

Improving Water Information Program



Australian Government

Bureau of Meteorology

Progress Report

Advances in water information made by the Bureau of Meteorology from 2007 to 2010



Front cover photograph: Lake Menindee. Photograph by Lynton Crabb.

Back cover photograph: Sunset at the Loddon River, Kerang, Victoria. Photograph by Luke Shelley.

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Contents

- Introduction page 5
- Improving water information page 6
- Program objectives page 8
- 1. Sharing data page 10
- 2. Setting standards page 12
- 3. Building systems page 14
- 4. Data warehousing page 16
- 5. Improving observations page 18
- 6. Publishing information page 20
- 7. Assessing water resources page 22
- 8. Accounting for water page 24
- 9. Forecasting flows page 26
- 10. Research and development page 28
- Stakeholder consultation page 30
- Communication page 34



Irrigation boom near Alice Springs, NT

Introduction

“The foundations we have laid are solid and will support the steady roll out of new water information products and services in the future.”

In a water-limited environment like Australia, using water wisely and sustainably holds the key to our future. As water supply reduces under climate change and water demand increases with population growth, we must continually adjust the way we manage our water resources.

A rapidly worsening water supply and demand imbalance has invoked unprecedented investment in the Australian water sector over the last decade. Examples include expenditure of over \$14b in urban water projects in 2009-10, water trades totalling \$2.8b in value in 2008-9, and an Australian Government water reform program valued at \$12.9b over ten years, including over \$3b for environmental water purchases and almost \$6b for improved water infrastructure.

To ensure that water is secure, equitably shared, protected from degradation, and sustains our water-dependent industries and unique riverine environments, it is essential that we measure and understand our water resources well. The Australian public rightly expects that water policies and management decisions will be founded on a sound evidence base.

In Australia, water information has traditionally been gathered, analysed and reported in different ways in different jurisdictions. No less than 200 organisations are involved in the collection of water information for a particular business need, operating in a particular part of the country. Until now, we have never had a means to assemble the information and systematically report on water across the nation. This has inhibited productive community debate about water reform and contributed to governments delaying action.

Thanks to the Australian Government's *Improving Water Information* Program, that situation is rapidly changing and an improved evidence base for reform is emerging. Over the past three years, the Bureau of Meteorology has recruited and trained around 130 dedicated scientists and IT professionals, who are now piecing together a comprehensive body of knowledge on our nation's water resources. Considerable progress has been made in developing a suite of water information products and services that will greatly enhance community understanding of water resources, water management decision-making and water policy.

A key achievement has been the building of extensive, nationwide partnerships with government, industry and other scientific organisations on water information matters. These partnerships have brought Australia's best water experts and key water managers together, enhancing the coherence and professionalism of Australia's water sector.

In this report we highlight the progress we have made over the first three years. The foundations we have laid are solid and will support the rapid roll out of new water information products and services in the future.

Dr Rob Vertessy



Dr Rob Vertessy, Deputy Director
(Climate and Water) Bureau of Meteorology

Improving water information

A severe drought that has seen several major stored water supplies dwindle to historically low levels. Escalating demand for water in our cities, due to a rapidly growing population; climate change effects on southern Australia, making it warmer and drier; over-allocation of water resources in Australia's food-bowl, the Murray-Darling Basin; declining health of our precious riverine environments. All of these factors are driving the need for national water reform in Australia. Recent wet conditions following on from our worst recorded period of drought, further highlight the need to understand the effects of climate variability.

Australia is responding to the water security challenge in several ways. Investment is occurring in new urban water supply sources, in rural water delivery systems and in on-farm water efficiency measures. The rules governing water pricing and water trading are being reformed to ensure that we properly value water and derive the most economic value from it. Sustainable diversion limits are being set to ensure that the amount of water extracted from rivers and aquifers is environmentally sustainable. Water is being purchased on the water market for allocation to the environment.

Under the *Water for the Future* initiative, the Australian Government is investing \$12.9 billion in these reforms over ten years. State governments and water utilities around the nation are also making significant complementary investments and interventions.

The framing policies and business cases for such important reforms all require a sound base of water information. Fully understanding the availability, condition and use of our water resources and how these change over time, enables effective design and adaptive improvement of such reforms.

A new role for the Bureau of Meteorology

In recognition of this need, the Australian Government has assigned the Bureau of Meteorology, Australia's weather and climate agency for the last century, national responsibility for collecting and disseminating water information. Under the *Water for the Future* initiative the Bureau has been allocated funding of \$450 million over ten years to revolutionise the way we measure, account for, report, forecast and analyse water information. A legislative mandate for the Bureau's new role in water information is provided by the *Water Act 2007*.



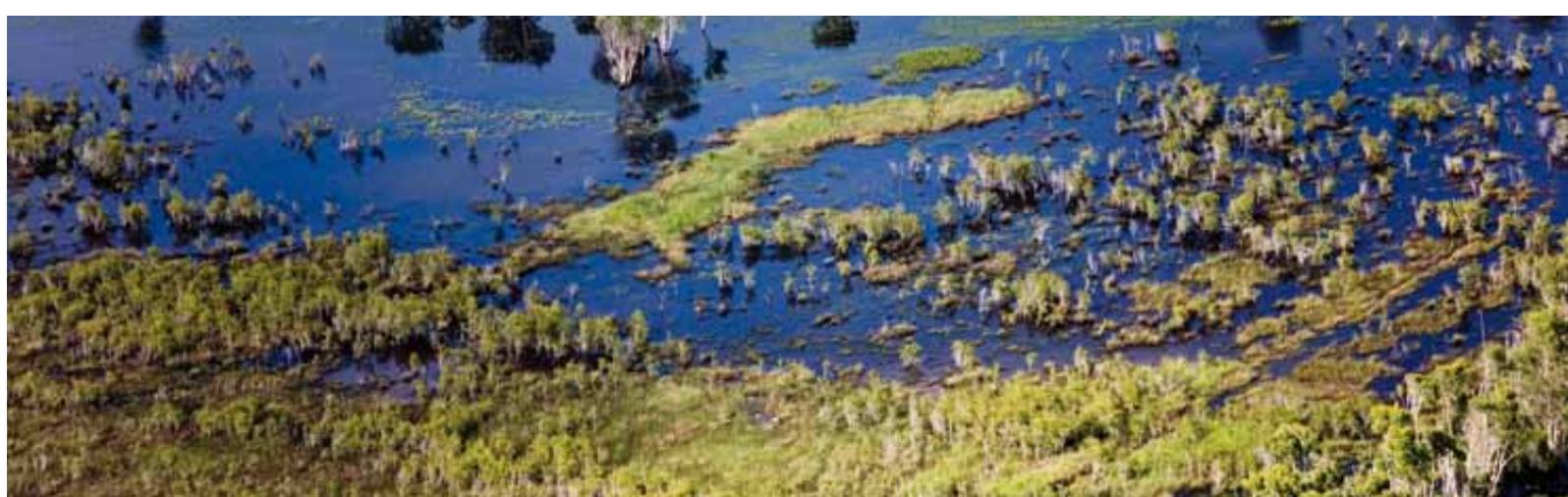
Gold Coast Desalination Plant, photograph from WaterSecure.

"The Australian Government is investing in the *Improving Water Information Program* to ensure that water policies and management actions of the future are founded on a strong evidence base."

DR JAMES HORNE, DEPUTY SECRETARY, DEPARTMENT OF SUSTAINABILITY, ENVIRONMENT, WATER, POPULATION AND COMMUNITIES.

Benefits expected to accrue from the *Improving Water Information Program* include:

- increased transparency of water information underpinning water policies and management decisions
- consistent national information to benchmark the performance of managed water systems
- public disclosure of water entitlements, allocations, trades and use, improving the performance of water markets
- improved water availability forecasts, leading to greater certainty in water resources planning
- improved flood estimation, enabling safer and more cost efficient infrastructure design
- improved community understanding of water resources management.



Halifax Bay wetlands in North Queensland receiving environmental flow, photograph courtesy of EPA Qld.

Program objectives

The Bureau's *Improving Water Information* Program began in July 2007 as a ten-year effort. Initiating the program has entailed recruitment and training of 130 specialist staff, the procurement and commissioning of IT hardware, establishing new offices, and building productive stakeholder relationships. Having established strong foundations, our effort has now turned to building new water information systems, harmonising diverse data sets and analysing them for hydrologic insights.

The *Improving Water Information* Program has ten objectives:

1. Establish enduring national water data sharing and licensing arrangements.
2. Develop and disseminate national water information standards.
3. Build and maintain the Australian Water Resources Information System (AWRIS) to underpin all of the Bureau's water information products and services.
4. Collate, standardise and archive water data gathered by over 200 organisations named in the schedules in the Water Regulations 2008.
5. Support water data collecting organisations to improve the coverage, currency and accuracy of water data collected around Australia and to enable its ready transmission to the Bureau.
6. Provide the Australian public with free online access to reliable water information that is readily understood.
7. Analyse trends in water availability and quality across the nation, and convey this information to the public via Australian Water Resources Assessments.
8. Publicly disclose water entitlements, allocations, trades and take for all major urban and rural water supply systems in an annual National Water Account.
9. Provide effective and reliable streamflow forecasting services for high priority water supply systems.
10. Enhance the science and technology base of the Bureau's water information products and services by supporting strategic research and development.



