

Bibliography of reports written about the water resources and values of the Ooloo Aquifer and Daly River

Hydrogeology – Ooloo Aquifer

Title	Description
Jolly (1984) Douglas/ Daly Groundwater Resource Investigations 1981 – 1983, Department of Transport and Works, Report 8/1984	The first study of the hydrogeology of the Ooloo Dolostone Aquifer in the Douglas/ Daly region.
Jolly et al (2000) Analysis of groundwater fed flows for the Flora, Katherine, Douglas and Daly Rivers, Department of Lands, Planning and Environment, Report 36/2000D	The first work to develop relationships between rainfall and groundwater fed flows to the major rivers of the Daly Basin based on rain fall record and available stream flow monitoring.
Tickell (2001) Groundwater Resources of the Stray Creek Area, Department of Lands Planning and Environment, Report NR 2001/39	Groundwater investigation in the Stray Creek area only, including aquifer characterisation
White (2001) A late dry season survey of Katherine and Daly Rivers, Department of Lands Planning and Environment, Report 24/2001D	The study aimed to quantify the location and volume of groundwater inflows to the Katherine and Daly Rivers from the Ooloo Dolostone Aquifer. Work included flow gaugings, water quality analysis and mapping rock bars and spring locations. The survey found that the majority of groundwater inflow from the Ooll Aquifer occurred between Claravale Crossing and the Douglas Daly confluence.
Jolly (2002) Daly River catchment water balance, Department of Lands Planning and Environment, Report 10/2002	The first work to provide a preliminary catchment wide estimate of the water balance of the Daly River catchment, including surface water and groundwater components. Identified further work required to better estimate the water balance.
Tickell (2002) A survey of springs along the Daly River, Department of Lands Planning and Environment, Report 06/2002	Built on the work of White (2001) to further characterise spring locations and discharge volumes from the Ooloo Dolostone Aquifer, focussing on river reaches between Dorisvale Crossing and Green Ant Creek.
Tickell (2002) Groundwater Resources of the Ooloo Dolostone, Department of Infrastructure Planning and Environment, Report 17/2002	Defined the regional hydrogeology of the Ooloo Dolostone Aquifer including its extent, thickness, hydraulic properties, recharge, regional flow pattern and discharge. Formed the base data for the development of the first regional groundwater model of the aquifer that would be used to better define the water balance. The work brought together borehole data, geological mapping, satellite imagery, topography, airborne geophysical surveys and the spring surveys conducted in 2001 and 2002.
Tickell et al (2002) Stream Baseflows in the Daly Basin, Department of Infrastructure	Undertook dry season stream gauging in September 2002 in major rivers crossing the Tindall Limestone Aquifer and the Ooloo Dolostone Aquifer

