



WA Agricultural Research Collaboration

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Capacity needs analysis for the Western Australian agricultural research, development and extension sector: Summary report

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Summarised by the WA Agricultural Research Collaboration (WAARC) from
reports documented by Jane Wightman Consulting for WAARC

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Primary Industries and
Regional Development



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1. Background

The WA Agricultural Research Collaboration (WAARC) is Western Australia's (WA's) platform for collaborative agricultural R&D, bringing together government, universities, and industry to address key challenges such as climate resilience, productivity, sustainability, and biosecurity. Through its "Team WA" approach, WAARC drives practical, industry-led research that maximises impact while building capacity and strengthening the State's future agricultural workforce.

In August 2025, WAARC commissioned a capacity needs/gap analysis (Needs Analysis) to identify and validate Western Australia's (WA's) current and future human capacity requirements in the agricultural research, development and extension (RD&E) sector. This work is intended to guide WAARC and others in planning and investment to equip the sector with the expertise, skills and workforce structure to meet emerging challenges over the next 5 to 15 years. The work is a point in time stocktake, conducted by Queensland-based Jane Wightman Consulting.

Five reports relating to the Needs Analysis are now publicly available (May 2026):

1. Capacity needs analysis for the WA agricultural RD&E sector: Summary report **(this report)**
2. Capacity needs analysis for the WA agricultural RD&E sector: Literature review
3. Capacity needs analysis for the WA agricultural RD&E sector: Sector-wide survey
4. Capacity needs analysis for the WA agricultural RD&E sector: Interviews (Workforce pipeline and early career attraction)
5. Capacity needs analysis for the WA agricultural RD&E sector: Interviews (Data, digital and modelling)

Apart from the Summary report, these reports reflect the chronological flow of the study, which began in August 2025 and was completed in December 2025. The reports should not be considered independently of each other, but as a part of a package.

The aim of the Literature review was to ascertain what evidence was already available about needs/gaps in human capacity in the sector for WA, and to use this information to guide the structure and questions for the survey. The survey was the key data collection mechanism for the Needs Analysis, with 92 respondents from middle/senior manager, cross-discipline positions across the WA agricultural RD&E sector. Two focused interview topics were then selected from survey findings, with 15 interviews conducted. This Summary report brings together an overview of the findings from the suite of full reports.

At each key step in the Needs Analysis process, feedback and validation were sought from a Strategic Advisory Group, comprised of senior and middle managers from key organisations and businesses across the agricultural RD&E sector.

2. Methodology overview

The study used a mixed methods design incorporating:

1. Literature review
2. Sector-wide online survey (92 respondents)
3. In-depth interviews on two priority issues (15 interviews)

Triangulation across literature, survey data, and interviews tested consistency and strengthened confidence in findings.

Feedback and validation were sought from a Strategic Advisory Group (SAG) including senior and middle managers from WAARC, CSIRO, Department of Primary Industries and Regional Development (DPIRD), Grower Group Alliance (GGA), Grain Industry Association of WA (GIWA), Grains Research and Development Corporation (GRDC), Nutrien and others.

Analysis was AI-enabled analysis, with:

- Alchemer capturing survey data
- ChatGPT Plus supporting thematic analysis of de-identified qualitative responses
- All AI outputs reviewed by the project lead to ensure accuracy and relevance.

