



Australian Government

**Grape and Wine Research and
Development Corporation**



Annual Operational Plan

2011–12

Mission

Enhanced profitability, international competitiveness
and sustainability of the Australian wine sector

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Executive Director	Mr Neil Fisher
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Deputy Chair	Mr Jim Caddy
	Dr Anne-Maree Boland
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Introduction

The Grape and Wine Research and Development Corporation (GWRDC) invests in research, development and extension (RD&E) on behalf of its stakeholders.

Wine Grape Growers' Australia (WGGA) and the Winemakers' Federation of Australia (WFA) are the GWRDC's representative organisations under the *Primary Industries and Energy Research and Development Act 1989* (PIERD Act). However, every winegrape grower and winemaker, in partnership with the Australian Government, has a stake in the success of the GWRDC. Winegrape growers and winemakers contribute through two statutory levies - on the tonnage of grapes grown and delivered to wineries (the grape research levy) and on the tonnage crushed (the wine grapes levy) - and the Australian Government provides matching funding.

Levies are collected by the Levies and Revenue Service of the Department of Agriculture, Fisheries and Forestry (the Department), and are paid to the GWRDC for investment in appropriate research and development (R&D) for the grape and wine sectors. These producer levies receive matching Australian Government funding once R&D investments are undertaken, up to a maximum of 0.5% of the gross value of production (GVP).

The range of partnerships with R&D providers developed by the GWRDC enables a combination of applied and strategic research, development and extension (RD&E) to be undertaken with benefits flowing to the grape and wine sector, the environment and the community.

As the investor, the GWRDC's responsibilities are:

- to ensure programs in the *GWRDC Five-year R&D Plan 2007–2012* (R&D plan) produce their planned outcomes
- to evaluate research outcomes and extend benefits of R&D
- to report to and liaise with all stakeholders (including grape and wine sector groups, R&D providers and the Australian Government), and
- to maintain a watching brief for opportunities (including awareness of activities of other R&D organisations in Australia and overseas).

The GWRDC is required, under Section 25 of the PIERD Act, to prepare an Annual Operational Plan (AOP) each year and to submit the plan to the Minister for Agriculture, Fisheries and Forestry for approval.

The Minister responsible for approving this 2011–12 AOP is Senator the Hon Joe Ludwig.

Principal outcome and major objectives

The PIERD Act best explains the overriding objectives of the GWRDC, which are:

- increasing the economic, environmental and social benefits to members of primary industries and to the community in general, by improving the production, processing, storage, transport or marketing of the products of primary industries
- achieving the sustainable use and sustainable management of natural resources
- making more effective use of the resources and skills of the community in general and the scientific community in particular, and
- improving accountability for expenditure on R&D activities in relation to primary industries.

The principal outcome of the GWRDC is: the generation of new information that enhances the profitability, international competitiveness and sustainability of the Australian wine sector through investment in research and development.

Deliverables and performance information relating to this outcome are described in detail in section 10: R&D objectives, outcomes, strategies and performance information.

Corporation structure

Overall responsibility for strategic planning, the development of policy directing the delivery of that strategy for the benefit of all stakeholders and issues of corporate governance rests with the GWRDC Board (the Board). The Board scrutinises and considers recommendations made by the GWRDC's senior management about the most effective and efficient functioning of the GWRDC. Broadly, the activities of the Board are developing strategy, setting policy, providing accountability and monitoring the GWRDC's performance. To assist the Board fulfil these roles, it has four sub-committees.

The Audit Committee oversees the GWRDC's finances and end-of-year financial audits. It also has responsibility for risk and fraud management controls, the conduct of internal audits using independent external service providers, the oversight, monitoring and review of compliance with all statutory and financial reporting requirements and the GWRDC's compliance with the Australian Government's protective security framework. In accordance with best governance practice, the Audit Committee is chaired by non-Executive Director Mr Andrew Kay. Dr Terry Lee and Ms Mary Retallack are members.

The Remuneration Committee oversees the GWRDC's compliance with employment matters and has responsibility for the GWRDC's policy on terms and conditions of employment, Executive Director performance appraisal and legal or regulatory matters that may have a material impact on employment and remuneration. The Remuneration Committee is chaired by the Hon Rory McEwen. Mr Jim Caddy and Dr Helen Garnett are members.

The R&D Committee reviews, assesses and formulates recommendations to the Board regarding preliminary and final project applications, major variations to existing programs of research and major reviews of programs or suites of projects to ascertain the progress and success of investments and to inform future program development. The R&D Committee also considers the balance of funding between programs to deliver the outcomes of the R&D plan. The R&D Committee is chaired by Dr Terry Lee and its members are Dr Anne-Maree Boland, Mr Neil Fisher, Dr Helen Garnett and Mr Terry Hill. GWRDC program management staff (Ms Kate Harvey, Dr Troy Fischer, Dr Mark Krstic, Dr Liz Waters and Mr Ed Parker) also attend R&D Committee meetings.

The Regional Committee oversees the GWRDC's extension and adoption activities through the Regional Program and the Innovators Network. These programs are central to the GWRDC's strategy of making the results of research more applicable and available to the sector. The Regional Committee is chaired by Mr Jim Caddy and its members are Mr Terry Hill and Mr Andrew Kay. GWRDC program management staff (Ms Kate Harvey, Dr Troy Fischer, Dr Mark Krstic and Dr Liz Waters) also attend Regional Committee meetings.

The GWRDC has a small management team that focuses on R&D, its extension and adoption, business matters, compliance, finance, stakeholder relations, communication and administration. This team is led by the Executive Director and works to implement the Board's strategic direction and to deliver measurable outputs from GWRDC's investments. Key office holders are Executive Director Mr Neil Fisher and General Manager Ms Kate Harvey.

Grape research levy

Grape producers contribute to grape R&D through a levy on fresh and dried grapes and grape juice used in the manufacture of wine and delivered to an establishment for processing. Wineries that grow their own grapes for winemaking are also required to pay this levy.

The grape research levy is payable on grapes and juice delivered to an establishment that processes more than 20 tonnes (fresh grape equivalent) in a year. The levy system for grape research is regulated by the:

- *Primary Industries (Excise) Levies Act 1999*
- *Primary Industries (Excise) Levies Regulations (Schedule 13).*

The maximum rate of the levy permitted under the legislation is \$2 per tonne. The operative rate of the grape research levy is currently 198.4 cents per tonne (with a further 1.6 cents per tonne being paid directly to Plant Health Australia).

