Building a new national river modelling platform

– **Supporting Modelling Requirements in the MDB**

Peter Wallbrink

Hydrological Society Modelling Seminar

Adelaide, September 1, 2010

45 partners = 34 industry + 11 research

PUBLIC INDUSTRY

New South Wales Government
Department of Environment and Climate Change

New South Wales Government
Department of Water and Energy

Victoria
The Place To Be

Department of Sustainability and Environment
Department of Primary Industries
Environmental Protection Agency (EPA)
Victorian Catchment Management Authorities

Queensland Government

Department of Environment and Resource Management
Queensland Primary Industries and Fisheries – Department of Employment, Economic Development and Innovation

MURRAY–DARLING BASIN AUTHORITY

DEPARTMENT OF THE ENVIRONMENT, CLIMATE CHANGE, ENERGY AND WATER

Government of South Australia
Department of Water, Land and Biodiversity Conservation

BRISBANE CITY

SYDNEY CATCHMENT AUTHORITY

EPA South Australia

CORPORATE INDUSTRY

State Water

LOWER MURRAY WATER

Melbourne Water

SA Water

SKM

SunWater

BMT WBM

ACTEW CORPORATION

SOUTHERN Rural Water

GOULBURN-MURRAY WATER

RESEARCH

LA TROBE UNIVERSITY

Griffith UNIVERSITY

MONASH University

THE UNIVERSITY OF ADELAIDE AUSTRALIA

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

THE UNIVERSITY OF QUEENSLAND

Australian Government
Bureau of Meteorology

SARDI
SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

THE UNIVERSITY OF MELBOURNE

UC

CSIRO

eWater

Why?

- Current models struggling to handle 21C policy and management complexity
- Recognition by COAG partners that their models are reaching their ‘use-by’ date (IQQM, REALM, BigMOD).
- Need for nationally consistent modelling base, integrating
  - engineering, environment and management
  - city water supplies in a catchment context
  - planning & operational requirements
  - scalable and customisable

Source platform will be available in standard configurations

….or customisable to meet specific needs

eWater

eWater

eWater Source Rivers

For River Managers & River Operators

Source Rivers Vision

- A national river system modelling platform
  - Flexible, fit for purpose across jurisdictions
  - Applicable from sub-catchment to basin scales
  - Relevant for next 20 years – extensible
- Consistency of modelling approach
  - Surface water modelling guidelines, community of practice
- Considering
  - Rural and urban water use
  - Environmental demand and use
  - Groundwater and surface water interactions
- As well as drivers considered by others
  - Climate change, forestry and farm dams

Value to our partners

- Operational efficiency – better implementation of complex IWRM policy
- Integration of surface/groundwater, climate and environmental outcomes
- Uniformity cross jurisdictions and regions
- Support for real-world problems
- Skilled and well-trained staff
- Support - training, user manuals, user guides

