Australian Government
Department of Industry, Science and Resources

Cooperative Research Centres Program

Annual Report 2025

SAAFE CRC

Contents

Australian Government
Department of Industry, Science and Resources

Cooperative Research Centres Program

This project received grant funding from the Australian Government through the CRC Program.

Acknowledgment of Country

SAAFE acknowledges the Traditional Custodians of the lands, seas and waters of this Country, and of all areas in which we live and work across Australia. We respect Aboriginal and Torres Strait Islander Peoples' deep cultural and spiritual relationship with this land and pay our respects to Elders past and present. We acknowledge the diversity of Aboriginal peoples and their knowledge systems. We recognise the concept of One Health (which highlights the integrated nature of human, animal, plant and environmental health) is not something new to Aboriginal peoples, and that embracing this knowledge and connection to Country is a vital step in the path to reconciliation. SAAFE is respectfully committed to a research program underpinned by the core value of Caring for Country.

A message from

The Hon. Karlene Maywald, SAAFE CRC Chair

Antimicrobial resistance (AMR) remains one of the most complex challenges of our time, requiring coordinated action across food production, agriculture, water, environment and human health. Addressing it demands collaboration that reaches beyond traditional boundaries. In 2025, SAAFE continued to demonstrate the power of this approach, bringing together researchers, industry, government and regulators to deliver practical, evidence-based solutions that protect productivity, public health and the environment.

Across our research portfolio, we are seeing tangible progress. From advancing vaccines that can dramatically reduce antibiotic use in aquaculture, to deploying new diagnostics that help growers and water utilities detect and manage resistance earlier and more precisely, SAAFE projects are translating science into real-world impact.

Our research programs are strengthening Australia's capability to identify AMR risks, target interventions where they matter most, and enable consistent, evidence-driven, risk-based decision-making across sectors. These outcomes reflect not only scientific excellence, but deep and sustained collaboration with end users.

Collaboration also sits at the heart of our Education and Training program. In 2025, our growing community of SAAFE Scholars and Foundation Fellows continued to flourish, supported by new training content, national engagement through the AMR Research Roadshow, and strong connections with industry partners. These emerging leaders are developing the technical expertise, systems thinking and communication skills needed to tackle AMR as a One Health challenge. By investing in people, SAAFE is building long-term capability that will endure well beyond the life of the CRC.

Looking ahead, hosting the Environmental Dimensions of Antimicrobial Resistance Conference (EDAR8) in Brisbane in 2026 is a significant milestone for SAAFE and for Australia. EDAR8 will bring together the global AMR community at a time when international cooperation has never been more important. By placing industry and impact at the centre of the program, and by creating new opportunities for early career researchers, policymakers and practitioners to work together, EDAR8 will help accelerate the translation of knowledge into action.

I would like to thank our partners, researchers, Scholars, Fellows, Board and staff for their continued commitment and collaboration. The progress reflected in this report reinforces SAAFE's unique role as a trusted connector across sectors, and our shared capacity to deliver meaningful impact now and into the future.

The Hon. Karlene Maywald
SAAFE CRC Chair

A message from

Alex Lloyd, SAAFE CRC Chief Executive Officer

When we established SAAFE, we knew solving AMR was a task too large for any single industry, government body, or research institution.

AMR does not respect the boundaries of a farm, a waterway, or a laboratory. It is the quintessential "One Health" challenge, where the health of our environment, our animals, and our people are inextricably linked.

At SAAFE, we exist to bring the right people together, across research, industry and government, to deliver solutions that protect Australia's food systems, environment and communities.

Deepening partnerships, growing capability and tangible progress across our research portfolio all marked what was a year of strong momentum for our CRC. Not the kind you announce in a press release, but the kind you feel when a research community starts to gel. It's when our PhD scholars present to industry veterans, when experts trade insights between sectors, or when a Kickstart project seeds an idea that could reshape how an entire sector monitors for disease in the field.

Our portfolio now includes thirty-one active projects. Some are advancing rapidly, such as our some of our Kickstart projects that will have deployed prototype in-field monitoring tools in months. Others are laying groundwork that will pay off over years, like our comprehensive water monitoring and risk programs establishing baseline data we've never had before and modelling the implications for AMR risk. This is the nature of the work: some results come fast; others require patience. Both matter.

This work is made possible through the strength of our national consortium. In 2025, SAAFE brought together 43 partners and collaborators, working across sectors to identify AMR risks, target interventions where they matter most, and enable consistent, evidence-driven, risk-based decision-making. These outcomes reflect not only scientific excellence, but deep and sustained engagement with end users.

A major highlight of the year was the AMR Research Roadshow, which connected our community across Brisbane, Sydney, Perth and Melbourne. These events strengthened partnerships, onboarded new researchers into the SAAFE way of working, and equipped participants with practical tools to translate research into impact.

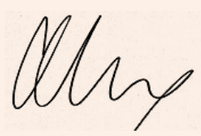
Building capability for the future remains central to SAAFE's mission. In 2025, our Education and Training Program continued to grow, with six Foundation Fellows and eight SAAFE Scholars now forming a vibrant and connected cohort.

We have also recommended a further 15 PhD projects for funding. The support, training and development of SAAFE's ECR and HDR cohort is an important investment in the next generation of One Health AMR leaders.

Looking ahead, hosting the Environmental Dimensions of Antimicrobial Resistance Conference (EDAR8) in Brisbane in August 2026 will be a landmark moment for SAAFE and for Australia.

EDAR is the premier global forum for environmental AMR research, and hosting it gives us the opportunity to showcase Australian science, strengthen international collaborations, and demonstrate our model of industry-research partnership to the world.

SAAFE's legacy lies in the strength of the connections it fosters, and we are building a collaborative network that will continue to translate knowledge into action well beyond 2032. This report reflects not only our progress but the commitment of our partners, researchers, Scholars, Fellows, Board and staff - thank you. Together, we are reinforcing SAAFE's role as a trusted cross-sector connector, and demonstrating the power of collaboration to drive impactful, sustainable change.



Alex Lloyd
SAAFE CRC
Chief Executive Officer

2025 at a glance

Projects

$24.4m Project Value (Cash and In-kind)

10 Active Projects

13 Kickstart Projects

Education and Training

23 PhD Projects Recommended

>$1.5m in Scholarship Funding

14 SAAFE Scholars
8 PhDs, 6 Foundation Fellows

Publications

16 Research Outputs

Partners

43 SAAFE Partners and Collaborators

8 Sectors Engaged

13 Major Partners

16 Minor Partners

Collaboration

68 collaborating private and public sector organisations across 8 industry sectors

SAAFE Events

>170 AMR Research Roadshow registrations

4 states visited by AMR Research Roadshow

SAAFE's Strategy

Protecting Australia's environment, economy and communities from antimicrobial resistance.

SAAFE's Values

Integrity

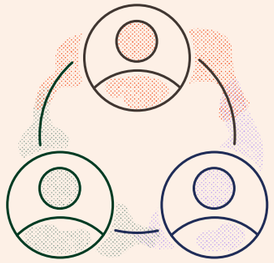
Respect

Empowerment

Collaboration

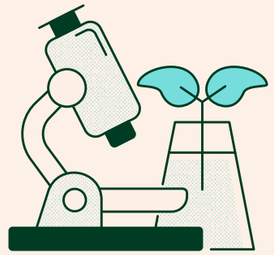
Wellbeing

SAAFE's Pillars



Collaboration

SAAFE will enable cross-sector collaboration to continue beyond the life of the CRC.



Applied Science

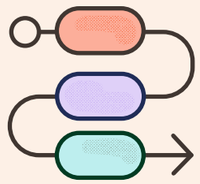
SAAFE's research program will ensure monitoring and mitigating AMR from a One Health perspective are embedded into 'business as usual' systems across a diverse range of industries and stakeholders.

Education and Training

SAAFE will increase the skills, understanding, and knowledge base of industry and research to wholistically address AMR.