For the purpose of setting grape research levy rates, WGGA and the WFA are the relevant sector organisations that may make recommendations to the Minister.

Wine grapes levy

Winemakers' contributions to fund wine R&D are derived from a specific component of the wine grapes levy on fresh grapes, dried grapes and grape juice used in the manufacture of wine. (The other component of this levy finances Wine Australia.) Wineries using fewer than five tonnes (fresh grape equivalent) for winemaking in a year are exempted from levy payment. The relevant legislation for this levy system is:

- *Primary Industries (Excise) Levies Act 1999*
- *Primary Industries Levies and Charges Collection Act 1991*
- *Primary Industries (Excise) Levies Regulations (Schedule 26).*

The maximum rate of the levy permitted under the legislation is \$10 per tonne. The operative rate of the wine research component of the levy is currently 497.6 cents per tonne (fresh grape equivalent). Plant Health Australia receives 2.4 cents per tonne and Wine Australia receives the remainder of the levy.

The WFA is the peak wine sector body and may make recommendations to the Minister concerning the operative rate of the wine research levy.

Australian Government matching funds

The Australian Government matches the expenditure of the GWRDC on grape and wine R&D activities to a limit of no more than either the total of sector levy contributions to eligible R&D activities or to 0.5% of the GVP, whichever is the lower amount.

R&D activities can also be funded by interest from the investment of GWRDC funds, money from the sale of assets, money collected as penalties imposed in regard to the collection of levy charges and any other income generated by the GWRDC.

While two separate levies are sourced, the GWRDC does not differentiate between viticultural and wine making research. Given that viticultural research often has a winemaking outcome and that winemaking research often requires viticultural input, the distinction is artificial and does not reflect either the sector's or Government's supply-chain approach to R&D. In addition, R&D aimed at increasing the sector's long-term sustainability and competitiveness has benefit for all levy payers. The challenge in all investments is to ensure there is a flow of benefits from effective R&D and innovation that provide positive returns.

Funding allocation

Funds are allocated to selected projects and programs of research that meet the priorities of the grape and wine sector and the Australian Government's National Research Priorities (NRP) and Rural Research and Development Priorities (RRDP).

The GWRDC's investment objectives are developed after sector consultation with regional, state and national associations. Each year, the GWRDC holds three of its board meetings in regional areas and, as part of these visits, ensures that all Board members gain a full appreciation of regional issues and priorities as they relate to R&D. Program management staff are also directly involved in regional planning for extension and innovation activities through the Regional Program and Innovators Network. Insights gained through formal and informal interactions with regions gives the GWRDC a sound, independent grounding about the issues that affect our levy payers.

In developing research objectives, the GWRDC also considers the views of its national peak sector bodies, WGGGA and the WFA, through direct consultation and their contribution to sector committees. In relation to the priorities that inform investments in Program 1, the GWRDC also consults extensively with the wine sector's statutory marketing authority, Wine Australia.

Wide consultation with the sector, from levy payers to national representative organisations, provides a sound basis to further develop the objectives of the R&D plan, and to focus investments within the plan's programs to accommodate the continuing and emerging priorities of the sector and the Australian Government.

Through program 1, the GWRDC invests in the provision of foundation data on winegrape production, researchable questions that help define market opportunity and consumer preference, the Australian wine sector's precompetitive marketing efforts and supporting work that helps to maintain and improve (where possible) the opportunities for the Australian wine sector to access international markets.

GWRDC's program 2 investments aim to increase winemaking expertise and allow the sector to tailor wines for its target markets with a range of tools and technologies.

Through program 3, the GWRDC invests in research that allows the sector to sustainably produce grapes for any winemaking purpose or market while maintaining a commitment to the quality of all products.

GWRDC's program 4 investments emphasise the sector's responsibilities to the environment and society and a readiness to use sustainability as a competitive advantage. Of particular focus is the sector's response to the challenges of climate change and in defining how management practices will adapt to changed environments. The program also encompasses programs of research that address the sector's biosecurity issues and developing the skills of the next generation of leaders and researchers.

Through program 5, GWRDC helps levy payers benefit from the outcomes of their research investment through a variety of extension and adoption strategies. Extension is one of the key strategic priorities of the GWRDC. The GWRDC's regional and sector consultation and engagement, and mechanisms for promoting innovation and ascertaining the sector's priorities are also carried out under program 5.

The GWRDC is acutely aware that the new knowledge generated from investments in research is not innovation until the GWRDC's stakeholders can use that knowledge to improve their profitability, international competitiveness, sustainability or community. Above all else, the GWRDC will focus on making a tangible difference by facilitating innovation.

The GWRDC utilises its flexibility to ensure interactive and professional responsiveness to the wine sector's objectives, issues and priorities and is committed to ensuring projects are outcome-oriented and well managed. Accountability to Parliament, the Minister and the sector within this framework is of prime importance.

The grape and wine sector and research environment in 2011–12

The Australian wine sector continues to trade under difficult business conditions with our terms of trade, international competitors, strong retail pricing pressures and continuing consolidation in the retail sector combining to threaten the economic sustainability of many grape and wine sector businesses.

Given the effects of adverse weather conditions in most production regions in late 2010 and early 2011, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) projected in April 2011 that the national crush for the 2010–11 season will be approximately 1.5 million tonnes, down 2 per cent on the national crush of 2009–10.

GWRDC's budget estimates were prepared on the assumption of a 1.705 million tonne crop. After these budget estimates were prepared and after ABARES verbally advised GWRDC of its national crush estimate, most of the inland and coastal wine producing areas experienced weather conditions that were detrimental to the size of the grape crop, including inundation of vineyards and unseasonal rain leading to disease pressures, so all the risk to the budget estimates is on the downside.

GWRDC has commissioned a number of reviews over the past 12 months to provide both the Board and management with additional information that will help the GWRDC make better informed decisions about future investments. For example, last year a detailed scientific review of R&D related to soil health in viticulture and other related industries in Australia was undertaken. The review identified what is known about soil health, where gaps in knowledge occur and how these gaps might be addressed in future R&D that could be funded by the GWRDC. The effectiveness of the GWRDC's leadership development investments was reviewed and the first year's outcomes from the Regional Program were evaluated. The outcomes of these reviews will help shape future investment in these areas.

In 2011–12, the GWRDC investments will continue to focus on answering researchable questions that help to underpin and support the Australian wine sector. New investments in 2011–12 will complement ongoing investments and the scale of these investments is directly dependent on the size of the 2011 crop.

