



National Water Reform

Productivity Commission Issues Paper (May 2020)

Submission from the National Health and Medical Research Council (NHMRC)

Introduction

The National Health and Medical Research Council (NHMRC) has a responsibility to issue guidelines and advise the community, the Commonwealth and states and territories on matters relating to improving health and preventing disease. NHMRC maintains several water guidelines that provide advice for water managers on how to manage water supplies to keep Australians safe. These include the:

- *Australian Drinking Water Guidelines* (ADWG, 2011)
- *Guidelines for Managing Risks in Recreational Water* (GMRRW, 2008)
- *Australian Guidelines for Water Recycling: Augmentation of Drinking Water Supplies* (AGWR, 2008).

NHMRC water guidelines provide nationally consistent standards to maintain public health, with the ADWG underpinning state and territory regulations on drinking water quality. NHMRC water guidelines also contribute to the National Water Quality Management Strategy, managed by the Department of Agriculture, Water and the Environment.

In 2017 NHMRC provided a response to the *National Water Reform: Productivity Commission Issues Paper (March 2017)* and outlined our concerns regarding the lack of consideration of public health and water quality in the National Water Initiative (NWI). In particular, we suggested that water quality and health should feature more prominently in the NWI and be considered during economic calculations and infrastructure planning.

This 2020 NHMRC submission has been prepared in response to the *National Water Reform: Productivity Commission Issues Paper (May 2020)*. This submission was prepared with the assistance of the NHMRC Water Quality Advisory Committee and the NHMRC Recreational Water Quality Advisory Committee. These committees advise NHMRC on water quality matters of national significance. Information regarding the roles and composition of these two advisory committees is provided at the end of this document.

NHMRC considers that the management of water quality should feature more prominently in a renewed National Water Initiative (NWI).

Many of the problems with water in Australia are caused by water quality rather than just water quantity issues. Water quality is the condition of water (including its physical, microbial, chemical and radiological characteristics) and how suitable it is for its intended purpose.

Water quality means that:

- drinking water is safe to drink
- recreational water is safe for swimming
- recycled water is safe for the designated purpose
- water used for agriculture is safe
- wastewater does not cause harm to the environment
- water quality supports ecosystem health and

- the quality of our waterways meets the cultural and spiritual values of Aboriginal and Torres Strait Islander peoples.

Under the *National Health and Medical Research Council Act 1992*, NHMRC has a responsibility to improve and maintain the health of Australians. While NHMRC has a specific focus on the human health impacts from water quality, we support the overall improvement of water quality across all sectors.

NHMRC responses

INFORMATION REQUEST 1

The Commission welcomes feedback on:

- whether the signatories to the NWI are achieving the agreed objectives and outcomes of the agreement
- which elements of the NWI have seen slow progress
- whether there are cases where jurisdictions have moved away from the actions, outcomes and objectives of the NWI
- any other data and information sources that might be useful for assessing progress.

NHMRC does not have any information to provide in response to Information Request 1.

INFORMATION REQUEST 2

Is the NWI adequate to help Governments address the identified challenges?

Are there any other current or emerging water management challenges where the NWI could be strengthened?

NHMRC considers that the NWI could be strengthened by addressing water quality. The NWI establishes agreed outcomes, actions and implementation timelines for eight key elements:

1. Water Access Entitlements and Planning Framework
2. Water Markets and Trading
3. Best Practice Water Pricing and Institutional Arrangements
4. Integrated Management of Water for Environmental and Other Public Benefit Outcomes
5. Water Resource Accounting
6. Urban Water Reform
7. Community Partnerships and Adjustment
8. Knowledge and Capacity Building.

Ensuring Satisfactory Water Quality is absent from these eight key elements and should be added as an additional element of the NWI. The key elements are all dependent on water quality. Both water quality and water quantity together are essential for water security across Australia. This is particularly true with ongoing uncertainty due to climate change.

One of the challenges to water quality management is the number of different sectors that need to coordinate efforts to achieve their desired outcomes. Protecting human health from the impacts of poor water quality is an example of an outcome where many sectors intersect and need to work together (e.g. health, agriculture, industry, tourism, and environment). An appropriate objective of a renewed NWI would be to apply a ‘One Health’ approach while addressing issues related to water quality. One Health is a collaborative, multisectoral and transdisciplinary approach working at local, regional, national and global levels to achieve optimal health and wellbeing outcomes. It recognises the interconnections between people, animals, plants and their shared environment. This approach is being used by some agencies in Australia and some international agencies and organisations use this approach to manage disease outbreaks and other risks to public health (e.g. World Health Organization, One Health European Joint Programme, United States Department of Agriculture, Centers for Disease Control and Prevention).