Left: Goongong Reservoir, ACT **Middle:** Bureau of Meteorology Regional Hydrology Manager, Nigel Mules and Nerida Beard, Community Water Planning Project Manager for Power Water, check a production bore for the town of Yuelamu, NT **Right:** Darling River at Pooncarrie, NSW.

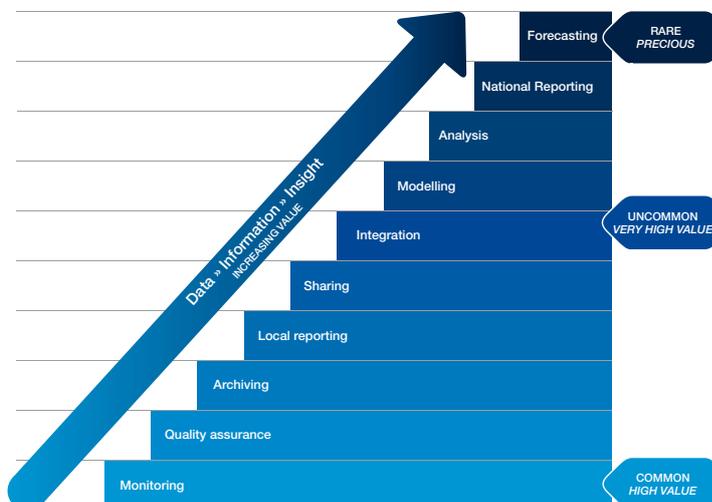
“The open sharing of water data, transparency in water planning arrangements and systematic water accounting are key objectives of the National Water Initiative.”

MR KEN MATTHEWS, FORMER CHAIRMAN AND CHIEF EXECUTIVE, NATIONAL WATER COMMISSION.

Water information questions

The water information products and services being developed by the Bureau will have national reach and will be readily available to the public, free of charge. They will enable answers to the following questions for any part of Australia:

- How much water is available today, and how does that compare with the past?
- Who is entitled to use water, how much can they use and under what constraints?
- How much water is being traded and at what price?
- How much water is being allocated to the environment?
- How is the rate and pattern of water use changing?
- How is the quantity and quality of water in our rivers and aquifers changing?
- How much water is being lost to evaporation and leakage?
- What are the hydrologic impacts of land management changes and climate change?



Left: The Water information value ladder **Right:** Irrigation boom near Alice Springs, NT.

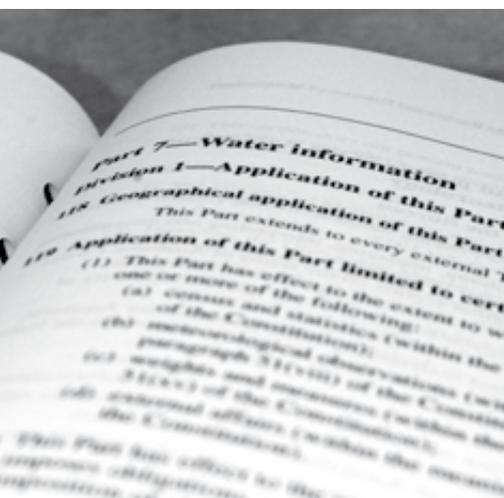
1. Sharing data

Objective: Establish enduring national water data sharing and licensing arrangements

About this objective: For a national water information service to succeed it is vital to first establish national data sharing and licensing arrangements. With more than 200 organisations collecting a piece of the national water information puzzle, cooperation and collaboration is critical. For these to be robust and enduring, a national leader with a legislative mandate is required.

Achievements

1. The *Water Act 2007* came into effect in March 2008. Part 7 of the *Act* empowers the Bureau of Meteorology to collect and publish water information. This legislation ensures that water data will be shared freely as a public resource.
2. The Water Regulations 2008 came into effect in June 2008. They define who must give specified water information to the Bureau and the time and format in which it must be supplied. The Regulations individually name over 200 persons or organisations required to give the Bureau specified water information that is in their possession, custody or control.
3. We commissioned the *Regulations Online* website to assist water data providers to understand their responsibilities under the Regulations and to aid their interactions with the Bureau.
4. We secured the commitment of 182 out of 215 water data providers to apply the Creative Commons Attribution Australia Licence to the data sets they are supplying to the Bureau under the Water Regulations 2008. This has simplified licensing arrangements, reduced restrictions and significantly enhanced the utility value of the data.



Left: Water Act 2007, Part 7 Middle: Chris Leahy, Senior hydrologist, Melbourne Right: Regulations Online webpage.

“Prior to the Bureau taking on its new water information role it was hugely problematic to discover, access and utilise water data collected by many different organisations across Australia.”

MR WARWICK WATKINS, DIRECTOR GENERAL, DEPARTMENT OF LANDS, NSW.

The *Water Act 2007* and *Water Regulations 2008*

The *Water Act 2007*, which came into effect in March 2008, enables the Bureau to carry out new statutory functions including:

- issuing national water information standards
- collecting, standardising and publishing water information
- conducting regular national water resources assessments
- publishing an annual National Water Account
- providing regular water availability forecasts
- advising on matters relating to water information
- enhancing understanding of Australia's water resources.

The Bureau has authority to publish any water information it holds and will make information freely available online.

The *Water Regulations 2008*, which came into effect in June 2008, set out data supply obligations for water data collecting organisations. Water data providers identified in the Regulations include: lead water agencies, other Commonwealth or state government agencies, hydroelectricity generators, major storage owners and operators, rural and urban water utilities, catchment management authorities, and providers of data for flood forecasting and warning.

Creative Commons Attribution Licensing

To ensure flexible third party use of water information and protect data suppliers' copyright, the Bureau has encouraged organisations to use the Creative Commons Attribution Australia Licence (the 'Creative Commons Licence').

This licence gives the community permission to use water information issued by the Bureau without having to contact the data supplier, provided the original author is acknowledged and has adopted the licence. To date, 182 organisations —providing about 85 per cent of the nation's water data—have adopted the licence. By simplifying and liberalising the conditions under which this data can be used, its utility value has been greatly increased.

The Bureau is applying the Creative Commons Attribution Licence to all of the water information products we are releasing.



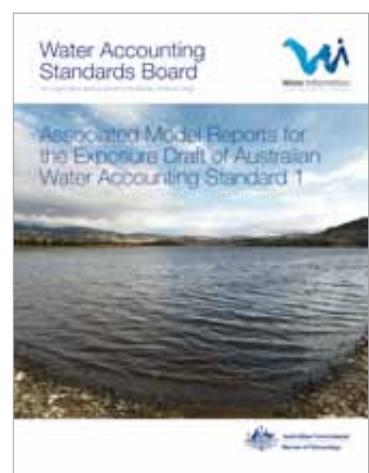
2. Setting standards

Objective: Develop and disseminate national water information standards

About this objective: Improving Australia's water information begins with standardising data collection and reporting regimes. The Bureau is working closely with water agencies, researchers and expert panels to develop a range of national standards that will harmonise water data collection, analysis and reporting across the nation. Under the *Water Act 2007*, the Director of Meteorology has the power to issue water information standards, including water accounting standards. To date, the standards developed by the Bureau have been disseminated on a voluntary-adoption basis.

Achievements

1. We developed the Water Data Transfer Format (WDTF) to provide a national standard for translating water data into a common format. Most large water agencies have adopted the standard, as have most vendors of water information system software used in Australia. Use of the WDTF is reducing the cost and enhancing the accuracy of water data sharing.
2. We published a standardised national set of terms and definitions for water entitlements, allocations and trades for use in the National Water Market System. For the first time, a nationally-consistent terminology is available to underpin reporting on water entitlements, allocations and trades.
3. We established the Water Accounting Standards Board to prepare national water accounting standards. The Board includes academics, senior water industry officials, and accounting practitioners, ensuring that the standards are both highly rigorous and practical to apply.
4. We published the Water Accounting Conceptual Framework for the Preparation and Presentation of General Water Accounting Reports and Preliminary Australian Water Accounting Standard. These documents guided the preparation of the Pilot National Water Account, published in December 2009.
5. We published the Exposure Draft of the Australian Water Accounting Standard 1 and Associated Model Reports. This standard is guiding the preparation of the first National Water Account, due for publication in April 2011.



Left: CSIRO researcher Dr David Lemon speaking at WDTF launch in Canberra **Middle:** Zarna Everett from Toowoomba Regional Council, transferring water data using a WDTF-based system **Right:** Exposure Draft of Australian Water Accounting Standard 1.

“The Bureau's work in creating new water information standards will have positive and lasting impacts on the Australian water sector.”

MR ROSS YOUNG, CHIEF EXECUTIVE, WATER SERVICES ASSOCIATION OF AUSTRALIA.

The Water Data Transfer Format (WDTF)

The Water Regulations 2008 require more than 200 water data collecting agencies across Australia to provide various types of information to the Bureau. Each of these organisations has developed ways of collecting and storing this data to meet their business needs. However, this meant that when the organisations began submitting the data required under the Regulations, the Bureau received millions of data files in formats that were often inconsistent and sometimes incompatible with our systems.

This problem has been addressed by developing the Water Data Transfer Format (WDTF). Released in April 2010, the first version of WDTF provides a standardised file format based on an Extensible Markup Language (XML) schema that is easily downloaded to AWRIS. Vendors of most water information systems in Australia have adopted this format in their software.

