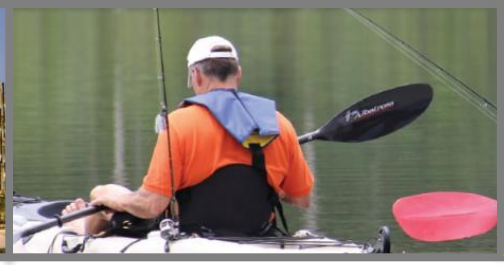
Science Capability Audit - Water

Final Report, July 2014



Queensland Government

This review audit and strategic analysis of water related applied science and research within the Queensland Government has been undertaken as part of the Government's examination of its science capability and investment, following the state election in March 2012.

The Queensland Government is committed to using science and innovation for economic success by ensuring it has access to the best possible scientific advice, that this is directed toward meeting the future policy challenges of Queensland industries, and contributes to sound decision-making about environmental, economic, industry and social issues.

This is the first thematic audit of the Queensland Government's scientific capability and investment oversighted by the Office of the Queensland Chief Scientist.

Acknowledgements
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Data supplied by:

- Queensland Departments of: Agriculture, Fisheries and Forestry; Energy and Water Supply; Environment and Heritage Protection; Natural Resources and Mines; Queensland Health; and Science, Information Technology, Innovation and the Arts
- Queensland universities: Central Queensland University; Griffith University; James Cook University; Queensland University of Technology; The University of Queensland; University of the Sunshine Coast; and University of Southern Queensland
- The Bureau of Meteorology
- Water utilities: Sunwater; SEQ Water; Unity Water; Health Waterways
- Research: Urban Water Security Research Alliance; CSIRO; Natural Environmental Research Program; National Centre for Groundwater Research; Australian Water Recycling Centre of Excellence
- Gold Coast City Council

Co-authored by: Jenny Riches, Office of the Queensland Chief Scientist

Biography of Paul Greenfield, Lead Author

Paul Greenfield AO is the current Chairman of the Australian Nuclear Science and Technology Organisation (ANSTO) and Chair of the International Water Centre - a joint venture between The University of Queensland (UQ) and Griffith University, and the International Energy Centre - a joint venture between three universities and a major resource company.

He has a Bachelor of Engineering and a PhD in chemical engineering from UNSW and Bachelor of Economics from UQ. Throughout his career, he has worked in the private sector, with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and at universities in Australia and the USA. From 1975 until the end of 2011, he worked at UQ, initially as an academic and finally as Vice Chancellor and President. His research interests have been in environmental and energy management, wastewater management, biotechnology and technology innovation.

As well as maintaining an active consulting activity throughout his career, he has been involved in establishing a number of commercial enterprises aimed at taking early stage intellectual capital to the market. Current activities involve working with industry and government to address water-related issues associated with coal seam gas as well as exploring the increasing connections between energy and water management, particularly in the urban setting.

He holds board positions with Healthy Waterways Ltd and the Great Barrier Reef Foundation Ltd referred to in this review.

Contents

Executive Summary

- The Chief Scientist is oversighting a series of audits/reviews looking at the applied science and research and development (R&D) undertaken or commissioned by the Queensland Government. This audit focused on the Queensland Government investment, capability and delivery in water-related science and R&D.
- The audit had two broad objectives – to provide an evidence base in arguing for future investment and policy directions, and to assess the effectiveness of current and alternative delivery mechanisms.
- The audit was sponsored by the Departments of Agriculture, Fisheries and Forestry (DAFF), Energy and Water Supply (DEWS), Environment and Heritage Protection, (DEHP), Natural Resources and Mines (DNRM), and Science, Information Technology, Innovation and the Arts (DSITIA).
- It was the first thematic audit, the previous audits being departmentally focussed. Being thematic, the boundaries were less clear-cut than they were for the departmental audits.
- The audit included both quantity and quality issues related to water, e.g. supply, catchment hydrology, waterways, ports and the inner Great Barrier Reef but excluded the outer reef, while recognising there were interactions between terrestrial and marine environments e.g. mainland run-off and crown-of-thorns (COTS) outbreaks.
- Compliance monitoring in itself was not included, but investigative monitoring was. Likewise, where data was gathered to manage a system in the short term but gave rise over time to longitudinal datasets which were quality assured, it was considered that this activity generated a science asset(e.g. streamflow or groundwater data, or ecosystem quality data), even though the original objective was management or policy focused.
- Meetings were held with all five sponsoring departments and with the Departments of State Development, Infrastructure and Planning (DSDIP), Premier and Cabinet (DPC), Health, and National Parks, Recreation, Sport and Racing (DNPRSR).
- Data was gathered from the five sponsoring departments on expenditure in water-related applied science and R&D at program (not project) level for the past five years (when available) categorised against an established Council of Australian Governments (COAG) framework (eight classifications).
- Information for 2012-13 was also collected from a range of other research, university, utility and government-related agencies, e.g. Seqwater; Unity Water; Bureau of Meteorology (BoM); Australian Water Recycling Centre of Excellence (AWRCoE); CSIRO; Healthy Waterways; and Queensland universities.
- In 2012-13, the five departments managed funds totalling $37.5 million to support water related science and R&D activities. Of this, $18.8 million came from their internal funds (i.e. the funds were provided as an allocation by the Queensland Government to the department and the projects managed – but not necessarily carried out - within the respective departments). Inter-departmental transfers (i.e. the funds were sourced from Queensland Government departments other than that carrying out the project) accounted for $6.5 million (mostly to DSITIA). Another $12.2 million was attracted from bodies external to the Queensland Government for water-related science and R&D (mostly to DNRM and DSITIA).

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- Most of the resources were spent within DNRM (45.4%) and DSITIA (44.6%), although the DNRM figure is inflated by $7 million (17.3%) committed to stream flow gauging and groundwater measurements, which is required for management rather than scientific purposes, but which generates data of scientific and future policy value.

- The total spend in Queensland in 2012-13 on water-related science and R&D outside of the Queensland Government (not including the private sector) exceeded $100 million, i.e. almost three times the spend by Government. While the focus of some of this work differs from departmental priorities, it provides evidence of significant water-related science capability existing in Queensland outside of the five departments.

- Reliable trend data over time on water-related science and R&D expenditure was difficult to obtain due to recent departmental restructuring. The data that was available, acknowledged reductions in full time equivalent (FTE) numbers and external commentary all attested to a drop in capability over the past two years.

- Despite these reductions, the focus of the investment in water-related science and R&D at a meta level mirrors the core responsibilities of the five departments: surface water; ground water; and aquatic ecosystems. The science activities are operational in nature, driven primarily by the separate short term needs of the sponsoring departments and agencies.

- As expected, the portfolio of water-related science and R&D activities reflects a combination on ongoing base programs, including monitoring, together with short-term contractual projects to answer specific questions. It was agreed at the outset of the review that detailed examination of individual projects was beyond its remit.

- Within the five departments, there is very limited investment in longer term strategic research on water-related science and technology issues. This contrasts with the thirty year horizon taken in developing a water plan for the state (WaterQ). It is not clear how the current applied science and research capability within the state informs and will assist the achievement of the water plan goals.

- The dominant feature of the delivery program is the role of DSITIA Science Delivery Division (SDD) as service provider to the other agencies. This model differs from the traditional approach where relevant science capability is co-located in the same agency as the related policy, management or regulatory functions. This mode of delivery has both advantages (focus, perceived independence) and challenges (scale, culture, inflexibility, sensitivity to short term changes in funding).

- In particular, the delivery model requires the existence of mechanisms for effective translation of applied science and R&D to policy, management or regulatory practice. This challenge, difficult to achieve under any model, is exacerbated by the separation of the line agencies and the groups carrying out the science activities. There is a risk of developing scientifically competent silos of activity, having only a marginal impact on major strategic directions and policy issues.

- There is a prevailing external view (both nationally and within Queensland) that the Queensland Government's capability in water related science and R&D has diminished over recent years, particularly in catchment hydrology and urban water issues. In part, this external perception reflects reality with the cessation of funding for the Urban Water Security Research Alliance (USWRA - $50 million over 5 years) and the eWater CRC occurring over the last two years; such changes in program focus are typical of scientific research.

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- The combination of the dominant service provider model and the reduced capability as a result of the budget cuts and changes in program focus over the last two years means that a vulnerability has emerged in maintaining capability in the science areas related to the core policy and business functions of the line agencies beyond their immediate needs.

- One expression of this vulnerability is the dependence within DSITIA and the other agencies on a small number of key individuals in the water space with the necessary scientific credentials and experience, policy 'know-how' and effective leadership skills. While effective recruitment strategies can partially address this issue over the longer term, the vulnerability will remain in terms of strategic water-related science and its policy implications.

- Part of the issue is the tendency of the current model to allow silos of activity in the water sector to develop. There does not appear to be a common view on what core water science capabilities must be retained within the agencies to protect key water and aquatic ecosystem assets, to manage increasingly contested supplies or to provide advice on achieving the state's future vision.

- Given that so much of the Queensland Government science and R&D activity relates to monitoring (linked to policy, management or regulatory functions), a question arises as to whether there is sufficient investment in research related to the emerging issues of management by combined monitoring (from multiple, often remotely sampled, sources) modeling and visualisation, and the issues concerning massive data collection, processing, storage and availability.

- A key issue facing governments worldwide is the concept of "open data" i.e. making data, in this case water related data, widely accessible with a view to encouraging individuals and the private sector to utilise such information in a business or social sense. DNRM currently achieve this to some extent with their streamflow and groundwater data. There remain issues of scope, accessibility, quality assurance, liability and cost of provision, but the community pressure for "open data'" is likely to grow. There does not seem to be an overarching approach from the Queensland Government to this issue in the water space.

- Outsourcing of water-related science and R&D occurs largely on an ad hoc basis when specialist skills are needed or when leveraging of resources can be achieved; such outsourcing appears effective. There is a significant history of such engagements, particularly in the recent past.

- There are only a few long term, strategic partnerships with other research groups in the water related applied science and R&D space despite the relative strengths in this area which exist in Queensland outside the government departments. This contrasts with the agricultural sector where such partnerships are common.

- Three partnership examples, involving the Queensland Government, that have demonstrated a capability to deliver science effectively into management and regulatory functions are OGIA within DNRM; Healthy Waterways Ltd - a partnership involving the Queensland Government (DEHP and DSITIA), local government in south east Queensland, other agencies and industry (e.g. Seqwater), local community groups and local research institutions; and TropWATER – formed by combining a group of water professionals from government and a university research group.

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- Lessons can be drawn from examples such as these in terms of assessing and managing cumulative impacts, achieving broad community and industry consensus and utilising new monitoring and modeling approaches. In their different ways they demonstrate the value of leverage in achieving outcomes beyond those able to be achieved by a single agency, department or research organisation. Internationally, modern research management has recognised the ability of enduring partnerships as an effective means of accessing the knowledge skills essential for addressing future strategic opportunities and threats in the natural resource management space.

- The audit raises three key issues for the water-related departments to address.

    1. How to understand at a policy or management level within the line agencies the potential of science and R&D to help address issues both in the immediate and longer time frames, and its corollary, namely, how to ensure effective translation of science and R&D to achieve effective policy outcomes and management actions.

    2. How to ensure that sufficient and appropriate water-related applied science and R&D capability is retained within government to allow it to carry out its core functions effectively and at an acceptable risk level.

    3. How to access the relevant research capacity to provide options for strategically addressing future issues which Queensland is likely to face and which imply financial and legal risk for government e.g. implications of a major increase in agricultural output and resource extraction on water supply options and water quality issues, managing water supplies and ecosystem quality over a time period that will almost certainly contain one or more extreme events.

- The Science Delivery Board, which includes the Directors-General of the five key water related departments plus others, suggests itself as the key group to oversight a process to address the above questions. Suggested options for the Delivery Board to consider include:

    1. Using a risk-based framework to address in a holistic way where future investments in water-related science and R&D might deliver value to the state and how such science and R&D might be delivered. There would be real value in engaging with industry and external research providers in setting such an agenda.

    2. Identifying mechanisms to attract, retain and develop science capability and leadership relevant to core areas of water policy and management.

    3. Developing improved communication processes between science and policy related staff; and improved communication to the external community both of Queensland Government's water science expertise and the link between water science and water policy in key areas of interest ,as is currently being achieved with the GBR.