INFORMATION REQUEST 3

The Commission welcomes feedback on the matters that should be considered for inclusion in a renewed NWI.

NHMRC considers that water quality should feature more prominently in a renewed NWI.

Any water sector reform must ensure water is safe for the Australian community and protects the environment for ecosystem, commercial, residential and recreational purposes. NHMRC believes that the water quality issues outlined in the table below should be addressed in the NWI.

Proposed water quality issues to address in a revised NWI	
Impacts on human health	<ul style="list-style-type: none"> Consider human health impacts from exposure to poor water quality including acute and chronic illness, and physical and mental health. Include the economic impacts of poor health, particularly for rural and regional communities which are disproportionately impacted.
Improvement of water quality management	<ul style="list-style-type: none"> Ensure consistency across jurisdictions by provision of a water quality management framework by which community-managed water treatment and distribution systems provide access to safe and reliable drinking water. Provide clarity of roles and responsibilities in the management and regulation of water quality across sectors and jurisdictions and action taken to address regulatory gaps. Promote greater use of integrated catchment management approaches to prevent potential sources of water quality contamination. This includes avoiding inappropriate management of multi-use catchments which can lead to poorer water quality (e.g. inappropriate recreational access to drinking water catchments). Such incompatible uses should be included in planning controls and consistently implemented across Australia to help ensure the continuous supply of safe drinking water. Improve approaches to stormwater and sewer management, which are key factors affecting water quality in urban areas.

Proposed water quality issues to address in a revised NWI	
	<ul style="list-style-type: none"> • Consider the One Health approach in addressing issues relating to the management of water quality in a revised NWI. • Improve management of water quality issues resulting from climate change, topography and geology combined with ongoing changes to land and water use (e.g. salinisation of rivers and groundwater).
Protection of water sources to improve and maintain water quality	<ul style="list-style-type: none"> • Protect water sources from infection or contamination to improve and maintain water quality. This includes: <ul style="list-style-type: none"> ○ raw (untreated) private and community water supplies (particularly for water supplies in regional, remote and Indigenous communities) ○ water catchments that contribute to drinking water supplies. Recent monitoring data highlights many current challenges to maintaining drinking water quality such as bushfires and algal blooms. Existing treatment processes are sometimes unable to manage these events effectively, resulting in 'do not drink' or 'boil water' advisories being issued. Safeguarding drinking water catchments can prevent the need for additional treatment processes that may be required to address future water quality issues. ○ waterways, including ground and surface waters that contribute to healthy aquatic ecosystems. Water quality is also important for the maintenance of Groundwater Dependent Ecosystems, which help sustain habitat pools for threatened aquatic species during drought periods. Urban, commercial and tourist developments, as well as intensive agricultural land use can adversely affect groundwater quality and the ecosystems that depend on that groundwater. ○ safe recreational use of designated natural riverine waterways, lakes, reservoirs and estuarine and marine bathing beaches ○ water quality impacts of wastewater discharge into water systems from industries such as mining operations, agriculture and fisheries.
Impacts on industry, agriculture, fisheries	<ul style="list-style-type: none"> • Protect and improve the quality of water used by industry, agriculture and fisheries to improve operations and support health, industry and economic development, including: <ul style="list-style-type: none"> ○ reduce salinisation (to protect stock, crops and machinery) ○ support high value agricultural activities (to ensure that they do not pose risks to public health for example through the consumption of contaminated produce) ○ protect animal health (to avoid economic losses for primary producers). • Ensure wastewater from industry, agriculture and fisheries does not harm human health or the environment through the release of harmful chemicals (e.g. heavy metals and PFAS) or waste into drinking water catchments and ecosystems including: <ul style="list-style-type: none"> ○ improve on-farm water efficiency, such as undertaking best practice land management to reduce sediment and nutrient runoff from farms, riparian weed control (e.g. willows and other deciduous species),

