Australian Government
National Water Commission

Australian Water Resources 2005

A baseline assessment of water resources for the National Water Initiative

Level 2 Assessment

Australian Water Resources Information System: Executive Overview

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WRON

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A baseline assessment of water resources for the National Water Initiative
Level 2 Assessment

Australian Water Resources Information System: Executive Overview

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1 Introduction

This document gives an executive level overview of the Australian Water Resources Information System (AWRIS). Included are a description of what AWRIS is, why it is needed, who will use it and why certain architectural decisions have been made.

The document also briefly describes the relationship between AWRIS and the Australian Water Resources 2005 (AWR2005) website (www.water.gov.au)

1.1 Background

As a requirement of the Intergovernmental Agreement on a National Water Initiative (the NWI), and the National Water Commission Act 2004, the National Water Commission (the Commission) has developed a baseline assessment of water resources , known as Australian Water Resources 2005 (AWR2005).

The primary purpose of AWR2005 is to provide the Commission with a baseline understanding of a range of water management and resource issues against which future assessments can be compared, and the success of NWI reform processes can be measured.

AWR2005 addresses three headline parameters:

- Water Availability (How much water do we have? How much do we store? What are the variability factors? What are the connections between resources?).
- Water Quality/River and Wetland Health (What's the condition of our water resources? What are the key environmental assets for each system? Are our water systems healthy and able to sustain appropriate biodiversity?).
- Water Use (How much water is under entitlements/licences? How much is allocated? How much do we use? What types of water are used? For what purposes?).

A key deliverable of AWR2005 is the specification of a set of tools that will access information published through a distributed water data infrastructure to deliver future water resource assessments. This 'enduring asset' is to be known as the Australian Water Resources Information System (AWRIS) and will be one of the most important outputs of the project.

The development of this specification involved three key tasks:

Capture of User Requirements – an investigation into who might use AWRIS and the types of data and functionality these users might require or expect.

Design of a System Architecture – describing the proposed technical architecture for AWRIS and the associated enabling framework at the component level.

Development of an Investment and Implementation Plan – proposing a strategy for implementing AWRIS and the associated enabling framework along with suggested indicative funding requirements.

2 The Australian Water Resources Information System

2.1 AWRIS Vision

An important outcome of the development of the AWRIS specification was the definition of a vision for AWRIS. In order to be considered a success AWRIS should meet this vision:

> "AWRIS will provide a comprehensive, credible, open view of Australia's water resources data and information. It will allow users to review and investigate this data, understand the data in context, and bigger picture details about the data. AWRIS will help further (and add value to) the discussion about water."

AWRIS will be a set of tools that will access data published through a distributed data infrastructure to deliver, amongst other things, future water resource assessments.

2.2 AWRIS Outcomes

Key outcomes of AWRIS will be:

- Provision of on-going access to biophysical data (water availability, water use, and river and wetland health) and some management level information for Australian water management areas.
- Assessments such as AWR2005 able to be performed as a matter of routine. The availability of transparent water resources data, information and knowledge will facilitate improved decision making processes and build public trust and confidence in the overall process.
- Information gathered for AWR2005 and made available through AWRIS can be used in performance indicator and benchmarking assessments.
- Consistency at a national level in terminology, measurement and data collation. This will, in time facilitate:
    - an agreed national understanding of the current status at catchment/groundwater management unit level of ecological assets, flows, usage and management regulation and implementation;
    - a common hydrological and river health basis for informing debate about water availability, entitlements and usage and the occurrence/protection of environmental;
    - a step towards uniform national terminology on water measurement parameters;
    - clarification of critical geographic and knowledge gaps;
    - improved understanding of where further investment is required to deliver NWI outcomes, and;

- a basis and method by which some changes resulting from the NWI can be assessed.

2.3 AWRIS Tools and Architecture

The purpose of AWRIS is to provide tools to users that allow for access to information stored in a variety of distributed databases around the country. As a result of recent proposed changes to the management of water information in Australia, a key contributor will be the Bureau of Meteorology. However, many other organisations will continue to collect water information and may wish to contribute as well.

The tools and services provided by AWRIS to its users will include reporting, mapping, data visualisation, data download, data brokering and discovery tools. The tools to be provided are listed in Table 1.

Table 1: AWRIS Tools

Tool	Description
Reporting	Standard and customisable reports of available water resource information for selected areas, time periods, and subjects
Mapping tools	Standard and customisable maps
Data Visualisation	Graphs and figures that enable visual comparison between selected areas and time periods
Discovery	Ability to perform advanced searches for information about water
Future tools	Includes almanac (water resources facts and figures and other information compiled from common user requests),

Architecturally, AWRIS will consist of four distinct tiers of components. These are shown in Figure 1.