Title	Description
Planning and Environment, Report 36/2002	
Tickell (2003) Carbon dating of groundwaters in the Ooloo Dolostone Aquifer, Department of Infrastructure Planning and Environment, Report 21/2004D	Undertook carbon dating of groundwaters of the Ooloo Dolostone Aquifer, providing a broad indication of ages ranging from less than 50 years to several thousand years. The oldest water was found in areas where the Ooloo Aquifer is covered by Cretaceous sediments which reduce the recharge to the Ooloo Aquifer. The youngest water was found where the Ooloo Aquifer is in outcrop or near ground level. The youngest water is found where recharge occurs rapidly via sinkholes, fractures and through riverbed infiltration.
Olsen et al (2004) Report on the accuracy of Hydsys generated flow data for gauging stations in the Daly River catchment, Department of Infrastructure Planning and Environment, Report 05/2004D	Identified that further work was required to better define dry season low flow (dry season) information.
Russ et al (2005) Stream flows and water quality parameters in the Daly Basin, Department of Infrastructure Planning and Environment, Report 33/2005D	Undertook water quality and flow gauging at 26 sites across the Daly River and its tributaries in June and September 2005 (dry season flows)
Wilson et al (2006) Effect of land use on evapotranspiration and recharge in the Daly River catchment, Department of Natural Resources the Environment and the Arts, Report 17/2006D	Undertook further work on defining the water balance of the northern part of the Ooloo Dolostone Aquifer and made a preliminary analysis of the potential effects of land use change on key water balance components.
Tickell (2008) A survey of springs and rapids along the Katherine and Daly Rivers, Department of Natural Resources the Environment and the Arts, Report 04/2008D	Undertook mapping of geology, spring location and location and size of rapids from Galloping Jacks, Katherine River to Florina Homestead, Daly River, building on the work of previous surveys. The study resulted in revised mapping of some geological formations.
Tickell (2008) Dry season stream flows in the Daly/ Katherine Rivers, 2008, Department of Natural Resources, Environment, the Arts and Sport, Report 21/2008D	Undertook flow gaugings at 15 sites during two surveys, one in July 2008 and the next in September/ October 2008. The survey locations were on the Daly River and its tributaries.
Tickell (2009) Groundwater in the Daly Basin, Department of Natural Resources, Environment, the Arts and Sport, Report 27/2008D	Provides an excellent and simple to read overview of the groundwater resources of the Daly Basin, including the Ooloo Dolostone Aquifer.
Wagenaar et al (2009) Daly low flow gaugings, October 2009, Department of Natural Resources, Environment, the	Undertook flow gaugings at 27 sites during a survey in October 2009. The survey locations were on the Daly River and its tributaries.

Title	Description
Arts and Sport, Report 21/2009D	
Tickell (2010), Daly Basin Drilling, 2009, Department of Natural Resources, Environment, the Arts and Sport, Report 08/2010D	Reports on the results of drilling and construction of seven new monitoring bores in 2009, located in the central part of the Daly Basin. The bores were located to better understand groundwater discharges to the Daly River.
Tickell (2010) Daly Basin Drilling, 2010, Department of Natural Resources, Environment, the Arts and Sport, Report 24/2010	Reports on the drilling of four investigation/ monitoring bores on and adjacent to Florina Station. Establishes the presence of the Florina Formation, marking a significant change to the geological conceptualisation of the Daly Geological Basin.
Tickell (2011) Daly Basin Drilling, 2011, Department of Natural Resources, Environment, the Arts and Sport, Report 21/2011	Reports on the drilling of four investigation/ monitoring bores in the Ooloo Aquifer, one located in the Douglas Daly Region, two in the King River area and one adjacent to the eastern boundary of Florina Station. The bores improved the regional understanding of the Ooloo aquifer as well as improving the coverage of the monitoring network.
Tickell (2011) Subsurface characteristics of the Ooloo Dolostone, Department of Natural Resources, Environment, the Arts and Sport, Report 28/2011D	Improved the hydrostratigraphic and lithological information available for the Ooloo Dolostone.
Tickell (editor) (2011) Assessment of major spring systems in the Ooloo Dolostone, Daly River, Department of Land Resource Management, Report 22/2011D	A major milestone in the knowledge and understanding of the Ooloo Dolostone Aquifer, the report built on the body of knowledge previously established as well as undertook further analysis of water chemistry and other data. The project was a collaboration between NT Government, CSIRO and Charles Darwin University and included the drilling program outlined above.
Water Monitoring Group Water Allocation Plan Snapshot Reports 2009 - 2016	The Water Monitoring group undertake snapshot stream flow and water quality monitoring twice per year throughout the Tindall Limestone Aquifer and the Ooloo Dolostone Aquifer, as well as along the Katherine and Daly Rivers. This information is collected in addition to the routine continuous groundwater and surface water monitoring conducted across the catchment. Snapshot monitoring is conducted each year, once at the end of the wet season and once at the end of the dry season. The results of these surveys are written up each year and provide information about the contribution of flows from the different aquifers and sub-catchments relative to the total runoff in the Daly River. This information helps us to better understand the recharge and runoff relationships throughout the catchment which is important for refining and calibrating hydrological models and to verify model predictions.