The GWRDC has a renewed focus on communicating the findings from its investments in R&D with all of its stakeholders. The GWRDC will build on the solid base of the Regional and Innovators Network extension programs to extend knowledge to its stakeholders. Only by adopting the results of research will Australia's grapegrowers, winemakers and the wider community realise their investment in the research paid for by levies and the Australian Government's matching contribution.

Alignment to the R&D plan

New investments in 2011–12 will build on existing projects to deliver against the priorities in the R&D plan. New and existing projects are summarised in Appendix A.

How the GWRDC will continue developing and supporting emerging leaders is being considered in light of a review into the existing leadership development programs and it will be included in the Future Leaders Program managed by WFA. The GWRDC will continue maximising the benefits of research through the coordination of effective extension programs to encourage innovation in the sector.

The GWRDC is committed to the continual evaluation of its investments through direct contact with research providers and sector collaborators and by using the formal cost–benefit analysis framework established in collaboration with the other Rural Research and Development Corporations as a measure of the performance of investments in all rural R&D funded nationally through these organisations.

National Research Priorities and the Rural Research and Development Priorities

Table 1 below shows how the GWRDC's programs are strongly aligned with the Australian Government's RRDP and NRP. Further information on how the individual program areas address these priorities is contained in Section 10 of this AOP.

Table 1: Alignment of the GWRDC's research programs with RRDP and NRP

GWRDC Programs	Rural Research and Development Priorities	National Research Priorities										
<p>Market and consumer understanding</p> <p>Subprograms: a) Know Your Consumer b) Market Opportunities and Development</p>	<p>Supply chains and markets</p> <p>Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the whole of the supply chain, including to consumers</p>	<p>Promoting and maintaining good health</p> <p>Through strengthening Australia's social and economic fabric</p>										
<p>Winemaking excellence</p> <p>Subprograms: a) New Technologies and Products b) Managing and Enhancing Wine Quality</p>	<p>Productivity and adding value</p> <p>Improve the productivity and profitability of existing industries and support the development of viable new industries</p>	<p>Frontier technologies for building and transforming Australian industries</p> <p>Stimulating the growth of world-class Australian industries using innovative technologies</p>										
<p>Grapes for purpose</p> <p>Subprograms: a) Vine Improvement and Performance b) Berry Composition</p>			<p>Sustainability of industry, environments and communities</p> <p>Subprograms: a) Sustainable Production b) Environmental Custodians</p>	<p>Natural resource management</p> <p>Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable</p> <p>Climate change and climate variability</p> <p>Build resilience to climate variability and adapt to and mitigate climate change</p>	<p>An environmentally sustainable Australia</p> <p>Transforming the way we utilise the land and water resources through a better understanding of human and environmental systems and the use of new technology</p>	<p>c) Looking ahead</p>	<p>Biosecurity</p> <p>Protect Australia's community, primary industries and environment from biosecurity threats</p>	<p>Safeguarding Australia</p> <p>Protecting Australia from invasive diseases and pests</p>	<p>d) The next generation</p>	<p>Supporting the Rural Research and Development Priorities</p>	<p>Frontier technologies for building and transforming Australian industries</p>	<p>Smart science, practical solutions</p> <p>Subprograms: a) Knowledge development b) Industry solutions c) Administration and governance</p>
<p>Sustainability of industry, environments and communities</p> <p>Subprograms: a) Sustainable Production b) Environmental Custodians</p>	<p>Natural resource management</p> <p>Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable</p> <p>Climate change and climate variability</p> <p>Build resilience to climate variability and adapt to and mitigate climate change</p>	<p>An environmentally sustainable Australia</p> <p>Transforming the way we utilise the land and water resources through a better understanding of human and environmental systems and the use of new technology</p>										
<p>c) Looking ahead</p>	<p>Biosecurity</p> <p>Protect Australia's community, primary industries and environment from biosecurity threats</p>	<p>Safeguarding Australia</p> <p>Protecting Australia from invasive diseases and pests</p>										
<p>d) The next generation</p>	<p>Supporting the Rural Research and Development Priorities</p>	<p>Frontier technologies for building and transforming Australian industries</p>										
<p>Smart science, practical solutions</p> <p>Subprograms: a) Knowledge development b) Industry solutions c) Administration and governance</p>	<p>Innovation skills</p> <p>Improve the skills to undertake research and apply its findings.</p> <p>Technology</p> <p>Promote the development of new and existing technologies</p>	<p>Stimulating the growth of world-class Australian industries using innovative technologies</p>										

Budget

The Board has maintained its policy, during the current period of uncertainty, to release part of the GWRDC's accumulated reserves to ensure the delivery of strategically important research outcomes. Projections of income for 2011–12 are based on an anticipated crop of 1.705 million tonnes for the 2011 vintage, although the GWRDC recognises that the risk to this estimate is on the downside. As a result, cash reserves will be deployed for operational flexibility in 2011–12 and the Board acknowledges that this flexibility may be restricted in future years.

Estimates of income

For the financial year 2011–12, it is estimated that proceeds from levies will amount to \$11.936 million, if a crop of 1.705 million tonnes is achieved, as indicated in Table 2, noting the caveats above. Australian Government contributions for 2011–12 are estimated to be \$12.792 million. The GWRDC's estimate for income other than levies and Commonwealth matching funds for 2011–12 is also provided in Table 2.

Table 2: Estimates of sources of levies and other income for 2011–12

	\$m
Grape levies	3.410
Wine levies	8.526
Commonwealth Contribution	12.792
Other	0.594
Total	25.322

Estimates of expenditure

A summary of the GWRDC's estimate of expenditure for 2011–12 is provided in Table 3. These figures are indicative only, as changes in the GWRDC's operating environment may require the GWRDC to vary the total expenditure or specific allocations. The forecast funding shortfall of \$765,000 will be met from reserves.

