Australian Government



Department of Agriculture, Fisheries and Forestry

DAFF Science Strategy

2013-2018



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Cataloguing data

DAFF 2013, DAFF Science Strategy, Department of Agriculture, Fisheries and Forestry, Canberra.

ISBN: 978-1-76003-007-0 (print) ISBN: 978-1-76003-008-7 (online)

Internet

DAFF Science Strategy is available at daff.gov.au

Contact

Web

Department of Agriculture, Fisheries and Forestry

Postal address

GPO Box 858 Canberra ACT 2601 Australia daff.gov.au

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Andrew Metcalfe AO, Secretary

Department of Agriculture, Fisheries and Forestry

Foreword

Since I commenced as DAFF Secretary early this year, it's been my privilege to watch our scientists at work – in laboratories, offices and out in the field – providing the advice, analysis and services that enable us to sustain life and prosperity for all Australians.

I have been impressed with the way our department uses scientific modelling and analysis, and the way that this work contributes to a robust biosecurity system and policy advice.

There is no question about the importance of science to the work of DAFF.

Good science is the foundation of productive, competitive and sustainable agriculture, fisheries and forestry industries. It plays an essential role in public policy development and evidence-based decision-making across the department.

The importance of that role will only get stronger in the future – not only in DAFF, but across the Australian Public Service and within the Australian community as a whole.

The purpose of this strategy is twofold. First, DAFF must be clear about how our science capability can be effectively developed and best deployed to ensure we deliver the best possible outcomes to the communities we serve.

Second, a thriving culture of science in Australia is something that we must contribute to and draw upon at every opportunity. Our peers and partners across all disciplines are central to our success.

Science allows people, organisations and governments alike to set the agenda for productive discussion and intelligent solutions across the range of challenges we face as a nation.

Our goal is to meet these challenges at every opportunity.

What is science?

The word science comes from the Latin 'scientia', meaning knowledge.

'Science is the pursuit of knowledge and understanding of the natural and social world following a systematic methodology based on evidence' (UK Science Council).

This involves observation and experimentation to explain and produce useful descriptions of reality.

The term science also refers to the organised body of knowledge people have gained using systematic methodology and tools. Scientists apply the scientific method and knowledge to understand our world and to help manage decision-making in an uncertain environment.



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Summary

In March 2012 the Secretary of the Department of Agriculture, Fisheries and Forestry (DAFF) reaffirmed the importance of science to the department and called on the DAFF Chief Scientist to prepare a strategic plan to guide its scientific resources. The DAFF Science Strategy provides this strategic blueprint. DAFF's vision for science, set out in this strategy, is a connected DAFF science community that underpins the work of the department and is held in high esteem both within DAFF and by all of the department's stakeholders.

- This strategy is for DAFF, about DAFF and available to the public. It focuses on the biophysical sciences, although it fits in the context of DAFF's larger research capability—where biophysical sciences combine with social sciences and economics to inform the evidence base for policy development.
- DAFF invests in and uses biophysical science, together with its social science and economic analyses, to understand resources and the effects of their use by Australian agricultural, fisheries and forestry industries and to provide evidence to support decision-making.
- DAFF's scientific capability has evolved over time and its many forms suit varied business needs. Scientists use their expertise at the border, in the department's divisions and in its large multidisciplinary divisions—including Biosecurity Animal, Biosecurity Plant and the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES).
- Science must function within the operational and practical reality of DAFF's business—its business context. It is one input in a complex policy environment. The department must be aware of both this context and its scientific competency to provide fit-for-purpose knowledge so it can make strategic, tactical and operational decisions that are timely, evidence-based, robust and outcome-driven.
- DAFF is a scientifically literate organisation that uses high-quality and timely science to support its mission.

- DAFF's scientists are public servants who work within the APS Values and Code of Conduct to provide scientific advice as an input into the policy process. This dual role has responsibilities specific to scientists working within the APS that benefit from being clearly articulated and understood.
- DAFF's science supports the department's mission to sustain the way of life and prosperity of all Australians through thriving agriculture, fisheries and forestry sectors. To achieve the vision of the science strategy and support DAFF's mission, the science strategy will focus on:
 - Establishing a scientific leadership panel to provide cohesive leadership to guide and manage scientific resources and investment, better position science as a strategic asset for DAFF and improve science quality assurance procedures.
 - Endorsing a science network that functions as an active scientific community of practice to facilitate timely knowledge brokering to share resources, data, information, knowledge, expertise and advice. A science network will also enhance the visibility of DAFF's science and champion competency across the portfolio.
 - Developing a DAFF research and science communication strategy to tell the science story and improve DAFF's positioning and credibility in debates on agriculture, fisheries and forestry issues.
 - Showing leadership to advance agriculture, fisheries and forestry innovation by providing direction to the national research effort consistent with portfolio priorities and DAFF's resources, productivity and markets (RPM) goals.
 - Increasing engagement with the external scientific community (including CSIRO, universities and rural research and development (R&D) corporations) to support best practice in setting the department's scientific direction and innovation.
 - Planning DAFF's scientific workforce to support the availability of appropriate and continuous scientific expertise, including promoting strategic workforce sharing/mobility links with other science agencies and R&D corporations.
 - Holding an annual DAFF science exchange conference to deepen the department's engagement with the external scientific community and to ensure its scientists can access the highest quality and most current science.



