

DSITIA Science Delivery Audit

Phase 1 Final Report



This internal audit and strategic analysis of the activities of the Science Delivery Division (SDD) in the Department of Science, Information Technology, Innovation and the Arts (DSITIA) has been undertaken as part of the Queensland Government's examination of its science capability and investment, following the state government 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 and 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 pilot audit is the first in a series of audits of the Queensland Government's scientific capability and investment oversight by the Office of the Queensland Chief Scientist.

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Acknowledgements

Photography - DMW Creative 2010, page: (cover pages)

Other images courtesy of DSITIA SDD

Data - provided by Dr Christine Williams, SDD, DSITIA

Biography of Dr Bob Eisemann, Lead Author

Dr Bob Eisemann BAgSc PhD is General Manager, Science Strategy and Application with DSITIA.

He has a strong background in public sector policy and management, including a specific focus on science and research based on 16 years of research and development experience in agriculture, principally in plant breeding, prior to a 22 years in policy and management roles in the Queensland State public service from 1990.

Dr Eisemann has represented the department and its predecessors on numerous high level committees and working groups at state and national levels. He was Deputy Chair of the Northern Regional Panel of the Grains Research and Development Corporation from 2001-04 and is currently Australian delegate on the Program Steering Committee for the Sustainable Intensification of Maize and Legume Systems for Eastern and Southern Africa project, a major African food security aid initiative funded by the Australian Centre for International Research.

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Key findings and recommendations

The following is a summary of key findings and recommendations resulting from interviews (*see list on page 15*) with DSITIA SDD senior managers and science leaders, senior managers of client departments, external collaborators and partners (including CSIRO and the Queensland Alliance for Agriculture and Food Innovation) and the private sector. Interviews were mostly face-to-face and conducted over a three week period in August 2012 by Dr Bob Eisemann with the support of the department (*see also Summary of Consultation Feedback at page 31*).

Key findings

Term of Reference 1: Scope and content of the current program

The current focus of the DSITIA SDD is on:

- applied science
- natural resources, climate and environment (long-term trends and high impact events)
- government policy, planning, decision-making and risk management.

It is **not** focused on 'pure science', and not directly focused on R&D for productivity improvement.

The business model of the DSITIA SDD is a predominately collaborative co-investment approach that:

- includes seven science program areas (*see full descriptions at pages 17–21*)
- is largely a service provider for other government agencies
- has core capability provided through base appropriation funding
- has individual programs that generally provide services to multiple clients
- has some inter-dependence between programs.

The business model of the DSITIA SDD is a collaborative co-investment model that has:

- general use of co-funded collaborative projects to harness additional investment from project partners
- a varying mix of funding and business strategies across programs
- limited direct transaction ('fee for service') charging
- little full cost contracting (i.e. co-investment model)
- some sub-contracting of services
- some services directly address Science, Information Technology, Innovation and the Arts portfolio responsibilities, e.g. Tweed River project (*see full details at pages 17–21*).

Executive Summary: Key findings

Term of Reference 2: Alignment of Program with Government Objectives and Priorities

DSITIA SDD Services are:

- strongly demand driven
- focused on government policy, planning, decision-making and risk management
- aligned with the Queensland Government's election commitment for scientific advice to underpin evidence-based decision making
- prioritised through formal and informal consultation with client departments.

All program areas have strong relevance to current requirements for scientific services, but the focus and effort within each program should be reviewed (*see full details at pages 19-21*).

Term of Reference 3: Key clients and stakeholders

DSITIA SDD major clients are Queensland Government departments and Ministers with responsibilities for natural resources and environment, including: Environment and Heritage Protection; Natural Mines and Resources; National Parks,

Recreation, Sports and Racing, Energy and Water Supply; and Agriculture, Fisheries and Forestry.

Other clients include a broad range of government (commonwealth, state and local), industry and community clients (*see full list at Appendix 1 and 2, pages 37-38*). Client focus differs by program (*see further details at page 23*).

Term of Reference 4: Resources and capabilities required to conduct the program

DSITIA SDD had a total 2011-12 budget allocation of \$89 million, which included:

- base appropriation (43 per cent)
- limited life special (LLS) funding (40 per cent)
 - DSITIA 'owns' 55 per cent of LLS
 - other departments 'own' 45 per cent of LLS
- external funding (17 per cent).

Staff are a critical resource with current staffing at 416 full time equivalents (FTE) (*see full details at pages 24-27*).

Term of Reference 5:

Advantages and disadvantages of the current program

The current DSITIA SDD collaborative co-investment business model:

- is highly focused, demand-driven applied science to support policy, planning, decision-making and risk management
- however is highly dependent on funding from other departments
- has evolved in response to several machinery-of-government and internal departmental changes
- is still to be fully established following the change of government (Science Delivery Board established)

(See full list of advantages and disadvantages at pages 29-30)

Efficiency, effectiveness and service quality

Major client departments consider DSITIA SDD:

- responsive and integral to their needs
- provides 'business critical' services in many instances
- valuable as a source of impartial and un-conflicted advice
- conducts high quality science, some internationally first-class
- is over-committed.

Demand for services exceeds current resources and capacity *(see further discussion at page 31)*.



Term of Reference 6: Alternative suppliers and models

- The DSITIA service model is similar in form to alternative suppliers such as the CSIRO, but differs in scale and focus (*see comparison on page 32*)
- It could be varied by emphasising different business strategies/models, four of which have been highlighted (*see page 33*)
- It could consider different business strategies/models alone or in combination (*see discussion at pages 33-35*).

Term of Reference 7: Benefits, costs and risks associated with alternative models

There are benefits and risks associated with adopting alternative strategies/models which need to be taken into account in altering the current business model (*see further discussion at pages 34-35*).

Term of Reference 8: Recommendations proposed for future provision of scientific services and advice

The feasibility and impact of any significant change in the current business strategy/model would require more thorough assessment through a detailed business case before it is implemented (*see full Recommendations at pages 9-10*).



Executive Summary: Key recommendations

Term of Reference 8: What recommendations are proposed for future provision of scientific services and advice?