Key characteristics of this architecture are:

- **Service Oriented Architecture** – In order to provide real time access to distributed data sources, information will be accessed via web-services as the user requires.
- **Browser tools** (client tier) – Tools that enable the end-user to access data and information. Browser tools include searches and display mechanisms that help the end user.
- **Application tools** (application tier) - Server side tools components that are specific for the AWRIS toolset (mapping services, report tools etc).
- **Infrastructure** (enabling framework) – Infrastructure components that enable the upload and register of (meta-) data, or have metadata harvests and including spatially and temporally enabled catalogue of

registered services. This framework allows custodians of water information (data contributors) to make their data available for sharing via standards based web services.

- **Contributor tools** (contributor tier) – Services that allow those who are providing data and information to be able to do so.
- **AWRIS builds upon existing and ongoing projects** and initiatives, most notably the Water Resources Observation Network (WRON) and the Australian Water Data Infrastructure Project (AWDIP).
- **AWRIS will rely on strong governance** and **project management** to ensure that agreements and delivery expectations are met.

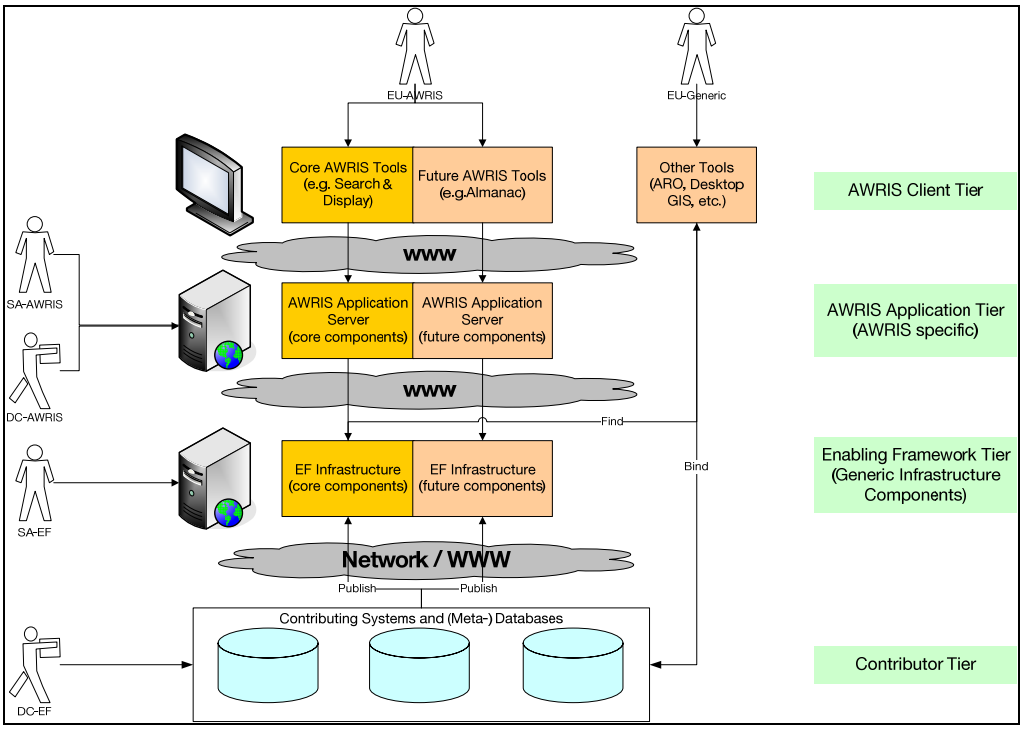

Figure 1. High Level AWRIS Architecture

3 Who will use AWRIS and why?

Extensive analysis was undertaken across Australia through interviews and workshops to identify who might use AWRIS, and what these users' expectations might be. An identified set of users are listed in Table 2 along with typical tasks that these users might perform with AWRIS.

Table 2: AWRIS User Groups

User group	Typical requirements that could be met through AWRIS
Policy and strategy analysts	Review, evaluation, assessment of policies, strategies. Identify the essential elements of a particular issue Provide evidence that justifies a specific position Inform members or senior staff
Program, Project and Resource Planners and Managers	Setting benchmarks and reporting criteria, status reports Identify data gaps and areas of priority for funding assistance Determine validity of creating the program or project, or using the resource.
Business Planners and Managers	Determine characteristics of water in specific areas Determine water access rights, trading Identify areas of business opportunities and risk Provide information and advice to customers
Advanced Researchers	Obtain data to input into models or conduct independent analysis Test a hypothesis Review data etc, prior to more sophisticated analysis Understand data availability, reliability, accuracy and currency. Identify and review research and water information related activities
Elementary Researchers	Understand the current Australian water management environment Obtain predefined information to answer specific questions Find more information on timely 'issues of the day' Quote facts and figures, obtain maps and diagrams that will improve the quality of assignments, media stories etc Help in setting the scene and providing introductory / contextual / preliminary information
'Public'	Answer to specific questions as they arise Similar tasks to elementary researchers