The Modernisation and Extension of Hydrologic Monitoring Systems Program (see page 18) has been used by 33 Australian organisations so far to embed the WDTF in their water information systems. Within two months of its release, around 30 per cent of data was being submitted to the Bureau in the new format. By mid-2011, the Bureau expects 85 per cent of data will be received in WDTF. WDTF is also now being considered for inclusion in an international standard.

The Australian Water Accounting Standard

Water accounts enable users to compare the nature and volumes of water assets and water liabilities of a water report entity, and changes in those water assets and water liabilities, over time. Water accounts are intended to be used for making and evaluating decisions about the allocation of water resources, and understanding and evaluating the accountability of managers, management groups or governing bodies of the water report entity and its water assets and water liabilities.

The recent publication of the *Exposure Draft of the Australian Water Accounting Standard 1* is a major milestone in the development of the new discipline of water accounting and will be adopted for the production of the first National Water Account. The approach blends accrual-accounting principles employed by financial accountants with water balance principles used by hydrologists.

The standard sets out procedures for quantifying water assets, water liabilities, net water assets, changes in water assets, and changes in water liabilities. It provides guidance on populating the various statements and note disclosures embedded within a water account.

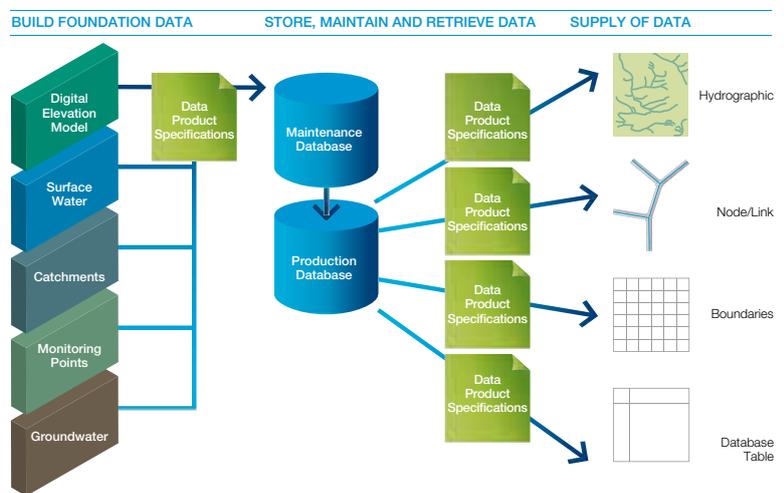
3. Building systems

Objective: Build and maintain the Australian Water Resources Information System (AWRIS) to underpin all of the Bureau's water information products and services.

About this objective: The Bureau is building the Australian Water Resources Information System (AWRIS) to receive, ingest and normalise water data gathered from around the nation, and to deliver a range of water information products and services.

Achievements

1. We completed Phase 1 of the AWRIS project, providing a basic water data ingest and storage capability, as well as reporting functionality on water storage and water market information. Through this project, a solid core has been established for delivery of a large number of future water information products.
2. We completed Phase 1 of the Australian Hydrological Geospatial Fabric (Geofabric), a Geographic Information System that codifies the spatial relationships between most of Australia's significant hydrological features such as rivers, lakes, dams, catchments, aquifers, supply channels and drains. For the first time, it is now possible to model the fluxes of water between these hydrological features on a national basis. The Geofabric data sets are available free of charge from the Bureau's website.
3. We commissioned new computing infrastructure at the Canberra Data Centre, dedicated to the needs of the *Improving Water Information Program*. This includes high performance servers and a large data storage system, providing a highly reliable and secure platform upon which to store and deliver Australia's water information.
4. We commissioned a large (6m x 2m) video wall in the Bureau's Canberra office, providing sophisticated visualisation capability for tracking and analysing hydrologic information being sent to us from around the nation. The facility is also being used for workshops and public events requiring high-end data visualisation. It will play an important part in helping us to communicate the power of water information.



Left: Video wall in the Bureau's Canberra office Right: Geofabric model.

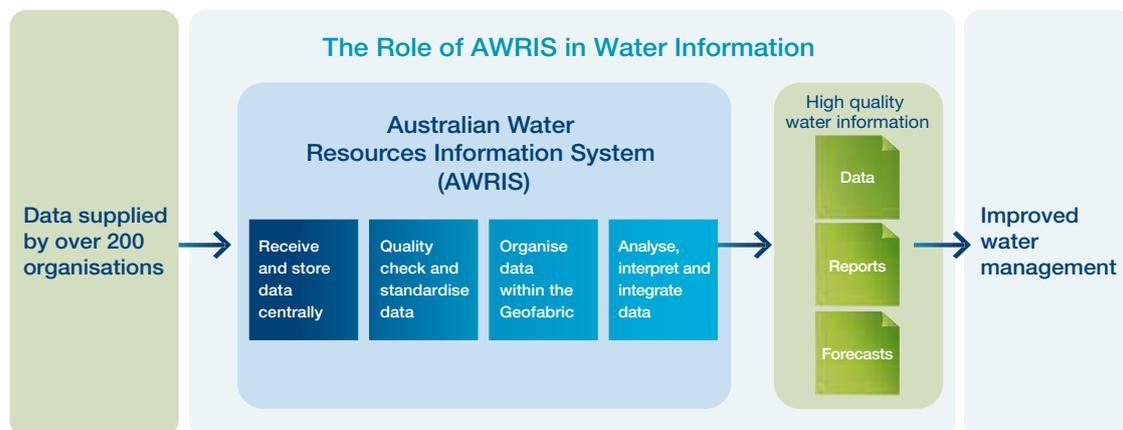
“In prosecuting its new water information mission, the Bureau is confronted with an immense technical challenge. Harmonising disparate data sets from across the nation and deriving useful insights from them will require a very powerful set of tools”

MR ROB FREEMAN, CHIEF EXECUTIVE OFFICER, MURRAY-DARLING BASIN AUTHORITY.

The Australian Water Resources Information System

The Australian Water Resources Information System (AWRIS) lies at the heart of the Bureau’s new water information mission. This new IT infrastructure will underpin most of our water information functions and its functionality will grow over the next few years.

AWRIS is first used to safely store incoming streams of water data from suppliers. It is then used to standardise and quality assure the records we are collating, and to make these accessible to the public via a data warehouse and to machines via web services. AWRIS provides online reports on the status of our water resources via ‘dashboards’, the first examples of which are Water Storage and Water Markets (see page 20). It is also used to provide the data needed to compile Water Resources Assessments and annual releases of the National Water Account, two important products now under development. Finally, AWRIS will include a range of hydrologic models to provide short-term, seasonal and long-term streamflow forecasts.



The Geofabric

The Australian Hydrological Geospatial Fabric (‘Geofabric’) is a Geographic Information System (GIS) that maps the spatial relationships between hydrological features such as rivers, lakes, dams, catchments, aquifers, water supply channels and drains.

When coupled to hydrologic observations and models in AWRIS, the Geofabric provides a basis for tracing the movement of water through the Australian landscape. By querying the Geofabric it is now possible to click on any point of any river reach in Australia and immediately determine the properties of the catchment upstream of that point.

Phase 1 of the Geofabric has been completed, and the Bureau now provides free public access to national coverages of elevation data, a network of connected streams and a nested hierarchy of catchment reporting units. Over the next few years, the Geofabric will be progressively refined using higher resolution spatial data as they become available.

The Geofabric is being developed by the Bureau in collaboration with CSIRO, Geoscience Australia and the Australian National University.

4. Data warehousing

Objective: Collate, standardise and archive water data gathered by over 200 organisations as per the schedules in the Water Regulations 2008.

About this objective: The *Water Act 2007* empowers the Bureau to collect water data from around the nation and to make this freely available to the public. For data to flow to the Bureau and out to the public, we must negotiate and monitor data supply agreements, develop data management procedures and assemble teams to curate the information we store.

Achievements

1. We have received over 8 million water data files from over 200 agencies across the nation, and receive over 10,000 new files per day. The data encompasses 75 variables across 10 categories of water information, including streamflow, groundwater, climate, water storages and water entitlements, allocations, trades and restrictions.
2. We have standardised a large volume of data relating to water storages, water entitlements, water allocations and water trades, and we now publish this information online. This is the first time that it has been possible to make valid intercomparisons of these data across agencies and jurisdictions.
3. We completed the nation's first inventory of all hydrologic monitoring undertaken across Australia, highlighting the existence of over 120,000 unique monitoring sites. For the first time it is possible to assess the value and adequacy of the nation's hydrologic monitoring systems. This inventory also provides a strategic basis for future investments in hydrologic monitoring infrastructure.
4. We completed a pilot study to test methods and procedures to revise Australia's design rainfall estimates. Current estimates used by Australian engineers only use data up to 1983. In 2012, the Bureau will publish new design rainfall estimates based on data from a much larger number of sites and include records up to 2004. This will result in safer, more reliable and more cost-effective engineering design.



Left: Bureau's servers at Canberra Data Centre **Middle:** ACT Regional Computing Manager Fiona Prentis, at the Canberra Data Centre **Right:** Christine Price, Data Provider Liaison Officer, Canberra.

“The Bureau’s data warehousing activities will yield enormous benefits once the data is made available for others to use.”

MR JOHN BARRETT, OFFICE OF THE CHIEF INFORMATION OFFICER, SOUTH AUSTRALIA

Standardising data relating to water entitlements, allocations and trades

When the Bureau began assembling Australia’s data on water entitlements, allocations and trades we were confronted by a thorny problem. Over the years, each state and territory has developed its own terminology and definitions for these important concepts, so it was not immediately possible to summarise the data across the nation.