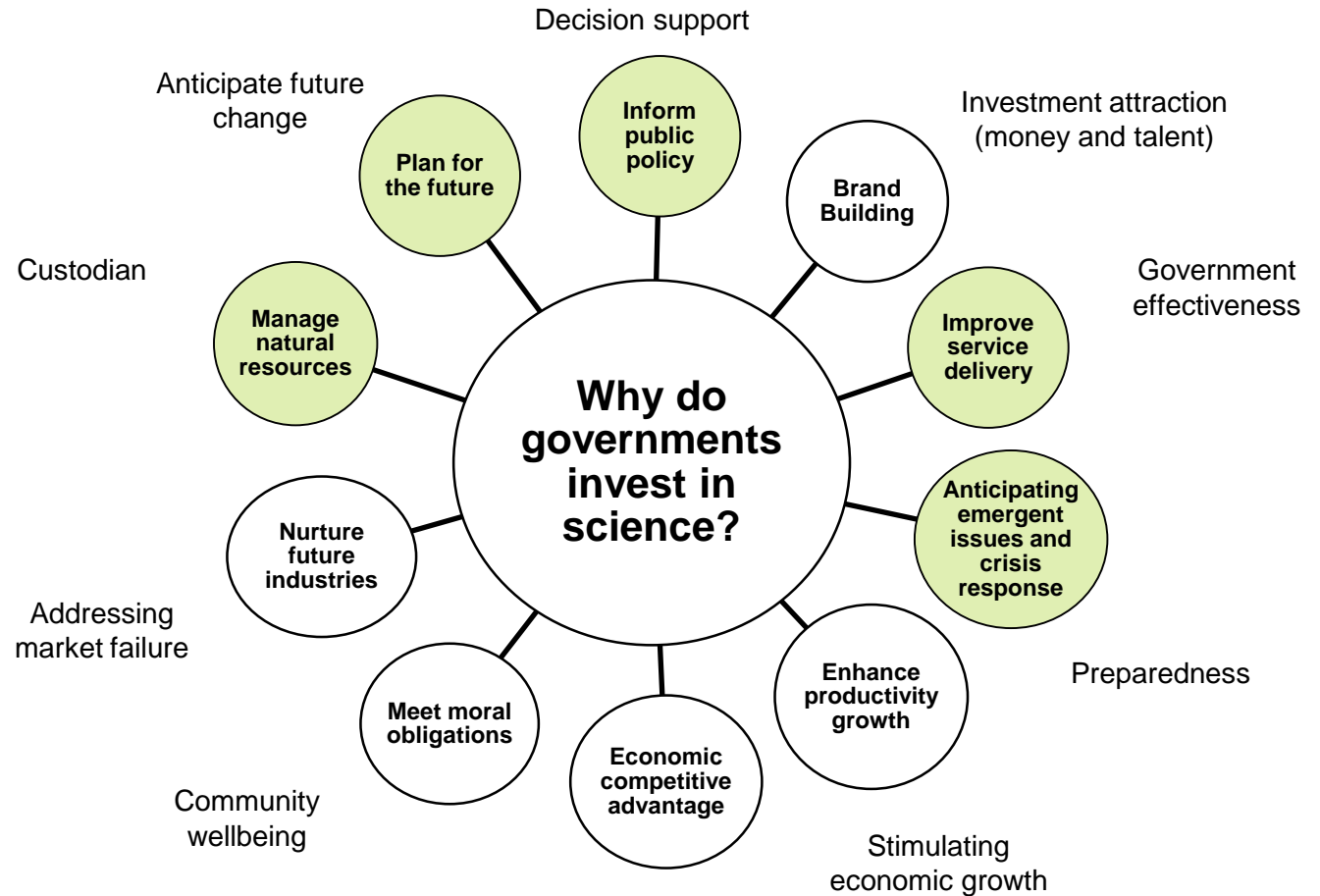
Key recommendations

1. For the current SDD business model:
 - maintain the current core strategy of collaborative co-investment across the existing programs within the envelope of available funding
 - review the focus of all program areas in conjunction with relevant client departments and reassess service requirements in line with the government's election commitments and priorities
 - identify opportunities for outsourcing of scientific services for low risk activities such as routine environmental monitoring or modelling studies and implement ,where cost effective
 - identify and assess the feasibility of additional service opportunities which support departments other than the current 'big five'
 - review the business model in two years.
2. Implement full cost accounting of project proposals and develop an indicative pricing framework modelled on that used by CSIRO to establish the level of funding to be contributed to projects by SDD.
3. Ensure SDD's information assets (herbarium collection, data sets, information systems, etc.) are properly valued and capitalised and have appropriate funding provisions for depreciation and operating expenses.
4. Examine the feasibility of introducing fees for access to information to defray the management costs associated with information systems managed by SDD.
5. Review the use of major equipment assets (e.g. drilling rig, hydraulics laboratory, high performance computing) and, if necessary, develop revenue raising strategies to optimise the productive use of these assets.
6. As part of a continuous improvement process:
 - develop standards for peer review and auditing of science outputs and implement these more uniformly across SDD
 - review the need for competence accreditation (for example, National Association of Testing Authorities) and process certification (for example, International Organisation for Standardisation) across SDD
 - establish more formal mechanisms to assess client satisfaction with SDD services.
7. As part of the consolidation process underway in DSITIA, rationalise and standardise administrative functions across all SDD's organisational units.
8. Strengthen governance processes by:
 - strongly supporting formal governance and communication mechanisms established through the Science Delivery Board to ensure relationships between SDD and key client departments are maintained
 - ensuring the program of scientific services delivered by SDD is specified in agreements with client departments (e.g. via Memorandums of Understanding)
 - considering the establishment of a Ministerial forum or other mechanism to provide a point of formal engagement between relevant Ministers on provision of scientific services by DSITIA to support each Minister's portfolio responsibilities.

Government investment in science

Key points

- Governments invest in science for a wide variety of reasons, as illustrated in this diagram.
- The highlighted items indicate the focus of the scientific services currently provided by the SDD in DSITIA.
- This focus differs from that in other departments such as the DAFF and Queensland Health, and from other science-based organisations (see model comparison on page 32).



Background

- This internal audit and strategic analysis of the activities of the Science Delivery Division (SDD) has been undertaken as part of the Government's examination of its science capability and investment following the election in March 2012.
- The government is committed to using science and innovation for economic success by ensuring that it has access to the best possible scientific advice and 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.
- The audit will serve as a pilot for wider consideration of the state government investment in scientific services, conducted through the Office of the Chief Scientist.
- The Minister has also expressed a desire to see DSITIA run like a business and to provide the best value for money from its program investments.

Describe and analyse the science activities of DSITIA's SDD in relation to the following questions:

1. What is the scope and content of the scientific program?
2. How does this program align with the government's objectives and priorities, including legislative requirements for scientific services and advice?
3. Who are the key clients and stakeholders?
4. What resources and capabilities (costs, staffing, infrastructure, funding arrangements) are required to conduct the program?
5. What are the advantages and disadvantages of the program in terms of its efficiency, effectiveness and service quality?
6. What alternative models and suppliers could be considered to provide the scientific services and advice currently provided by the program?
7. What are the benefits, costs and risks associated with the alternative models?
8. What recommendations are proposed for future provision of scientific services and advice?

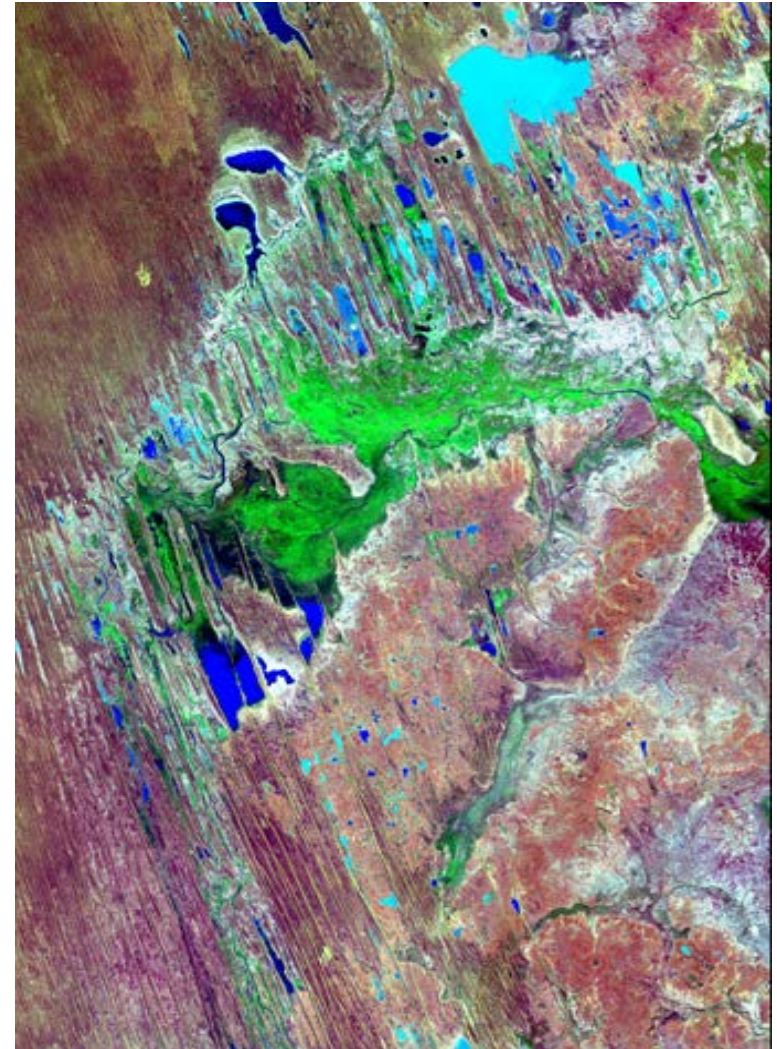
Audit process steps

1. Terms of Reference – preparation and submission
2. Background documentation aggregation
3. Development of consultation list
4. Internal SDD consultations and analysis
5. Client agency consultations and analysis
6. External consultations and analysis
7. Consolidation of themes and findings
8. Interim Report – preliminary recommendations
9. Presentation to Minister for feedback
10. Follow-up on feedback and final consultation
11. **Final Report to Minister for Science, Information Technology, Innovation and the Arts**