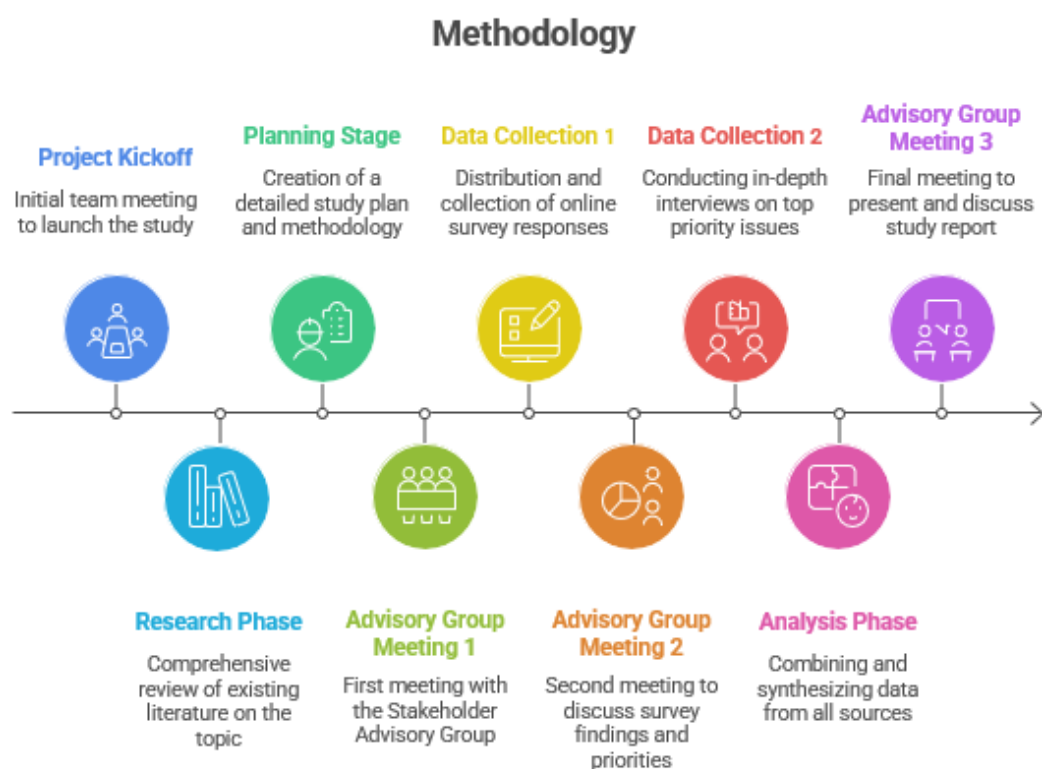


Figure 1. Overview of project methodology

3. Literature review

The literature review was structured to prioritise state-level reports and documents, which provided the initial identification of WA's agricultural RD&E needs and associated capacity requirements. This was followed by a review of Australian agricultural industry and CSIRO reports, which helped to highlight gaps relating to expected future megatrends and sector-specific priorities. Finally, global reports were reviewed to provide a comparative perspective, offering insights into cross-country RD&E alignments and differences that can inform WA's positioning in an international context.

The review identified nine priority domains where WA can look to strengthen RD&E capacity. These areas reflect where future capacity will be most critical for competitiveness, resilience and growth.

Nine priority themes to strengthen RD&E capacity

1. Data and digital technologies

The report identifies data and digital technologies as a foundational capability for WA's future agricultural competitiveness, recognising their role in improving productivity, risk management and decision-making under increasing system complexity. It highlights the growing importance of artificial intelligence (AI), machine learning, robotics, remote sensing and interoperable data platforms in enabling precision agriculture and automation across diverse farming systems. The report also emphasises data governance, connectivity and farmer-ready decision-support tools as critical enablers of adoption, noting that without trusted, integrated digital systems the benefits of technological innovation will not be fully realised.

2. Climate adaptation and environmental markets

Climate adaptation and environmental markets are presented as urgent and strategically significant issues, driven by declining rainfall, rising temperatures and increasing market and policy expectations around sustainability. The report underscores the need for RD&E capacity in climate-resilient farming systems, low-emissions pathways and natural capital management, alongside robust measurement, reporting and verification (MRV) systems. These capabilities are positioned as essential not only for managing climate risk but also for enabling participation in emerging carbon and biodiversity markets that may become important income streams for WA producers.

3. Biosecurity and market access

The report emphasises biosecurity and market access as critical to protecting WA's export-oriented agricultural economy and its competitive advantage as a relatively pest and disease-free region. It highlights the growing risks posed by climate change, increased trade flows and geopolitical volatility, which heighten the likelihood of biosecurity incursions. The

significance of this issue is addressed through a strong focus on predictive surveillance, advanced diagnostics, resistance management and compliance systems that underpin both rapid response capability and continued access to premium international markets.

4. Systems agronomy and farm engineering

Systems agronomy and farm engineering are identified as central to sustaining productivity growth while reducing reliance on land, water, labour and inputs. The report addresses their significance by framing them as integrative disciplines that connect crops, livestock, soils, machinery and infrastructure at whole-farm and landscape scales. It highlights the need for RD&E capacity that supports adaptive farming systems, soil constraint management, crop–livestock integration and engineering solutions for automation and processing, enabling WA agriculture to respond effectively to climate variability and resource constraints.

5. Genetics and breeding

The report positions genetics and breeding as long-term strategic investments that underpin productivity, resilience and competitiveness across WA's major commodities. It highlights the significance of breeding for drought and heat tolerance, disease resistance, feed efficiency and product quality in the context of climate change and market expectations. By emphasising advances in genomics, phenomics and bioinformatics, the report demonstrates how genetic improvement remains one of the most powerful levers for delivering sustained gains in “more from less” production systems.