Groundwater and Surface Water Model Development – Tindall Limestone Aquifer and Ooloo Dolostone Aquifer

Title	Description
Knapton (2005) Preliminary groundwater modelling of the Ooloo Dolostone, Department of Natural Resources, Environment and The Arts	Developed the first numerical groundwater model of the Ooloo Dolostone Aquifer using the Feflow computer code. The work included calibration, sensitivity analysis and scenario modelling. Recharge and discharge to the aquifer were represented by FEFLOW boundary conditions.
URS (2008) Integrated hydrologic modelling of the Daly River catchment and development of a water resource monitoring strategy, Report prepared for the Department of Natural Resources, Environment and the Arts.	<p>Developed an integrated surface water and groundwater model for the Daly Basin catchment including the Tindall Limestone Aquifer, the Ooloo Dolostone Aquifer and the Daly River and its tributaries. Groundwater flow modelling is simulated by FEFLOW computer code and the surface water system is simulated by the MIKE-11 computer code. Rainfall/ runoff components of the water balance are simulated using the NAM rainfall – runoff model. The models are coupled together so that water can be exchanged between them. The work included model calibration, sensitivity analysis and scenario modelling.</p> <p>The following processes are represented by the models:</p> <ul style="list-style-type: none"> • Catchment rainfall runoff • Rainfall Infiltrating into the soil and down into groundwater • Flow in creeks and rivers • River losses into the aquifer • Aquifer discharge into the river • Extractions from the river and from the aquifer
Knapton et al (2011) Northern Australia Sustainable Yields Project: An investigation into the effects of climate change and groundwater development scenarios on the water resources of the Daly River catchment using an integrated groundwater/ surface water model, Department of Natural Resources, Environment, The Arts and Sport, Report 29/2011D	Further progressed the integrated surface water – groundwater model by undertaking further development and calibration of the FEFLOW, MIKE-11 and NAM models. Included advanced parameter estimation approaches to calibration and sensitivity analysis. Modelled groundwater and surface water dynamics under future climate scenarios based on IPCC AR4 modelling of future climate.
Knapton (2011) National Water Commission Low Flows Project: Case Study – Recalibration of a coupled surface water – groundwater model to the low flows in the Daly River catchment, Department of Natural Resources, Environment, The Arts and Sport, Report 13/2012D	Further progressed the integrated surface water – groundwater model by improving the calibration of spring discharge along the Katherine River.

Climate Information

Title	Description
NASY 2009 Water in the Daly Region Report	<p>Report on water in the Daly region of the Timor Sea drainage division from the northern Australia Sustainable Yields Report.</p> <p>This region report contains information on water availability and demand, context and water balance results for the Daly region, including predictions of water availability under alternative future climate scenarios based on the Intergovernmental panel on Climate Change (IPCC) 4th Assessment Report.</p> <p>More recent climate change predictions are now available (IPCC 5th Assessment Report) however these predictions have not yet been explored using hydrological models in the Daly River catchment.</p>