eWater Source Rivers

Standard configurations

eWater River Manager — River systems Planning and management

eWater River Operator — River systems Operations

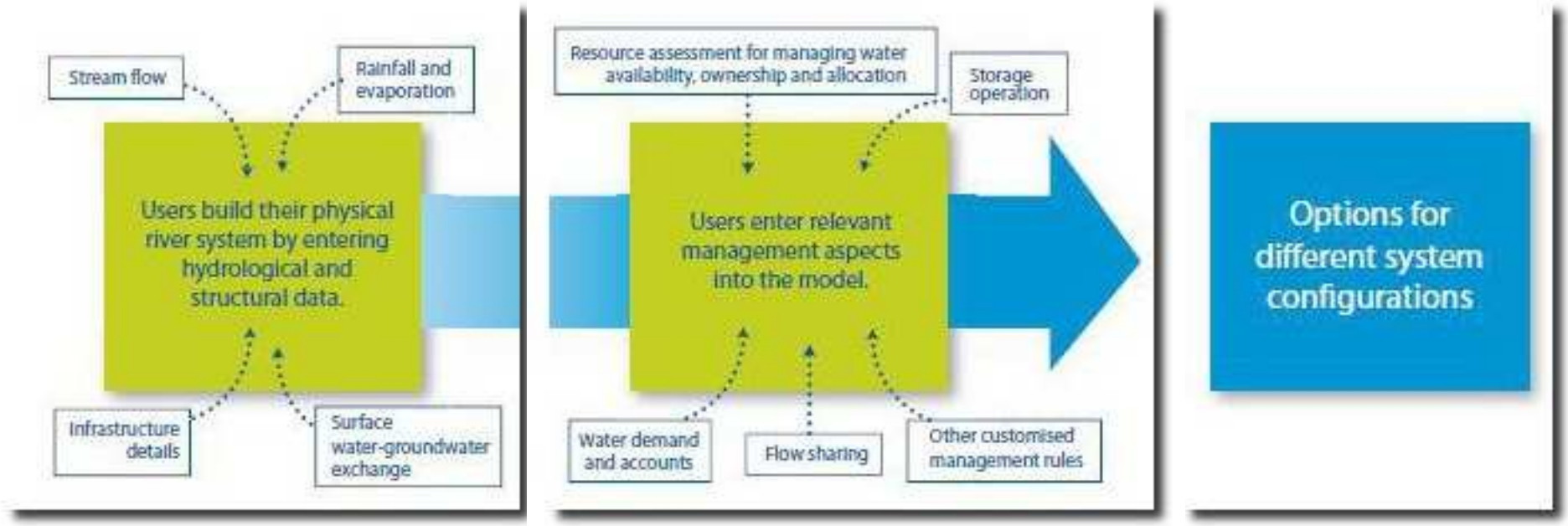
eWater River Manager

- Long term planning and policy development and support
- Supply, demand and use in rural regulated systems
- Ie. Resource assessment
- Water ownership
- Regional groundwater systems

eWater River Operator

- Operational decision support for regulated rivers
  - from days to seasonal
- Based on same river model
- Dynamically switch models and data sources during a simulation

Source Rivers structural overview



Enhancements on existing models

- Tracks multiple parcels of water as they are stored and move through a river system
- Swaps between spatial, schematic and temporal views
- Integrates river system modelling with catchment models
  - Climate change
  - Runoff generation
  - Forest cover change impacts
  - Farm dam impacts
- Considers surface and groundwater interactions

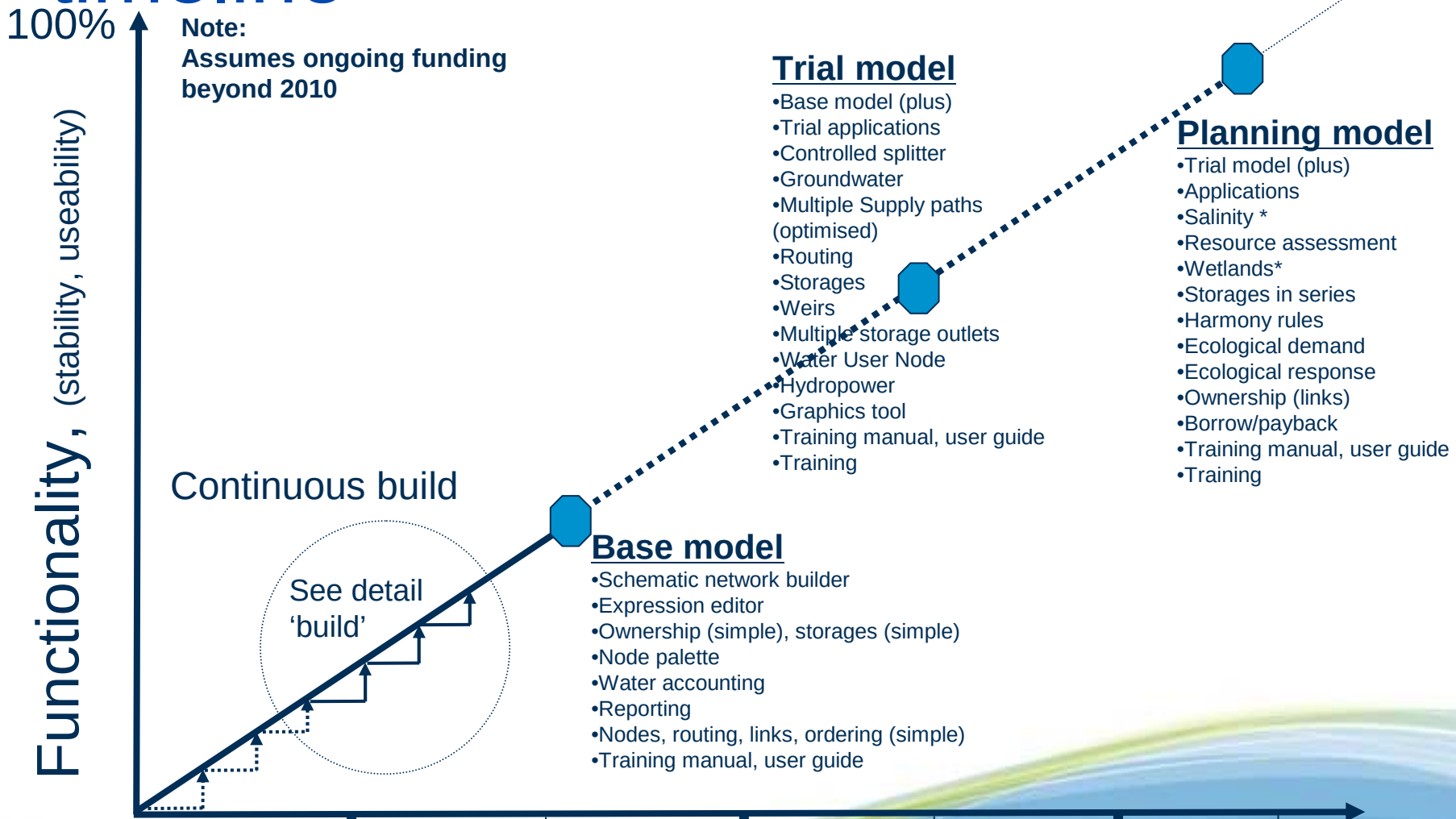
Enhancements (contd.)

