and implements departmental licensing and industry regulation policy. www.dec.wa.gov.au
Businesses (Prescribed premises)	Businesses operating prescribed premises listed in Schedule 1 of the <i>Environmental Protection Regulations 1986</i> that have the potential to cause environmental harm.
Environmental Protection	Independent statutory authority with the broad objective of protecting WA's environment. The authority consists of five members (full time Chairman and four part-time

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Authority (EPA)	members) and is supported by the Department of Environment and Conservation under a service agreement. The authority provides environmental advice to the Minister, prepares environmental protection policies and state environment policies under the <i>Environmental Protection Act 1986</i> , and provides public statements about matters of environmental importance. www.epa.wa.gov.au
Cockburn Sound Management Council	The role of the Cockburn Sound Management Council is defined in the <i>State Environmental (Cockburn Sound) Policy 2005</i> and includes development and implementation of the Cockburn Sound Management Plan.



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South Australia

Legislation / Regulation / Statutory Instruments / Licences

<i>Environmental Protection Act 1993</i>	Provides the regulatory framework to protect South Australia's environment including air, land and water. The Act provides for the development of the Environmental Protection Authority, which also administers and enforces the Act. It also provides for the development of environmental protection policies and issuing of licences. www.legislation.sa.gov.au
<i>Environmental Protection (Water Quality) Policy 2003</i> (incl. Environmental Values and Water Quality Criteria)	Subordinate legislation supporting the <i>Environmental Protection Act 1993</i> . The policy provides for the development of environmental values and water quality objectives for South Australian waters. The policy outlines additional regulations for point source and diffuse pollution to ensure achievement of water quality objectives. Environmental values are the qualities of waterways that need to be protected from pollution to support healthy aquatic ecosystems and social and economic uses. Environmental values prescribed in the <i>Environmental Protection (Water Quality) Policy 2003</i> are consistent with the National Water Quality Management Strategy and determine the application of water quality criteria. Environmental values must be considered in the assessment of licences. Water quality criteria are values that have been set for water quality characteristics that are necessary to achieve or maintain designated environmental values. They are specified in the <i>Environmental Protection (Water Quality) Policy 2003</i> and based on relevant national standards and guidelines including ANZECC and the Australian Drinking Water Guidelines 2004.
Environmental authorisations (incl. conditions)	Issued by the Environmental Protection Authority under the <i>Environmental Protection Act 1993</i> . An environmental authorisation is required before undertaking certain prescribed activities which are outlined in Schedule 1 of the Act. Authorisations may specify conditions in relation to a licence to ensure compliance with the <i>Environmental Protection Act 1993</i> .
Guidelines	Guidelines are non-statutory documents referred to in the <i>Environmental Protection (Water Quality) Policy 2003</i> as a means of describing how a person undertaking a particular activity can comply with their general environmental duty (i.e. monitoring and reporting requirements). Guidelines may be prepared by the Environmental Protection Authority or other bodies.
Codes of Practice	Non-statutory documents referred to in the <i>Environmental Protection (Water Quality) Policy 2003</i> that describe how a person undertaking a particular activity can comply with their general environmental duty. Codes may be prepared by the Environmental Protection Authority or other bodies.
<i>Code of Practice for Milking Shed Effluent</i>	Applies to the management of waste from milking sheds to ensure protection of the environment. The <i>Environmental Protection (Water Quality) Policy 2003</i> specifies that operators of milking sheds must comply with this code.
<i>Code of Practice for Vessels on Inland Waters</i>	Applies to the management of waste from all vessels on non-marine surface waters in South Australia. <i>Environmental Protection (Water Quality) Policy 2003</i> specifies that operators of vessels must comply with this code.

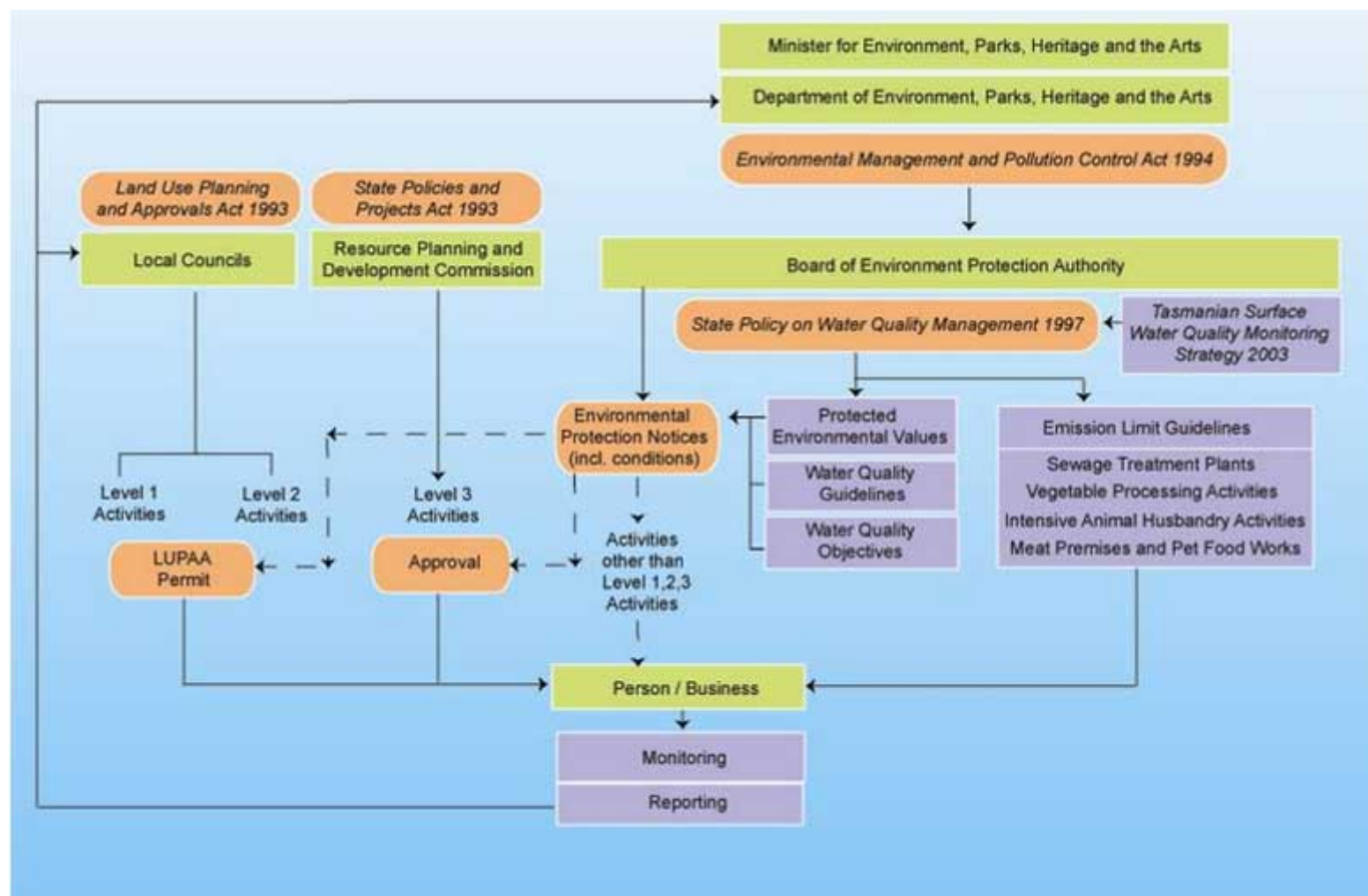
Non-statutory documents and activities

Monitoring	Under the <i>Environmental Protection Act 1993</i> , the Environmental Protection Authority can require monitoring as a licence condition. Monitoring requirements are described in Environmental Protection Authority Guideline for Monitoring Plan Requirements.
Reporting	Under the <i>Environmental Protection Act 1993</i> , the Environmental Protection Authority can require reporting on monitoring as a licence condition. Reporting requirements are described in the Environmental Protection Authority Guideline for Reporting Requirements,

Minister / Department / Authority / Organisation / Individual

Minister for the Environment and Conservation	Has overall responsibility for the protection of South Australia's environment. The Minister is supported by agencies that make up the Environment and Conservation Portfolio: these include the Environmental Protection Authority, Department of Environment and Heritage and the Department of Water, Land and Biodiversity Conservation and Zero Waste.
Environmental Protection Authority	Independent statutory authority with responsibility for the protection of water quality, and regulation of pollution under the <i>Environment Protection Act 1993</i> . www.epa.sa.gov.au
Person / Business (undertaking activity in Schedule 1 of Act)	Businesses operating prescribed activities of environmental significance listed in Schedule 1 of the <i>Environmental Protection Act 1993</i> require an environmental authorisation from the Environmental Protection Authority.

Tasmania



Tasmania

Legislation / Regulation / Statutory Instruments / Licences

<i>Environmental Management and Pollution Control Act 1994</i>	Provides the regulatory framework to protect Tasmania's environment from pollution and for waste management. The Act provides for the establishment of the Board of the Environment Protection Authority. It also specifies regulatory instruments to control activities that are likely to cause environmental harm and provides for the development of environment protection policies. www.thelaw.tas.gov.au
<i>State Policy on Water Quality Management 1997</i>	Provides a strategic framework for water quality management through the determination of protected environmental values, the setting of water quality objectives and the management of point and diffuse sources of pollution. The policy was prepared under the <i>State Policies and Projects Act 1993</i> and is implemented by the EPA and local government. The policy is presently under review. www.thelaw.tas.gov.au
Environmental Protection Notices (incl. conditions)	One of many regulatory instruments in the <i>Environmental Management and Pollution Control Act 1994</i> to control businesses or persons undertaking activities that may cause environmental harm. Issued by the Director, EPA, to regulate Level 2 (and some Level 1) activities and in specific cases for the prevention or remediation of environmental harm. Environmental Protection Notices may specify conditions or restrictions under which an activity can operate. Conditions must be consistent with the environmental values and water quality objectives specified for the waterway under the <i>State Policy on Water Quality Management 1997</i> .
<i>Land Use Planning and Approvals Act 1993</i>	The principal planning Act in Tasmania that provides for the development assessment process, including development applications, appeals and enforcement. www.thelaw.tas.gov.au
Level 1 Activities	Under the <i>Environmental Management and Pollution Control Act 1994</i> , Level 1 activities are those that may cause environmental harm and require a permit from local councils under the <i>Land Use Planning and Approvals Act 1993</i> and may be referred to or 'called in' by the Director, EPA, for assessment by the Board of the EPA. These are usually smaller industrial-type activities and are usually assessed, approved and regulated by local councils.
Level 2 Activities	Level 2 activities are those included in Schedule 2 of the <i>Environmental Management and Pollution Control Act 1994</i> . These are generally larger industrial activities or mining and are assessed, approved and regulated by the EPA with the assistance of the Department of Environment, Parks, Heritage and the Arts. The "approval" may take the form of a permit issued by a planning authority under the <i>Land Use Planning and Approvals Act 1993</i> , or an Environmental Protection Notice issued by the Director under the <i>Environmental Management and Pollution Control Act 1994</i> .
Level 3 Activities	Level 3 activities are those that have been declared 'Projects of State Significance' under the <i>State Policies and Projects Act 1993</i> . These are assessed by the Resource Planning and Development Commission and may be regulated by a number of agencies, but usually by the EPA in respect of environmental matters.
<i>State Policies and Projects Act 1993</i>	Provides for the development of state planning policies, integrated assessment of projects of state significance and the preparation of State of Environment Reports. Supports the <i>Land Use Planning and Approvals Act 1993</i> . www.thelaw.tas.gov.au
Land Use Planning Permit	Issued by councils under LUPAA for Level 1 and Level 2 activities. The Board of the EPA places conditions on permits for Level 2 activities such that any discharge is consistent with the requirements of the State Policy on Water Quality Management, e.g. pollutants be reduced to the maximum extent that is reasonable and practical having regard to best practice environmental management and in accordance with the hierarchy of waste management, the use of accepted modern technology, and the achieving of water quality objectives at the point of discharge or at the boundary and outside of the mixing zone designated by the EPA Board

Non-statutory documents and activities

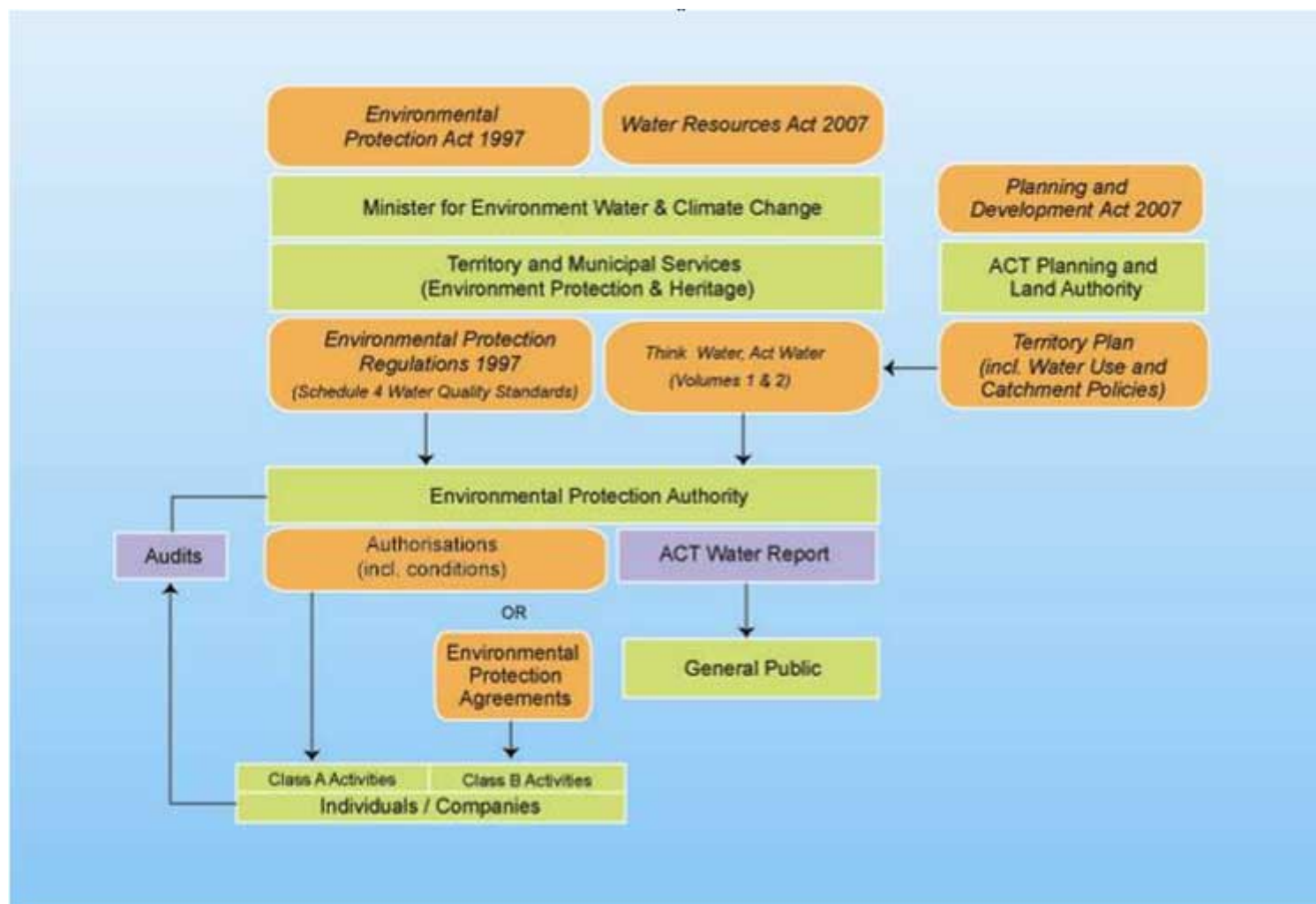
<i>Tasmanian Surface Water Quality Monitoring Strategy 2003</i>	Supports the development and implementation of the <i>State Policy on Water Quality Management 1997</i> through identification of the need for a standard and consistent water quality monitoring strategy, including regular baseline monitoring, creation of a centralised database and a review of regulatory reporting.
Protected Environmental	The qualities of waterways that need to be protected from pollution to support healthy aquatic ecosystems and social and economic uses. Protected environmental

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Values	values prescribed in <i>State Policy on Water Quality Management 1997</i> are consistent with the National Water Quality Management Strategy and determine the application of water quality guidelines and water quality objectives. These values must be considered in the assessment of development applications and issuing of Environmental Protection Notices.
Water Quality Guidelines	Estimates, based on the best scientific information available, of the levels of indicators that should be met in order to protect an environmental value. Specified in the <i>State Policy on Water Quality Management 1997</i> and based on relevant national standards and guidelines including <i>Australian and New Zealand Guideline for Fresh and Marine Water Quality (ANZECC) 2000</i> and the <i>Australian Drinking Water Guidelines 2004</i> .
Water Quality Objectives	Apply to a specific body of water and are the most stringent set of water quality guidelines that should be met to achieve all of the protected environmental values nominated for that body of water.
Emission Limit Guidelines	Emission Limit Guidelines, produced by the Board of the EPA under the <i>State Policy on Water Quality Management 1997</i> , set emission limits for point source pollution. Guidelines have been developed to date for sewage treatment plants, meat premises and pet food works, intensive animal husbandry activities and fruit and vegetable processing activities.
Monitoring	Monitoring to ensure compliance with guidelines and/or permit conditions issued by local councils or the Board of the EPA is required by the <i>State Policy on Water Quality Management 1997</i> .
Reporting	Reporting on compliance with guidelines and/or permit conditions issued by local councils or the Board of the EPA is required by the <i>State Policy on Water Quality Management 1997</i> .

Minister / Department / Authority / Organisation / Individual	
Minister for Environment, Heritage and the Arts	Responsible for the protection of Tasmania's environment through the administration and enforcement of the <i>Environmental Management and Pollution Control Act 1994</i> . The Minister is supported by the Department of Environment, Parks, Heritage and the Arts.
Department of Environment, Parks, Heritage and the Arts (Environment Division)	State Government department incorporating Tourism Tasmania, Arts Tasmania, Parks and Wildlife Service and Environment Tasmania. The Environment Division has the responsibility to support the EPA in the management and protection of Tasmania's environment in accordance with the <i>Environmental Management and Pollution Control Act 1994</i> . The Division also provides environmental and policy advice and develops environment protection policies. www.depha.tas.gov.au
Environment Protection Authority Board	Established under the <i>Environmental Management and Pollution Control Act 1994</i> to enforce the provisions of the Act including assessment of Level 2 and other activities and publication of emission limit guidelines for point source pollution under the <i>State Policy on Water Quality Management 1997</i> . www.epa.tas.gov.au
Resource Planning and Development Commission	Statutory body that oversees the State's planning system, is responsible for state of the environment reporting, assesses public land use issues and projects of state significance, and reviews water management plans and council planning schemes. www.rpdc.tas.gov.au

Australian Capital Territory



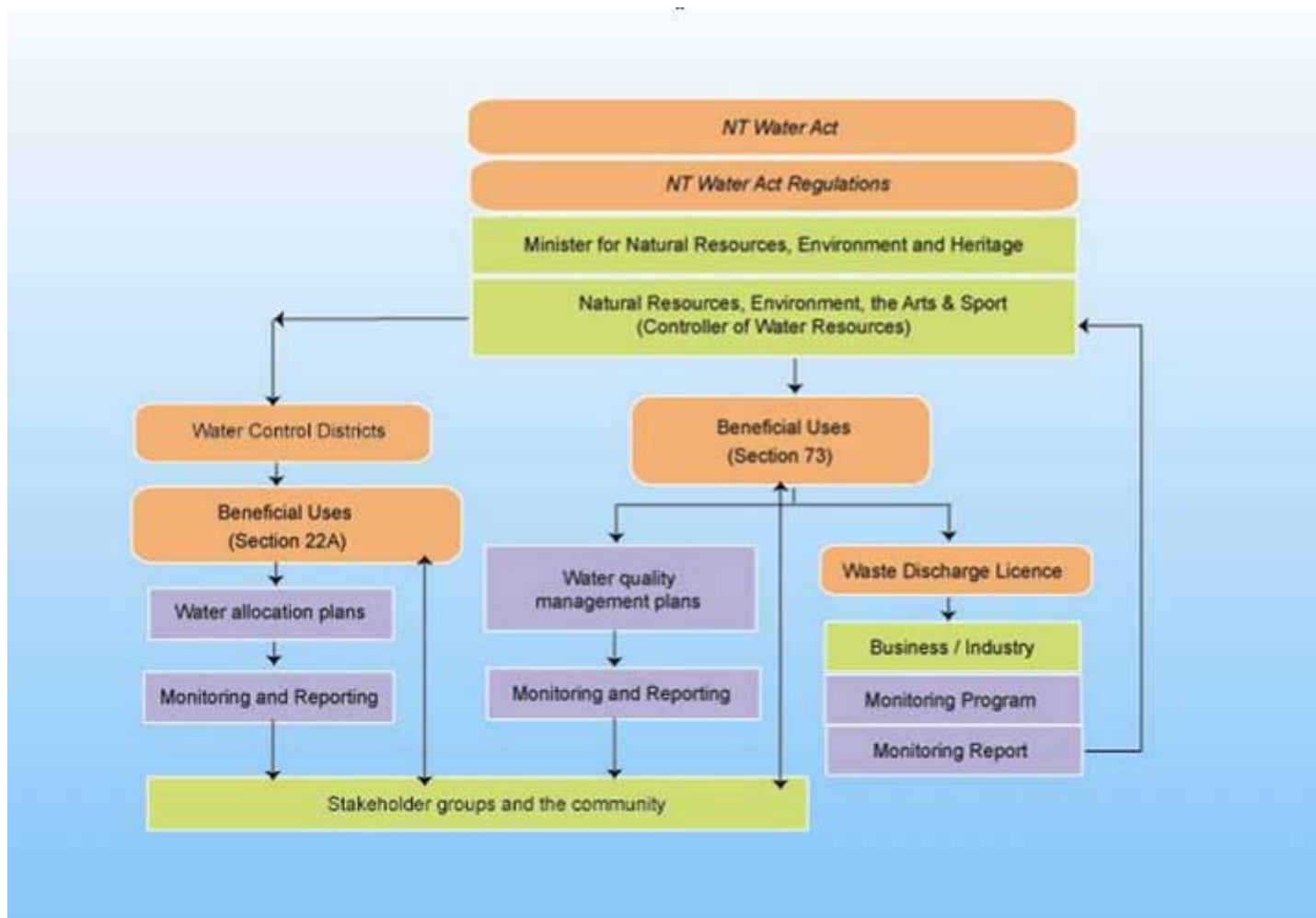
Australian Capital Territory

Legislation / Regulation / Statutory Instruments / Licences	
<i>Environmental Protection Act 1997</i>	The Australian Capital Territory's (ACT) main legislation for managing pollution, including water pollution. The Act provides for the protection of the ACT environment by regulating activities that may pollute or harm the environment, promoting pollution prevention and waste minimisation and providing for regular monitoring and reporting of environmental quality. www.legislation.act.gov.au
<i>Environmental Protection Regulations 2005 (Schedule 4 Water Quality Standards)</i>	Support the <i>Environmental Protection Act 1997</i> and provide further detail on the types of activities that may harm the environment. The Regulations include a section on the regulation of activities that may pollute waterways. Schedule 4 specifies water quality standards for a range of water uses and environmental values described in the <i>Territory Plan</i> . The standards are based on the National Water Quality Management Strategy. www.legislation.act.gov.au
Environmental Authorisations (incl. conditions)	Issued by the Environment Protection Authority (EPA) under the <i>Environmental Protection Act 1997</i> to businesses and companies undertaking activities that pose a high risk to the environment. The EPA may specify conditions in relation to an Environmental Authorisation to ensure compliance with the <i>Environmental Protection Act 1997</i> and relevant best practice for that industry. Conditions may include regular audits, monitoring and reporting or compliance with a standard or code of practice.
Environmental Protection Agreement	Formal agreements between the Australian Capital Territory (EPA) and some businesses and companies conducting Class B Activities. The agreements allow businesses to manage their environmental performance with support and advice from the EPA. Where a person enters an Environmental Protection Agreement, no environmental authorisation is required.
Class A Activities	Class A activities are considered to have a high potential for significant environmental harm and are listed in Schedule 1 of the <i>Environmental Protection Act 1997</i> . It is an offence to undertake these activities without an Environmental Authorisation. Activities listed include wastewater treatment.
Class B Activities	Class B activities that are considered to have less potential for significant environmental harm than Class A activities, but still require regulation under the <i>Environmental Protection Act 1997</i> . It is an offence to undertake these activities without an Environmental Authorisation or an Environmental Protection Agreement.
<i>Water Resources Act 2007</i>	Provides for the management of water resources in the Australian Capital Territory (ACT) including the issuing of licences and the preparation of water resource management plans. The Act requires maintenance of up to date information on the quality and quantity of water resources of the ACT. www.legislation.act.gov.au
<i>Think water, act water (Volumes 1 & 2)</i>	"Think water, act water Strategy for Sustainable Water Resource Management in the ACT" was released in April 2004. The strategy provides long-term guidance to the management of water resources for Canberra and the region. Volumes 1 & 2 provide policy guidance. www.legislation.act.gov.au
<i>Planning and Development Act 2007</i>	Provides for strategic planning through the development and implementation of the <i>Territory Plan</i> and the regulation of development in the ACT through environmental assessment of development approvals. www.legislation.act.gov.au
<i>Territory Plan</i> (incl. Water Use and Catchment Policies)	Prepared under the <i>Planning and Development Act 2007</i> , the purpose of the <i>Territory Plan</i> is to manage land use change and development within the Australian Capital Territory (ACT). The Plan is reviewed regularly to ensure consistency with strategic directions set by the ACT Government. The plan identifies the need to consider the impact of development on water quality and includes Water Use and Catchments Policies in Appendix A. These policies set the permitted uses and protected environmental values for the waterways in the ACT. Policies have been developed for each of three types of water catchment areas defined as conservation, water supply, and drainage and open space. Uses such as maintenance of ecosystems, recreation and water supply are designated for water bodies within each of these types of catchments. These uses define water quality standards will apply to a particular water body.
Non-statutory documents and activities	
ACT Water Reports	Under the <i>Water Resources Act 2007</i> , a report on the results of water quality monitoring, etc. in the Australian Capital Territory must be made available to the community. The Water Report is prepared by Environment Protection Authority on an annual basis and compares the results of monitoring to the water quality standards in the <i>Environmental Protection Regulations 1997</i> and the Water Uses and Environmental Values outlined in the <i>Territory Plan</i> .
Minister / Department / Authority / Organisation / Individual	
Minister for the Environment, Water & Climate Change	Responsible for the protection of Australian Capital Territory's (ACT) environment through the administration and enforcement of the <i>Environment Protection Act 1997</i> . The Minister is supported by Environment ACT.