River health, biodiversity and environmental water requirements

Title	Description
Dostine (2000) Patterns in macroinvertebrate community composition and recommendations for monitoring in the Daly River system.	Conducted macroinvertebrate sampling at a number of locations across the Daly River and its tributaries. Recommended that macroinvertebrate monitoring could provide information to detect and assess ecological changes in the Daly River catchment. However, further scientific work was recommended to better evaluate the design and utility of such a monitoring program.
Rae et al (2002) Environmental water requirements of <i>Vallisneria nana</i> in the Daly River, Northern Territory, Department of Infrastructure, Planning and Environment, Report 37/2002	The project identified <i>Vallisneria nana</i> as a keystone species of the Daly River, providing food, breeding habitat and refuge for animals, and in cycling nutrients, metals and carbon. The project mapped the presence of <i>Vallisneria nana</i> bed, collected data and undertook modelling to inform the relationships of these beds with geomorphology, water quality and flow.
Townsend et al (2002) Periphyton and Phytoplankton Response to Reduced Dry Season Flows in the Daly River, Department of Infrastructure, Planning and Environment, Report 38/2002.	Examined the relationship between flow and algae in the Daly River as a potential indicator of changes in flow or water quality resulting from changes in water use.
O'Grady et al (2002) Tree water use and sources of transpired water in riparian vegetation along the Daly River, Northern Territory	Assessed the spatial and temporal patterns in water use of two tree species, <i>Eucalyptus bella</i> and <i>Melaluca argenta</i> at Dorisvale Crossing, Ooloo Crossing and the confluence of the Douglas and Daly Rivers. The study concluded that there is strong evidence that riparian vegetation along the Daly River is groundwater-dependent.
Erskine WD, Beggs GW, Jolly P, Georges A, O'Grady A, Eamus D, Rea N, Dostine P, Townsend S and Padovan A 2003. Recommended environmental water	Undertook the first integrated assessment of flow regimes and environmental water requirements of the Daly River.

Title	Description
requirements for the Daly River, Northern Territory, based on ecological, hydrological and biological principles. Report produced for NT DIPE by Supervising Scientist Division, Supervising scientist, Darwin NT	
Erskine WD, Jolly P and Smith I, July 2004, Environmental Water Requirements of the Daly River: Revision of Recommendations of Erskine et al. (2003), based on Daly Regional Water Allocation Workshop held in Darwin on 5 May 2004, Report 30/2004D, Department of Infrastructure, Planning and Environment, Natural Resources Division, Palmerston NT	Sets out a revision of the Erskine (2003) work based on discussion during and following a Daly Region Water Allocation Workshop. The work intended to make the results of the original study clearer and more useable for water allocation decisions. The work identified key knowledge gaps and made recommendations for future scientific work along with potential changes to the management framework for the catchment.
Risby, Townsend & Bennett (2009) Towards a water quality monitoring and management framework for the Katherine and Daly River catchment, TRaCK Project, Charles Darwin University	Conducted stakeholder interviews to understand the potential requirements of a water monitoring framework. Provides conceptual models for key pressures/ threats on water quality in the Katherine and Daly River catchment. Provides recommendations for monitoring framework design.
Chan et al 2010 Bayesian network models for environmental flow decision making in the Daly River, Northern Territory Australia	Investigated the relationship between dry season flows and abundance of barramundi and sooty grunter in the Daly River. No other study has looked specifically at this question.
Robson et al (2010) Towards understanding the impact of land management on productivity in the Daly River, TRaCK Project, November 2010	For the first time, established an understanding of nutrient and sediment fluxes, primary production and organic matter in the Daly River. Made recommendations for further work including monitoring of water quality parameters and indicators of primary production. There is a 2016 publication in preparation for the Journal of Aquatic Botany which is based on this work.
Schult & Townsend (2012) River health in the Daly catchment. A report to the Daly River Management Advisory Committee, Department of Natural Resources, Environment, The Arts and Sport, Report 03/2012D	Provides an excellent summary of a number of research projects and one-off surveys and categorises the subcatchments of the Daly catchment to give an indication of their overall health. The report concluded that most of the rivers and streams are in healthy condition, though some were under increasing pressure and affected by localised impacts. The report identified the need for long-term coordinated monitoring of river health in the Daly catchment.
Schult 2014 End of dry season water quality in the Roper and Daly River catchments	Collected water quality data from 52 sites throughout the Daly and Roper catchments at the end of the dry season in 2012 and 2013.