6. Water systems and irrigation

Water systems and irrigation are addressed as increasingly significant under conditions of climate stress, particularly for irrigated agriculture and northern production systems. The report highlights the need for integrated RD&E capacity in hydrology, irrigation engineering, water-use efficiency and governance to ensure sustainable and resilient water use. It recognises that future productivity and diversification opportunities will depend on improved water planning, precision irrigation technologies and system-level approaches that balance agricultural, environmental and community water demands.

7. Market and consumer intelligence

The report identifies market and consumer intelligence as a key driver of future value creation rather than a peripheral consideration. It highlights the growing importance of understanding consumer preferences, provenance, traceability and ESG requirements in securing premium market access. By linking market intelligence to product development, certification systems and supply chain innovation, the report demonstrates how RD&E can help WA agriculture move beyond commodity production towards differentiated, high-value offerings aligned with global consumer trends.

8. Trade, policy foresighting, and risk analysis

Trade, policy foresighting and risk analysis are framed as essential strategic capabilities in an increasingly volatile global environment. The report addresses their significance by highlighting WA's exposure to geopolitical shifts, trade disruptions and regulatory change, particularly given its strong export orientation. It underscores the need for RD&E capacity in scenario planning, trade policy analysis and integrated risk modelling to support proactive

decision-making, protect market access and position WA agriculture to adapt to long-term structural changes rather than respond reactively to shocks.

9. Extension and adoption science

The report highlights extension and adoption science as a critical enabler of impact across all RD&E investment areas, recognising that research outcomes only deliver value when they are effectively taken up and applied by industry. It emphasises the growing importance of behavioural science, co-design approaches and participatory research models in improving adoption of new technologies, practices and systems, particularly under conditions of uncertainty and risk. The report also notes the need for modern extension capability that integrates digital tools with trusted, relationship-based engagement through grower groups and industry networks. By positioning extension and adoption science as a core capacity rather than a downstream activity, the report underscores its significance in accelerating innovation, closing productivity gaps and ensuring that RD&E investments translate into measurable on-farm and value-chain outcomes.

General comment

While the literature was clear about future capacity needs, it provided limited evidence about current capacity gaps in WA's RD&E system. Apart from some insights into diversity, gender balance and inclusion, most reports did not quantify or describe present workforce strengths and weaknesses.

The literature review helped to shape the questions for the next phase of work – the cross-sector online survey.

Further details can be found in the full in-depth report - Capacity needs analysis for the Western Australian agricultural RD&E sector: Literature review.

4. Sector-wide online survey

Who was the survey sent to and who responded?

The online survey was sent to a broad range of stakeholder groups in the Western Australian agricultural RD&E sector. This included stakeholders from WA universities (Curtin, Murdoch, UWA and Edith Cowan), CSIRO, DPIRD, GGA, grower groups, industry bodies (GIWA, GRDC, Meat & Livestock Australia (MLA), Cotton Research and Development Corporation (CRDC), Hort Innovation, Wine Australia, AgriFutures Australia, WA Livestock Research Council (WALRC)), corporate agri-sector (Australian Association of Agricultural Consultants (AAAC), private consultants, Elders, Nutrien, Craig Mostyn Group, other corporate farming businesses), specialist providers (Living Farm, InterGrain, Australian Grain Technologies (AGT)), some Natural Resource Management (NRM) groups and others.

The targets in these organisations were specifically middle-to-senior management roles and others known to have cross-discipline and/or cross-sector experience. Single discipline area experience was deliberately not sought. This was because we were looking for relative capacity need priorities across the sector rather than single discipline perspective needs. Inherent in this approach is that the survey results are generated from the subjective perspective of each respondent.

The survey was sent to about 125 targets and 92 responses were received.

Among the 92 people who completed the survey, the largest group of respondents (n=29, 32%) was R&D Managers. CEOs/EOs were the next largest group (n=18, 20%), followed by Researchers and Other (both at n=13, 14%).

Sixty-one per cent of the respondents were drawn from Perth, 34% regional and 5% interstate. Most respondents had either between 21 and 30 years' experience in agriculture, or more than 30 years.