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Department of Territory and Municipal Services	State Government department incorporating Urban Services, Environment Protection & Heritage, Australian Capital Tourism, Sport and Recreation ACT, and parts of the Office of Sustainability Plans. The department develops and delivers a range of state municipal services for the people of the Australian Capital Territory including environmental protection and management. The main environmental legislation administered by this department in relation to water quality is the <i>Environmental Protection Act 1997</i> and its Regulations, and the <i>Water Resources Act 1998</i> . www.tams.act.gov.au
Environment Protection Authority (EPA)	A statutory position established by the <i>Environmental Protection Act 1997</i> that has statutory powers including the issue of Environmental Authorisations and Environmental Protection Agreements, and enforcement of the <i>Environmental Protection Act 1997</i> . The Environment Protection Authority also administers certain sections of the <i>Water Resources Act 2007</i> relevant to the monitoring of water quality in the Australian Capital Territory under <i>Think water, Act water</i> . www.environment.act.gov.au/businessandindustry/envprotectact97/enprotectauth
Individuals or Companies	Persons or businesses undertaking activities listed in Schedule 1 of the <i>Environmental Protection Act 1997</i> that have the potential to cause environmental harm.
ACT Planning and Land Authority	The Australian Capital Territory's planning authority established under the <i>Australian Capital Territory (Planning and Land Management) Act 1991</i> . The Authority is responsible for administration of <i>Planning and Development Act 2007</i> , strategic planning, development applications and land information and oversight of the <i>Territory Plan</i> . www.actpla.act.gov.au

Northern Territory



Northern Territory

Legislation / Regulation / Statutory Instruments / Licences

<i>Water Act</i>	Regulates the management and protection of water resources in the Northern Territory. Under the Act, pollution of water is prohibited unless licensed under the Act. The Act also provides for the declaration of water control areas and beneficial uses of waterways. Definitions of beneficial use categories are specified in the Act. www.nt.gov.au/dcm/legislation/current.html
<i>Water Regulations</i>	Provide further detail relevant to the administration of licences issued under the <i>Water Act</i> . www.nt.gov.au/dcm/legislation/current.html
Water Control Districts	Under the <i>Water Act 2004</i> , the Minister for Natural Resources, Environment and Heritage may declare parts of the Northern Territory as water control districts and give them a name. Districts are declared for specified purposes such as water allocation.
Beneficial Uses	A legislated process under the <i>Water Act</i> that identifies the values and uses of a water control district, or other area where potential impact to ambient waters may occur, to assist in its protection and management. Seven categories of beneficial uses are listed in the <i>Water Act 2004</i> and include agricultural, cultural, aquaculture, public water supply, environment, riparian and manufacturing industry.
Water Quality Objectives	Can be declared under s 73 and can specify the WQOs that need to be met to sustain range of beneficial uses in ambient waters.
Water Allocation Plans	Declared under s 22b of the Act – Plan incorporates allocation of water quantities to beneficial uses and can specify monitoring of ecological flow and water quality parameters.
Waste Discharge Licence	Regulatory instruments issued by the Controller of Water Resources under the <i>Water Act 2004</i> in areas where beneficial uses have been declared. Licences specify the quality and quantity of wastewater discharged to natural waters by industrial and commercial operations in the Northern Territory.

Non-statutory documents and activities

Monitoring Program	Waste discharge licences specify environmental monitoring programs that a licence holder must implement to verify that discharge limits and ambient WQOs are being met. Research work may be called up to close knowledge gaps. Water Allocation Plans likewise call up monitoring requirements.
Monitoring Report	Under the <i>Water Act</i> holders of waste discharge licences are required to provide the results of monitoring specified in the licence to the Controller of Water Resources in a form and at intervals specified in the licence. Reports called up in the licence are public documents.
Water quality management and water allocation plans (incl. water quality monitoring)	The Department of Natural Resources, Environment the Arts and Sport implements water allocation and quality management plans for areas with declared beneficial uses.

Minister / Department / Authority / Organisation / Individual

Minister for Natural Resources, Environment and Heritage	Responsible for the protection of the environment in the Northern Territory. The Minister is supported by the Department of Natural Resources, Environment and the Arts. In this role, the Minister is responsible for implementation of the <i>Water Act</i> including appointment of the Controller of Water Resources and the declaration of water control districts.
Department of Natural Resources, Environment, the Arts and Sport (Controller of Water Resources)	Territory government department responsible for ensuring sustainable use of natural resources through the regulation of appropriate land and water management practices and provision of advice and information. The Department also supports the declaration of beneficial uses for water control districts by characterising the waterway and its uses, facilitating community input, and managing and monitoring water quality. The Controller of Water Resources is appointed by the Minister for the Natural Resources, Environment and Heritage to administer the <i>Water Act</i> and its Regulations including issuing of licences and intervening in cases of pollution. www.nt.gov.au/nretas
Stakeholder groups and the community	The community participates in the process to decide the beneficial use categories that should apply to a water control district. A Water Advisory Committee can be appointed under s 23 to advise the Minister on the effectiveness of the Plan.

Appendix 13 - Jurisdictions' responses to Appendix 6 pro-forma

New South Wales

Victoria

Queensland

Western Australia

South Australia

Tasmania

Australian Capital Territory

Northern Territory

New South Wales - WQ Management Roles & Responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
General Comments										
‘Partners’ in Waterway Management	Department of Environment and Climate Change (DECC)	Developed guidance material e.g. “Local planning for healthy waterways - using NSW Water Quality Objectives” (http://www.environment.nsw.gov.au/water/planningusingwqos.htm)	Administers the <i>Protection of the Environment Operations Act 1997</i> & <i>Protection of the Environment Operations (General) Regulations 1998</i> . Issues Environment Protection Licences for “scheduled activities”. Required to consider the environmental values of water in exercising its licensing functions. Provides technical advice on activities that have the potential to pollute waters	Provides policy direction, support and advice to councils. Developed guidance material e.g. “Managing urban stormwater: harvesting and reuse” (http://www.environment.nsw.gov.au/stormwater/)		Developed river flow objectives for individual catchments (http://www.environment.nsw.gov.au/ieo/index.htm)	Regulates vegetation clearing (including within riparian zones) and regulates water access and use	Under s.120 of the <i>Protection of the Environment Operations Act 1997</i> it is an offence to pollute waters	Beachwatch & Harbourwatch (http://www.environment.nsw.gov.au/beach/default.aspx)	State of the Environment Report (http://www.environment.nsw.gov.au/soe/index.htm) State of the Beaches Report (http://www.environment.nsw.gov.au/beach/Reportann.htm)
	Department of Water and Energy (DWE)	Responsible for developing Sydney's Metropolitan Water Plan. Provides advice on integrated water cycle management	Provides management, technical and financial support to non-metropolitan water utilities on water and sewerage systems. Provides approvals under the <i>Local Government Act 1993</i> for sewage treatment and disposal systems			Administers the <i>Water Management Act 2000</i> & <i>Water Management (General) Regulation 2004</i> . Responsible for developing Water Sharing Plans (http://www.dnr.nsw.gov.au/water/sharing_plans.shtml)			Leading the NSW Monitoring, Evaluation and Reporting Strategy	
	Department of Primary Industries (DPI)				Provides advice to landholders on developing and implementing sustainable irrigation systems					
	Department of Planning (DoP)	Administers the <i>Environmental Planning and Assessment Act 1979</i> & <i>Environmental Planning and Assessment Regulation 2000</i>						Develops planning policies such as State Environmental Planning Policies which specify management controls for developments and provide protection for environmentally sensitive areas		

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
	Growth Centres Commission (GCC)			The Growth Centres Development Code requires Development Control Plans for Sydney's Urban Growth Areas to specify stormwater quality targets which have been developed in consultation with DECC						
	Catchment Management Authorities (CMAs)	Responsible for preparing Catchment Action Plans (http://www.cma.nsw.gov.au/)			Provides training, financial assistance / incentives and technical advice to landholders		Provides training, financial assistance / incentives and technical advice to landholders. Undertakes or facilitate on-ground NRM works for the purposes of catchment activities e.g. river rehabilitation, native vegetation management and salinity mitigation programs			
	Local Governments	Under proposed planning reforms, some local councils may be required to consider the environmental values of water when preparing their Local Environmental Plans	Under the <i>Protection of the Environment Operations Act</i> local councils are the appropriate regulatory authority for most "non-scheduled activities"	Responsible for the provision and maintenance of most stormwater services in NSW. Local councils specify particular development requirements in their Local Environmental Plans	Local councils specify particular development requirements in their Local Environmental Plans			The standard Local Environment Plan contains provisions for environment protection zones		

Victoria - WQ Management Roles & Responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
General Comments										
'Partners' in Waterway Management	Environment Protection Agency	Environmental water quality objectives set through SEPP	Works approval and licensing through the Env Prot Act 1970	Policy only	Policy only				Marine and estuary water quality monitoring. Biological monitoring of inland streams. Requires licence holders to conduct monitoring.	Beach and Yarra River water quality reports. Targeted water quality reporting.
	Department of Sustainability and Environment	DSE leads the Victorian Government's efforts to sustainably manage: <ul style="list-style-type: none"> • water resources and catchments. Oversight of regional river health strategies and overall statewide river health policy Co-ordinates planning to meet water quality objectives for Port Phillip Bay through EMP.	Dredging through the Coastal Management Act.	Implementing state stormwater strategy and 5 star standards relating to stormwater.	Statewide policy (as DSE is the "land management agency")	Water Act * Statewide policy and oversight of regional flow management programs	Statewide policy and program management and oversee regional river health strategies	Statewide policy	Co-ordinates a range of monitoring activities, including the Victorian Water Quality Monitoring Network	Produces annual and 5-yearly water quality reports for Victoria
	Department of Primary Industries		Manage extractive industries through Resources Act		Primary agency for working with rural land users					
	Department of Planning and Community Development			Incorporates stormwater management requirements into planning provisions.						
	Catchment Management Authorities	Regional Catchment strategies through Catchment and Land Protection Act			Regional Catchment strategies through Catchment and Land Protection Act	Water Act - Through licensing and other provisions of the Water as well as stream flow management plans, sustainable water strategies, dry inflow contingency plans	Prepare and implement regional river health strategies and any associated waterway and riparian action plans	Through regional river health strategies and associated waterway and riparian action plans	Involvement in regional water quality monitoring partnerships	Annual water quality reports
	Local Governments			Implements stormwater quality measures mainly through drainage management and Planning and Environment Act	Implements rural land use quality measures mainly through Planning and Environment Act		Yes *			

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
	Melbourne Water	Caretaker of River Health in Port Phillip and Western Port catchments. Prepare and implement regional river health strategy and any water quality action plans (eg Better Bays and Waterways)	Manage wastewater discharges to surface waters under EPA licences	Manages urban stormwater as caretaker of River Health in Port Phillip and Western Port catchments	Works with DPI for Port Phillip and Western Port catchments	Water Act * Through licensing and other provisions of the Water Act as well as stream flow management plans, sustainable water strategies, dry inflow contingency plans	Yes * Prepare and implement regional river health strategy and any associated waterway and riparian action plans, eg Stream Frontage Management Program	Yes * Through regional river health strategies and associated waterway and riparian action plans	Water quality monitoring in Port Phillip and Western Port catchments	Various WQ and river health reports
	Urban water authorities		Manage wastewater discharges to surface waters under EPA licence			Water Act *			Monitor discharges. Involvement in regional water quality monitoring partnerships	
	Rural water authorities					Water Act * Through licensing and other provisions of the Water Act as well as stream flow management plans, sustainable water strategies, dry inflow contingency plans	Through responsibility to licence take and use have some impact on riparian zone management		Involvement in regional water quality monitoring partnerships	
	Parks Victoria						Yes *	Yes *		

Queensland - WQ Management Roles & Responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ planning	Point source management	Urban stormwater management	Rural land use & land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ monitoring	Reporting
General Comments (MISC legislation/policy)		Land Act 2003		Integrated Planning Act 1997 (DIP)	Nature Conservation Act 1992 ↳ Forestry Act 1959			Environmental Protection and Biodiversity Conservation Act 1999 National Environment Protection Council (QLD) Act 1994 NSW-QLD Border Rivers Act 1946	Environmental Protection Regulation 1998	
‘Partners’ in Waterway Management	Environmental Protection Agency		Environmental Protection Act 1994 ↳ Environmental Protection (Water) Policy 1997				Marine Park Act 2004	Environmental Protection Act 1994 ↳ Environmental Protection (Water) Policy 1997 Coastal Protection and Management Act 1995 Nature Conservation Act 1992 Marine Parks Act	Environmental Protection Act 1994 ↳ Environmental Protection (Water) Policy 1997	State of the Environment Reports
	Department of Natural Resources & Water	Water Act 2000 Wild Rivers Act 2005 ↳ Murray-Darling Basin Agreement 1992 ↳ Lake Eyre Basin Agreement 2001		Queensland Urban Drainage Manual	Land Act 1994, Leasehold land conditions	Water Act 2000 ↳ Various Water Resource Plans ↳ Various Resource Operation Plans ↳ Water Regulation 2002	Water Act 2000 Land Act 1994 Vegetation Management Act 1994 River Improvement Trust Act 1940 ↳ River Improvement Trust Regulation 1998 Rural Lands Protection Act 1985	Wild Rivers Act 2005 ↳ Wild Rivers Regulation 2007 Wet Tropics World Heritage Protection and Management Act 1993 ↳ Wet Tropics Management Plan 1998 National Heritage Trust Act 1997 ↳ Regional Natural Resource Management Water Resource Act 1989 Rural Lands Protection Act 1985	Water Act 2000	SWAN report ABMAP report WRP Annual Reports Annual Water Statistics Report
	Department of Primary Industries & Fisheries		Environmental Authorities				Fisheries Act 1994	Fisheries Act 1994		Aquatic vegetation, fish catch monitoring
	Department of Infrastructure and Planning	Integrated Planning Act 1997 State Planning Policies (SPP)			SPP 1/92 - Development and the Conservation of Agricultural Land SPP 2/02 - Planning and Managing development involving acid sulfate soils					
	Regional NRM Bodies	14 QLD regional NRM bodies NRM plans WQIPs			NRM Plans / Water Quality Improvement Plans					NRM Water Quality Reports SEQ EHMP
	Local Governments	73 QLD local governments	Environmental Authorities	Local Government Act 1993						
	Reef Partnership (Australian Government/ Qld Govt / Regional NRM Bodies)	Reef Water Quality Protection Plan 2003 Water Quality Improvement Plans			Water Quality Improvement Plans					Reef Report Card
	Great Barrier Reef Marine Park Authority	Great Barrier Reef Marine Park Act 1975						Great Barrier Reef Marine Park Act 1975 Marine Parks Act 2004	GBR Marine Monitoring Program	Reef Outlook Report

Notes: ↳ Subordinate legislation

The following table is an example of an alternative table to show roles and responsibilities (with more details of the roles) for integrated waterway management in Queensland

		Categories for Management ^a					
		Point source management	Urban stormwater management	Rural land use & land management	Flow management	Riparian and in-stream management	Protection & Conservation
‘Partners’ in Waterway Management	Environmental Protection Agency	➤ Approve ERAs and ensure compliance	➤ Requirement for urban stormwater management plans	➤ Requirement for GED	➤ WRPs to consider EVs in EPPW		➤ Schedule HEV waters
	Natural Resources and Water		➤ Urban Drainage Manual (Planning & design guideline)	➤ Requirements for leasehold land	➤ Develop and implement WRPs ➤ Develop and implement ROPs	➤ Regulate activities within bed and banks	➤ Identify & protect “wild rivers”
	Primary Industries & Fisheries	➤ Approve “intensive agricultural” ERAs and ensure compliance		➤ Liaise with land holders re BMPs		➤ Liaise with land holders re BMPs	➤ Liaise with land holders re BMPs
	Infrastructure & Planning	➤ Funding for wastewater infrastructure	➤ Funding for urban stormwater infrastructure	➤ State interests for LGPSs		➤ State interests for LGPSs	➤ State interests for LGPSs
	Regional NRM Bodies			➤ Develop NRM Plans incl. BMPs		➤ Develop NRM Plans incl. BMPs	➤ Develop NRM Plans incl. BMPs
				➤ Liaise with land holders re BMPs		➤ Liaise with land holders re BMPs	➤ Liaise with land holders re BMPs
				➤ Incentives for adoption of BMPs		➤ Incentives for adoption of BMPs	➤ Incentives for adoption of BMPs
	Local Governments	➤ Approve “local” ERAs and ensure compliance	➤ Develop LGPS and USWMP	➤ Develop LGPS	➤ Provide water supply infrastructure	➤ Develop LGPS	➤ Develop LGPS
		➤ Provide wastewater infrastructure	➤ Approve development applications ➤ Provide stormwater infrastructure	➤ Approve development applications		➤ Approve development applications	➤ Approve development applications
	Rural Industry Peak Bodies			➤ Develop BMPs and PLMSs ➤ Liaise with land holders re BMPs		➤ Develop BMPs and PLMSs ➤ Liaise with land holders re BMPs	➤ Develop BMPs and PLMSs ➤ Liaise with land holders re BMPs
	Water Utilities	➤ Manage ERAs and comply with GED		➤ Liaise with clients and land holders re BMPs	➤ Provide water infrastructure ➤ Manage water and comply with ROP requirements	➤ Liaise with clients and land holders re BMPs	➤ Liaise with clients and land holders re BMPs
	GBRMPA	➤ Joint permitting of ERAs in GBRMP	➤ Reef Guardian program	➤ Reef Guardian program		➤ Regulate activities within GBRMP	➤ Protect high value areas
	Landholders	➤ Manage ERAs and comply with GED	➤ Implement DA conditions and BMPs	➤ Develop and implement PLMP	➤ Comply with LWMP	➤ Develop and implement PLMP	➤ Develop and implement PLMP

Note:

^a Categories for Management based on Bennett, J. and Moss A. (2005b)

Colour Legend	Regulation	Planning / Resource Allocation	Land/resource Management	Extension	Infrastructure Provision	Disbursing Funds
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ERA – Environmentally Relevant Activity
 LGPS – Local Government Planning Scheme
 BMP – Best Management Practices
 EPPW – Environmental Protection (Water) Policy

GED – General Environmental Duty
 USQMP – Urban Stormwater Management Plan
 PLMS(P) – Property Level Management Systems (Plans)
 GBRMP(A) – Great Barrier Reef Marine Park (Authority)

WRP – Water Resource Plan
 DA – Development Application
 HEV – High Ecological Value
 LWMP – Land & Water Management Plan

ROP – Resource Operation Plan
 NRM – Natural Resource Management
 EVs – Environmental Values

Western Australia - WQ Management Roles & Responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ Policy / Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient Water Quality Monitoring	Reporting
General Comments Statutes & (administering agency)		Planning and Development Act 2005 (WAPC & DPI) Health Act 1911 (DoH) Water & Rivers Commission Act 1995 ^a (DOW) Town planning regulations 1999 (WAPC)	Environmental Protection Act 1986 Parts III, IV, V & VI (DEC) Waterways Conservation Act 1976 (DOW) Health Act 1911 (DoH)	Water & Rivers Commission Act 1995 ² (DOW) Local Government Act 1995 (local governments)	Agriculture Act 1988; Soil and Land Conservation Act 1945 (DoAF) Heath Act 1911 (DoH)	Water & Rivers Commission Act 1995 ² ; Rights in Water and Irrigation Act 1914; Metropolitan Water Supply, Sewerage and Drainage Act 1909; Country Areas Water Supply Act 1947 (DOW)	Water & Rivers Commission Act 1995 ² (DOW); Waterways Conservation Act 1976 (DOW) Conservation and Land Management Act 1984 (DEC)	Environmental Protection Act 1986 Parts III, V & VI,(DEC) Contaminated Sites Regulations 2004 (DEC); Clearing of native Vegetation Regulations 2004 (DEC)	Water & Rivers Commission Act 1995 ² (DOW); Rights in Water and Irrigation Act 1914 (DOW)	Environmental Protection Act 1986 (DEC)
‘Partners’ in Waterway Management	EPA + Conservation Commission + Department of Environment and Conservation (DEC)	Policies and guidance statements issued by the WA Environmental Protection Authority (EPA)	Minister for the Environment - approvals and conditions for developments likely to have a significant effect on the environment; DEC - Environmental Regulation Division - Licences, works approvals for prescribed premises	Environmental policy and guidance only	Guidance on best industry environmental practice. Environmental impact assessment & regulation of prescribed premises	Environmental policy & guidance only	Environmental policy & guidance Ecological management of conservation valued wetlands	Statutory policy, regulation and guidance, contamination incident response; management of conservation estate; ecological science for marine waters, and conservation wetlands	Ecological and water quality monitoring of conservation valued wetlands	EPA audit reports; State of the Environment reporting, see www.epa.wa.gov.au Annual departmental performance reports; information on website www.dec.wa.gov.au , (select Environment)
	Department of Water (DOW)	DOW prepares and administers Water resource allocation plans; Drinking water source protection plans; Waterway management plans; Drainage management plans; Flood-plain management plans	DOW - Regional offices with advice from Drainage and Waterways and Water Source Protection Branches (presently via development approval conditions imposed under land planning statutes) Drainage – governance, coastal drainage management (transition are to urban), Drainage & Water Management Plans, Waterways- licensing of activities that may affect managed waterway ecology or amenity	DOW -Drainage and Waterways Branch: Guidance via Stormwater Management Manual for WA; Drainage & Waterway Management Plans, Best Management Practices guidance, Drainage governance (e.g. funding roles & responsibilities)	Surface and ground water allocation licensing;& permits for disturbance of waterways; best water management practice; salinity control; guidance on land development near sensitive water resources, rural water supply, waterways management plans, river action plans, Wheatbelt drainage governance & planning drainage schemes & groundwater management demonstration	Advice on water balance/ flow data, flood plain management & flood warnings, waterways & drainage practice; regulation of water allocation, stream diversions and dam building, identifying environmental water requirements & setting environmental water provisions	Guidance on riparian buffers, naturalisation of degraded streams; water science, salinity controls River Restoration Manual & Field guide for managing waterways in the Avon Wheatbelt.	Guidance on best industry practice to protect water quality, support for NRM & salinity control & water science; Wild river policy; Development and implementation of waterways management plans.	DOW operates state water information data base; operates stream gauging sites & groundwater monitoring network; monitors and reports on water ecology (including algal blooms) & quality, surface and groundwater systems	Annual departmental performance reports; information on website www.water.wa.gov.au ; Data on water flows and quality held on Water Information (WIN) data base
	Department of Agriculture & Food (DoAF)	DoAF & DOW jointly administer the State salinity action plan	DoAF administer the Soil and Land Conservation Regulations 1992	N/A Land Drainage Act 1925 applies in rural areas	Research and guidance on best industry practice, and agronomics	Not applicable apart from on farm erosion controls and farm dams	Not applicable	Not applicable	Monitoring of WQ in agricultural drains associated with chemical loss from rural land	Annual departmental performance reports; information on website www.agric.wa.gov.au

		WQ Policy / Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient Water Quality Monitoring	Reporting
	WA Planning Commission (WAPC) & Department of Planning and Infrastructure (DPI)	Western Australian Planning Commission: State planning policies: Public Drinking Water; Water Resources; Land use and water management strategies	State land use planning, controls on subdivision and conditions set in response to development applications	State planning policies (SPP), Development Control policies (DCP) and Planning bulletins (e.g. PB 61- Urban stormwater management) & planning guidelines	Bush Forever (PB 69) Subdivision of rural land (DCP 3.4)	Not applicable	Not applicable	Environment and Natural resources Policy (SPP 2)	Not applicable	Annual departmental performance reports; information on websites www.wapc.wa.gov.au www.dpi.wa.gov.au
	Department of Industry and Resources (DOIR)	Ensures the mining, petroleum and resource extraction and processing industries meet environmental sustainability requirements	Issues mining, petroleum, gas and mineral processing licences with environmental conditions, administers state agreement acts for resource enterprises	Not applicable	Ensures that resource extraction and processing doesn't harm farming and pastoral interests	Places controls on extractive industry dewatering	Implements resource licensing controls and audits that protect waterways and their dependent vegetation in consultation with environmental and water agencies	Ensures resource extraction and processing industries operate sustainably in the environment	Not applicable	Annual departmental performance reports; information on website www.doir.wa.gov.au
	Water Corporation (principal provider of water services in WA)	Determines which water sources will be used for public drinking water sources for much of WA; provider of most reticulated sewerage and main drainage services in WA	Provider of main drainage services in WA (which cross LGA boundaries)	Some impacts from reservoir construction, catchment area management and impacts of scheme water supply borefields	Water access and extraction quantity regulated by Economic Regulation Authority and DOW	Must ensure environmental flows, wetland levels and societal water needs met	Not applicable	Provides catchment drinking water catchment surveillance services (rangers)	Monitors water quality and quantity for PDWS reservoirs and borefields	Annual performance reports; information on website www.watercorporation.com.au
	Department of Health (DoH)	Department of Health (Environmental Health Directorate) see http://www.health.wa.gov.au/envirohealth/water/drinkingwater.cfm provides guidance and oversees the activities of LGA environmental health officers on all matters involving protection of community health (pathogen controls). The DoH chairs the <i>Advisory Committee on Purity of Water</i> which oversees the provision of safe drinking water supplies to WA community including scheme supplies, remote communities and bottled water supplies.								
	Regional NRM Body see 6 NRM regions at www.nrm.wa.gov.au	Each NRM region each has an operational plan	Refer to regional plans, objectives and targets – NRM regions don't do point source licensing, but do industry-based program aimed at improving best management practices. Reporting is through NRM quarterly project progress reports and annual reporting.							
	Local Governments	Protection of water resources from pathogens under <i>Health Act 1911</i>	Development approvals -community health, local planning schemes & community amenity	Control of local drainage systems, local planning policies involving water sensitive urban design.	Planning schemes, subdivisions and development approvals	Not applicable	Control of reserves for community amenity/ waste management	Not applicable	Not applicable	Not applicable
	Department of Consumer and Employment Protection	Not applicable	<i>Dangerous Goods Safety Regulations 2007</i> - controls on fuel and chemical storage and handling to prevent contamination of land and water resources.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Notes: ^a Department of Water administered legislation expected to be consolidated in *Water Resource Management Act* during 2008-09

Table incorporates no data on groundwater management -groundwater resources provide more than 60% of WA's water sources and sustain many wetlands