Table 3: Estimates of expenditure by groupings and total for 2011–12

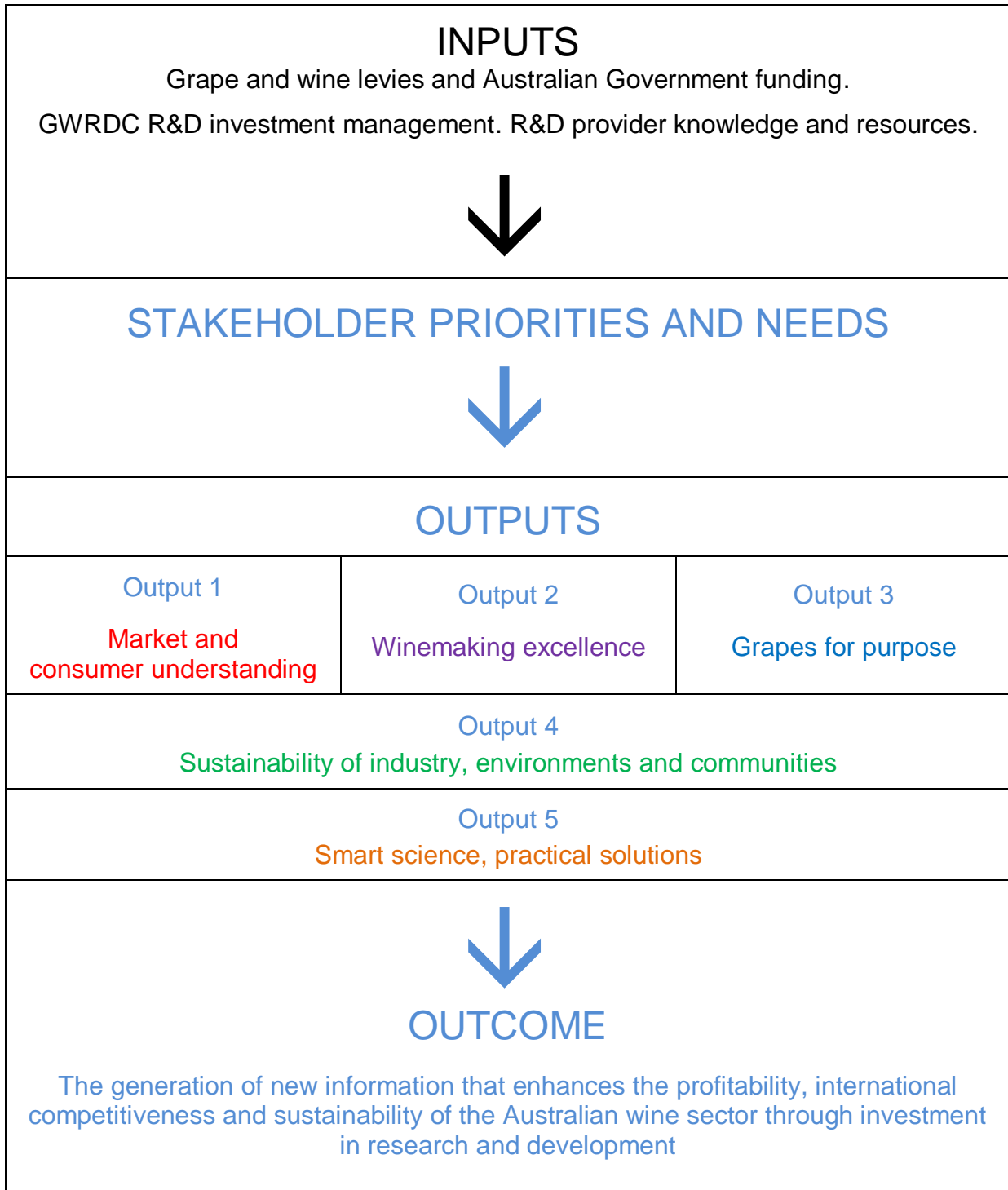
2011–12 budget allocation	\$m	%
R&D activities		
1. Market and consumer understanding	\$2.444	9.4
2. Winemaking excellence	\$8.341	32.0
3. Grapes for purpose	\$2.180	8.4
4. Sustainability of industry, environments and communities	\$5.497	21.1
5. Smart science: practical solutions	\$4.611	17.7
<i>Sub-total</i>	23.073	88.6
Management		
Employees	1.492	5.7
Suppliers	1.409	5.4
Depreciation and amortisation	0.112	0.4
<i>Sub-total</i>	3.013	11.5
Total	26.086	100

R&D objectives, outcomes, strategies and performance

The GWRDC’s five R&D programs and output categories have been developed to align the GWRDC’s R&D objectives with those of the grape and wine sector and Australian Government, and to deliver the GWRDC’s outcome:

The generation of new information that enhances the profitability, international competitiveness and sustainability of the Australian wine sector through investment in research and development.

Table 4: How the GWRDC’s outputs are structured to achieve its outcome.



The following information on each program area highlights the link between the objectives, strategies and performance measures of the GWRDC's R&D plan. The objectives, strategies and performance measures for 2011–12 are also provided.

The GWRDC also reports to government against the five key performance indicators in the table below and the targets for 2011–12 are included.

Key performance indicators	2011–12 target
Research and development projects are funded in line with the approved Annual Operational Plan	96%
Research and development contracts are actively managed through regular and ongoing monitoring of the research undertaken	100%
The outcomes of funded research are recognised and promoted through publication in peer-reviewed international journals	10 per annum
Increased number of Innovators Network members	320
Maintain number of key regions participating in Regional Program	11

Output 1 delivered by Program 1: Market and consumer understanding

Subprogram a) Know your consumer

Objective

- To ensure Australian wines are the preferred choice of consumers across a range of styles available in domestic and export markets.

This subprogram sets out to improve understanding of consumer preferences for wine. This includes understanding both the sensory and non-sensory characteristics of wine that appeal to different segments of consumers. A better understanding of consumer preferences should enable Australia's wine sector to target wine styles and products more effectively, thereby improving their competitiveness in a challenging global environment.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measure of success
1. Conduct foundational studies that will help identify market opportunities and identify the preferences and expectations of consumers within those markets	Increase in value and volume of Australian wine sales	Identify both sensory and non-sensory characteristics of finished wine that may influence consumer preference in particular market segments	Determination of key sensory and/or non-sensory consumer preference attributes in at least two key markets or market segments
2. Develop qualitative and quantitative tools to measure consumer behaviour and preferences in domestic and export markets to direct product innovation	Progress toward and delivery of tools used by the sector to measure consumer behaviour and preferences in a range of markets	Build knowledge and understanding through qualitative and quantitative methods of sensory and non-sensory consumer preferences	Understand the sensory and/or non-sensory attributes of a key variety and of consumer trust marks through consumer preference research programs

The development of qualitative and quantitative tools to predict consumer behaviour and preferences in domestic and export markets in order to inform product innovation begins with the development and testing of pilot stage quantitative tools for identifying sensory and non-sensory consumer preferences. In future years, these will lead to sector-ready applications, followed by the development of qualitative tools.

At this stage of the GWRDC's R&D plan, the strategy is to identify new and validate existing preferences and expectations of consumers so that a reliable means of assessing consumer responses to various wine styles and packaging can be developed.