Strategy purpose

In March 2012 the Secretary of the Department of Agriculture, Fisheries and Forestry (DAFF) reaffirmed the importance of science to the department and asked the DAFF Chief Scientist to prepare a strategic plan to guide the department's scientific resources. The DAFF Science Strategy provides this strategic blueprint. It adds another dimension to DAFF's science competency to enable evidence-based policy, programs and decisions that underpin DAFF's mission and vision under its resources, productivity and markets (RPM) framework goals. The goals are:

- ensuring the sustainable use of natural resources (resources)
- improving the competitiveness of portfolio businesses (productivity)
- enabling trade in goods (markets).

Scientific competency comprises capability (applied scientific expertise, knowledge and operational capability—that is, laboratory/field, scientific technology) and capacity (the size of accessible capability), which are shaped by DAFF's resources, operational needs and business context. This strategy will support the continued availability of the scientific resources to DAFF.

Strategy scope

This strategy is for DAFF, about DAFF and available to the public. This strategy focuses on the biophysical sciences, although it fits within the context of a larger research capability within DAFF where these sciences combine with social sciences and economics to inform the evidence base for policy development. The term 'science' covers scientists, scientific method, scientific knowledge and technology. The DAFF Science Strategy's scope extends to DAFF's own scientific resources, its externally administered R&D investment and its broader relationships with the external scientific community. It has a five-year outlook.

Outline

The DAFF Science Strategy 2013–18 describes:

- the vision and desired outcomes of a departmental science strategy
- the importance and history of science in DAFF
- science resources available
- how DAFF uses science to improve portfolio outcomes
- relationships with scientific stakeholders
- an action plan.

Vision

A connected DAFF science community that underpins the work of the department and is held in high esteem both within DAFF and by all of the department's stakeholders.

DAFF's science supports the department's mission to sustain the way of life and prosperity of all Australians through thriving agriculture, fisheries and forestry sectors. To achieve the vision of the strategy and support the department's mission DAFF will focus on:

- strengthening DAFF's scientific credibility and integrity
 - recognising the integration of science (scientists, method, data, knowledge and systems) in DAFF's business when communicating to stakeholders and the broader community
 - raising the awareness and profile of DAFF scientific resources in strategic planning, funding and priority-setting cycles
 - establishing quality assurance procedures for science
 - improving community, stakeholder and executive confidence in DAFF
- ensuring the public, DAFF stakeholders and the scientific community see us as a focus for and showing leadership to advance the agriculture, fisheries and forestry innovation system
 - providing direction to the national research effort consistent with portfolio priorities and DAFF's RPM goals
 - increasing the provision of accessible and authoritative public information to industry, media and the public
- increasing DAFF's formidable scientific capability
 - facilitating a culture of one-DAFF science, together with portfolio agencies, to optimise the sustainability and performance of its scientific resources and investment
- becoming an employer of choice
 - continuing to be a smart place with smart people—attracting, developing and retaining staff with science qualifications who understand, communicate and meet DAFF's scientific competency needs
- · ensuring evidence-based decision-making
 - identifying and accessing the best available science, tools and knowledge systems to ensure policy processes and outcomes are underpinned by rigorous and credible evidence
- creating synergistic partnerships
 - building on DAFF's relationships with other key organisations in scientific R&D to maximise outcomes from collaborative scientific partnerships
- · recognising DAFF's public sector role
 - adding value to the Australian Public Service (APS) and the Australian Government.



1 Context for strategy

1.1 Business context

DAFF invests in and uses biophysical science, together with its social science and economic analyses, to understand resources and the effects of their use by our agricultural, fisheries and forestry industries and to provide evidence to support decision-making.

DAFF's scientific capability has evolved over time and its many forms suit varied business needs. Scientists use their expertise at the border, in DAFF's divisions and in its large multidisciplinary divisions—including Biosecurity Animal, Biosecurity Plant and the Australian Bureau of Agricultural and Resource Economics and Science (ABARES). ABARES is an independent, in-house research bureau. It has a statement of professional independence.

Biosecurity science in Australia began in 1908 with the establishment of the Bureau of Microbiology by the predecessor of the current department. Since then, DAFF and its predecessors have employed scientists to perform different functions to support quarantine and biosecurity. In 1989, the establishment of the Bureau of Rural Sciences (BRS) further enhanced scientific input into policy development. In 2011 DAFF merged BRS with its economic analysis function to create ABARES. Other Australian Government agencies use DAFF's scientific capability, and it has a reputation for undertaking rigorous analysis and providing independent advice. Science protects Australia from harmful pests and diseases and underpins Australia's claims on its biosecurity status, enabling primary industries to access multi billion-dollar export markets.