South Australia - WQ Management Roles & Responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ Policy / Planning ^a	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient Water Quality Monitoring	Reporting
General Comments Statutes & (administering agency)		Development Act 1993 (Planning SA) Public and Environmental Health Act 1987 (DoH) Environmental Protection Act 1933 (EPA) Natural Resource Management Act 2004 (DWLBC) Local Government Act 1999 (local councils)	Environmental Protection Act 1993 (EPA) Natural Resource Management Act 2004 (DWLBC) Mining Act 1971 (PIRSA) Environment Protection (Water Quality) Policy 2003 (EPA) Waterworks Act 1932 (SA Water)	Environmental Protection Act 1993 (EPA) Local Government Act 1999 (local councils)	Natural Resource Management Act 2004 (DWLBC) Waterworks Act 1932 (SA Water)	Natural Resource Management Act 2004 (DWLBC) South Eastern Water Conservation and Drainage Act 1992 (DWLBC) Local Government Act 1999 (local councils) Waterworks Act 1932 (SA Water) Water Conservation Act 1936 (Office for Water Security / SA Water)	Environmental Protection Act 1993 (EPA) Natural Resource Management Act 2004 (DWLBC) Native Vegetation Act 1991 (DEH) National Parks and Wildlife Act 1972 (DEH)	Environmental Protection Act 1993 (EPA) Natural Resource Management Act 2004 (DWLBC) Native Vegetation Act 1991 (DEH) National Parks and Wildlife Act 1972 (DEH) Marine Parks Act 2007 (DEH) Coast Protection Act 1972 (DEH)	Environmental Protection Act 1933 (EPA) Natural Resource Management Act 2004 (DWLBC)	Environmental Protection Act 1933 (EPA) Natural Resource Management Act 2004 (DWLBC) River Murray Act 2003 (DWLBC)
Partners' in Waterway Management	Environment Protection Authority (EPA)	Policies issued by the SA Environmental Protection Authority (EPA)	Licences, works approvals for prescribed premises Environment Protection (Water Quality) Policy 2003 and Codes of Practice to manage other point sources	Codes of practice and guidelines	Codes of practice and guidelines Regulation of licensed activities Guidance and/or direction on land development potentially impacting waters	Environmental policy & guidance only	Environmental policy & guidance	Statutory policy, regulation and guidance, contamination incident response for all waters	State ecological and water quality monitoring of coastal, groundwater and inland waters	State of the Environment reporting, Annual departmental performance reports and water quality reporting see www.epa.sa.gov.au and www.epa.sa.gov.au/water_quality.html
	Department of Water, Land and Biodiversity Conservation (DWLBC)	The State NRM plan, Water resource allocation plans; State policies regarding sustainable water, land and biodiversity management	Drainage governance, Drainage & Water Management Plans Regulation of 'water affecting activities' Salinity management strategies	Urban Stormwater Management Policy for South Australia 2008 with LGA www.dwlbc.sa.gov.au/assets/files/PolicyState mentfinalMay132005.doc	Surface and ground water allocation licensing;& permits for water affecting activities; best water management practice; salinity control; South East drainage governance & planning drainage schemes & groundwater management	Advice on water balance/ flow data, flood plain management & flood warnings, waterways & drainage practice; regulation of water allocation, stream diversions and dam building, identifying environmental water requirements & setting environmental water provisions. Development of Water Allocation Plans with NRM Boards and surface and ground water allocation licensing & permits for disturbance of waterways	Guidance on riparian buffers, naturalisation of degraded streams; water science, salinity controls Evaluation of riparian management	State policies and guidelines on biodiversity, salinity, water quality and water resources www.dwlbc.sa.gov.au/policysearch.html	DWLBC operates state water information data base; operates stream gauging sites & groundwater monitoring network; monitors and reports on water ecology, surface and groundwater systems	State NRM Plan and Annual departmental performance reports. Data on water flows and quality held on groundwater and surface water databases. Information on website www.dwlbc.sa.gov.au

		WQ Policy / Planning^a	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient Water Quality Monitoring	Reporting
	Planning SA	South Australian Planning Commission: State planning policies Planning Strategies for Metropolitan Adelaide, Outer Metropolitan Adelaide Region and Regional SA The Yorke Peninsula Regional Land Use Framework The Greater Mount Gambier Master Plan	State land use planning, controls on subdivision and conditions set in response to development applications Major Development Assessment process through DAC	State planning policies & planning guidelines Water Sensitive Urban Design Project	State planning policies & planning guidelines	Not applicable	Not applicable	State planning policies & planning guidelines	Not applicable	Annual departmental performance reports; information on websites www.planning.sa.gov.au
	Primary Industries South Australia (PIRSA)	Agricultural and horticultural industry and policy development Fisheries and aquaculture management and industry development Minerals and petroleum exploration and development Sustainable resources management including soil, landcare and productive use of water	Issues mining, petroleum, gas, mineral processing and aquaculture licences with environmental conditions	Not applicable	Irrigation, agricultural, mining, oil, gas, fisheries, aquaculture, soil and landcare legislation, management policy and guidelines Regulation of agricultural and veterinary medicine use. Research and guidance on best practice	Irrigation management Aquaculture, mining, oil and gas water resource management through licence process State industry sector policies and guidelines	State industry sector policies and guidelines	Biosecurity management and regulation State industry sector policies and guidelines	Not applicable	Annual departmental performance reports; information on website www.pir.sa.gov.au
	Department of Health (DoH)	State level policies, standards and guidance on drinking water and health aspects of wastewater and reuse	Coordinates the notification of water quality incidents	Advice on managing risks to recreational waters	Policies, guidelines and guidance on managing threats to recreational and drinking waters	Not applicable	Policies, guidelines and guidance on managing threats to recreational and drinking waters	Not applicable	Not applicable	Annual departmental performance reports; information on website www.health.sa.gov.au
	SA Water	Determines which water sources will be used for public drinking water sources for much of SA; provider of most reticulated sewerage and main drainage services in SA	Provider of main sewage services in SA	Waterproofing Adelaide Strategy	Management of reservoir reserves Advises other partners regarding watershed management strategies	Commitment to environmental flows, wetland levels and societal water needs met	Within reservoir reserves and diversion weirs Targeted projects to improve catchment water quality	Within reservoir catchments	Monitors water quality and quantity for reservoirs and borefields Water quality monitoring of River Murray water, including algae	Annual performance reports; information on website www.sawater.com.au

		WQ Policy / Planning ^a	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient Water Quality Monitoring	Reporting
	Regional NRM Bodies see 8 NRM regions at www.nrm.sa.gov.au	Each NRM region each has a regional NRM Plan	Refer to regional plans, objectives and targets – NRM Boards are responsible for the administration of Water Allocation Plans. Reporting is through NRM quarterly project progress reports and annual reporting. Also responsible for licensing 'water affecting activities'							
	Local Governments	Development Plans and policies	Development approvals, public and environmental health management Authorised officers under the <i>Environment Protection (Water Quality) Policy 2003</i>	Control of local drainage systems, local planning policies involving water sensitive urban design. Urban Stormwater Management Policy for South Australia 2008 with DWLBC	Planning schemes, subdivisions and development approvals	Responsible for management of stormwater flow	Control of reserves for community amenity/ waste management	Local government policies and guidelines	Some water quality monitoring undertaken to assess recreational and ecological values in specific waters	Annual reports on individual council websites, accessible through the LGA at www.lga.sa.gov.au

Notes: ^a Numerous specific regional or issue based legislation includes the *Adelaide Dolphin Sanctuary Act 2005* (DEH); *River Murray Act 2003* (DWLBC); etc.

Tasmania - WQ Management Roles & Responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
General Comments										
'Partners' in Waterway Management		Implementation and interpretation of the <i>State Policy on Water Quality Management</i> 1997.	Administers the <i>Environmental Management and Pollution Control Act</i> 1994. Issues environmental permit conditions as part of "Land Use Planning Permits" or "Environment Protection Notices" for "scheduled activities".	Require through the <i>State Policy on Water Quality Management</i> 1997 that Stormwater Management Plans be prepared consistent with the NWQMS "Guidelines for Urban Stormwater Management". Provide advice and technical support to "scheduled activities", local government and others on best practice in stormwater management.	Require through the <i>State Policy on Water Quality Management</i> 1997 that agricultural run-off be managed through the development of codes of practice or guidelines describing best practice environmental management. Provide advice to other agencies in the development of codes of practice such as for the management of dairy effluent.	Require through the <i>State Policy on Water Quality Management</i> 1997 that the release of water from storages should be consistent with best practice environmental management guidelines. Under this policy water management authorities with regulatory control over water abstraction or diversion, or the construction of in-stream impoundments must take account of the likely effects on water quality and whether the action will prejudice the achievement of WQOs.	The <i>Environmental Management and Pollution Control Act</i> 1994 provides the mechanisms (environment protection notice and environment infringement notice) for protection of waterways and wetlands. Under the <i>State Policy on Water Quality Management</i> 1997, water management authorities with regulatory control over water abstraction or diversion, or the construction of in-stream impoundments must, take account of the likely effects on water quality and whether the action will prejudice the achievement of WQOs. Guidelines produced to protect streams such as: " <i>Environmental Best Practice Guidelines for Undertaking Works in Waterways and Wetlands</i> (2003)".	The <i>Environmental Management and Pollution Control Act</i> 1994 provides the mechanisms such as environment protection notices, environmental improvement programs, and environment infringement notices, and allows for court prosecutions) where environmental harm to water bodies has occurred or might reasonably be expected to occur.	Baseline monitoring has been conducted in estuarine waters such as the Tamar estuary, Macquarie Harbour and the Derwent Estuary. Investigations include periods of monitoring of specific waterways for various purposes. Local Government is required to conduct recreational water quality monitoring and compliance monitoring regarding discharges to waters from sewage treatment plants. Various activities "scheduled" under the <i>Environmental Management and Pollution Control Act</i> 1994 are required to conduct upstream, downstream, and effluent point-source monitoring where such activities may impact on receiving environment water quality.	Information is provided for the Tasmanian "State of the Environment Report". Incident reports are prepared or are required in relation to various incidents that might result in impacts on water quality. Data collection, data collation, and preparation and then publishing of regular reports; "The State of the Tamar" and "The State of the Derwent" reports. Data is collected to assist in the cyano-bacteria alerts programs.
	Department of Environment, Parks, Heritage and Arts (DEPHA), Environment Division.		Regulation of "scheduled" activities including STPs, mining activities, food, wood and paper processing activities etc. Provides technical advice to other state government agencies, local government, consultants, industry and individuals on Best Practice Environmental Management and Accepted Modern technology for activities that have the potential to pollute waters. Issues Wastewater Management Guidelines for various activities such as "intensive animal husbandry", Sewage Treatment Plants, Meat and Pet Food Works: etc under the <i>State Policy on Water Quality Management</i> 1997.	Supports the "Derwent Estuary Program". This program includes urban stormwater management interests. Provision of the document, " <i>Environmental Guidelines for the use of Recycled Water in Tasmania</i> " that is relevant to reuse of treated industrial, food processing, and sewage treatment effluents such as to manage risks to surface and ground waters. Provision of guidelines on biosolids reuse that arise from industrial, food processing, and sewage treatment activities such as to manage risks to surface and ground waters.						

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
	Department of Primary Industry & Water (DPIW)	<p>Under Tasmania's <i>Water Management Act 1999</i>, develop and coordinate policies relating to the sustainable use and development of Tasmania's water resources. Regulate the development of Water Management Plans under the <i>Water Management Act 1999</i>.</p> <p>Provides guidelines and policies such as "<i>Guidelines to assess applications for New Water allocations from Watercourses during Winter</i>".</p> <p>The Tasmanian Water for Ecosystems Policy provides the mechanism for determining environmental flow requirements and sustainable development limits on the State's water resources</p>	NA	NA		<p>Administers the <i>Water Management Act 1999</i>.</p> <p>River flow is managed through the <i>Water Management Act 1999</i> and through the development of Water Management Plans and the establishment of environmental flows</p> <p>The identification of the water needs, i.e., "environmental flows" of ecosystems is a key element in the achievement of sustainable water management.</p> <p>'Guiding Principles for Water Trading in Tasmania' provides clarity and certainty on the interpretation of the relevant provisions of the Act.</p>	<p>Water diversion works and activities are, in most cases, regulated under the WMA 1999.</p> <p>Under this Act a permit is granted by the Assessment Committee for Dam Construction ACDC for all on-stream dam construction and all off-stream storages larger than 1 ML.</p> <p>An outline of relevant legislation and policy is in "<i>Legislative and policy requirements for the protection of wetlands & waterways when undertaking works</i>"</p>	<p>The <i>Water Management Act 1999</i> provides for the identification and management of water for ecosystems.</p> <p>Enforcement Policy applies to the enforcement of the provisions of the <i>Water Management Act 1999</i> (WMA) and its subordinate legislation by the Department of Primary Industries and Water (DPIW).</p>	<p>Baseline pesticide monitoring program on a quarterly basis in streams at a number of testing station locations across Tasmania.</p> <p>Baseline waterways monitoring network provides data on stream flow, water quality and riverine health.</p>	<p>Waterways Reports using information from the baseline waterways monitoring network is published annually, and provides information on a catchment basis</p>

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
	Resource Planning and Development Commission	The <i>Resource Planning and Development Commission Act 1997</i> established the Resource Planning and Development Commission. The Commission oversees the State's planning system, is responsible for "State of the environment reporting", assesses public land use issues and "Projects of State Significance", and reviews "Water Management Plans".						<p>The Commission is responsible for the functions prescribed under the following Acts:</p> <ul style="list-style-type: none"> • <i>Land Use Planning and Approvals Act 1993</i> • <i>Public Land (Administration and Forests) Act 1991</i> • <i>State Policies and Projects Act 1993</i> • <i>National Parks and Reserves Management Act 2002</i> • <i>Water Management Act 1999</i> • <i>Sullivans Cove Waterfront Authority Act 2004</i> 		State of the environment reporting is one of the features of the Resource Management and Planning System (RMPS) of Tasmania. These reports are prepared as a requirement of the <i>State Policies and Projects Act 1993</i> .

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
	Regional NRM Bodies (Cradle-Coast, North, and South NRM Regions)	<p>The <i>Tasmanian Natural Resource Management Framework 2002</i> and the <i>Natural Resource Management Act 2002</i>: develop and implement regional strategies for natural resource management</p> <p>Provide regional strategic direction, support and build regional NRM capacity.</p> <p>Support the development of Program Logic and associated monitoring and evaluation strategies for key NRM investments.</p> <p>Integrate NRM issues into policy, planning and decision making</p>		<p>Provide education, training, incentives, technical information, and support to landholders.</p> <p>Facilitate strategic on-ground NRM works and planning for the purposes of whole-of-catchment management</p>	<p>. Provide education, training, incentives, technical information to support land managers implement improved land management practices.</p> <p>Support cross tenure co-ordination of land management and the integration of NRM principles and issues into planning activities (local, catchment, municipal and state planning processes).</p>		<p>Provide education, training, incentives, technical information, and support and property management planning to landholders.</p> <p>Facilitate strategic on-ground NRM works and planning for the purposes of whole-of-catchment management incl. river rehabilitation, native vegetation/ riparian and land management e.g. salinity/erosion mitigation programs</p>	<p>Facilitate implementation of priority actions in approved sub-regional, catchment and Rivercare plans, threatened species recovery plans and the Southern Weeds Strategy.</p>	<p>Waterwatch and community waterway monitoring programs</p> <p>Facilitate and encourage monitoring by a variety of stakeholders including use of appropriate tools to inform river and catchment management.</p> <p>Support the development of Program Logic and associated monitoring and evaluation strategies for key NRM investments. (Note the Aus Govt are using this type of framework to report on intermediate outcomes, with less emphasis on RCTs)</p>	<p>Report to state government on progress in implementing the regional strategies.</p> <p>Communicate trends in resource condition.</p> <p>Report to the Australian govt about intermediate outcomes achieved by NRM funding (Caring for our Country).</p>

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
	Local Governments	<p>Natural resource management forms a part of many council operations.</p> <p>Protected environmental values are shown in any strategic planning study developed for marine farming and national parks and reserves. They may be shown in planning schemes, water management plans, resource management strategies, forest management plans or catchment management plans; and are shown and taken into account, in any strategic planning study (excluding strategic planning plans pursuant to s.66 of the <i>Local Government Act 1993</i>) conducted by a planning authority.</p>	<p>Under the <i>Environmental Management and Pollution Control Act 1994</i> local councils are the appropriate regulatory authority for level 1 and “non-scheduled activities”. Under this Act councils have powers to issue “Environmental Protection Notices” and “Environmental Infringement Notices” where environmental harm may have occurred or may be reasonably expected to occur.</p> <p>Local governments are responsible for the provision, maintenance, and operation of sewage treatment plants until the changes that will result from the implementation of the <i>Water and Sewage Industry Act 2008</i> where provision of sewage services will become the responsibility of three new regional bodies.</p>	<p>Responsible for the provision and maintenance of most stormwater services in Tasmania.</p> <p>Local councils specify particular development requirements for stormwater management for unscheduled and level 1 activities.</p>	<p>Local councils specify particular development requirements for stormwater management for unscheduled and level 1 activities.</p>	<p>Local Government can affect water flows in their roles in providing: reticulated drinking water, storm water management systems, catchment planning; and their role in regard to treated wastewater reuse schemes on recreational areas, and for commercial and agricultural uses.</p>	<p>Works in wetlands and waterways may be subject to council requirements as detailed in council by-laws and /or abatement notices</p>	<p>Operation and activities of local government use the following legislation for resource management and protection:</p> <ul style="list-style-type: none"> ▪ Land Use Planning and Approvals Act 1993 ▪ Environmental Management and Pollution Control Act 1994 ▪ Resource Management and Planning Appeal Tribunal Act 1993 ▪ Public Health Act 1997 ▪ Water Management Act 1999 	<p>Local Government plays a key role in managing water in Tasmania by providing water quality tests both for drinking water and recreational waters, and monitoring for sewage plants, and minor point source pollution.</p>	<p>State of the beach reporting</p> <p>Provide public cyano-bacteria alerts for local community</p>

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
	Department of Health and Human Services (DHHS)		<p>Administers the Recreational Water Quality Guidelines 2007 which are issued under the <i>Public Health Act 1997</i>. DHHS in conjunction with local government is responsible for ensuring the protection of human health by the management of recreational water which may be impacted by point or diffuse source pollution.</p> <p>Administers the Drinking Water Quality Guidelines 2005 which are issued under the Public Health Act 1997. The aims of the Guidelines is to protect public health and to improve drinking water quality by improving the management of risks posed to drinking water which includes recognition that protection of source water from pollution and microbial contamination is a significant aspect of the supply of safe drinking water. DHHS oversee the development and implementation of Drinking Water Quality Management Plans which are prepared by drinking water suppliers. These Plans incorporate risk management of hazards in the catchment, point sourced or otherwise.</p>	<p>Administers the Recreational Water Quality Guidelines 2007 which are issued under the <i>Public Health Act 1997</i>. One of the aims of the Guidelines is to protect human health during contact with recreational waters. DHHS in conjunction with local government is responsible for ensuring the protection of human health by the management of recreational water which may be impacted by stormwater.</p>	<p>Administers the Drinking Water Quality Guidelines 2005 which are issued under the Public Health Act 1997. The aims of the Guidelines are to protect public health and to improve drinking water quality by improving the management of risks posed to drinking water which includes recognition that protection of source water from pollution and microbial contamination is a significant aspect of the supply of safe drinking water. DHHS oversee the development and implementation of Drinking Water Quality Management Plans which are prepared by drinking water suppliers. These Plans incorporate risk management of hazards in the catchment which can be related to land use practices.</p>				<p>Enforce compliance with the Public Health Act 1997 Recreational Water Quality Guidelines. DHHS ensures Local Government complies with the monitoring requirements of these Guidelines.</p> <p>Supports the ‘Derwent Estuary Program’ and the ‘Tamar Estuary Esk Rivers Program’ which monitors the environmental health of the Derwent and Tamar Estuary/Esk Rivers respectively.</p>	<p>Annual Director of Public Health Recreational Water Report. This report provides information to the community concerning water quality at recreational water sites in Tasmania.</p>

Australian Capital Territory - WQ Management Roles & Responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
General Comments			Addressed by EP Act and Regs	Urban stormwater management addressed in planning and DA conditions by ACT P&LA	Little intensive rural industry Land management agreements (because Crown land)	Addressed by WR Act 2007	Designated River Corridors under Territory Plan (because Crown land)	About 70% ACT is national Park		
‘Partners’ in Waterway Management	Environmental Protection Authority		Environmental Protection Act 1997 Environmental Protection Regulations 2005 (Schedule 4 WQ Standards)			Water Resources Act 2007			Rivers Urban Lakes Groundwater	Annual Report on “ACT Water Resources”
	Department of Territory & Municipal Services (Env Protection & Heritage)	Think water, Act water – Vols. 1&2								WR Act reqt for WQ & flow Information
	ACT Planning and Land Authority	Planning & Development Act 2007 Territory Plan (incl. Water Use and Catchment Policies) – set EVs for ACT waters								
	Regional NRM Body	ACT NRM Plan (+ 3 ICM Plans)								
	Local Governments^a									

Notes:

^a Local Government functions performed principally by Department of Territory & Municipal Services

Northern Territory - WQ Management Roles & Responsibilities, including relevant legislation, policies, regulations, plans, monitoring and reporting

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
General Comments										
'Partners' in Waterway Management	Environmental Protection Agency	Policy only (Environment Protection Authority Act)			Policy only		Policy only	Policy only		Annual report to Leg. Assembly
	Dept. Natural Resources Environment The Arts and Sport	Water Control Districts, Water allocation Plans, Declarations of Beneficial Uses, Policy development (Water Act), Environmental Impact Assessments under Environmental Assessment Act (and Admin Procedures).	Licences via Water Act & Waste Management & Pollution Control Act (for scheduled activities)	Erosion and sediment control guidance, Codes of Conduct for urban stormwater mgt. General environmental duties under WMPCA	Pastoral Land Act - best pastoral practice guidance, Vegetation mgt (Weeds Mgt. Act) Veg. clearance permits (under Planning Act) Soil Con. and Land Utilisation Act	Water allocation planning with environmental flow provisions (Water Act) Bore licensing and metering	Parks & Wildlife Conservation Act + regs	Territory wide policy Parks & Wildlife conservation planning Biodiversity mgt., Bushfires mgt (Bushfires Act + regs)	All waters – ground marine surface waters. HYDSTRA database management and custodian-ship for WQ, hydrology (gw, sw).	Licence reports annually from licensees
	Dept. Regional Development, Primary Industry, Fisheries and Resources	Activity approval require environmentally sustainable practices, demonstration of industry best practice (eg in Mine Management Plans)	Issue activity approvals to extractives, mining and aquaculture under Mine Management Act and Fisheries Act		Agricultural and Veterinary Chemicals (Control of Use) Act. Best irrigation and fertiliser management practices		Stock exclusion zones, off-stream watering, Fisheries Act			Annual reports on mining activities
	Dept. Planning & Infrastructure	Planning Schemes – Land Use Objectives	Marine Pollution Act for ship discharges (ballast water, bilge etc)	Development approvals and permits under Planning Act, subdivision approvals, WSUD policy, Development Consent Authority (DCA) conditions for developments.	Planning Schemes – Land Use Objectives for rural districts					
	NT NRM Board, DHAC, DRMAC, DRWAP, Greening Australia (GA).	Strategic Plans (incl. WQPP) – Matters for Target NT-wide Planning for whole of NT (INRM) and Daly River, Darwin Region							Water for Life program (GA) associated with priority catchments	
	Dept. Health & Community Services	Water recycling guidance Potable water supply approvals, endorsement of Drinking Water Guidelines.			Re-use schemes, Septic Tank- on-site disposal approvals under Public Health Act					

		WQ Planning	Point source management	Urban stormwater management	Rural land use and land management	Flow management	Riparian & in-stream management	Protection & Conservation	Ambient WQ Monitoring	Reporting
	Local Government	Local environmental management plans incorporate aspects of good water resource mgt.		By-laws under Local Government Act Design specs requirements for urban drainage. Maintenance of stormwater systems				Urban streams and wetlands subject to by-laws		
	Power Water Corporation	Potable water supply and catchment management plans' Sewage treatment and disposal both under Water Supply and Sewerage Services Act (and Regs)							Source water incl. ground & surface water (rivers, reservoirs) Receiving waters wq monitoring as part of licence conditions.	Annual performance reports to public

Appendix 14 - Jurisdictions' responses to Appendix 7 pro-forma⁸

State / Territory	Water Quality Management Plans	High Ecological values (HEVs)	Environmental Values (EV)	Water Quality Guidelines	Water quality objectives (WQOs)	Environmental Flow Objectives (EFOs)
New South Wales						
Process	<p>Water Quality Improvement Plans (WQIPs) Implemented under the Coastal Catchments Initiative, WQIPs are prepared consistent with the Framework for Marine and Estuarine Water Quality Protection. They identify the most cost-effective and timely projects that will form an agreed approach to achieving pollutant load reductions in a catchment.</p> <p>Catchment Action Plans (CAPs) have been developed by Catchment Management Authorities (CMAs), to provide a strategic direction for natural resource management in the catchment and to provide direction for future investments. The CAPs outline a number of catchment and management targets to improve the natural assets, including water resources. CAPs are required to be consistent with the Government adopted Standard and state-wide targets for natural resource management. The catchment specific targets provide a framework to guide work towards more long-term goals, such as the WQOs.</p> <p>Planning Instruments Under proposed planning reforms some local councils may be required to consider the environmental values of water when preparing their LEPs.</p> <p>DECC guidance material encourages local councils to recognise the community identified environmental values for waterways in their LEPs and DCPs.</p> <p>The Growth Centres Commission's Development Code will require Development Control Plans for Sydney's Urban Growth Areas to specify stormwater quality targets which have been developed in consultation DECC.</p> <p>Regional Plan: Sydney's drinking water catchment Sydney Catchment Authority has prepared a Regional Plan for the drinking water catchments of Sydney and adjacent regional centres. The plan aims to better protect water quality in the rivers leading to various drinking water storages.</p>	<p>Generally waterways that mainly flow through national parks, World Heritage areas or wetlands of outstanding ecological significance are considered 'high conservation value'.</p> <p>Water Sharing Plans (WSPs) identify key ecological values in each sub-catchment.</p> <p>The <i>National Parks and Wildlife Act</i> allows for the declaration of 'wild rivers'. These are conservation areas on DECC estate that identify, represent and manage pristine freshwater ecosystems at the high conservation end of the spectrum.</p> <p>Wetlands The State Environmental Planning Policy 14 (SEPP 14) – Coastal Wetlands, identifies over 1300 wetlands of high natural value along the NSW coast. SEPP 14 ensures coastal wetlands are preserved and protected for environmental and economic reasons.</p> <p>NSW has nominated wetlands onto Ramsar and the Directory of Important Wetlands Australia.</p> <p>Marine Marine parks are areas of marine waters and lands permanently set aside to protect the biological diversity of our marine plants and animals, and to provide protection for unique and representative areas.</p> <p>Aquatic reserves have been established to protect biodiversity and provide representative samples of our varied marine life and habitats.</p>	<p>Through comprehensive consultation processes, NSW has identified the environmental values for the state's waterways. They set out the community's values and uses for our rivers, creeks, estuaries and lakes (i.e. healthy aquatic life, water suitable for recreational activities like swimming and boating, and drinking water)</p> <p>The NSW Groundwater Quality Protection Policy (a component of the NSW State Groundwater Policy) establishes the framework for identifying and maintaining beneficial uses ("beneficial use" may be used interchangeably with the term "environmental value").</p>	<p>DECC has developed a range of guidance (available on-line at: http://www.environment.nsw.gov.au/ieo/index.htm) to help the consideration of WQOs in decision making.</p> <p>Stormwater guidance Managing urban stormwater: harvesting and reuse</p> <p>A resource guide for local councils: erosion and sediment control</p> <p>A resource guide for local councils: environmental management of council operations</p> <p>Managing urban stormwater: soils and construction (Volume 1) (The Blue Book)</p> <p>Other guidelines that encompass water quality issues are available on DECC's website e.g. <i>Environmental Guidelines: Use of Effluent by Irrigation</i> and <i>Environmental Guidelines: Use and Disposal of Biosolids Products</i>. (www.environment.nsw.gov.au)</p>	<p>The NSW state government has endorsed the community's environmental values for water, as the WQOs. These were adopted in 1999, following extensive consultation with the community in 1998. A similar process produced the Marine WQOs for NSW oceanic waters, agreed to by the NSW Government in 2005.</p> <p>WQOs are the agreed EVs and long term goals for NSW waterways; and a range of water quality indicators to help us assess whether the current condition of our waterways supports those values and uses.</p> <p>WQOs must be considered in administration and enforcement of the <i>Protection of the Environment Operations Act 1997</i>.</p> <p>The Natural Resources Commission (NRC) has developed a state-wide standard and targets for managing natural resources. The WQOs and RFOs were used as the basis for the NRC's water resource condition targets.</p> <p>NSW has developed stormwater quality targets for the north-west and south-west growth centres in Sydney. The stormwater targets are best management design targets for developers to meet in new urban areas. The targets are specified as pollutant loads that move towards achieving sustainable loads. These loads have been calculated with the aim of meeting the community agreed environmental values for the waterway.</p>	<p>RFOs are the agreed high level goals for surface water flow management. They identify 12 key elements of the flow regime that protect river health and water quality for ecosystems and human uses.</p> <p>The RFOs were developed for individual catchments through an extensive public consultation process and were endorsed by the NSW government in 1999.</p> <p>Water Sharing Plans set environmental flow rules that are based on the RFOs.</p>

⁸ This Appendix shows the flexibility with which the NWQMS can be applied across jurisdictions to meet their individual circumstances (e.g. institutional frameworks, priorities, budgets, etc.).