Five priority areas of capacity need

There were five areas which consistently emerged from the survey responses as priority areas of need over the next five to 15 years:

1. Data and digital

Data and digital capability emerged as the most critical and under-resourced area within WA's agricultural RD&E system, reflecting the sector's growing reliance on analytics, modelling, automation and decision-support tools and systems. Respondents consistently highlighted that while data volumes and digital technologies are expanding rapidly, workforce capability to integrate, analyse and translate these data into practical outcomes is lagging. Strengthening data governance, analytics, applied AI and digital literacy across disciplines is therefore essential to enable evidence-based decision-making, improve research efficiency and support innovation at farm and system levels.

2. Extension and communication

Declining extension capacity threatens the impact of RD&E investments, with respondents calling for renewed investment in extension and communication skills, and behavioural and adoption sciences, to connect research with practice. Findings emphasised that strong technical research alone is insufficient without skilled professionals who can engage growers, facilitate co-design and support behavioural change. Extension workforce development was seen as fundamental and critical to achieving productivity, resilience and return on agricultural research investment in WA.

3. Systems / Interdisciplinary capacity

Survey responses revealed a critical shortage of people able to integrate across disciplines and institutions, limiting the system's ability to address whole-of-farm and landscape-scale problems. Systems and interdisciplinary capacity were reported as being increasingly significant as agricultural challenges become more complex and interconnected, spanning production, climate, economics and social dimensions. Building this capacity is essential to move beyond siloed research cultures and approaches, enabling more effective collaboration, innovation and system-wide solutions that reflect the realities faced by producers.

4. Climate and sustainability

Respondents recognised that climate variability, carbon markets and sustainability reporting are no longer peripheral issues but central to long-term viability and competitiveness. Capability needs around climate and sustainability reflect the growing urgency of climate adaptation, emissions management and environmental stewardship in WA agriculture. Strengthening skills in climate modelling, adaptation strategies and sustainability metrics is critical to support resilient production systems and ensure the sector can respond proactively to environmental and market pressures.

5. Agronomy and production systems

Agronomy and production systems remain the applied foundation of WA's agricultural RD&E system, ensuring research is grounded in practical, regionally relevant farming contexts. Despite their enduring importance, respondents signaled concern about declining field-based expertise and succession in applied agronomy and farming systems research. Maintaining and renewing this capacity is vital to translate innovation into on-farm outcomes, integrate new technologies with existing practices, and sustain productivity while meeting emerging sustainability and climate challenges.

General comment

These capacity gaps are already constraining RD&E delivery, and without targeted intervention they will limit the state's ability to respond to climate pressures, emerging technologies, shifting biosecurity threats and increasing global competition.

Attracting and retaining skilled people

The top six themes that repeatedly emerged from the survey responses in relation to attracting and retaining skilled people in the WA agricultural RD&E workforce were:

1. Salary competitiveness

Salary competitiveness was consistently identified as a key challenge to the attraction and retention of skilled staff. Respondents highlighted issues such as competition with the mining industry and other STEM fields, the demanding nature of the work relative to salary level ('hard work for less money'), inequity in government versus private/external remuneration, and high cost of living in WA. The link between salary and employment continuity also emerged strongly in relation to retention. Collectively, these perspectives suggest that improving pay structures and financial incentives could significantly enhance the sector's ability to attract and retain skilled professionals.

2. Job security

Lack of job security was similarly identified as one of the most critical and persistent barriers to attraction and retention of skilled staff, with uncertainty surrounding ongoing employment a recurring theme. Many pointed to the prevalence of short-term contracts and short-term, unstable funding arrangements as major deterrents for both new entrants and established staff. Additional nuance emerged in the retention-focused responses around the impact of 'short-termism' on career development and workforce morale. Overall, the comments reflect a sector that struggles to offer long term career stability, which in turn limits its ability to build and sustain capacity over time.

3. Career pathways, mentoring and succession planning

The survey results showed lack of clear progression and structured mentoring as a core systemic weakness and major succession risk. Across the attraction, retention, and career pathway sections, respondents consistently reported 'no clear career structures beyond entry level,' 'few mid-career opportunities,' and 'limited overlap between retiring and incoming staff.' Mentoring and leadership development were identified as the most effective enablers and necessary for workforce renewal.

4. Organisational culture and leadership

Respondents stressed that strong, supportive leadership and organisational culture are central to attraction and retention of skilled staff. Comments described the need for leaders who value and recognise staff and create supportive workplaces, and emphasised that good management, recognition, autonomy and a positive culture were central to keeping skilled people. Respondents also voiced the need for better collaboration between institutions ('one system, not silos'). Culture and leadership were also critical to inclusion and wellbeing.