- Support both rules based and optimised solutions to manage the delivery of water from multiple supply storages via multiple paths
  - Provide an expression engine for creating rules
  - Two different types on NETLP solvers
  - Support part system optimisation
  - Support optimisation on a daily time step with multiple owners
- Provide a range of demand models
  - Regression and time series
  - Several crop models
  - Urban
  - Environmental (event and frequency based)

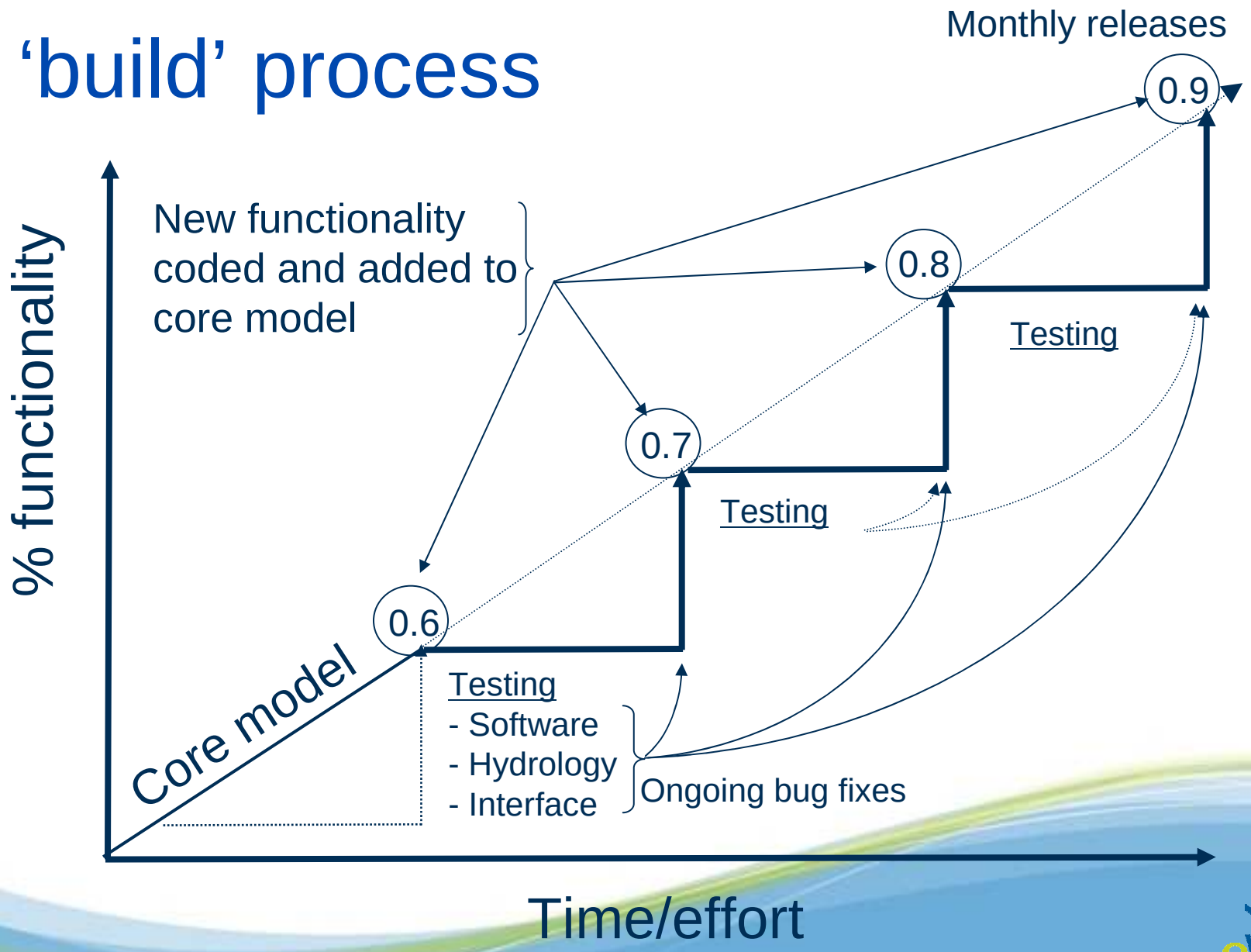
Enhancements (contd.)