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State / Territory	Water Quality Management Plans	High Ecological values (HEVs)	Environmental Values (EV)	Water Quality Guidelines	Water quality objectives (WQOs)	Environmental Flow Objectives (EFOs)
Status	<p>Great Lakes WQIP has been developed and Botany Bay WQIP is being developed.</p> <p>Approved CAPs are in place for 12 of the 13 CMAs. The remaining CAP (for the Sydney Metropolitan CMA) is currently going through the approval process.</p> <p>The NRC will assess the CAPs against how actions in the plans have contributed to achieving the state-wide natural resource management targets.</p> <p>The Growth Centres Commission's Development Code is currently being finalised. In the interim, some of the relevant DCPs already specify the stormwater quality targets.</p>	NSW has declared five wild rivers and is currently assessing the suitability of another five rivers.	<p>The WQOs have been agreed for most fresh and estuarine surface water catchments in NSW (31 catchments) and marine waters.</p> <p>Groundwater beneficial uses are identified through the water sharing planning process.</p>			29 WSPs have been developed for the most stressed surface water sources across NSW.
Under Development	NSW is currently exploring options for improving the incorporation of stormwater quality targets into land use planning across the state.	NSW is participating in the process of developing a national approach for identifying high ecological value aquatic ecosystems.		<p>NSW is currently finalising volume 2 the <i>Managing urban stormwater: soils and construction</i> guideline (volumes 2 A – 2 E).</p> <p>NSW is developing a <i>Diffuse Source Water Pollution Strategy</i> for NSW state government, natural resource and environment agencies, CMAs and local government authorities to better direct and coordinate efforts and investment in managing diffuse source water pollution</p>	NSW is currently developing stormwater targets to apply across the state (i.e. expand the approach developed for the 'growth centres').	Around 60 additional WSPs are under development and will be made by 2011.
Victoria						
Process	<p>WQMPs developed mid 1990s-early 2000s (following NWQMS approach). WQ planning now essentially embedded in regional river health strategies (mid 2000s)</p> <p>5 year review for sustainable water strategies, regional catchment strategies and regional river health strategies</p> <p>10 year review period for SEPPs</p>	SEPPs and localised in RRHS's	Beneficial uses in SEPPs Values also documented in regional river health strategies	Generally conducted by EPA	SEPPs Embedded in existing WQMPs and regional river health strategies	Environmental water reserve (Water Act), Stream flow management plans, Dry Inflow Contingency plans, Sustainable water strategies
Status						Central SWS completed; Northern SWS nearing completion
Under Development	<p>Revised Sustainable Water Strategies for eastern, northern and western Victoria (Water Act).</p> <p>Revised Regional River Health Strategies</p> <p>Revised Regional Catchment Strategies (CALP Act)</p> <p>Review of Port Phillip Bay EMP date TBC</p>		Review of SEPPs planned by 2013	Review of wastewater reuse and biosolids guidelines in next 2 years.	Review of SEPPs planned by 2013 Many regions undertaking environmental risk assessments to assist development of specific regional WQOs (as provided for by SEPP)	Sustainable water strategies developing for west and east
Queensland			Process:			
Process	No formal requirement. Plans follow NWQMS WQ Mgt Framework	Ecological values assessments undertaken with WQMPs resulting in agreement on HEV areas	EPPW's Schedule 1 for established EVs &WQOs (EPPW has default EVs for other waters)	QWQG developed mainly using reference site data	EPPW's Schedule 1 for established EVs &WQOs	Established under Water Resource Plans
Current Status	SEQ HWS (2007-2012), TIMP (1992), NRM Plans, Douglas WQIP	SEQ, M-GSS, Douglas	TI (1997), SEQ, M-GSS, Douglas (2006) EVs scheduled	QWQG 2006	TI, SEQ, M-GSS, Douglas WQOs scheduled	Most of Qld catchments have WRPs developed or in progress

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State / Territory	Water Quality Management Plans	High Ecological values (HEVs)	Environmental Values (EV)	Water Quality Guidelines	Water quality objectives (WQOs)	Environmental Flow Objectives (EFOs)
Under Development	WQIPs for Tully, Ross-Black, Burdekin, M-W, Burnett-Baffle	Tully, Ross-Black, Burdekin, M-W, Burnett-Baffle	Tully, Ross-Black, Burdekin, M-W, Burnett-Baffle	QWQG periodically updated	Tully, Ross-Black, Burdekin, M-W, Burnett-Baffle	Remaining WRPs
Western Australia						
Process	<p>Drinking water Source Protection Plans being prepared by Dept. of Water using <i>Aust'n Drinking Water Guidelines (ADWG) 2004</i> framework.</p> <p>NRM plans prepared by each NRM body</p>	<p>Conservation wetlands defined for whole of state, best management practice guidelines used to influence community behaviour. Wetlands are administered via statutory management processes under the <i>Conservation and Land Management Act 1984</i></p> <p>Ramsar wetlands and estuaries - ecological evaluations undertaken</p> <p>Wild rivers (near pristine) inventory conducted. Regulatory measures and plans not available except under NRM processes</p>	<p>Environmental values defined using ADWG and NWQMS Document 4 (ANZGFMWQ 2000) for land use planning matters</p> <p>EVs defined for some strategic assets protected under Environmental Protection Policies or State Environmental Policies.</p> <p>NRM regional plans used to define EVs and management strategies</p>	<p>State Water Quality Management Strategy documents prepared covering <i>Framework for implementation</i> 2001, <i>Implementation plan-status report</i> 2003, <i>Implementation framework for NWQMS docs 4 & 7</i> 2002, <i>Policies and Principles</i> (draft 2007)</p> <p>National guidelines 4 (ANZGF&MWQ) & 6 (ADWG) used for benchmarking water quality criteria and risk management measures</p>	<p>Definition in regional NRM plans see http://www.nrm.wa.gov.au/index.htm</p> <p>In proclaimed Public Drinking Water Source Areas: Objective is to minimise contamination of surface and ground waters so the treatment costs are minimised and ADWG 2004 criteria are consistently met by water service providers</p> <p>Objectives under various state agency management strategies for specific assets e.g. Swan and Canning Rivers management strategy, healthy rivers action plan, Wilson Inlet nutrient reduction plan, Peel-Harvey water quality improvement plan, Dairy-catch and broad policies e.g. state wetland conservation strategy, state water plan, state water strategy.</p>	
Status	Drinking water source protection plans (DWSPP) published for 79 out of 139 proclaimed drinking water sources (excludes remote community and private supply sources)		<p>Being defined in ad hoc way until NRM processes formally define values for waterway segments and groundwater strata.</p> <p>Public drinking water source areas proclaimed under 2 drinking water catchment water management acts = 139;</p> <p>Waterways proclaimed for management =6;</p> <p>State environmental protection plans -Cockburn Sound; Environmental protection policies = 4</p> <p>Peel-Harvey; Gangara Mound (water supply source area) ; Swan coastal plain lakes, Agricultural wetlands</p>	<p>Department of Water fostering production of multi-agency environmental guidelines & industry codes of practice (23 published).</p> <p>In interim DOW has published 62 Water Quality Protection Notes and 35 Water Notes 3 state-wide water quality protection policies, and 20 advisory papers on salinity controls</p>	NRM plans being implemented in 6 regions covering WA	Surface water sites with EWPs in place =2; Groundwater sites with EPPs in place = 8
Under Development	12 DWSPP in development FY 07-08		State marine waters EPP	Environmental guidelines on pesticides management, mining and mineral processing, extractive industries, biosolids application to land & aquifer recharge with municipal wastewater		
South Australia						
Process	<p>Water Quality Improvement Plans (WQIPs) Implemented under the Coastal Catchments Initiative, WQIPs are prepared consistent with the Framework for Marine and Estuarine Water Quality Protection. They identify the most cost-effective and timely projects that will form an agreed approach to achieving pollutant load reductions in a catchment.</p> <p>Port Waterways Water Quality Improvement Plan released. Adelaide Coastal Water Quality Improvement Plan development well advanced and due for release for public comment first quarter 2009</p>	<p>High Conservation Value Aquatic Ecosystems have been listed for South Australia, based on DEWHA criteria. These cover wetlands and estuarine environments.</p> <p>Declared Ramsar Wetlands recognised. Ecological values assessments undertaken with Water Allocation Planning Process (see eflows objectives).</p>	<p><i>Environment Protection (Water Quality) Policy 2003</i> (EPP) ascribes default EVs for all South Australian waters.</p> <p>Process of development of WQIP includes the development of area specific EVs that have been developed in consultation with local communities.</p>	<p>Guidelines have been developed for establishing environmental values and water quality objectives—applying the National Water Quality Management Strategy in South Australia (http://www.epa.sa.gov.au/pdfs/guide_ev.pdf)</p> <p>South Australian EPA has developed a range of guidelines to manage waters consistently with the State EPP and the NWQMS. These guidelines can be found on-line, together with other EPA guidelines at http://www.epa.sa.gov.au/guidelines.html.</p> <p>Codes of Practice, developed for range of industries and for community, government and construction stormwater management are linked to the State EPP. These Codes of Practice are available at http://www.epa.sa.gov.au/codes.html</p>	<p>Environment Protection (Water Quality) Policy 2003 ascribes default Water Quality Objectives for all South Australian waters.</p> <p>Process of development of WQIP includes the development of area specific Water Quality Objectives that have been developed in consultation with local communities.</p>	Environmental flow objectives are undertaken with Water Allocation Planning Process. WAPs are undertaken for all Prescribed regions (significantly developed catchments and basins)

Final Discussion Paper on Implementation of NWQMS

State / Territory	Water Quality Management Plans	High Ecological values (HEVs)	Environmental Values (EV)	Water Quality Guidelines	Water quality objectives (WQOs)	Environmental Flow Objectives (EFOs)
Status	Port Waterways Water Quality Improvement Plan released	High Conservation Value Aquatic Ecosystems preliminary listing includes 35 aquatic ecosystem complexes, development ongoing. Ramsar Wetlands ecological character descriptions completed. - Coorong Lower Lakes - Banrock Station - Riverland	Draft EVs now developed for all of Adelaide's metro waters including the Port waterways	The Codes of Practice have legal authority through links to the State EPP	Draft Water Quality Objectives now developed for all of Adelaide's metro waters including the Port waterways	WAPs have been completed for South east region, Barossa Prescribed Water Resources Area, Musgrave Prescribed Wells Area, Southern Basins Prescribed Wells Area, Clare Valley Prescribed Water Resources Area, Far North Prescribed Wells Area, River Murray Prescribed Watercourse, Noora Prescribed Wells Area, Mallee Prescribed Wells Area
Under Development	Adelaide Coastal Water Quality Improvement Plan development well advanced and due for release for public comment first quarter 2009	Ramsar Wetlands ecological character descriptions ongoing. - Bool and Hacks - Coongie Lakes Strategy for the Assessment of South Australian Aquatic Ecosystems Program in planning stage	Program to establish draft EVs for McLaren Vale aquifers as a pilot process for groundwater EVs	The stormwater Codes of Practice are currently under review. Guidelines are reviewed on an as needs basis.	Program to establish draft WQOs for McLaren Vale aquifers as a pilot process for groundwater WQOs	WAPs are being prepared for Marne / Saunders, Eastern and Western Mt Lofty Ranges Baroota, Peak Roby and Sherlock Prescribed Wells Area
Tasmania						
Process	Plans follow NWQMS WQ Mgt Framework. <i>State Policy of Water Quality Management 1997</i> integral to WQMPs. Water Management Plans developed and regulated under <i>Water Management Act 1999</i> . NRM planning and strategic on-ground works by each regional body for whole of catchment management. DHHS oversees the development and implementation of Drinking WQMP.	Pristine and near pristine PEVs have been set consistent with the SPWQM 1997 and the NWQMS framework. The Tasmanian Water for Ecosystems Policy under the WMA 1999 provides the mechanism for determining environment flow. Protection through EMPCA 1994.	Protected Environmental Values have been determined consistent with the SPWQM 1997 and the NWQMS framework.	WQGs set consistent with the NWQMS framework and the SPWQM 1996. WQGs determined either through reference site specific biological and physical and chemical data or defaulted to the NWQMS ANZGFMWQ 2000 WQGs or more contemporary references.	WQOs set consistent with the NWQMS framework and the SPWQM 1996.	Under the Water Management Act 1999 policies are developed and co-ordinated to sustainably use and develop water resources. The Water for Ecosystem Policy provides the mechanism for determining environmental flow requirements. This has been based primarily on the principles espoused in the <i>National Principles for the Provision of Water for Ecosystems</i> (ARMCANZ & ANZECC 1996)
Status	WMPs developed for a number of catchments. DWQMPs prepared by drinking water suppliers. Recreational water reports prepared annually. State of Derwent Reports and State of Tamar Estuary Reports prepared	Thirty percent of the State is protected in national parks and reserves: twenty percent SW Wilderness World Heritage Area. Ten Ramsar : Moulting Lagoon, Logan Lagoon; Lavinia; Pittwater-Orielton Lagoon; Apsley Marshes; East Coast-Cape Barren Island Lagoons; Flood Plain Lower Ringarooma River; Jocks Lagoon; Interlaken; Little Waterhouse Lake.	PEVs including protection (e.g. Pristine and near pristine) aquatic ecosystems for all inland waters and estuaries.	WQGs set for PEVs on an as need basis for specific projects, and existing or proposed activities.	WQOs set for PEVs for specific projects, and existing or proposed activities.	Scientific studies to determine the minimum flow requirements have been completed for 48 rivers/catchments and are being used to establish trigger points for water restrictions and for setting environmental water provisions under WMPs.

Final Discussion Paper on Implementation of NWQMS

State / Territory	Water Quality Management Plans	High Ecological values (HEVs)	Environmental Values (EV)	Water Quality Guidelines	Water quality objectives (WQOs)	Environmental Flow Objectives (EFOs)
Under Development	WQIPs for Derwent Estuary Program. DEP – EMP Stormwater management plans being developed. Updates of NRM plans	Whole of catchment management and protection allowing review of environmental values through partnerships with government and no-government stakeholders, and NRM regions.	PEVs are proposed to be set for all coastal waters and groundwater regions over 2009-2010.	WQG handbook is proposed to be completed in the 2009.	WQOs proposed to be set on catchment basis over 2009-2010. Water Quality Targets (MAT, RCT, AT) will be set as part of this process through partnerships with government and no-government stakeholders, and NRM regions	The Water for Ecosystem Policy is being revised to better incorporate the concepts of a holistic approach to establishing environmental water requirements: assessing the water requirements of ephemeral streams, riparian and other flood dependent vegetation and estuaries.
ACT						
Process	No formal requirement. Plans follow NWQMS WQ Mgt Framework	About 70% of ACT is protected by National Park	Water Use and Catchment policies in original Territory Plan sets EVs for 3 types of catchment areas	WQOs based on guidelines developed mainly from reference site biological and phys-chem data. Some data from impact studies on most susceptible organisms	Schedule 4 of EP Reg 2005 sets WQ standards for EVs in Territory Plan	
Status	3 ICM Plans ACT NRM Plan	As above	Territory Plan 2007 included additional category of stormwater	As above	Schedule 4 reviewed after AWQG 2000 but no changes needed	
Under Development	Future updates of NRM Plan	As above	Any updates to be included in regular updates of Territory Plan	As Above	None planned	
Northern Territory						
Process	No formal statutory requirement. Planning follows NWQMS framework. INRM plan for NT recognises national approach and process.	Declared Ramsar Wetlands and Conservation Parks and reserves (NT & Commonwealth) recognised.	Declared under S 73 of the Water Act for WQ planning and s 22A for water allocation planning. Most EVs declared to date to facilitate discharge licence issue under s 74-77 of Water Act	Use National documents and guidance therein. No locally specific guidance developed.	WQOs for WDLs derived from NWQMS doc 4 re guidance and benchmarking on toxicants.	Declared under draft Water Allocation Plans (generally as 80% of total flow or availability)
Status	WQPP being developed for Darwin Harbour and its catchment waterways - see http://www.nt.gov.au/nreta/water/bud/quality.html	NT 'Living Rivers' policy being drafted that will incorporate high conservation values waters (wild rivers) for special recognition and protection.	EVs declared under s 73 listed at http://www.nt.gov.au/nreta/water/bud/index.html ADWQ and new Recreational Risk Management guidance endorsed and adopted by Health Dept. (DHCS)		Darwin Harbour WQPP has drafted WQOs for community endorsement. Cultural and ecological values (EHOs) yet to be determined.	
Under Development	Water quality and quantity plans for priority catchments being developed – Darwin Region, Katherine Daly and Mataranka. See http://www.nt.gov.au/nreta/water/kvac/index.html	A draft Parks Master Plan is under development.				

Appendix 15 - Water Quality Management in New Zealand¹

Context

In New Zealand, the [Ministry for Environment](#) sets legislation and policy at the national level. The principal legislation relating to water quality management is the [Resource Management Act](#) [RMA]. Under the RMA, New Zealand's regional councils (see map below) – which are based on catchment boundaries - have primary responsibility for managing water quality.



Introduction

Water in rivers, lakes and wetlands is one of New Zealand's most important resources. Good quality water is valued for many reasons; including its ecological function and its role in maintaining biodiversity, its scenic and recreation value, and its cultural and spiritual significance. It is also an invaluable resource for drinking, irrigation, aquaculture, many industrial processes, and for assimilating contaminants.

Developing a regional water quality plan is a complex, multi-disciplinary task that requires technical information from experts and knowledge of community values and expectations. The role of a plan is to guide the sustainable management of surface water quality, meaning plan provisions must allow for reasonable use of the resource,

¹ Sourced from: <http://www.gp.org.nz/plan-topics/surface-water-quality.php>

while safeguarding its life-supporting capacity and managing any adverse effects of its use.

Resource uses have the potential to affect environmental values by reducing water quality. Water quality planners must be able to identify the relevant values, account for the effects of different types of point and non-point source discharges, establish acceptable water quality for receiving waters, and establish acceptable zones for mixing of discharges.

A range of effective planning approaches are used in current practice in New Zealand. Significant challenges still exist, and developmental work is in progress. One of the largest challenges is managing non-point source discharges and the cumulative effects from land uses on water quality.

The following notes summarise planning for the management of surface water quality in rivers, lakes and wetlands in New Zealand. Surface water quality planning is a large and complex subject that ranges from strategic considerations, such as identifying the effects of land uses on the quality of adjacent water resources, to site specific issues associated with individual discharges. It has a considerable technical component that requires input from a range of disciplines (eg water chemistry, microbiology and aquatic ecology). At an early stage in the planning process planners should identify their technical information requirements, and relevant knowledge and expertise to meet these.

Planning for water quality cannot be separated from water quantity management, as a reduction in water quantity (for example, due to water takes) can result in a reduced capacity of that water body to dilute contaminants (see the [water allocation guidance note](#) for more information). Neither can surface water quality be managed independently of groundwater, or the beds and margins of water bodies, or the coastal marine environment or catchment land uses. Surface water quality must be managed comprehensively, and in a manner that is fully integrated with other environmental media and human uses.

The role of regional water quality plans

A regional water quality plan is a valuable part of a New Zealand regional council's overall framework for managing water quality. It enables a council to:

- Ensure that a wide range of environmental and cultural values, as well as many other important matters (such as those listed in Part II of the RMA) are considered, and that the most effective methods are used to manage any adverse effects of water use
- Establish and/or maintain an equitable use of resources
- Make consistent, justifiable decisions on consent applications for discharges into water, or discharges onto land that might result in contaminants entering water
- Avoid the re-litigation of issues through the resource consent process by dealing with common issues in the plan
- Take into account the cumulative effects of discharges
- Provide guidance to resource users on what is expected when seeking a consent
- Provide a framework to help monitor and measure the environmental results of plan provisions and management practices.

Section 65 of the RMA allows a regional council to prepare a regional plan at any time and sets out a number of circumstances in which '...a regional council shall consider the desirability of preparing a regional plan...' One of these circumstances, section 65(3)(h), relates to any use of land or water that has actual or potential adverse effects on water quality.

In the absence of a regional plan, water quality is generally managed by considering discharge consent applications on a case-by-case basis. This is because section 15 of the RMA restricts any person from discharging contaminants or water into water (or onto land in circumstances which may result in contaminants entering water) unless the discharge is expressly allowed by a rule in a regional plan, a resource consent, or regulations.

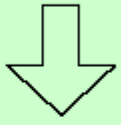
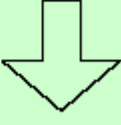
Although considering applications on a case-by-case basis allows councils to take into account the site-specific details for each discharge, it is unlikely to be the most effective way of managing the cumulative effects of discharges or the effects of activities that generate non-point source discharges. They also do not provide resource users with guidance on what is expected when preparing an application.

By contrast, regional water quality plans assist councils to co-ordinate regional functions to address environmental issues and provide a structured means for them to consider:

- National and regional policy and instruments (e.g. national and regional policy statements, water conservation orders)
- Local policies and plans (e.g. district and city plans)
- Integrated catchment management (e.g. considerations of the quality and quantity of surface water bodies, as well as the relationship of these resources with their catchment land-use and groundwater quality)
- Community priorities and requirements for resource use
- Integrated environmental monitoring.

The overall management framework under the RMA can be illustrated in Figure 1 as follows: the RMA at the national level; policies and plans at the regional level, and individual resource consents at the site-specific level.

Figure 1: NZ's RMA statutory framework for water quality management

Institutional Level	Statutory Framework	Spatial Scale	Resolution
<u>Goal</u>	National Level (RMA)	LARGE (National)	LOW 
<u>Strategic</u>	Conservation Orders Regional Policy Statement Regional Plans (e.g., Region-wide Plans Catchment Plans Combined Plans)	MEDIUM (Regional-Sub Regional)	INTERMEDIATE 
<u>Operational</u>	Resource Consents	SMALL (Site Specific)	HIGH

Under this framework, a regional water quality plan must give effect to any national policy statements and the regional policy statement and must not be inconsistent with any other regional plan for that region (section 67 RMA).

The regional water quality plan should also:

- State the regional environmental values for rivers and lakes
- State the community expectations for use of the water resource
- Seek to resolve the conflict between sustaining environmental values and use of the water resource
- State the plan's objectives for environmental values
- State the plan's objectives for allowing resource use
- State the management controls (the policies and rules, which may include standards and other methods) to achieve the objectives.

Resolving conflict between environmental values and resource uses

Good quality water supports many environmental values and resource uses. It is also of spiritual value to Māori.

The key issues in surface water quality planning usually involve:

1. Conflict between human activities and the values associated with rivers, lakes and wetlands.
2. Determining the state in which water quality should be sustained.

Environmental values

Environmental values reflect the community's aspirations for the water in its region, and the level of water quality desired, including:

- Ecological function and biodiversity, such as plants, invertebrates, fish, and birds
- Natural character
- Natural features and landscape
- Cultural and spiritual
- Scenic and amenity
- Contact recreation, such as swimming, fishing, kayaking, and boating
- Mauri (life force) and mahinga kai (food and other resources).

Cultural and spiritual values

Many Māori consider water as the source of life and sustenance. Māori believe that water contains a mauri (life force) that joins physical and spiritual elements and links water to every other part of the natural world. Water is a taonga (treasure) because it carries the lifeblood of the land; the well-being of all living things depend on it. Maintaining water quality in the best possible condition, so that a river or lake and its ecosystems are healthy, is an issue of major concern for many Māori.

[A Cultural Health Index for Streams and Waterways: Indicators for Recognising and Expressing Māori Values](#) has been developed to facilitate the input and participation of iwi² into land and water management processes and decision making. This index links Western scientific methods and cultural knowledge about stream health,

² Māori word for a set of people bound together by descent from a common ancestor or ancestors

Particular values concerning water quality vary among [tangata whenua](#), and depend on characteristics at specific sites. Consultation with local iwi is essential for identifying values.

Resource uses

Resource uses include:

- Human drinking supply
- Stock drinking supply
- Irrigation supply
- Industrial processing (particularly food processing)
- Aquaculture
- Groundwater aquifer recharge
- Contaminant assimilation, such as receiving discharges.

Human activities often affect environmental values by discharging contaminants into rivers or lakes. Contaminants in water can be increased and concentrated by point source discharges and non-point source (diffuse) discharges. Water takes (abstractions) can also affect water quality by reducing the water's ability to dilute contaminants.

Point source discharges come from a single discrete point, such as the end of a pipe or drain. Some of these discharges are treated before being released into receiving waters, but many are not. Common examples include:

- Stormwater from reticulated networks, collecting run-off from roofs, roads, and carparks
- Wastewater containing community sewage
- Leachate from landfills and other contaminated sites
- Industrial by-products, such as cooling water, and process chemicals
- Agricultural by-products, such as dairy shed effluent
- Irrigation by-wash, such as canal and border-dyke return outlets.

Non-point source discharges are from widespread or diffuse sources. Contaminants enter rivers or lakes via runoff across land or shallow sub-surface drainage. These discharges are difficult to manage, because it is hard to establish a direct link between an adverse effect and its source.