3.1.1 Critical Success Factors

At a higher level, a set of critical success factors for AWRIS were identified:

1) Provide **easier and faster discovery** of, **access** to and **sharing** of nationally consistent water resources data and information over time.
2) Provide greater **understanding** of the water resources data and information that is discovered.
3) Provide a **comprehensive, exhaustive and authoritative** system, which also indicates where the **gaps** exist.
4) Give users appropriate **context**, **help** them view and apply related information and **guidance through** the discovery process.
5) Be responsive, user centred, professional and beyond reproach.
6) **Coordinate and add value** to tools and systems that are already available or will be available.
7) Help facilitate **standard and coordinated approaches** to water resources data and information.
8) Be **'community' run**: not owned by any one group but contribution and responsibility of everyone in the industry – a **collaborative** effort – but with some protection.

3.1.2 Data Requirements

Data requirements for AWRIS have not been identified in detail at this stage of the development as these would be dependent on the functionality of the site and overall availability. However, as a guide the data that was required to undertake the AWR 2005 is likely to be a minimum requirement. The key data sets used for each of the AWR 2005 themes – water availability, water use and river and wetland health assessments – are listed in Appendix A. Included with this listing is guidance on the organisations from which these data were sourced, the format they were required in, the scale of coverage, whether the data was used directly, and whether the presentation of the data could be automated.

After the functionality of AWRIS is agreed it would be necessary to undertake as part of the initial work a data requirements assessment.

4 AWRIS and the AWR2005 Website

As part of AWR2005, a domain name and website have been created that provide a place on the internet from which to launch AWRIS. The current website for the AWR2005 project (www.water.gov.au) has been developed primarily to publish the reports and collated water resource data produced in the AWR2005.

The reports and other content provided on the site are, for the most part, static and relatively difficult to update as they were built generally from the written reports (MS Word Documents). A map navigation tool was built to identify and present information collected at the Water Management Area scale for each of the assessment themes.

Table 3 gives an indication of the differences in sophistication between the AWR2005 website and AWRIS.

Table 3: Comparison of AWRIS and AWR2005 website

Components	Tool		
	AWR 2005	AWRIS (Phase 1)	AWRIS (Future)
Client tier			
Static web content	✓	✓ +	✓ ++
Discovery (external, internal)	✓	✓ +	✓ ++
Static reports	✓	✓ +	✓ ++
Dynamic reports		✓	✓ ++
Mapping / spatial		✓	✓ ++
Data visualisation		✓	✓ ++
Data download		✓	✓ ++
Collaboration components			✓
Almanac			✓
Usage analysis			✓
Application tier		✓	✓ +
Enabling Framework tier		✓	✓ +
Contributor tier		✓	✓ +

Comparison between components of AWR2005 and AWRIS

It should be noted that the intent is that AWRIS users would still be able to obtain static reports and information about AWR2005. The key difference between AWR2005 and AWRIS is that the current website provides static web content, static web reports, and some discovery mechanisms only.

AWRIS will contain additional reports and content including future assessments, dynamically generated reports derived from a combination of datasets and models, and additional functionality. Furthermore, the information required to generate many of these reports will be accessed from the custodian of that information at the time the report is generated.

5 Implementing AWRIS

The AWRIS implementation plan outlines four distinct work plans for the implementation of AWRIS. The components are:

1) Project Foundation: Develop a business plan for implementation; establish an appropriate governance framework for implementation. Develop appropriate documentation.
2) Coordination. Engage an implementation coordinator for the coordinated (parallel) approach to developing the tool set and the framework. This could also include ongoing project management, stakeholder consultation, communication and change management.
3) Enabling Framework: Adopt a national approach to develop the 'national enabling framework' in a coordinated manner. Further solution development tasks and specifications.
4) Develop the AWRIS tool set (as defined above). Development of prototypes, solution development and specification, vendor and contractor selection and management, project management.

Implementation costs are estimated at approximately $7.1M and are broken down as follows:

- Establishment Cost (Governance, Implementation Coordination, etc) $1,800,000
- Enabling Framework Infrastructure Cost (AWRIS Component) $1,450,000
- AWRIS Tool Set Cost $1,850,000
- Data Contributor Cost (infrastructure and data collation) $2,000,000

It should be noted that the recent proposed changes in the management of water resources information in Australia may change the assumptions made when generating these figures.