To counter this problem, we undertook the Australian Water Information Dictionary (AWID) Project to develop a standard set of terms and definitions for this family of data. These definitions have now been incorporated into the National Water Markets System portal, operated by the Department of Sustainability, Environment, Water, Population and Communities. As a result, it is now far easier to conduct online searches of changes in ownership and trade of water entitlements and allocations.

Standardisation of water storage data

Australia has just over 500 publicly-owned water storages with a capacity of 1 GL or more, servicing a range of needs including potable water supply, irrigation, flood control and recreational activities. These important facilities are operated by over 40 different organisations, each using slightly different terms and definitions to describe their storages and how they operate.

For instance, in calculating ‘available water’, some operators include water held below the minimum supply level of the storage, whereas others do not. There are similar variations with respect to the inclusion of water held above the maximum supply level. Such differences have prohibited accurate comparisons to be made between water volumes stored in individual storages, as well as for regions, basins, states and the nation.

In building the Water Storage dashboard and iPhone application (see page 20), it was necessary to develop a common conceptual model for a water storage, based on a standard list of terms and definitions. Once this was developed, we were able to map data received from each storage owner, to this standard model. As a result, it is now possible to make valid comparisons of water held in all Australian public water storages.

5. Improving observations

Objective: Support water data collecting organisations to improve their hydrologic observing networks and information systems to enhance the quality of primary water information available to the Bureau.

About this objective: Under the Water Regulations 2008, more than 200 water data providers are required to provide specified water information to the Bureau. The Australian Government's \$80 million Modernisation and Extension of Hydrologic Monitoring Systems Program (M&E Program), administered by the Bureau, is equipping data providers with the resources they need to update their monitoring systems and improve data quality and delivery to the Bureau.

Achievements

1. We have allocated \$67.1 million of funding to 397 projects over four annual rounds of the M&E Program since 2007 (see Table below). Projects have received funding to modernise streamflow, groundwater and water storage monitoring networks and to improve the transfer of water data to the Bureau. These investments have arrested recent declines in the quality and coverage of hydrologic monitoring networks, and significantly enhanced data sharing.
2. We are receiving much more 'near real-time' information as result of the significant roll-out of telemetry systems supported by the M&E Program. Over 550 monitoring sites have been equipped with new telemetry systems. These investments are greatly enhancing the utility value of hydrologic data to water managers and the general public, lowering the cost of data acquisition and reducing the length of monitoring system outages.
3. The accuracy of Australian streamflow measurements has been greatly enhanced through the purchase of 145 Acoustic Doppler Current Profiling Meters across 25 projects supported by the M&E Program. Technology enables field crews to make many more measurements, with greater accuracy, under a wider range of flow conditions.
4. We funded Strategic Water Information Coordinators (SWICs) in each state and territory, to help us forge strategic relationships with data providers and enhance understanding of our water information activities. SWICs also play a pivotal role in guiding monitoring investments, and obtaining user feedback on the Bureau's water information products and services.
5. Strategic Water Information Management Plans (SWIMPs) are now available for each state and territory. These plans, prepared by SWICs, describe the current water information monitoring systems in each jurisdiction and highlight gaps and priorities for further investment. This is the first time that any state, let alone the nation, has had a holistic view of their monitoring systems.

M&E Program

Details of funding allocated in the first four years of the *Modernisation and Extension of Hydrological Monitoring Systems Program*.

Round	Year	Projects funded	Organisations funded	Total funding awarded (excl. GST)
1	2007 – 08	55	20	\$8,042,833
2	2008 – 09	132	51	\$19,454,231
3	2009 – 10	118	49	\$19,678,085
4	2010 – 11	92	36	\$19,883,000
Total		397		\$67,058,149

“The Modernisation and Extension of Hydrological Monitoring Systems Program has catalysed remarkable effort and collaboration amongst water data collecting agencies, leading to significant improvements in the coverage, currency and coverage of Australia’s water information”.

MR RAY BOYTON, MANAGER WATER MONITORING, NEW SOUTH WALES OFFICE OF WATER

Strategic Water Information Coordinators

Strategic Water Information Coordinators (SWICs) are funded by the Bureau’s M&E Program in each jurisdictional lead agency, excluding the ACT. SWICs have helped to quickly establish a positive identity for the Bureau’s *Improving Water Information* Program. As information brokers, SWICs provide a channel for two-way communication between the Bureau and stakeholders including government representatives, water organisations and catchment management authorities.

SWICs enable the Bureau to leverage existing relationship networks, harness regional and strategic knowledge, and improve communication with data providers. They assist data suppliers to understand their obligations under the Water Regulations 2008. They also respond to stakeholder queries and prepare annual Strategic Water Information Monitoring Plans (SWIMP) alerting the Bureau to state-specific, water monitoring needs. SWIMPs can be viewed or downloaded at www.bom.gov.au/water/regulations/fundingProgram/swimps.shtml

Improving groundwater monitoring in the Northern Territory

Monitoring of remote groundwater supplies in Australia’s dry centre and northern dry tropics is critical to managing water quality, and the livelihoods of the communities that depend on them. Vital groundwater monitoring equipment has now been upgraded at 34 remote Indigenous communities across the Northern Territory.

Data collected from these monitoring facilities is enabling more informed decisions to be made about the sustainable management of the resource and opportunities for wider use for the benefit of the community. Better monitoring will also enhance the study groundwater characteristics in aquifers and to gain a better understanding of the way they respond to climate variations.



Left: Strategic Water Information Coordinators at the Bureau’s Canberra office. Front: Sabine Schreiber, Victoria; Donna Beattie, Queensland; Pauline Farrell, WA; David Thorp, Tasmania. Rear: David Malone, NSW; Linton Johnson, Bureau of Meteorology; John Barrett, SA; John Cameron, Victoria.
Right: Anthony Juttner, Essential Services Officer for Yuendumu, NT, explains the operation of SCADA telemetry equipment installed in the Eclipse borefield to Nerida Beard of Power and Water Corporation and Nigel Mules, NT Regional Hydrology Manager, Bureau of Meteorology.

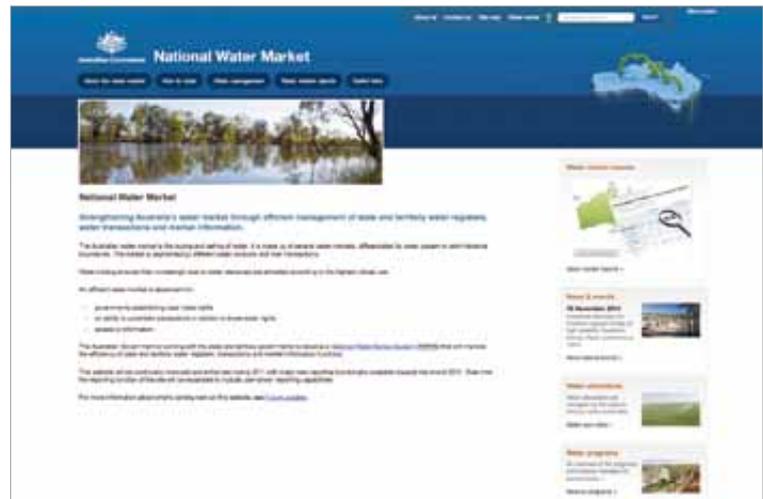
6. Publishing information

Objective: Provide the Australian public with free online access to reliable water information that is readily understood.

About this objective: The Bureau is striving to make most of Australia's water information freely and publicly accessible, and to package it in a way that maximises its utility value. This will not only assist water managers and policy makers do their jobs better. It will also help to satisfy the needs of water-dependent businesses, farmers, industry, educators and the general community.

Achievements

1. We released the Water Storage dashboard on the Bureau's website, providing daily updated water storage values for over 260 dams, representing over 94% of the nation's water storage capacity. The same information is also delivered to the National Water Commission website. It is now possible to rapidly scan the current status of, and trends in, water storage across the nation; a task that was hitherto impossible with many organisations reporting this data in different ways.
2. We released a free iPhone application providing access to water storage data. Within the first two months after release, the application had been downloaded by over 6500 users. Making this information readily available to mobile users will help to raise awareness of our water resources.
3. We released National Water Market Reports on the National Water Markets System (NWMS) portal operated by the Department of Sustainability, Environment, Water, Population and Communities. This new product will help to inform water markets by providing regularly updated online reports on water entitlements, allocations, trade volumes and trade prices. Improving this information should help to increase the equity of the Australian water market, valued at \$2.8bn in 2008-9.



Left: Water Storage iPhone app *Middle:* Parliamentary Secretary for Sustainability and Urban Water, Senator Don Farrell launching Water Storage at the Bureau's Canberra Office. Photograph by Malcolm Watson *Right:* National Water Markets System website.

“The recent publication of water storage and water markets information by the Bureau will do much to improve public understanding of water resources in Australia.”

MR MATT KENDALL, GENERAL MANAGER, SUSTAINABLE WATER MANAGEMENT GROUP,
NATIONAL WATER COMMISSION.

Publishing Water Storage information

For the first time, all Australians now have access to information about major water storages across the nation on a single website.

The Bureau of Meteorology’s Water Storage product allows the public to compare water storage levels and volumes for more than 260 publicly-owned lakes, reservoirs and weirs across the nation. The storages included on the site account for over 94% of the capacity of Australia’s public water storages.