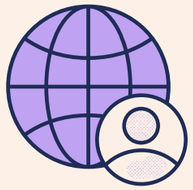
SAAFE's Enablers

Communication



Effective processes

Governance



People and culture

Research Director's Report

Prof Erica Donner
SAAFE Research Director

From Words to Action

In 2026, AMR remains one of the most complex and pressing challenges facing global health, food systems and environments. This update provides a brief report on key developments from 2025, along with a taste of what's ahead for SAAFE in the year to come.

Nationally and globally, the full scale and impact of AMR is still revealing itself as knowledge gaps are addressed and new stakeholders engaged. As we have said many times before, coordinated action is needed to counter this complex challenge.

Needed - and happening.

Joint action is accelerating in Australia and worldwide.

Over the past year, strong Quadripartite leadership by WHO, FAO, WOAH and UNEP has advanced development of a new Global Action Plan on Antimicrobial Resistance (GAP-AMR). The draft is now in consultation and revision, with adoption scheduled from May 2026. The updated plan strengthens the 2015 GAP by embedding a more robust One Health approach and addressing gaps in environmental contamination, access to medicines and financing.

There has been a clear shift in both international and national responses, with One Health moving decisively from concept to action. Integrating environmental dimensions into AMR responses is integral to this progression, and an area where SAAFE is particularly strong.

SAAFE's research with the environmental services sector, including our major collaborative program with Water Research Australia and the national Water Industry Consortium, spans all research programs and takes a systems-wide approach. This work generates evidence and tools to support risk-based decision-making and is helping position Australia at the forefront of action on environmental AMR.

Over the past year we have embraced opportunities to contribute this nuanced perspective to key national initiatives including the Australian Government One Health Symposium for the launch of Australia's Centre for Disease Control, Australia's One Health Surveillance System project, AusPathoGen, Vet Science Week, and the NHMRC HEAL network.

Research Program Delivery and Maturation

For SAAFE, 2025 marked a transition from establishment to a more advanced, delivery-focused phase. We have consolidated foundational investments, grown our research and management team, and strengthened pathways to impact across industry, policy and practice.

Program maturation is evident in tangible progress. Coordination across monitoring environments is laying foundations for nationally comparable surveillance data and illuminating intervention points across interconnected environmental and agricultural systems. Early findings are informing monitoring design and risk prioritisation, demonstrating the value of embedding research within operational contexts, which is a key aspect of the CRC value proposition.

Recognising that future-changing solutions need to start somewhere, SAAFE continues to invest in Kickstart projects to seed new directions and build collaboration. In 2025 we funded pilot projects focused on field-based diagnostics to support earlier disease detection and resistance mitigation in food production settings. Other Kickstarts include the Environmental Water Quality Guidelines Project with CSIRO and DCCEEW, now transitioning to roadmap co-design through next-stage partnered research, and the Design Thinking Toolkit for One Health AMR developed with UNEP to continue the momentum of SAAFE's 2024 Solutions Summit, building capacity for evidence-informed policymaking across Australia and the Asia-Pacific.

SAAFE research is helping shape how AMR is understood, managed and addressed across systems, and with that in mind we are increasing emphasis on standardisation, comparability and scalability of methods to support national relevance and capacity building across our portfolio.

Translation, Impact and Decision Support

Over the past year we strengthened translation pathways through an Impact Assessment and Planning project, improving articulation of intended outcomes and strengthening links between research outputs and measurable sector impacts.

SAAFE's research is embedded into real-world systems to ensure outputs are relevant. End-users are engaged early, with Project Advisory Committees now formalised across all projects. This underpins operational decision-making, investment prioritisation and capability building across the consortium.

Data, Infrastructure and Enabling Capability

Alignment between SAAFE outputs and national data infrastructure initiatives has strengthened through completion of our foundational project with the Australian Research Data Commons.

A practical guidance tool emerging from this work is the forthcoming AMR Data Code. Developed with multi-sector stakeholders, it provides checklists for Data Receivers and Providers to support consistent data handling practices. The AMR Data Code will be published on the SAAFE website in early 2026.

Education, Capability and Research Leadership

Capability development remains central to SAAFE's long-term impact. Through initiatives such as our Scholars' Journal Club and other collaborative activities, we support early career researchers to connect and prepare for leadership.

SAAFE now has its full complement of Foundation Fellows across our core providers, actively contributing scientific expertise across the consortium. These emerging leaders strengthen the national AMR capability pipeline, as seen in the recent co-development and delivery of One Health AMR Methods training during our 2025 multi-state roadshow. This training will also form the basis of new researcher and student induction resources.

Further developments are ahead as our first PhD cohort nears capacity, additional major projects are contracted, and our Research Excellence and Integrity Framework takes shape in 2026.

Looking Ahead

Awareness and communication gaps still hinder decisive action, and the complexity of AMR will always challenge us. Yet our collective progress provides confidence that the capability required to meet this challenge is being built.

We are delighted to regularly welcome new faces to the SAAFE community and look forward to meeting many of you in Brisbane in August 2026 for EDAR8. With programming pathways spanning the full suite of One Health perspectives, it promises to be a fascinating, engaging and impactful event.

Once again, I extend my thanks to our partners, collaborators and researchers, and to my colleagues who continue turning this CRC into the impactful program we are striving for. I hope you enjoy reading about the exciting work underway in the pages that follow.