Science must function within the operational and practical reality of DAFF's business—its business context. Science is one input in a complex policy environment. Broadly, DAFF derives its science competency through its staff and external relationships and delivers it as either research or applied science. Science-based competency adds value to DAFF's business as part of the APS. Science is one element of the policy process, and DAFF's scientists are bound by the APS Values and Code of Conduct. DAFF must be aware of its business context and scientific competency so it can provide fit-for-purpose knowledge to make strategic, tactical and operational decisions that are timely, evidence-based, robust and outcome-driven (Figure 1). Intelligence, horizon scanning and strategic foresight activities facilitate these processes. Scientific competency is essential in acquiring, analysing and interpreting this intelligence.



Consistent with the report <u>APS200 project: the place of science in policy development</u> in the <u>Public Service</u>, DAFF uses science in its policy cycle—particularly with policy anticipation, formulation and evaluation.

DAFF uses its scientific competency to research, analyse and apply existing science to reach conclusions and deliver practical outcomes for policy development. This scientific competency enables DAFF to make evidence-based policy and assess program efficacy and probity; supports research, analysis, decision-making and review frameworks; and aids an open government agenda. Although the majority of DAFF scientists do not regularly carry out primary research, they undertake operational laboratory and field activities as well as complex modelling and applied analyses. DAFF also procures science and administers portfolio relevant R&D investment (such as rural R&D corporations, grants and commissioned research), activities which benefit from being carried out by scientifically literate staff.

'My work benefits the Australian community by improving our preparation for outbreaks of animal disease. While at DAFF, I have been very fortunate to have completed a PhD on the potential transmission and control of highly pathogenic avian influenza.'

Sam Hamilton

Australian Foot and Mouth Taskforce, Office of the Chief Veterinary Officer. Sam holds a Bachelor of Science (Veterinary), a Bachelor of Veterinary Science and a PhD in veterinary science.



DAFF's mission is to 'advise the government and our stakeholders how to improve the productivity, competitiveness and sustainability of our portfolio industries'. This is set in the context of the world becoming more complex. Pressures on our natural resource base, and on our industries, are increasing. Climate change and food security challenges will demand sophisticated policy responses. Movement of people and goods across our borders is increasing and requires science-based interventions. A risk-based approach to managing biosecurity must be informed by intelligence and evidence.

Contestability and transparency of the evidence base for policy decisions is increasing, requiring policy makers and communicators to have timely and fit-for-purpose access to scientific advice. The recent bovine spongiform encephalopathy and foot-and-mouth outbreaks in the United Kingdom, which caused crises in the agricultural and tourism industries, demonstrate the importance of government departments retaining sufficient scientific expertise in house to understand and review advisory committee advice.

DAFF must ensure it has the capability, capacity and networks necessary to address these challenges and achieve its mission. This science strategy sets out a path to support this.

Importance of science in the Australian Public Service

The APS is increasingly frequently asked to solve complex policy problems that require significant scientific input. APS policymaking must be rigorous and evidencebased and routinely and systematically draw on science. Science trained policy officers have highly-developed critical thinking and analytical skills. They use these skills to interpret, translate and communicate both scientific and non-scientific information and apply rigour to policymaking. Science provides evidence to stimulate action, clarify ambiguity, identify gaps, improve resilience of decision-making and manage uncertainty. It is also essential for innovation. Science is contestable and rigorously tests and retests to establish its credibility, authority and robustness. In complex areas or where research is moving rapidly, scientific evidence may support quite different, and even incompatible, approaches to resolving policy issues. Policymakers routinely deal with uncertainty and complexity and need to understand the nature and limitations of all evidence used to develop options and support decisions.

<u>Ahead of the game: blueprint for the reform of Australian Government</u> <u>administration states</u>:

The APS needs to strengthen its capacity to undertake rigorous research, gather and analyse data and provide the highest-quality strategic policy advice.

The Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education coordinated the <u>APS200 project: the place of science in policy</u> <u>development in the Public Service</u> to systematically review how scientific evidence is used to inform policy development in the APS. The report provides departments and agencies with practical and useful strategies to achieve better government outcomes through effectively using science in policy development.

The Chief Scientist for Australia further supports science in the APS. The Chief Scientist provides high-level, independent advice to the Prime Minister and ministers on science, technology and innovation. The Chief Scientist also advocates for Australian science internationally and focuses national thinking on science across the states and territories through the Forum of Australian Chief Scientists.

Scientists in the APS contribute to the policy process. DAFF's scientists work within the APS Values and Code of Conduct to provide scientific advice for the policy process. This dual role has responsibilities specific to scientists working within the APS, that benefit from being clearly articulated and understood. The <u>ABARES statement of professional independence</u> clearly identifies how scientific and economic research relates to the organisation rather than the individuals within it and how research is based solely on sound and broadly-accepted economic and scientific concepts and principles.