    4. Developing a strategic approach to partnering.

Conclusions

Overall conclusions

1. The Queensland Government currently spends around $38 million per annum on water-related science and R&D within five departments (DAFF, DEWS, DNRM, DEHP, DSITIA). Of this, around $19 million was commissioned and managed within each department from their own internal funds, $6.5 million involved a transfer, primarily into DSITIA, from one of the other four departments and just over $12 million was from external bodies. The $38 million represents approximately 26% of the total spend on water-related science and R&D in the state.

2. The focus of the state government spend is broadly in alignment with key policy responsibilities of government and is consistent with government's economic goals:
   - managing surface water resources,
   - managing ground water resources,
   - managing the condition of these resources and aquatic eco-systems.

3. Most water-related science and R&D activity is operationally focused, i.e. it responds to short-term issues reflecting line agency needs. There is general satisfaction with the role of DSITIA as service provider for such operational activities and little evidence of overlap or duplication.

4. There is little investment in and limited strategic research capability in water-related R&D, in part because of resourcing pressures and in part because water as a national issue has dropped in priority. Gaps include work on longer term climate and availability threats; managing the water cycle between extreme events; data quality, storage and availability issues; and more effective monitoring technologies.

Conclusions

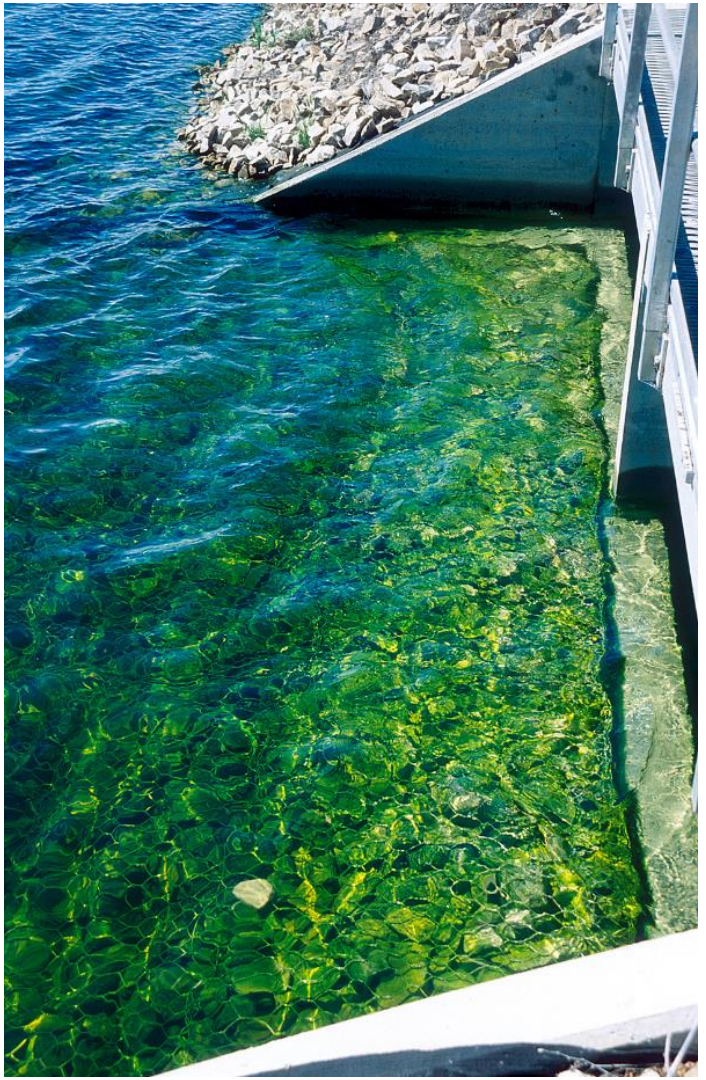
5. There has been a substantial reduction in water-related science and R&D spend within the Queensland Government over the recent past as the funding of a number of major programs has ended (e.g. UWSRA and the eWater CRC) and broad scale budget cuts implemented. There are external perceptions that Queensland's capability in this space has been significantly reduced, particularly in the areas of catchment hydrology and urban water issues.

6. The service delivery model, by which DSITIA SDD contracts with the other departments to carry out water related science and R&D, has the advantages of improved focus and perceptions of increased independence but has a number of challenges in terms of resourcing, flexibility and culture.

7. The effectiveness of links between the primary service delivery department (DSITIA) and the other line agency departments appears mixed, with examples both of good practice and also of neglect. There is a risk of developing scientifically competent silos of activity, which have only a marginal impact on major strategic directions and policy issues. To be effective the current model requires ongoing communication at multiple levels between the service delivery agent and the purchaser of the service.

8. The mechanisms for effectively translating water-related research into policy, management or regulatory actions appear vulnerable. Given the dominant delivery mechanism of DSITIA being a service provider, this issue is likely to grow in significance over time as existing key staff, a number of whom have both policy and science experience, leave.

9. There are a limited number of partnership arrangements involving water-related science and R&D which have been shown to deliver outcomes better than could be achieved by a single departmental entity and from which lessons could be learned. Existing approaches to R&D partnerships, while effective, appear ad hoc rather than strategic.



Recommendations

Overall recommendations

1. **A strategy for water research and application…** The five departments (in consultation with industry and other relevant bodies) should collectively identify potential future water-related science and R&D needs, relevant to the four pillars of the Queensland economy and recognising external factors that will affect water supplies and aquatic ecosystems. The identification should be strategically focused and utilise a risk-based approach. It should also address the most suitable delivery mechanisms. The Science Delivery Board comprising Directors-General of the key water departments and supported by DSITIA is a logical body to drive this activity, while the 30 year water plan provides a possible framework. External research and industry input should be part of such a process.

2. **Talent retention, development and recruitment…** Water-related science and R&D capability should be retained at appropriate levels within the departments in areas of core responsibility. Within the private sector, core business activities are rarely outsourced, and the same logic applies to government. This does not imply that there is no scope for contestability of specific functions (e.g. laboratory analytical capability). It does recognise, however, that the there are more factors than short term financial or efficiency gains to be considered in any contestability analysis. If internal science and technology capability in the water sectors of interest to government drops below a critical level or is narrowed excessively, the level of risk in a policy and management sense increases significantly. Effective analytical and policy synthesis capability requires more than the ability to manage external contracts.

3. **Provider/stakeholder problem definition…** Mechanisms need to be introduced to ensure there is effective communication between the line agency departments and the service delivery personnel at all stages of a project, from conceiving the original project linked to policy or management, during the project, and after completion.

4. **Play it again, Sam…** Consideration should also be given to communicate more effectively to the external community Queensland Government's water science expertise and the link between water science and current water policy in key areas of interest, as is currently being achieved with the GBR.

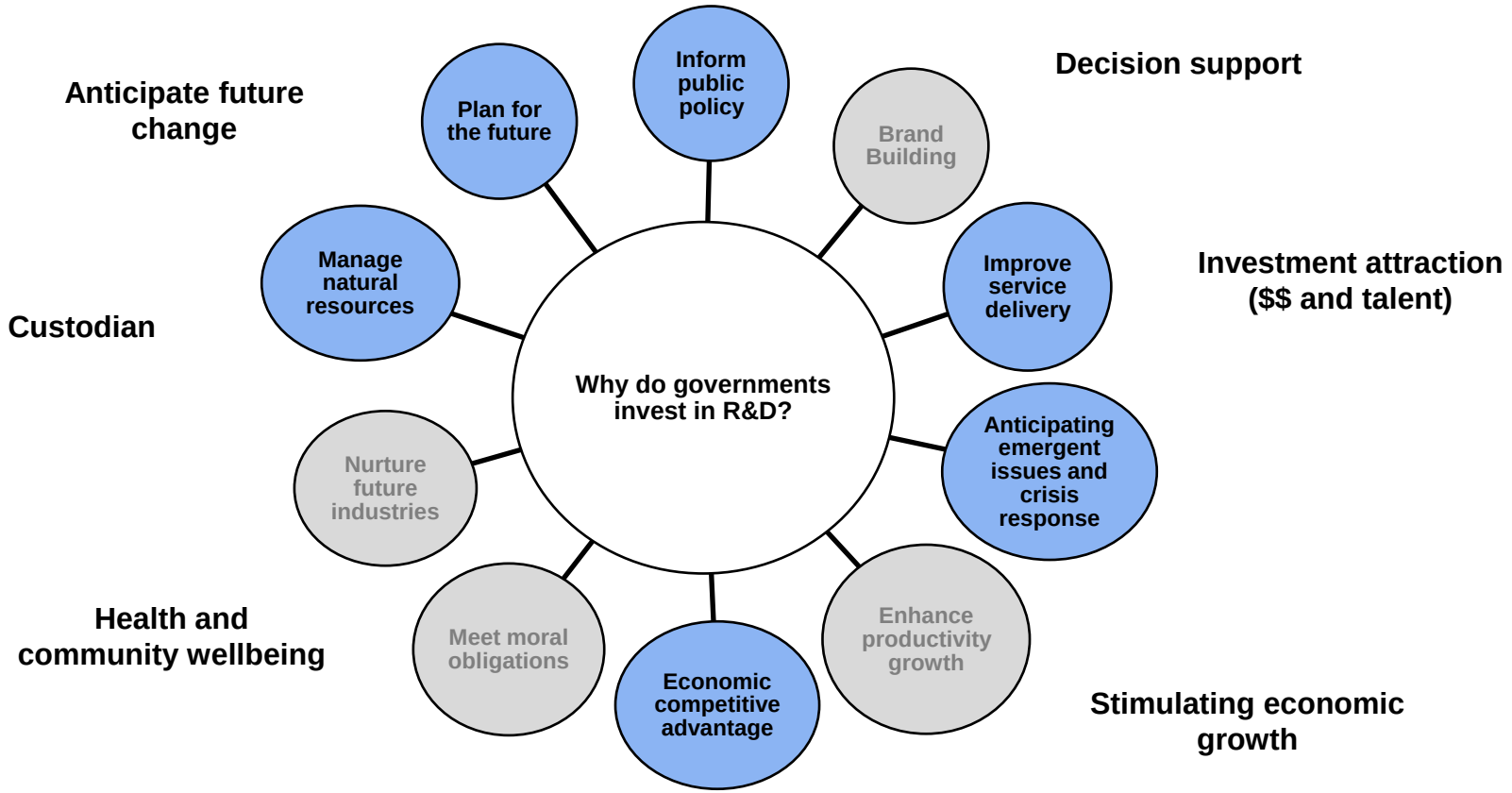
5. **Lost in translation…** Consideration should be given in future appointments, within all departments, to the need for improved translation of science and R&D to effective policy outcomes or management and regulatory actions. Consideration should also be given to a secondment scheme by which DSITIA science personnel spend an extended period (perhaps 12 months) with a line agency or where technically trained line agency staff spend time in DSITIA SDD.

6. **More… and strategic partnering…** Greater use should be made of the very significant water-related science and R&D capability that exists outside of government in Queensland, in particular for addressing emerging trends and strategic needs. Ad hoc partnerships have been used effectively by the government departments in the past for addressing specific capability gaps and these, no doubt, will continue into the future. A more strategic approach, however, to science and R&D partnerships should be developed, linked to the activities outlined in Recommendation 1. International best practice recognises the importance of partnerships in achieving natural resource management goals. A corollary of such partnerships is that governments recognise the need for independence in such entities i.e. many such partnerships will only be effective if they are supported by, but not controlled by government.

Introduction – Why do Governments Invest in Science and R&D?

The figure below summarises the reasons that governments invest in R&D. The blue circles indicate those that are applicable to water-related applied science and R&D capability. Three of Queensland's economic pillars – resources, agriculture and tourism – impact on and are impacted by our water resources. Increased urbanisation, increased industry activity and increased amenity values can lead to conflicting demands and pressures.

The cycle of extreme weather events, which affect all parts of the state, poses increasing challenges to Queensland's communities, industries and aquatic ecosystems. The value of Queensland's water based assets is very high; maintaining the value of these assets with competing economic, social and environmental pressures, under varying climatic conditions requires scientific and R&D expertise. Understanding the potential of our water-related science and research capability is essential if we are to achieve our long term goals.