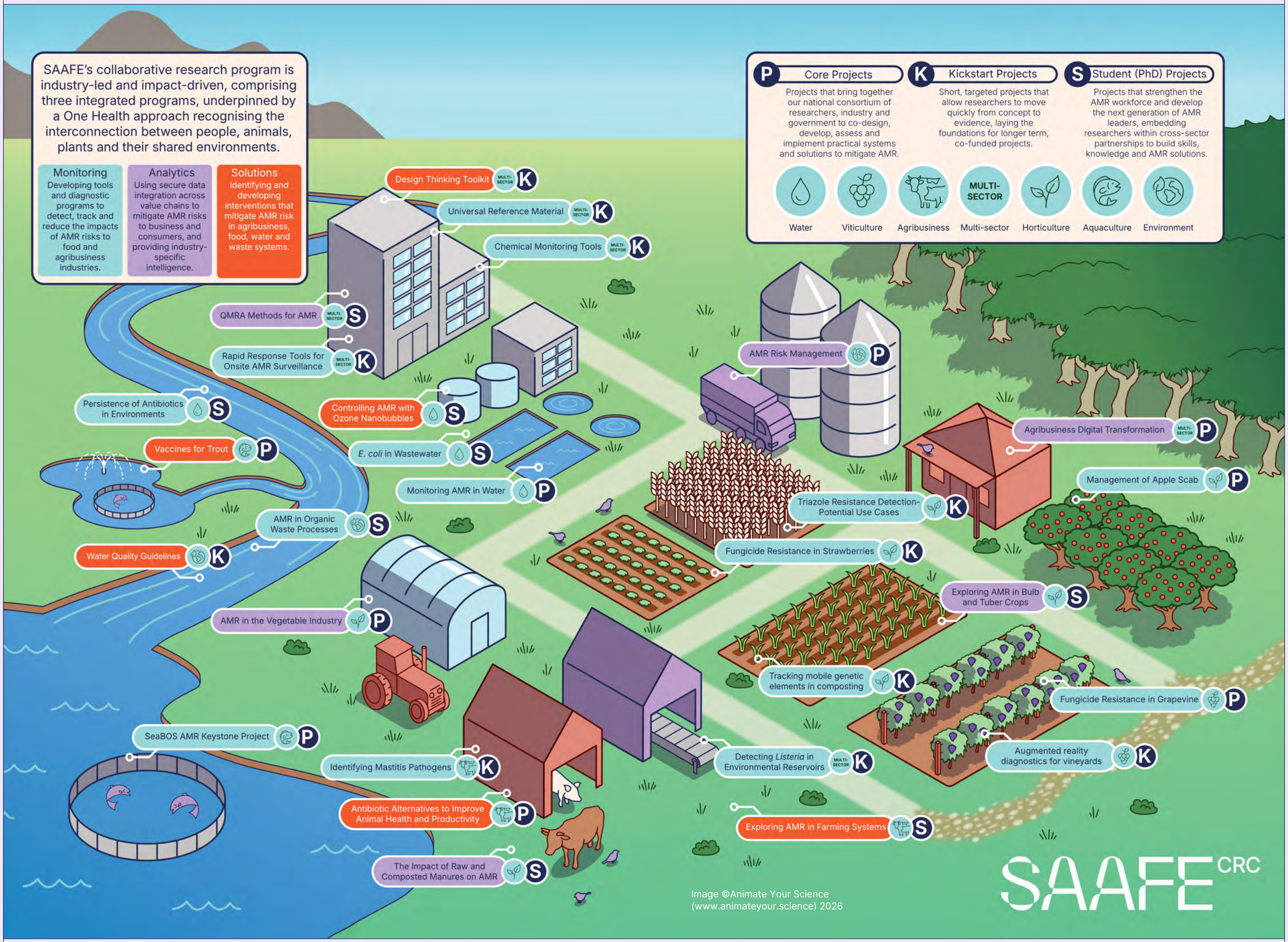


Image ©Animate Your Science (www.animateyour.science) 2026

Project Update Report

Project Update Report

Future-proofing *Lactococcus garvieae* vaccines for Australian farmed trout in a warming climate

Project partners

Fisheries Research and Development Corporation, The University of Queensland, Future Fisheries Veterinary Service, Tréidlia Biovet Pty Ltd

The Issue

Lactococcosis, caused by Lactococcus garvieae, is a bacterial disease affecting Australian trout farms during warm summers. It occurs nationwide and can result in major economic losses, with two farms reporting losses of fish valued at $140,000 and $356,000 in the 2022–23 season alone.

The disease is currently managed using antibiotics delivered through medicated feed, estimated to cost affected farms $8,000 - $30,000 per year. This reliance on antibiotics increases the risk of antimicrobial resistance, threatening long-term disease control.

Project Objectives

This project aims to optimise vaccination to prevent lactococcosis disease in farmed trout, reducing the need for antibiotics while improving fish health and welfare. Using genomics, epidemiology and laboratory and field trials, the project supports responsible vaccine development and long-term stewardship.

Delivered in partnership with trout farmers (via FRDC), aquatic veterinarians, vaccine manufacturer Tréidlia Biovet and the University of Queensland, the project embeds industry throughout the research process to support practical adoption.

Outcomes to Date

The project is making strong progress towards developing an effective vaccine as a long-term alternative to antibiotics for managing lactococcosis in trout farming.

More than 100 isolates of the bacteria causing lactococcosis collected from Australian farms over three summers have been genetically analysed, identifying that the variant is unique to Australian trout farms. Analysis of these isolates confirms that antibiotic resistance remains rare, despite ongoing use.

Current autogenous vaccine performance is modest in controlled trials and there is substantial room for improvement, however, the most recent trials have identified several promising vaccine candidates, with a clear path towards a better product. Controlled trials have also shown there is no influence of feed type on disease outcomes or vaccine performance. To date, nearly 4,000 fish have been transported by road from Goulburn River Trout Farm to support these trials conducted at UQ, St Lucia.

Impact

Vaccination has the potential to reduce antibiotic use by more than 90%, based on experience in the Atlantic salmon industry. Preventing outbreaks rather than treating disease will improve fish welfare, farm productivity and reduce AMR risk across the trout industry.

Next Steps

Further clinical trials in 2026 will confirm and improve vaccine effectiveness and deliver new production processes for the manufacturer. This represents novel intellectual property from the collaboration, which will support future industry-ready solutions.

Project Update Report

Advancing diagnostics for Monitoring and Management of Fungicide Resistance in Grapevine

Project partners

Wine Australia, South Australian Research and Development Institute, Curtin University

The Issue

Powdery mildew, downy mildew and Botrytis bunch rot are significant diseases affecting Australian grape production, with impacts on yield and wine quality. Fungicides are used in vineyards for disease control; however, increasing fungicide resistance is reducing their effectiveness. Current resistance detection methods are slow and labour-intensive, limiting the ability to undertake effective resistance monitoring. Improved diagnostic tools are required to support timely and informed disease management decisions.

Project Objectives

Building on earlier Wine Australia-funded research, the project aims to develop advanced diagnostic tools for monitoring fungicide resistance in grapevines. It focuses on improving both laboratory and in-field testing protocols to detect resistance markers more efficiently, while establishing robust sampling methods to ensure accurate and reliable results. The project also continues to refine phenotyping protocols for fungicides where resistance mechanisms are not yet well understood. Together, these efforts support early detection of resistance, enable more effective disease control, and give growers confidence in optimising spray programs and managing fungicide resistance.

Outcomes to Date

Quantitative PCR (qPCR) assays targeting known resistance mutations have been developed for key pathogen–fungicide combinations across powdery mildew, downy mildew and Botrytis. Assays have been optimised for high-throughput laboratory testing and in-field application, with routine testing now underway. High-throughput sequencing has also been established to detect multiple resistance mutations in powdery and downy mildew.

Multiple sampling approaches have been evaluated for molecular resistance testing, including spore traps, washing and swabbing methods. High-throughput qPCR demonstrated high sensitivity across all sampling methods, while in-field qPCR was most effective on fresh infected tissue. Field trials identified spore traps as a reliable tool for early-season monitoring, while GPS-guided sampling is enabling spatial mapping of resistance at the vineyard scale. Swabbing leaves and gloves also emerged as cost-effective, grower-friendly methods for routine monitoring.

Isolates collected from commercial vineyards across Australia have shown reduced sensitivity and resistance to several major fungicide groups across all three diseases, including instances of multi-group resistance. The project team continues to engage with industry through workshops, updates and publications, and is working with SAAFE's Analytics Program team to refine sampling strategies and manage project data.

Impact

The project is expected to significantly strengthen disease management in vineyards by enhancing Australia's capacity to monitor fungicide resistance at scale, enabling the analysis of thousands of samples annually. Improved diagnostic capability will support more targeted disease control, helping growers maintain grape yield and quality, extend the effective lifespan of fungicides, and reduce unnecessary chemical use. This contributes to more sustainable vineyard management and improved long-term disease control outcomes for the Australian wine sector.

Project Update Report

Comprehensive monitoring of AMR in Australia's drinking, waste and recreational waters

Project partners

WEHI, Water Research Australia

The Issue

Wastewater treatment plants, recycled water, biosolids and water catchments sit at important interfaces within the water cycle where antimicrobials and their residues can be received, transformed and managed, and where antimicrobial-resistant genes (ARGs) and bacteria (ARBs) may be observed. While there has been a significant understanding and management of public health and environmental impacts from contaminants at points within the water cycle, knowledge gaps remain around how AMR and how it is transmitted, distributed and influenced by treatment processes, environmental conditions and storage practices across the water cycle.

Project Objectives

This project is developing and deploying robust tools to identify, quantify and track AMR through the water cycle, enabling measurement of the distribution, dynamics and concentration of AMR genes and ARB through wastewater treatment systems in recycled water, biosolids and into recreational waters. A core aim is to link ARGs with the organisms encoding them, improving understanding of sources of horizontal gene transfer and environmental amplification of AMR risk, and to generate data that supports Quantitative Microbial Risk Assessment (QMRA) and evaluate the cost-effectiveness of potential management options.

Outcomes to Date

The project has now established regular sampling across major wastewater treatment plants and at key catchment locations. More than 60 samples have been collected and processed to ensure reliable, comparable results. The team has tested and refined laboratory methods that can detect priority AMR genes and priority ARB with the first round of advanced genetic sequencing completed. Practical improvements to sampling and filtration have made the process more efficient, while maintaining accuracy. Planning for biosolids sampling is underway so this important part of the water cycle can also be included.