'I have very interesting work and constantly find myself at the interface between importers, exporters, internationally traded goods and Australian industries—always working in the best interests of the community.'

Aaron Maxwell

DAFF Biosecurity South-West Region, Quarantine and Export Operations. Aaron holds a Bachelor of Science and a PhD in forest pathology.



1.2 Input from DAFF science staff

This strategy builds on key outcomes of an extensive review of DAFF's scientific competency by the science strategy steering committee and working group. It also considers gaps and future needs and identifies actions to address these.

The department established a network of DAFF scientists to drive and facilitate consultation for this strategy and an intranet science page for information sharing and discussion. The network gathered input for the strategy through a staff questionnaire, seminars and regional visits.

The network of DAFF scientists identified these factors as important in DAFF's science strategy. It must:

- recognise that science includes scientists, the scientific method, scientific knowledge and integrity
- recognise that science plays a vital role in DAFF
- define how rural R&D corporations are involved in science at DAFF
- · assess how DAFF defines and sets research priorities
- investigate how resources such as publications and libraries, information technology, regionally based universities, science organisations and outside expertise can be made more accessible to DAFF scientists
- explore how DAFF can develop and maintain databases and other tools essential for its evidence base
- emphasise the importance of training, publishing and career development for DAFF scientists
- specify science quality assurance and peer review requirements.

'My scientific training and early career experience as a scientific adviser have provided a great foundation for my work and career opportunities. In my senior executive level policy role, I am able to apply greater rigour in developing policy and assessing the underpinning evidence, to know when and how to draw on science and integrate it with other research disciplines, and to interpret and communicate the results of research to decision-makers.'



Peter Ottesen

Assistant Secretary, Crops, Horticulture and Wine Branch. Peter holds a BSc Hons (Marine Ecology) and an MSc (Natural Resource Management).



2 How DAFF uses science

2.1 Role of science in DAFF

DAFF uses its scientific competency to research, analyse and apply existing science to reach new conclusions and practical outcomes and to develop policy. It enables DAFF to make evidence-based policy and assess program efficacy and probity; supports research, analysis, decision-making and review frameworks; and aids the open government agenda. Although the majority of DAFF scientists do not regularly carry out primary research, they undertake operational laboratory and field activities as well as complex modelling and applied analyses. DAFF also procures science and administers portfolio relevant R&D investment (such as rural R&D corporations, grants and commissioned research), activities which benefit from being carried out by scientifically literate staff.

Scientific positions in DAFF

Science underpins DAFF's evidence-based policy development, decision-making and service delivery. In 2012, 927 staff had tertiary science qualifications—including in zoology, botany, molecular biology, microbiology, geospatial analysis, food and nutrition science, quantitative science, environmental science and veterinary science. DAFF is the largest employer of veterinarians in the country (Box 1).

The DAFF Chief Scientist, a Senior Executive Service officer in ABARES, leads DAFF's analysis and research. The senior departmental roles of Chief Veterinary Officer and Chief Plant Protection Officer advise the Australian Government on managing animal and plant pest and disease incidents and lead Australia's international representation in biosecurity policy forums. DAFF's policy divisions also employ scientists.

Box 1 Veterinary science in DAFF

DAFF employs veterinarians in a wide range of jobs—in policy and operational roles, in head office, in the regions and overseas. DAFF's veterinarians provide scientific and technical advice to inform development of policy and standards for animal and public health, food safety, animal welfare and biosecurity. They contribute to the delivery of operational and regulatory functions, undertake surveillance activities and scientific and veterinary project work and contribute to emergency responses. They work in import and export of live animals, animal products, food products and biological products. For Australia to maintain its trade in animals and animal products, it is essential that veterinarians issue veterinary certificates and permits and that these are underpinned by current scientific knowledge.

Veterinary specialties in DAFF include veterinary epidemiology, laboratory diagnostics, emerging infectious diseases and veterinary public health, including ante mortem and post mortem inspection. Veterinarians in the Northern Australia Quarantine Strategy undertake routine animal health surveillance, veterinary investigation and diagnostic activities for early detection of exotic and emerging pests and diseases in northern Australia.

The Australian Pesticides and Veterinary Medicines Authority also employs specialist scientists. It is the Australian Government statutory authority responsible for registering pesticides and veterinary medicines and regulating them up to and including their retail sale.

Scientists also work in the Australian Fisheries Management Authority, the Australian Government statutory authority responsible for day-to-day management of fisheries under Commonwealth jurisdiction.

DAFF is working to establish new work level standards for its veterinary, science, and policy and technical streams. Work level standards describe and set work value for a job. They state clearly the broad job requirements, key duties and responsibilities, and operating environment for each work level. The science work level standards will support job design, recruitment and classification decisions within DAFF.