6 Conclusions

The aim of AWR2005 was to collate as much relevant data as possible to provide a stocktake of Australia's water resources for 2004-05. The data collection process for the project highlighted that the jurisdictions describe and define water variables as well as collect and store water data in different ways. These inconsistencies made collation at a national scale a slow and sometimes tedious process.

Furthermore, whilst each water agency is often doing an effective job within their respective jurisdiction, it is not possible to easily gain a national perspective as there is no water resources data system that works effectively across state and territory borders. Developing such a system is vital and will inspire public trust and confidence in understanding and management of water resources.

A clear goal for all involved in water data management should be the development of both:

- real-time accessibility of all water data relevant to managing the resource at plot to basin scales
- an ability to summarise water data for a range of time steps, literally at the press of a button, based on each jurisdiction measuring and reporting along consistent and standardised lines.

Under such conditions, future Australian water resource assessments, most probably combined with an Australia-wide chart of water accounts, can be made available annually, with considerably less effort than occurred for AWR2005 and furthermore with a considerably higher degree of consistency.

AWR2005 has, as part of its examination of the data issues described above, developed user requirement specifications, a system architecture, and an implementation and investment plan for development of a tool capable of achieving these goals - AWRIS.

It is clear that the development of AWRIS will require significant investment at all levels of government in Australia. There is also need for further encouragement and support to government agencies to improve the quality, structure and access of datasets, in support of the development of AWRIS and to provide improved data access.

Glossary

ABS	Australian Bureau of Statistics
ANZLIC	Australian New Zealand Land Information Council http://www.anzlic.org.au/
API	Application Program Interface
Application	A program that performs a specific function directly for a user. Applications can make use of SDI.
Architecture	The organisational structure and operating environment of the SDI, including the relationships between its parts, and the principles and guidelines governing their design and evolution over time.
ASDD	Australian Spatial Data Directory http://asdd.ga.gov.au/asdd/
AWDIP	Australian Water Data Infrastructure Project
AWR2005	Australian Water Resources 2005
AWRIS	Australian Water Resource Information System
Binding	Specific syntax and parameter values used by a client to invoke a specific server operation
BOM	Bureau of Meteorology
BRS	Bureau of Rural Sciences
BWRA	Baseline Water Resources Assessment
Catalogue	A registry that, in the SDI context, is usually used to describe spatial data sets.
Client	A software component or an application that accesses a service. Clients may be categorised in three ways Thin clients where the client supports only human-interface code, such as a web browser or a minimal PDA or WiFi handset, and must also support non-proprietary standards. They typically lack long-term memory such as disk drives. Application code and data access both run remotely and are entirely dependent on an external network connection. Thick clients where the client supports all the human interface and application code, may support some or all data access code, and may support long-term data memory. Human interface code may be entirely customised and not conform to non-proprietary standards. May not even support human interfaces i.e. may be entirely automated remote processes. May operate at times without network connection. Chubby clients have capabilities somewhere on the spectrum between thick and thin clients i.e. may support some application and data code, and may store limited amounts of data. Will usually but not necessarily support human interfaces. May operate well for limited time without network connection.
CMA	Catchment Management Authority

Component	Software that packages the client or server implementation of a service and can provide the realisation of a set of interfaces. A component consists of software code (source, binary or executable) or other equivalents such as scripts or command files.
Conceptual Architecture	An overview of the services, data, technology and institutional environment of SDI. It describes, in general terms, both what the SDI will include and how it will operate.
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Custodian	The authoritative manager of an SDI resource, whether data set, service or component, who is responsible for the declaration of the policies regarding use and accounting for the resource.
Datastore	Any type of persistent storage for components and data. Content may be static or dynamic. May include database systems, file systems, structured text storage, XML repositories etc.
DMZ	Demilitarized Zone - A part of the network that is neither part of the internal network nor directly part of the Internet. Basically a network sitting between two networks.
EB-XML	Electronic Business using eXtensible Markup Language
ebRIM	EB-XML Registry Information Model
ESCAWRI	Executive Steering Committee for Australia's Water Resource Information
FGDC	Federal Geographic Data Committee (USA) http://www.fgdc.gov/
GA	Geoscience Australia (Australian Government) http://www.ga.gov.au/
Gazetteer	A dictionary of geographical names. May encompass locations, cultural and landscape features and may embody various naming conventions including official name, names in common usage, traditional and community-based names. Attributes of gazetteer entries may include geographic coordinates, extent and topology. May be implemented through Web Feature Service for SDI applications such as user interfaces.
GIS	Geographic Information System
GML	Geography Mark-up Language (OGC) http://www.opengis.org/docs/02-023r4.pdf
HTTP	HyperText Transfer Protocol
ISO	International Organisation for Standardisation http://www.iso.org/
LDAP	Lightweight Directory Access Protocol
Map	A pictorial representation or portrayal of geographic