5. Infrastructure and regional investment

Survey respondents pointed to ageing facilities, limited regional infrastructure and poor housing or social services. Respondents argued that 'modern, well-equipped research hubs' and 'regional housing and partner employment support' are essential to make regional

RD&E jobs viable. Infrastructure was both a barrier (when lacking) and an enabler (when renewed and collaborative).

6. Public perception and career awareness

Another shared theme was the need to restore the societal and institutional value of agriculture; that agricultural RD&E should be recognised for its contribution to food security, sustainability and the economy. Respondents cited limited awareness of career opportunities, particularly among young people and non-agricultural disciplines, as a barrier to attraction. Respondents wanted stronger industry and government messaging positioning RD&E as a prestigious and meaningful profession, helping to attract young scientists and retain experienced practitioners. They called for promotion of the diversity of RD&E careers, stronger branding and showcasing of success stories.

Further details can be found in the full report - Capacity needs analysis for the Western Australian agricultural RD&E sector: Sector-wide online survey.

5. In-depth interviews

The next phase of the study involved in-depth interviews in two focus/topic areas to validate and deepen understanding of the survey insights, particularly around high-risk disciplines, attraction and retention barriers, and effective interventions. The two focus/topic areas selected were:

- Workforce pipeline and early career attraction
- Data, digital and modelling workforce capacity

Fifteen subjects were interviewed across the two focus areas.

5.1 Workforce pipeline and early career attraction

Who was interviewed?

Semi-structured interviews were conducted online with nine interviewees from a diverse cross-section of the Western Australian agricultural sector, including government research agencies, universities, grower-led organisations, private consultants, commercial agribusinesses and a First Nations agricultural organisation. Participant roles included agricultural research program leads, staff and student supervisors; consultants and advisers employing and mentoring graduates; tertiary educators shaping curriculum and preparing students for RD&E careers; and leaders of grower group organisations coordinating regional

research and capacity building. One interviewee also represented an innovation-focused consultancy supporting start-ups and skills development.

Challenges

Interviewees described a pipeline weakened by structural, cultural and funding challenges. Across all evidence sources, the most significant challenges relate to instability in funding and employment, weak succession and early pipeline development, declining applied training, system fragmentation and weakened extension capacity.

Challenges include:

- Early school exposure to agriculture is minimal, with limited hands-on science and weak career visibility.
- University training has shifted away from applied learning, reducing graduate job readiness.
- Short-term funding undermines mentoring, succession and stable early career roles.
- Partnerships are fragmented, limiting effective work integrated learning.
- Agriculture's public image is outdated, reducing appeal to high-calibre STEM students.
- First Nations participation faces additional barriers including mistrust, limited mentors and competition from mining.

Enablers

Major enablers to address these challenges included stable funding, competitive salaries, applied university training, collaboration, improved infrastructure, stronger career visibility, relational early career support, and targeted investment in digital, extension and interdisciplinary capabilities, Indigenous pathways and gender equity initiatives.

Interviewees identified high-value solutions including strengthened school engagement, curriculum reform, applied training, Honours pathways, long-term early career roles, cadetships, rotations, summer scholarships and culturally grounded pathways for First Nations people.

Interviewees emphasised that improving alignment requires:

- Long term, co-designed university/industry partnerships rather than short project ties.
- Authentic, applied work integrated learning where students participate in real RD&E activities.
- Curriculum modernisation, including digital, AI, engineering and applied science.
- Better relational and collaborative skills, not just technical content.

Further details can be found in the following report: 'Capacity needs analysis for the Western Australian agricultural RD&E sector: Interviews - Workforce pipeline and early career attraction'.

5.2 Data, digital and modelling capacity

Who was interviewed?

Semi-structured interviews were conducted online with six interviewees representing a diverse mix of digital-enabled roles associated with WA's agricultural RD&E sector. Participants encompassed commercial service providers, industry organisations, farming businesses, consultancies, research groups and ag-tech companies; the majority of whom described digital and data capability as central to their daily operations and decision-making.

Full details can be found in the following report: 'Capacity needs analysis for the Western Australian agricultural RD&E sector: Interviews - Data, digital and modelling'

Findings

Interviewees agreed that digital capacity now underpins RD&E functions, with data essential to agronomy, breeding, modelling, environmental monitoring and decision-making.

They also agreed there were major disconnects between digital ambition and capacity:

- Fragmented, incompatible datasets and weak interoperability.
- Data, digital and modelling translation.
- Digital recruits lack agricultural context, slowing implementation.
- Large volumes of data that cannot be fully utilised.
- Short-term projects unable to generate meaningful datasets.
- Universities lagging in digital preparation of graduates.