'It's applied science; there's no two ways about that. The opportunity to practise applied science in the national arena is really valuable and rewarding.'

James Walker

Northern Australia Quarantine Strategy. James holds a Masters in Agricultural Entomology and is undertaking a PhD in cockroach taxonomy.



Scientific resources in DAFF

A wide range of scientific resources support DAFF's scientists and enable them to do their jobs. Table 1 shows these resources, along with the currency of the data used.

DAFF has operational capacity to identify pests and diseases—through, for example, insect identification and plant pathology—intercepted at the border at facilities in Cairns, Brisbane, Tullamarine and Perth. Other facilities at Eastern Creek (New South Wales) and Knoxfield (Victoria) will be consolidated into the new Post Entry Quarantine (PEQ) facility in Victoria. DAFF contributes funding to the CSIRO's Australian Animal Health Laboratory, to maintain Australia's capacity to diagnose exotic and emerging animal diseases.

TABLE 1 Scientific resources used in DAFF

Science infrastructure, information sources and systems		Currency
DAFF Diagnostic Labs	2	2013
DAFF Inspection Labs	7	2013
Specialist software applications	>200	2013
Science articles accessed per year >18 0		2011
Science Interlibrary loans per year		2011

In the 2012–13 Budget, the Australian Government allocated funding of \$379.9 million over seven years to the construction and operation of the new PEQ facility, to consolidate high-risk plant and animal imports on one site.

2.2 Science in the divisions

DAFF has an in-house scientific capability in divisions and functional centres which include:

- Agricultural Productivity, Biosecurity Food (Box 2), Climate Change and Sustainable Resource Management policy divisions.
- ABARES (Box 3)
- Biosecurity Animal and Biosecurity Plant divisions (Box 4)
- Operational Science Program (OSP), including NAQS and the Australian Plague Locust Commission (Box 5)

To function effectively, DAFF embeds much of its scientific expertise so it can be accessible readily. When appropriate, it uses external scientific resources. DAFF's scientific competency enables it to make evidence-based policy and run evidence-based programs across agriculture, fisheries and forestry.

DAFF also uses its science competency to administer portfolio-relevant R&D investment—such as rural R&D corporation engagement, grants or commissioned research. For example, the department delivers components of the Carbon Farming Futures program, including Filling the Research Gap—\$201 million to fund research into new technologies and practices for land managers to reduce emissions and store soil carbon.

Under Caring for our Country, DAFF administers innovation grants ranging between \$250 000 to \$1.5 million to help drive the development and adoption of innovative practices and technologies in primary production. Other research grant initiatives include \$28.5 million to research Asian food markets under the National Food Plan.

Box 2 Biosecurity Food Division

Microbiologists in Biosecurity Food Division provide scientific advice on food safety and food wholesomeness, emphasising market access. They ensure that department policy is consistent with microbiological requirements of Australian and importing country standards. Biosecurity Food Division microbiologists also advise industry bodies, industry representatives and departmental field officers to ensure Australia maintains its current markets and gains access to new markets.

The division's microbiologists design and operate systems in the export industry to measure hygienic performance. This includes analysing and interpreting key performance indicator data and generating reports to industry and authorities in importing countries. Division scientists also advise on Australia's response to the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures notifications on microbiological criteria proposed by importing countries and participate in the Codex Alimentarius Commission to ensure DAFF is informed on developments.

Box 3 Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

ABARES provides DAFF's portfolio interests with a distinct business advantage through its professionally independent research, analysis and advice for government and private sector decision-makers. ABARES aims to maintain its public presence and reputation for analysis based on the best available scientific research. Its outputs need not necessarily reflect the government's views or policy positions. ABARES' biophysical and social scientists undertake innovative research, scientific analysis and data modelling, surveys and data collection, statistical analysis, risk assessment and management, and geographical mapping, particularly for natural resource management. Its scientists work alongside and are integrated with economists. ABARES reports its work through publications, reports, data compilations, databases, presentations, conferences and workshops.

Box 4 Biosecurity Animal and Biosecurity Plant divisions

Biosecurity Animal and Biosecurity Plant scientists perform the biosecurity functions that allow plants and animals and their products to move safely into and out of Australia. They work to mitigate potential pest and disease impacts on Australia through strengthening national preparedness, detection and response mechanisms.

Scientific competency enables Australia to meet its international obligations. As a member of the World Trade Organization, Australia has the right to specify the level of biosecurity protection on imports it considers appropriate to protect human, animal or plant life or health within its territory, provided it applies it consistently. The World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures requires that risk measures that may affect international trade:

- be based on scientific principles
- not be maintained without sufficient scientific evidence
- be based on a risk assessment, appropriate to the circumstances, taking into account techniques developed by the relevant international standard organisations.