Issues and questions to be addressed

Describe and analyse the Queensland Government's applied water science and research in relation to the following questions:

1. What is the scope and content of current activities across relevant departments?
2. How does the total suite of activities align with the government's objectives and priorities? These include, but are not restricted to:
   - maximising the return on existing water assets
   - reducing salinity levels and protecting water quality across the Fitzroy Basin
   - ensuring a sustainable, efficient and secure water supply for priority areas
   - encouraging the beneficial use of coal seam gas (CSG) water in a way that protects the environment and maximises its productive use as a valuable resource
   - contributing to economic development targets such as doubling agricultural production by 2040
   - improving the quality of water in the Great Barrier Reef though improved land management in reef catchments
   - establishing appropriate water sharing rules for groundwater management areas
   - optimising the operation of dams to provide multiple benefits in a flood to drought continuum
   - community resilience and user engagement.
3. What are the strengths, gaps, overlaps and conflicts in the existing suite of activities?
4. Who are the key clients and stakeholders? What partnerships currently exist (both within and outside government) in applied water research and science?
5. What resources and capabilities (costs, staffing, infrastructure, library/information services, funding arrangements, etc.) are required to conduct the activities?
6. What are the advantages and disadvantages of the current approach in terms of effectiveness, efficiency and service quality?
7. What alternative models and suppliers could be considered for the provision of the necessary scientific services and advice?
8. What are the benefits, costs and risks associated with the alternative models?
9. What recommendations are proposed for future provision of applied water science and research?

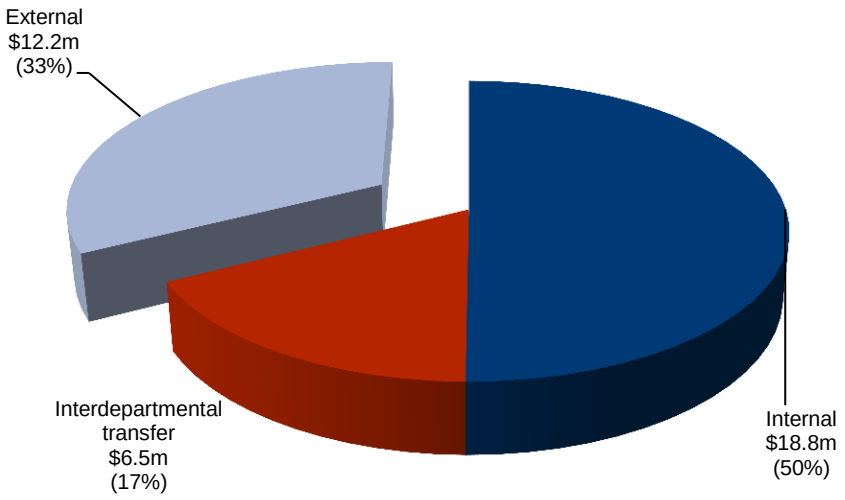
Audit Process

- The Queensland Chief Scientist has been placed in charge of science policy in Queensland, and, in support of this, has oversighted a series of departmental science capability audits to baseline current government expertise and identify future options for government investment in science. Departmental Audits completed to date include DAFF, DNRM, DSITIA, and TMR.
- By contrast, this was the first thematic audit. It examined water science and research across government and aimed to generate an integrated analysis of this highly distributed and complex issue. The audit was sponsored by the five departments with key water responsibilities (DAFF, DEHP, DEWS, DNRM and DSITIA).
- Independent consultants, with appropriate expertise, have been appointed to lead each audit to provide an external perspective, expert analysis and final recommendations. The Office of the Queensland Chief Scientist has provided process support, governance, logistics and review oversight to the audits.
- The audit was performed from January to June 2014.
- Compiling financial data on past projects can be tedious. The efforts of numerous individuals and organisations, both within and outside government, in providing such data and addressing the myriad of questions needed to allow effective interpretation are gratefully acknowledged. Likewise the forthright and constructive discussions which were held with many individuals are acknowledged as a vital part of this review. The authors gratefully acknowledge the preparedness of these individuals to provide their time and their thoughts.
- The audit gathered data on expenditure in applied science and research in water at program level over the past five years, categorised against the eight established COAG categories of water research, namely:
  - Environmental water
  - Water quality
  - Social, economic and institutional reforms
  - Future water availability
  - Irrigation water use efficiency
  - Hydrology and hydrological modelling
  - Urban water systems
  - Groundwater
- At the outset, it was agreed that the audit would focus at the program level, not the individual project level.
- The audit also consulted with other government departments with an interest in water, i.e.*:* DPC; Health; NPRSR; and DSDIP.
- To contextualise the investment of the five sponsoring departments, data was sought from key state-owned, state-influenced and independent entities in the Queensland water sector – including bulk water suppliers, Healthy Waterways, SEQ Catchments, major ports and utilities, Queensland universities, CSIRO, AIMS and the Bureau of Meteorology. The quantitative data was complemented by face-to-face interviews to explore issues in greater depth.
- A series of spread-sheets were generated collating the 2012-13 and any other data from all organisations approached.
- A consultation list for the Audit is provided at Appendix 1.

ToR 1: Scope and content of the current program

In 2012-13, $37.5 million was committed by the five departments on water-related applied science and R&D activities, of which $18.8 million was Queensland Government funding internal to the particular departments (i.e. the departments both commissioned and managed the activity from within the department, although the actual work may have been carried out by another department or external to government), $6.5 million was transferred inter-departmentally (largely to DSITIA from the other four departments) and the remaining $12.2 million came from external sources, principally to DNRM and DSITIA (Figure 1).

Figure 1. Source of 2012-13 Departmental Resources for Water Related Applied Science and R&D



Total - $37.5m

The value of $37.5 million is a net value i.e. it considers intra-departmental transfers only once, while an examination at the individual department level will include these transfers as part of the portfolio of the commissioning department (e.g. DNRM) as well as that of the service department (e.g. DSITIA).

A significant component of the internal funds are for the monitoring of stream flows, groundwater resources and water and ecosystem condition i.e. the activity is driven by the policy, management or regulatory responsibilities of the line agencies rather than a posed research or science question. The datasets generated by these activities, having been produced over extended time periods and quality assured to varying degrees, represent a significant scientific and policy-related asset to help address future state challenges, for example in the development of water markets and ensuring security of entitlement, in doubling the agricultural output of Queensland and, simultaneously, increasing investment in tourism.

The 2012-13 figures reflect a snapshot in time of the level of water related science and R&D activity within the Queensland Government agencies. There are almost certainly some additional commitments from departments such as Health and DPC, but after discussion with the relevant personnel, it was felt that these were captured as external funds to DSITIA or were very small.

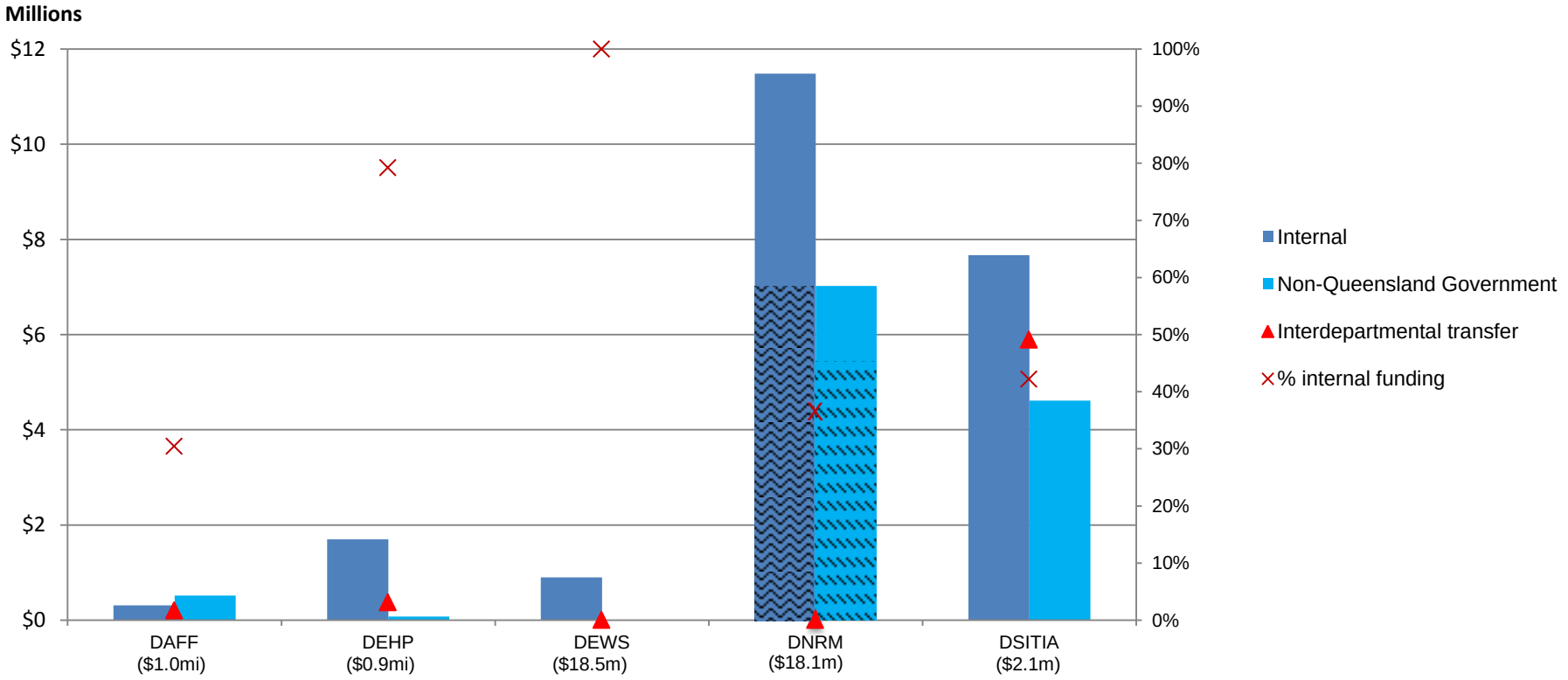
As with any snapshot of science and research activity, the $37.5 million represents a portfolio of ongoing activity mixed with specific short-term project activity. It was agreed by all parties at the beginning of the process that examination of individual projects was beyond the scope of this review. More detailed commentary on some of the existing and recent science programs is found on the following pages.

ToR 1: Scope and content of the current program

Figure 2 shows the sources of funding for water-related applied science and research for each of the five departments. The figures do not differentiate between whether the science activity is ultimately commissioned, managed or actually carried out by the respective department – they are meant solely to indicate the relative proportions of internal, inter-departmental transfer or external funding that each department secures to carry out its water-related science activities.

The cross-hatching on the DNRM Internal bar represents the stream-flow monitoring component while that on the DNRM Non-Queensland Government bar represents funding for the Office of Groundwater Impact and Assessment (OGIA). Figure 2 highlights the significant role of DSITIA as a science delivery mechanism to the other departments and the success of both DNRM and DSITIA in attracting significant external funding for some of their activities.

Figure 2: Source of 2012-13 funding for water-related applied science and R&D within the five Queensland Government departments



ToR 1: Scope and content of the current program

Figures 3 and 4 indicate more clearly the roles of the respective departments in providing water-related applied science and R&D capability, noting again that the general spend within DNRM outside of stream-flow/ ground water monitoring and OGIA is relatively small.

As with Figure 2, Figures 3 & 4 do not differentiate between the disposition or the source of resources received (Figure 3 includes both inter-departmental transfers and resources received from outside the Queensland Government while Figure 4 includes inter-departmental transfers). Figures 3 and 4 depict the overall level of departmental activity in the water-related science space, whether that activity is a commissioning or management activity or an actual science activity.