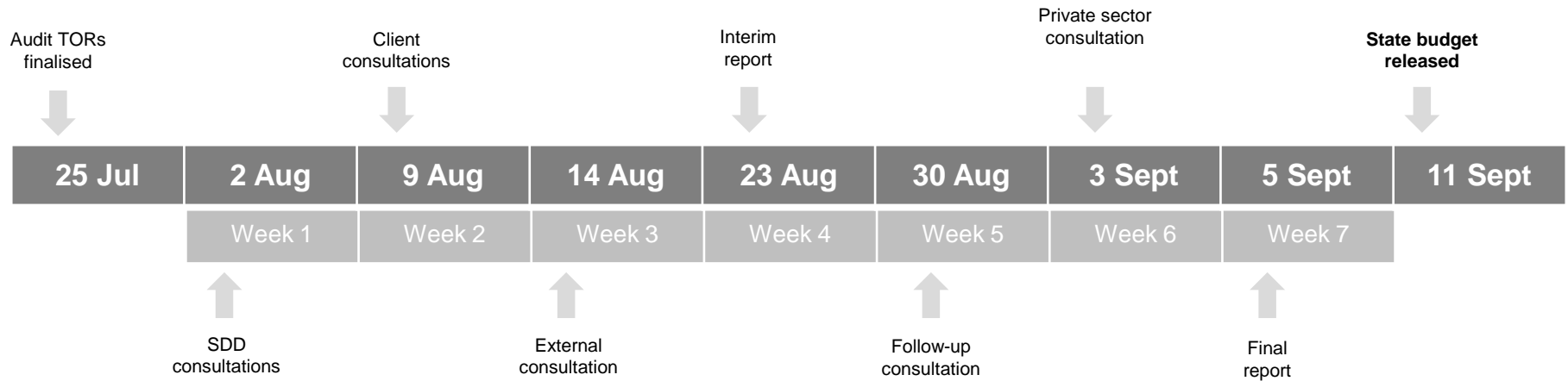
Key points

The audit process involved information gathering in relation to SDD activities, interviews with key managers in SDD, consultation with major clients and a limited comparative review of scientific services in other agencies.

The Queensland Chief Scientist provided process and governance oversight and objective assessment of the audit.



Audit timeline



Key point

The audit involved a rapid appraisal process designed to elicit the nature of the current scientific services and advice provided by SDD, and to recommend how future provision of those services could be tailored to provide best value for DSITIA’s investment.

Process

Consultation list

| DSITIA | SDD | Client departments | Other |
|--|--|---|---|
| <p>Office of the Minister for Science, IT, Innovation and the Arts Alistair Mitchell</p> <p>Office of the Director-General Philip Reed</p> | <p>Science Delivery Division Dr Christine Williams, Assistant Director- General</p> <p>Strategic Science & Information Systems John Mullins Steve Jones Ken Brook</p> <p>Land Management Services Paul Lawrence Rob DeHayr Phil Moody Christian Wittle</p> <p>Aquatic Ecosystem Sciences Dr Julia Playford</p> <p>Air Quality Science David Wainwright</p> <p>Coastal and Climate Science David Robinson</p> <p>Water Planning Sciences John Ruffini</p> <p>Biodiversity Sciences Gordon Guymer Bruce Wilson</p> | <p>EHP Bob Speirs Geoff Clare Glen Brown</p> <p>NRM Liz Dann Lyll Hinrichsen Greg Claydon</p> <p>DAFF John Chapman Greg Robbins</p> <p>DNPRSR Annie Moody Clive Cook</p> <p>DEWS Craig Gordon Darren Thompson Jinaraj Rajakaruna</p> | <p>CSIRO Dr Anthony Van Herwaarden</p> <p>GSQ Brad John Russell D'Arcy</p> <p>BMT WBM Tony McAlister Greg Fisk</p> <p>QAAFI Melissa Glendenning</p> |

Glossary

DAFF: Department of Agriculture, Fisheries and Forestry

DEWS: Department of Energy and Water Supply

DNRM: Department of Natural Resources and Mines

EHP: Department of Environment and Heritage Protection

NPRSR: Department of National Parks, Recreation, Sport and Racing

CSIRO: Commonwealth Scientific and Industrial Research Organisation

GSQ: Geological Survey of Queensland, DNRM

QAAFI: Queensland Alliance for Agricultural and Food Innovation

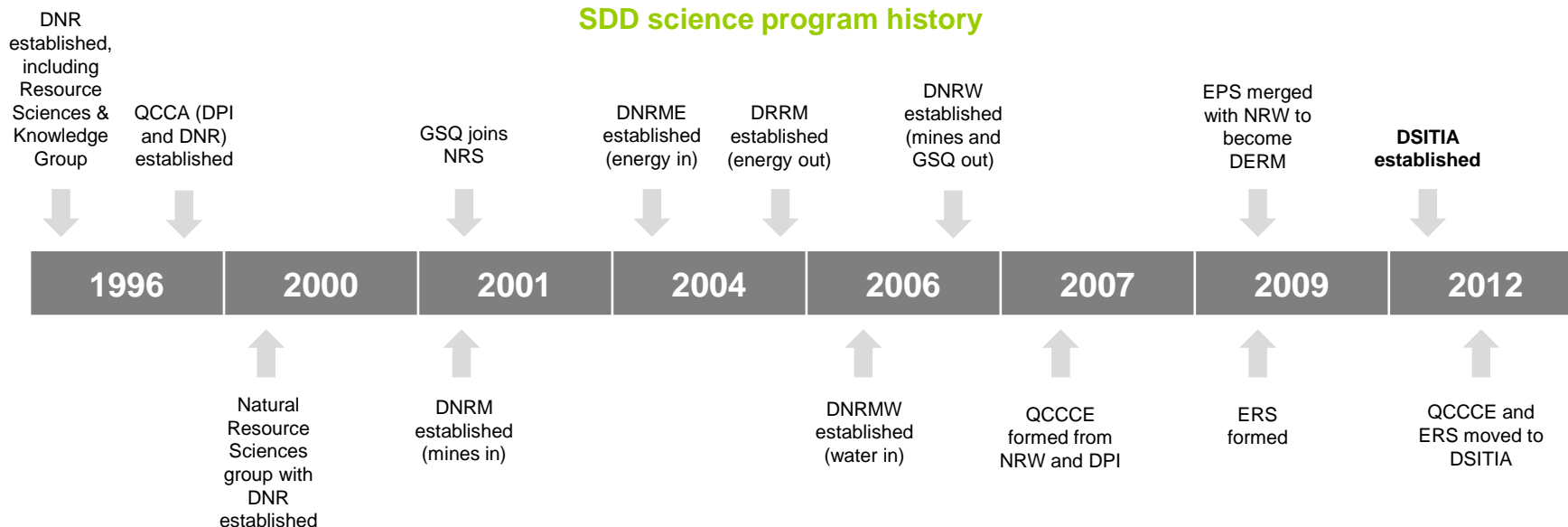
BMT WBM: British Maritime Technologies - Winders, Barlow, Morrison

Key point

Consultation with clients was conducted through face-to-face interviews by the audit team.

Program Description

SDD science program history



Key points

- The SDD has evolved into its current form over the last decade, in response to demands for scientific services and departmental changes.
- The timeline indicates key changes that have occurred since 1996.
- SDD provides scientific services and advice in partnership and close consultation with other departments with portfolio responsibilities across the environment, natural resources and climate spectrum.

Glossary

- DNR:** Department of Natural Resources
- QCCA:** Queensland Centre for Climate Applications
- DPI:** Department of Primary Industries
- GSQ:** Geological Survey of Queensland
- NRS:** Natural Resource Sciences
- DNRME:** Department of Natural Resources, Mines and Energy
- DNRM:** Department of Natural Resources and Mines
- DNRMW:** Department of Natural Resources, Mines and Water
- QCCCE:** Queensland Climate Change Centre of Excellence
- NRW:** Department of Natural Resources and Water
- EPA:** Environmental Protection Agency
- ERS:** Environmental and Resource Sciences
- DERM:** Department of Environment and Resource Management
- DSITIA:** Department of Science, Information Technology, Innovation and the Arts

Program Description

Overview of scope and content of DSITIA Science Delivery Program in 2011-12*

Term of Reference 1 - What is the scope and content of the current scientific program?*

Key points

- SDD programs provide scientific services, advice and information, generally in the form of public goods with broad business and community benefits, to support better management, protection and use of Queensland's land, water and atmospheric resources and environment.
- SDD incorporates seven program areas with capability focussed on scientific research and monitoring, synthesis and coordination of information systems, provision of policy advice and inputs to policy development, and scientific support for management responses to critical events such as floods, cyclones and industrial disasters such as coastal oil pollution (*see pages 19-21*).

**2010-11 data*

- 1. Water Planning Sciences (WPS) \$14.1m, 73 FTE**
 - Collection and interpretation of data for water resource planning and allocation.
- 2. Biodiversity Sciences (BS) \$7.6m, 62 FTE**
 - Surveys, cataloguing and assessment for management and conservation of Queensland's flora and fauna biodiversity.
- 3. Aquatic Ecosystem Sciences (AES) \$8.4m, 51 FTE**
 - Monitoring and assessment for the maintenance and management of water quality and health of aquatic ecosystems.
- 4. Land Management Sciences (LMS) \$11.8m, 85 FTE**
 - Monitoring, assessment and modeling for management of soils, land and vegetation resources.
- 5. Air Quality Sciences (AQS) \$3.6m, 22 FTE**
 - Collection, assessment and modeling of air pollutant data for management of air quality.
- 6. Coastal & Climate Sciences (C&CS) \$14.3m, 56 FTE**
 - Analysis and risk assessment of climatic and tidal information for planning, managing emergencies and responding to climate variability in Queensland.
- 7. Strategic Science & Information Systems (SS&IS) \$7.1m, 61 FTE**
 - Filling knowledge gaps and providing integrated information for policy development and management of natural resources and the environment.