Box 5 Operational Science Program

DAFF's operational science areas provide its scientific operational (laboratory/field) capability. Their main roles are preparedness, surveillance detection and identification, which underpin response mechanisms for pest and disease risk mitigation. Australia's northern coastline is vast and sparsely populated, making it vulnerable to undetected foreign vessels, migrating birds and wind currents and other natural pathways that can carry pests and disease agents to Australian shores from neighbouring countries.

The Northern Australia Quarantine Strategy addresses these unique quarantine risks.

The Australian Plague Locust Commission runs part of a national cost-shared response program of monitoring, forecasting, research and control to reduce the effect of major locust outbreaks on agriculture. Operational Science Program entomologists and plant pathologists identify pests and diseases detected by DAFF's inspectors around Australia and provide them with technical training and advice.

2.3 Relationships with the external scientific community

DAFF engages external scientific resources when appropriate to access specialist expertise but scientific collaborations take time to establish, develop and deliver the science needs of DAFF. DAFF must continue to commit to longer-term engagement with the external scientific community to maximise its benefits. Ongoing, high-level scientific engagement and leadership will encourage investment in portfolio priorities.

Agencies and organisations that contribute scientific competency to the portfolio provide:

- advice—for example, DAFF's Eminent Scientist Group provides independent scientific advice to DAFF's biosecurity import risk analysis process. DAFF also provides independent, external advice to CSIRO via its representation on the advisory committees of their Biosecurity Flagship and Sustainable Agriculture Flagship.
- research—for example, CSIRO, state and territory agencies, universities, the Centre of Excellence for Biosecurity Risk Analysis, cooperative research centres and Geoscience Australia conduct primary research for DAFF as well as being research collaborators
- knowledge—for example, the Bureau of Meteorology, the Australian Bureau of Statistics, museums and the Australian Centre for International Agricultural Research contribute primary and secondary data to DAFF
- funds—for example, rural R&D corporations, cooperative research centres and Commonwealth agencies such as the Murray–Darling Basin Authority contract DAFF's scientists for specialist consultancies.

These policies and institutional arrangements shape DAFF's science:

- the Rural Research and Development Policy Statement
- the Rural Research and Development Priorities
- the <u>National Primary Industries Research, Development and Extension Framework</u>, endorsed by the former Primary Industries Ministerial Council (now Standing Council on Primary Industries)
- the Intergovernmental Agreement on Biosecurity.

'Being able to design, conduct and publish experimental and field based research to improve our ability to monitor and forecast locust populations is very rewarding.'

James Woodman

Biosecurity Plant, Australian Plague Locust Commission. James holds a Bachelor of Science (Hons) in Zoology and a PhD in invertebrate physiological ecology.



While DAFF is engaged in developing these reports, their conclusions can also influence the direction of DAFF's science.

DAFF engages and collaborates with the external science community through:

- contributing, as a joint funding partner with CSIRO, more than \$7 million annually to the Australian Animal Health Laboratory (AAHL) in Geelong. AAHL provides much of the testing and research capability for Australia's animal disease responseactivities
- facilitating the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry. These awards encourage science, innovation and technology in rural industries and help advance the careers of young scientists through national recognition of research and ideas
- engaging in developing and implementing the National Primary Industries Research, Development and Extension Framework strategies
- having access, through the Intergovernmental Agreement on Biosecurity, to a network of specialist research scientists, diagnostic scientists and emergency pest and disease managers and respondents in state and territory departments of agriculture
- membership of the Australian Research Committee chaired by Australia's Chief Scientist, the science advisory committees for the CSIRO Biosecurity Flagship Sustainable Agriculture Flagship and the joint DAFF-CSIRO executive level forum
- working with CSIRO to establish a strategic memorandum of understanding to facilitate a stronger relationship between CSIRO and DAFF and provide a mechanism for progressing specific strategic items between both agencies.

DAFF's scientific staff engage broadly with the international science community through their involvement in:

- developing international food standards through the Codex Alimentarius Commission
- developing plant and animal health standards through the International Plant Protection Convention and the World Organisation for Animal Health
- · world trade through the World Trade Organization
- reports on food, agriculture and development by the Food and Agriculture Organization of the United Nations and the Organisation for Economic Co-operation and Development.



3 A path forward

3.1 A vision for DAFF's science

DAFF is a scientifically literate organisation that uses high-quality and timely science to support its mission. DAFF brings scientific and technical excellence to its public sector role. DAFF's vision for science, set out in this strategy, is a connected DAFF science community that underpins the work of the department and is held in high esteem both within DAFF and by all of the department's stakeholders.