Subprogram b) Market opportunities and development

Objectives:

- To build wine market intelligence
- To understand and comply with trade-related technical and regulatory requirements

This subprogram sets out to improve our understanding of key export and domestic wine markets and related trade and technical barriers. A better understanding of markets and market barriers will enable Australia's wine sector to respond to opportunities and threats in those markets, helping to increase their competitiveness in a challenging global environment.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measure of success
1. Collaborate with other sector bodies to support the collection of timely and accurate information on key markets for wine that adds value and opportunity for the Australian wine sector	Demonstrable use by and support of the sector for the knowledge generated from the information collected	Continue to collect and disseminate sector-relevant data in a coordinated and resource efficient manner	Demonstrable use by and support of the sector for the information collected
2. To assist in the identification of current and potential trade barriers in new and existing markets	Continued and improved market access	Collaborate with other sector bodies to support the identification and quantification of the impact of current and potentially new trade barriers	No reduction in market access for Australian wines through technical or regulatory issues
3. Support the development of innovative solutions to technical and regulatory issues	Continued and improved market access	Maintain a response capacity and capability to technical and regulatory issues as they arise	No reduction in market access through technical or regulatory issues

The GWRDC will continue to collect and disseminate sector-relevant information on key markets, and continually monitor the usefulness and efficiency of the information collected. Over the life of the R&D plan, the information needs of the sector will be continually reviewed. The GWRDC will use these reviews to prioritise its investments.

The GWRDC will maintain the current capacity to respond to regulatory and technical market barriers. Over the life of the R&D plan, additional capability will be developed when required to ensure maintenance and/or improved market access through the resolution of regulatory and technical issues in partnership with other grape and wine sector organisations.

Output 2 delivered by Program 2: Winemaking excellence

Subprogram a) Production technologies

Objectives:

- To support the development of novel and improved winemaking processes
- To provide winemakers with the knowledge and capability to respond to changing consumer demands.

This subprogram aims to improve winemaking processes to achieve greater definition of wine styles. A better understanding of winemaking processes will allow the Australian wine sector to optimise wine production costs in line with desired wine characteristics.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measure of success
1. Development of novel yeasts and application of expanded knowledge of microbiology and fermentation technologies	<p>Definition of new wine styles predicted to appeal to the consumer</p> <p>A reduction in average winemaking costs</p>	<p>Continue to support research to improve fermentation efficiency through the generation of new yeast strains and other microbiological species with improved characteristics, to:</p> <p>Reduce the incidence of problem or ‘stuck’ fermentations.</p> <p>Enhance flavour and aroma profiles in accordance with consumer preferences.</p> <p>Produce lower levels of ethanol.</p>	<p>Outcomes available from winemaking trials using new hybrid yeasts generated through selective breeding/adaptive evolution techniques.</p> <p>Progress achieved on the development of commercial yeast strains that produce lower levels of alcohol during fermentation.</p> <p>New knowledge available on the biology of <i>Oenococcus</i> spp., (malolactic fermentation bacteria) that could beneficially impact the sensory properties of finished wine.</p>
2. Develop and test practical methods to articulate and understand desirable attributes in wine from the perspective of emerging and established wine drinkers	<p>Sector’s capacity to rapidly respond to changing consumer demands increased</p>	<p>Determine significant factors affecting wine composition, flavour and aroma properties.</p> <p>Continue to invest in tannins research, based on identified knowledge gaps and the sector’s contemporary needs.</p>	<p>New knowledge published on the drivers of phenolic tastes in white wines.</p> <p>Progress in improving sector’s knowledge on wine composition and target compounds that can influence sensory attributes in wine. In particular: the relationship between tannin chemistry and mouthfeel in red wine, and encourage sector adoption of tannin web portal.</p>

The use of specialised yeasts and an enhanced understanding of the impact of other significant microbiological species on fermentation processes create the possibility to adapt winemaking outcomes towards preferred wine styles with different flavour, aroma and mouthfeel characteristics. Aligned with the outputs from consumer preference studies, this capability can provide a powerful tool to meet changing consumer trends, or the preferences of non-traditional wine markets. The program will investigate and take advantage of adaptive evolution techniques to isolate more robust yeast strains that perform better and can assist in minimising or preventing problem fermentations. In addition, there will be a continuing focus on the development of yeasts capable of producing wines with a lower ethanol concentration and on the influence of tannin composition and chemistry on 'mouthfeel' and wine styles.

Subprogram b) Managing and enhancing wine attributes and composition

Objectives:

- To enhance the quality of Australian wines at all price points.
- To ensure that Australian wine continues to meet the most rigorous consumer and market standards.
- To maintain wine quality during transport and storage.

This subprogram aims to improve the quality of Australian wines by seeking to better understand the sources of faults and spoilage and to develop and apply innovative technologies to minimise their occurrence or impact.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measures of success
1. Development of objective measurement tools to inform winery design and best practice management of vineyard logistics.	Opportunities created to increase the value proposition of Australian wine sold at selected price points.	Investigate novel analytical techniques to measure important grape and wine quality parameters in the vineyard and/or in wineries.	Outcomes available from trials evaluating a new analytical tool to assess optimum berry ripeness and grape composition in the vineyard.
2. Continue to support the development of knowledge and technical solutions to eliminate wine faults and maintain product integrity.	Reduction in levels of spoilage and in product returns from the market.	Explore novel technical solutions and treatment options to avoid or reduce the occurrence of faults and spoilage.	Generation and dissemination of results from protein stability and removal studies, using alternative treatments. Availability of improved analytical methodology to detect and quantify important compounds implicated in bushfire smoke taint in grapes and wine.

<p>3. Understand and quantify the variables associated with the key attributes of wine composition during transport and storage.</p>	<p>Reduction in levels of spoilage and in product returns from the market.</p>	<p>Invest in research to understand and quantify variables associated with the maintenance of wine quality during transport and storage.</p>	<p>Release new knowledge to the sector on ways to reduce transport- and/or storage-related spoilage issues.</p> <p>Investigate novel, real-time methods to measure sulphur dioxide levels in wine.</p>
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Continuing emphasis will be placed on the development of new or enhanced technologies to reduce the impact of taints or faults, including those induced by environmental influences such as heat, light or smoke taint. Areas of focus include bound (flavourless) forms of smoke taint compounds in wine, new ways of measuring sulphur dioxide and protein instability and the prevention of in-bottle hazes through the use of, for example, novel cold-active enzymatic treatments.