Figure 3. Total 2012-13 Departmental spend on water-related applied science and R&D

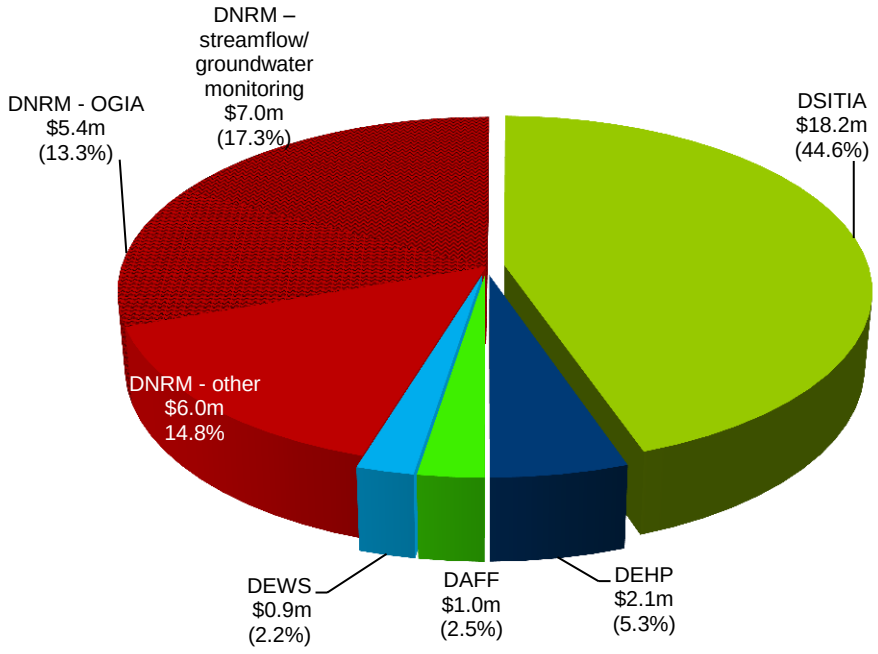
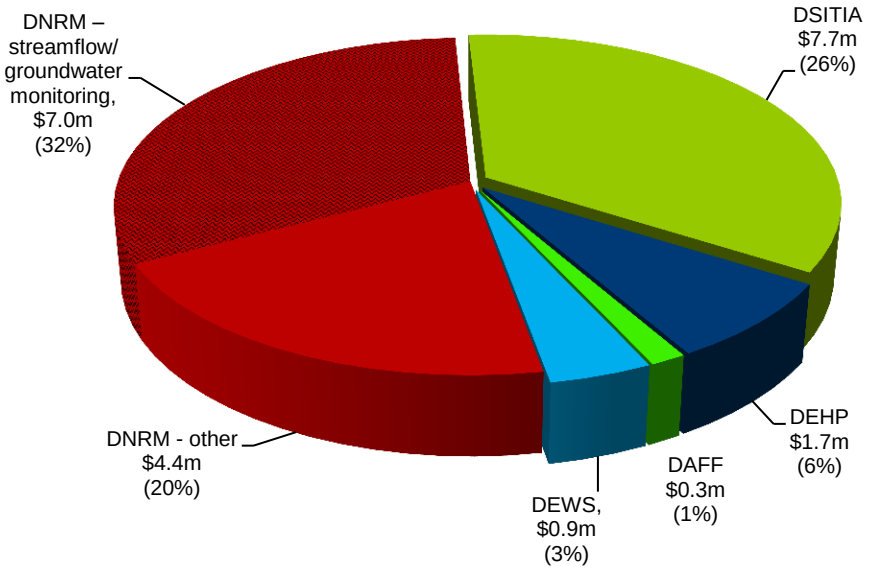


Figure 4. Internal 2012-13 departmental spend on water-related applied science and R&D

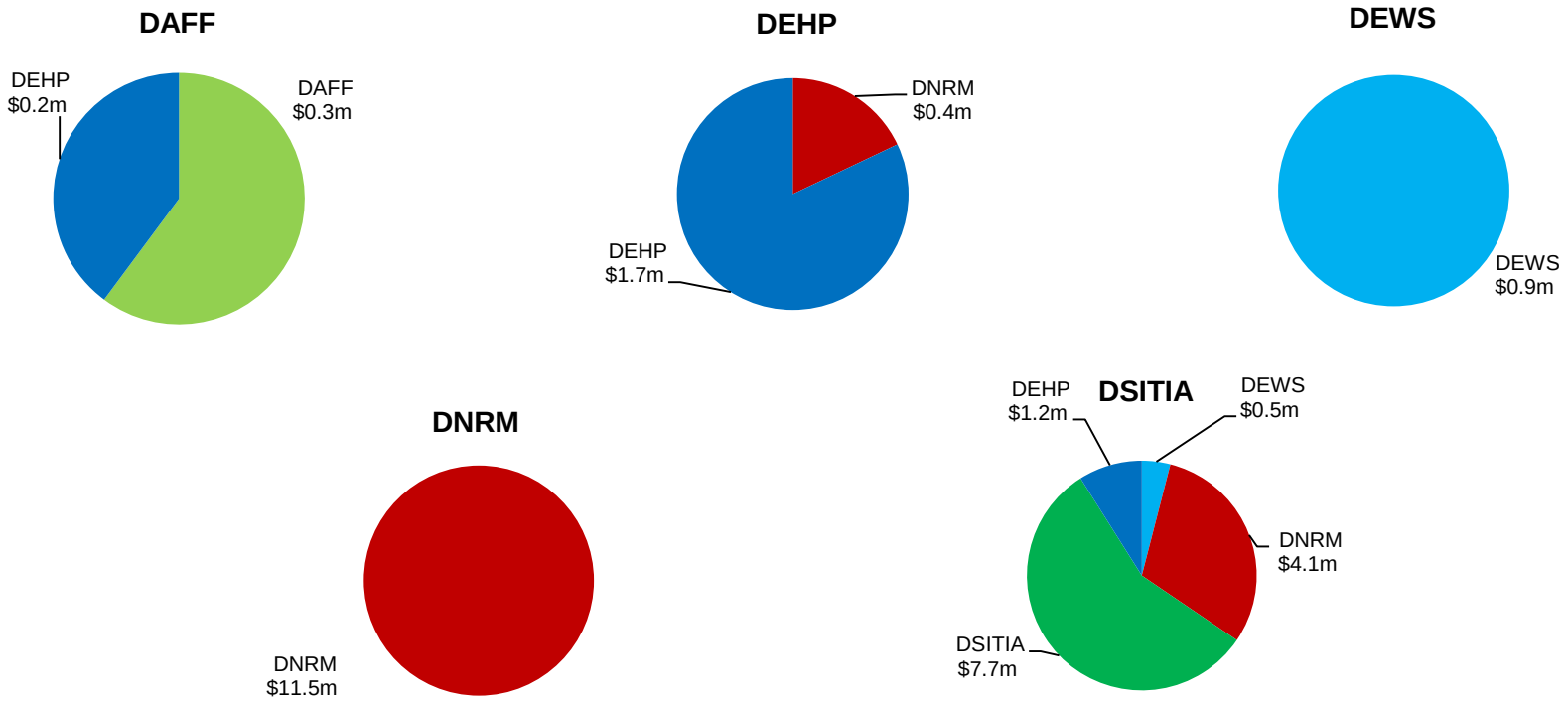


ToR 1: Scope and content of the current program

Figure 5 provides further details of the inter-departmental transfers between the five departments, relative to the internal funding provided by government to each department – it does not include any sources of funding external to the Queensland Government. As with Figures 2 – 4, each departmental pie chart reflects both the internal funds received from central government and any inter-departmental transfers from the other four departments (e.g. funds received by DSITIA from the other departments come largely from internal government funds received by those departments, respectively)

The role of DSITIA as a key service delivery agent in the water-related science space to the other four departments is clear.

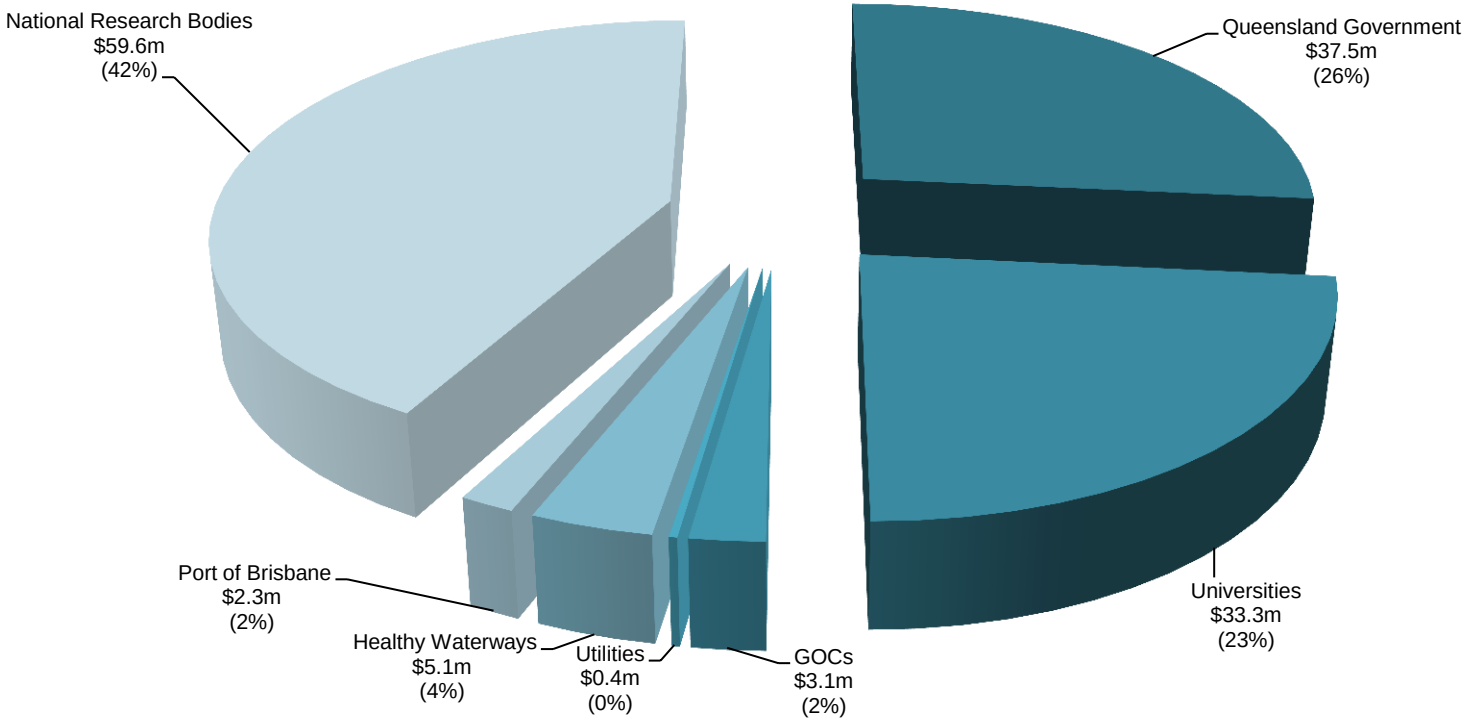
Figure 5. Source of Queensland Government funding in each Department for water science and R&D



ToR 1: Scope and content of the current program

The Queensland Government $37.5 million compares with more than $100 million spent by other statutory bodies, local governments, research organisations, universities and the private sector.