Proposed water quality issues to address in a revised NWI	
	<p>increasing native riparian vegetation, preventing stock access to waterways</p> <ul style="list-style-type: none"> ○ improve stormwater management from rural towns. While the importance of water sensitive cities is recognised in the Issues Paper, stormwater from rural towns also needs attention due to the cumulative impacts this can have on rivers and streams.
Recognition of all benefits and uses of a water supply	<ul style="list-style-type: none"> ● Acknowledgement of all beneficial uses that a particular water body provides when considering water quality. For example, recreational use of water bodies currently falls outside commercial water trading but provides both economic outcomes (e.g. tourism, infrastructure, employment) and health benefits (e.g. cultural, spiritual, social, wellbeing and fitness). In order to ensure these benefits are not lost, water quality needs to be suitable for agricultural, environmental and close-contact human uses.

The Need for National Water Quality Reform

The National Water Quality Management Strategy (NWQMS) was developed to deliver a nationally consistent approach to water quality management in Australia (Water Quality Australia, 2018). This was in response to growing community concern about the condition of waterways and water quality across Australia. The 2004 NWI recognised that continued implementation of the NWQMS would complement the outcomes of the agreement. The NWQMS policy objective *'to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development'* complements the aims of the NWI together with the overriding principles of:

- ecologically sustainable development
- an integrated approach to water quality management
- community involvement in setting water quality objectives
- developing state and territory water quality management plans
- government endorsement of water quality objectives for particular water bodies, catchments or uses.

NHMRC considers that the NWQMS should continue to underpin any national water reform to achieve national water quality objectives and effective implementation across all jurisdictions. In addition, inclusion of water quality management and the NWQMS as a central component of a renewed NWI would assist in delivering a number of important outcomes to water quality reform. These include improved national consistency in water quality management, particularly in areas such as the regulation and management of drinking water quality and wastewater.

Since initiation, the NWQMS has grown and improved through collaboration between the Australian, state and territory governments, peak bodies and other stakeholders to develop guideline documents and tools to assist with water quality management (Water Quality Australia, 2018). While the NWQMS is not mandatory, it is used by state and territory governments to establish their own guidelines, regulations, policies, processes and standards for managing fit-for-purpose water quality. The Australian Government has also used the NWQMS for various purposes, such as for meeting international obligations.

The value of the NWQMS and the role it plays in Australian water quality management has been demonstrated in a number of ways that support its continued inclusion in a revised NWI, particularly to underpin any reforms regarding water quality. Points to consider include:

- A review of the implementation of the NWQMS in 2008 found that the NWQMS provided a good framework for managing water quality and sound technical references to support water quality management (Bennett, 2008). There was also a good range of examples of water quality management plans at the catchment level that applied the framework and tools from the NWQMS, such as environmental values, water quality guideline values and effective management strategies.
- An independent review of the NWQMS was conducted in 2011 to evaluate the strategy within the water reform policy framework. The review found that water quality continues to be an issue that requires national policy intervention (KPMG, 2011).
- The NWQMS has supported the implementation of the NWI in key areas such as environmental water planning. For example, the Murray–Darling Basin Plan uses information from NWQMS guidelines to set water quality targets and objectives for catchments.
- The NWQMS is applicable to all types of water in Australia, including fresh water, marine water, groundwater, estuarine water and recycled water. It also supports the different purposes of water such as for drinking, the environment, primary industry, recreation, industry and cultural and spiritual values (Water Quality Australia, 2018).
- The collaborative approach to the NWQMS has helped to reduce duplication and achieve consistency in approaches across the states and territories. These collaborative efforts have also resulted in the NWQMS providing the best available science to support decision making while incorporating flexibility to tailor the information to local conditions. It aims to meet the need of governments, industry and organisations to manage water so that it is fit-for-purpose.
- The NWQMS and other reference materials can assist in the integrated management of complex water resources for human and environmental needs. An important example of a complex water quality issue that requires integrated management across sectors is the impacts of drought on the quality of the available water. However, it has more recently been shown to be critical when planning for emergency situations such as flooding and 'blackwater events'. Blackwater events occur following heavy rainfall after bushfires and result in large amounts of organic matter being washed into waterways. This depletes the oxygen in the water and sometimes leads to the death of fish and other aquatic organisms. Blackwater is also difficult and expensive to treat by water treatment plants, which can increase risks to public health and impact aesthetics.