	data.
Metadata Standard	Data will be documented according to the FGDC Content Standard for Digital Geospatial Metadata (CSDGM) and/or the ISO 19115.
NLWRA	National Land and Water Resources Audit
NRDD	Natural Resource Data Directory. NSW node of the ASDD. www.canri.nsw.gov.au/nrdd/
NRM	Natural Resource Management
NWC	National Water Commission
NWI	National Water Initiative
OASIS	Organisation for the Advancement of Structured Information Standards http://www.oasis-open.org/who/
OGC	Open Geospatial Consortium http://www.opengis.org/
PDF	Adobe Portable Document Format
Persistent Bindings	Persistent Bindings link a type of information resource (e.g. spatial data layer) to a display tool (e.g. web mapping application). They can be compared to filetype associations in e.g windows explorer.
Registry	A listing of the specific, individual services, components, datasets or other entities that comprise the SDI or are relevant to its users. Instance registries are used to identify, locate, and describe individual instances. Many registries refer to associated Type Libraries that record the allowed types within registry classes e.g. types of services, types of user authorities.
Resource	Data, services and components that are published and underlie the creation of all useful products. Resources are presented to the internet as Web Services.
Schema	A schema is an expression of the Type using a particular data modelling language. Types can be described as classification taxonomy for a set of schema definitions. The OGC application data modelling language is GML and each schema fragment corresponding to a given type is defined in GML.
SDI	Spatial Data Infrastructure
Server	(a) A software component that delivers a service. (b) A physical implementation of such a component that provides the realisation of its operations.
Service	A collection of operations, accessible through one or more interfaces, that allows a user to evoke behaviour of value to that user. A server delivers each service. A service may encapsulate many processes. A “service instance” is another name for a server (b).
Site	A location (e.g. URL) at which a system is accessed.
SKM	Sinclair Knight Merz
SLD	Styled Layer Descriptor
SOA	Service Oriented Architecture. A service-oriented

	architecture is a collection of services that communicate with each other. The services are self-contained and do not depend on the context or state of the other service. They work within distributed systems architecture.
SOAP	Simple Object Access Protocol (W3C) http://www.w3.org/TR/2000/NOTE-SOAP-20000508/
SSO	Single Sign On
Taxonomy	The science, laws, or principles of classification; systematics
Thesaurus	A list of synonyms a search engine can use to find matches for particular words if the words themselves don't appear in documents
W3C	World-Wide Web Consortium http://www.w3.org
Web Coverage Service (WCS)	Supports electronic interchange of geospatial data as "coverages" – that is, digital geospatial information representing space-varying phenomena. A WCS provides access to potentially detailed and rich sets of geospatial information, in forms that are useful for client-side rendering, multi-valued coverages and input into scientific models and other clients. The WCS may be compared to the OGC Web Map Service (WMS) and the OGC Web Feature Service (WFS); like them it allows clients to choose portions of a server's information holdings based on spatial constraints and other criteria. Unlike WMS (OGC document 01-068r3), which filters and portrays spatial data to return static maps (rendered as pictures by the server), the Web Coverage Service provides available data together with their detailed descriptions; allows complex queries against these data; and returns data with its original semantics (instead of pictures) which can be interpreted, extrapolated, etc. - and not just portrayed. Unlike WFS (OGC Document 02-058), which returns discrete geospatial features, the Web Coverage Service returns representations of space-varying phenomena that relate a spatio-temporal domain to a (possibly multidimensional) range of properties.
Web Feature Service (WFS)	Serves vector data (points, lines and polygons) to the web for use by applications on remote websites. Provides interfaces for describing data manipulation operations on geographic features using http as the distributed computing platform. A Web Feature Service request consists of a description of query or data transformation operations that are to be applied to one or more features. The request is generated on the client and is posted to a web feature server via http. The web feature server then reads and (in a sense) executes the request. The OGC Web Map Service (WMS) allows a client to overlay map images for display served from

	multiple Web Map Services on the Internet. In a similar fashion, the OGC Web Feature Service allows a client to retrieve geospatial data encoded in Geography Markup Language (GML) from multiple Web Feature Services
Web Map Service (WMS)	Produces maps of georeferenced data. A "map" is a visual representation of geodata; a map is not the data itself. These map views are rendered in a 2D pictorial format such as PNG, GIF or JPEG. The WMS specification thus enables the creation of a network of distributed Map Servers from which clients can build customised maps. A particular WMS provider in a distributed WMS network need only be the steward of its own data collection. This stands in contrast to vertically integrated web mapping sites that gather in one place all of the data to be made accessible by their own private interface.
Web Service	Application logic accessible across a network using standard Internet protocols. Web Services combine the best aspects of component-based development and the Web. Like components, Web Services represent functionality that can be easily reused without knowing how the service is implemented. Unlike current component technologies that are accessed via proprietary protocols, Web Services are accessed via ubiquitous Web protocols (e.g. http) using universally accepted data formats (e.g. XML).
WRON	Water Resources Observation Network.
WSDL	Web Services Description Language (W3C) http://www.w3.org/TR/wsdl
XML	Extensible Mark-up Language (W3C) http://www.w3.org/XML/