Program Description

Scope of SDD science programs

TOR 1 - What is the scope and content of the current scientific program?

SDD provides leading-edge applied science in several areas of activity including in remote sensing applications and computer simulation modelling. It also maintains extensive long-term databases in relation to Queensland's land, water, climate and flora and fauna resources.

There are currently strong collaborative working partnerships between SDD and its Queensland Government client departments based on relationships and trust that have been established, particularly over the last three years. These have largely been built on the goodwill of staff in both SDD and the client departments.

There are strong inter-dependencies between SDD's service function and its primary clients in relation to the provision of scientific advice and in developing and maintaining critical information systems which are currently a shared responsibility.

For Queensland Government clients, SDD service provision, following the realignment of SDD to DSITIA, is currently configured as a collaborative co-investment investment model for procurement of scientific services, where there is co-investment in projects by DSITIA and client departments.

To harness additional science capability and resources to address high priority needs, SDD also conducts collaborative projects through co-investment with research agencies or funders external to the Queensland Government including CSIRO and universities. This broadens the base of available investment, including access to Commonwealth funding provided to support the national science and innovation system.

In some circumstances, SDD engages contractors or consultants to provide scientific services on its behalf where these are routine or provide a competitive advantage in terms of skills or cost.



Program Description

Alignment of SDD science programs

Term of Reference 2 – How does the program align with government objectives and priorities, including legislative requirements for scientific services and advice?

Key points

DSITIA SDD Services are:

- aligned with the Queensland Government's election commitment for scientific advice to underpin evidence-based decision making
- strongly demand driven
- focussed on government policy, planning, decision-making and risk management
- prioritised through formal and informal consultation with client departments.
- All program areas have strong relevance to current requirements for scientific services, but the focus and effort within each program should be reviewed.

Water Planning Sciences

Collect and interpret data on water resources, develop improved decision-making tools for water resource planning and allocation, and provide information to policy makers and managers through a range of reports, publications and maps. This work supports the requirements of the *Water Act 2000*, and commitments under the National Water Initiative. Example: Technical hydrological reports to support water resource planning to improve water security and account for impacts of water allocation on the environment (e.g. in the Wet Tropics).

Biodiversity Sciences

Surveys, catalogues and assesses Queensland's flora and fauna biodiversity and provision of information to support their monitoring, conservation and management. This includes the enhancement and maintenance of the Queensland Herbarium, assessment of biodiversity, and documenting and enhancing weed detection. This work supports the requirements of the *Environmental Protection Act 1994*, *Nature Conservation Act 1992*, *Vegetation Management Act 1999* and State Planning Policy 4/11: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments. Example: Development of regional ecosystem, remnant vegetation and wetland maps to inform proposed changes to regulations.

Aquatic Ecosystem Sciences

Monitors and assesses aquatic ecosystems to provide information on the health of those systems to support their on-going management, to ensure water quality is maintained and threats to flora and fauna are mitigated. This work supports the requirements of the *Environmental Protection Act 1994*, *Fisheries Act 1994*, and State Planning Policy 4/10: Healthy Waters. Example: Monitoring and analysis of water quality in Gladstone Harbour for future management of activities impacting on the harbour and the Great Barrier Reef.

Program Description

Alignment of SDD science programs

Term of Reference 2 – How does the program align with government objectives and priorities, including legislative requirements for scientific services and advice?

Land Management Sciences

Monitor, assess and model soils, land and vegetation resources to enhance Queensland's ability to manage its natural resources, and to support the design and implementation of government policies. This work supports the requirements of the *Vegetation Management Act 1999*, *Great Barrier Reef Protection Amendment Act 2009*, *Strategic Cropping Land Act 2011*, *State Planning Policy 1/92: Development and the Conservation of Agricultural Land, Land Act 1994* (State Rural Leasehold Land Strategy), and *State Planning Policy 2/02: Planning and Managing Development Involving Acid Sulphate Soils*. Example: Assessments to evaluate the impact of farm management practices on the quality of water flowing to the Great Barrier Reef; identification and categorisation of strategic cropping lands in Queensland.

Air Quality Sciences

Collect, interpret, model and assess air pollutant data to ensure the health and well-being of people and ecosystems throughout Queensland. This work supports the requirements of the *Environmental Protection Act 1994 (Environmental Protection (Air) Policy 2008)*, *National Environment Protection Council (Queensland) Act 1994*, and the *Sustainable Planning Act 2009*. Example: Real-time monitoring and analysis of air quality to support management action in relation to industrial emissions in Mt. Isa and Gladstone.

Coastal and Climate Sciences

Provide climatic and coastal tidal data, climate and coastal hazards risk analysis and decision-support tools for use in managing climate variability in agriculture and other industries, and for water resource planning, coastal and regional development (including the Tweed River Entrance Sand Bypassing Project) and emergency management. This work supports the requirements of the *Coastal Protection and Management Act 1995*, *State Policy for Coastal Management and State Planning Policy 3/11: Coastal Protection*, and the *Tweed River Entrance Sand Bypassing Project Agreement Act 1998*. Example: Seasonal climate forecasts tailored specifically for Queensland and updated monthly for use by agricultural producers and resource managers in weather-dependent industries; monitoring and analysis of storm tides to support alerts and warnings for community safety.

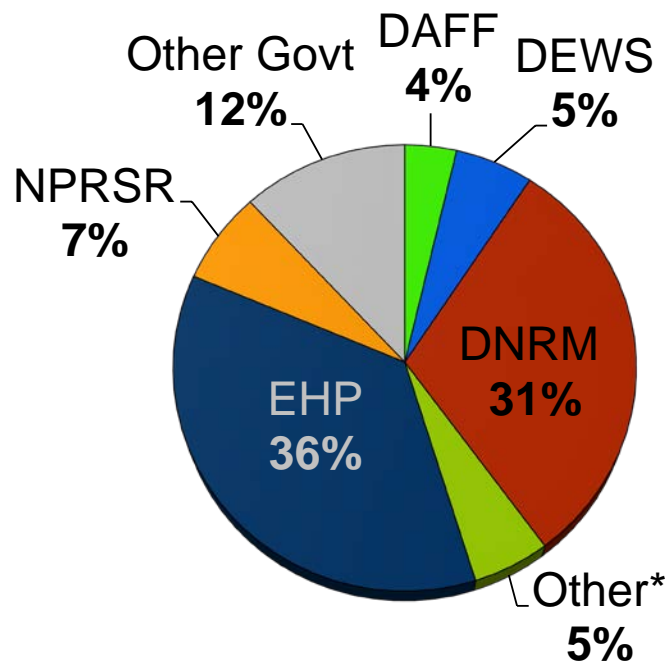
Science Coordination and Information

Strategic direction setting, coordination and management of collaborative multi-disciplinary science, tactical environmental systems research (natural and social sciences) to fill knowledge gaps, and maintenance and enhancement of science-based environmental information systems and reporting. This work supports the requirements of the *Great Barrier Reef Protection Amendment Act 2009*, *Nature Conservation Act 1992*, *Environmental Protection Act 1994*, *Sustainable Planning Act 2009*, *State Planning Policy 4/10: Healthy Waters*, and the *Murray-Darling Basin Agreement*. Example: Development of the Great Barrier Reef Report Card under the Reef Water Quality Protection Plan.

Program Description

SDD key client focus

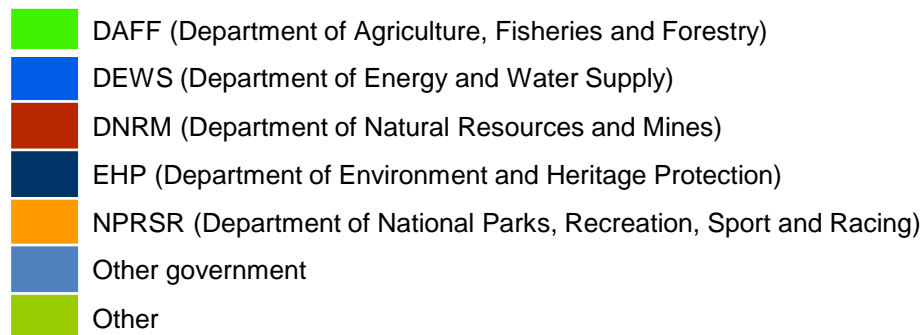
Term of Reference 3 – Who are the key clients and stakeholders?