While the NWQMS has been successful in driving improvements and collaboration in water quality management, there are some areas that are in need of reform. For example, knowledge and expertise on managing water quality has grown, however, key NWQMS documents have not captured this information and are in need of updating.

There are also many other areas for improvement in the management of water quality in Australia that can be facilitated by more prominent use of the NWQMS in a revised NWI. For example, there is a particular challenge for small councils and small private water management entities to maintain the quality and safety of drinking water, recycled water and recreational/environmental water. Many of these challenges may be overcome by focused reforms to water quality management through the NWQMS. The Tasmanian case study below provides an important example of how water quality management reform starting at the local council level can have a profound and widespread impact on drinking water quality and public health at a state level.

Case Study: Tasmanian Water Reform (provided by Tasmanian Department of Health)

Tasmania has undergone significant reform in the water and sewerage sector since 2009. Reforms have included economic regulation and improvements to water quality and wastewater quality.

Prior to 1 July 2009, water and sewerage in Tasmania were provided by 29 individual local councils. After this time, major water reform saw the creation of three regional water corporations to undertake that function. They continued to operate until 1 July 2012, when a single water corporation was created to have sole responsibility and management for all drinking water and sewerage services in Tasmania.

With the reform came significant sequential improvements and outcomes in the safety of drinking water for Tasmanians, reducing public health risks and increasing the level of reliability and service across the state over time. For example:

- At the end of Council-run operations, there were 22 boil water alerts across the state, with only 59% of all water supply systems exhibiting microbiological compliance.
- At the end of the three regional water corporations' operations, the number of boil water alerts had reduced to 14 and the microbiological compliance rate had increased to 68%.
- As of today, the single water corporation has seen microbiological compliance improve to 100% with no boil water alerts in place. This means that every Tasmanian that receives a reticulated drinking water supply can safely consume that water without any restrictions on its safe use.

Operation and control of drinking water by one water corporation has seen a consistent application of management systems and practices across the state. This ensures that regional and remote supplies have the same level of regulation and quality that those of the populated areas receive. Significant capital investment has seen the commissioning of many new water treatment plants and centralised operations that provide drinking water to other communities via pipelines. The improvements in quality, frequency and appropriateness of drinking water quality monitoring gives greater confidence in determining the quality of water delivered to consumers. There has been a significant reduction in public health risks as a result of this reform.

INFORMATION REQUEST 4

How effective are water plans at managing extreme events such as severe drought?

Are NWI principles being applied at these times?

What steps have been undertaken — or should be undertaken — to plan for long term changes in climate?

What lessons have recent extreme events (bushfires and COVID 19) provided for planning?

Extreme weather events that have impacted water quality in Australian towns and cities include droughts, heatwaves, bushfires, cyclones and heavy rainfall events (Khan *et al.*, 2017). Further development of management approaches to maintain water quality during and after these events is required (Khan *et al.*, 2015). National water reform provides an opportunity to focus on national strategies for the improved

management of water quality during and following extreme weather events. Some possible strategies include:

- Developing a national benchmarking system for assessing the resilience of urban water supply systems in extreme events. This will enable vulnerable water supplies and systems to be identified and a water supply system (as a whole) to reliably maintain the continuous supply of water for essential purposes, including safe drinking water, during extreme events (e.g. bushfires or floods). If water quality management is incorporated into a renewed NWI, then this task could be given national focus.
- Developing national guidance for managing water quality during and after extreme events. This will provide water suppliers with nationally consistent advice so they are appropriately prepared for extreme events. Demonstrated compliance with these guidance documents could become a requirement of relevant state and territory governments' operating licences for catchment managers and drinking water service providers.

NHMRC is aware of existing frameworks at the state and territory level that aim to improve planning for climate change and extreme weather events. For example, in Victoria the *Climate Change Act 2017* has led to the development of Climate Change Adaptation Action Plans. However, further work needs to be done to fully implement these improvements particularly in the water sector. Significant opportunities are likely to follow from a nationally coordinated and consistent approach as part of a renewed NWI.

INFORMATION REQUEST 5

How could the NWI be amended to support best practice monitoring and compliance across jurisdictions?