Figure 6. 2012-13 Spend in Queensland on water-related applied science and research



Total Queensland Spend $141.3 million*

* *The $104 million of non-Queensland government department spend represents a lower estimate. This is because the audit did not examine the private sector spend in detail, although some private sector spend is reflected in the numbers provided by the universities and public sector research agencies. A countervailing error (significantly smaller) is the possibility of some of the university and public research agency spend having been counted as part of the spend of the departments. This was assessed as relatively insignificant.*

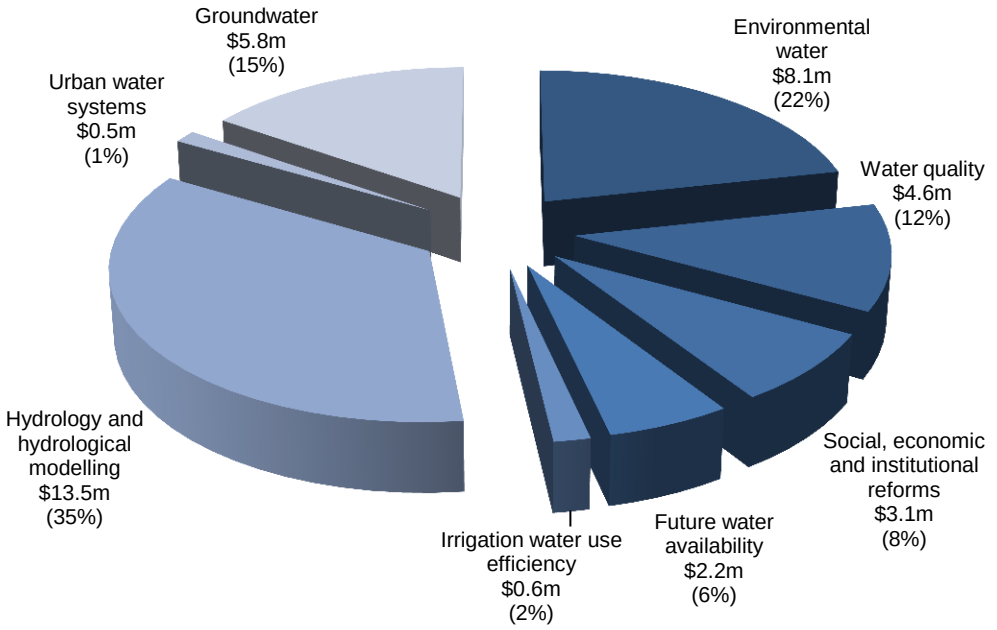
\# *National Research Bodies include CSIRO, Bureau of Meteorology, etc.*

ToR 1: Scope and content of the current program

Across the five departments, 85% of the current applied science and R&D effort in water can be captured in four of the eight COAG water research themes, namely: environmental water; water quality; hydrology and hydrological modelling; and groundwater (Figure 7).

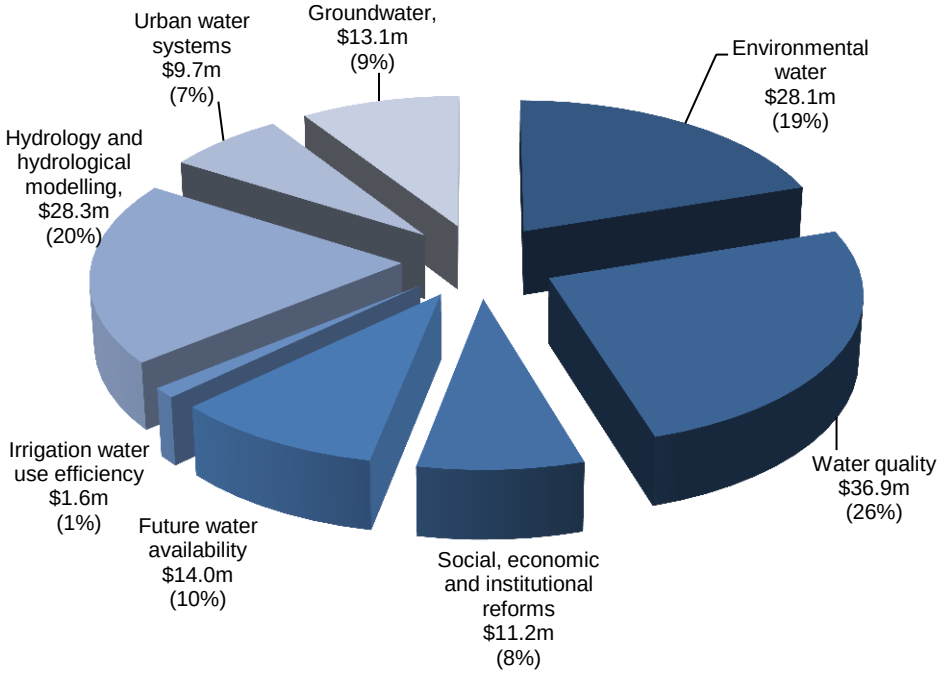
The additional capability within the state in each of the capabilities is shown clearly by comparing the dollar values in each segment between Figures 7 and 8.

Figure 7. Net Departmental 2012-13 spend against COAG categories



Total Net Departmental spend - $37.5 million

Figure 8. Total Queensland spend 2012-13 against COAG categories ($ million)



Total Queensland spend - $141.3 million

ToR 1: Scope and content of the current program

- The majority of applied science activity can be classified as operational* research and is focused on the short term, being driven by the immediate requests of the line agencies.
- There appeared little interest within the departments (with a few notable exceptions) of considering the water cycle as an overall system, in contrast with current international thinking. This “silo” approach allows for greater focus on current issues that have previously been identified, but does not encourage a strategic understanding of future issues. As a consequence, there appeared to be little investment in addressing future strategic issues through relevant water related applied science and R&D.
- A major focus of the Queensland Government’s investment in water related applied science is related to its role in monitoring and managing surface water, ground water and aquatic ecosystem quantities and/or quality – this is core business for the state. Yet, there appears limited investment in accessing the advances that are occurring worldwide in remote sensing, large scale data issues, visualisation, etc. There are exceptions to this (e.g. Queensland Government investment in eReefs via GBRF; remote sensing group, although it currently has a greater focus on terrestrial rather than aquatic systems). The area stands out as one in which extending the existing partnerships with external research organisations is likely to prove valuable.

** ‘operational research’ in this instance means research to facilitate and support the operations of the individual agency*

Key Findings – Term of Reference 2

ToR 2: Alignment of Program with Government Objectives and Priorities

- The water related applied science and R&D effort is broadly consistent with current, internal policy drivers of the four line agency departments. Supported by external perceptions of the role of government, these drivers essentially establish that it is core business of government to generate information on and manage:
  - extent of and availability of surface water resources in Queensland;
  - extent of and availability of groundwater resources in Queensland; and
  - condition of surface water and ground water resources and aquatic eco-systems of Queensland.

- The water related applied science provides information directly relevant to three of the four pillars around which growth in Queensland is focused: tourism, agriculture and resources.

- The long-term data-sets related to stream flows, ground water supplies and quality, eco-system condition and the related modeling and monitoring expertise that lie behind this activity represent scientific assets of significant value in helping facilitate the relevant pillars of growth. Given the core nature of this activity for government, maintenance of such capability should be seen as a priority and expertise retained within government to allow this to continue. The value of Queensland's aquatic assets (surface water, ground water, aquatic ecosystems) is very high and maintaining the value of these assets requires policies and management actions informed by evidence. This is a role for government or for government in partnership with other R&D based organisations. The threats to these assets in the future will come from increased competition for available resources, potentially conflicting quality demands, ensuring that environmental performance underpins economic activity and externally imposed events. Not being able to access timely and reliable scientific and other evidence exposes the state to enhanced financial, social and legal risk.

- The $19 million of internal resources represents a decrease over the past few years in commitment to applied science and R&D. It was not possible to be precise as to the extent of this decrease in $ terms because of the changed institutional structures, but the conclusion is supported by a lower 2012-13 spend relative to the recent average annual spend, reduced FTE numbers and internal and external observations on capacity. Such a decrease reflects, in part, the conclusion of investment in two large collaborative programs – UWSRA ($50 million over five years) and the eWater CRC – as priorities have changed.

Key Findings – Term of Reference 3

ToR 3: Strengths, Gaps, Overlaps and Conflicts

- There are science strengths in a number of the areas relevant to the core functions of the departments, primarily within DNRM and DSITIA: surface water hydrology, ground water modeling and monitoring, ecosystem monitoring, wastewater discharge monitoring and licensing and catchment load modeling. Within DSITIA, there are significant strengths in remote sensing, however, it appears that the effort of this group is more focused on terrestrial issues rather than aquatic issues.

- While there has been a reduction in the overall science effort and capability within the departments, the key areas have been somewhat protected and, in the case of groundwater modeling and monitoring, actually enhanced, albeit from externally generated funds.

- There was little evidence of overlap in terms of science or R&D activities within or between the departments.

- Given that most of the water related applied science and R&D activity was driven by the immediate operational needs of the departments and that there have been financial cutbacks over the past few years, it is not surprising that the gaps in the program relate to longer term issues. Water as a holistic system (in particular links to management of catchments beyond farm management), water issues linked to the climate cycle including extreme events, modeling relevant to ecosystems of different form and scale and economic research relevant to water issues all appeared as gaps. It is unrealistic to expect government to resource research into every future option, but there does not appear to be an overall strategic approach to what future water research issues should be resourced.

- A second potential gap lies in the translation of research outcomes into policy or management action. There exists within all the departments a number of key individuals who understand both the policy and management space and the potential of science and R&D to address these issues. There was general concern that as these individuals left the system that a major gap would arise in effectively utilising government's water related science and R&D capability. To some extent, effective recruitment will alleviate this issue, but there was a strong feeling from all departments that the translation and 'silo' issues needed to be addressed explicitly.

- The principal form of conflict raised in discussions referred to broad communication issues related to the dominant service delivery model. A number of positive initiatives have been taken, particularly by DSITIA SDD staff, to address these issues and it is recommended that such efforts be encouraged.

Key Findings – Term of Reference 4

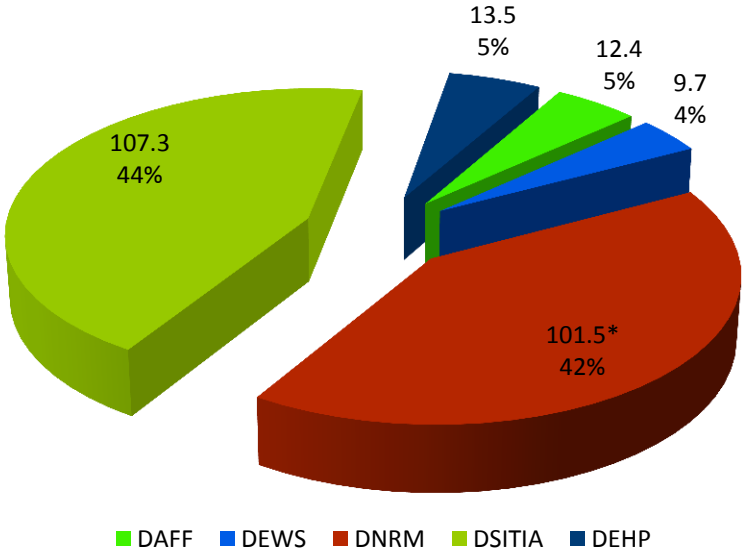
ToR 4: Key Clients and Stakeholders

- The major clients for water related applied science and R&D activities are Queensland Government Departments. This includes four of the five departments sponsoring this review - DAFF, DEWS, DNRM and DEHP - as well as DSDIP and DPC.
- The principal interaction model with these sponsoring departments, particularly for the DSITIA water science groups, is via either a co-sponsoring approach or a purchaser-provider model. In either case, the sponsoring department is the driver for the work being funded and DSITIA is effectively a service provider, in some cases providing additional resources from within the DSITIA budget.
- The service provider model requires within the sponsoring agency a clear appreciation of the linkages between particular policy, management or regulatory issues and the role of applied science, data or evidence generation; within the science agency a focused, project orientated approach; and, within both, mechanisms to ensure ongoing communication and effective translation. While comments were received that the DSITIA groups were addressing its issues (improved focus, responsiveness), it was not clear that the complementary requirements in the agencies sponsoring the work were always appreciated.
- Other clients include Commonwealth agencies (e.g. BoM), local government authorities and a number of state-wide partnerships (e.g. Healthy Waterways) as well as corporate clients involved in joint government-industry programs (e.g. Office of Groundwater Impact Assessment (OGIA)).
- The water related science groups within DSITIA are perceived to be more independent than when they were within a line agency department (e.g. when they were more closely aligned to regulators) and this has generated a slight increase in external demand for their services in interacting with the line agencies (e.g. on compliance and related issues).
- A recent survey by DSITIA SDD ("2012-2013 Client Satisfaction Survey Results – Science Delivery) showed a high level of satisfaction by all client departments for services provided in the 2012 – 2013 financial year. Over 90% of respondents were satisfied across the key drivers of satisfaction (timeliness; ease of access; staff; quality; and outcomes/outputs); 81% were satisfied by SDD's management of concerns or issues; and 67% were satisfied with the management, negotiation and/or responses to the development of new science services.