3.2 Actions and time frames

ln 2013	 Launch the DAFF Science Strategy and publish it on the website. Establish the scientific leadership panel (see section 3.3). Include a science focus in DAFF's investment plan. Include a science focus in DAFF's workforce plan. Include a science focus in DAFF's communications and media plan. Prepare a plan to ensure access to the tools necessary to enable science work in DAFF.
By 2014	 Establish a science network to facilitate information sharing, champion competency and provide feedback to the scientific leadership panel (see section 3.4). Hold the inaugural DAFF science exchange conference (see section 3.8). Report to the DAFF Executive Management Committee on strategic policy directions for DAFF's science capability.
2015 & beyond	 Hold annual DAFF science exchange conferences. Produce biennial performance reports to the Executive Management Committee on the state of DAFF's science. Continue the science network and information sharing.

3.3 Scientific leadership panel

Science could be better connected within DAFF and more broadly assimilated into strategic planning, business activities and the policy cycle. Cohesive leadership to guide and manage scientific resources and investment will better position science as a strategic asset for DAFF and improve science quality assurance.

A scientific leadership panel will transform the way the Executive Management Committee deals with strategic scientific needs and governance, coordination and liaison with the broader scientific community—including CSIRO, universities and rural R&D corporations. This would support best practice in setting DAFF's scientific direction and innovation.

The panel will:

- comprise, as a minimum, the DAFF Chief Scientist, the Chief Veterinary Officer and the Chief Plant Protection Officer and have scientific secretariat support
- set research priorities internally and define research needs and applications for DAFF
- lead scientific improvement by producing discussion papers on topics like setting research priorities, managing relationships with research providers, peer reviewing publications, quality assuring science, presenting at conferences and ensuring good governance
- culturally embed science as an integral and valued component of departmental capabilities, including establishing mechanisms to better connect science across DAFF and among stakeholders. These include: a science network and information sharing portal (3.4), communication and media planning (3.5), scientific investment planning (3.6), scientific workforce planning (3.7) and a national DAFF science exchange conference (3.8)
- introduce science key performance indicators on monitoring, evaluation and reporting scientific performance; relevance; and impact across all programs.
 DAFF will analyse scientific competency and report to the Executive Management Committee every two years
- assess departmental scientific capability and impact—for example, science quality, staff resources, professional support, research needs and priority setting and enabling tools such as evidence bases.
- champion high-level scientific engagement and leadership of portfolio priorities in the rural innovation system
- recommend mechanisms to enhance scientific professional credibility appropriate to business needs and resourcing—including clearance process for publications, publication in scientific journals, presentation at conferences, student supervision and secondments.

3.4 Science network and information sharing

A network of departmental scientists from around Australia could function as an active scientific community of practice. DAFF's endorsement of the network would facilitate timely knowledge-brokering among departmental scientists to share resources, data, information, knowledge, expertise and advice. It would also enhance the visibility of DAFF's science. The science network would champion competency across the portfolio, including in:

- scientific knowledge capture and dialogue
- scientific peer review and quality assurance
- scientific seminars
- publications, both in the form of DAFF reports and in the peer-reviewed scientific literature.

DAFF demonstrates its credibility and integrity when its scientific knowledge is accessible, timely, current, accurate and fit for purpose. It obtains its knowledge from numerous sources and in many formats—for example, from papers, reports, technical facts, frameworks and data. DAFF must manage its knowledge across the enterprise to ensure its accessibility and application. Scientific knowledge compiled for one function may be useful elsewhere in DAFF, and DAFF should view this knowledge as a fundamental department-wide resource.

Effective knowledge sharing will encourage DAFF to adopt best practice standards in data acquisition, sharing and use. They will place greater emphasis on understanding more precisely the potential end uses of data.

DAFF should review the ability of DAFF's ICT systems to underpin its knowledge management.

The departmental library acts as an information broker rather than a reference collection. DAFF needs practical mechanisms to improve the breadth and quality of scientific papers, data and other materials accessible to DAFF's scientists. The library could amend its information brokering function to facilitate broader scientific knowledge management activities, including virtual services. DAFF should instigate greater interagency collaboration or APS-wide agreements to broaden its scientists' access to key information.

DAFF must further develop intelligence, horizon scanning and strategic foresight activities to form a comprehensive picture of DAFF's operation and business. DAFF must ensure it captures knowledge it gains from these activities and uses science to underpin its policymaking.

3.5 Communication and media planning

The DAFF research and science communication strategy aims to tell the science story and increase the department's positioning and credibility in debates on its portfolio issues.

DAFF science communication aims to:

- reposition the role of science as underpinning what DAFF does
- identify the science that supports its key priorities and develop supporting communication products
- extend and strengthen relationships with key influencers and decision-makers to tell its science story.

Through its science communication and media strategy, DAFF committed to:

- using its science and research to support its position in debates about its portfolio issues
- · using the most appropriate channel to ensure its voice is heard
- emphasising scientific analysis when communicating its work
- making its scientific resources available to other government departments where they contribute to the development of policies that impact its portfolio industries
- increasing the provision of accessible, authoritative and public information to industry, the media and the general public.

'My interest, more than in any particular discipline, is to provide a sound evidence base from which decision-makers best ensure robust policies and programs and a sustainable agricultural base in the long term.'