Impact

This work is creating Australia's first coordinated, standardised AMR surveillance capability for the water sector and aligns AMR monitoring with established risk-based environmental management practices. By enhancing national capability, the project provides utilities and regulators with defensible, contextualised data to identify environmental and operational AMR hotspots, understand seasonal and event-based variation, and support proportionate, evidence-based decisions.

Next Steps

The project will expand testing to include more samples and locations, giving a clearer picture of how AMR changes across seasons, different parts of the water system, and in different parts of Australia. Laboratory methods will continue to be fine-tuned to ensure results are robust and easy to interpret. Sampling of biosolids will begin, and AMR findings will be combined with existing water quality information, such as metals and chemical data, to support early risk assessments. These steps will help translate scientific results into practical guidance for water managers and regulators.

Project Update Report

Improved management of apple scab to reduce pesticide usage and fungicide resistance in Australian orchards

Project partners

The Department of Primary Industries and Regional Development (WA) and Curtin University

The Issue

Apple scab, caused by the fungus *Venturia inaequalis*, is one of the most damaging diseases affecting apple production worldwide. In Australia's $650 million apple industry, it costs growers more than $10 million each year through reduced yield, fruit quality losses and, in severe cases, complete crop loss.

Management has traditionally relied on frequent fungicide applications. While effective, this approach can be costly, environmentally challenging and increases the risk of fungicide resistance developing in the pathogen. Many leading Australian varieties, including key export cultivars such as Pink Lady® and Bravo®, are highly susceptible.

While resistance genes exist in different apple species around the world, little was known about the resistance profile of those cultivars used for breeding in the Australian National Apple Breeding Program (ANABP). This knowledge gap limited the program's ability to produce new cultivars combining superior eating quality and, storability, with disease resistance.

Project Objectives

This project supports best-practice apple scab management while reducing reliance on chemical control. Using advanced molecular diagnostics alongside traditional testing, the project aims to: identify and map fungicide resistance in *V. inaequalis* across major apple-growing regions; analyse the pathogen's population structure and genetic diversity; screen ANABP cultivars for genetic resistance to apple scab and; inform breeding decisions and best-practice resistance management guidelines.

Outcomes to Date

More than 250 apple scab isolates have been collected nationally, creating Australia's largest dataset of its kind. Early testing has identified isolates resistant to one or more fungicide groups, highlighting the importance of ongoing surveillance. Further sampling has occurred during the 2025/26 growing season in NSW and Vic, with plans to sample SA and Tasmania underway, adding to the dataset of isolates.

DPIRD scientists are screening cultivars used as breeding parents within ANABP to identify genetic resistance and validating results under field conditions. Molecular tools are also being developed to enable early screening of young trees for resistance traits, improving breeding efficiency.

To support industry adoption, the project delivered a national sampling kit and digital app that streamlines sample collection and provides growers with access to real-time resistance data via a live dashboard, supporting more targeted spray decisions.

Impact

The project is delivering significant and practical benefits for Australia's apple industry, including: reduced reliance on pesticides through identification and adoption of resistant cultivars; reducing input costs and environmental impact; improved breeding outcomes through molecular screening and informed cross-selection; early detection of fungicide resistance to safeguard the effectiveness of existing chemical tools and potential risk for those in development; enhanced digital capability to support modern, data-driven disease management; stronger collaboration between researchers, breeders and industry that will improve adoption of best practice management of apple scab and fungicide resistance risk.

Next Steps

While resistance has been identified within the ANABP, fewer than 5 per cent of current breeding cultivars carry known resistance genes. The project has identified private collectors of apple cultivars within Australia willing to provide material for testing for resistance as part of the project. These cultivars are publicly available but not currently used within the ANABP for crosses.

The digital and field-based tools developed under this project also have potential application in other crops, supporting a broader shift towards sustainable, data-driven disease management across Australian horticulture, and protecting the productivity and export reputation of this industry sector.

Project Update Report

Applying quantitative microbial risk assessment, epidemiological modelling, and Bayesian Network models to facilitate antimicrobial resistance management in wastewater services, water reuse and biosolids/composts usage

Project partners

University of South Australia, Environment Protection Authority (SA and Vic), SA Health, The University of Queensland, University of Technology Sydney

The Issue

AMR arises across interconnected environmental, water and agricultural systems, yet there is currently limited clarity on where the most significant AMR risks occur, which determinants drive them, and which management interventions are both effective and practical across water, reuse and food production contexts.

Project Objectives

This EPA-supported project addresses the complexity of AMR by identifying system-wide hotspots for AMR development across connected environmental, water and agricultural systems and, where required, recommending practical management options for parts of the system such as agricultural soils, receiving waters, and associated water reuse areas. The project objectives are to: prioritise key AMR determinants, including chemicals, genes and microorganisms that may require control within water and food production systems; identify potential AMR control points across sewage treatment, recreational waters, water reuse, and compost and biosolids applications; and assess where and how different management options influence AMR hotspots, including the relative costs and effectiveness of control measures.

Outcomes to Date

Building on collaborative research, the project is developing an advanced Bayesian network model that integrates diverse qualitative and quantitative datasets to enable the prioritisation of AMR hazards and exposure pathways. A prototype model has been developed for sewer and sewage treatment plant impacts, with data inputs underway for key reference pathogens. Complementary laboratory studies are examining how free-living amoeba may protect AMR pathogens from disinfection processes, improving our understanding of treatment efficacy.

Impact

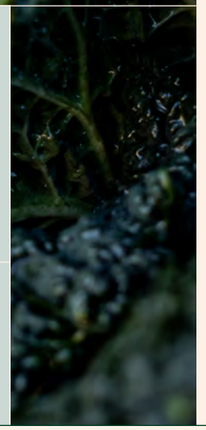
The project will strengthen Australia's capacity to manage AMR through advanced, system-wide risk modelling that translates complex industry and environmental data into practical insights. By identifying priority AMR hotspots and clarifying how treatment processes and management options influence AMR risk, the project supports more targeted, evidence-based decision-making. Its scalable approach enables regulators, utilities and producers to better balance cost, performance and public health protection, while reinforcing confidence in the safety and sustainability of water reuse, food production and aquatic environments.

Next Steps

High priority AMR hazards will undergo system-wide evaluation of control and mitigation measures, incorporating counterfactual analyses of alternative interventions and economic assessments to identify optimal risk-management leverage points. This identification process will include iterative, structured engagement with stakeholders to co-develop and refine the most effective and feasible control strategies across interconnected system sectors.

Project Update Report

Risk assessment of AMR in the vegetable industry



Project partners

Horticulture Innovation Australia, University of South Australia, The University of Queensland, Curtin University and AUSVEG

The Issue

Antimicrobials and pesticides are used in agriculture to support disease management and protect productivity.

To ensure they remain cost effective into the future, targeted interventions and practical management programs are required. The risk assessment provides the evidence base for industry to determine where and how to mitigate AMR, creating an opportunity to optimise chemical use, support effective disease control, protect productivity, and deliver co-benefits for environmental and public health.

Project Objectives

In partnership with Hort Innovation, this project is assessing the risks and impacts of AMR across the Australian vegetable supply chain, from production through to food safety and security. By examining practices related to seed, water, soil, pest management and post-harvest handling, the project will develop practical, commodity-specific AMR risk assessments for levy vegetables. The work aligns with the Vegetable Strategic Investment Plan 2022–2026 and will support evidence-based decision-making across the industry.

Outcomes to Date

This project has assessed AMR and chemical resistance risks across Australian levy vegetable crops.

The first phase involved consultations with agricultural chemical companies and leading researchers to identify current and emerging resistance risks, including those linked to crop rotations and neighbouring production systems. These insights were compiled into an industry article, endorsed by contributors and soon to be published in VegeNotes, ensuring practical, evidence-based guidance is available to growers and advisers.

Early findings show that resistance is influenced by more than just pesticide or antimicrobial use. On-farm practices, water management, post-harvest handling, sanitation and processing environments all play a role. Other factors, such as fertilisers, disinfectants, water reuse and post-harvest settings can also increase resistance risks, even when antimicrobials are not used directly. This highlights the need for a whole-of-system approach. Current regulations focus mainly on general food safety, with limited attention to AMR in soils, organic inputs, and post-harvest systems, reinforcing the value of proactive, industry-led risk management.