ToR 5: Resources & Capability to Conduct the Program

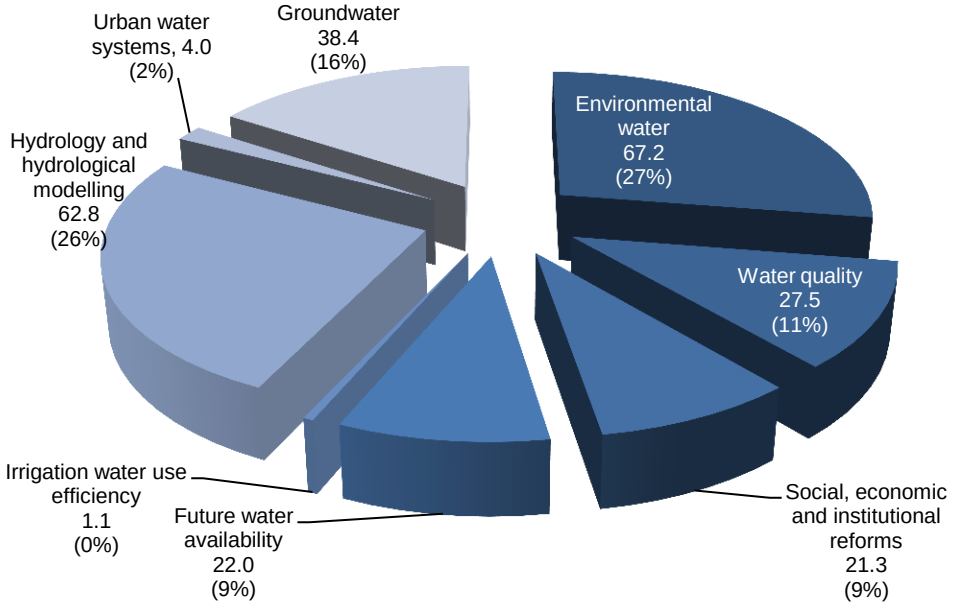
- The estimated net spend by the five departments in 2012-13 on water related applied science and R&D was $37.5 million.
- DSITIA (44.6% of total departmental spend) and DNRM (45.4% of total departmental spend) accounted for the majority of water related applied science and R&D spend within Queensland Government.
- The estimated staffing levels involved in water related applied science & R&D in 2012 -13 were 244.4 Full Time Equivalents (FTEs), with the relative numbers in each agency reflecting the dollar spend. This represents a drop relative to 2011-12 of 29 FTEs (11%). This reduction was softened by the establishment of 9 externally funded additional FTEs on the Queensland Water Commission demise and establishment of the Office of Groundwater Impact Assessment (OGIA) within DNRM. Exclusive of this number, the drop in capability over the twelve months would have been 38 FTEs (14%). Over 2012-13, the Public Service Commission reported an average drop in public servant numbers across Queensland Government of 6.5%.
- Figures 9 indicates the disposition of staff by department while Figure 10 does so by COAG category.

Figure 9. Water-related applied science and R&D FTEs in core Queensland Government departments 2012-13



**Includes OGIA staff (17 FTEs)*

Figure 10. Distribution of Queensland Government 2012-13 water related applied science and R&D FTEs by COAG classification



Key Findings – Term of Reference 5

ToR 5: Resources & Capability to Conduct the Program

- It was not possible to obtain clear trends on the change in financial resources allocated over time to water related applied science and R&D because of the changed departmental structures since 2012. A comparison of the actual spend on specific programs in 2012-13 compared to the average spend over the past few (up to 5) years, where available, showed a decline in the resources being applied to water related science. Changes in FTE numbers in the agencies support the argument that capability in this area has been reduced. The view from external groups is that Queensland Government capability in water related issues, particularly in catchment hydrology and urban water issues, has declined significantly over the recent past, to the extent that in some eyes Queensland is no longer seen as a significant player on the national scene. This needs to be put in the context that water as a national issue is seen politically as less significant than it was a few years previous.

- There is a vulnerability in capability in water related science and its application to policy, management or regulation. This vulnerability relates to the lack of depth of talented professional leaders in the science space and to the loss of experience in the translation process from science to policy, management and regulation. In a number of areas, the loss of a few key individuals either by retirement or resignation will have a marked negative effect on Queensland Government's capacity in the overall water sector. Departments are aware of this issue and are looking to address it through effective recruitment, however the vulnerability in the short to medium term remains.

- Because of resource constraints, there is limited capacity within the five departments to initiate or undertake longer term research on issues related to strategic threats or opportunities related to the water sector. There are, however, longer term issues in Queensland involving water science, R&D and policy that suggest there would be value in identifying the most significant of these and allocating resources to the science and R&D needed to understand and address these issues.

- Outside of the Queensland Government, the state has very significant capability in water related science and R&D capability as Figures 11 & 12 on the following page show. In particular, there are four groups that have major research capability – the Australian Rivers Institute (ARI) at Griffith University, the Advanced Water Management Centre (AWMC) at The University of Queensland, TropWATER at James Cook University and CSIRO at the Ecosciences Precinct – as well as a number of smaller, more focused groups.

- While the capabilities of these external groups do not match perfectly the needs of government, there is significant overlap. The depth of external expertise begs the question of why the Queensland Government does not make greater use of this expertise in a more strategic fashion than the current ad hoc (but often effective) partnership arrangements. All partnership arrangements incur transaction costs; so partnering just for the sake of partnering is not proposed. Rather, identifying one or more groups who are likely to provide ongoing access to relevant expertise and thinking, based on the future needs of Queensland, is suggested as a way forward.

ToR 5: Resources and Capability to Conduct the Program

Figure 11 Location of Water Related Applied Science and R&D Human Resources in Queensland in 2012-13 (FTEs)

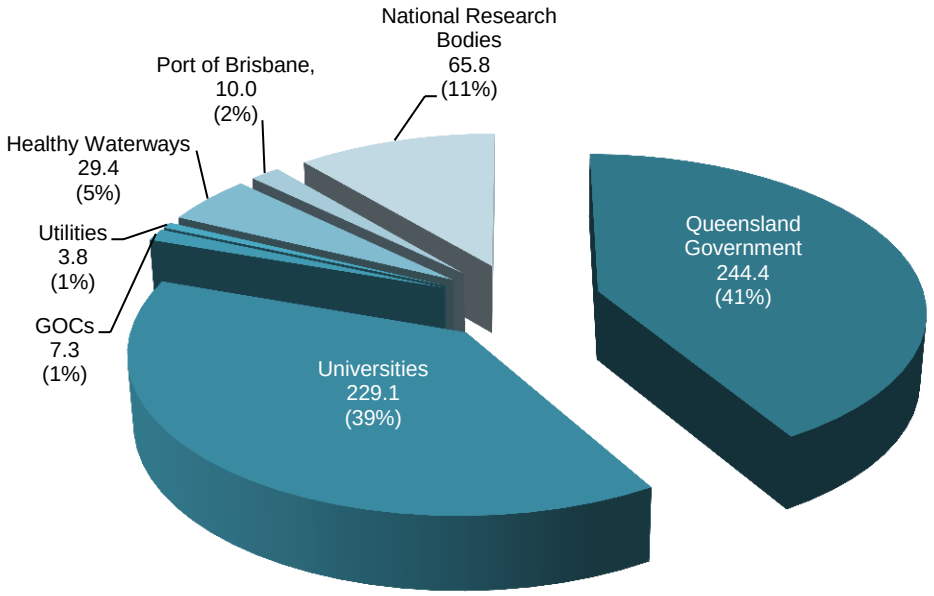
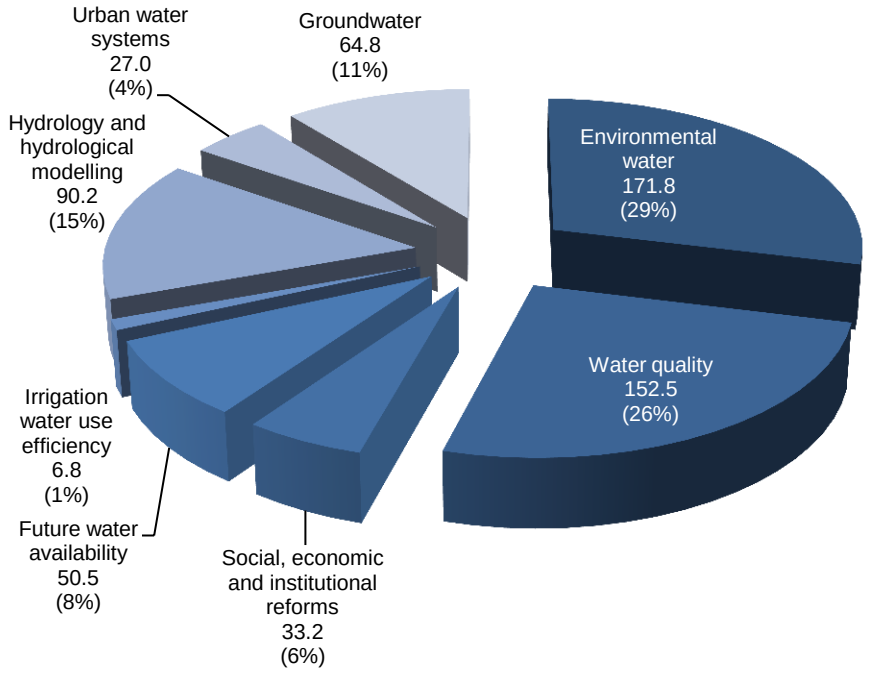


Figure 12 Distribution of Water Related Applied Science and R&D Human Resources in Queensland in 2012-13 by COAG Classification (FTEs)



Key Findings – Term of Reference 6

ToR 6: Advantages/Disadvantages of the Current Program

- The dominant feature of the current water related applied science & R&D delivery program is the role of DSITIA SDD as service provider to the other agencies. This model differs from the traditional approach where relevant science capability is co-located in the same agency involved in water related policy, management or regulation.
- A key advantage of the current model is the greater independence, both real and perceived, that the SDD group has by being separated from the line agencies. Independence is a key requirement of any top-class science group and the current model is seen to confer greater confidence in external parties than the traditional model. An external view was that groups are more likely to access SDD expertise than they were when science was managed within a regulatory agency.
- In addition, the service delivery role is brought into sharper alignment with the current model, and positive comments were received from within the other agencies as to the more focused approach of the DSITIA SDD groups in dealing with requests from those agencies relative to the past.
- A third (potential) advantage is the co-location with a major research agency (CSIRO) in a well-equipped, modern facility.
- Against these advantages there are a significant number of disadvantages, not all of which are a sole function of the current structure, and some of which can be addressed through specific actions:
  - lack of critical mass overall
  - lack of support for a strong research culture or of appropriate performance metrics beyond financial viability
  - inflexibility in joint venture arrangements and in appointment processes and employment conditions
  - dependence for resources on short - term goals of other agencies, with little say over annual changes
  - increased structural difficulties in ensuring effective translation of science into policy, management and regulation, because of silo effects.
- Another component of the current program that is noteworthy is demonstrated by the role of the Office of Groundwater Impact Assessment (OGIA). Fully funded by industry, operating within a technical and financial governance framework, managed by a group within DNRM with strong strategic leadership and backed by a key piece of CSG related legislation, this model is seen by national agencies, industry and within government as a real success.
- Likewise, Healthy Waterways Ltd - a partnership between DSITIA, DEHP, local government, other government and industry entities, research institutions and community groups to provide science and research capability to inform the management of South East Queensland waterways - has helped deliver aquatic ecosystem improvements in South East Queensland beyond that which any single organisation could have achieved. It is seen worldwide and nationwide as an example of best practice.

ToR 7 and 8: Alternative Models & Benefits/Costs and Risks

- The principal manner in which water related applied science and R&D are delivered to line agencies is via DSITIA entering into co-funding arrangements with the line agencies on agreed tasks and then carrying out those tasks, primarily using DSITIA SDD staff. These agreements are typically short-term e.g. one year or less.
- Within the line agencies, some activities are retained which generate applied science outcomes. In particular, the generation of stream-flow data and groundwater data is managed within DNRM, not as a scientific activity per se, but the activity gives rise to data sets of significant scientific value in addressing questions related to water allocations and increased agricultural output. Within DAFF, a small amount of water related applied science continues (e.g. irrigation efficiency), but most, as with DEHP and DEWS is outsourced from the DSITIA agency.
- DSITIA and DNRM themselves outsource activity when it is not core to their agreed mission or when specialist skills are required. This appears to occur on an ad hoc basis, but seems effective as far as it goes.
- Figures 13 to 17 depict how the total Queensland Government spend is managed by the commissioning department, either in-house or outsourced.