Data Description		Data source				Data Type					Current Capabilities of Data																					
						Category				Comments/Details	Data Form				Scale of Data Availability						Data Accessibility								AWRIS			
																							Automatically Derived		Manually Derived							
Water Balance Component	Water Balance sub-component	Commonwealth Dept. / Organisation	State/ Territory Dept./ Organisation	Regional Water Authorities including Urban Authorities	Other	Measured	Converted measurements	Estimated	Calculated / Modelled		excel	access	XML	other: provide details of form	National	Jurisdicational level	Regional level	SWMA	GMU	other - eg irrigation districts, site specific studies	Directly downloadable from AWDIP (or via links via AWDIP eg BOM website)	Directly available from a Telemetric Station	survey	meter readings	other: provide details of method	Does the data require screening (YES - all data requires screening!)	Does the data need to be analysed or assessed	readiness of current data for AWRIS - comments about major milestones / hurdles needed for this data to be AWRIS ready	Proposed delivery mechanism of this data item for AWRIS
Inflow to Surface Water	Rainfall to surface water runoff (this is inflow in reservoirs, rivers, channels excl. baseflow) (see note 1)	Y	Y						y	Water2010 model unless modelled by state / territory agency								y			y						y	y			
Inflow to Groundwater	Recharge to groundwater (excluding irrigation)	Y	Y						y	Water 2010 model or analysed / modelled datasets							y		y						y			y	y			
Outflow from Surface water	Evaporation from major storages			y		y	y			assessed from climatic data and measured water levels								y			y						y	y			
Outflow from Surface water	Evaporation from open water and wetlands (excluding major storages and minor catchment dams)	Y	Y						y	analysed / modelled								y		y	y						y	y			
Outflow from groundwater	Groundwater discharge to ET (does not include unsaturated zone usage by vegetation)	Y	Y						y	analysed / modelled										y							y	y			
Opening Balance	Major on-river reservoirs (includes dead storage volume)			y			y			measured levels converted to volumes with rating curves								y			y						y	y			
Opening Balance	On-stream minor and farm dams (unknown, record as zero - assume same at start and end of period)			y			y			measured levels converted to volumes with rating curves								y			y				GIS analysis, other statewide or regional assessments		y				
Opening Balance	Major off-river storages (includes dead storage volumes)			y			y			measured levels converted to volumes with rating curves							y		y	y	y						y	y			
Inflow to Surface Water	Discharge from Groundwater to Surface Water (baseflow) or seepage from streams to groundwater	Y	Y		site specific investigations				y	modelled or analysed data sets								y									y	y			
Inflow to Surface Water	Surface inflow from other entities			y			y			measured levels converted to volumes with rating curves											y						y	y			
Inflow to Surface Water	Urban treated effluent			y		y				monitored / measured volumes							y			y							y	y			
Inflow to Groundwater	Drainage to groundwater from irrigation		y	y	Irrigation Authorities	y	y		y	measured runoff and assessment leaving "unknown" as drainage to gw OR assessed as % of irrigation (accessions rates)							y			y							y	y			
Outflow from Surface water	Surface water extractions: urban diversions			y	Shires/ councils	y		y		metered / estimated from pump hours / estimated / surveyed							y			y							y	y			
Outflow from Surface water	Surface water extractions: irrigation diversions			y	Irrigation Authorities	y		y		metered / estimated from pump hours / estimated / surveyed							y	y		y				y			y	y			
Outflow from Surface water	Surface water extractions: private diversions			y				y		farm dam volume estimates / surveyed						y	y			y				y			y	y			
Outflow from groundwater	Groundwater extractions: Urban Diversions			y	Shires/ councils	y		y		metered / estimated from pump hours / estimated / surveyed							y			y				y			y	y			
Outflow from groundwater	Groundwater extractions - self extracted or stock and domestic use			y		y		y		metered / estimated from pump hours / estimated / surveyed							y			y				y			y	y			
Outflow from Surface water	Other surface flow out of entity			y		y		y		measured / estimated							y	y		y						modelled / analysed	y	y			
Outflow from Surface water	Minor catchment dams			y				y		farm dam volume estimates / surveyed							y	y		y						y	y	y			
Outflow from Surface water	Losses from minor catchment dams			y			y			estimated from measured levels and volumes							y	y		y						y	y	y			
Outflow from groundwater	Groundwater flows out of entity	y	y						y	modelled or analysed data sets							y		y	y						modelled / analysed	y	y			

All data to be provided in ascii format that can be used for analysis / assessment as required (eg models, excel, etc)

Currently no fields in the water balance would be directly assessed from data from AWRIS. They would be based on some information & data that AWRIS would provide, eg: BOM rainfall, streamflows, reservoir levels & volumes, etc. These datasets could be made available by direct links to websites where they exist. Other data sets would have to be requested from the relevant organisation via data request. Extensive analysis of this data and information would then be required to make sure the data was fit for purpose, to the correct scale and relevant to the question asked.