Successful examples of the use of data and digital programs and platforms were also highlighted: AI-driven analysis of trial data, rapid AI synthesis of research gaps and modelling enabled by increased computing power.

Interviewees consistently stressed that people, rather than technology, are the key limiting factor:

- A shortage of hybrid roles: digital agronomy translators, data stewards, digital extension specialists, interoperability specialists and workflow designers.
- Heavy reliance on international talent and visa challenges.
- Geographic barriers limiting contextual learning.
- Growing cybersecurity risks across the agricultural digital ecosystem.
- Organisational culture, trust and leadership as major enablers or barriers to digital adoption.

Further details can be found in the following report: 'Capacity needs analysis for the Western Australian agricultural RD&E sector: Interviews - Data, digital and modelling'

6. Looking forward

Western Australia's agricultural sector is entering a period of rapid change driven by global megatrends, technological advances and shifting market expectations. This Needs Analysis confirms that the WA agricultural RD&E workforce is deeply committed with a genuine passion for supporting growers, regional communities and industry transformation.

At the same time, the analysis identifies clear, urgent priorities for strengthening human capacity across WA's RD&E system. Evidence from the literature review, survey and interviews converges on five priority capacity areas requiring strategic, long-term investment:

1. Data, digital and modelling capacity – including AI, robotics, analytics, sensor technologies, simulation, and data governance.
2. Extension, communication and adoption science – particularly specialists skilled in co-design, digital extension and behavioural change.
3. Interdisciplinary and Systems integration capacity – roles that bridge biophysical, economic, social and digital domains.
4. Climate adaptation, sustainability and environmental markets expertise – carbon literacy, monitoring, reporting and verification, climate ready agronomy and adaptation economics.
5. Agronomy and production systems capacity - especially systems agronomy, and farm engineering, with strong regional expertise.

These capacity gaps are already constraining RD&E delivery, and without targeted intervention they will limit the state's ability to respond to climate pressures, emerging technologies, shifting biosecurity threats and increasing global competition. The workforce pipeline is also fragile, characterised by ageing specialists, succession challenges, limited mid-career mobility and declining applied skills in key disciplines.

The study also identifies several system wide enablers that provide a strong foundation for strengthening WA's future RD&E capacity. These enablers highlight the existing strengths, momentum and opportunities that WA can leverage to accelerate workforce development and innovation. These include:

- Growing momentum in digital transformation - Increasing uptake of data systems, modelling, remote sensing and automation is enabling more precise research, stronger decision support tools and new interdisciplinary roles that attract emerging talent.
- Industry demand and market pull for innovation - Growers and supply chain partners are increasingly seeking science-based solutions for climate resilience, sustainability credentials, environmental markets and productivity, strengthening the relevance and impact of RD&E.
- Supportive strategic alignment - State and national priorities around climate adaptation, competitiveness, digital transformation and sustainable growth align

strongly with the capacity areas identified in this analysis, creating fertile ground for coordinated investment.

- Emerging opportunities for interdisciplinary integration - The convergence of digital, biophysical, environmental and economic sciences is creating new career pathways and enabling more holistic research, strengthening WA's ability to respond to complex system challenges.
- Building on the established regional footprint and grower engagement; long standing relationships with growers and regional communities provide critical pathways for adoption, co-design and real-world validation, key enablers of high impact RD&E.
- WA's strong reputation and lifestyle advantages; WA's, unique production systems, and attractive lifestyle proposition offer a compelling narrative for national and international recruitment into priority disciplines.

Looking ahead, WA has the foundations and a unique opportunity to position itself as a global leader in future-focused agricultural RD&E. Strategic investment in priority areas, stronger early career pathways, modernised infrastructure, interdisciplinary roles and a coordinated statewide workforce strategy will build the human capacity needed for a profitable, climate resilient and internationally competitive sector.

7. Next steps

Public release of Needs Analysis reports and summary document

Needs Analysis full reports and summary documents will be made publicly available via WAARC's website and other channels, ensuring transparency and broad accessibility to industry, policymakers, education providers and regional stakeholders.

Findings utilised by WAARC

Needs Analysis findings have, and will continue to be, incorporated into WAARC capacity building programs, activities and decisions.

Cross-sector working group

A cross-sector working group could provide a mechanism for sustained collaboration and evidence-based strategy, including addressing the research finding that workforce challenges are often exacerbated by siloed decision-making and a lack of coordination.

Coordination/support for a cross-sector working group may be considered in the future.