Management options include reducing the contaminant at source, or using riparian management to maximise attenuation before contaminants enter rivers or lakes. Further detail can be found in the Ministry for the Environment's [Managing waterways on farms: A guide to sustainable water and riparian management in rural New Zealand](#).

Common examples of non-point discharges are:

- Irrigation or rainfall runoff from agricultural land containing contaminants such as fertiliser, animal faeces, and eroding soil
- Runoff from horticultural land containing contaminants such as fertiliser, chemical sprays, and rotting produce
- Runoff from forestry land containing contaminants such as eroding soil, chemical sprays, and debris

- Runoff from mining areas containing contaminants such as eroding soil and rock
- Stormwater from areas that are not reticulated.

For more information and resources see [Common point source and non-point source discharges](#)

Measuring water quality

Water quality can be measured using chemical and physical measures and/or biological measures. The quality of both the discharge effluents and of the receiving waters can be measured. It is also necessary to measure ambient (background) water quality, preferably through time, in order to quantify how water quality has changed or is changing.

Community consultation is needed to establish less tangible aspects of water quality, such as its mauri. Interpreting water quality is not a straightforward activity. The water quality that is measured is often the consequence of complex interactions between a number of factors, and understanding, for example, the relationship between measured water quality and catchment land use often requires the application of specialised skills.

Chemical/physical measures involve the scientific measurement of contaminants of concern, or 'indicators' of contaminants of concern. Contaminants are usually of concern because they affect aquatic 'biological health' or some other value of a water body (e.g. visual amenity or human contact-related illness risk). Contaminants and indicators are often referred to as water quality variables or determinants or parameters.

Most contaminants and indicators are measured as concentrations (an amount per volume). Exceptions include temperature, pH, clarity, and colour.

Biological measures involve directly measuring aspects of the density and/or composition of the biological communities that live in rivers, lakes and wetlands, and using these as indicators of 'health.' This approach is based on the relationship between chemical/physical water quality and the health of the biological community, although care is needed when interpreting results because factors other than water quality are also important influences (e.g. water flow or level, substrate, riparian condition, or biological interactions). For this reason, a range of methods is often used.

Biological measures are particularly useful because the composition of the biological community reflects the water quality over a period of time, rather than just the single instant in time represented by a chemical measure.

For examples see [Common measures of water quality](#).

Ambient (background) water quality usually refers to the existing quality of receiving water upstream of a discharge. This measurement includes concentrations of naturally occurring contaminants that are usually not harmful, and are often necessary, for aquatic life. For example, phosphorus compounds are released by eroding rocks, and phosphorus and nitrogen compounds are common components of biological processes. Concentrations of these contaminants can, however, reach harmful levels. Establishing the background water quality enables councils to decide

what is an acceptable change from background water quality, and establish standards that set an acceptable level of change from ambient conditions.

Cultural values of water quality should be recognised through consultation with the community to determine those aspects of water quality that cannot be measured scientifically. For example, the mauri (life force) of water cannot be directly measured, although measurements of water quality variables and biological indicators may help to assess some aspects of the state of mauri or effects on mauri.

Setting standards for water quality

Regional councils may choose to set water quality standards in a regional plan, but it is not mandatory to do so. If water quality standards are set, it is important to ensure that those standards meet the plan's objectives and policies for water quality and that they are reviewed over time to ensure ongoing suitability.

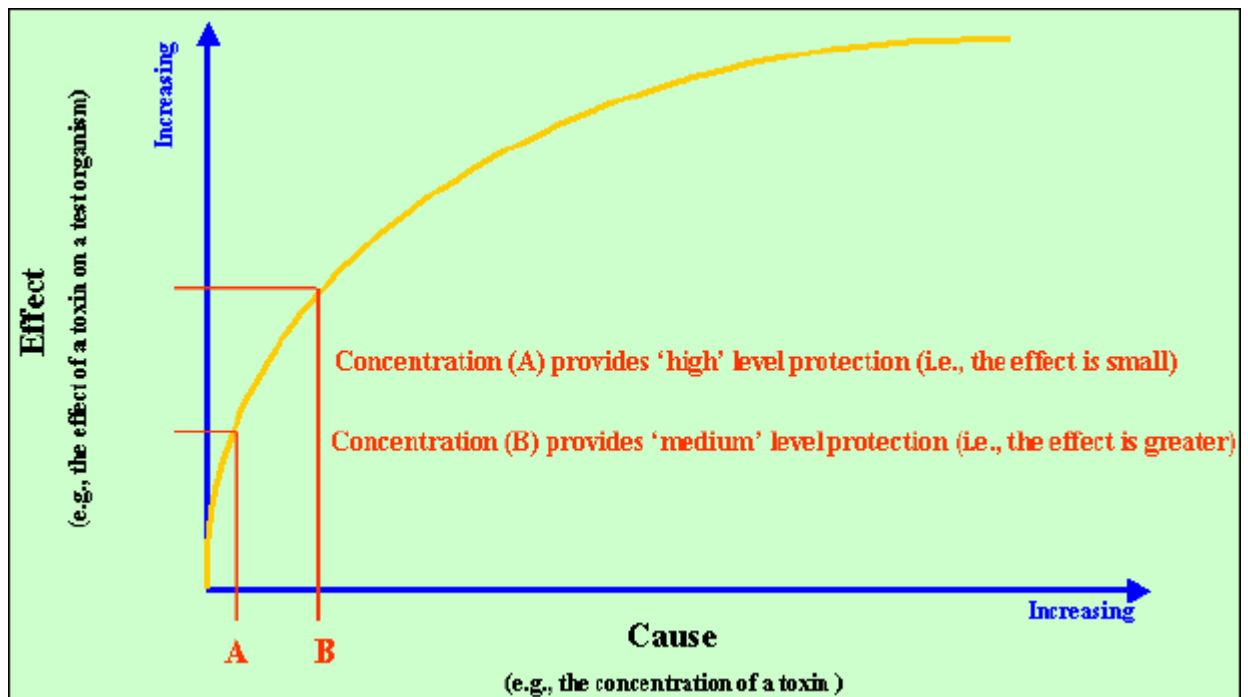
Setting water quality standards is a complex task that requires input by experts in water quality and aquatic ecology. The scientific information usually underlying water quality guidelines can be used to develop standards, but it is important to understand the difference between guidelines and standards. Guidelines do not have any statutory standing and they generally offer several levels of environmental protection, which are provided as 'options' that may apply to different types of water bodies, or different management purposes. Standards within rules in a plan have the authority of regulations under the RMA and can be enforced. They must therefore be carefully defined and justified based on the circumstances of the water bodies to which they apply.

When setting standards, councils also need to consider what mixing is appropriate or 'reasonable' in order for a discharge to meet the standards.

Guidelines

Guidelines are usually based on scientific information about the effects of contaminants on the environmental conditions of a water body, or on the organisms that live in that water body. This relationship can be seen as a conceptual cause-effect curve such as Figure 2:

Figure 2: Illustration of a typical 'cause-effect' relationship



For example, the cause-effect curve for a particular toxin is established by measuring growth impairment or death as the effect of increasing concentration of a toxin on aquatic species.

Adverse effects are not always the result of increasing concentrations. For example, aquatic species require dissolved oxygen for survival and adverse effects occur when concentrations decrease. Similarly pH can have adverse effects below and above a certain tolerance range.

In addition, the concept of a cause-effect relationship is also relevant for effects that are not related to aquatic biology. For example, the risk of water contact-related illness in humans increases with micro organism indicator concentration. Similarly, the 'conspicuousness' of changes in water colour to the human eye increases with measurable changes in hue.

The key point is that cause-effect relationships provide the basis for suggesting concentrations of contaminants that provide an identified level of protection.

For example, the [Australian and New Zealand Guidelines for Fresh and Marine Water Quality](#) provides a risk-based approach by presenting four options for concentrations of many toxic contaminants. These options are designed to protect aquatic organisms at either 99%, 95%, 90% or 80% levels of protection. These options are points on the [cause-effect](#) relationship for a range of New Zealand and Australian aquatic species. The Guidelines also show how to develop options for other levels of protection based on site-specific or region-specific information.

Many guidelines used in New Zealand are complex, and require professional technical advice to interpret. Guidelines commonly used include:

- [Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas \(MfE 2003\)](#)
- [Australian and New Zealand Guidelines for Fresh and Marine Water Quality \(ANZECC & ARMCANZ, 2000\)](#)
- [New Zealand Periphyton Guideline: Detecting, Monitoring and Managing Enrichment of Streams \(Biggs, 2000\)](#)
- Water Quality Guidelines No. 1 - Guidelines for the Control of Undesirable Biological Growths in Water (MfE, 1992) (Note: These guidelines have been largely superseded by the New Zealand Periphyton Guideline except for the sewage fungus component, for which the 1992 guideline remains current.)
- Water Quality Guidelines No. 2 - Guidelines for the Management of Water Colour and Clarity (MfE, 1994) (Note: These guidelines have been largely incorporated into the ANZECC & ARMCANZ (2000) guidelines)

Standards

Standards define a threshold for the point on the cause-effect curve that is deemed to be acceptable for a given situation. A standard can be either a numeric value for a contaminant or a narrative description of an environmental state.

Defining standards requires both the use of scientific information, such as cause-effect relationships in guidelines, and value judgements concerning what values to protect and at what level. Many plans include standards within rules as methods to achieve objectives and policies.

Section 69 of the RMA allows water quality standards to be set regionally in plans, and provides direction for regional councils in setting such standards. In particular sect. 69(3) requires that regional councils shall not set standards which may result in a decline in existing water quality unless it is consistent with the purpose of the RMA.

Section 43 of the RMA allows standards to also be set nationally. However, there are currently no national standards for water quality.

Related statutory restrictions that are sometimes referred to as standards are:

- Restrictions on granting permits for discharges with certain effects – sect.107 RMA
- Restrictions on allowing permitted activities with certain effects – sect. 70 RMA.

Other related standards are:

- Minimum standards for Water Quality Classes in the Third Schedule RMA.
- National standards for drinking water quality, administered by the Ministry of Health. They apply to water quality for drinking water 'at the tap' which may or may not have been treated. They do not have any statutory standing for environmental water quality, but they are often used as guidance where water bodies (and particularly groundwater) are used for drinking supply. For more information see [National Standards for Drinking Water Quality](#).
- [Proposed national environmental standard for human drinking-water sources](#). The Ministry for the Environment is working with the Ministry of Health to develop and implement a [national environmental standard](#) for human drinking water sources under the RMA. The standard is intended to help regional

councils and water suppliers manage drinking water sources better, which will ultimately lead to better quality drinking water.

The benefits of setting water quality standards in a regional plan are:

- They provide certainty about desired environmental outcomes and therefore what is expected from resource users
- They are generally measurable and can provide benchmarks against which to measure cumulative effects as well as the effectiveness of plans
- They provide clear guidance for processing resource consents.

The disadvantages of setting water quality standards in a regional plan are:

- It can be very difficult to define standards that are appropriate across a range of different types of waterbodies with different characteristics and different values. This approach can result in some waterbodies being under protected while resource use is unnecessarily restricted in others. This difficulty can be reduced by using [spatial frameworks](#) to group waterbodies into classes with distinctive characteristics and values.
- They can reduce the discretion that a regional council has when processing resource consents on a case-by-case basis.

Some examples of regional plans that have used standards are:

- [Manawatu Catchment Water Quality Regional Plan \(Horizons Regional Council\)](#)
- [Waimakariri River Regional Plan \(Environment Canterbury\)](#)
- [Opihi River Regional Plan \(Environment Canterbury\)](#)
- [Proposed Regional Freshwater Plan for Southland \(Environment Southland\)](#)

'Reasonable mixing'

The RMA requires that any water quality standards imposed through s107, s69, s70 or the Third Schedule shall be met after allowing for 'reasonable mixing' of discharges. This requirement implies that it is sometimes necessary and acceptable to allow for a zone in the receiving water to not meet water quality standards. Such a zone is called a 'non-compliance zone.' The question is: what sized non-compliance zone is reasonable?

Regional plans need to address this question if adopting the use of standards. When a standard is set in a plan, the size of the non-compliance zone considered reasonable for that standard should be defined as specifically as possible.

When dealing with individual discharge consents, the usual approach is to estimate the size and shape of the non-compliance zone for each contaminant in a particular discharge, taking into account:

- The discharge flow rate
- The contaminant concentration
- The mixing properties in the receiving river, lake or wetland
- The relevant water quality standard

- Whether the size and shape of this particular non-compliance zone will compromise the management objectives for the specific receiving river, lake or wetland.

If the non-compliance zone will not compromise the management objectives, it is a 'reasonable mixing zone.'

Matters that should be considered in reaching a decision include:

- The size (length, width, area) of the zone, relative to dimensions of the whole river or lake
- The type of contaminant in the zone, and the type and magnitude of effect, for example, acute or chronic effects
- Any special local use or value of the river or lake
- Whether effects could occur beyond the non-compliance zone, such as the restriction of fish passage to upstream spawning areas
- Any cumulative effect of multiple non-compliance zones, whether or not they overlap
- Whether all reasonable effort has been made to minimise the non-compliance zone.

No specific, quantified mixing zone will be reasonable in all cases because management objectives and environmental characteristics vary between rivers and lakes, and different contaminants have different effects on the management objectives. This makes defining a single criterion for reasonable mixing impossible.

The impossibility of a single, quantitative criterion for a reasonable mixing zone presents particular challenges for developing regional plans. The most justifiable definitions of reasonable mixing depend on case-by-case conditions, which is contrary to the aim of providing prior certainty in a regional plan. Defining sub-regional spatial frameworks helps to account for some of the variability between objectives for different rivers and lakes. See [Define a spatial framework](#) for further discussion.

Existing regional water quality plans deal with this challenge in different ways. Some councils have elected to reserve discretion over the definition of reasonable mixing, while others have used 'rules of thumb', such as five or 10 times a river's channel width, for purely practical reasons.

Terminology

The RMA does not define or provide guidance on reasonable mixing, which has led to wide debate and often there is confusion over terminology. It is important that regional plans use consistent terminology.

Refer to the publication, ['Reasonable Mixing': A Discussion of Reasonable Mixing in Water Quality Management](#) (Rutherford et al. 1994) for:

- Full definitions of common terminology
- Principles and approaches that are generally regarded as best practice in setting policies for reasonable mixing.
- Use accurate and consistent terminology when defining reasonable mixing, a reasonable mixing zone, and a non-compliance zone.

- Refer to the [Manawatu Catchment Water Quality Regional Plan](#) for an example of a reasonable mixing policy that provides a practical definition for reasonable mixing, while still retaining discretion over its application.

Developing provisions

Like all regional policy statements and plans, regional water quality plans need to show a clear relationship between the purpose for managing a particular water body and the issues, objectives, policies, methods, and anticipated environmental results (AERs).

- Identify the people with the right skills to develop provisions. Developing an effective water quality plan requires the input of different technical skills, including:
 - Water quality scientists and ecologists
 - Experts in Māori values
 - Specialists in water uses and values, such as the needs of recreational users, dischargers and irrigators
 - Resource management policy analysts
- Use consistent terminology and meanings for purposes, issues, objectives, policies, and methods.
 - See the guidance on: [Development of the policy framework](#)
 - See [Drafting Issues, Objectives, Policies and Methods in Regional Policy Statements and District Plans](#)
- Elicit community views on water quality outcomes. For example, use discussion documents, issues/options reports, community surveys and focus group meetings. See the guidance note on [Consultation](#).

The process

Developing provisions for a water quality plan essentially involves answering the key questions: Where? Why? What? How?

- First gather as much information as possible about the current water quality, resource uses and environmental values, of rivers, lakes and wetlands in the region.
- Undertake an analysis of the issues, including conflicts between environmental values and resource uses such as discharges, as well as linkages between surface and groundwater quality and quantity, and management of land-uses. See the guidance note on [development of the policy framework](#)
- Determine a spatial framework to define **where** the issues occur and **where** the water quality planning provisions will apply, and to determine the approach to developing the provisions.
- Define the management purposes that identify **why** water quality is being managed, particularly issues of conflict between environmental values and resource use. This may include defining areas where water quality is to be maintained in its natural state.
- Develop explicit objectives that describe **what** environmental state is required to support the purpose.
- Develop policies that define **how** the objective is to be achieved. These will include policies to manage point and non-point source discharges and may need to include a policy for 'reasonable mixing.'

- Develop methods that state **how** the policy will be implemented. A wide range of methods can be used, including regulatory methods (such as standards) and non-regulatory methods (such as community education and promotion initiatives). See the guidance note on [section 32 - Methods of Implementation](#).
- Define anticipated environmental results that are measurable and can indicate the extent to which the objectives will be obtained within the lifetime of the plan.
- Create a monitoring strategy that compares progress against the anticipated environmental results and tests **how well** the plan provisions are working. The monitoring strategy should also continue to monitor the state of the environment. See the guidance note on [policy and plan effectiveness monitoring](#).

Gather information

Planning for water quality requires detailed information on:

- Existing water quality, how it has changed or is changing, and the factors influencing that change
- Existing discharges and land uses that affect water quality
- Existing and likely future demands for water use
- Community expectations for environmental values and resource use
- Conflicts between environmental values and resource uses.

Analyse issues

Analysing and focusing issues is an important and complex task in developing plan provisions. Issues must be clear statements about matters that need addressing to achieve the purpose of the RMA and should be thoroughly researched and consulted upon. For example, the conflicts between environmental values of rivers, lakes and wetlands, and various point and non-point source discharges are usually key issues for water quality. The issues should be analysed in detail, including the linkages between surface and groundwater quality and quantity, and management of land uses.

Define a spatial framework

A spatial framework for water quality planning may involve breaking the region into catchments, individual rivers, lakes or wetlands, or even parts of rivers, lakes or wetlands.

The use of spatial frameworks recognises that different rivers and lakes have different environmental values and resource uses, and have different capacities to assimilate contaminants, all of which depend largely on physical characteristics and location. The purpose of spatial frameworks is to more specifically and justifiably assign provisions that are appropriate to the characteristics of different rivers and lakes. The gathered information and analysis of issues will help determine which spatial framework is appropriate.

The RMA statutory framework sets broad goals and regulations that apply across the whole of New Zealand, rather than being specific to particular parts of the country. Regional policy statements and plans can apply spatial frameworks to subdivide water bodies into types, in order to apply strategic provisions that take account of the variability between different types of rivers and lakes. Individual resource consent

processes are guided by national regulations and regional policies and rules, but involve case-by-case consideration of site-specific conditions.

- Identify and define the spatial framework that is most appropriate to the issues being addressed and the plan's overall management purpose.
- Apply provisions to types of rivers and lakes defined by the spatial framework.
- Use maps to present spatial frameworks in plans.

A recent approach to grouping rivers that share similar physical characteristics is the River Environment Classification (REC). Environment Canterbury and Environment Southland are using the REC to define spatial frameworks for their water plans. For a discussion of the use of river classification approaches for regional plans see [Using River Habitat Classification in Regional Plans](#).

Define the management purposes

Deciding on the purpose for managing a particular water body involves a value judgement and is a political decision. Since water bodies typically support many values and resource uses, some of which may be in conflict with each other, a judgement must be made to choose and prioritise which values will be managed for, and at what level of protection. This is the defined 'purpose for management' and it will drive the development of objectives.

- Identify which environmental values and resource uses are in conflict with each other.
- Prepare a paper for council outlining the pros and cons of various possible outcomes and the management implications associated with each option.
- Obtain council decision on the management priorities to be placed on the different values, and the levels of protection assigned to those values.

Develop objectives

Objectives describe the environmental outcomes required to support the defined management purpose.

Ideally, objectives should be specific, quantitative and measurable descriptions of environmental state or condition. However, quantitative outcomes can be difficult to define, especially when applied to large-scale spatial frameworks. This is because appropriate outcomes vary between rivers and lakes with different physical characteristics, environmental values, and uses. This variation decreases if spatial frameworks are used. In addition, as it is not possible to foresee all outcomes, and scientific knowledge about effects is sometimes uncertain, narrative objectives are often used.

The problem with narrative objectives is that they are open to interpretation and difficult to measure, and are therefore less certain and justifiable.

- Use numeric objectives where possible.
- Where narrative objectives are necessary, these should be as specific and precise as possible in describing the desired outcome.
- The extent to which the objectives will be achieved within the lifetime of the plan will be measured by the anticipated environment results (see below).

Develop policies

Policies define the course of action needed to achieve the objectives. For example, policies could state that land uses or point-source discharges should be managed such that they do not cause water quality effects that are inconsistent with the objectives.

Develop rules and other methods

Rules and other methods define how the policies will be implemented to achieve the objectives. Water quality plans usually include a wide range of methods, ranging from rules and standards relating to discharges, to community education and promotion initiatives, and more recently, to rules governing land use in catchments.

The use of rules governing land development is an emerging but contentious area of water quality planning that is potentially very important for future regional water quality plans. Such rules have been proposed on the basis of s9(3) RMA which imposes restrictions on certain uses of land that (it is contended) could have adverse effects on water quality. There may also be some basis for rules governing land development under s15(1)b RMA which restricts any person from discharging any contaminant onto or into land in circumstances which may result in that contaminant entering water.

A mix of regulatory and non-regulatory methods is generally the best way to achieve water quality management outcomes because:

- Problems are addressed more completely from several angles
- A mix of methods will have a greater ability to change the awareness of a greater proportion of the community
- A mix of methods is generally most cost effective

See [section 32 - Methods of Implementation guidance note](#).

Develop anticipated environmental results

Anticipated environmental results should be measurable and should indicate the extent to which it is anticipated the objectives will be achieved within the lifetime of the plan.

Create a monitoring strategy

Monitoring the effects of resource uses on rivers and lakes is an essential part of planning for water quality. Development of monitoring programmes requires careful forethought. Good design is essential if strategies are going to answer adequately the kinds of questions that will be asked of them. For example, where programmes are intended to determine rates or magnitudes of changes in water quality relative to plan objectives, particular emphasis needs to be given to statistical considerations.

Develop a monitoring strategy that:

- Fills information gaps that have been discovered
- Tests assumptions implied by the plan provisions

- Measures whether the plan is effective, by comparing actual results with the anticipated environmental results and measuring progress towards achieving the objectives

Best practice examples

Planning for water quality is a developing area. Many regional councils are currently working on regional water quality plans using a variety of approaches to developing provisions. These can be summarised into three broad approaches. Many councils have used a combination of these approaches. The choice of combination depends on regional characteristics such as the size and nature of water resources, and the level and type of resource use.

The following examples illustrate best practice in particular aspects of plan preparation, as described in the guidance note.

[Waimakariri River Regional Plan Date \(PDF 2.57MB\)](#)

The Waimakariri River Regional Plan provides an example of where provisions have been applied to rivers or lakes with similar characteristics. These are grouped according to their characteristics. Plans using this approach apply spatial frameworks to group rivers and lakes with similar characteristics. Plans then assign management purposes and apply provisions, including standards, to these groups. The strength of this approach is that provisions can take account of the variability in physical characteristics among different rivers and lakes, as well as various purposes for managing different groups.

Regional councils that are trying this approach include:

- Environment Canterbury (Proposed Natural Resources Regional Plan)
- [Environment Southland \(Proposed Regional Freshwater Plan for Southland\)](#).

Provisions applied to water quality classes

[Manawatu Catchment Water Quality Regional Plan \(PDF 314KB\)](#)

The Manawatu Catchment Water Quality Plan is a best practice example of where provisions have been applied to water quality classes. These are based on management purposes, as defined in the Third Schedule of the RMA. Most plans using this approach use spatial frameworks to identify rivers and lakes within each class. The plans then apply conditions and/or standards to each class. The strength of this approach is that it provides clear linkage between provisions and the various purposes for managing particular water bodies or parts of water bodies, even if the effects of some activities are not well understood. Several regional councils have created Water Quality Classes, based on management purposes similar to those set out in the Third Schedule of the RMA.

Councils that have used this approach include:

- Environment Waikato
- Horizons Regional Council
- Environment Canterbury
- Environment Southland
- Greater Wellington.

Provisions based on activities

[Proposed Auckland Regional Plan: Air, Land and Water - 5. Discharges to Land or Water \(PDF 222KB\)](#)

Chapter 5 of the Proposed Auckland Regional Plan – Discharges to Land or Water provides a best practice example of where provisions have been based on activities. The plan sets rules for particular activities, such as specific types of discharges, and makes some activities permitted and others discretionary. Most plans apply conditions and/or standards to the permitted and discretionary activities. The strength of this approach is that it provides clear direction for resource users undertaking activities for which the effects are well understood. Most regional councils have used this approach for at least some of their water quality planning provisions.

Councils that have used this approach include:

- Auckland Regional Council
- Otago Regional Council
- Environment Waikato
- Taranaki Regional Council
- Hawke's Bay Regional Council
- Horizons Regional Council
- Environment Canterbury
- Environment Southland
- Greater Wellington.

RMA provisions

- **Sections 5 to 8** provides the broad purpose and key principles for the sustainable management of natural and physical resources (including water).
- **Section 9** imposes restrictions on certain uses of land. The section is relevant for two reasons. First, the word 'land' in this section includes the surface of water in any lake or river. Second, some uses of land could have adverse effects on water quality that could contravene rules relating to water quality in a regional plan.
- **Section 13** imposes restrictions on certain uses of the beds of lakes and rivers.
- **Section 14** imposes restrictions relating to the take, use, dam, or diversion of water.
- **Section 15** imposes restrictions relating to the discharge into water of any contaminant or water unless authorised by a rule in a regional plan, resource consent, or regulations.
- **Section 43** allows for the possible development of national standards for water quality
- **Sections 59 to 62** provide for the compulsory preparation of regional policy statements and require the contents of these to include issues, objectives, policies and methods (excluding rules) for managing natural and physical resources (including water)
- **Sections 63 to 70** provide for the optional preparation of regional plans (except regional coastal plans, which are compulsory under s64) and provide direction on the contents of such plans.
- **Section 69** provides direction on the use of Water Quality Classes and standards described in the Third Schedule.

- **Section 70** provides directions on the minimum receiving water quality standards that must be met if a regional council provides rules allowing permitted activities. Section 70 also allows for 'reasonable mixing.'
- **Section 107** places restrictions on the granting of discharge permits unless minimum receiving water quality standards (the same as those in s70) can be met. Section 107 also allows for 'reasonable mixing.'
- **Section 137** provides for the transfer of discharge permits.
- **Part IX (sections 199 to 217)** provides for the creation of Water Conservation Orders to recognise and sustain any outstanding values of rivers or lakes.
- **Part XII (s329)** provides for regional councils to issue a temporary direction to restrict or suspend any discharge of any contaminant during any serious temporary shortage of water.
- **Third Schedule** provides for Water Quality Classes

Appendix 16 – Review of selected regional NRM plans

Introduction

Water Quality Management Plans at the catchment level are a key instrument for implementation of the NWQMS. Development and implementation of these plans are supported by a number of national and jurisdictional policies, programs, plans and projects. At the national level, regional NRM Plans have been supported over the last decade by the Natural Heritage Trust (NHT) programs and the National Action Plan for Salinity and Water Quality program (NAP). The NHT2 program included a Coastal Catchments Initiative (CCI) which supported development of Water Quality Improvement Plans (WQIPs) around Australia in key coastal “hotspot” areas. These WQIPs provided improvements to the estuarine and coastal WQ management components of the regional NRM Plans.