As part of a revised NWI that emphasises the importance of water quality, water quality monitoring and compliance provisions in the NWQMS could be adopted by all jurisdictions. The inclusion of a framework and accompanying guidance will support the uptake of best practice monitoring and compliance approaches by jurisdictions and improve national consistency in managing water quality. A renewed NWI could also help support monitoring and compliance by including a mechanism that facilitates coordination and information sharing (e.g. monitoring data) between jurisdictions.

INFORMATION REQUEST 6

Are environmental outcomes specified clearly enough in water plans to guide management actions, monitoring and accountability?

Are institutional and administrative settings effective in supporting these outcomes? Do environmental water managers have the necessary authority, resources and tools to achieve agreed outcomes?

Is environmental water management (including planning for use of held water, delivery of held water, use of markets and compliance with planned environmental water) sufficiently integrated with complementary natural resource planning and management frameworks?

Can environmental outcomes be more cost effectively achieved with greater and more innovative use of water markets and market like mechanisms?

Is the monitoring and assessment of environmental outcomes sufficient?

How effective has adaptive management and planning decision making been during the recent drought?

Do environmental water managers maximise opportunities to achieve social or cultural outcomes alongside environmental watering? How could this be improved?

Water quality and environmental outcomes are intrinsically related. Water quality objectives and requirements, which protect public health, should feature as an important and prominent consideration in environmental outcomes. The impacts of various approaches to water use should be assessed in terms of their water quality consequences.

INFORMATION REQUEST 7

What progress are States and Territories making on including Indigenous cultural values in water plans, and how are they reporting progress?

How could a refreshed NWI help Indigenous Australians realise their aspirations for access to water, including cultural and economic uses?

Water quality and flow are important to maintaining the cultural values identified by Aboriginal and Torres Strait Islander peoples. Scientists have worked in southwest Victoria with Wadawurrung Traditional Owners to identify Aboriginal water values in FLOWS Studies and Seasonal Watering Plans in the Barwon, Yarrowee and Leigh rivers.

Water quality management is an important contemporary issue for many Aboriginal and Torres Strait Islander communities around Australia. A high proportion of regional and remote Indigenous communities are experiencing intermittent and reoccurring water quality issues that lead to poor water safety and aesthetic outcomes. For example, the community of Walgett (NSW) has recently encountered elevated sodium concentrations in drinking water. In addition, elevated concentrations of uranium in drinking water have been a persistent problem in the remote community of Laramba (NT).

Water quality issues can sometimes be due to a lack of infrastructure to manage the quality of community water supplies (e.g. Laramba). These experiences can also lead to community perceptions that drinking water is unsafe to drink. In some cases, it has led to an increased consumption of sugary drinks which can have serious long term public health impacts (Thurber *et al.*, 2019). These issues could be resolved through national water reforms that actively aim to address inequity in access to good water quality.

INFORMATION REQUEST 8

Are the institutional arrangements for metropolitan water service providers fit for purpose? Is there evidence of inefficient pricing or investment decisions?

The institutional arrangements in place for urban water service providers may not be fit-for-purpose in all instances. NHMRC is aware that the institutional arrangements in some states can present challenges, particularly for small water service providers.

INFORMATION REQUEST 9

How can small regional providers best balance affordability with longer term service quality? Are there barriers to effective local planning?

Is there scope for greater collaboration between small providers? When might government support be warranted, and how should it be provided?

Initiatives such as the Queensland Water Regional Alliance Program (QWRAP) have had successes in addressing barriers to planning and collaboration. This experience has demonstrated that such collaboration is valuable and should be fostered. There is potential for greater collaboration and innovation in the way urban water services are provided. Opportunities for achieving this throughout Australia should be carefully considered in a revised NWI.

A barrier to local planning, especially in small remote and regional communities, is a lack of simple tools, resources and funds that can assist local managers in planning and managing their water supplies and resources. NHMRC's *Community Water Planner* was developed as an online tool to accompany the ADWG and help with preparing risk management plans. However, the tool is no longer available. Ongoing funding and support is required to develop and maintain planning tools that can facilitate local planning activities for all types of water uses.

INFORMATION REQUEST 10

Do water service providers supply high quality water services in regional and remote areas? Are there examples of poor water quality, service interruptions, or other issues? Have regional water service providers adequately planned for extreme events?

Are there sources of data that could be used to benchmark smaller providers' water service levels (with fewer than 10 000 connections)?