Figure 13 DAFF Outsourcing and In-house effort Total Resources

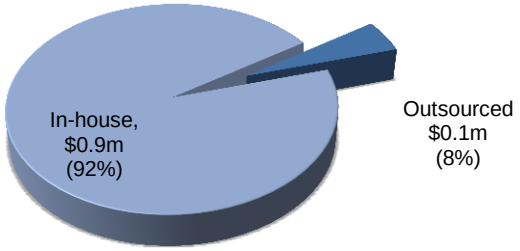


Figure 14 DEHP Outsourcing and In-house effort Total Resources

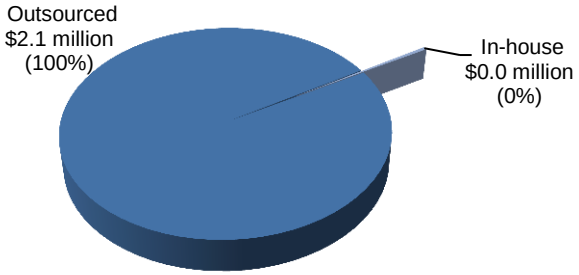


Figure 15 DEWS Outsourcing and In-house effort Total Resources

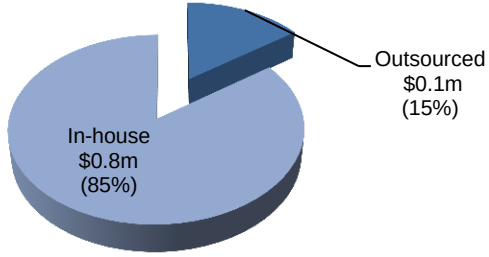


Figure 16 DNRM Outsourcing and In-house effort Total Resources

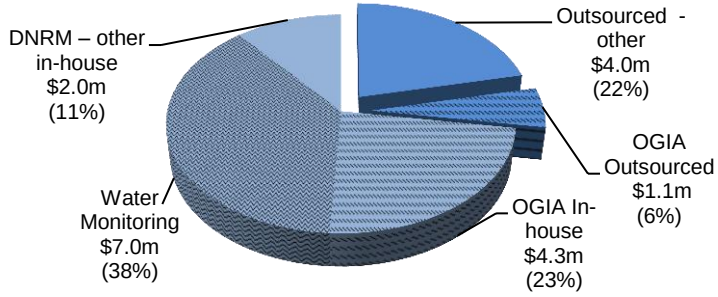
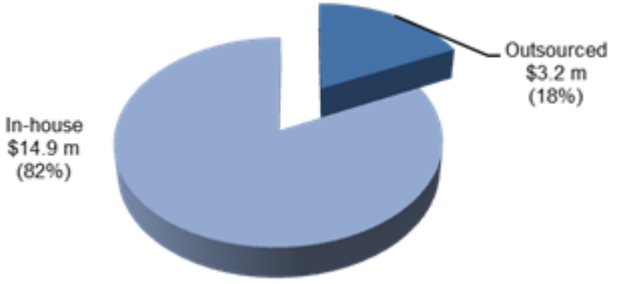


Figure 17 DSTIA Outsourcing and in-house effort Total Resources



ToRs 7 and 8: Alternative Models and Benefits/Costs and Risks

- There are a number of alternative models in the water-related applied science space, in which the Queensland Government has current or has had past involvement:
  - Industry-funded, government managed e.g. OGIA
  - Partnerships, generally based on the provision of funding for specific projects e.g. Healthy Waterways, Gladstone Healthy Harbour, SEQ Catchments, Great Barrier Reef Foundation (GBRF), “Paddock to Reef”, Urban Water Supply Research Alliance (UWSRA), eWater CRC, TropWATER, CSIRO Memorandum of Understanding
  - Shared appointments e.g. Australian Rivers Institute (ARI, Griffith University) – DSITIA
  - Co-funded university centre e.g. ENTOX – The University of Queensland and Queensland Department of Health

- There are collaborative models in other sectors which involve a significant investment by the Queensland Government but which include only a small level of water related science:
  - Queensland Alliance for Agriculture and Food Innovation (QAAFI, The University of Queensland)

- There are national collaborative models in the water related research sector in which the Queensland Government is not involved:
  - CRC for Water Sensitive Cities
  - Australian Water Recycling Centre of Excellence
  - National Centre of Excellence in Desalination Australia
  - The National Centre for Groundwater Research and Training

- A summary of three of these models - OGIA, Healthy Waterways and TropWATER – is found in Appendix 2. What is significant in each of these models is that they are designed to achieve very different objectives.

  1. OGIA brings together major industry (CSG) players with government to deliver a modeling and monitoring program which is closely linked to actions to minimise or mitigate groundwater impac from CSG operations. Although responsibilities are established within a statutory framework, it operates using a coordinated approach from industry and government; in addition it is clearly suited to a situation where there are a limited number of larger industry players who are capable of contributing financially. From a government viewpoint, it achieves the goal of sustaining significant groundwater expertise within government, even though it makes use of external groups for some of the applied science and R&D.

  **An OGIA-style model appears particularly suited for application to a geographical region where water impacts are likely to be caused by the activities of a relatively small number of entities which are sufficiently large to be able, not only to pay for the monitoring and modeling required for effective management, but also participate actively in generating the data for sharing amongst all players. An example might be groundwater issues in the Galilee Basin being impacted by future mining and CSG or shale gas operations.*

ToRs 7 and 8: Alternative Models and Benefits/Costs and Risks

2. Healthy Waterways provides scientific evidence to develop the policies and management actions necessary to ensure the quality of South-East Queensland's aquatic ecosystems. Its strengths are its independence and its ability to leverage and coordinate financial resources, intellectual capability and community engagement. It leverages funding provided by its partners for the monitoring, modeling and science necessary for understanding the pressures on the rivers and bays and for developing appropriate responses to these pressures. It has shown over almost 20 years its ability to capture the intellectual capability of the region's research organisations. Most importantly, it provides focus and coordination for the many community based organisations who contribute to the efforts to improve ecosystem health. A key role of an independent Healthy Waterways is to communicate the state of the rivers, estuaries and bays to the community. Unlike OGIA, it has no regulatory clout, but has contributed to significant investment decisions in the region that have led to improvements in ecosystem quality. It is unlikely that these improvements would have been achieved by regulation alone, nor by any one of its partners.

**The Healthy Waterways type model appears appropriate for a region involving multiple stakeholders of unequal size and power, who have a vested interest in a particular water related outcome and who can contribute in different ways. Independence is essential for such a relationship to remain effective over the medium term. A more recent example utilising some of the same principles is seen in the Gladstone Healthy Harbour Partnership.*

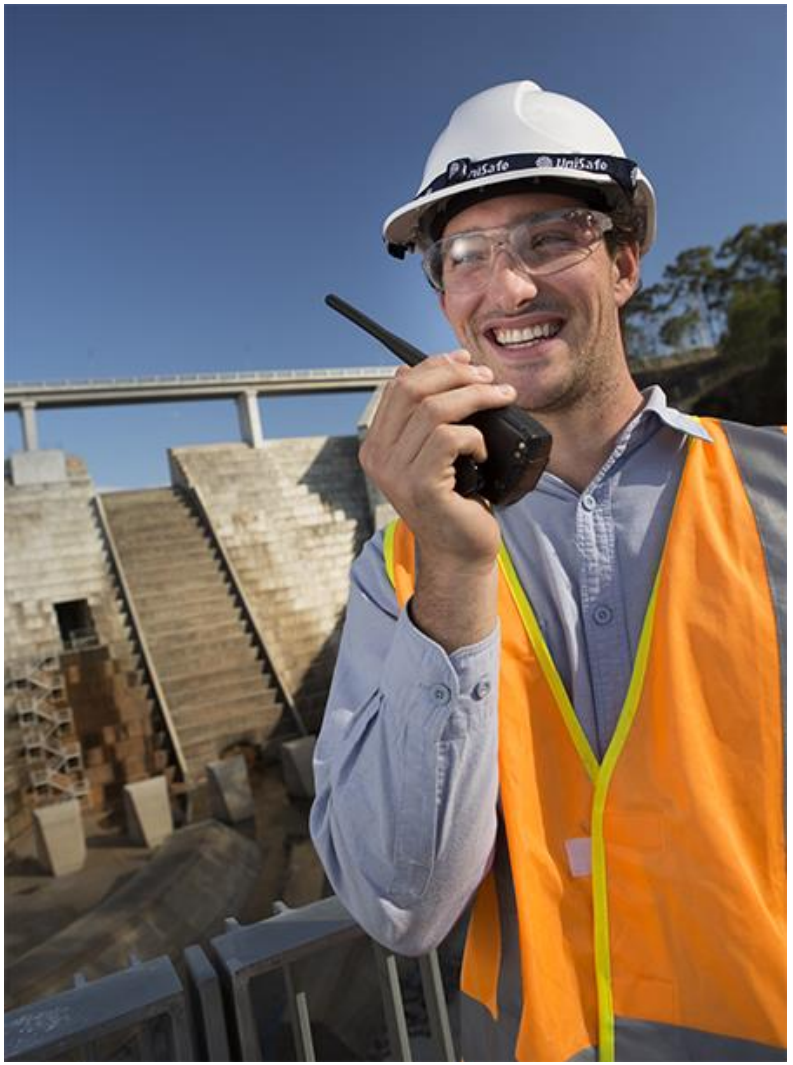
3. TropWATER is an example of how university and other public sector research agencies can perform effective water related applied science and R&D when that role is clearly acknowledged in their mandate. It was formed when a group of water professionals moved from the Queensland Government (DAFF) to James Cook University. TropWATER receives no guaranteed funding from government (unlike QAAFI) but has built up a successful business based on its applied research and consulting capabilities.

**The potential of this model lies in the ability of the Queensland Government to maintain access to science skillsets which it needs periodically and/or which are developing rapidly on an international scale (e.g. custodianship and further development of water quality models, measures of aquatic ecosystem health, remote sensing technologies – an area in which DSITIA has considerable expertise, visualisation of natural resource data, etc). There is considerable variation possible in the nature of the model as shown by the extremes of QAAFI and TropWATER. Potential partners in this model are Griffith University (freshwater ecosystems), The University of Queensland (remote sensing, visualisation), AWERA - a joint venture between Griffith University and The University of Queensland - (aquatic ecosystem modeling and monitoring) and CSIRO at the Eco-sciences Centre.*

ToR 7 & 8: Alternative Suppliers/Models and Benefits/Costs and Risks

- Some of the current arrangements involving external groups and multiple line agency departments in terms of funding water related applied science and R&D appear confused. An example is Healthy Waterways, which is viewed in an international setting as a major success story for Queensland. While aspects of Healthy Waterways are undergoing necessary change, a key element of its success has been its independence. It accesses cash and in-kind resources from both DEHP and DSITIA (and previously DNRM), along with cash from local councils and other bodies (e.g. Seqwater). The complicated and inflexible manner in which Healthy Waterways is resourced by DEHP and DSITIA appears to leave each party dissatisfied in terms of transparency, accountability and value for money (DEHP's concern appears largely to be about funding issues, DSITIA's about value for money and Healthy Waterways' about inflexibility of resourcing affecting their perceived accountability and value for money).

- The approach to external science and R&D partnerships appears *ad hoc* rather than strategic. Such *ad hoc* partnerships appear effective at addressing specific capability gaps, but there is potential for the Queensland Government to gain much more if it were to enter a limited number of strategic partnerships. This is particularly so in some of the emerging issues that will impact Queensland's water resources over the coming years. Before any such specific partnership is developed, however, principles related to control (or independence), leverage and ongoing funding sustainability need to be agreed.