The second phase is underway and is developing qualitative estimates of AMR and chemical resistance risks for key crops including leafy greens, carrots, and cucumbers. A review of more than 200 international studies has identified high-risk points in the supply chain, crop-specific vulnerabilities, and gaps in current risk assessment methods. Surveys, interviews, and economic and trade data are being used to understand potential industry impacts.

Overall, the work indicates there is no single point of failure. Instead, resistance risks are spread across the production and supply chain and can be managed through targeted, incremental improvements. This approach will help protect market access, regulatory compliance, consumer confidence, and industry reputation.

Impact

Australia's $5.7 billion vegetable industry produces 3.8 million tonnes of vegetables annually and is critical to national food security. Strengthening AMR risk management will help safeguard pest and disease control, sustain productivity, and support long-term industry resilience.

Proactive leadership on AMR will also reinforce Australia's reputation as a trusted supplier of safe, high-quality produce. By meeting and exceeding international expectations for food safety and residue management, the industry can protect consumer confidence and strengthen access to premium global markets.

Note: This project has been funded by Hort Innovation, using the vegetable industry levy fund, contributions from the Australian Government and co-investment from SAAFE and other project partners). Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Next Steps

In the short-term, the project will complete industry surveys and interviews, finalise economic and trade impact analysis, and identify key data gaps that limit informed decision-making.

In 2026, the project will develop a practical risk assessment framework for levy vegetables, mapping AMR risks from paddock to retail and identifying control points that fit with existing grower practices and assurance systems. The framework will be designed for use across different crops and adaptable to future regulatory and market changes.

Clear communication remains a priority. Findings and recommendations will be shared through regional grower meetings, industry briefings, and Hort Connections 2026 to support knowledge exchange and ongoing engagement.

Overall, the project aims to provide early warning of emerging risks, reduce the likelihood of future trade or compliance disruptions, and ensure AMR management is practical, proportionate and evidence based. This will support market confidence, regulatory preparedness and the long-term resilience of the Australian vegetable industry.

Completed Projects

Completed Projects

Digital Transformation to Prevent Pathogen Resistance and Improve Food Security

Project partners

The University of Queensland,
Australian Research Data Commons

Effective management of AMR and antimicrobial use (AMU) in Australia is constrained by fragmented, siloed data systems and inconsistent terminology across sectors. This limits the ability to collect, integrate, and interpret information needed to support research, regulation and industry decision-making.

To address this challenge, SAAFE's digital transformation project set out to build the foundations for more coordinated, trusted and interoperable data management across water industries and agribusinesses.

Led by The University of Queensland in partnership with the Australian Research Data Commons (ARDC) through its Food Security Data Challenges initiative, the 18-month project brought together partners from multiple sectors to strengthen data governance and enable greater reuse of AMR and AMU information. A key outcome was the development of the SAAFE Data Code comprising seven principles supported by practical standards designed to guide secure, ethical and consistent handling of sensitive data.

These resources will help SAAFE partners review their own data practices and maximise the impact of current and future research.

Extensive consultation underpinned the project. The research team interviewed data custodians across water, horticulture, and viticulture to map existing data environments, identify what information is being captured and understand how it flows between organisations. From this, large-scale diagrams were produced to reveal common touchpoints between sectors, with critical insights for designing systems capable of supporting multiple users and purposes. This cross-sector engagement ensured the industry partners had a strong voice in shaping the outcomes.

The final stage delivered a prototype online platform that could allow partners to standardise and enrich their existing datasets. Users can upload information and apply shared terminology for antimicrobials, microorganisms and genetic markers, while also linking to authoritative references such as the Australian Strategic and Technical Advisory Group on AMR (ASTAG) antimicrobial ratings and Australian Pesticide and Veterinary Medicine residue limits. The platform demonstrates how diverse data can be harmonised to support surveillance, risk assessment and policy development.

The project has laid essential groundwork for a national approach to AMR and AMU data, improving interoperability, trust and collaboration across sectors. These advances will enable more informed responses to AMR risks and strengthen Australia's preparedness for future regulatory and market demands.

Next steps will prioritise targeted refinements informed by industry feedback and the practical assessment of use across various industries. Continued alignment of data custodians and standards will enable progressive strengthening of terminology consistency, and data management to support AMR mitigation and prevention.

The project Advancing agribusiness digital transformation to prevent pathogen resistance and improve food security is a co-investment partnership with the Australian Research Data Commons (ARDC) through the Food Security Data Challenges program (DOI: 10.47486/DC104). The ARDC is enabled by the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS).

Completed Projects

Development of alternative antimicrobial agents for the treatment of skin conditions to improve animal health and productivity

Project partners

Calix Ltd, University of South Australia

For animal industries, following good animal management practices focusing on disease prevention, and using antimicrobials responsibly are the key to collective action on mitigating AMR. There is a need for research to discover innovative solutions to reduce or replace antibiotics where possible.

The Calix and University of South Australia project explored new antimicrobial alternatives to support animal health and productivity. The project focused on nanostructured magnesium oxide porous microparticles (MgO PMPs) produced using Calix's proprietary flash calcination process under varying environmental conditions. By incorporating different gases during calcination and adding metal dopants, the team developed more than 60 MgO PMP variants, screening them for antibacterial properties and assessing 35 for cytotoxicity against skin cells.

The research demonstrated that lead compounds exhibited strong antibacterial activity against both Gram-negative and Gram-positive bacteria and significantly reduced biofilm formation by Staphylococcus aureus. Importantly, limited cytotoxicity at effective doses indicates potential for managing skin infections.

Industrial-scale production of bioactive MgO PMPs was successfully demonstrated, underscoring their promise as effective antibiotic alternatives and contributing to global AMR-mitigation efforts while supporting animal health.

The project also confirmed that industrial-scale production of MgO PMPs with bioactivity is achievable, reinforcing their potential as viable alternatives to antibiotics and supporting efforts to combat AMR while maintaining animal health. These results highlight the potential of nanostructured MgO PMPs as viable alternatives to antibiotics, supporting efforts to combat AMR while maintaining animal health.

The project concluded in January 2026, highlighting several new potential avenues for ongoing product development. Publications arising from the project will add valuable evidence to the scientific literature on mesoporous compounds, informing future innovations in this area.

Completed Projects

SeaBOS AMR Keystone Project

Project partners

SeaBOS, University of South Australia, The University of Queensland, The Beijer Institute for Ecological Economics, The Stockholm Resilience Centre at Stockholm University and Chulalongkorn University of Bangkok

AMR presents an increasing risk to global aquaculture, with implications for regulatory compliance, market access, and consumer trust. SeaBOS (Seafood Business for Ocean Stewardship), a coalition of some of the world's largest seafood companies, is committed to strengthening responsible antibiotic stewardship across the sector to protect human, animal, and environmental health.

Supported by SAAFE and the SeaBOS Consortium, this completed pilot project demonstrated how AMR risks can be detected and assessed in shrimp aquaculture in Thailand, laying the groundwork for a future industry-led program.

The project developed and tested protocols to identify the diversity and potential sources of AMR genes in shrimp farming systems, focusing on key inputs such as the farm's water source, animal feeds and shrimp pond water. Strategic sampling approaches were designed and validated through metagenomic analysis, providing evidence to support investment in larger-scale AMR mitigation initiatives and informing the SeaBOS antibiotics stewardship roadmap.

The project successfully delivered a reliable and reproducible method for detecting AMR determinants in farmed shrimp and their surrounding environments. Results confirmed the approach can identify both known and emerging antimicrobial determinants, while also revealing potential environmental pathways at a broader landscape scale.

Key highlights included metagenomic screening of farmed shrimp samples from Thailand and comparative analysis of conventional shrimp pond systems and advanced recirculating shrimp aquaculture systems, each presenting distinct opportunities and risks for AMR management. Together, these findings provide shrimp producers with a practical, science-based starting point for improving antibiotic stewardship in collaboration with regulators and other stakeholders.