- Considers conjunctive use
- Supports a range of accounting systems
  - Annual accounting
  - Continuous accounting
  - Continuous sharing
  - Surplus flow sharing
- Models connections between wetlands and storages
- Can be configured as both a planning and operational model
- Links to common databases (Hydsys, Oracle and SQL)

Source Rivers model development timeline



Source Rivers ‘build’ process



Quality assurance processes

- Cornerstone of confidence
- Ensuring model fit for purpose

Best Practice modelling

Best Practice Modelling

2 components

1. Practices for Internal model development

2. Guidelines/procedures for models in application & use

Best practice Modelling

1. Practices for Internal model development

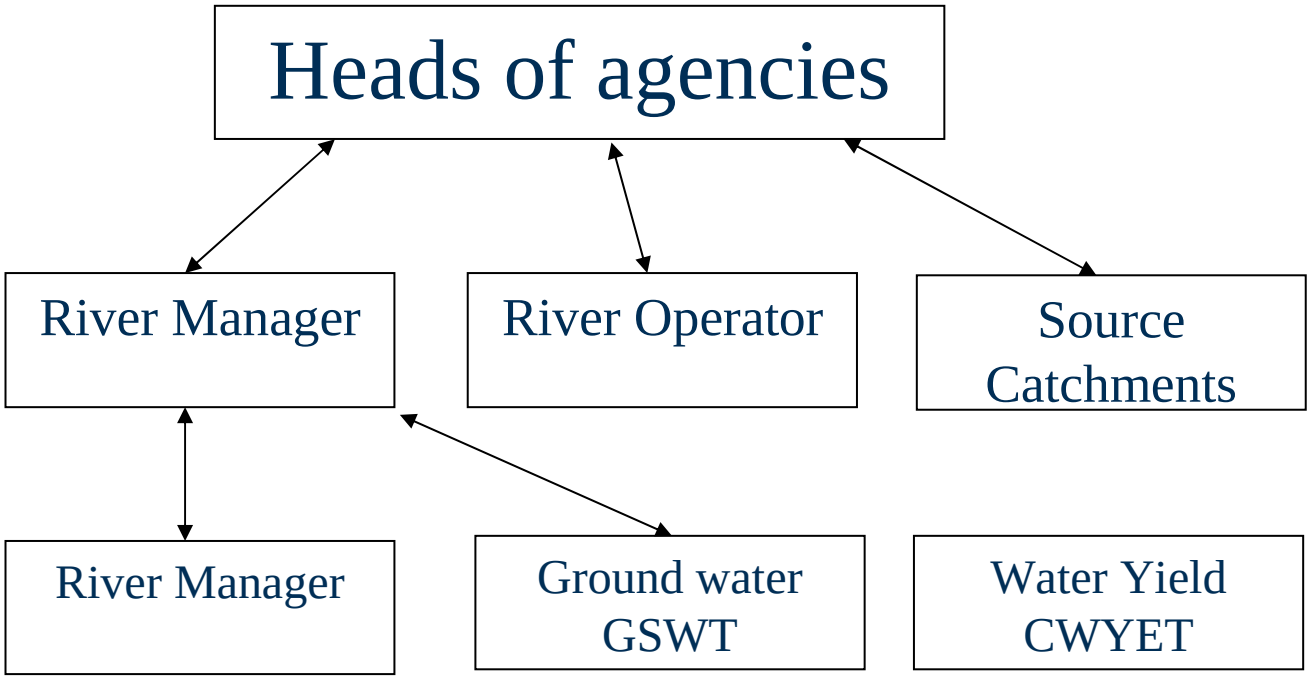
- Capture of formal User Requirements
- Creation of Specifications (review, endorsement)
- Software coding
- Review, testing of code
- Use cases for specific functionality
- Trial Applications
- Governance committees
  - Executive – High Level Steering Committee
  - Policy – User Reference Group
  - Technical – Technical User Group