AWR 2005 - River and Wetland Health

Data Description	Data source					Data Type					Current Capabilities of Data																
											Data Form				Scale of Data Availability						Automatically Derived		Manually Derived			Data Accessibility			AWRIS	
						Category				Comments/Details																			
River and Wetland Health Assessment Component	Sub-component	Commonwealth Dept. / Organisation	State/ Territory Dept./ Organisation	Regional Water Authorities including Urban Authorities	Other	Measured	Converted measurements	Estimated	Calculated / Modelled		excel	access	XML	other: provide details of form	National	Jurisdictional level	Regional level	SWMA	GMU	other - eg irrigation districts, site specific stu	Directly downloadable from AWDIP (or via links via AWDIP eg BOM website)	Directly available from a Telemetric Station	survey	meter readings	other: provide details of method	Does the data require screening (YES - all data requires screening!)	Does the data need to be analysed or assessed	readiness of current data for AWRIS - comments about major milestones / hurdles needed for this data to be AWRIS ready	Proposed delivery mechanism of this data item for AWRIS
Framework Combined Score	Framework Component Index Scores		y						y	based on expert rules				shape file		y	y	y	n		n	n	n	n	n	y	y		
	Framework Component Sub-Index Scores																			reaches									
Hydrological Disturbance Index	Victorian ISC		y		DSE				y	site up to WMA	y					y	y	y		reaches	n	n	n	n	n	y	y		
	Tasmanian CFEV		y		DPIW				y	'link' up to WMA - Uses expert rules		y				y	y	y		reaches	n	n	n	n	n	y	y		
Water Quality index	Victorian ISC		y		DSE	y				Very poor actual coverage (few sites)	y					y	y	y		reaches	n	n	n	n	n	y	y		
Physical Form index	Victorian ISC		y		DSE	y				Very poor actual coverage (few sites)	y					y	y	y		reaches	n	n	n	n	n	y	y		
Catchment Disturbance Index	Infrastructure (Wild Rivers dataset)	y			NLWRA	y				Cartographic data: Presence/absence of different infrastructure features				Raster (250m)	y	y	y			reaches	n	n	n	n	n	y	y	Framework rules could be built as AWRIS tool for AWR2007. And assessment models used by states/territories could be built as AWRIS tools for dual function (ie jurisdictional use and as feed into framework)	
	Infrastructure (Wild Rivers dataset)	y			NLWRA	y				Satellite imagery: Vegetation cover and change				Raster (100m)	y	y	y			reaches	n	n	n	n	n	y	y		
	Land Use (Version 3)	y			NLWRA	y				Satellite imagery: Land use categories				Raster (50m)						reaches	n	n	n	n	n	y	y		
	Tasmanian CFEV		y		DPIW				y	'link' up to WMA		y				y	y	y		reaches	n	n	n	n	n	y	y		
Aquatic Biota Index	Tasmanian CFEV		y		DPIW				y	'link' up to WMA -Uses expert rules, subset used in Framework - macroinvertebrates measured and modelled, native and exotic fish		y				y	y	y		reaches	n	n	n	n	n	y	y		
	Victorian ISC		y		DSE	y				site up to WMA	y					y	y	y		reaches	n	n	n	n	n	y	y		
Fringing Zone Index	Tasmanian CFEV		y		DPIW				y	'link' up to WMA - NRIPV used in Framework		y				y	y	y		reaches	n	n	n	n	n	y	y		
	Victorian ISC		y		DSE	y				site up to WMA	y					y	y	y		reaches	n	n	n	n	n	y	y		