By generating robust, comparable AMR data, future research can support ongoing development enabling seafood producers and regulators to better assess risks and develop targeted safeguards.

Following confirmation of feasibility, the approach is presented to SeaBOS companies as a tool ready to be applied on additional farming practices, in additional landscapes and across aquaculture producing countries, while building local laboratory capacity so testing can be adopted directly by industry. The project exemplifies how collaboration between academia and industry can drive responsible antibiotic use across the global seafood sector.

Kickstart Projects

SAAFE's Kickstart projects play a vital role in accelerating SAAFE's progress across the consortium by seeding new ideas, testing emerging technologies and building partnerships that enable impact at scale.

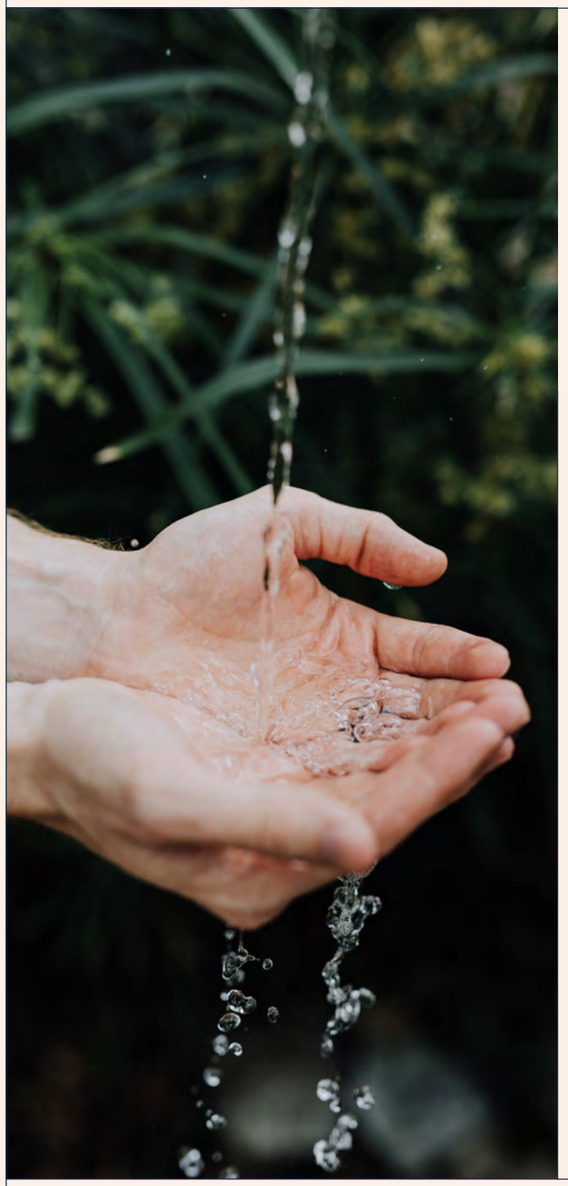
The current kickstart cohort reflects the breadth of SAAFE's One Health agenda, spanning water and wastewater, food production, horticulture, viticulture, dairy, composting, and environmental management. Drawing on expertise in microbiology, chemistry, ecotoxicology, engineering, data science, design thinking and immersive technologies. Delivered through collaboration between CSIRO, the National Measurement Institute, leading Australian universities, health agencies, and industry partners including growers, utilities and food producers, the projects are grounded in real-world operational needs.

Together, SAAFE's Kickstart projects strengthen the pipeline from concepts and innovation to implementation and support the translation of research into practice. This enables the development of practical, adoptable solutions to priority AMR challenges across food, agribusiness, and the environment.

Defining the approach for deriving water quality guideline values for antimicrobials that integrate environmental protection and AMR prevention

Project partners and collaborators

University of South Australia, CSIRO



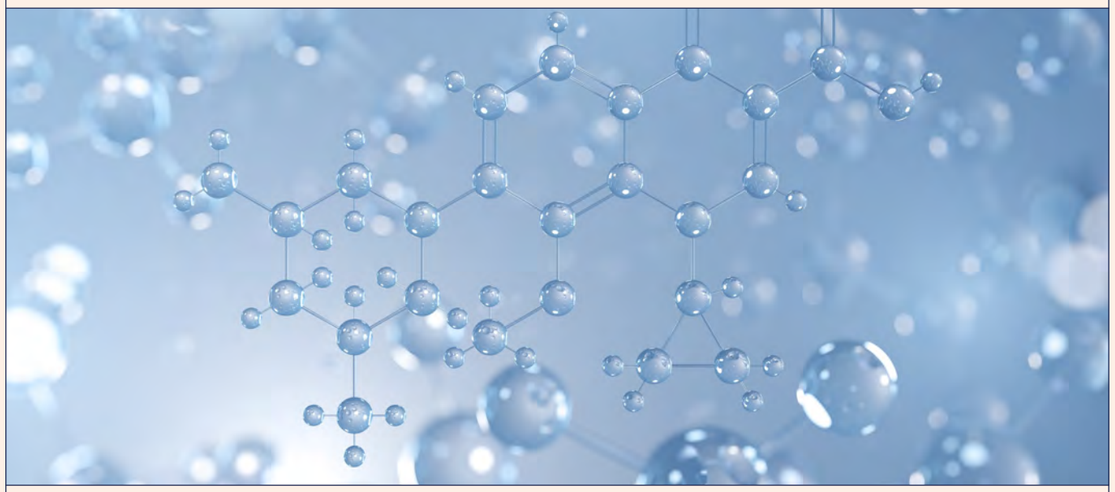
Antimicrobials in waterways can harm aquatic life and contribute to the spread of AMR. This kickstart project brings together researchers, industry and regulators to develop a practical Australian approach to managing these risks.

The project, led by CSIRO's Monique Binet and SAAFE Living Labs Lead Professor Nicholas Ashbolt, will lay the groundwork for Australia's first environmental water quality guidelines for antimicrobials, helping protect both ecosystems and plant, animal and human health. By addressing current gaps in science, it provides a framework for future research, policy and improved wastewater management to reduce AMR risks in the environment.

Chemical Monitoring Tools

Project partners and collaborators

The University of Queensland, University of South Australia, Queensland Health



This Kickstart project, led by Dr Jake O'Brien and Dr Emily Stevenson at The University of Queensland (UQ), is focused on understanding what chemicals we should be looking for in any monitoring programs, building the foundation for practical, industry-relevant chemical monitoring within SAAFE. It identifies priority chemical residues of concern and the most effective methods to detect them, helping ensure monitoring efforts focus on what matters most for industry, regulators and the community.

Working with partners from UQ, the University of South Australia and Queensland Health, the project will deliver a clear, usable report that identifies optimal detection methods, and targets to support advanced, reliable chemical monitoring as well as identifying chemical monitoring gaps across sectors.

This will help partners to better understand and manage chemical risks, support development of science-based policy and regulation, and strengthen confidence in environmental and food safety performance.

By aligning scientific capability with industry needs, the project supports the development of future chemical monitoring programs that are fit-for-purpose, efficient and trusted by regulators and customers. It also builds technical capability across the SAAFE network and supports the next generation of specialists in chemical analysis.

Overall, this project enables smarter investment in monitoring, reduces uncertainty around chemical risks, and supports industry in maintaining its social licence to operate.

Design Thinking Toolkit (Solutions toolkit)

Project partners and collaborators

The University of Queensland, University of South Australia, United Nations Environment Program

To help SAAFE program teams and partners develop better user-centred solutions to AMR, this project is building a practical Design Thinking Toolkit. Led by Prof Lisa Hall with Prof Sheleigh Lawler, Prof Simon Reid and Dr Yukiko Ezure from UQ and Dr Sopheak Hem (UniSA) in collaboration with the United Nations Environment program, it extends the momentum of the 2024 AMR Solutions Summit and focuses on strengthening capability across sectors to tackle complex, cross-disciplinary challenges.