Most of our storage information is less than two days old and is standardised so that sites and systems can be validly compared. It is now possible to determine how much water is available in storage in each state, capital city, drainage division and major water supply system. Users can also ascertain how the volume of water in storage has changed over the previous, year, month, week and day.

We plan to enhance Water Storage in the coming months with the addition of a number of small water storages and extended historical sequences of water storage data.

Publishing information on water entitlements, allocations and trades

The Bureau of Meteorology and the Department of Sustainability, Water, Environment, Population and Communities have worked collaboratively to develop National Water Markets Reports that are embedded in the Department’s National Water Markets portal.

The National Water Market Reports use data sourced from the Bureau’s Australian Water Resources Information System and collected under Category 6 of the Water Regulations 2008.

National Water Market Reports include Entitlements on Issue, Entitlement Trades and Allocation Trades. The reporting framework provides a common terminology and understanding across jurisdictions while maintaining the specific characteristics of water markets in different states and territories.

For the first time the Australian public can freely access current and historical consolidated water markets information via the internet and from a central point. Users can view that information at national, state and regional levels. Users can also access reports detailing water markets information noting the types of water products traded, which water resource type is traded, the volume of water traded and the number of trades conducted for a defined period. Reports also detail whether trades are interstate or intrastate.

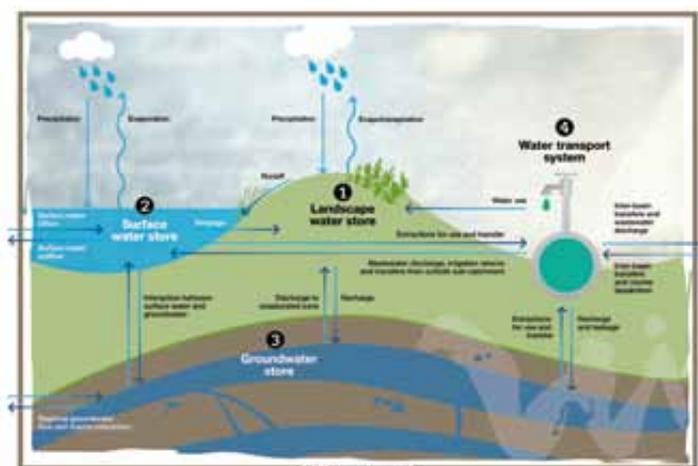
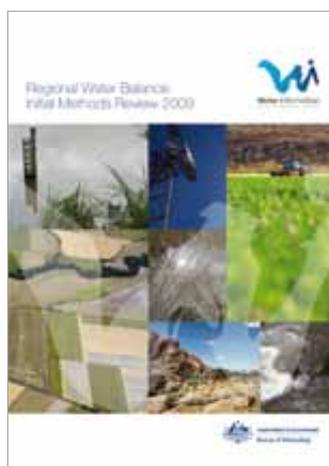
7. Assessing water resources

Objective: Analyse trends in water availability and quality across the nation and convey this information to the public via Australian Water Resources Assessments.

About this objective: Australian Water Resources Assessments will be periodically published by the Bureau to describe changes in the availability, condition and use of our nation's water resources. The assessments require detailed climatologic and hydrologic analyses to be undertaken on fourteen regions spanning the continent. The first assessment report will be published in June 2011 under the title Australian Water Resources Assessment 2010 (AWRA2010).

Achievements

1. We published *Regional Water Balance: Initial Methods Review 2009*, outlining options and recommendations for methods to be used to calculate water balance parameters for Australian Water Resources Assessments. This provides a rigorous, peer-reviewed basis for the hydrologic analyses we are conducting.
2. We piloted a range of water balance methods on several large rural and urban catchments around Australia to test their suitability for use in national-scale water accounting and water resources assessments. As a result, we now have confidence that the methods we are applying are fit for purpose.
3. We commissioned the first version of the Australian Water Resources Assessment model (AWRA-L). This system will be used to estimate a detailed water balance for the Australian continent for inclusion in the Australian Water Resources Assessments and National Water Accounts. AWRA-L plays a vital role in filling significant gaps in our national hydrologic observations.
4. We completed a pilot study of the methods and process to revise Australia's design rainfall estimates. The results of the study are informing a forthcoming revision of the engineers flood design guidelines *Australian Rainfall and Runoff*. These new estimates will lead to improvements in engineering design of new water infrastructure, yielding significant reliability, safety and economic benefits.



Left: Bonnie Pettett of Lower Murray-Darling CMA, measures phosphate levels in the River Murray at Buronga, New South Wales **Middle:** The *Regional Water Balance: Initial Methods Review 2009 (Methods Review)* **Right:** Conceptual diagram of subcatchment water balance framework.

“Good optics on the status of our water resources are critical if we are to use them efficiently and responsibly. Australian Water Resources Assessments will provide the public with such a view, and give us all greater insight into water availability, condition and use.”

MR CHRIS BENNETT, CHIEF EXECUTIVE OFFICER, IRRIGATION AUSTRALIA.

Australian Water Resources Assessment model

The Australian Water Resources Assessment model (AWRA-L) is being developed by CSIRO scientists engaged in the Water Information Research and Development Alliance (see page 28). Version 1 of AWRA-L was recently deployed in the Bureau and is now being used for hydrologic analyses underpinning Australian Water Resources Assessments and National Water Accounts.

AWRA-L is a grid-based, distributed biophysical model that simulates most components of the catchment water balance. It will be applied to the entire Australian continent, initially at a grid resolution of 5km, to fill in the huge gaps in Australia's water balances due to the sparsity of our hydrologic monitoring systems. The model is applied 'retrospectively', meaning it is intended to simulate the past, not predict the future.

AWRA-L is constrained as much as possible to agree with independently gathered water balance observations and estimates, including ground-based hydrometric data and satellite observations.

Revising Australia's design rainfall estimates

Accurate estimates of the intensity/frequency/duration characteristics of rainfall are critical to the task of designing structures affected by flooding, such as gutters, culverts, drains and bridges. These estimates are also a critical input to hydrologic models used for the assessment of flood risk.

Current estimates of design rainfall published in the Australian engineers handbook *Australian Rainfall and Runoff* are based on data available up to 1983. Since then the availability of additional rainfall data has increased markedly and new techniques in frequency analysis have been developed. The Bureau is working with Engineers Australia to revise design rainfall estimates for the nation, using a much larger rainfall database and the latest analysis methods.

A pilot study of the revision process was completed in 2008, for a region spanning southeast Queensland and northeast New South Wales. The pilot study generated design rainfalls for standard durations of 1, 2, 3, 6, 12, 24, 48 and 72 hours and average recurrence intervals of 1, 2, 5, 10, 20, 50 and 100 years.

8. Accounting for water

Objective: Publicly disclose water entitlements, allocations, trades and take for all major urban and rural water supply systems in an annual National Water Account

About this objective: As competition for water resources intensifies, it is more important than ever to account for how water is distributed across Australia in a transparent and rigorous way. Water accounting is the systematic process of identifying, recognising, quantifying, reporting and assuring information about water, the rights or other claims to it, and the obligations against that water.

The *Water Act 2007* requires the Director of Meteorology to annually publish a National Water Account. This will inform water resources planning, water market activity, investment decisions, environmental management decisions and community dialogue. Over time, the National Water Account will create a deep knowledge base upon which to found policies and management decisions to enhance the security of water supply for all uses.

Achievements

1. We established the National Water Account Committee (NWAC) to oversee the preparation of the National Water Account (NWA). This ensures that senior government and industry stakeholders have an opportunity to influence the NWA and are well-informed about its contents prior to release.
2. We released the *Pilot National Water Account* for public comment. This account included demonstration water accounting reports for the Murray-Darling Basin, Onkaparinga, Murrumbidgee and Namoi-Peel catchments. The Pilot has enabled a great deal of stakeholder input to be gathered, leading to a positive impact on the design of the National Water Account.
3. We developed *NWA Online*, a web-based system for the publication of the National Water Account. This will make it relatively simple for stakeholders to navigate through the significant volume of data that will be included in the National Water Account.
4. We developed a suite of methods and tools to populate the line items of the National Water Account. These are now being used in the preparation of NWA2010.
5. We established work teams and collaborative partnerships with 33 organisations across eight water reporting entities to prepare the National Water Account 2010. Reports are being prepared for Brisbane, Sydney, Melbourne, Adelaide, Perth, the Murray-Darling Basin and the Ord River scheme. NWA2010 is scheduled for publication in April 2011. The reports to be included in NWA2010 will cover most of the significant water supply systems in Australia and greatly enhance the transparency and public understanding of the Australian water entitlement system.