Output 3 delivered by Program 3: Grapes for purpose

Subprogram a) Vine improvement and performance

Objectives:

1. To optimise vineyard inputs and costs to the targeted end-use of grapes.
2. To optimise the characterisation, selection and testing of grapevine germplasm.
3. To develop a smarter approach to breeding and developing grapevine rootstocks.

This subprogram provides support for activities aimed at helping growers to utilise vineyard management practices to grow grapes appropriate for targeted winemaking end uses and different market segments. The availability of superior, field validated planting material is essential to this and the program has a strong emphasis on foundational research to develop and make these resources available to meet future needs.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measures of success
1. Targeted project investments to benchmark vineyard inputs and costs	Increased availability of vineyard cost benchmarking data	Provide growers and winemakers access to tools to assess the economic viability of their businesses.	Financial tools readily available to help growers and winemakers assess the economic viability of their businesses.
2. Investigation and development of grapevine germplasm	Increased range of potentially valuable characterised grape vine germplasm available to sector	Maintain support for the development of grapevine germplasm according to sector needs.	<p>Progress on fundamental grapevine genetics studies to improve the understanding of links between specific genes and key traits, for varietal improvement purposes.</p> <p>Implement a sector-supported quality accreditation system for grapevine material.</p>
3. Investigation and development of grapevine rootstocks to better deal with emerging issues	Increase in the availability of rootstocks with commercially and environmentally important traits specific for Australian conditions	Continue investment in projects to develop grapevine rootstocks better able to address emerging issues.	<p>Progress towards the commercial release of hybrid rootstocks adapted to warmer growing conditions.</p> <p>Results from rootstock breeding programs and field performance trials of salt excluding rootstocks available.</p> <p>Progress towards genetic markers for the rapid screening and selection of salt tolerant vine material.</p> <p>Review of Australian and international rootstock R&D to guide future investments</p>

Development of new or improved grapevine germplasm will support longer term initiatives to provide appropriate planting material for the wine sector, as it positions itself to accommodate the changes inherent in a warming climate. In some cases, the studies involve and take advantage of the use of molecular tools to inform and accelerate conventional plant breeding methods for rootstocks and scion material. Projects within this program support these initiatives to deliver germplasm with greater tolerance to temperature extremes, reduced requirements for irrigation water, the ability to cope with more saline soil and water resources and changes in the incidence patterns of pests and diseases. Accordingly, this subprogram complements and maintains strong links with program 4's sustainability objectives.

Subprogram b) Berry composition

Objective:

- To produce fruit of known and desirable composition.

This subprogram aims to help grapegrowers produce fruit with the characteristics demanded by winemakers, in response to market demands.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measures of success
Identification of measurable grape characteristics that translate to specific wine attributes.	Improved opportunities for the manipulation of specific attributes of berry composition	Support the development and application of novel techniques to understand, and manage grape compositional characteristics that lead to desirable wine outcomes.	<p>New knowledge generated on understanding of berry acid metabolism under higher growing temperature regimes.</p> <p>Results available to allow better understanding and management of the nexus between sugar ripeness and flavour ripeness using plant growth regulators.</p>

The impact of a scenario of warmer growing temperatures is expected to change vine physiological responses, leading to an acceleration of berry ripening that could potentially affect berry composition. In this subprogram, research investments in the coming period will focus on finding ways to adapt and manage these changes to ensure that key grape compositional characteristics can be adequately maintained as well as berry development and ripening and acidity management under imposed experimental temperature extremes.

Output 4 delivered by Program 4: Sustainability of industry, environments and communities

Subprogram a) Sustainable production

Objectives:

- To further develop and maximise the adoption of vine health and integrated pest management practices.
- To ensure the long-term viability and sustainability of sector practices.

This subprogram sets out to help grapegrowers produce fruit in a sustainable and viable way with particular regard to environmental issues. Work will be undertaken in the areas of:

- minimising water inputs per hectare of fruit grown
- improving vine and soil health for sustainable production, and
- pest and disease control.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measure of success
1. Knowledge dissemination of vine health and pest management practices	Increase in adoption of best management practice for pest and disease control	Develop materials and run regional workshops to disseminate latest information in dealing with vine health and pest management issues	Increased grape grower awareness of vine health and pest management issues through fact sheets and attendance at regional workshops
2. Investigate and disseminate methods of improving sustainable viticultural practices	Long-term protection of natural resources	Disseminate knowledge about sustainable production	<p>Increased grapegrower awareness of mid-row management, spray impacts in the vineyard and sub-surface drip irrigation through field days, print media and other extension activities</p> <p>Launch of mid-row management website</p> <p>Review key soil quality indicators for possible incorporation into a national benchmarking scheme</p>

Subprogram b) Environmental custodians

Objectives

- To allow the Australian wine sector to build and utilise its reputation as an internationally recognised environmental custodian as a competitive advantage.
- To define the opportunities and adapt to the challenges of climate change.

This subprogram is focused on ensuring that the Australian wine sector is able to understand key environmental issues with a view to being able to demonstrate its commitment and leadership in addressing environmental issues as part of its responsibility to the Australian community as well as to domestic and international markets. Work will be undertaken in the following areas:

- investigating the effects of long-term irrigation on soil health and water quality
- management to cope with extreme weather events
- lower environmental impact methods of pest and disease control, and
- better understanding of the impact of climate change at a national and regional level.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measure of success
1. Dissemination and maintenance of Australia's 'green credentials', which consider environment issues throughout the supply chain	Buyer recognition of Australian wines' environmental credentials; reduction of the Australian wine sector's environmental footprint	Provide support for tools and programs that reduce the environmental footprint of the sector and help demonstrate the footprint of the wine supply chain.	Improved awareness and participation of grapegrowers and wineries in credible environmental initiatives within the wine sector such as Entwine. Launch of GWRDC winery wastewater website
2. Collaborate with other parties to determine and disseminate the effects of climate change on the wine sector	Implementation of strategies to manage the challenges of climate change	Generate knowledge to help the wine sector adapt to the impacts of climate change	Dissemination of information to the sector that addresses the implications and how to adapt to climate change

In order to implement the R&D plan's strategy of dissemination and maintenance of Australia's 'green credentials', work will be done to reduce the Australian wine sector's environmental footprint. Work will focus on disseminating of results of environmental research to grapegrowers and wineries with an emphasis on improving their ability to adopt management practises that improve individual and sector environmental sustainability.

The next step in the R&D plan's strategy is to collaborate with other agricultural industries to address priority cross-commodity projects that determine and disseminate the effects of climate change at a national, regional or catchment level where the results of these initiatives can be shown to benefit the wine sector and its environments.