* **Other:** Port Authorities, Industry (e.g. Ag Force) and Community Organisations (e.g. Regional NRM Groups). See full list at Appendix 1 & 2 (pages 37, 38)

Key points

- Major service contribution to other Queensland departments and Ministers with the following portfolio responsibilities:



- Major client departments consider that SDD:
 - o is responsive and integral to their needs
 - o provides 'business critical' services in many instances
 - o is valuable as a source of impartial and un-conflicted advice
 - o conducts high quality science, some internationally recognised.(See page 31 for additional points)
- In overall terms, SDD provides services for a broad range of clients, with a major focus on client departments with portfolio responsibilities covering natural resources and environment.

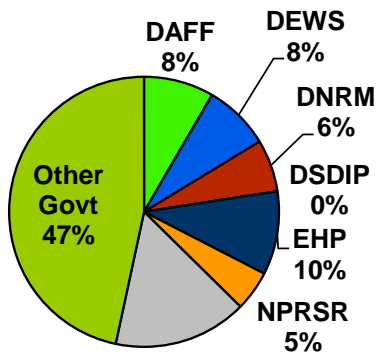
Consultation feedback

... they have models that cover over 90 per cent of Queensland, are time stepped over 100 years and are very accurate
... it would not be possible to get this historical data from the university sector
... government is filling a gap from market failure

Program Description

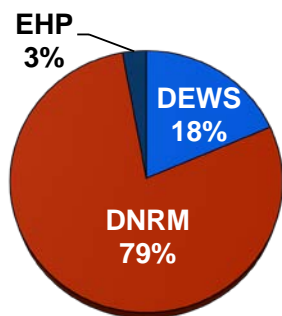
SDD key client focus by program

Term of Reference 3 – Who are the key clients and stakeholders?



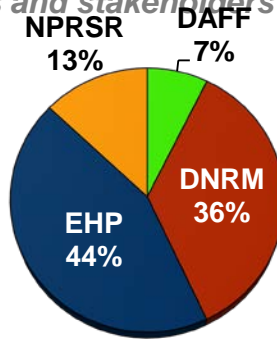
Coastal and Climate Sciences

\$14.3m*



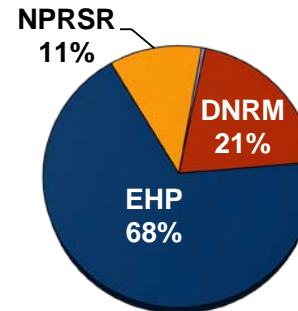
Water Planning Sciences

\$14.1m



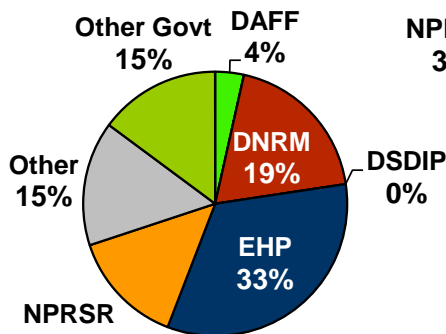
Land Management Sciences

\$11.8m



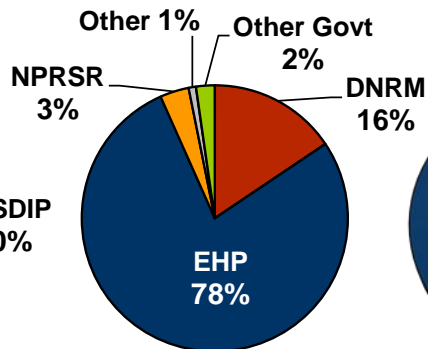
Aquatic Ecosystem Sciences

\$8.4m



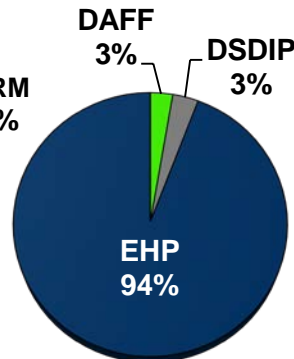
Biodiversity Sciences

\$7.6m



Strategic Science and Information Systems

\$7.1m



Air Quality Sciences

\$3.6m

Key points

- Client focus varies across different program areas.
- Coastal and Climate Sciences has the most diverse client base, encompassing both government and a strong level of external engagement with industry.

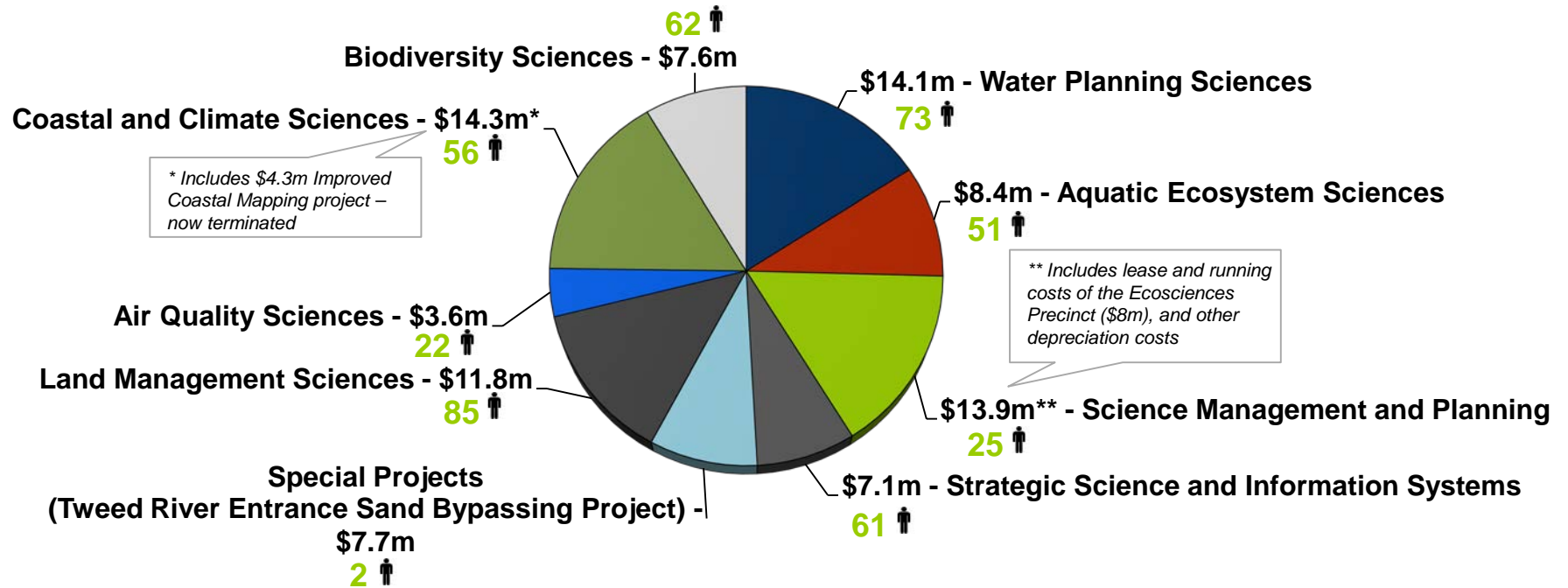
* Includes \$4.3m Improved Coastal Mapping project (now terminated), but excludes the \$7.7m Tweed River Entrance Sand Bypassing project

'Other' includes: Port Authorities, Industry (e.g. Ag Force) and Community Organisations (e.g. Regional NRM Groups) - see full list at Appendix 1 and 2 (pages 37, 38)

Program Description

Overall 2011-12 SDD funding (\$88.6m / 437 [^]) 

Term of Reference 4 – What resources and capabilities are required to conduct the program?