Design thinking is a structured, collaborative approach that helps teams understand real-world needs, challenge assumptions, and test ideas quickly before investing in large-scale solutions. While many design thinking resources exist, they often require specialist expertise and are used only in one-off workshops. This project will create a tailored, easy-to-use toolkit with templates, case studies and training materials designed specifically for One Health and AMR contexts.

The toolkit will be co-designed with industry, government and research partners, tested with regional stakeholders, and supported by a “train-the-trainer” model to enable scaling and long-term use. It will form a core part of SAAFE’s future solutions framework and be launched through training workshops, including at the EDAR8 conference in 2026.

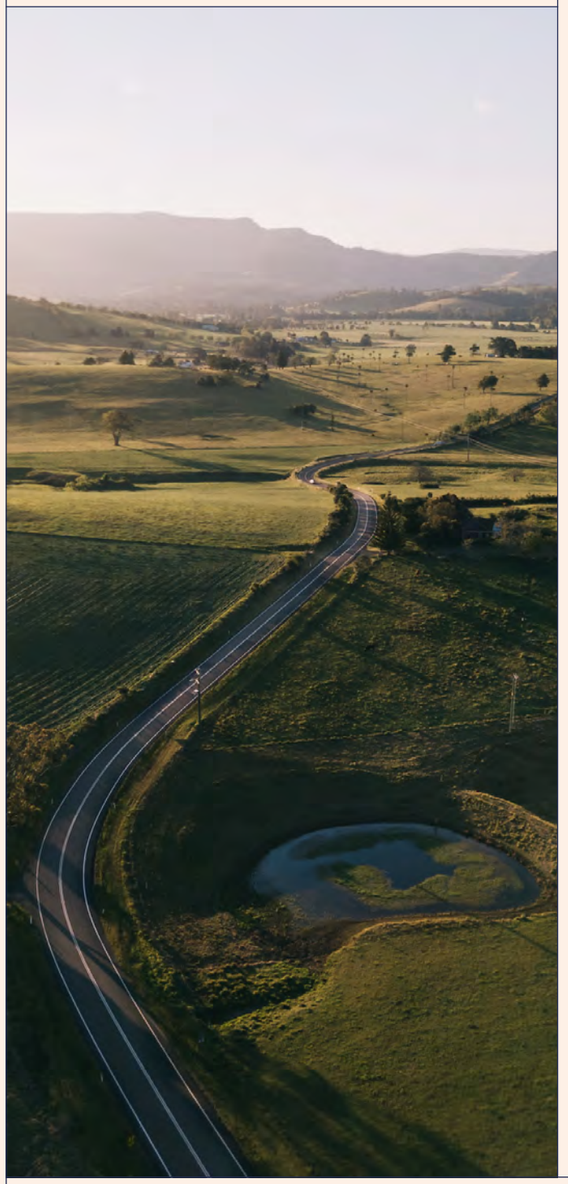
Overall, the project will help industry and partners design more effective, practical and scalable AMR solutions grounded in real-world needs.

Field-based diagnostic Kickstarts

Cross sector, multi-target, candidate DNA reference material

Project partner

National Measurement Institute



This Kickstart project will develop a universal DNA reference material to support consistent, reliable measurement of antimicrobial resistance and other priority genetic markers across the SAAFE network.

Led by Dr Kate Griffiths from the National Measurement Institute (NMI), the project will create a synthetic, multi-target DNA reference material that can be used as a calibration and quality control standard for common DNA testing methods, including quantitative PCR and digital PCR. This will allow researchers and industry to validate their methods, compare results across laboratories and sectors, and ensure measurements are accurate and reproducible.

The reference material will be tailored to SAAFE's needs through consultation with researchers from different sectors to identify the most important genetic targets, such as genes linked to resistance to antibiotics, fungicides, herbicides and pesticides, and those that enable resistance to spread.

Once developed and tested by NMI, the reference material will be supplied to project partners in fit-for-purpose formats and concentrations. This will enable consistent reporting, improve confidence in monitoring data, and support faster development, validation and adoption of new surveillance tools.

Overall, the project will strengthen measurement capability across SAAFE and support industry, regulators and researchers with trusted, comparable data.

Rapid point-of-care detection of Listeria monocytogenes in environmental reservoirs

Project partners and collaborators

University of South Australia, The University of Queensland

Listeria monocytogenes remains a serious risk to food safety, particularly for ready-to-eat foods such as dairy, meat and fresh produce. It survives in many environments, resists common cleaning methods, and can form biofilms, making it difficult to control. The growing presence of antimicrobial resistant strains further increases the risk. Innovative diagnostic test development can support new monitoring and food safety control programs by industry and health departments.

This project, led by Dr Sopheak Hem, is developing a low-cost, easy-to-use, on-site diagnostic tool that allows food producers to rapidly detect Listeria in processing environments. The test can deliver highly sensitive results within an hour, without the need for specialised laboratory equipment or staff. It is being designed for use across key materials such as water, soil, meat, dairy and fresh produce.

Working closely with industry, the project will tailor and validate the tool for real-world use and benchmark its performance against existing laboratory methods. The result will be a practical prototype that can be integrated into food safety and quality systems, enabling earlier detection, better risk management, improved regulatory confidence, and reduced public health and AMR risks.

This project strengthens Australia's food safety capability and supports safer, more resilient food supply chains.

Tracking thermally persistent antimicrobial resistance genes and transmissible locus of stress tolerance during composting

Project partners and collaborators

University of Technology Sydney, Good Garlic

Composting is an important part of a circular economy, but it can also create conditions where AMR genes survive and spread. This project is investigating how resistance genes persist through composting and under what conditions they are reduced or rebound, so the industry can manage AMR more effectively.

Recent research led by Prof Long Nghiem has shown that while AMR levels drop during the high-temperature phase of composting, they can increase again during cooling and maturation. This project will track the genetic elements responsible for this rebound and identify key factors, such as temperature and moisture, that influence their survival.

Working with industry partners, including horticultural producers who rely on compost for crop health, the project will generate practical evidence to improve composting practices. The findings will support the development of simple, field-ready diagnostic tools to monitor AMR in compost in real time and adjust operations when needed.

By linking science with on-farm and facility-level decision making, the project will help compost producers deliver safer products, protect soil and water quality, support regulatory confidence, and reduce the risk of resistance spreading through agricultural systems, strengthening both sustainability and biosecurity outcomes.

In-field tests for fungicide resistance in strawberries

Project partner

Curtin University

Fungal diseases such as grey mould and powdery mildew cause major crop losses in horticulture and are becoming harder to control as fungicide resistance increases. Dr Joel Haywood's project is helping strawberry growers detect fungicide resistance earlier, choose more effective treatments and reduce unnecessary chemical use.

The project will deploy a rapid, in-field DNA test that can identify fungicide-resistant strains of key strawberry pathogens so growers and agronomists can adjust their disease management strategies quickly, improving disease control, protecting yields and extending the useful life of existing fungicides.

Over 12 months, the project will monitor resistance at several strawberry growing regions across Western Australia. Data collected from this project will be used to support evidence-based, technology-guided pest management decisions.

By linking early diagnostics with real-world management and outcomes, the project supports better fungicide stewardship, lower input costs, reduced environmental impact and more resilient crop production. It also lays the groundwork for long-term monitoring and smarter, data-driven disease management across the horticulture sector.

Point-of-care rapid diagnostic assay for bovine mastitis

Project partners

University of Technology Sydney,
The University of Queensland

Mastitis is a major cause of economic loss in the Australian dairy industry. Ongoing effective antibiotic use is essential to protect the health and welfare of dairy cows. Innovative diagnostic technologies help the industry achieve good stewardship practices for responsible antibiotic use by targeting treatment of animals where antibiotics are needed.

This project is led by Dr Piklu Roy Chowdhury, and aims to develop a rapid, easy-to-use on-farm diagnostic test to help farmers detect mastitis earlier and treat it more precisely.