For this project, a cross-section of NRM plans was chosen for review based on the feedback from the contact group and consultants involved in reviews of these plans. The reviews below detail key features of the selected plans, including establishing environmental values, water quality objectives/targets and management and monitoring actions to achieve those objectives/targets. The Mackay-Whitsunday NRM Plan and the Mackay-Whitsunday WQIP were specifically chosen for review to show the links between WQIPs and regional NRM plans, including how the WQIP added more detail to the WQ management components of the previous NRM Plan.

Mackay-Whitsunday NRM Group (Queensland)
(www.mwnrm.org.au)

First NRM Plan (M-W NRM Plan 2005)

Environmental Values

Goals in the “Water and Waterways” section of the Plan:

- Protection of water quality in waterways will complement the region’s freshwater, estuarine and marine ecosystems, including recreational and aesthetic assets.
- Water discharging into the Great Barrier Reef will meet the Reef Protection Plan goal: “to halt and reverse the decline in the quality of water entering the Reef, within ten years.”
- The standard of water quality and quantity will satisfy human needs, terrestrial and aquatic ecosystem functionality, and industrial and agricultural requirements.
- The management of water supplies will provide equity between users and environmental flow requirements acknowledging variability in climate.
- The channels, wetlands and riparian zones of the region’s waterways will provide for natural hydrological and ecosystem processes.

WQ Objectives and Management Actions to protect EVs

The resource condition targets (WQOs), management action targets and management actions in the Plan relating to water quality are shown below.

Resource Condition Target: W2. Water quality is improved in all regional waterways through reduced sediment, nutrient and chemical pollutant loads (to meet defined water quality standards) by 2014.

Management Action Target	Management Actions
W2.1 Establish in-stream water quality standards for nutrients, sediments and contaminants tailored for Mackay Whitsunday conditions by 2008.	<ol style="list-style-type: none"> 1. Facilitate a research program on tropical water quality standards and achievement goals. 2. Revise and tailor interim water quality targets where necessary for local conditions. 3. Establish in-stream water quality standards for pesticide and heavy metal concentrations, tailored for Mackay Whitsunday conditions by 2008. 4. Establish benchmark levels of contaminants based on best available monitoring information, including benchmark levels of Atrazine and Diuron (for example, 50% less of specific residual chemicals released to the environment by 2008). 5. Promote and support take up of BMPs that reduce release of nutrients, sediments and other contaminants such as pesticides and heavy metals. 6. Create and implement a system of verification to confirm that Best Practice is being applied.
W2.2 Prepare Water Quality Improvement Plans (WQIP) consistent with the reef water quality guidelines for each Mackay Whitsunday catchment by 2008.	<ol style="list-style-type: none"> 1. Establish an inclusive and consultative process to establish locally relevant WQIPs for the catchments of the plan area.
W2.3 Set interim quantitative water quality targets by June 2005 in all catchments for reduced sediment and nutrient discharges (achieved as a result of defined and agreed adoption rates for BMPs per industry by 2014).	<ol style="list-style-type: none"> 1. Engage a technical panel to set interim water quality load targets for nutrients and sediments and to document management practices required for each sector that will assist achieving those. 2. Define benchmark adoption rates for each management practice that are likely to achieve the interim water quality targets in consultation with industry, local government and other stakeholders. 3. Promote and support uptake of the management practices to achieve the adoption rates. 4. In partnership with the Integrated Great Barrier Reef Catchments Water Quality Monitoring Program, support and improve community and industry based water quality monitoring programs including expansion of networks to cover high-risk sub-catchments.
W2.4 Reduce sediment, nutrient and chemical pollutant loads from 2005 ongoing.	<ol style="list-style-type: none"> 1. Establish a program of on-ground works in priority catchments. 2. Support local government, other agencies and private developers meet the Great Barrier Reef Marine Park Policy that all new sewage treatment facilities that discharge directly into the Great Barrier Reef Marine Park are tertiary standard or comply with a load-based approach (as defined in the Regulations). 3. Promote and support upgrade of sewage treatment to tertiary standards.

Management Action Target	Management Actions
	4. Provide awareness raising and information to educate urban residents on proper use of chemicals to reduce impacts on the marine ecosystem through runoff.
W2.5 Facilitate the introduction of sewage pump-outs at major marinas by 2008.	<ol style="list-style-type: none"> 1. Raise awareness of vessel owners operating within the GBRMPA area of their responsibilities re sewage discharges from vessels and its effect on the marine environment. 2. Develop and implement regional guidelines in cooperation with local governments and with statutory provisions where necessary, for the provision of wastewater services for marine facilities and provision of land-based collection and treatment systems.
W2.6 Develop an integrated long-term water quality monitoring regime that will determine the effectiveness of on-ground actions and the success of achieving water quality targets for each major catchment and adjacent marine waters by 2006.	<ol style="list-style-type: none"> 1. Establish an integrated water quality monitoring program that will determine the effectiveness of on ground actions and the success of achieving water quality targets. 2. Investigate the cost effectiveness of finer scale sediment and nutrient modelling the Mackay Whitsunday Region. 3. Develop a monitoring/measurement tool to enable farmers and land managers to assess and manage the impact on water quality of their operations at a property level. 4. Define nutrient sensitive zones at sub-catchment scale where BMPs and nutrient management plans will be given highest priority.

Monitoring and reporting

The NRM plan had a management action target to develop an integrated long-term WQ monitoring program (see MAT W2.6 above).

WQ Improvement Plan (May 2008) – to be incorporated in Second NRM Plan***Environmental Values***

A detailed consultation process was undertaken with all stakeholders to establish all environmental values throughout the WQIP process. For aquatic ecosystems, an ecological value assessment of all freshwater, estuarine and coastal waters was undertaken and then workshopped with technical experts. This identified draft high ecological value (HEV) waterways (see map below) and key ecological assets for all waterways. This information was then taken through the public consultation process and further refined to establish the final draft EVs in the draft WQIP (see example table below).

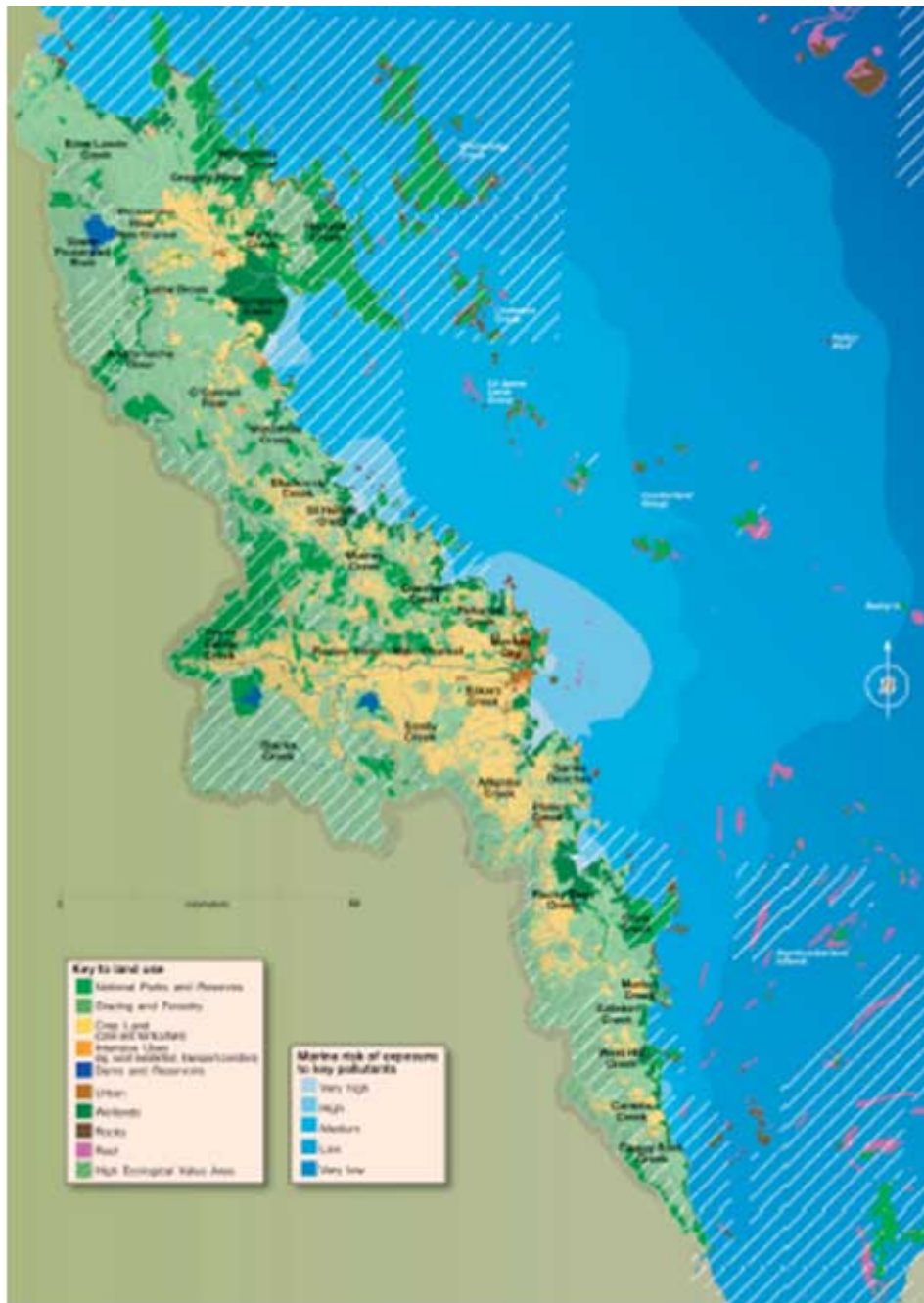


Table 13 Summary of Environmental Values for human uses for freshwater management areas.

Future uses are based on participants' understanding of future pressures and known/approved developments. Values were determined by consensus of the Catchment Reference Panel. The decision to use this approach was based on the preference of the Catchment Reference Panel members. H – High importance/use; M – moderate importance/use; L – low importance/use; '-' waterway use/value not selected (i.e., no use) '?' – Not currently assessed. Note that aquatic ecosystem health environmental value applies to all management areas but were included under HEV assessment.

Management area											
Eden Lassic Creek Now	L	L	H	H	L	-	-	L	L	-	?
Eden Lassic Creek Future	L	L	H	H	L	-	-	L	L	-	?
Gregory River Now	H	M	H	H	L	L	-	L	L	M	?
Gregory River Future	H	M	H	H	L	L	-	L	L	L	?
Whitsunday Coast Now	L	L	L	-	L	L	-	H	L	-	?
Whitsunday Coast Future	L	L	L	-	L	L	-	H	L	-	?
Upper Proserpine River Now	L	L	H	-	M	H	H	H	L	-	?
Upper Proserpine River Future	L	L	H	-	M	H	H	H	L	-	?
Proserpine River Main Channel Now	H	H	L	-	L	M	-	L	H	H	?
Proserpine River Main Channel Future	H	H	L	-	L	M	-	L	H	H	?
Myrtle Creek Now	H	H	M	-	L	H	-	H	M	M	?
Myrtle Creek Future	H	H	M	-	L	H	-	H	M	-	?
Repulse Creek Now	-	-	-	-	L	L	-	H	L	-	?
Repulse Creek Future	-	-	-	-	L	M	-	H	L	-	?
Lethe Brook Now	H	H	H	-	L	L	-	L	L	-	?
Lethe Brook Future	H	H	H	-	L	L	-	L	L	-	?
Thompson Creek Now	M	M	H	-	L	L	-	L	L	-	?
Thompson Creek Future	M	H	H	-	L	L	-	L	L	-	?
Andromache River Now	M	L	H	-	L	M	-	L	L	-	?
Andromache River Future	H	H	H	-	L	M	-	L	L	-	?
O'Connell River Now	H	H	H	H	L	H	-	H	M	-	?
O'Connell River Future	H	H	H	H	L	H	-	H	M	-	?
Waterhole Creek Now	L	L	H	-	L	L	-	L	L	M	?
Waterhole Creek Future	L	M	H	-	L	L	-	L	L	M	?
Blackrock Creek Now	M	M	M	-	L	L	L	-	L	-	?
Blackrock Creek Future	M	M	M	M	L	L	L	-	L	-	?
St Helens Creek Now	M	M	M	M	L	M	L	M	M	-	?
St Helens Creek Future	M	M	M	M	L	M	L	M	M	-	?
Murray Creek Now	M	M	H	M	L	L	L	L	L	-	?
Murray Creek Future	M	M	H	M	L	L	L	L	L	-	?
Constant Creek Now	M	M	H	M	L	M	L	H	L	-	?
Constant Creek Future	M	M	H	M	L	M	L	H	L	-	?

WQ Objectives

The EVs (including HEV areas) were used to establish WQ objectives (ambient and event mean concentrations) using local and state WQ guidelines. These WQOs were used to derive "sustainable" WQ load targets for each of their 38 catchments.

Management Actions to protect EVs

An assessment of current loads with respect to the “sustainable” load, together with social and economic assessments and modelled load reductions of alternative management scenarios were used to determine management action targets for the next seven years. These were based on A (good) to D (bad) management practices for the region’s main polluting sectors (cane, horticulture, grazing and urban) and three main pollutants (nutrients, pesticides and sediments). Examples of the A-D management practices and the management action targets (and load reductions) are shown below.

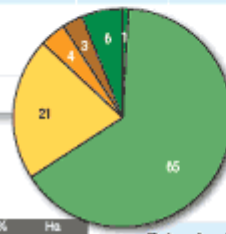
Class D Grazing Soil Management	Class C Grazing Soil Management
Description: No pasture management 1. High stocking rates 2. Minimal infrastructure 3. Pasture utilisation exceeds sustainable thresholds 4. Emergency feeding or de-stocking required every year 5. No weed management	Description: Basic pasture management 1. Continuous set stocking rate 2. Minimal infrastructure 3. Pasture utilisation regularly exceeds sustainable thresholds in dry season 4. Emergency feeding or de-stocking required one in three years 5. Records kept in daily diary
Land condition indicators: 1. General lack of any perennial grasses 2. Increasing areas of bare ground. Erosion problems in fragile soils 3. Thickets of woody plant growth 4. Riparian areas very degraded	Land condition indicators: 1. General decline in perennial, palatable & productive (3P) grasses 2. Increase in less desirable pastures 3. Susceptible to erosion 4. Some increase in areas of bare ground 5. Increase of weeds 6. Riparian areas degraded
Planning and record keeping: 1. None	Planning and record keeping: 1. Basic pasture management 2. Keep daily diary
Capital: 1. Basic boundary fence 2. Basic internal fencing and watering	Capital: 1. Same as Class D
Class B Grazing Soil Management	Class A Grazing Soil Management
Description: 1. Pasture monitoring used to adjust stocking rates annually 2. Some soil testing & nutrient deficiency remediated 3. Some grazing to land types 4. Some drainage lines and watercourses separated by internal fences 5. Pasture utilisation exceeds sustainable thresholds once in three years 6. Pasture spelling incorporated into management 7. Emergency feed core breeders 8. Records kept in Paddock Journal	Description: 1. Pasture monitoring used to adjust stocking rates monthly 2. Soil testing & nutrient deficiency remediated 3. All grazing to land types 4. All major drainage lines and watercourses separated by internal fences 5. Pasture utilisation exceeds sustainable thresholds rarely . Pasture utilisation never exceeds sustainable thresholds for drainage lines and watercourses 6. – 8. Same as Class B
Land condition indicators: 1. Some decline in 3P grasses 2. Some minor weeds 3. Some decline in soil condition 4. Some thickening of woody plants 5. Some decline in riparian condition	Land condition indicators: 1. Good cover of 3P grasses 2. No significant weeds 3. No erosion and good soil surface condition 4. No sign of woodland thickening 5. Riparian areas in good condition
Planning and record keeping: 1. Identify grazing land types and pastures for each paddock using existing farm maps 2. Develop and implement Grazing Land Management Plan, including plan for water infrastructure 3. Keep records in Paddock Journal 4. Record pasture condition and cattle production 5. Adjust Grazing Land Management Plan the following year if required	Planning and record keeping: 1. – 5. Same as Class B – but with more formal documentation and accurate record keeping
Capital: 1. Some fencing to separate grazing land types,	Capital: 1. Stock fences to separate grazing land types & all

drainage lines and watercourses	major drainage lines and water courses
2. Some off-stream watering points	2. All off-stream watering points

Plane Creek Catchment Management Area - Current Condition Report

Key Pollutant	Ambient Fresh Water Quality Values				Event Fresh Water Quality Values				Pollutant Source
	Objective 2010	Current Condition 2007	Target 2014	Action	Objective 2010	Current Condition 2007	Target 2014	Action	
Dissolved Inorganic Nitrogen µg/L	30	7	CC	L H	300	514	368	L H	C I U
Particulate Nitrogen µg/L	160	115	CC	L H	340	178	CC	L H	C I U G
Dissolved Inorganic Phosphorus µg/L	20	5	CC	L H	30	78	59	L H	C I U
Particulate Phosphorus µg/L	20	16	CC	L H	70	61	CC	L H	C I U G
Total Suspended Sediment mg/L	10	1	CC	L H	200	200	CC	L H	C I U G
Ametryn µg/L	0.04	<L00	<L00	L H	<L00	<L00	<L00	L H	C I U
Atrazine µg/L	0.4	<L00	<L00	L H	0.29	0.23	0.17	L H	C I U
Diuron µg/L	1	<L00	<L00	L H	0.85	0.68	0.51	L H	C I U
Hexazinone µg/L	0.5	0.4	CC	L H	0.24	0.19	0.14	L H	C I U
Terbuthion µg/L	0.04	<L00	<L00	L H	<L00	<L00	<L00	L H	G
Dissolved Oxygen % saturation	40-120	24-75	40-120	L H					
pH	6.5-8.5	7.4-7.83	6.5-8.5	L H					
Electrical Conductivity µS/cm	750	536	CC	L H					

CC = Current condition; L00 is Limit of detection which is 0.01 µg/L for all herbicides



Freshwater Rating (0 = poor, 5 = excellent)		
Value Rated	Rating 0-5	
Fish Community	2	
Water Quality	3	
Flow	1	
Barriers to Migration	1	
Instream Habitat	1	
Riparian Vegetation	1	

Catchment Land Use

Key Land Use	%	Ha
National Parks & Reserves	1	121
Grazing & Forestry	65	10423
Crop Land (total)	21	3370
Horticulture	1	158
Cane	20	3213
Intensive Uses (total)	4	665
Rural Residential	4	585
Railway, Port, Airport	0	49
Other Intensive Uses	0	25
Urban	3	412
Dams & Reservoirs	0	30
Wetlands	6	953
Total	100	18975

Estuarine Rating (0 = poor, 5 = excellent)

Value Rated	Rating 0-5	
Fish Community	2	
Water Quality	5	
Flow	1	
Estuary Modification	3	
Mangroves & Saltmarsh	2	

Land Use	Management Practices	Key Pollutant	2000 % Adoption	2007 % Adoption	2014 % Adoption	Effort Required	Total Cost \$ '000s
Cane & Horticulture	Soil	III	D	C	D	L H	93
	Nutrient	II	D	C	D	L H	632
	Chemical	I	D	C	D	L H	632
Grazing	Soil	III	D	C	D	L H	281
New Urban & Intensive Development	Soil	III					?
	Nutrient	II					?
	Chemical	I					?
Existing Urban & Intensive Development	Soil	III					?
	Nutrient	II					?
	Chemical	I					?

D = Old practice; C = Common practice; D = Currently promoted practice; A = Cutting-edge practice

Monitoring and reporting

The draft WQIP has a detailed monitoring and modelling strategy, as well as an adaptive management strategy.

Table 62 Costs to implement the recommended monitoring and modelling strategy

Activity to 2014	Description	Cost
Design integrated monitoring and modelling program	Regional scale integrated monitoring and modelling program that informs WQIP implementation and provides a framework for cross regional integration	\$200,000
Monitor adoption of management practices	Industry led annual audit of management practice for cane, grazing and urban land use at a regional scale	\$1,500,000
Validate management practice – water quality relationships	Plot, paddock and sub-catchment scale research into how changes in management practice relate to water quality	\$5,000,000
Validate water quality – ecosystem health relationships	Subcatchment, end-of-catchment and marine scale research into changes in water quality relate with aquatic ecosystem health	\$4,100,000
Monitor and model regional scale water quality improvements	Subcatchment, end-of-catchment and marine water quality monitoring and modelling programs linking changes in management practice to improvement in aquatic ecosystem health	\$2,300,000
Health Waterways volunteer monitoring of pollutants	Monitoring/research into pollutants of concern by community volunteers network (Waterwatch)	\$900,000
Total		\$14,000,000

Hawkesbury-Nepean Catchment Management Authority (NSW)
(www.hn.cma.nsw.gov.au)

Hawkesbury Lower Nepean Catchment Blueprint (2002)

(The plan commenced in 2002/2003. The original term of the plan was to be 10 years)

River Health Section - Catchment Target

By 2012, water quality and river health indicators at 6 representative river regions will meet the Healthy Rivers Commission (1998) water quality objectives in base flow conditions, for more than 80% of the time. The river regions are selected to represent the full range of river environments.

Note: This target will be refined to incorporate details of indicators and locations of the river regions. This will be the first step of an on-going program of improving baseline information and developing and refining targets.

Benefit Statement

The waters of the Hawkesbury-Nepean region have natural ecological, chemical and geomorphological processes essential to the health of the catchment and the people in it. They support social and economic activities by providing water for drinking, irrigation, stock, commercial fishing, and industry. They are used for recreation and scenic amenity, which in turn supports tourism. Water of appropriate quality and sufficient quantity is critical for maintaining both natural ecosystems and human welfare. The ability of the river system to meet the needs of residents has been severely compromised by human activities. These include: major extraction from the system to supply Sydney's drinking water; changes in quality and quantity of runoff (contaminated with sediments and other pollutants) from urban and rural areas; the impact of industrial, commercial and extractive industries, sewage effluent discharge; loss of instream and riparian habitat and vegetation; and erosion and destabilisation of waterway morphology.

The water quality of the river has slightly recovered since the late 1970's, through improvements in sewage effluent treatment. However, many waterways still suffer from poor water quality from diffuse pollutant sources and sediment, reflected by the high incidence of algal blooms and aquatic weeds. Swimming and fishing are no longer advisable in many places. This plan supports the further and on-going work needed to sustain the processes of the river system and meet the needs of the various ecosystems, the residents of the catchment, and other beneficiaries. It recognises the importance of developing and implementing water plans for surface flow and groundwater, improving sewage management, and further developing and implementing stormwater management plans.

Achievement of significant improvements to the health of the Hawkesbury-Nepean river system will require improved understanding of the total water cycle of the catchment and integrated management on this basis.

Environmental benefits include: improving water quality; approximating natural flow conditions; maintaining habitat characteristics; approaching the conditions required to sustain a diversity of ecosystems, habitats, and species; enabling evolutionary processes to continue; improving ecosystem resilience against major disturbance impacts; decreasing risk to human health.

Social benefits include: sustaining the well-being of the community through long-term commercial and residential viability; improving knowledge and understanding of the impact of human activity on environmental processes; creating greater collaborative effort between users and managers of water in the catchment; enhancing opportunities for safe and

satisfying recreational use of water; improving equity of access to adequate quantity and quality water, and to service delivery, for all people in the catchment; and supporting and encouraging voluntary/community efforts in improving aquatic environments.

Economic benefits include: improving coordination between resource allocation and management action to reduce duplication of effort and minimise overlaps; decreasing the costs associated with restoring river health in the future; ensuring sustainability of industries requiring adequate water quantities/quality for their operations, especially commercial fishing and agriculture; sustaining the tourism industry; enhancing opportunities for “green and clean” production, and value-adding to products

River Health Management Targets (MT)

MT 1: Flow

By 2012 environmental flows are improved as a result of the implementation of an integrated comprehensive flow management regime.

MT 2: Sewage management

By 2008, there is a minimum 5% decrease in priority pollutant loads from sewerage systems, including sewage sourced from on site systems and vessels

MT3: On-site sewage system management

By 2012, 80% of medium to high-risk on site sewage systems are improved to a status of low risk, according to standardised risk assessment and management protocols

MT 4: Stormwater management

By 2012, all key stakeholders have developed and implemented stormwater management programs to control urban stormwater in existing and new urban developments and to control rural run-off to reduce by 25% sediment and priority pollutant load export into receiving waters.

MT 5: Groundwater

By 2007, Water Management Plans have been developed and implemented for high and medium priority aquifers.

MT 6: Irrigation Management

By 2012, all water user/managers/irrigators have improved water use efficiency by 10% through the implementation of Integrated Drainage Management Plan processes.

MT 7: Water Sensitive Urban Design

By 2005, 100% of new urban development incorporates the principles of Water Sensitive Urban Design.

Hawkesbury-Nepean Catchment Action Plan (2008)

The “Hawkesbury Lower Nepean Catchment Blueprint” (2002) has now been superseded by the Hawkesbury Nepean Catchment Management Authority’s (CMA) Catchment Action Plan (CAP) which was approved in March 2008.

The NSW Natural Resources Commission (NRC) set state-wide targets in 2005 as a framework for each CMA to report on their contribution to NRM in NSW. The Hawkesbury-Nepean CAP clearly indicates its relationship to these state-wide targets by showing their relationship to the catchment targets. The NRC’s water theme targets are:

Macro-environmental targets:

- By 2015 there is an improvement in the condition of riverine ecosystems
- By 2015 there is an improvement in the ability of groundwater systems to support groundwater-dependent ecosystems and designated beneficial uses
- By 2015 there is no decline in the condition of marine waters and ecosystems

Specific priorities:

- By 2015 there is an improvement in the condition of important wetlands and the extent of those wetlands is maintained
- By 2015 there is an improvement in the condition of estuaries and coastal lake systems.

The CAP is supported by the River Health Strategy (RHS), which provides a framework for identifying the priorities for action that will help achieve the state-wide targets for water. The RHS was developed in response to a direction by the Minister. The direction was issued following the aquatic weed crisis in the main stem of the river in the summer of 2004/5.

The RHS applies a systematic approach to identifying the values and threats of each reach and then appropriate management actions. Its objectives are to:

- maintain the condition of reaches in natural or near intact condition;
- maintain and improve reaches in good condition;
- improve the environmental condition in the remaining reaches; and
- achieve the highest environmental and community gain for the resources invested.

The CAP translates these objectives from the RHS into priorities for the river health targets that guide investment and provide an adaptive management framework for on-ground action. This framework implements the objectives of the RHS by identifying the focus for management action according to the condition of the reach.

The RHS is based on eight management themes derived from the assessment of the key values and threats operating on the Hawkesbury–Nepean river reaches. These themes represent the major groups of action for the CMA to improve river health. The relationship between the themes and the targets in the CAP is shown in Table 12 and graphic (below). Many, but not all, of these themes are supported by the river health targets.