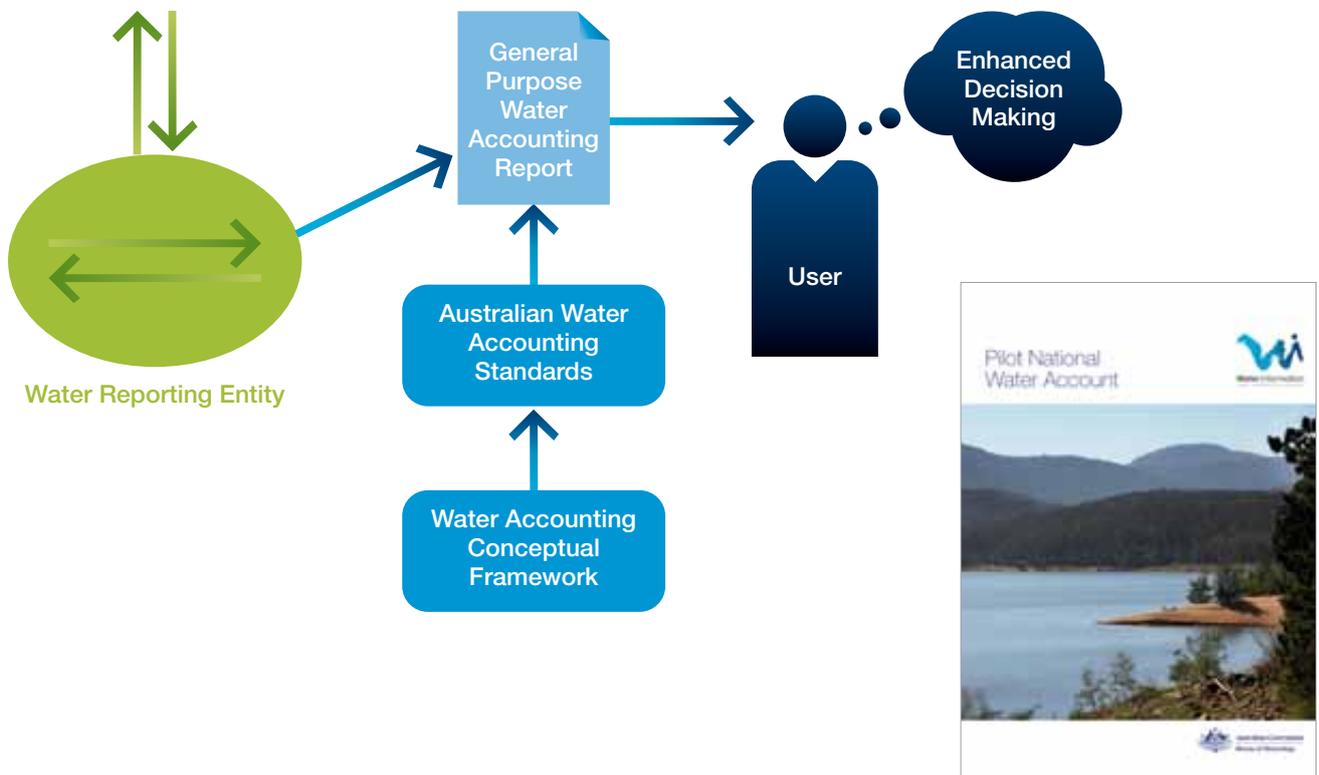
“Year on year, the National Water Account will provide the public with a coherent picture of how we are licensing, allocating, trading and using our valuable water resources.”

MR MIKE SMITH, CHAIR, AUSTRALIAN WATER ACCOUNTING STANDARDS BOARD.

The Pilot National Water Account

The Bureau released Australia’s Pilot National Water Account in December 2009. The Bureau worked closely with water utilities, government agencies and peak water bodies to prepare pilot sub-accounts for the Murray-Darling Basin, Onkaparinga catchment in South Australia, and the Murrumbidgee and Namoi catchments in New South Wales. This pilot project involved the first test of the *Preliminary Australian Water Accounting Standard* and a range of methods needed to populate water accounts.

Lessons from the Pilot National Water Account project and subsequent feedback from the National Water Account Committee and various potential end-users of water accounts, have been factored into the production process for the first National Water Account (NWA2010) to be published in April 2011.



Left: Delivery of General Purpose Water Accounting Report to a user
Right: Pilot National Water Account.

9. Forecasting flows

Objective: Provide effective and reliable streamflow forecasting services for high priority water supply systems.

About this objective: The protracted drought over many parts of Australia has increased demand for more timely and accurate water availability forecasts, prompting the Bureau to expand its services to include continuous short-term streamflow and seasonal streamflow forecasts. The Bureau's continuous, seasonal and short-term streamflow forecasting services are expected to have a major impact on Australian water policy development and practice. They will provide a much stronger and more timely information base for decisions about water allocations, cropping strategies, water demand, purchasing environmental water, water trading and drought management.

Achievements

1. We launched the Seasonal Streamflow Forecasting Service to predict inflows into major water supply systems three months in advance. The service provides forecasts for 21 sites in south-eastern Australia and will gradually be extended into other parts of Australia. This new information will aid river and reservoir operators and environmental water holders who need to plan operations for months ahead.
2. We piloted a Short-term Streamflow Forecasting System to predict river discharges over the next seven days. The system has been tested in the Ovens Valley, Victoria and will become operational in late 2011. This system has the potential to extend the lead times of flood warnings and to support the activities of river and reservoir managers.



Left: Burrinjuck Dam. Photograph by Tanya Jacobson **Middle:** Narendra Tuteja, Hydrologist and modelling expert at monitoring station on Murrumbidgee River at Halls Crossing **Right:** Jeff Perkins, supervising hydrologist, David Woodman, hydrologist and Peter Baddley, Regional Hydrology Manager working in the Queensland Flood Warning Centre.

“River and water storage managers will derive significant benefits from the Bureau’s new streamflow forecasting services.”

PROFESSOR RUSSELL MEIN, CHAIR, AUSTRALIAN WATER INFORMATION ADVISORY COUNCIL.

Short-term Water Information Forecasting Tool (SWIFT)

The Bureau is piloting a CSIRO-developed system to forecast streamflows up to seven days ahead for two locations in the Ovens River basin in Victoria. The system, referred to as the Short-term Water Information Forecasting Tool (SWIFT), is being trialled with water managers and is showing promising results.

Using rainfall forecasts from the Bureau’s new ACCESS (Australian Community Climate Earth-System Simulator) model, together with a range of conceptual rainfall-runoff models, SWIFT generates continuous short-term streamflow forecasts. The pilot study has demonstrated that SWIFT can provide useful, continuous flood and short-term streamflow forecasts with lead times of seven to ten days. Such forecasts have great utility value for river and reservoir managers, for irrigators and for the general public planning recreational activity on our waterways.

The system will be piloted at further locations during 2011 before it goes into operational service in late 2011.

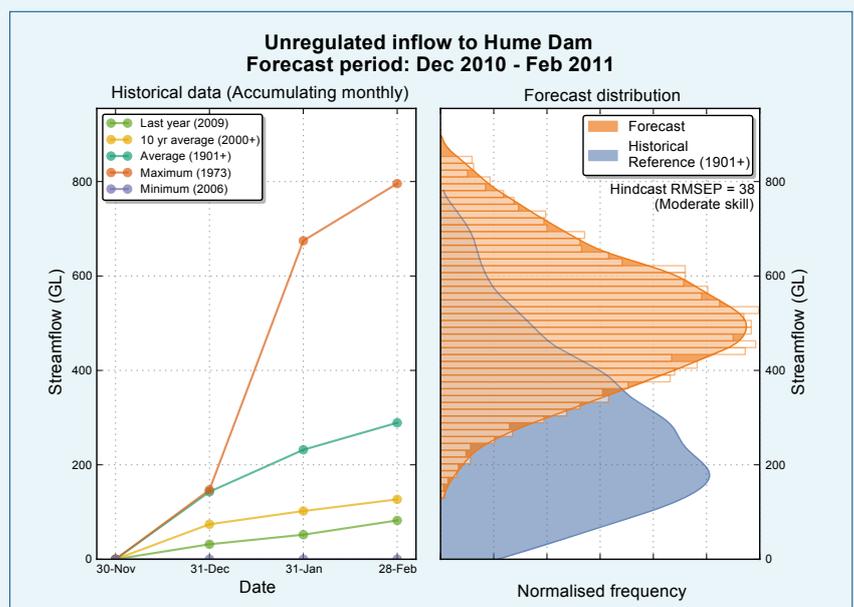
Seasonal Streamflow Forecasting Service

After more than a year of testing with a community of over 20 users, the Bureau has released a new Seasonal Streamflow Forecasting Service to the public. The service provides forecasts of inflows into major water supply systems three months in advance. The forecasts are updated each month and give river and water storage operators unprecedented insight into what hydrologic conditions lie ahead.

The forecasts are expressed as a probability distribution of likely streamflows and are accompanied by rich information on historical flow sequences and the reliability of the forecasts. Forecast skill varies from site to site and through the year, though for most of the time the skill of the forecasts is adequate to reliably support their decision-making.

The new service arises out of research undertaken by CSIRO as part of the Water Information Research and Development Alliance (see page 28).

Right: Unregulated inflow to Hume Dam
December 2010 to February 2011



10. Research and development

Objective: Enhance the science and technology base of the Bureau's water information products and services by supporting strategic research and development.

About this objective: The Bureau invests in research and development to ensure that its new water information role is supported by the best available science and technology. We invest primarily through our water information joint venture with CSIRO, the Water Information Research and Development Alliance (WIRADA). Other important collaborations include the eWater Cooperative Research Centre, the Centre for Australian Weather and Climate Research.