River Systems suite – Governance committees

High level steering

User Reference

Technical input



Best practice Modelling

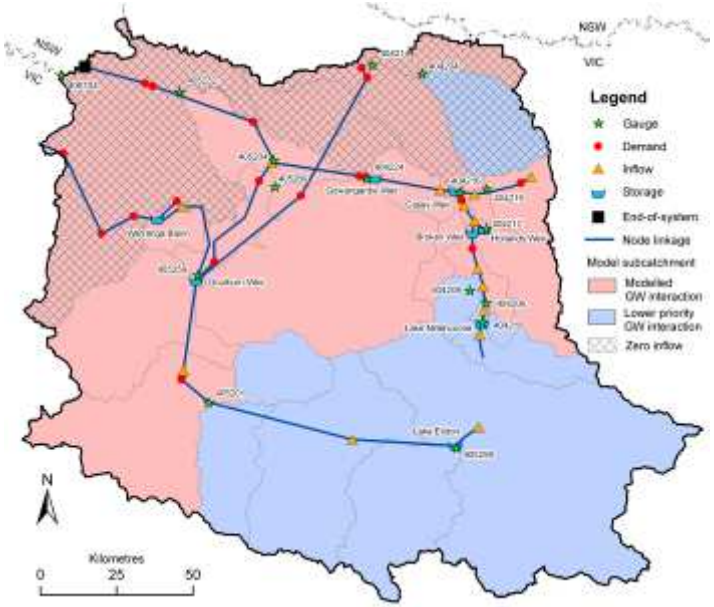
2. Guidelines/procedures for models in application & use

- Guidelines for model selection
- Guidelines for model use
- Tips and ideas in software/documentation
- Uncertainty framework to assist in interpretation and communication of results with stakeholders
- Documentation (help and user manuals)
- Training
- User Groups and community of Practice