The CAP is one part of the water management framework for the Hawkesbury–Nepean. This framework is more complex than elsewhere in the state reflecting the importance of this catchment’s role in supplying water to the city of Sydney. Figure 3 (below) indicates the relationship of the CAP to this overall framework for water management in the Hawkesbury–Nepean key components of which are:

- Hawkesbury–Nepean water quality objectives;
- 2006 Metropolitan Water Plan; and
- Drinking Water Catchments Regional Environmental Plan.

Table 12. River Health Strategy management themes and CAP targets.

River Health management themes	CAP targets
Management theme 1: Improving the management of riparian lands	CT RH1 Riparian lands MT RH1-1 Riparian conservation MT RH1-2 Riparian vegetation condition MT RH1-3 Riparian vegetation rehabilitation
Management Theme 2: Managing severe immediate threats and severe downstream impacts	MT B4-1 Weed control MT B4-3 Threatening processes – pest animals MT SL1-1 Soil erosion
Management Theme 3: Managing important wetlands	CT RH3 Wetlands MT RH3-1 Important wetlands
Management Theme 4: Aquatic habitat condition and connectivity	CT RH2 Aquatic biodiversity MT RH2-1 Restoration of in-stream habitat
Management Theme 5 Aquatic weeds management	MT B4-1 Weed control
Management Theme 6: Improving management of riparian lands under pressure from recreation	MT RH1-4 Best practice for public recreation areas
Management Theme 7: Supporting the community to take action	MT C1-2 Incentives MT C1-3 Education and training
Management Theme 8: Managing habitat for flagship species	MT B6-1 Icon species

RIVER HEALTH TARGETS

STATE-WIDE TARGETS				
By 2015 there is an improvement in the condition of riverine ecosystems		By 2015 there is an improvement in the condition of important wetlands, and the extent of those wetlands is maintained		By 2015 there is no decline in the condition or marine waters and ecosystems
		By 2015 there is an improvement in the ability of groundwater systems to support groundwater dependent ecosystems and designated beneficial uses		By 2015 there is an improvement in the condition of estuaries and coastal lake ecosystems
CATCHMENT TARGETS				
CT RH1	CT RH2	CT RH3	CT RH4	CT RH5
Riparian lands	Aquatic biodiversity	Wetlands	Groundwater	Estuary and marine condition
MT RH1-1 Riparian conservation	MT RH2-1 Restoration of in-stream habitat	MT RH3-1 Important wetlands	This target supported by wetlands targets. Management of groundwater is a responsibility of DECC. Advice has been sought from (previously DNR) DECC on suitable targets	MT RH5-1 Estuary and coastal management plans
MT RH1-2 Riparian vegetation regeneration				
MT RH1-3 Riparian vegetation rehabilitation				
MT RH1-4 Best practice for public river access recreation areas				

Figure 3: River health and water management framework for the Hawkesbury-Nepean.

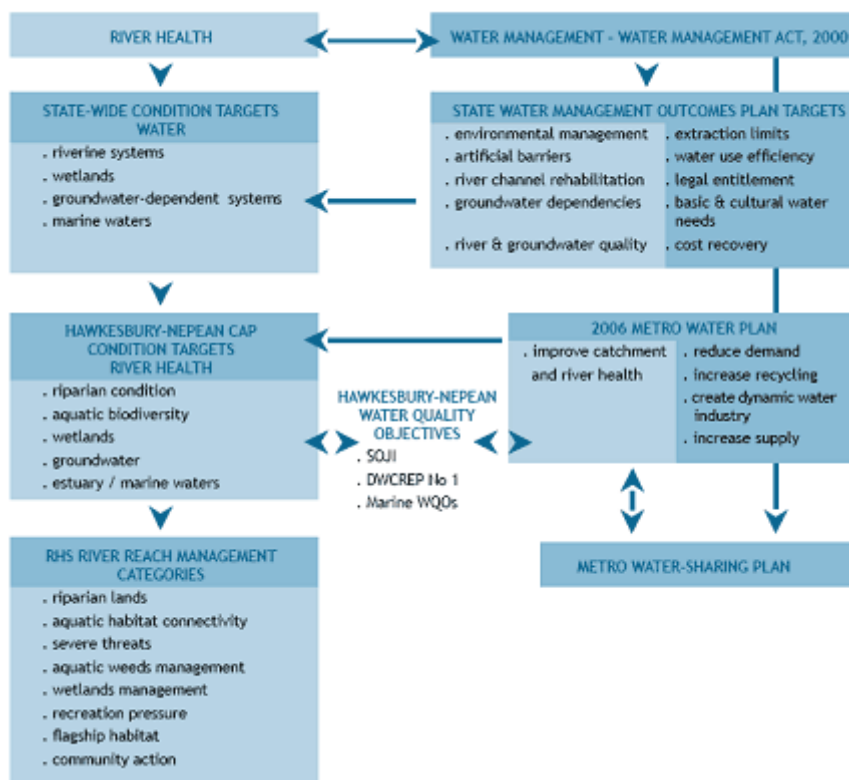


Table 14 (below) summarises the agreed environmental values for the Hawkesbury–Nepean.

Table 14: Environmental values for water in the Hawkesbury-Nepean catchment

Location	Environmental values for water							
	Aquatic ecosystem	Recreational water			Raw drinking water	Irrigation and general use	Primary industry	Human consumption of aquatic foods
		Primary contact	Secondary contact	Visual use			Livestock drinking	
Above dams	✓	✓	✓	✓	✓	✓	✓	✓
Below dams								
Mixed use rural	✓	✓	✓	✓	✓	✓	–	–
Forested	✓	✓	✓	✓	✓	✓	✓	✓
Urban	✓	–	✓	✓	–	–	–	–
Brackish and estuarine	✓	✓	✓	✓	✓	–	–	–
Ocean waters	✓	✓	✓	✓	–	–	–	✓

Sources: Above dams (NSW Government 2006b:7); below dams: (HRC 1998:74 and HNCMT 2001:65-8); Ocean waters (DEC 2005b:2,11)

The CAP details each river health condition target and associated management action targets – see one example of each below:

River Health condition target CT RH1 –Riparian lands

Aim: By 2016, an identifiable improvement in the health of riparian lands will be achieved by: <ul style="list-style-type: none"> • maintenance of the condition of all lands identified as being in good condition in the RHS (this includes most reaches within national parks) • an increase in the extent and connectivity of native riparian vegetation in areas identified as a priority in the RHS • a decrease in key weed species (e.g. canopy invading species/new outbreaks) identified as a priority 	
Benefit statement	<p>The aim of the river health targets is to ensure that river health is protected and enhanced in the longer term. The riparian lands targets have a specific focus on improving the management of riparian lands with the intention of protecting and maintaining riparian lands in good condition and rehabilitating lands in a degraded condition. The condition of the catchment's rivers is highly dependent on the condition of riparian lands.</p> <p>The general principle of the riparian lands in management target is to direct investment towards preventing further degradation of good condition lands before investing in the more intervention-based rehabilitation of degraded lands.</p> <p>The catchment's 'near-intact' and good condition rivers are extremely valuable assets for the health of the catchment, contributing clean water and undisturbed flows to the Hawkesbury-Nepean River. Near-intact riparian zones are also valuable biodiversity reserves and corridors. Healthy riparian lands characterised by well-developed native riparian plant communities filter diffuse source pollutants from riverside land uses, reduce the amount of sediment entering rivers, and provide valuable habitat and habitat connectivity for both terrestrial and aquatic animals. The benefit of maintaining these lands in their current condition is that a relatively small investment to manage the typically minor threats present can ensure the maintenance of the ongoing contribution these river reaches make to the health of the catchment.</p> <p>The RHS has identified opportunities for the protection of some rivers and the rehabilitation of others. Reaches with a focus on 'assisted regeneration' will require less intervention and, as such, are a better investment. The RHS has also identified a series of 'severe immediate threats' to river reaches such as specific invasive weeds. Acting to address these threats early will help to reduce their possible impact in the future.</p>
Management targets	<p>MT RH1-1 Riparian conservation</p> <p>MT RH1-2 Riparian vegetation revegetation</p> <p>MT RH1-3 Riparian vegetation rehabilitation</p> <p>MT RH1-4 Best practice for public river access recreation areas</p> <p>MT C1-2 Incentives</p> <p>MT B4-1 Weed control</p>
Links to other targets and actions	This target aligns with SOJ1 Appendix A Action RC20: expansion of programs to include sensitive riverine corridors
Complementary targets	<p>By 2010 regional strategies have been developed which recognise and secure regional biodiversity corridors</p> <p>By 2010 catchment councils have prepared local biodiversity strategies that inform the revision of EPIs</p>
Data informing target	HNCMA 2006a,b

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River Health management target MT RH1-1 Riparian conservation

Aim: By 2016, there is an increase in the length of river and stream banks identified as being in the riparian land management category of *focus on conservation* being managed primarily for conservation so that 23% or 150km of reaches in this category are being managed with a focus on conservation. (refer to HN River Health Strategy)

Short-term targets	<p>Target Year 1: 15km of river/stream bank managed with a focus on conservation</p> <p>Target Year 3: 45km of river/stream bank managed with a focus on conservation</p>
Intent	<p>Reaches with self-adjusting river forms and processes, and relatively intact vegetation associations that have high ecological diversity are considered to be in good condition. In contrast to near-natural streams, they require some minimal intervention but this will achieve substantial improvements in condition. Condition may be impacted by altered hydrologic conditions from dams, weirs or reservoirs and recovery may be improved by tributary inputs.</p> <p>Management in these reaches will focus primarily on conservation management of these reaches and generally requires a low level of intervention. They are primarily targets for the development and implementation of conservation agreements to protect geomorphology and remnant riparian vegetation.</p> <p>This target seeks to give priority to investment in high quality riparian areas. These are the reaches included in the RHS under the management category of Focus on Conservation. There are 41 reaches in this category making up a total of 631 km and 15% of total river length.</p>
Basis for target amount	<p>The extent of conservation-focused management identified in this target is based on:</p> <ul style="list-style-type: none"> • an understanding of the current investment level directed towards this management category currently supporting around 11 km per year of riparian conservation work • the priority given in the RHS to maintenance of good condition riparian areas which supports an increase in current funding to this management category • the length of reach in this category, and • understanding that contributions made by partners to this target will support achievement of change that exceeds current levels
Priorities	<p>RHS priority reaches focus on conservation reaches (MAP8) and rare river style reaches in good condition and with high recovery potential.</p> <p>Rare river styles are identified in the <i>Geomorphic Categorisation of Streams</i> (DLWC 2001) as: meandering laterals, cut and fill, meandering vertical, chain of ponds, and wet channel wetlands. There are two reaches that meet this criteria and provide the opportunity to conserve a representative rare river style. These reaches are on the Upper Cocks River and Little Wheeny Creek.</p>
Performance indicators	<p>Number of management agreements for riparian works negotiated in reaches in the priority areas</p> <p>Proportion of management agreements for riparian works on targeted reaches</p> <p>Area (ha) of riparian native vegetation protected by fencing</p> <p>Area (ha) of riparian native vegetation enhanced/rehabilitated</p>
CMA action	<p>Continuation and expansion of River Restoration Project</p> <p>Integration with local government, SCA and other riparian incentives programs that focus on maintaining 'good' riparian condition</p> <p>Standardised condition assessment to be undertaken and recorded as a baseline at start date of management agreements negotiated with landholders</p> <p>Awareness program to promote RHS and the principle of conserving riparian areas in good condition</p> <p>Support the creation of improved river access points that are managed to protect conservation values for public recreation through Local Government River Health Partnership</p>

The CAP's River Health Program then provides funding for landholders and local government as the key partners in delivering on-ground action to positively influence the health of this river system (and achieve the river health targets). Table 23 (below) summarises the key components of the River Health Program.

Table 23: Summary of River Health Program components

HNCMA project	Partnership project	Project description	Key locations
River Restoration project		Funding for landholders to undertake activities to maintain and improve riparian area, instream habitat, riverine wetlands and bank stability	Priorities identified in the RHS
	South Creek River Recovery Greening Australia (NSW)	Part of a national program focusing on practical environmental protection and restoration works in nine priority subcatchments – works with corporate partners as well as community, landholders and local government	Established urban areas in South Creek
	Local Government River Health Partnership	Partnership with local government to implement programs that meet CAP targets and priorities for river health	RHS priorities for each LGA
Wetlands Program		Program includes a number of projects using a range of techniques to protect and restore wetlands including: partnership with councils, incentives funding through the river restoration project, development and implementation of management plans for targeted wetlands	Wetlands of national significance outside of national parks Wetlands identified as important communities or mapped in regional plans
Subcatchment action plans			Nepean subcatchment below the Nepean dams and above Wallacia Other subcatchment priorities to be determined
	Bringing Back the Fish – DPI	Cross CMA project delivered by DPI to modify or remove barriers to fish passage	Priority barriers as determined through DPI mapping and assessment
	Local Government Saltmarsh Restoration project	Project fund activity by local government to protect and restore saltmarsh	Saltmarsh in estuary (i.e. Pittwater, Gosford and Hornsby councils)
Estuary Clean Up Project		Project to work with industry groups and community to remove rubbish from estuarine areas that has been identified as having an adverse impact on aquatic habitat	Estuary
	Caulerpa Awareness – DPI	Education project to inform recreation users of the locations, implications and management of this aquatic weed	Pittwater/Patonga
	Coastal CMA Partnership – SM CMA	Partnership program with SM CMA that supports efficient delivery of a range of coast and marine projects along the coastline from Barrenjoey to Port Hacking – recognises that it would not otherwise be possible for the HNCMA to deliver the range of programs required in the coast and marine area given the small length of coastline in this catchment	Coast from Barrenjoey to Turrimetta Headland

South Australian Murray-Darling Basin Natural Resources Management Region

Initial NRM Plan 2006-07 – The following table is an extract from the Water Quality section

Pressures / Threats	Assets	Asset Values	WQ/Resource Condition Targets	MATS re WQTs	Management actions to protect EVs	Monitoring, Evaluation, Review & improve (MERI)
<ol style="list-style-type: none"> 1. Knowledge transfer and acquisition 2. Decision making processes 3. Community capacity 4. Inappropriate land use practices 5. Inappropriate development and land use change 6. Salinity 7. Water allocation, supply and trade 8. Point source pollution 9. Pest animals 10. Pest plants 11. Land erosion 12. Changes to flow regime 13. Fragmentation of habitat 14. Loss of species and diversity 15. Inappropriate recreation 16. Algal blooms 17. Changes to fire regime 18. Soil acidity 19. Climatic variability 20. Population decline 21. Loss and disturbance to culturally significant sites 22. Farm business viability 23. Soil structure decline 	<ul style="list-style-type: none"> • River Murray • Lake, Estuarine and Coastal areas • Eastern Mount Lofty Ranges Tributaries • Groundwater 	<ol style="list-style-type: none"> 1. Natural flora and fauna habitat 2. Recreation and tourism 3. Irrigation water supply 4. Drainage disposal 5. Urban water supply 6. Cultural heritage 7. Landscape – visual amenity 8. Domestic and stock water supply 9. Direct economic activity 10. Rural living 11. Flood protection 12. Surface water production 13. Groundwater balance 14. Infrastructure corridors 15. Urban infrastructure and services 16. Carbon sequestration and nutrient recycling 	<p>Community objectives for water quality that have been expressed through the existing natural resources management plans are:- to maintain or improve water quality so that it is suitable for economic, social and environmental purposes and to adopt environmentally responsible recreation and tourism practices.</p>	<ol style="list-style-type: none"> 1. Increasing community capacity, implementation arrangements, M&E, Institutional arrangements, and R&D 2. Policy and implementation of water sharing and management of impacts 3. Improving land and water management practices 4. Control on land use and development 5. Salt interception 6. On ground works to address diffuse and source pollution 7. Integrated Management of the Lower lakes, Coorong, Murray Mouth and Coastal zone 8. Targeted animal and pest plant programs 9. Improved river and floodplain operation and management to improve health of the River Murray 10. Targeted and coordinated wetland management 11. Habitat protection and recovery to address biodiversity and areas of conservation significance 12. Priority R&D Activities 	<p>The South Australian Murray-Darling Basin NRM Board will continue to implement relevant existing plans and programs through this initial plan during the period in which it prepares its comprehensive regional NRM plan.</p>	<p>The Board recognises the value of monitoring and evaluation in assisting with the setting of future targets and the review of the performance of its NRM programs.</p> <p>Community participation in monitoring and evaluation is essential.</p> <p>The Board will give further consideration to the required structure of its monitoring and evaluation program.</p>

Goulburn Broken Regional River Health Strategy (2005 – 2015)

Goulburn Broken Catchment Management Authority

The Goulburn Broken Regional Catchment Strategy identified river health and waterway management as one of our highest priority natural resource management issues in the Goulburn Broken catchment. In order for the Catchment Community to protect and enhance the rivers and streams within the region, there is a need to develop a Regional River Health Strategy.

The Goulburn Broken Regional River Health Strategy (2005-2015) builds on existing river-related action plans, implementation plans and strategic documents, supported by a series of sub-strategies and discussion papers, to achieve the vision for Goulburn Broken Catchment rivers and streams:

'Healthy rivers, streams, wetlands, floodplains and adjacent land that support a vibrant range and abundance of natural environments, provides water for human use, sustains our native flora & fauna and provides for our social, economic and cultural values'

The Goulburn Broken Regional River Health Strategy aims to achieve four main objectives for the rivers and streams of the Goulburn Broken Catchment:

- Enhance and protect the rivers that are of highest community value (environmental, social and economic) from any decline in condition;
- Maintaining the condition of ecologically healthy rivers;
- Achieving an 'overall improvement' in the environmental condition of the remainder of rivers;
- Preventing damage from inappropriate development and activities.

The Regional River Health Strategy identifies a number of High Priority Reaches within the Goulburn Broken catchment. These include rivers that are "of greatest value to the community", and rivers that are currently "ecologically healthy". For the Strategy, reaches of the highest community value in the Goulburn Broken Catchment are identified as:

- Heritage Rivers;
- Reaches associated with International or Nationally significant wetlands;
- Reaches classified as environmental Sites Of Significance;
- Regional Representative Rivers;
- Reaches with records of water-dependant nationally listed endangered flora and fauna species located within 100 m of the watercourse;
- Reaches classified as having very high overall environmental significance;
- Reaches classified as having very high overall social value; and
- Reaches classified as having very high overall economic value.

Key environmental threats to high value assets in High Priority Reaches were identified using a risk-based analysis. These threats determined the range of management actions to be implemented in various parts of the catchment. The Strategy also identified 13 reaches within the catchment that can potentially be improved to ecologically healthy condition, and other opportunities for restoration or improving the environmental condition of other rivers throughout the catchment.

The Goulburn Broken Regional River Health Strategy will be delivered in seven separate programs, targeting the four key elements outlined in the Strategy development, as well as monitoring and research, and community engagement:

- Program A – Protection and Enhancement of High Priority Reaches
- Program B – Protection of Ecologically Healthy Rivers
- Program C – Creating More Ecologically Healthy Rivers

- Program D – Improvements to other reaches
- Program E – Preventing damage from inappropriate development and other activities
- Program F – Community Engagement and Building Capacity
- Program G – Monitoring, Evaluating and Reporting

The process for developing the Regional River Health Strategy is shown below.

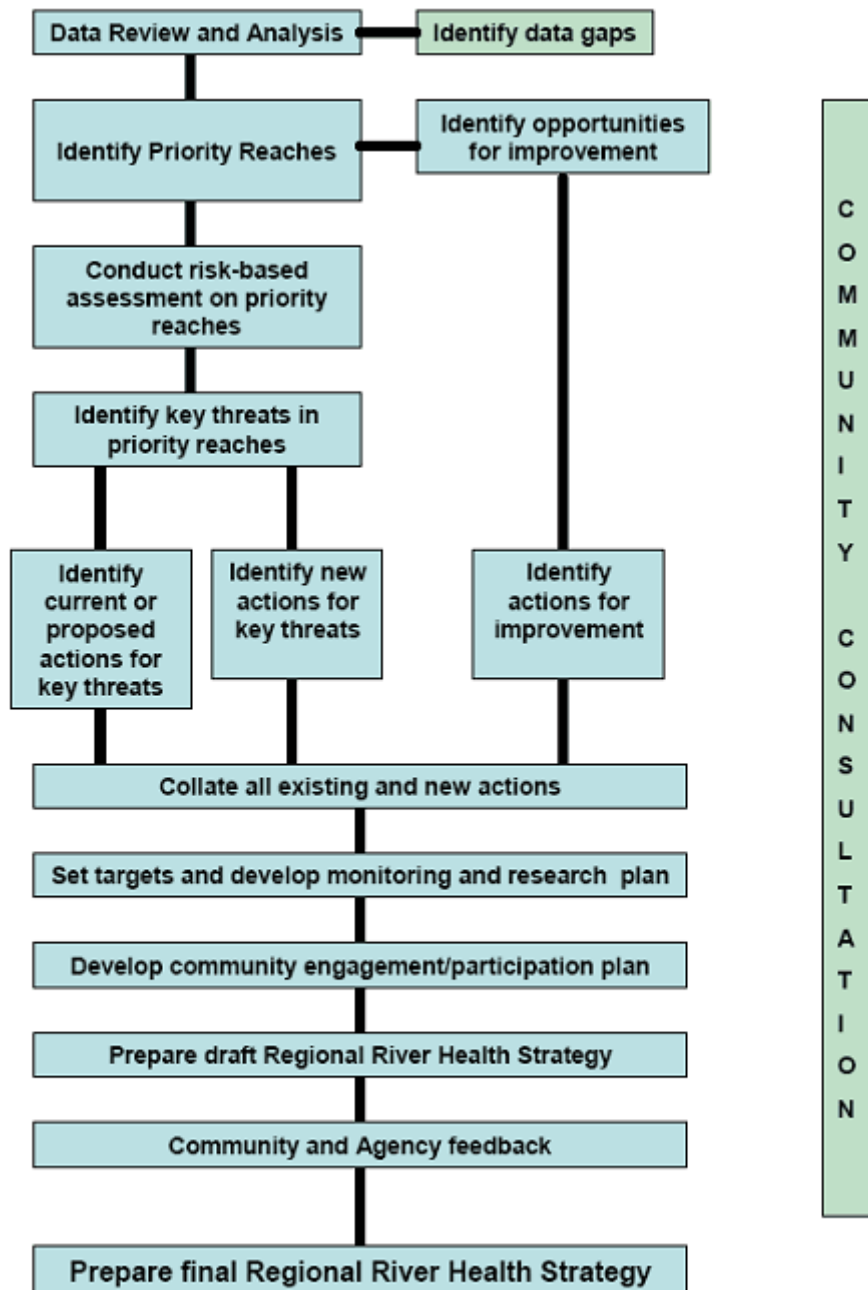


Figure 3.1. Process for developing the Goulburn Broken Regional River Health Strategy.

Assets and Threats

A summary of the identified assets and threats for the Goulburn Broken catchment are shown below, followed by a more detailed example of the assets of high priority reaches and a risk rating for each threat in high priority reaches.

Table 4.1 Assets (environmental, social and economic) and threats identified for the Goulburn Broken Catchment (see Appendices 2-5 for more detailed information)

Assets	Threats
Environmental	<i>Physical Threats</i>
<i>Environmental significance</i>	Bank erosion
Significant Fauna	Bank stability
Significant Flora	Channel form
Significant Ecological Vegetation Classes	Loss of instream habitat
Fish Migration	Stock access
Significant Wetlands	<i>Flow Threats</i>
Rare Wetlands	Flow deviation
Sites of Significance	Wetland connectivity
Heritage Rivers	<i>Water Quality Threats</i>
<i>Environmental Naturalness</i>	Water quality (trend)
Width of riparian vegetation	Water quality (physicochemical quality)
Longitudinal riparian continuity	Water quality (SIGNAL score)
Riparian structural intactness	Temperature
Aquatic invertebrate community	Algal blooms
Native fish community	<i>Biological Threats</i>
Proportion of introduced fish	Introduced flora
Ecologically Healthy River	Introduced fauna
<i>Environmental Representativeness</i>	Barriers to fish migration
Representative River	Degraded riparian vegetation
Social	
Recreational fishing	
Non Motor Boat sports	
Camping	
Swimming	
Passive Recreation	
European Heritage	
Listed landscape	
Species of Local Significance	
Economic	
Water supply – delivery	
Water supply – collection	
Infrastructure	
Land value	
Tourism	
Power generation	

Table 5.7. Highest priority Reaches identified in the Goulburn Broken Catchment.

River	Reach	High value asset
Goulburn Basin		
Goulburn River	1,2,3,4,5,6,7, 8,9,10,11,12, 13,14,15,16	Heritage River (1-14); Association with wetlands of national significance (1-8); High overall environmental significance (1,3,4,7,8); High overall social significance (5,6,8,9); High overall economic significance (14); Murray cod (1-8); Silver perch (1-8); Macquarie perch (15); Ecologically healthy river (15); Barred galaxias (16); Spotted tree frog (16); Alpine bent (16).
Seven Creeks	19	Trout cod; Macquarie perch; Environmental Site of Significance.
Seven Creeks	20	Macquarie perch
Gobarup Creek	33	Association with wetlands of national significance.
Hughes Creek	37	Macquarie perch; Murray cod.
King Parrot Creek	51	Macquarie perch.
Yea River	55	Macquarie perch.
Acheron River	62	Environmental Site of Significance.
Taggerty River	64	Ecologically Healthy River; Representative River; High overall environmental significance; Barred galaxias.
Rubicon River	66	Barred galaxias.
Big River	67	Heritage River; Ecologically Healthy River; Spotted tree frog.
Big River	68	Heritage River; Ecologically Healthy River; Representative River.
Howqua River	69	Heritage River; High overall economic significance.
Howqua River	70	Heritage River.
Delatite River	71	Murray cod.
Delatite River	72	High overall economic significance.
Broken Basin		
Broken River	1,2,3,4,5	Association with wetlands of national significance (1,2); Murray cod; Macquarie Perch (3,4,5) Silver perch (1).
Holland Creek	13	Macquarie perch.
Ryans Creek	17	Ecologically Healthy River; Representative River.
Broken Creek	21,22,23,24,25,26	Association with Ramsar wetlands (21); Murray cod (21-23); Association with wetlands of national significance.