Achievements

1. WIRADA scientists developed the Water Data Transfer Format (WDTF), which has since been promulgated by the Bureau as a national standard for the sharing of water data. This has greatly improved our ability to ingest the large volumes of data we receive from around the nation.
2. WIRADA scientists developed a prototype Seasonal Streamflow Forecasting System that has since been put into operational service by the Bureau.
3. WIRADA scientists developed a prototype system that can generate a continental 5km daily rainfall grid in near-real time using a blend of rain-gauge and satellite rainfall data. The system is now being tested in the Bureau. When operationalised, it will greatly enhance the accuracy and currency of spatial rainfall estimates, leading to better hydrologic forecasts.
4. WIRADA scientists developed the underpinning conceptual information model for the Australian Hydrological Geospatial Fabric (Geofabric), which has since been put into operational service by the Bureau. This will make it far easier to maintain and evolve the Geofabric as higher-resolution spatial data becomes available.
5. WIRADA scientists developed a high-resolution (30m grid) Digital Elevation Model for Australia. This has been delivered to the Bureau for inclusion in a future release of the Australian Hydrological Geospatial Fabric. This new product will describe the shape of Australia's terrain and drainage networks far more accurately than the current 250m grid product.
6. WIRADA scientists developed a prototype continental-scale daily water balance model known as the Australian Water Resources Assessment model (AWRA-L). This is now undergoing testing within the Bureau.

“CSIRO is proud to be working with the Bureau to create cutting-edge solutions to practical water information needs.”

WARWICK MCDONALD, DIRECTOR, WATER INFORMATION RESEARCH AND DEVELOPMENT ALLIANCE.

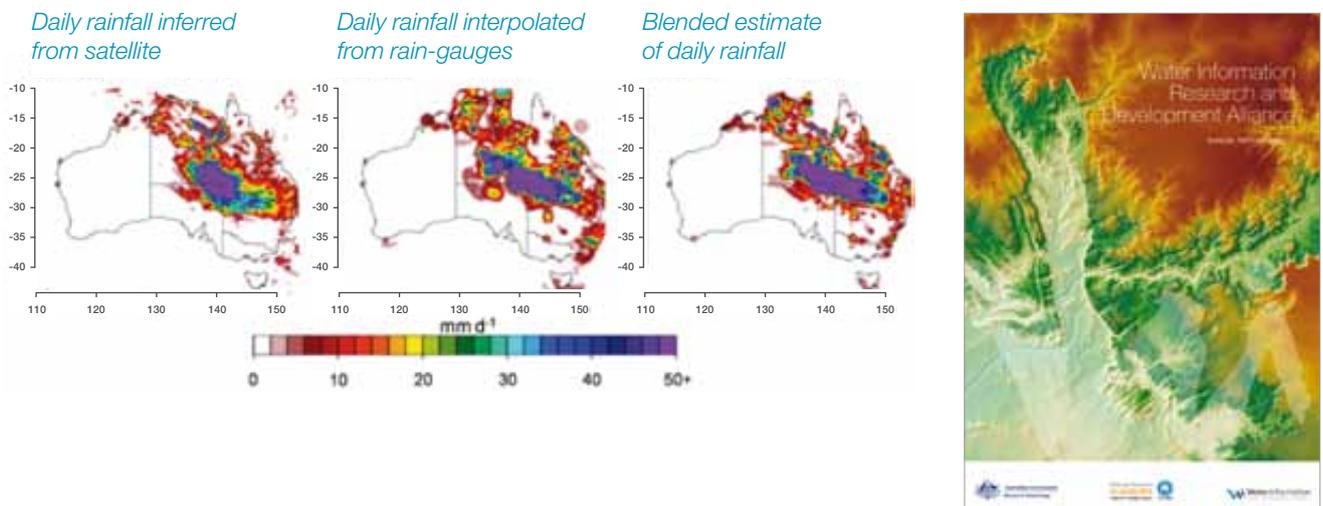
The Water Information Research and Development Alliance (WIRADA)

WIRADA brings together CSIRO’s research and development expertise in water and information sciences and the Bureau of Meteorology’s operational role in hydrological analysis and prediction to transform the way Australia manages its water resources.

Over the five years from 2008 to 2013, WIRADA will deliver most of the scientific and research innovation required by the Bureau to fulfill its national water information mandate.

The Bureau and CSIRO are together investing \$50 million over five years to support R&D by 40 leading CSIRO researchers on hydrologic modelling, water accounting, water resources assessment and data compatibility.

WIRADA is governed by a Management Committee consisting of senior Bureau and CSIRO officers, and is managed by the WIRADA Director, Mr Warwick McDonald. In 2009-10, the WIRADA R&D portfolio consisted of 11 projects with a total annual budget of \$11.3 million.



Above: Near real-time continental daily rainfall estimates for 1 March 2010. From left to right: daily accumulation from a NASA multi-satellite rainfall product (3B42RT); ground-based rain-gauge only analysis of daily rainfall from the Australia Water Availability Project (AWAP); and blended gauge and satellite rainfall estimate. The figure shows the rain front that led to widespread flooding in southern Queensland and northern New South Wales. **Right:** WIRADA Annual Report 2009–10.

Stakeholder consultation

Australian Water Information Advisory Committee (AWIAC)

AWIAC provides strategic advice to the Bureau on the emerging water information needs of government and industry. It guides our water information activities to maximise their contribution to the water reform objectives set out under the National Water Initiative. Members of AWIAC provide high-level advocacy for national reform in water information management.

The current members of AWIAC are:

- **Professor Russell Mein** (Chair)
- **Dr James Horne**, Deputy Secretary, Department of Sustainability, Environment, Water, Population and Communities
- **Mr Ken Matthews**, former Chief Executive Officer, National Water Commission
- **Mr Rob Freeman**, Chief Executive, Murray-Darling Basin Authority
- **Mr Warwick Watkins**, Director General, Department of Lands, New South Wales
- **Mr Ross Young**, Executive Director, Water Services Association of Australia
- **Mr Chris Bennett**, Chief Executive Officer, Irrigation Australia

To date, six meetings of AWIAC have been held:

- AWIAC-1 25 February 2008
- AWIAC-2 28 November 2008
- AWIAC-3 5 May 2009
- AWIAC-4 28 August 2009
- AWIAC-5 16 February 2010
- AWIAC 23 April 2010 (special meeting)

Jurisdictional Reference Group on Water Information (JRGWI)

JRGWI is the primary vehicle for coordinating the Bureau's water information activities with those of the states and territories. Comprising representatives from the lead water agencies in each state and territory, JRGWI provides a forum for members to articulate water information priorities in their jurisdictions and provide feedback to the Bureau on its various water information products and services.

The current members of JRGWI are:

- **Adrian Spall**, Department of Sustainability and Environment, Vic.
- **Bruce Rhodes**, Melbourne Water, Vic.
- **Diana Leeder**, Department of Natural Resources, Environment, The Arts and Sport, NT
- **Stewart Chapman**, Department of the Environment, Climate Change, Energy and Water, ACT
- **Greg Carson**, Hydro Tasmania, Tas.
- **Dr Martin Read**, Department of Primary Industries, Parks, Water and Environment, Tas.
- **Greg Long**, Department of Environment and Resource Management, Qld
- **Dr Mike Minter**, Sunwater, Qld
- **Tim Goodes**, Department for Water, SA
- **John Barrett**, Office of the Chief Information Officer, SA
- **Tino Galati**, Water Corporation, WA
- **Liz Western**, Department of Water, WA
- **Paul Pendlebury**, Office of Water, NSW
- **Ray Boyton**, Office of Water, NSW
- **Fraser MacLeod**, Murray-Darling Basin Authority
- **Lawrence Lingam**, Murray-Darling Basin Authority

“Reform of Australia's water information must be a team effort as many actors are involved. The Bureau is to be commended for spearheading unprecedented coordination and collaboration amongst the nation's water information groups.”

MR ADRIAN SPALL, DIRECTOR, WATER INFORMATION MANAGEMENT, OFFICE OF WATER,
DEPARTMENT OF SUSTAINABILITY AND ENVIRONMENT, VIC.

To date, ten two-day meetings of JRGWI have been held:

- JRGWI-1 30 January – 1 February 2008
- JRGWI-2 22-23 May 2008
- JRGWI-3 6-7 August 2008
- JRGWI-4 12-13 November 2008
- JRGWI-5 12-13 March 2009
- JRGWI-6 23-24 July 2009
- JRGWI-7 22-23 October 2009
- JRGWI-8 25-26 March 2010
- JRGWI-9 22-23 July 2010
- JRGWI-10 28-29 October 2010

Commonwealth Inter-Departmental Committee on Water Information (IDC-WI)

The IDC-WI enables Australian Government agencies to understand and influence the Bureau's water information role. It enhances cooperation and efficiency at the Commonwealth level by deepening members' understanding of each other's water information needs. The IDC-WI also enables members to discuss ways to streamline water information requests to the States via the Bureau.

Current members of the IDC-WI are:

- **Matt Kendall**, National Water Commission
- **Peter Gooday**, ABARE-BRS
- **Helen Forde**, Department of Sustainability, Environment, Water, Population and Communities
- **Warwick McDonald**, CSIRO
- **Michele Barson**, Department of Agriculture, Fisheries and Forestry
- **Paul Williams**, Australian Bureau of Statistics
- **Ben Searle**, Office of Spatial Data Management

- **Greg Scott**, Geoscience Australia
- **Fraser MacLeod**, Murray-Darling Basin Authority
- **Gary Dolman**, Department of Infrastructure, Transport, Regional Development and Local Government
- **Anthony Swirepik**, Department of Climate Change and Energy Efficiency

To date, the IDC-WI has met four times:

- IDC-WI-1 6 March 2009
- IDC-WI-2 2 July 2009
- IDC-WI-3 19 March 2010
- IDC-WI-4 22 October 2010

National Water Account Committee (NWAC)

NWAC provides important stakeholder advice and collaboration on the development, implementation and production of the National Water Account. NWAC reviews all water accounting standards recommended by the Water Accounting Standards Board and advises the Bureau on their utility for the NWA production process.