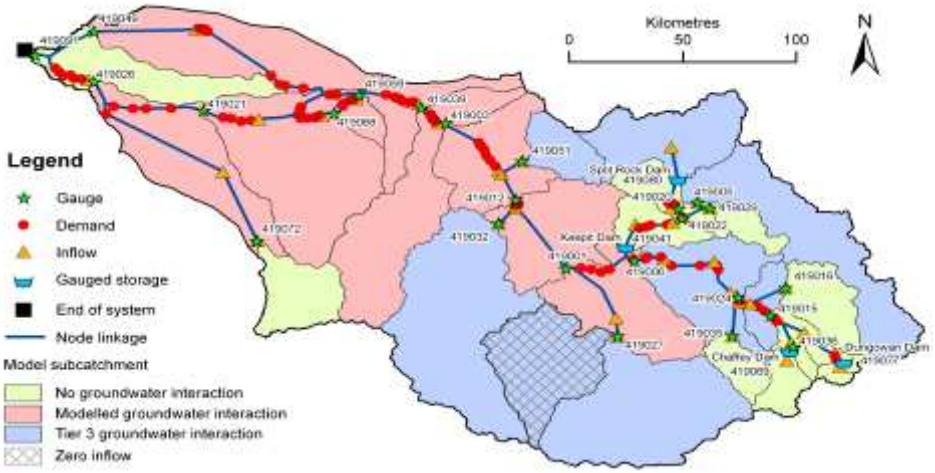
Trialling functional components

Murray-Darling Basin - Trials

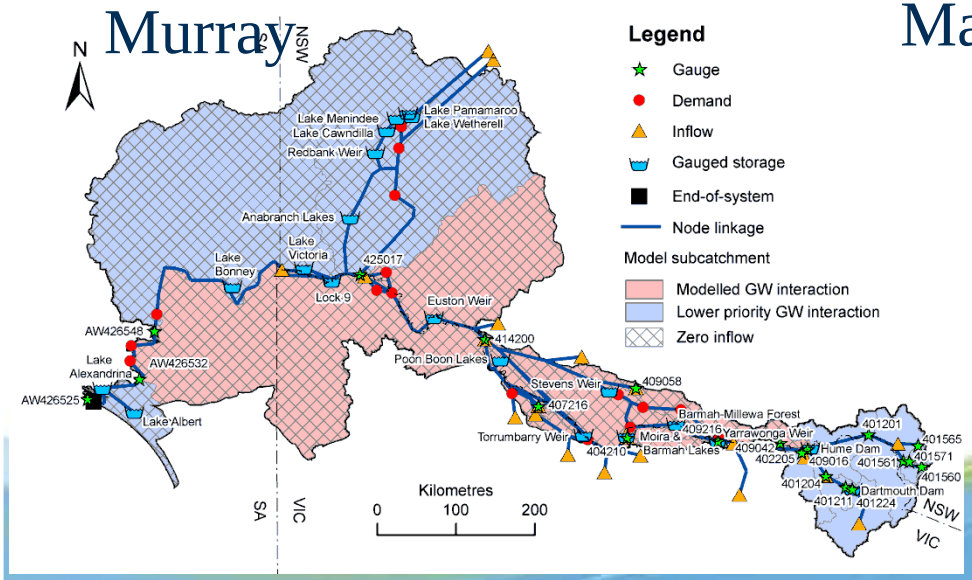
Goulburn Broken



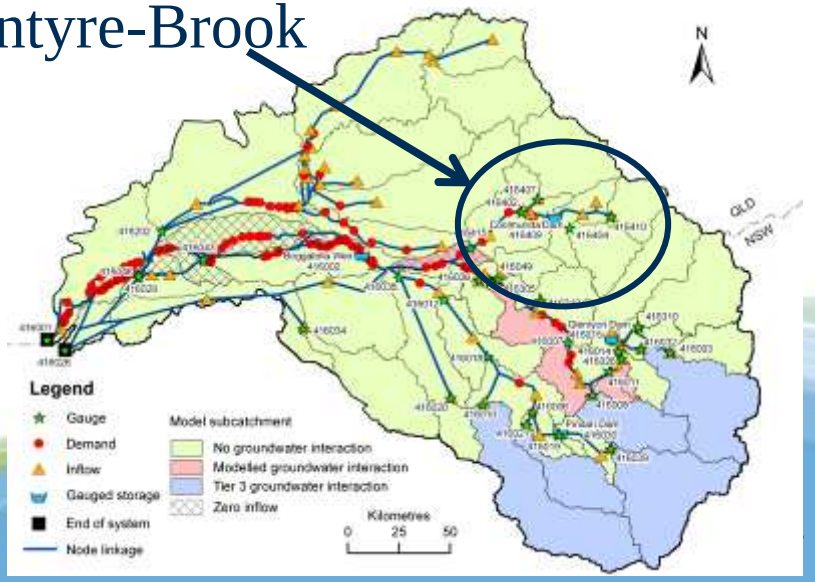
Namoi



Murray



Macintyre-Brook



Next Steps

- Release of Beta ‘Trial’ Source Rivers
- Ongoing coding & testing of new functionality
- Continued trialling
- Bug fixes & refactoring
- Release of prototype ‘Planning’ model July 2011
- Continued production of supporting material
  - User guides
  - Training manual
  - Scientific reference guide
  - On line training
  - F1 help
- Completion of Source Urban
- Next version of Source Catchments

Thankyou