Title	Description
2012/2013, Department of Land Resource Management, Report 03/2014D	
Schult 2016 Pesticide monitoring in the Douglas-Daly region during the 2014 and 2015 dry seasons, Department of Land Resource management, Report 5/2016D.	Sampled river waters for pesticides and herbicides at seven monitoring sites on the middle and lower Daly River, upper and lower Douglas River, Stray Creek, Hayes Creek and Green Ant Creek. This work forms the first baseline information for pesticide and herbicide contamination of streams in the Douglas-Daly region and can be used for comparison with future monitoring results to assess long-term contaminant trends. The concentrations of all the chemicals that were detected (12 out of 122 chemicals that were sampled for) were very low and none exceeded the ANZECC environmental guidelines for the protection of slightly to moderately disturbed ecosystems.

Indigenous Water Values

Title	Description
Jackson S, May 2004, Preliminary Report on Aboriginal perspectives on land-use and water management in the Daly River region, Northern Territory. A report to the Northern Land Council, CSIRO Sustainable Ecosystems	Describes the significance of water to Aboriginal groups in the Daly Region including a qualitative description of values. Documented the concerns that Aboriginal people had about environmental change in the Daly Region. Provided recommendations for future Aboriginal engagement, management institutions and research and monitoring.
Jackson et al (2011) Indigenous socio-economic values and river flows – A summary of research results: 2008-2010 CSIRO Ecosystem Sciences, Darwin, NT.	Undertook river use mapping, household surveys to quantify the harvest and consumption of aquatic resources, and social and cultural studies of Indigenous values. Work was conducted in the Daly River and Fitzroy River catchments. The work investigated the potential effects of flow changes on Indigenous resource use. The work estimated the value of food harvesting and consumption to estimate the size of the customary economy, using a replacement value method. This method did not include non-material values that are part of the customary economy such as hunting, fishing, gathering, art, craft and caring for country activities which if included, were considered to increase the estimated value. The report advocated for the inclusion of aboriginal people in environmental monitoring and management activities.
Jackson et al (2012) Aquatic resource use by Indigenous Australians in two tropical river catchments: the Fitzroy River and Daly River, Human Ecology 40 (6)	Conducted river use mapping and household surveys. Presents information on the species harvested, the spatial distribution of harvesting sites and the patterns and timing of harvesting activity. Demonstrated the relative proportion of harvested resources to consumption, documenting trading/sharing in the customary economy.
Jackson et al (2014) The use of replacement cost method to	Conducted household surveys twice every two months over a two year period in 2009 and 2010 at Naiyu and

Title	Description
<p>assess and manage the impacts of water resource development on Australian indigenous customary economies, Journal of Environmental Management 135</p>	<p>Pine Creek. The main aquatic resources that are harvested were identified. These were converted to a common substitutable item based on the survey results to calculate a replacement value (e.g. Long-neck turtle was allocated the value of T-bone steak). Results were presented as both the proportions of household incomes as well as the total value of foods gathered at the five key harvesting sites identified by the study. The report provides compelling evidence of the continued importance of the customary economy from the perspective of household incomes.</p>
<p>Jackson et al (2014) "We like to listen to stories about fish" : integrating Indigenous ecological and scientific knowledge to inform environmental flow assessments, Ecology and Society 19 (1): 43</p>	<p>Explored how Scientific Knowledge can be complemented by and integrated with Indigenous Ecological Knowledge in the Daly River catchment to enhance scientific knowledge of fish biology and flow-ecology. Demonstrated that incorporating Indigenous Ecological Knowledge created more scientific knowledge for the Daly River catchment as well as highlighting potential future research questions.</p>

Plan Development

Title	Description
<p>Tickell, S. 2010 Information Report for the Ooloo Dolostone Aquifer Water Allocation Plan</p>	<p>Provides information about the development of the water allocation plan for the Ooloo Dolostone Aquifer. Identified several key knowledge gaps:</p> <ul style="list-style-type: none"> • Refining the extent and capacity of the resource • Ooloo Aquifer Computer model • Future Consumptive water use • Indigenous aspirations for water <p>There has been further work undertaken in these areas and this report can be updated.</p>