Key points

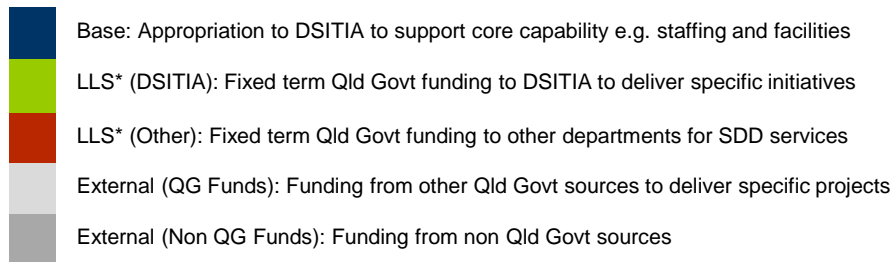
- SDD represents a significant investment of Queensland Government resources, with a budget in 2011-12 of around \$88 million and a workforce of over 400 FTE staff.
- SDD scientific services have a strong focus on applied science to measure and monitor the condition of Queensland's natural resources, climate and environment over the long term and in relation to specific high impact events such as floods, cyclones and man-made disasters. The objective is to provide scientific information to inform balanced policy, planning, decision-making and risk management by government and industry, rather than research, development and technology application for productivity improvement (see page 18 for more details).

[^] As at April 2012 (since reduced to 416)

Program Description

Overall 2011-12 SDD Funding Sources (\$88.6m)

Term of Reference 4 – What resources and capabilities are required to conduct the program?



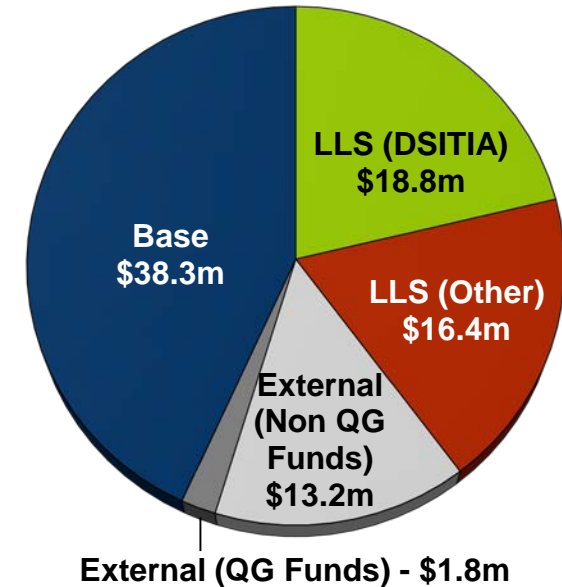
* Limited Life Treasury Special Funding

Facilities

Ecosciences Precinct at Dutton Park (incl. high performance computing), Hydraulics modelling facility at Deagon, Queensland Herbarium at Mt Coot-tha, Australian Tropical Herbarium in Cairns.

Key points

- The current SDD business model has adapted over time under the influence of an array of direct and indirect changes and now utilises a mix of base, limited life Treasury special allocations and funding from other sources to support its science functions.
- SDD science activities are based on a collaborative co-investment model with research partners, similar to that pursued by many science-based organisations, including CSIRO (*see model comparison on page 32*), with projects built around joint investment with collaborating research agencies and funders.
- There is limited direct transaction cost recovery 'fee for service' work or full cost contracting.
- Some SDD services are delivered by engaging contractors or consultants where there are capacity or skills constraints and alternative suppliers of a suitable standard are available.
- SDD now occupies major new collaborative research facilities of a very high standard at the Ecosciences Precinct. Significant operating costs are associated with these facilities.



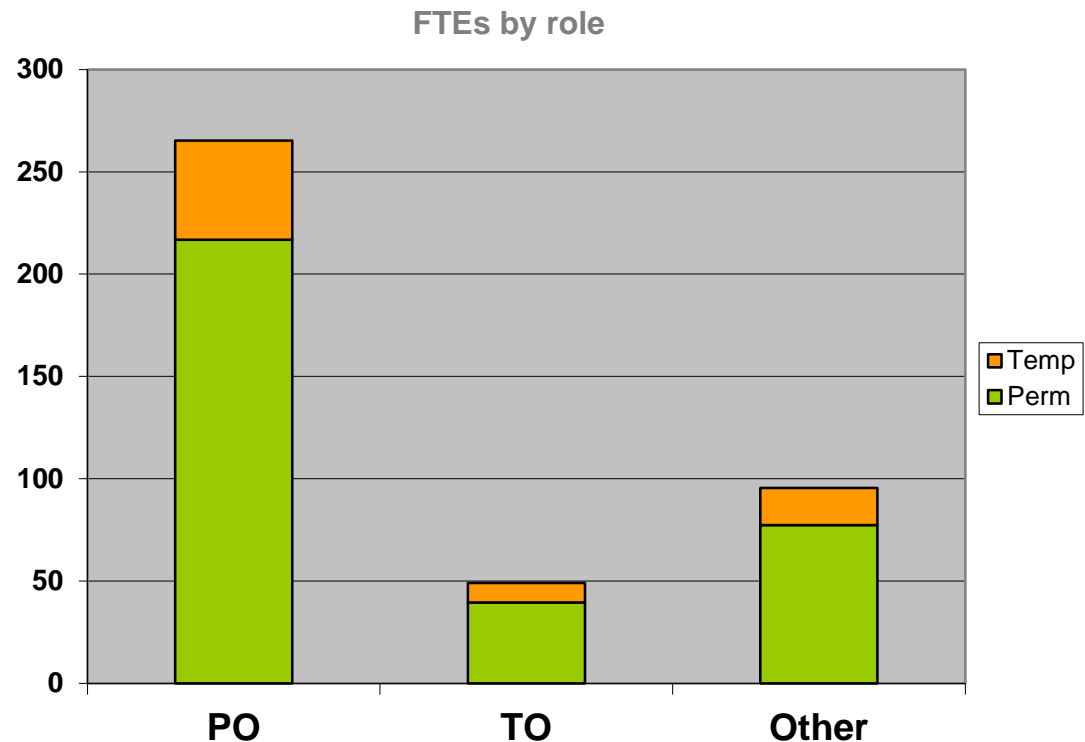
Program Description

Staffing - SDD Resources

Term of Reference 4 – What resources and capabilities are required to conduct the program?

Key points

- Priorities for the provision of scientific services have in the past been established through extensive consultation between SDD and its clients. This is now occurring at interdepartmental level, given the realignment of SDD as part of DSITIA.
- Relationships between SDD and client departments rely heavily on relationships at officer level.
- Key senior scientists in SDD are approaching retirement.
- There is limited staged succession planning in place.
- Formal governance and communication mechanisms (e.g. Science Delivery Board) need strong support to ensure SDD relationships with clients departments are maintained over time.



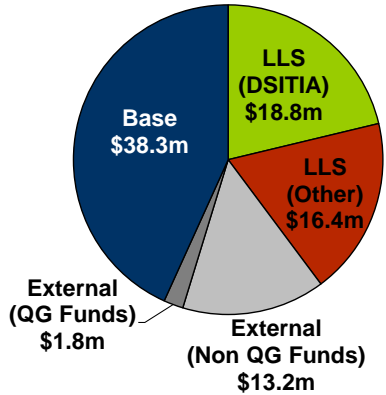
Note: PO (Professional Officer), TO (Technical Officer), Other (AOs – Administrative Officers and SOs – Senior Officers)

Current Business Model

Summary of Terms of Reference 1 - 4

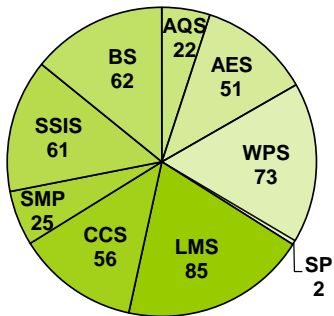
The current business model is: demand driven; government-focused (policy, planning, risk management); applied science-focused; based on collaborative co-investment.