Subprogram c) Looking ahead

Objective:

- To ensure that the sector can proactively meet and minimise the impact of biosecurity and other threats.

This subprogram sets out to ensure the wine sector can minimise the impact of biosecurity and other threats.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measure of success
Targeted research partnerships with national and international agencies to avert biosecurity threats	Development of agreed strategies to combat biosecurity threats	Generation of additional knowledge to assist sector's capacity to combat biosecurity threats and to manage incursions	Latest knowledge disseminated to sector

In order to implement the R&D plan's strategy of targeted research partnerships with national and international agencies to avert biosecurity threats, the first step is to ensure that sector's prevention measures and responses to threats are as robust as possible. Future work will establish partnerships with national and international agencies to ensure that threats are averted where possible, as well as to ensure that Australia has the capacity, protocols and knowledge to initiate response strategies if required with other state and national organisations.

Subprogram d) The next generation

Objective

- To facilitate the training of the next generation of research and grape and wine sector leaders.

This subprogram sets out to ensure the grape and wine sector can maintain the human and intellectual capital required for a prosperous and vibrant sector into the future.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measure of success
Ensure sufficient resources are devoted to training future wine sector researchers and sector leaders	Increase in the appropriately trained people available to the sector	Attract high calibre candidates to undertake relevant leadership, Honours and PhD studies Respond to recommendations from the review of GWRDC leadership investments	Funding of at least 30 people to undertake relevant leadership, Honours or PhD studies and tracking their career path after completion of the GWRDC scholarship. Recommendations from the review of GWRDC leadership investments implemented

Output 5 delivered by Program 5: Smart science, practical solutions

Subprogram a) Knowledge development

Objective

- To ensure that the full value of the GWRDC's investments is realised by all relevant stakeholders.

This subprogram sets out to ensure dissemination and adoption of research outcomes.

Strategies and measures of success

R&D plan strategy	R&D plan measure of Success	2011–12 strategy	2011–12 measure of success
Development of an extension and knowledge management system to deliver timely information to adopt into business practice	Increased R&D adoption rates and measurable cost—benefit of R&D investments	Enhance website functionality, content, international linkages and end-user relevance	Increased website visits within Australia Improved content and sector usage as measured through user survey and other feedback
Evaluation of performance to ensure there are adequate returns to stakeholders from R&D investments	Increased R&D adoption rates and measurable cost benefit of R&D investments	Perform cost benefit analyses of selected completed projects	Completed analyses demonstrate positive rates of return on R&D investment

The GWRDC established a new website in 2009–10. All relevant information, including final project reports, is now easily accessible in one location and in a consistent format. The 2011–12 strategy is to build on this achievement, undertake evaluation of the website's usage, modify structure and functionality and explore other communication tools to improve access to and uptake of information.

Subprogram b) Sector solutions

Objective

- To foster stronger links between research and the development of solutions for sector.

This subprogram sets out to ensure dissemination and adoption of research outcomes.

Strategies and measures of success

R&D plan strategy	R&D plan measure of Success	2011–12 strategy	2011–12 measure of success
To foster an innovative culture within the Australian wine sector and to develop techniques and partnerships that will allow the most efficient and effective dissemination of knowledge to the sector	Increased R&D adoption rates and measurable cost—benefit	Run focussed and successful Innovators Network and Regional programs in key wine grape growing regions throughout Australia	Innovators Network and Regional Program viewed by Australian grape and wine sector as key vehicles for extending R&D information into the sector

In 2010–11, the Innovators Network extension and knowledge development strategy will be the focus for improving the targeted delivery of key viticultural and wine knowledge to the service provider and early adopter segment(s) of the Australian grape and wine sector for improved capacity development. This segment is critical for the dissemination of knowledge via the ‘ripple’ or cascading effect to the wider grape growing community across Australia.

Subprogram c) Administration and governance

Objective

- To continuously improve the efficiency and effectiveness of the GWRDC’s administrative and governance procedures.

This subprogram sets out to ensure that the GWRDC is efficiently administered.

Strategies and measures of success

R&D plan strategy	R&D plan measure of success	2011–12 strategy	2011–12 measure of success
Continuous review and improvement of the GWRDC administrative and governance functions	The GWRDC administration expenditure to be aligned to the sector’s needs, while maintaining appropriate levels of governance and administration	Continuing focus on effectiveness and efficiency of GWRDC operations	Full compliance with all governance requirements

Contract Number	Project title
Program 1: Market and Consumer Understanding	
Subprogram 1a - Know Your Consumer	
AWR 06/01	Stream 3.1 Wine and consumer needs
CSU 1002	Measuring Consumer Taste Preference through Wine Shows
UA 0901	Understanding and leveraging the marketing opportunities of engaging wine buyers through virtual communities and other e-based sales channels
UA 0903	Mapping the decision influencers along the wine industry supply chain
Subprogram 1b - Market Opportunities and Development	
ABS 0901	2010-12 Vineyards Statistics Collection
AWB 0902	GWRDC support for OIV Vice Presidency
AWR 06/01	Stream 3.2 Consumer health and safety
AWR 06/01	Stream 3.3 Technical, regulatory and trade issues
BAE 08/01	Australian wine grape production projections
UA 08/04	Australia's place in the world's wine markets by 2030: empirical economic analysis of wine globalisation
Program 2: Winemaking Excellence	
Subprogram 2a - New Technologies and Products	
AWR 06/01	Stream 1.1 Defining and controlling important volatile compounds in wine and their impact on wine aroma and flavour
AWR 06/01	Stream 1.2 Defining and controlling key phenolic compounds and their impact on wine sensory properties
AWR 06/01	Stream 1.3 Microbial modulation of wine composition to increase wine value
AWR 06/01	Stream 2.1 Optimising fermentation performance
AWR 0901	Identification of the major drivers of 'phenolic' taste in white wines
UA 06/04	New grape and wine chemistry research initiatives to bring long-term benefits to the Australian wine industry (Formally - Chair of Oenology - wine industry development project)
Subprogram 2b - Managing and Enhancing Wine Quality	
AWR 06/01	Stream 2.2 Novel winemaking processes
AWR 06/01	Stream 2.3 Process measurement and improvement
AWR 06/01	Stream 2.4 Industry applications
AWR 06/01	Stream 2.5 Protecting the quality and integrity of Australian wine
DPI 1001	Tannin Structure Function Relationships – A Foundation for Understanding Mouthfeel Perception
Program 3: Grapes for Purpose	
Subprogram 3a - Vine Improvement and Performance	
CSP 0903	Molecular and genetic strategies to reduce the susceptibility of wine grapes to fungal pathogens
CSP 0904	Advanced grapevine genetics for varietal improvement
CSP 1002	Delivering chloride and sodium excluding rootstocks for quality wine production
GWR 1002	Australian Vine Quality Standards Scheme - Vine Assurance