The current members of the National Water Account Committee are:

- **Dr Louise Minty** (Chair), Bureau of Meteorology
- **Paul Williams**, Australian Bureau of Statistics
- **Russell James**, Department of Sustainability, Environment, Water, Population and Communities
- **Will Fargher**, National Water Commission
- **Chris Biesaga**, Murray-Darling Basin Authority
- **Peter Gee**, Water Services Association of Australia
- **Clarke Ballard**, Irrigation Australia
- **Graeme Milligan**, Department of Environment and Resource Management, Qld

STAKEHOLDER CONSULTATION

- **Lindsay Preece**, Department of Water, WA
- **David Nicholls**, Department of Primary Industries and Water, Tas.
- **Paul Pendlebury**, Office of Water, NSW
- **Stewart Chapman**, Department of the Environment, Climate Change, Energy and Water, ACT
- **Adrian Spall**, Office of Water, Vic.
- **Diana Leeder**, Department of Natural Resources, Environment, The Arts and Sport, NT
- **Tim Goodes**, Department for Water, SA

To date, the National Water Account Committee has met nine times:

- NWAC-1 15 April 2009
- NWAC-2 27 May 2009
- NWAC-3 29 July 2009
- NWAC-4 30 September 2009
- NWAC-5 12 November 2009
- NWAC-6 17 February 2010
- NWAC-7 12 May 2010
- NWAC-8 4 August 2010
- NWAC-9 10 November 2010

Strategic Water Information Coordinators (SWICs)

SWICs provide a focal point for communication between the Bureau and our many water data suppliers. SWICs provide water data suppliers with a 'way in' to the Bureau and can assist with questions about the Water Regulations 2008, data delivery and the Modernisation and Extension of Hydrologic Monitoring Systems Program. SWICs bring together water data suppliers in their jurisdictions to distil State/Territory priorities in water data collection. These priorities have now been documented by SWICs in a series of Strategic Water Information and Monitoring Plans (SWIMPs).

The current SWICs in each jurisdiction are:

- NSW **David Malone**, Office of Water
- Vic. **John Cameron**, Department of Sustainability and Environment
- Qld **Donna Beattie**, Department of Environment and Resource Management
- SA **John Barrett**, Office of the Chief Information Officer
- WA **Pauline Farrell**, Department of Water
- NT **Caroline Pendlebury**, Department of Natural Resources, Environment, the Arts and Sport
- Tas. **David Thorp**, Department of Primary Industries, Parks, Water and Environment
- ACT **Stewart Chapman**, Department of the Environment, Climate Change, Energy and Water

To date, the SWICs have met eight times:

- SWIC-1 6 August 2008
- SWIC-2 18 November 2008
- SWIC-3 11-12 March 2009
- SWIC-4 22-23 July 2009
- SWIC-5 21-22 October 2009
- SWIC-6 24-25 March 2010
- SWIC-7 21-22 July 2010
- SWIC-8 27-28 October 2010

Expert panels

The Bureau has formed and chaired three expert panels to advise us on technical and user requirements for various water information products of national significance.

Australian Water Information Dictionary

Members include Dr Louise Minty, Dr Grace Mitchell, Bruce Moore, Dr Q.J. Wang, Prof. Sam Lake, Neil Power, Grant Robinson, John Radcliffe, Blair Trewin.

Australian Hydrological Geospatial Fabric

Members include Tony Boston, Elizabeth McDonald, Dovey Dee, Darren Smith, Mathew Brooks, Phil Tickle, Maurits Van de Vlugt, Shane Crossman, Mike Hutchinson, Janet Stein, Anthony Brinkley, Adam Hender, Alan Forghani, Mike Maslen, Sarah Spackman, Greg Hoxley, Kim Lowell and Brett Miller.

Australian Water Data Transfer Format

Members include Jonathan Doig, Paul Sheahan, John Argus, Craig Walker, Ken Aitken, Peter Martin, Peter Heweston, Tony Boston, Dr David Lemon and Gavin Walker.

National workshops

The Bureau has run several workshops to bring together specialists from around Australia to discuss water information initiatives of national significance.

National Hydrographic Standards Workshop – 2-3 August 2007

The intent of this workshop was to brief water data specialists from around Australia on the Bureau's new water information role and to seek their input regarding data formatting and quality issues.

National Telemetry Workshop – 20-21 November 2007

This workshop discussed technical and strategic issues associated with water data telemetry and the possible development of a more national approach that might lead to improvements in the currency of water data.

Groundwater Data Information Workshop – 1-2 December 2008

This workshop brought together eminent hydrogeologists from around Australia to discuss technology solutions and user requirements for a national groundwater information system. This event was co-hosted by the Bureau, the National Water Commission and the National Working Group on Groundwater.

National Water Account Workshop – 9 December 2008

The intent of this workshop was to discuss the purpose and composition of the National Water Account to be developed by the Bureau. Jurisdictional experts shared their experiences in undertaking water accounting pilot projects around the nation.

National Technology Reference Group Workshop – 23 March 2010

The purpose of this workshop was to share knowledge regarding new technologies for water data capture and handling, and to identify opportunities for cross-jurisdiction collaborative projects that could be funded under the Modernisation and Extension of Hydrologic Monitoring Systems Program.

National Water Information Standards Workshop – 23 August 2010

This workshop sought to build consensus around purpose, priorities and process for development of national water information standards. Data specialists and end users of water information provided guidance to the Bureau on how to structure and phase its future standards activities.

National Workshop on Classification of Streamflow Datasets – 19 October 2010

The purpose of this workshop was to discuss criteria that could be used to classify, in terms of fitness for purpose, the large volume of streamflow data being collected by the Bureau. Workshop participants advised the Bureau how it could minimise inappropriate use of streamflow datasets.

Communication

Newsletters

We have produced 43 issues of our monthly internal water information newsletter, *Climate and Water Update*, and circulated this to around 200 recipients external to the Bureau. We have recently begun issuing a two-monthly water information newsletter, *EnGauge*, and are issuing this online to over 3000 external stakeholders.

Website

The Bureau maintains an active water information website at www.bom.gov.au/water. During the 2010 calendar this site was visited by over 211,000 unique visitors, resulting in close to 1.5 million page views.

National Water Information Seminar Series

We have twice visited each capital city – Darwin once only – to run half-day information sessions on the *Improving Water Information Program*. The National Water Information Seminar Series has enabled the Bureau to reach a large number of stakeholders, and to demonstrate how we are partnering with local water information groups. On each occasion, over 1100 stakeholders have attended these events.

Melbourne	21 November 2007	205	4 September 2009	219
Sydney	22 November 2007	133	24 September 2009	154
Adelaide	6 December 2007	194	13 October 2009	219
Canberra	7 December 2007	84	15 October 2009	126
Brisbane	14 December 2007	163	8 September 2009	137
Hobart	7 February 2008	146	22 September 2009	103
Perth	20 February 2008	180	10 November 2009	170
Darwin	14 February 2008	74	-	-
Total		1179		1128

Official product launches

To date, the Bureau has hosted four official launches of its new water information products and services.

The *Water Data Transfer Format* was launched by senior representatives of the Bureau of Meteorology and CSIRO, in Canberra on 25 March, 2010.

The *Australian Hydrological Geospatial Fabric* was officially launched at the *spatial@gov* Conference, in Canberra on 5 October, 2010 by Dr Greg Ayers, Director of the Bureau of Meteorology.

The *Water Storage website* was officially launched by Senator Don Farrell, Parliamentary Secretary for Sustainability and Urban Water, in Canberra on 21 October 2010.

The *Seasonal Streamflow Forecasting Service* was launched by senior representatives of the Bureau of Meteorology and CSIRO, in Canberra on 14 December 2010.

“The Bureau devotes considerable energy to communicating progress with the *Improving Water Information* Program. Stakeholders around the nation value this greatly.”

DR MARTIN READ, MANAGER, WATER ASSESSMENT, DEPARTMENT OF PRIMARY INDUSTRIES, PARKS, WATER AND ENVIRONMENT, TAS.

Conference participation

Sponsorship of, and active participation in, major national water conferences is an effective way for the Bureau to communicate its progress with the *Improving Water Information* Program. Significant events that we have targeted to date are listed below. At most of these we have submitted technical papers, staffed trade stands, and provided financial support via event sponsorship.

- *Water Down Under Conference 2008, 15–17 April 2008, Adelaide*
- *Irrigation Australia Conference, 20–22 May 2008, Melbourne*
- *Australian Hydrographers Association Conference, 20–22 August 2008, Canberra*
- *National Natural Resources Management Knowledge Conference – Changing landscapes, 14–16 April 2008, Melbourne*
- *ABARE Conference, 3–4 March 2009, Canberra*
- *Australian Water Association Conference OzWater 09, 16–18 March 2009, Melbourne*
- *Australian Water Association Conference OzWater 10, 8–10 March 2010, Brisbane*
- *Irrigation Australia Conference, 8–10 June 2010, Sydney*
- *Australian Hydrographers Association Conference, 20–22 October 2010, Perth*
- *National Groundwater Conference, 1–4 November 2010, Canberra*



Australian Government
Bureau of Meteorology

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