Funding sources breakdown

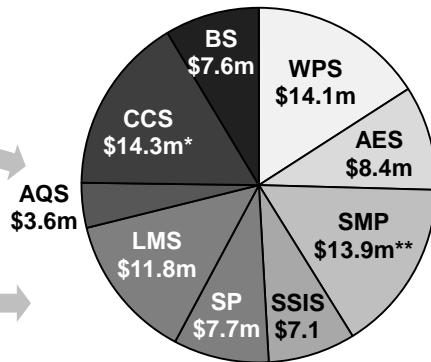


Facilities

FTE breakdown



Program spend

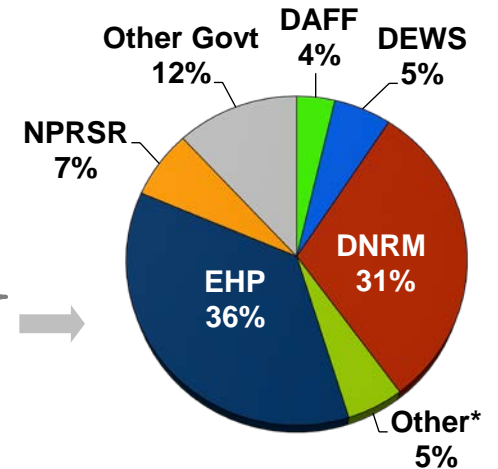


* Includes \$4.3m Improved Coastal Mapping project (now terminated)
 ** Includes lease and running costs of Ecosciences Precinct (\$8m), and other depreciation costs

+ Collaborators
 (See list at Appendix 1)

- Natural resources and environmental databases
- Water quality reports
- Regional ecosystem maps
- Qld Herbarium
- Land use maps
- Soil, water and plant analyses
- Hydrological technical reports
- Reef Report Card
- Air quality assessments
- Air emission inventory/dispersion modelling
- WildNet database
- SILO historical climate database
- 'Long Paddock' climate variability website
- Wave/storm tide monitoring & cyclone disaster support
- Reef catchment management options
- Flood frequency/risk assessments
- Nutrient/sediment hazard & risk maps
- Groundwater monitoring bores
- Hydrological models

Major client focus



* Other includes: industry, community organisations
 (See full list at Appendix 2)

BS: Biodiversity Sciences; AQS: Air Quality Science; AES: Aquatic Ecosystem Sciences; WPS: Water Planning Sciences; SP: Special Projects (Tweed River Entrance Sand Bypassing Project); LMS: Land Management Sciences; CCS: Coastal and Climate Sciences; SMP: Science Management and Planning; SSIS: Strategic Science and Information Systems

Inputs

Services

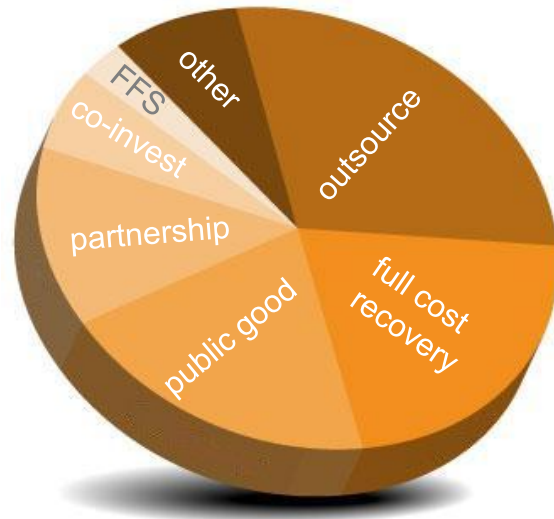
Outputs

Client outcomes

Current Business Model

Advantages and disadvantages of the current business model

Term of Reference 5 - What are the advantages and disadvantages of the current science program in terms of its efficiency, effectiveness and service quality?



Key points

- Current model is largely collaborative co-investment to harness additional investment from project partners.
- Core capability provided through base appropriation funding.
- Limited fee-for-service.
- Some subcontracting of services.

(Table 1 of 2)

| Advantages | Disadvantages |
|--|--|
| <ul style="list-style-type: none"> • Strong departmental and Ministerial support and public good focus • Strongly supports the government's requirements for evidence-based decision-making | <ul style="list-style-type: none"> • Restricted client base and lack of wider recognition of capability • Limited relevance to host Ministerial portfolio • Limited opportunities to tap additional alternative revenue streams |
| <ul style="list-style-type: none"> • Availability of dedicated science capacity within government provides easy access to science inputs and advice, and advice for science intelligence and emergent needs | <ul style="list-style-type: none"> • Science capacity servicing multiple departments (competing demands) • New science model not fully developed following the machinery-of-government changes |
| <ul style="list-style-type: none"> • Highly focused demand-driven applied science to support policy, planning, decision-making and risk management • Client satisfaction levels are high | <ul style="list-style-type: none"> • Limited focus on strategic science and cutting edge science opportunities because of applied science focus • Lack of flexibility in science investment |
| <ul style="list-style-type: none"> • Centralised science function provides economies of scale • Increased capacity to monitor science capability and adopt consistent methodology and standards | <ul style="list-style-type: none"> • Risk of disconnection between science and policy • Dependence on funding from other departments • Formal governance mechanisms and additional administrative overheads required |
| <ul style="list-style-type: none"> • Science services are impartial and of a high standard • Some applied science is nationally significant and internationally recognised | <ul style="list-style-type: none"> • Ad-hoc science quality assessments • Peer review and publication are not a primary driver for the science |

Current Business Model

Advantages and disadvantages of the current business model

Term of Reference 5 - What are the advantages and disadvantages of the current science program in terms of its efficiency, effectiveness and service quality?

(Table 2 of 2)

Key points

- Largely a service provider for other government agencies
- Individual programs generally provide services to multiple clients
- Some services address DSITIA portfolio responsibilities, for example Tweed River Entrance Sand Bypassing Project
- Some program interdependence.

| Advantages | Disadvantages |
|--|---|
| <ul style="list-style-type: none"> • Impartial government scientists minimise risks of conflicts of interest | <ul style="list-style-type: none"> • Service and approach to risk is science-based and may lack business drive |
| <ul style="list-style-type: none"> • Strong collaborative partnerships within and outside the Queensland Government based on co-investment in science to leverage additional science effort | <ul style="list-style-type: none"> • Funding model is complex • Limited availability of funds to leverage additional or strategic co-investment |
| <ul style="list-style-type: none"> • Co-location with other science agencies in high standard research facilities | <ul style="list-style-type: none"> • High cost of research facilities and equipment |
| <ul style="list-style-type: none"> • Dedicated and committed staff not motivated by personal financial gain in key positions | <ul style="list-style-type: none"> • Staff age profile • Reliance on key staff who are approaching retirement • Limited capacity for succession planning |
| <ul style="list-style-type: none"> • Unique long-term databases with high public good value • Access to long-term datasets | <ul style="list-style-type: none"> • Databases are dated and cannot be easily reproduced • Cost of maintaining data and information systems with high Government and public value |

Consultation feedback – efficiency, effectiveness and quality

Term of Reference 5 - What are the advantages and disadvantages of the current science program in terms of its efficiency, effectiveness and service quality?

SDD is considered by its primary clients to be responsive to client needs, but potentially overcommitted in terms of available resources, particularly in relation to managing current work and responding to emergent events with little capacity for further value-adding through tactical or strategic research.

Clustering scientific services in SDD affords opportunities to centralise the management of long-term databases and for multi-disciplinary approaches to provide integrated solutions and economies of scale to meet client requirements, reducing the need for duplication of services by other departments.

The business model for delivery of 'in-house to government' scientific services is complicated by recent departmental separations relative to that which existed previously in terms of linkages and the processes required to manage service provision.

Separation of scientific services from policy functions was identified as a strategic risk by client departments because there is a heavy dependence on science which needs to be strongly connected to operational requirements.

A range of SDD's scientific services are considered 'business critical' by client departments without which they would struggle to support the Government's agenda. This would be exacerbated if DSITIA base funding for SDD scientific services was unilaterally reduced by a significant amount.

The commitment of SDD staff and the impartiality of SDD advice is highly valued by client departments, the latter a critical issue in addressing real or perceived conflicts of interest for the Government.

The use of SDD scientific services to generate data and information can provide a 'circuit-breaker' between parties in managing perceptions and expectations in situations of community conflict.

SDD recognises the need to benchmark the quality of its science through peer review and scientific publications and has established review systems for its scientific outputs including accreditation of process standards for parts of its business.

Primary clients regard the quality of SDD's scientific services to be of a high standard, and in some cases the work is considered exceptional and internationally first-class.

Business Model Comparison

Key attributes of different science suppliers and providers

Term of Reference 6 – What alternative models and suppliers could be considered for provision of the scientific services and advice currently provided by the program?

Key points

- A comparison of the current SDD business model with those of CSIRO, GSQ (a business unit of DNRM) and QAAFI indicate significant similarities and some key differences in scale and focus.
- CSIRO has more explicit rules of engagement in terms of funding collaborative projects.