Georgina Kelley

ABARES, Land Use and Management Section. Georgina holds a Graduate Diploma in Environmental Management and a PhD in plant physiology.



3.6 Scientific investment planning

DAFF shows leadership in and draws on the best available scientific expertise, knowledge and technology to achieve practical outcomes for its portfolio interests. DAFF must generate greater awareness of its scientific resources among the wider scientific community. DAFF must also clarify the purpose of the department's science and how it will optimise use of departmental and externally sourced scientific resources.

The scientific leadership panel, with input from the broader scientific community, will direct departmental priority-setting and evaluation, The panel will define and rank DAFF's scientific competency needs and scientific investment directions, and recommend policy to satisfy these needs.

Innovation is about doing things better. A culture of innovation, including for seeking and adopting enhancements in scientific competency, is vital to DAFF to procure, maintain, grow and use its scientific competency. DAFF fosters a culture of innovation internally with the formal innovation initiative I-Gen, which encourages staff at all levels to generate ideas to improve the way DAFF operates and to drive their ideas forward. DAFF also encourages innovation in agricultural science more broadly by:

- coordinating the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry
- administering Caring for our Country Innovation Grants to help drive development and adoption of innovative, sustainable practices and technologies in primary production.

DAFF is responsible for administering the the primary legislation that governs the rural R&D corporations. DAFF will provide greater direction to the national research effort consistent with its portfolio priorities and RPM goals.

'My work with biosecurity counterparts overseas helps to provide an early warning capability for Australian biosecurity. And it has provided me with great opportunities to live overseas and work with biosecurity specialists across many different countries and cultures.'

Chris Dale

Biosecurity Plant Division, International Plant Health Program. Chris holds a Bachelor of Applied Science in Environmental Health.



3.7 Scientific workforce planning

Scientific expertise must be embedded and readily accessible to DAFF. The department must also finely balance its in-house and external scientific expertise.

DAFF offers attractive APS and scientific careers. However, it must use active, targeted scientific recruitment strategies in what is a competitive and, in some areas, diminishing scientific skills market.

It cannot assume that expertise currently available externally will remain so. Its availability may, decline.

DAFF must increase investment in maintaining and developing existing scientific staff, and staff's professional independence is essential to sustaining and building scientific integrity. Maintaining the existing scientific expertise base within DAFF will prevent loss of expertise.

The department's Performance Management Scheme provides the framework for managers and employees to work together to define, measure and discuss their performance. The scheme also facilitates the joint drafting of a forward Work Plan and Learning Agreement which can be specific to DAFF Science Work Level Standards. Through this process staff and their managers are able to determine the necessary competencies, skills and attributes to be developed in order to assist the department achieve the science strategy vision.

DAFF must demonstrate greater flexibility in applying scientific resources to meet emergencies, and changing priorities and needs. It must increase its ability to rapidly identify and access scientific expertise in its workforce, improve its scientific workforce planning and project management and increase the visibility and professional profile of scientific staff.

To develop professional staff—focusing on capacity building, people investment, skills improvement and attendance at conference and training courses—DAFF should:

- encourage staff to update Aurion (DAFF's personnel record management system) to capture more comprehensive information on their scientific qualifications, expertise and training
- facilitate staff's continuing professional development to meet the needs of DAFF's business
- succession plan to broaden the scientific expertise base
- target recruitment, including graduate recruitment, for science positions
- facilitate mobility programs for staff to access work opportunities across professional disciplines in DAFF
- generate promotional, recruitment and career opportunity materials for DAFF's science positions
- promote strategic workforce sharing/mobility links with other science agencies (such as rural R&D corporations, universities and CSIRO).

3.8 National DAFF science exchange conference

DAFF must access the highest quality and most current science to remain efficient and effective. It must also deepen its engagement with the external scientific community to influence and drive scientific innovation and provide products that are fit-for-purpose and that capitalise on scientific investment to benefit the portfolio.

A national science conference for both internal and external scientists would be effective for scientific knowledge exchange and dialogue. It would provide DAFF with an opportunity to demonstrate its scientific rigour to stakeholders and be a catalyst for driving informed, collaborative partnerships targeted at the highest priority issues. The department could also use the event to test its science capability against national priorities.

"I manage projects developing training and instructional materials for biosecurity Authorised Officers. I have always loved to apply my scientific knowledge where I can see outcomes, which is why I specialised in pest management. I feel that being involved in the work DAFF does in biosecurity while facilitating trade is very rewarding."



Catherine Mathenge

Biosecurity Plant Division, Authorised Officers Program, Bachelor of Education (Sciences), Bachelor of Science, MSc and PhD in biological control of weeds.

The 'Biosphere' Graphic Element

The biosphere is a key part of the department's visual identity. Individual biospheres are used to visually describe the diverse nature of the work we do as a department, in Australia and internationally.



Department of Agriculture, Fisheries and Forestry Postal address

daff.gov.au