The provision of high quality water services in regional and remote areas of Australia is variable and requires nationally coordinated improvement. Recent national media stories have highlighted uranium (e.g. Laramba) and other sources of drinking water contamination. In addition, failures to meet microbial water quality objectives must also be addressed in order to properly safeguard the health of all Australians. A review of state and territory annual water quality reports would assist in revealing whether there are more widespread and persistent issues.

Other issue to consider include:

- Water supplies that have been assessed as 'non-potable' are often not covered in state and territory reports which may result in community water supplies not fit for drinking being overlooked.

- Challenges in addressing the quality of many rural and remote water supplies and wastewater management typically revolve around cost-benefit analyses for small communities (i.e. high cost for very small populations) and resourcing issues. For example:
 - Ageing and inadequate rural drinking water treatment plants
 - Discharge of poorly treated wastewater into waterways, impacting residential, agricultural and recreational use.
- The growth of cyanobacterial species ('blue-green algae' blooms) is a reoccurring water quality problem in Australia which may be exacerbated by climate change. For example, blooms of the cyanobacterium *C. raciborskii* are common in the supply reservoirs of Mount Isa (Lake Moondara and Lake Julius) but during the summer of 2013-2014 an unprecedented bloom occurred in the supply's filtration lagoon. Cyanobacterial blooms can cause significant public health impacts from drinking water and recreational exposure to cyanotoxins as well as impacts to drinking water taste and odour.

Collecting, analysing and reviewing water quality data can assist in benchmarking water quality over time for all size systems. One of the major difficulties for small communities, particularly those in remote areas, is the implementation of regular monitoring programs. This is challenging both in terms of cost and the practicalities of transporting samples to testing laboratories.

The ADWG provide health-based and aesthetic guideline values for drinking water, along with a framework for managing and monitoring water supplies. The advantage of the ADWG framework is that it places emphasis on a preventive approach to managing water quality, with less reliance on water testing (see the ADWG, Chapter 4). Small water suppliers may need access to more resources for more consistent implementation of the ADWG framework.

INFORMATION REQUEST 11

What steps have been undertaken to address the priority areas for urban water reform identified in 2017?

Is further guidance on implementing an integrated water cycle management approach for delivering water supply, wastewater and stormwater management services required?

How does jurisdictional urban water service planning interface with urban landuse planning at different scales? Are the roles and responsibilities clearly set out?

Is the role of water in delivering amenity and liveability outcomes clear? How are the trade offs with other NWI outcomes considered? Is it clear how the level and type of amenity delivered by urban water services will be funded?

NHMRC supports increased attention to urban water reform in a renewed NWI. Improved national consensus and guidance for the management of urban water quality throughout all regions of Australia is required. The nature, extent, regulation and pace of many urban development activities have the potential to adversely impact on urban water quality. For example, increased urban development can lead to:

- significantly changed stormwater flow regimes, including vastly increased peak-flow conditions
- increased wastewater volumes that require reuse or safe disposal to the environment
- impaired recreational water quality or even drinking water quality.

In addition, decisions relating to the design and operation of urban stormwater and wastewater systems have the potential to significantly impact water quality. All decisions relating to urban water management must include careful consideration of current and future impacts on water quality.

INFORMATION REQUEST 12

Are there examples of projects that have not met the NWI criteria for new water infrastructure investment?

What principles should inform government funding or financing of new water infrastructure?

One of the guiding principles in Queensland Health's *Safe and Healthy Drinking Water in Indigenous Local Government Areas Program* is to advocate for infrastructure that is fit for purpose, place and people. This principle should inform all government funding or financing of new water infrastructure.

INFORMATION REQUEST 13

Are there any areas for future reform of the NWI that have not been raised in this issues paper that should be investigated for inclusion?

NHMRC believes national water reform and leadership is required to ensure satisfactory water quality. Water quality, including the National Water Quality Management Strategy (NWQMS), should be included as a central component of a renewed NWI.

One possible approach to encourage improved national consistency and overcome any problems of duplication might be the cooperative development of model legislation on environmental regulation and/or drinking water regulation. Such an approach has been successfully adopted for the development of model legislation for Occupational Health and Safety.

NHMRC supports a well-resourced national mechanism to drive, oversee and monitor implementation of the NWI. The establishment of a Principal Committee, with a mandate for the national management of water quality, would also facilitate effective communication and cooperation among the Australian Government and various state and territory governments.