* *Geological Survey of Queensland, DNRM*

** *Queensland Alliance for Agriculture and Food Innovation, University of Queensland*

| Element | SDD | CSIRO | GSQ* | QAAFI** |
|--|---|--|--|---|
| Organisation | Queensland Government Department | Commonwealth Statutory Authority | Queensland Government Department | University of Queensland Research Institute |
| Budget | ~\$89m | \$1b+ | ~\$25m | ~\$22m |
| • Appropriation funding | ~45% | ~60% | ~30% | ~10% |
| • Limited life funding | - | - | - | - |
| • Other external 'competitive' funding | ~40% | - | ~70% | ~35% |
| | - | - | - | - |
| | ~15% | ~40% | - | ~55% |
| Staff (FTEs) | ~420 | ~6,500 | ~100 | ~100 staff ~80 students |
| Principal science focus | <ul style="list-style-type: none"> • Applied science • Environment, climate, natural resources • Policy, regulation, risk management | <ul style="list-style-type: none"> • Discovery research • Industry development • R&D with national impact • Govt. policy support | <ul style="list-style-type: none"> • Applied science • Mining exploration | <ul style="list-style-type: none"> • Discovery research • Agricultural and food industry R&D • R&D with local and national application |
| Science collaboration | <ul style="list-style-type: none"> • Co-investment • Case-by-case contributions • CSIRO, universities, other State Governments | <ul style="list-style-type: none"> • Co-investment • Set formula for contributions • Universities, Australian and international research agencies | <ul style="list-style-type: none"> • Co-investment • Case-by-case contributions • CSIRO, universities | <ul style="list-style-type: none"> • General contributions for overheads • CSIRO, DAFF, universities, Australian and international research agencies |
| Principal clients | <ul style="list-style-type: none"> • Queensland Government • land-and water-based industries | <ul style="list-style-type: none"> • Australian and State Governments • Broad range of national industry sectors | <ul style="list-style-type: none"> • Mining industry (exploration) | <ul style="list-style-type: none"> • Commonwealth and Queensland Government • Agricultural industry sectors |
| Contracting out | <ul style="list-style-type: none"> • Limited • Contractors and consultants – specific science services | <ul style="list-style-type: none"> • Limited • Specialised services and equipment not available in-house | <ul style="list-style-type: none"> • Limited • Specialised high cost technology – airborne geophysics | <ul style="list-style-type: none"> • Limited • Individual expertise sought out for consultancy services |

Changing the business strategy mix?

Term of Reference 6 - What alternative models and suppliers could be considered for provision of the scientific services and advice currently provided by the science program?

STRATEGY

'service shrinkage'

Increased outsourcing of scientific services with reduced SDD capacity

'cost recovery'

SDD scientific services are offered at greater or full cost recovery

'service growth'

(expanding services to other departments)

SDD scientific services are broadened to service the needs of departments beyond natural resources and environment

'business growth'

(offering services beyond government)

SDD scientific services are offered both inside and outside government

Key points

- Four alternative business strategy arrangements with potential to vary the mix of services and the way in which these are provided by SDD relative to the current collaborative investment model have been identified for consideration.
- These strategies are not mutually exclusive and can be used in combination to alter the business model for delivery of scientific services.
- There are a range of benefits and risks associated with these strategies (see pages 34-35).
- Any significant change in business strategy arrangements will require a detailed business case.
- Given that the current model is still in an establishing phase, large scale change is not recommended.

Alternative Business Strategies

Benefits and risks of alternate business models or strategies

Term of Reference 7 - What are the benefits, costs and risks associated with the alternative models?

(Table 1 of 2)

Key point

There are benefits and risks associated with adopting alternative models which need to be taken into account in altering the current business model

| Strategy | Benefits | Risks |
|--|--|---|
| <p>'Service shrinkage' Increased outsourcing of scientific services with reduced SDD capacity</p> | <ul style="list-style-type: none"> • Explicit project costing • Reduced science management costs and associated risks • Managing the business and not the science • Increased focus on critical high priority science • Reduce DSITIA's science delivery focus • Source skills not available internally • Benchmark outsourced and internal services • Avoid science service 'creep' | <ul style="list-style-type: none"> • Loss of core science skills and capacity • Duplication of services within government departments • Unavailability of required scientific services • Loss of integrated science and policy advice • Increased costs for same level of service • Lack of easily accessible ancillary science advice • Increased contract management costs and risks • Managing conflicts of interest • Managing science service quality • Managing long-term data and project phases • Loss of leverage capacity for external co-investment • Reduced responsiveness to emergency situations |
| <p>'Cost recovery' SDD scientific services are offered at greater or full cost recovery</p> | <ul style="list-style-type: none"> • Explicit project costing • Revenue neutral for DSITIA • No cross-subsidisation of science activities • More rational science purchaser behaviour • Better management of budgets and costs • Stronger business focus on costs and services • Manage demand for science services and products | <ul style="list-style-type: none"> • Loss of appropriation funding • Variable revenue streams • Limitation of Government financial and business practices • Limited capacity to re-direct resources to leverage external science co-investment • Reduced collaboration in science • Increased business management costs • No resources for investment in strategic science • Business focus will undermine commitment of staff |

Alternative Business Strategies

Benefits and risks of alternate business models or strategies

Term of Reference 7 - What are the benefits, costs and risks associated with the alternative models?

(Table 2 of 2)

| Strategy | Benefits | Risks |
|---|---|---|
| <p>'Service growth' SDD scientific services are broadened to service the needs of departments beyond natural resources and environment</p> | <ul style="list-style-type: none"> • Holistic government scientific services and advice • Better industry and community engagement through external client focus • Greater relevance and more visibility of government service provision | <ul style="list-style-type: none"> • Competition with existing science service arrangements in other departments • Science capacity and skills constraints • Increased internal competition for scarce science resources |
| <p>'Business growth' SDD scientific services are offered both inside and outside government</p> | <ul style="list-style-type: none"> • Expanded revenue opportunities • Strong client business focus • Better business management • Strong market focus • More visibility of government service provision | <ul style="list-style-type: none"> • Dilution of focus on Government science requirements • Need to operate under competitive neutrality • Increased prices for government science services • Limitation of Government financial and business practices • Lack of flexible employment arrangements • Reduced responsiveness to emergency situations |

Key findings and recommendations

Term of Reference 8 – What recommendations are proposed for future provision of scientific services and advice?

Note

- Key Findings - see Page 4-8
- Key Recommendations – see Page 9-10

Appendix 1: Collaborators

SDD science collaborators

1. CSIRO
2. Healthy Waterways Ltd
3. Cooperative Research Centres
 - o eWater CRC
 - o Cotton Catchment Communities CRC
 - o Contamination Assessment & Remediation of the Environment CRC
4. Department of Agriculture, Fisheries and Forestry, Queensland
5. Australian Institute of Marine Science
6. International Water Centre
7. University of Queensland
8. Griffith University
9. Queensland University of Technology
10. University of the Sunshine Coast
11. University of Southern Queensland
12. University of Melbourne
13. Aberystwyth University, Wales, UK
14. University of Reading, UK
15. National Research Centre for Environmental Toxicology
16. GHD (Gutteridge Haskins & Davey Pty Ltd)
17. National Climate Change Adaptation Research Facility
18. EMISIA (Greece)
19. Environmental Protection Authority, Victoria
20. Environmental Protection Authority, SA
21. UK Meteorology Office, Hadley Centre
22. Australian Bureau of Meteorology
23. Australian Antarctic Division
24. Centre for Ocean-Land-Atmosphere Studies, USA
25. National Aeronautics and Space Administration, USA
26. NSW Department of Primary Industries
27. Department of Primary Industries, Victoria
28. Department of Agriculture and Food, WA
29. Environment and Heritage, NSW
30. SA Water
31. Department of Water, Land and Biodiversity Conservation, SA
32. Water Corporation, WA

Appendix 1: Clients

SDD clients

1. Queensland Government
 - Department of Environment and Heritage Protection
 - Department of Natural Resources and Mines
 - Department of Agriculture, Fisheries and Forestry
 - Department of National Parks, Recreation, Sport and Racing
 - Department of Energy and Water Supply
 - Department of State Development, Infrastructure and Planning
 - Department of Community Safety
 - Department of Transport and Main Roads
2. Commonwealth Government
 - Department of Agriculture, Fisheries and Forestry
 - Department of Sustainability, Environment, Water, Population and Communities
 - Defence Department
 - Australian Antarctic Division
 - Bureau of Meteorology
 - National Water Commission
3. Healthy Waterways Ltd
4. Gladstone Leadership Industry Group
5. Great Barrier Reef Foundation
6. RPS Group Australia
7. Regional natural resource management bodies
 - SEQ Catchments
 - Condamine Alliance
8. National Farmers Federation
9. Queensland industry groups
 - Queensland Farmers Federation
 - Moranbah Cumulative Impact Group
 - Growcom
 - Bundaberg Cane Growers
 - Queensland Seafood Industry Association
10. Grains Research and Development Corporation
11. Real estate agencies
12. Local Government
 - Brisbane City Council
 - Gold Coast City Council
 - Torres Strait Regional Authority
13. Property owners
14. Environmental consultants
15. Great Barrier Reef Marine Park Authority
16. Community or general public
17. Port Authorities