Appendix 1 – Consultation List

Glossary

AIMS:	Australian Institute of Marine Science
AWMC:	UQ's Advanced Water Management Centre
AWRCoE:	Australian Water Recycling Centre of Excellence
BOM:	Bureau of Meteorology
CSIRO:	Commonwealth Scientific and Industrial Research Organisation
DAFF:	Department of Agriculture, Fisheries and Forestry
DEHP:	Department of Environment and Heritage Protection
DEWS:	Department of Energy and Water Supply
DNPRSR:	Department of National Parks, Recreation, Sport and Racing
DNRM:	Department of Natural Resources and Mines
DPC:	Department of the Premier and Cabinet
DSDIP:	Department of State Development, Infrastructure and Planning
DSITIA:	Department of Science, Information Technology, Innovation and the Arts
EHMP:	Ecosystem Health Monitoring Program
IWC:	International Water Centre
OGIA:	Office of Groundwater Impact Assessment, DNRM
QAAFI:	Queensland Alliance for Agriculture and Food Innovation
QH:	Queensland Health
UWSRA:	Urban Water Security Research Alliance

Queensland Government

DAFF

Beth Woods, Deputy Director-General

Lea Diffey, Director, Agricultural Resources and Planning

Mark Hickman, Sustainable Farming System Science Leader

DEHP

Jon Black, Director-General

Tony Roberts, Deputy Director-General, Environmental Policy and Planning

Peter Hutchison, Executive Director, Environment and Water Quality

John Bennett, Chief Scientific Officer

Matthew Fullerton, Principal Policy Officer, Strategic Policy Services

DEWS

Dan Hunt, Director-General

Ken Sedgwick, Deputy Director-General, Water Supply and Sewerage Services

Abel Immaraj, General Manager, Water Supply Planning

Kirsten Shelly, Director of Water Strategies Water Supply Planning

DNPRSR

John Glaister, Director-General

DNRM

Brett Heyward, Director-General

Sue Ryan, Deputy Director-General, Policy & Program Support

Lyall Hinrichsen, Executive Director, Water Policy

Darren Moor, Executive Director, Central Region

Lloyd Taylor, Executive Director, Operations Support

Randall Cox, General Manager, OGIA

Universities or research

CSIRO

Andrew Johnson, Group Executive, Environment

CQU

Helen Winchester, Vice-Chancellor, Academic and Research

Grant Stanley, Pro Vice-Chancellor (Research)

Griffith University (GU)

Ned Pankhurst, Senior Deputy Vice Chancellor

GU - Australian Rivers Institute (ARI)

Stuart Bunn, Director

Jon Olley, Professor of Water Science

Liz O'Brien, Senior Research Development Officer (ARI)

James Cook University (JCU) - TropWATER

Damien Burrows, Director

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Arun Sharma, Deputy Vice Chancellor, Research and Commercialisation

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AWMC

Jurg Keller, Director

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John Gunn, CEO

Britta Schaffelke, Research Program Leader

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Tony McAlister, Managing Director

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Rob Vertessy , CEO & Director of Meteorology

AWRCoE

Mark O'Donohue, CEO

Healthy Waterways

Julie McLellan, CEO

IWC

Mark Pascoe, CEO

National Groundwater Centre

Craig Simmons, Director

Port of Brisbane

Craig Wilson, Environment Manager

QldWater

Dave Cameron, a/CEO

Rob Fearon, Director, Innovation Partnerships

Queensland Urban Utilities (QUU)

Robin Lewis , Chief Operating Officer

Paul Belz, Executive Leader, Planning

SEQ Catchments

Simon Warner, CEO

Key point: Consultation with clients was conducted through face-to-face and phone interviews by the audit team.

Appendix 1 – Consultation List

Queensland Government

DPC

Adrian Jeffreys, Executive Director Environment and Resources Policy

Grahame Byron, Director Reef Water Quality Protection Plan Secretariat

Bernadette Zerba, Director, Economic Policy

Emma Richter, Senior Policy Officer Economic Policy

DSDIP

Jamie Merrick, Deputy Director-General

Andrew Broadbent, Director, Regulatory Reform & Industry Facilitation

Andrew Walls, Director, State Development

DSITIA

Sue Rickerby, Director-General

Christine Williams, Assistant Director-General John Ruffini, Director, Water Planning Sciences

Julia Playford, Director, Water Quality and Aquatic Ecosystem Health

Michael Warne, Chief Scientist, Catchment Water Science

Leon Leach, Principal Project Officer, Queensland Hydrology

Satish Choy, Principal Scientist, Water Planning Ecology

Ian Ramsay, Aquatic Ecosystem Risk and Decision Support

Mark Jacobs, Executive Director, Science Development

QH

Janet Cummings, Advanced Environmental Health Scientist (Water), Environmental Health Regulation and Standards (Water Program)

The University of Queensland

Max Lu, Deputy Vice Chancellor, Research

Chris Moran, Director, Sustainable Minerals Institute

Andrew Garnett, Director, Centre for Coal Seam Gas

Other

Leith Boully

Piet Filet

Ian Poiner, Marine Scientist

Seqwater

Peter Dennis, CEO

Kate Lanskey, Manager, Water Supply Planning

Annalie Roux, Manager, Policy Strategy Research and Innovation

SunWater

Gordon Delaney, Manager, Water Planning Environment & Quality

UnityWater

David Fillmore, Technical Support & Innovation Manager

Barry Holcroft, Manager Technologies

Gold Coast Water

Dick Went, Manager, Operational Strategy

Kelly O'Halloran, Coordinator Process Engineering

Jo Csik, Coordinator Product Quality

Kylie Catterall, Coordinator Management Systems (Quality Performance & Compliance)

Jennifer Higgins, Coordinator Scientific Services

CRC for Water Sensitive Cities

Fiona Chandler, Leader Communications and Adoption

Appendix 2 - Alternative Models

Example 1 – Office of Groundwater Impact & Assessment (OGIA)

The Queensland Government has a regulatory framework to support the sustainable development of the coal seam gas (CSG) industry. The framework includes a role carried out by the Office of Groundwater Impact Assessment (OGIA), with regard to the management of the impacts from CSG water extraction.

OGIA is an independent entity established under the *Water Act 2000*. It is housed within the Queensland Department of Natural Resources and Mines, which provides corporate and administrative support. OGIA is funded through an industry levy.

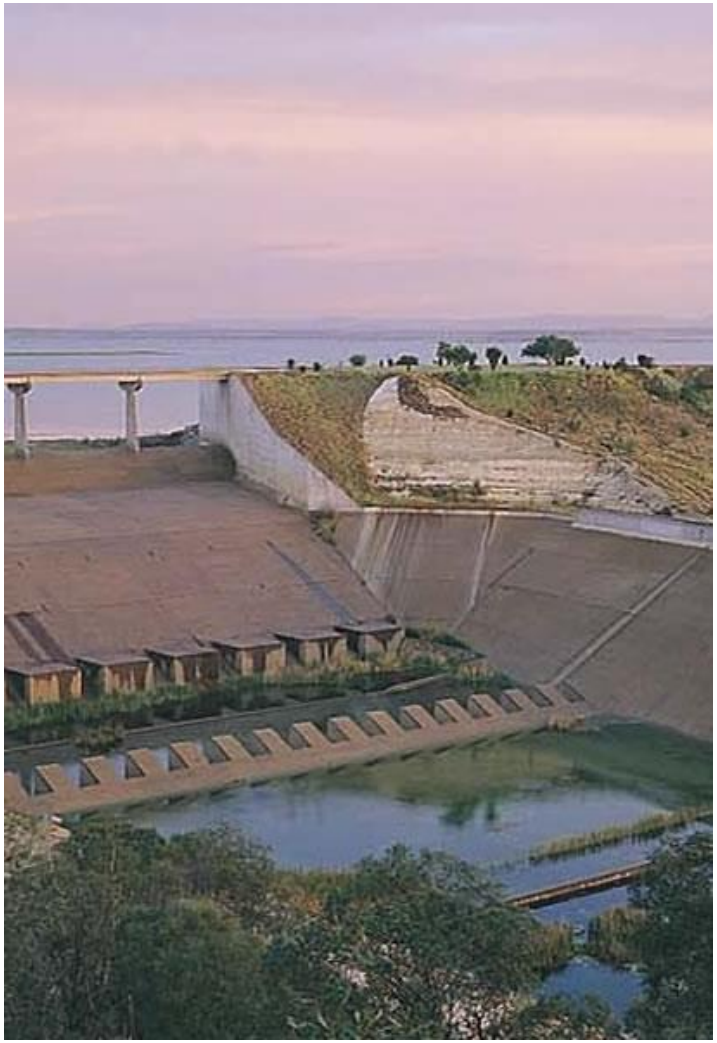
The Queensland Government can declare an area of concentrated CSG development as a cumulative management area. For such as area OGIA carries out a cumulative assessment and develops integrated regional management arrangements. The Surat Cumulative Management area was established in 2011 and the Surat Underground Water Impact Report was approved in 2012. OGIA is facilitating the implementation of the Report and carrying out research to support the updating of the report in 2015.

Research projects are being carried out in collaboration with: CSIRO; Geoscience Australia; universities; and petroleum tenure holders.

The unique features of OGIA include the industry funding of a group within government responsible for putting into effect elements of policy for sustainable development of an industry (i.e. CSG), empowered by legislation overseen through an independent technical and financial governance framework and operating in a collaborative research mode. The model is seen by state and federal governments, by industry and other external observers as very effective.

Its particular advantage is that it provides a sound structure to assess and monitor cumulative effects over time.

The question arises as to whether the existing capability can be extended or replicated in other resource rich basins e.g. Galilee.



Example 2 – Healthy Waterways

Healthy Waterways is a partnership between the state government, local councils, Port of Brisbane, Seqwater and private companies. It functions as an independent, not-for-profit, membership-based organisation working to protect and improve waterway health in South-East Queensland (SEQ) by providing scientific and other evidence based input into policy and management options relevant to the waterways. The waterways of SEQ are an integral part of its lifestyle and economy and are under pressure with a rapidly growing population, increased agricultural, industrial and recreational demands and varying climate extremes.

Healthy Waterways facilitates careful planning and coordinated efforts at local and regional levels among a network of member organisations including state government agencies, local government, industry, utilities, research institutions and the community. Healthy Waterways leverages $ from every partner and the intellectual capacity of the region to support a suite of activities, of which the Report Card is the most visible. The scientific expert panels and sub-panels work on identifying what information the stakeholders need to address their issues (was point source but now shifting to upper catchment).

Healthy Waterways is overseen by a Board, while its work program reflects the priorities of its members. A key output is an annual Report Card which summarises the ecological health and progress of particular management actions for the rivers, estuaries and bays of SEQ.

Funding for the applied science and research activities of Healthy Waterways is provided from its members, with significant in-kind contributions from DSITIA and cash contributions from DEHP. Contributions are effectively leveraged.

The unique features of Healthy Waterways are its independence and its scientific and evidence based approach. It has no regulatory power but has been shown to be able to leverage both funding and expertise through its partnership model to achieve effective investment in key management actions designed to maintain the economic, lifestyle and ecological values of SEQ. The model has been recognised worldwide as an example of best practice.

Somewhat paradoxically, the mechanisms by which DEHP and DSITIA support the activities of Healthy Waterways Ltd appear messy, with lack of clarity and accountability meaning each of the three parties is less than happy with the current arrangements. Given the success of the model to date, a clear strategy forward, agreed to by all major partners, is required.

Example 3 – TropWATER

The Centre for Tropical Water and Aquatic Ecosystem Research (TropWATER) is an amalgamation of aquatic expertise from across JCU. TropWATER employs 85 staff and has in excess of 40 associate members and around 90 post-graduate students. TropWATER won external contract funding more than $7 million in 2013. TropWATER's focus is on freshwater, estuarine and marine ecosystems in the tropics.

In December 2012, after more than twelve months of negotiations, TropWATER (James Cook University - JCU) employed all 24 staff of the Cairns-based Marine Ecology Group from DAFF. The transfer also included most of their equipment (boats, dive gear, laboratory equipment). This group predominantly worked on monitoring seagrass health in various coastal Queensland locations under externally-funded contracts to various companies, port authorities and government agencies.

These contracts were novated to JCU as part of the negotiated transfer, without the loss of any client support. Since transfer to JCU, all the pre-existing clients have maintained funding support and the group has increased collaboration with JCU and other university colleagues, grown to 28 staff and shown a significant increase in scientific publication output. They are also now pursuing projects beyond Queensland waters.

TropWATER is a related model to QAAFI, with the difference being that the focus is stronger on consulting than on applied research, although the latter component is growing.

Queensland Government