NHMRC believes future water reform should investigate establishment of a clear national funding source for the regular review and updating of key water quality guideline resources, such as community water planning tools, for adoption by jurisdictions.

Acknowledgements

NHMRC would like to thank members of the Water Quality Advisory Committee and the Recreational Water Quality Advisory Committee for their assistance in the preparation of this submission.

About the Water Quality Advisory Committee



The NHMRC Water Quality Advisory Committee (WQAC) provides expert advice to NHMRC on public health issues related to drinking water quality. The major role of WQAC is the rolling review of the *Australian Drinking Water Guidelines* (ADWG). Other activities in WQAC's Work Plan are outlined on the NHMRC website (<https://www.nhmrc.gov.au/health-advice/water-quality-and-health/water-quality-advisory-committee-wqac>).

WQAC members provide expertise in the fields of microbiology, toxicology, water quality risk assessment and management, water chemistry and recycling, groundwater hydrology, guidelines and methodology. Jurisdictional representatives with knowledge of implementing the ADWG are also members. WQAC has observer members from Food Standards Australia New Zealand, the Australian Department of Agriculture, Water and the Environment and Water Services Association Australia. WQAC members are members of professional networks and consult within and outside these networks to provide expert advice on water quality issues nationally and internationally.

Current members of WQAC are:

Member name	Affiliation
Prof Frederic Leusch	CHAIR, School of Environment and Science, Griffith University
Ms Miranda Cumpston	Monash University and University of Newcastle
Dr David Cunliffe	South Australian Department for Health and Wellbeing
Mr Cameron Dalgleish	Tasmanian Department of Health
Dr Dan Deere	Water Futures Pty Ltd
Prof Cynthia Joll	Curtin Water Quality Research Centre, Curtin University
Prof Stuart Khan	Water Research Centre, UNSW
A/Prof Susan Petterson	Water & Health Pty Ltd / Griffith University
Prof Craig Simmons	National Centre for Groundwater Research and Training, Flinders University
Ms Carolyn Stanford	CONSUMER REP, Stanford Marketing, Victoria
Dr Katrina Wall	NSW Health Department
Dr Nick Fletcher	OBSERVER, Food Standards Australia New Zealand
Ms Amy Lea	OBSERVER, Department of Agriculture, Water and the Environment
Mr Adam Lovell	OBSERVER, Water Services Association of Australia

About the Recreational Water Quality Advisory Committee

The NHMRC Recreational Water Quality Advisory Committee (RWQAC) provides expert advice to NHMRC on public health issues related to recreational water quality. The primary role of RWQAC is to review and update the *Guidelines for Managing Risks in Recreational Water*. Other activities in RWQAC's

Work plan are outlined on the NHMRC website (<https://www.nhmrc.gov.au/about-us/leadership-and-governance/committees/recreational-water-quality-advisory-committee-rwqac>).

RWQAC members provide expertise in the fields of water quality risk assessment and management, microbiology, toxicology, aquatic ecotoxicology, environmental and public health microbiology in wastewater treatment, environmental epidemiology and science, and river health. RWQAC members are members of professional networks and consult within and outside these networks to provide expert advice on recreational water quality issues nationally and internationally.

Current members of RWQAC are:

Member name	Affiliation
Prof Stuart Khan	CHAIR, Water Research Centre, UNSW, NSW
Dr Ben van den Akker	SA Water Corporation, SA
Dr Meredith Campey	BeachWatch, Office of Environment and Heritage, NSW
Dr Christine Cowie	Environmental Epidemiologist, UNSW
Dr Dan Deere	Water Futures Pty Ltd, NSW
Ms Sarah Holland-Clift	Corangamite Catchment Management Authority, VIC
Dr Andrew Humpage	Independent Consultant, SA
Dr Greg Jackson	Department of Health, QLD
Dr Muriel Lepesteur-Thompson	Environmental Protection Agency, VIC
Dr Richard Lugg	Independent Consultant, WA
A/Prof Susan Petterson	Water & Health Pty Ltd / Griffith University
Ms Rachael Poon	Department of Health and Human Services, VIC
Dr Jenny Stauber	CSIRO Land and Water, NSW
Dr Cameron Veal	Seqwater, QLD
A/Prof Anne Roiko	Griffith University Gold Coast, QLD

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