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Data Description		Data source		Data Type Category				Comments/Details	Current Capabilities of Data																				AWRIS	
									Data Form				Scale of Data Availability						Data Accessibility											
																			Automatically Derived		Manually Derived									
Water Use Component	Water Use sub-component	Commonwealth Dept. / Organisation	State/ Territory Dept./ Organisation	Measured	Converted measurements	Estimated	Calculated / Modelled		excel	access	XML	other	National	Jurisdictional level	Regional level	SWMA	GMU	other - provide details of scale	Directly downloadable from AWDIP	Directly available from a Telemetric Station	survey	meter readings	other: provide details of method	Does the data require screening	Does the data need to be analysed/ assessed	readiness of current data for AWRIS	Proposed delivery mechanism of this data item for AWRIS
Agricultural water use	• Self extracted • Distributed • Reuse • Area irrigated by pasture/crop • Other agricultural use	ABS Agriculture survey		Y			Y	National/state from survey measurements, SWMA modelled				ABS data set	Y	Y	Y	Y					Y				N	Y as the output (published) data, not the data which was used to generate the water use tables	Delivering data that was output in ABS water publication tables is a body of work that is currently unresourced. It is unknown how this data would be delivered to AWRIS. Regional water data is available on the ABS website in excel format. Delivering data that was input into ABS water publications would be a significant body of work involving issues like confidentiality, access agreements etc.
Water provider use, supply and discharge	• Self extracted • Distributed • Reuse • Discharge • Supply to customers (distributed and reuse) • Losses	ABS Water supplier survey		Y			Y	National/state from survey measurements, SWMA modelled				ABS data set	Y	Y	Y	Y					Y				N		
Mining water use	• Self extracted • Distributed • Reuse • Discharge • Supply to customers (distributed and reuse)	ABS Mining survey		Y			Y	National/state from survey measurements, SWMA modelled				ABS data set	Y	Y	Y	Y					Y				N		
Manufacturing water use	• Self extracted • Distributed • Reuse • Discharge • Supply to customers (distributed and reuse)	ABS Manufacturing survey		Y			Y	National/state from survey measurements, SWMA modelled				ABS data set	Y	Y	Y	Y					Y				N		
Electricity generators- water use	• Self extracted • Distributed • Reuse • Discharge • Instream • Supply to customers (distributed and reuse)	ABS Electricity generators survey		Y			Y	National/state from survey measurements, SWMA modelled				ABS data set	Y	Y	Y	Y					Y				N		
Service Industries water use	• Self extracted • Distributed	ABS Services Industries survey		Y			Y	National/state from survey measurements, SWMA modelled				ABS data set	Y	Y	Y	Y					Y				N		
Other Industries	• Self extracted • Distributed • Reuse	ABS Water supplier survey		Y			Y	National/state from survey measurements, SWMA modelled				ABS data set	Y	Y	Y	Y					Y				N		
Household water use	• Self extracted • Distributed • Reuse	ABS Water supplier survey		Y			Y	National/state from survey measurements, SWMA modelled				ABS data set	Y	Y	Y	Y					Y				N		
Water Access Entitlements, Allocation and Tradings	• Number and volume of water access entitlements • Number and volume of water allocations • Number and volume of water trades		State Government Departments • Dept. of Natural Resources, NSW • Dept. of Sustainability and Environment, Vic. • Dept. of Natural Resources and Water, Qld • Dept. of Water, Land and Biodiversity Conservation, SA • Dept. of Water, Western Australia • Dept. of Primary Industries and Water, Tas • Dept. of Natural Resources, Environment and Arts, NT • Environment ACT, ACT Irrigation authorities (e.g. Sunwater)	Y			Y	National, State, SWMA	Y				Y	Y	Y	Y						Request for data		N			
Water stocks	Large dam storage • Number • Capacity of dams • Volume in storage	ABS collection of dam storage	ANCOLD list of large dams	Y				National/state/drainage divisions	Y				Y	Y	Y	Y						ABS collection		N			
	Rainfall and run-off • Mean Annual Rainfall • Mean Annual Run-off	Bureau of Rural Sciences Australian Water Availability project		Y			Y	National/state	Y				Y	Y	Y	Y						Request for data		N	Unsure	n/a	
Water supplied, used, discharged, water origin.	• Provider type • Distributed & reuse • Environmental flows • Customer type • Quality • Quantity		State government departments • NSW Dept of Energy, Utilities and Sustainability 2004–05 NSW Water Supply and Sewerage Performance Monitoring Report • Vic. Dept of Sustainability and Environment 2004–05 State Water Report – A Statement of Victorian Water Resources • Vic. Water industry association 2004-05 Victorian Water review • Qld Dept of Natural Resources and Water 2004–05 Annual Reports and Financial Statements of Qld's Category 2 Water Authorities, 2004–05 Annual Water Statistics, and 2004–05 Urban Water Service Providers Qld Report • WA Economic Regulation Authority Licensed service provider statistics Water industry associations • Water Services Association Australia (WSAA) Facts 2005 Australian Urban Water Industry report • Australian National Committee on Irrigation and Drainage (ANCID) Australian Irrigation Water Benchmarking Report for 2004–05	Y			Y	Water supply areas				Publications					Water provider areas			Mandatory reporting				N	N	Data sets are generally in paper or pdf format.