Subprogram 3b - Berry Composition	
CSP 0905	Understanding and managing the timing of berry ripening and the flavour-ripe/sugar-ripe nexus
CSP 1001	Improving the tannin composition of grapes
UA 1002	Organic acid metabolism and the control of grape berry acidity in a warming climate
Program 4: Sustainability of Industry, Environments and Communities	
Subprogram 4a - Sustainable Production	
CSL 1001	Cleaner Production: New Technology for Water Recycling and Cleaner Production
CSL 1002	Sustainable Recycled Winery Water Irrigation based on Treatment Fit for Purpose Approach
CSP 0901	Achieving water use efficiency and improved drought tolerance with rootstocks
CSP 0902	Enhanced varieties and clones to meet the challenges of climate change and deliver lower alcohol wines
DAW 0901	Completing the Smoke Effect Picture: Systems development to reduce the negative effects of smoke on grapes and wine
DPI 0901	Strategies to Manage the Impacts of Global Warming on Winegrape Production
GWR 1003	Provision of secretariat services to the Wine Industry Biosecurity Technical Reference Group
SAR 0902	Managing vineyards rootzone salinity and maximising water saving by sub-surface irrigation techniques
SAR 1001	Optimising management of eutypa dieback
Subprogram 4b - Environmental Custodians	
AWR 0902	Improving Winery Refrigeration Efficiency
GRD 0901	Understanding Frost Risk in a Variable and Changing Climate
GWR 1004	Consultancy support for Project SAR 1002
MU 08/01	Adaptation of the Australian wine industry to climate change - opportunities and vulnerabilities
MU 08/02	Environment - genotype interactions and the physiological processes determining fruitfulness and yield in grapevines
SAR 0901	A window into hotter and drier futures: phenological shifts and adaptive practices
SAR 1002	Assessment of Vulnerability to Climate Change across Australia's Wine Regions
Subprogram 4c - Looking Ahead	
DPI 08/01	The three Rs - Rootstock, Resistance and Resilience to grape phylloxera
UM 0901	Developing tools for predicting responses of viticultural pests and their natural enemies under climate change: modelling management and extension
Subprogram 4d - The Next Generation	
AFF 08/01	Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry
GWR 1001	Wine Industry Leadership Program Project
various	Honours Scholarships
various	PhD Scholarships
RIR 0902	Youth Undergraduate Studentship Program

Program 5: Smart Science, Practical Solutions**Subprogram 5a - Knowledge Development**

GWR 0909 Extension Project Evaluation Services
various Performance evaluations

Subprogram 5b - Industry Solutions

CSL 0901 Vineyard Irrigation - delivering water savings through emerging technology
GWR 0903 Climate Change Project Manager
various GWRDC Regional Program
various Innovators Network
various Researcher travel support
GWRDC W&R Workshops and reviews
WFA 0901 Australian Wine Environmental Stewardship Coordination
AWR 06/01 Stream 4.1 Extension and knowledge transfer - the development and presentation of knowledge to industry personnel
AWR 06/01 Stream 4.2 Creating delivery mechanisms for the efficient transfer of knowledge and provision of technical information to the Australian wine and grape industries
AWR 06/01 Stream 4.3 Communication services and customised information delivery

Subprogram 5c - Administration and Governance

GWRDC CRRDC Council of Rural R&D Corporations

Appendix B: 2010–11 R&D expenditure estimates across National Research Priorities

National Research Priorities (NRP)	An environmentally sustainable Australia			Promoting and maintaining good health	Frontier technologies for building and transforming Australian industries	Safeguarding Australia	Total
	\$'000			\$'000	\$'000	\$'000	\$'000
	A1	A5	A7	B4	C5	D3	
Program 1: Market and consumer understanding				2,238 10%	245 1%		2,483 11%
Program 2: Winemaking excellence					9,295 40%		9,295 40%
Program 3: Grapes for purpose	265 1%		37 0%		2,231 10%		2,532 11%
Program 4: Sustainability of industry, environments and communities	172 1%	344 1%	2,282 10%		720 3%	299 1%	3,816 17%
Program 5: Smart science, practical solutions			204 1%		4,743 21%		4,946 21%
Total	437 2%	344 1%	2,523 11%	2,238 10%	17,234 75%	299 1%	23,073 100%

NB: percentages calculated based on existing distribution between programs.

Appendix C: 2011–12 R&D expenditure estimates across the Rural R&D Research Priorities

Rural R&D Priorities (RRDP)	Productivity and adding value	Supply chain and markets	Natural resource management	Climate variability and climate change	Bio-security	Supporting the priorities		Total
	\$'000	\$'000	\$'000	\$'000	\$'000	Innovation Skills \$'000	Technology \$'000	\$'000
Program 1: Market and consumer understanding		2,483 11%						2,483 11%
Program 2: Winemaking excellence	9,295 40%							9,295 40%
Program 3: Grapes for purpose	1,763 8%		265 1%	37 0%	467 2%			2,532 11%
Program 4: Sustainability of industry, environments and communities			344 1%	2,454 11%	299 1%	720 3%		3,816 17%
Program 5: Smart science, practical solutions				204 1%			4,743 21%	4,946 21%
Total expenditure	11,058 48%	2,483 11%	609 3%	2,694 12%	767 3%	720 3%	4,743 21%	23,073 100%

LEGEND to APPENDIX C

- A1 Water – a critical resource
- A5 Sustainable use of Australia's biodiversity
- A7 Responding to climate change and variability
- B4 Strengthening Australia's social and economic fabric
- C5 Promoting an innovation culture and economy
- D3 Protecting Australia from invasive diseases and pests

NB: percentages calculated based on existing distribution between programs.

Glossary

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
AOP	Annual Operational Plan
CAC Act	<i>Commonwealth Authorities and Companies Act 1997</i>
GVP	gross value of production
GWRDC	Grape and Wine Research and Development Corporation
NRP	National Research Priorities
R&D	research and development
RRDP	Rural Research and Development Priorities
WA	Wine Australia
WFA	Winemakers' Federation of Australia
WGGA	Wine Grape Growers' Australia