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Table 6.2 Risk ratings for each threat in High Priority Reaches in the Goulburn Basin

		Goulburn River: Goulburn Weir to Murray River	Goulburn River: Eildon Res. to Goulburn Weir	Seven Creeks	Severn Creeks	Gobarrup Creek	Hughes Creek	King Parrot Creek	Yea River	Acheron River	Taggerty River	Rubicon River	Goulburn River: u/s of Eildon Res	Goulburn River: lower u/s of Eildon Res. Upper	Big River lower	Big River upper	Howqua River lower	Howqua River upper	Delatite River	Delatite River
	Reach Number	L1	U1	19	20	33	37	51	55	62	64	66	15	16	67	68	69	70	71	72
	Threat																			
Physical Threats	Bank erosion	H	VH					M2											M2	
	Bed instability		VH	M2															H	M1
	Channel modification	H	M2		M2															
	Loss instream habitat	H	VH	M2			M2			VH										
	Stock access	VH	VH	VH	VH	M1	VH	VH	VH	H									VH	
Flow Threats	Flow deviation	VH	VH					M2				VH								
	Wetland connectivity	VH																		
Water Quality Threats	Water quality	VH		VH	VH															
	Water quality SIGNAL	VH	VH	VH				VH											M2	
	Water quality trend	H	H		H								H			H			H	
	Temperature		VH																	
Biological Threats	Algal blooms		VH																	
	Introduced flora	M2	VH	M2			M2	M2					M2	VH					H	
	Introduced fauna	M2		M2	M2					M2										
	Fish barriers		VH	M2	M2		VH	H	H		H								VH	
	Degraded riparian veg		VH	M2	M2									H					H	

** -Reach 1 only

Key: VH – Very High; H – High; M1 – Medium 1; M2 – Medium 2 (see Table 6.1 for explanation).

Resource Condition and Management Action Targets

The table below shows examples of actions and their associated management action and resource condition targets under the Regional River Health Strategy.

Table 9.1 Actions and targets in Management Unit L1 – Lower Goulburn and Floodplain – under the Regional River Health Strategy

No	Threat	Actions	Agencies	Cost (\$'000)	Management Action Target	Resource Condition Target	Sub-Programs
Very High Risk to Assets							
L1.1	Flow deviation	Complete Goulburn environmental flow project, undertake economic assessment of improved river health, and implement recommendations with negotiated environmental flow regimes by 2010 Implementation of Action 3.9 (our Water, Our Future to meet commitment to the Living Murray project)	DSE DSE	50 (link to L5.2)	Goulburn environmental flow project completed and negotiated environmental water reserve	Establish Environmental Water Reserve and improved environmental flow regimes for 8 high value river reaches currently flow stressed	<i>Flow Management Plan, Fisheries Management Plan, Aquatic and native riparian Flora and Fauna program</i>
L1.2		Review Bulk Entitlement for Goulburn River as part of Victoria's contribution to the Living Murray process	DSE, CMA	50	Bulk Entitlement Reviewed and amended as appropriate		<i>Flow Management Plan</i>
L1.3		Review the operating procedures of Goulburn Weir with a view to optimising water levels for the protection of the aquatic ecosystem	GMW, CMA, DSE	10	Operating procedures reviewed and amended as appropriate		<i>Flow Management Plan</i>
L1.4	Wetland connectivity	Implement Lower Goulburn Floodplain management plan (Reach 1 only)	CMA	25,000	Enhance floodplain to river linkages over 30km of stream	ISC Wetland connectivity rating improved by 2 points over 30km of river in Reach 1	<i>Wetlands Strategy</i>
L1.5	Stock access	Provide fencing and revegetation incentives	CMA	368	40km frontage fenced and revegetated with native species	Improve ISC Streamside Zone sub-index by up to 8 points over 98km river; Improve ISC Physical Form sub-index by up to 1 point over 98km river	<i>Waterway Management and Implementation Plan</i>
L1.6		Encourage land managers to adopt CRP for "Managing grazing in the riparian zone"	DSE, CMA	Program F	390km frontage under CRP		<i>Water Quality Strategy</i>
L1.7		Control grazing on public waterfronts	CLM, Parks	Program E	390km frontage controlled		<i>Licensed Grazing (Public Land)</i>
L1.8	Water quality (Nutrients)	Provide fencing and revegetation incentives in Management Unit L1 and tributaries of Management Units L3 (Euroa Strathbogie) and L5 (Lower Broken River) and U3 (Sunday/Dry Creeks – South West Goulburn) and other priorities identified through SEDNET modelling	CMA	5,014 plus L1.5	585km frontage fenced, as 40km frontage fenced (L1); 420 km frontage fenced (L3 and U3); 125km frontage fenced (L5)	Reduction in phosphorus exports of 2375kg/year at Gauge 405204	<i>Waterway Management and Implementation Plan</i>
		Investigate the implementation of key recommendations from Goulburn River Audit (2005)	CMA, EPA, GMW, GVV, DSE DP	TBD	TBD	TBD	<i>TBD</i>

Monitoring and Evaluation

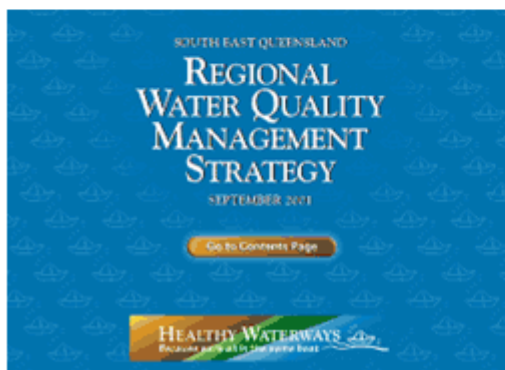
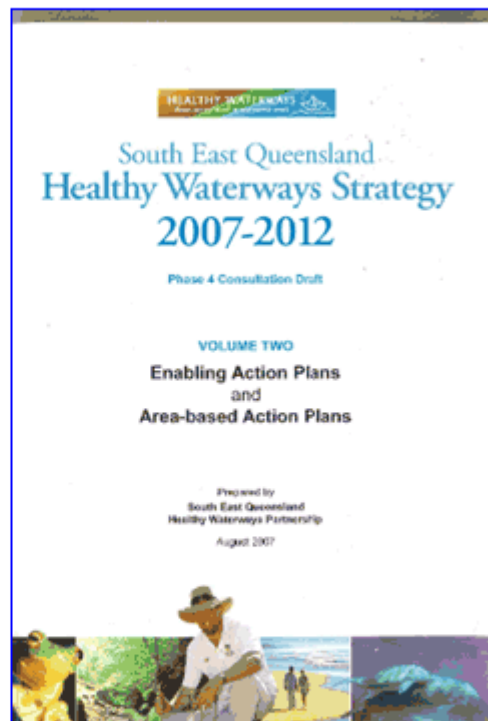
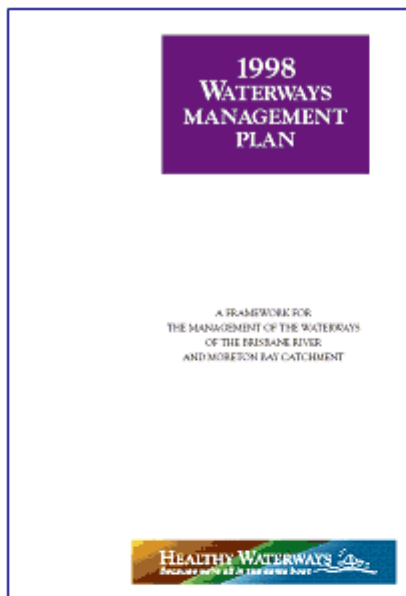
The table below shows the objectives and actions under the monitoring, evaluation and reporting program.

Table 15.1 Actions under Program G – Monitoring , Evaluation and Reporting

No.	Action	10Year Cost ('000)	Priority	Milestone Time frame	Responsibility
Objective: Report progress in river health in a clear and meaningful way					
G1	Promote a monitoring, evaluating and reporting framework that emphasises the link between those making the changes (implementers) and those at Catchment, State and national levels	50	2	Annually	CMA and IC's
	Support regional partnership initiatives (North East Regional Water Quality Monitoring Partnership) Promote and support opportunities for community involvement in monitoring the health of the region's waterways through Waterwatch and other community processes	(included in WQ costs)	1		CMA,GVW DSE, DPI, EPA and GMW
Objective: Ensure Strategy implementation is monitored and underlying assumptions are regularly reviewed and appropriate modifications made					
G2	Establish a program that monitors via CMA Implementation Committees: <ul style="list-style-type: none">• Resource (or Catchment condition) condition changes• Management Objectives and Strategies achievement• Management Task (output achievement)• Physical target (output) achievement• Evaluate RHS implementation at lease annually (Implementation Targets), and prepare Annual Report that shows progress on issues by Implementation Committee and whole of Catchment scales• Evaluate the RHS effectiveness every five years (Resource Condition Targets)• Monitor impact of Environmental Water Reserve	100	1	2009	CMA. RHWQC and IC's

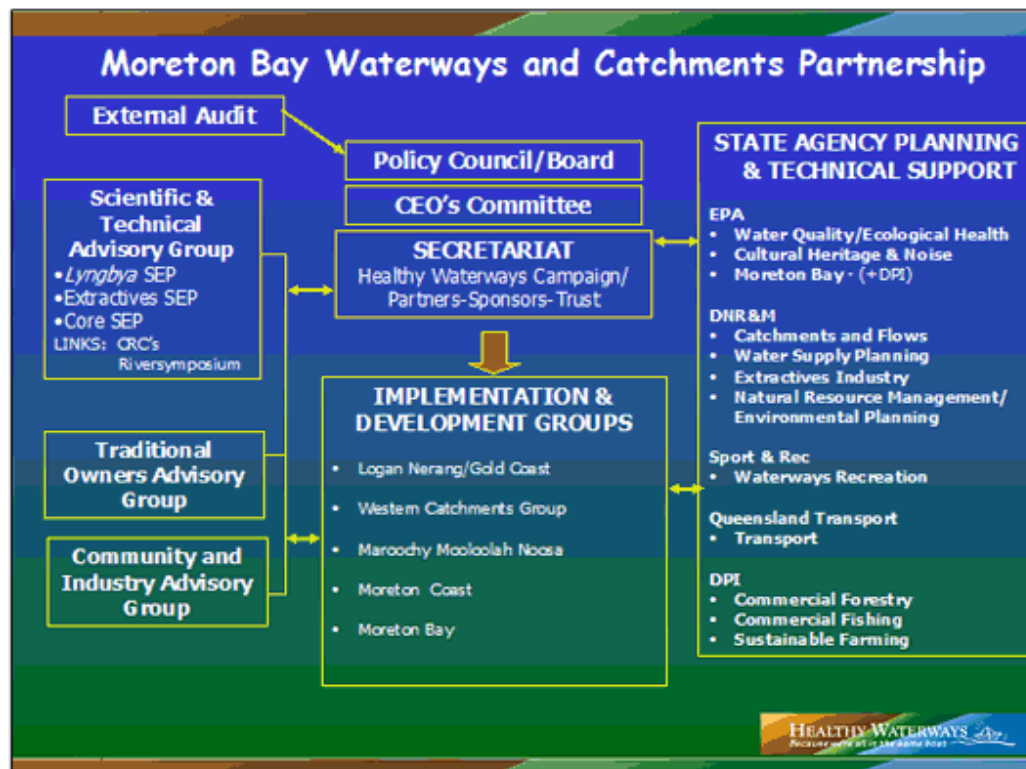
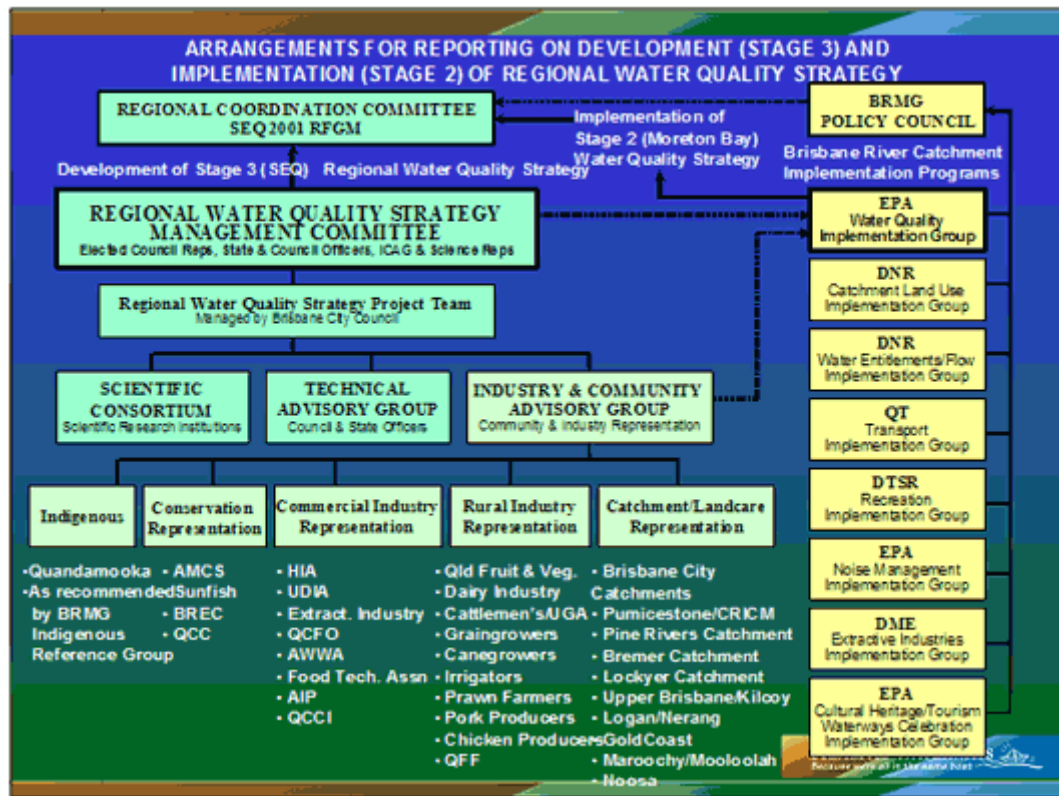
Southeast Queensland Healthy Waterways Strategy (2007-2012)

The Southeast Queensland (SEQ) Healthy Waterways (HWW) Strategy (HWS) is a good example of an adaptive, regional level WQ management strategy. It has developed through a number of stages from its genesis in the late eighties/early nineties; to stage one (scoping phase) in the mid-nineties [status reports, HWW structure, scientific expert panel, stage two projects funded]; to stage two (focused on Moreton Bay) in the late nineties [first plan – 1998, sewage upgrades, HWW campaign]; to stage three (focused on SEQ catchments) in the early 2000s [second plan – 2001, sewage upgrades, stormwater controls, riparian rehabilitation, HWW campaign]; to its most recent phase (development of third plan [HWS 2007-2012] expanding on all actions and integrating with SEQ statutory regional plan, SEQ NRM plan and moving towards total water cycle management.



Stakeholder Involvement

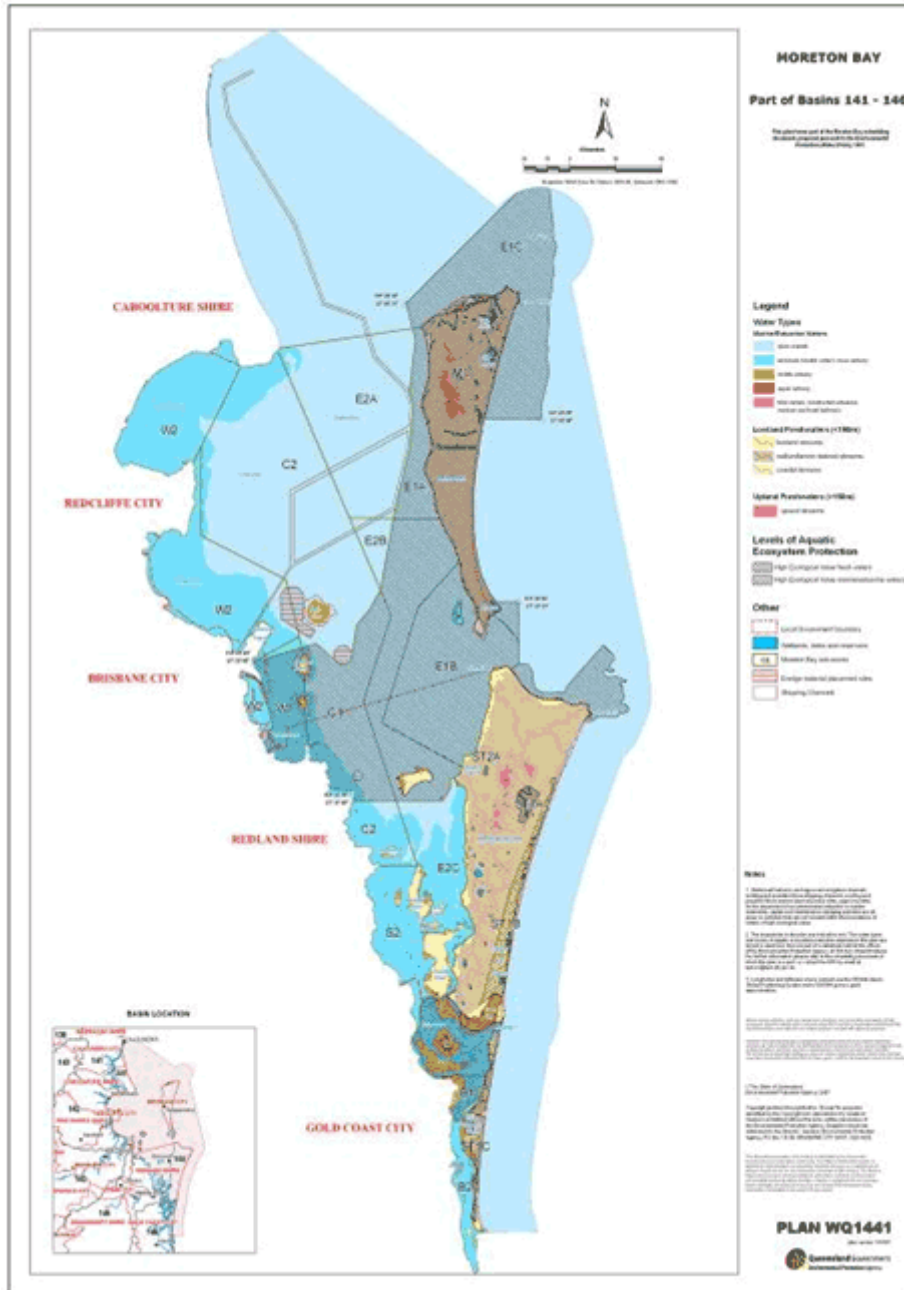
One of the strengths of the HWS has been its stakeholder involvement which has evolved over time and indeed is continuing to evolve with current changes in water utilities and local governments in SEQ. The graphics below (from the Healthy Waterways Partnership) show the partnership arrangements for stages two and three of the strategy.



Links to Environmental Protection (Water) Policy 1997

An outcome of the 2001 plan was a recommendation, as a result of wide community consultation on the environmental values of all catchments, to schedule the established EVs and water quality objectives under the Queensland Environmental Protection (Water) Policy 1997. As part of this process, waters with high ecological values were agreed and mapped (as shown in the example below). Further details of the scheduled EVs and WQOs (examples shown below) are available at:















http://www.epa.qld.gov.au/environmental_management/water/environmental_values_environmental_protection_water_policy_1997/schedule_1_of_epp_water_including_plans/moreton_bay/southeast_queensland_scheduled_evs_wqos/



Environmental Values

ENVIRONMENTAL VALUES AND WATER QUALITY OBJECTIVES FOR WATERS OF
MORETON BAY AND BAY ISLANDS

Table 1 – Environmental values (EVs) for Moreton Bay and bay islands

	Environmental values ^{1, 2, 3, 4}													
	Aquatic ecosystems	Human consumer	Primary recreation	Secondary recreation	Visual recreation	Cultural and spiritual values	Industrial use	Aquaculture	Drinking water	Irrigation	Stock water	Farm supply	Oystering	Seagrass
Water														
MORETON BAY														
Bramble Bay including Hay's Inlet	✓	✓	✓	✓	✓	✓								✓
Central Bay	✓	✓	✓	✓	✓	✓								✓
Deception Bay	✓	✓	✓	✓	✓	✓		✓					✓	✓
Eastern Moreton Bay	✓	✓	✓	✓	✓	✓							✓	✓
Southern Bay	✓	✓	✓	✓	✓	✓							✓	✓
Waterloo Bay	✓	✓	✓	✓	✓	✓	✓							✓
BROADWATER – including islands and canals	✓	✓	✓	✓	✓	✓							✓	✓
BAY ISLANDS														
Coochiemudlo Island	✓	✓	✓	✓	✓	✓							✓	✓
Karragarra Island	✓	✓	✓	✓	✓	✓		✓					✓	✓
Lamb Island	✓	✓	✓	✓	✓	✓		✓					✓	✓
Macleay Island	✓	✓	✓	✓	✓	✓		✓					✓	✓
Moreton Island - freshwater	✓	✓	✓	✓	✓	✓	✓	✓	✓					
Moreton Island – coastal and estuarine	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓
North Stradbroke Island - freshwater	✓	✓	✓	✓	✓	✓	✓	✓	✓					

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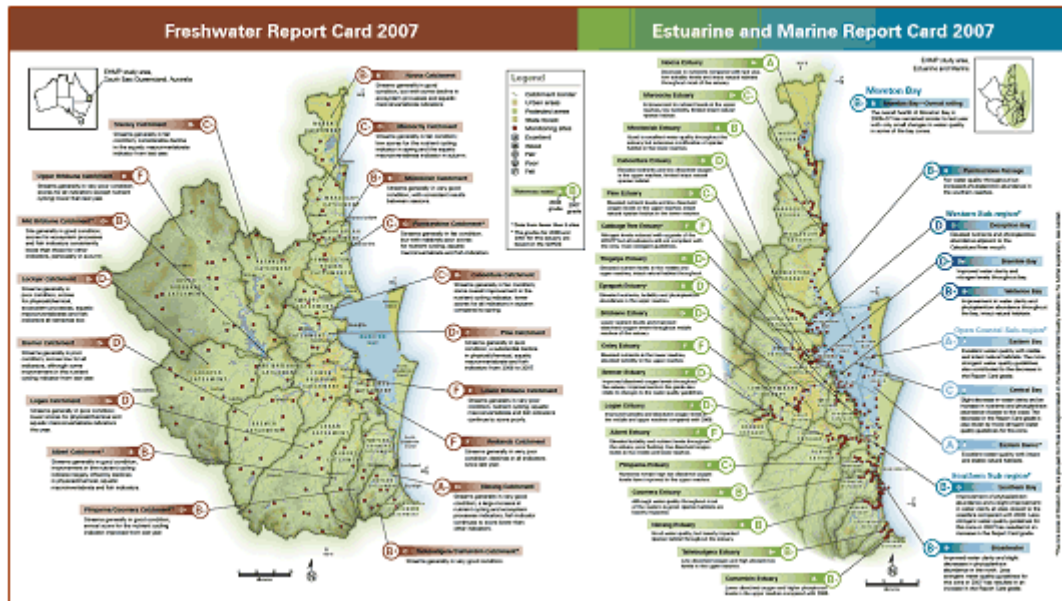
WQ Objectives and Management Actions to protect EVs

ENVIRONMENTAL VALUES AND WATER QUALITY OBJECTIVES OF
MORETON BAY AND BAY ISLANDS

Water area/type (refer Plan WQ1441)	Level of protection	Water quality objectives to protect aquatic ecosystem EV ¹⁻¹¹
Area W2 – Western Bay, including: <ul style="list-style-type: none"> Bramble Bay Deception Bay Waterloo Bay (part) 	Aquatic ecosystem – slightly to moderately disturbed (level 2)	<ul style="list-style-type: none"> turbidity: <6NTU chlorophyll a: <1.6 µg/L total nitrogen: <200 µg/L oxidised N: <2 µg/L ammonia N: <5 µg/L organic N: <190 µg/L total phosphorus: <30 µg/L filterable reactive phosphorus (FRP): <14 µg/L dissolved oxygen: 95 – 105% saturation pH: 8.1 – 8.4 secchi depth: >1.3m (note: minimum secchi depth needed to restore seagrass to areas where it has been lost is 1.7m) <p>Maintain the existing seagrass depth limit for <i>Zostera muelleri</i> of -1.9m AHD (50th percentile) for Waterloo Bay and -3.0m AHD (50th percentile) for Deception Bay</p>

The HWS (2007-2012) has detailed strategies for managing point sources, urban stormwater and polluted runoff from rural lands. It also contains enabling (supporting) actions including the scientific studies, monitoring and reporting (see the annual report card below based on the extensive ecosystem health monitoring program) and an adaptive management strategy. Details can be found on the HWW website: www.healthywaterways.org

Monitoring and reporting



Appendix 17 - Comparison of NWQMS and NHT/NAP Terms (extract from Bennett and Moss 2005)

The NWQMS originated in the early 1990s and there has been a steady roll out of documents since then. This was accompanied by initial Australian government publicity campaigns during the release of the guideline documents with some follow-up after the release.

At a State/Territory level, the detail of the NWQMS is well known to key people in relevant agencies. However outside of this group, while people may know that the NWQMS and its key guideline documents exist, they generally do not have a detailed knowledge of it. Similarly, while key elements of the NWQMS have been incorporated into environmental legislation in most jurisdictions, the application of these elements has varied. For example, in Queensland, while there have been a few limited previous applications, a concerted roll out of the process of establishing EVs and WQ objectives only started in 2004. Similarly, application in WA focused on developing a State level strategy and, in the NT, focused on declared beneficial uses in their *Water Act*. In the ACT, many of the steps in the NWQMS were actually written into the *Environmental Protection Act* but the practical uptake of this work appears to have been limited to key agencies and, as the project team discovered during the workshop, it is largely unrecognised by some current NRM practitioners in developing their NRM plans under NHT.

The lack of ongoing publicity has meant that detailed knowledge of the strategy has been confined to a few experts in the field. The advent of regional NRM bodies has seen the recruitment of a whole new generation of NRM practitioners who, given the context described above, are largely unaware of the NWQMS.

This situation has been significantly compounded by the NAP and NHT programs that, while attempting to achieve the same outcomes as the NWQMS with respect to WQ, have introduced superficially different management frameworks and a new set of terminology (see Table 1 below). Some of this new thinking, for example the Monitoring and Evaluation framework, could be usefully incorporated into the NWQMS, but currently the programs are treated as quite separate entities. The confusion between programs was frequently commented upon in the workshops. This highlights the need for a strong champion of the NWQMS at the Australian Government level and for simple and consistent frameworks and terminology across strategies and programs.

Table 1. Comparison of NWQMS and NAP/NHT frameworks

	NWQMS framework	NAP & NHT program frameworks (i) Standards and Targets, and (ii) Monitoring and Evaluation
Objective of strategy / programs	Sustainable use of the nation's water resources	Achieve desired national natural resource outcomes
Purpose of frameworks	Show how the NWQMS guidelines can be applied	(i) establish the principles and requirements for NRM standards and targets, and guide investment through national NRM programs (ii) assess progress towards improved natural resource condition
What is it trying to protect?	'Environmental values' – that is social, economic and ecological values and uses of waters	'Critical assets' – e.g. ecosystem and habitat 'matters for targets' below
What does it call the 'levels of quality' of the water resource that it is aiming to achieve?	Water quality objectives (which includes ecosystem health objectives)	Resource condition targets for relevant matters for targets, including: - Inland aquatic ecosystems integrity - Estuarine, coastal and marine habitats integrity - Nutrients in aquatic environments - Turbidity / suspended particulate matter - Surface water salinity (freshwater)