The test is based on a simple lateral flow format, like a pregnancy test, enhanced with advanced fluorescent nanoparticles that allow highly sensitive detection of mastitis-causing pathogens in milk or blood.

This makes it possible to identify infections quickly and accurately without the need for laboratory testing or specialised training.

By enabling farmers to distinguish between infected and healthy animals and identify the likely pathogen, the tool supports targeted treatment and antibiotic use. This will allow selective dry cow therapy, reduce unnecessary antibiotic applications entering farm environments, and lower costs for farmers.

Overall, the project supports better animal health, more efficient mastitis management, improved farm profitability, and reduced AMR risks, helping the dairy industry move towards more sustainable and responsible use of antibiotics.

VineSight: augmented reality field-based diagnostics for vineyard disease detection

Project partners and collaborators

University of South Australia, Dowie Doole

Australian grape growers are facing increasing disease pressure, including from pathogens such as powdery mildew that are becoming harder to control with fungicide sprays. Current detection relies heavily on expert inspections, which are costly, time-intensive and often identify problems only after damage has occurred.

Dr Andrew Cunningham's project is developing an AI-enabled diagnostic tool that allows vineyard workers to detect disease early and in real time. Using computer vision and a simple visual interface, delivered through mobile devices or augmented reality headsets, the system guides users to inspect leaves, captures images, and automatically identifies early signs of disease. Results are logged with location data, creating a live map of disease spread across the vineyard.

Over 12 months, the project will co-design and test the system with growers, agronomists and field workers, including trials at Dowie Doole Winery in McLaren Vale. The outcome will be a validated prototype showing that non-experts can reliably detect disease using this technology.

By enabling earlier intervention and more targeted management, the tool reduces unnecessary chemical use, lowers costs, and supports sustainable, precision viticulture. It also provides a scalable platform that could be expanded to other crops, diseases and regions in the future.

Triazole resistance detection – potential use cases

Project partners and collaborators

University of South Australia, Curtin University

This Kickstart project is exploring new ways to detect fungicide resistance earlier and more easily in agricultural environments. Led by Dr Jowenna Sim, it focuses on triazole resistance in Aspergillus fumigatus, a fungal pathogen of growing concern for crop production, food safety and biosecurity.

Triazole fungicides are widely used to manage fungal disease. This impacts not just the pathogens causing disease but also the soil microbiome. Current detection methods rely on laboratory testing, which is slow and limits timely response.

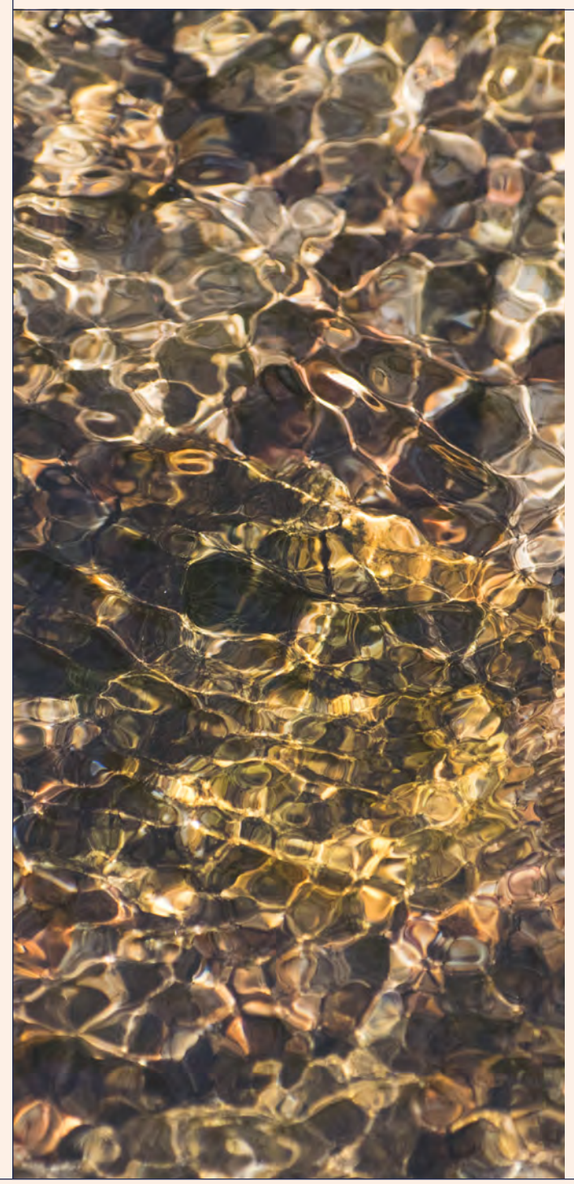
This project is testing a rapid diagnostic approach that combines established molecular techniques with a novel electrochemical sensor. Resistant and non-resistant strains will be identified using DNA-based methods and then assessed using a PEDOT-based sensor to determine whether resistance can be detected quickly and simply outside traditional laboratory settings.

The intended outcome is a proof-of-concept that demonstrates the feasibility of a low-cost screening approach with potential relevance to future field-based or decentralised monitoring applications. If successful, such an approach could inform the development of tools to support routine surveillance, guide further method refinement, and contribute to improved fungicide stewardship and biosecurity risk management strategies.

Development of a rapid recombinase polymerase amplification (RPA)-CRISPR-based lateral flow platform for on-site AMR Surveillance

Project partners and collaborators

WEHI, Melbourne Water



AMR in water poses growing risks to public health, the environment and food production. However, current monitoring relies on laboratory testing that is slow, expensive and difficult to scale, particularly for smaller or regional water utilities.

This project is developing a rapid, low-cost, on-site diagnostic test that can detect key AMR genes directly in water samples. The test combines fast DNA amplification with highly specific CRISPR-based detection in a simple lateral flow format, like a pregnancy test. It is designed to deliver clear results within an hour, without the need for specialist equipment or laboratory facilities.

The project, led by Dr Nijoy John, will optimise the test for use across different water sources, including wastewater, effluent and catchments, and validate its accuracy against standard laboratory methods. It will also develop simple sample preparation steps and practical guidance to support real-world use.

The outcome will be a field-ready prototype that makes AMR monitoring faster, cheaper and more accessible. By enabling earlier detection and more responsive management, the tool will support better risk management, inform mitigation strategies, and strengthen AMR surveillance across the water sector and beyond, including agriculture and aquaculture.

EDAR8

Environmental Dimensions of Antimicrobial Resistance Conference

Brisbane, Australia
2–7 August 2026

As the AMR threat grows, international collaboration and preparedness to tackle the issue have taken on unprecedented levels of importance.

We will need to respond in collaborative and collective ways like the world has never seen before.

EDAR, the world's leading conference series dedicated to the environmental dimensions of antimicrobial resistance, allows us to do just that, bringing together researchers from across the globe to share insights about One Health AMR.

Since Professor Ed Topp, a pioneer in the field of AMR, hosted the first EDAR conference in 2012 in Montebello, Canada, the conference has increased in size and scope.

In 2026, SAAFE is proud to host EDAR8 in Brisbane where more than 400 of the world's leading scientists, industry leaders, policymakers and regulators will converge for a week of collaboration, insight and action on one of the defining challenges of our time.

It's where breakthrough science meets real-world solutions, and where bold ideas are shaped into practical strategies that protect human, animal and environmental health.

As host, SAAFE is placing industry and impact at the heart of the program.

For the first time, EDAR8 will feature a dedicated Industry and Impact Workshop Program designed to connect researchers, industry and regulators to co-design solutions that can be implemented at scale.

Alongside this, the conference will offer an Early Career Researcher Program, mentoring opportunities and hands-on workshops to build capability across the next generation.

EDAR8 Workshop themes include:

- Animal health, zoonoses and environmental AMR
- Ecology and biology of AMR
- AMR omics, informatics and/or AI supported analysis
- One Health AMR modelling and risk assessment
- Advancing policy, guidance and best practice
- Interventions and technologies to mitigate AMR
- Political economy, sociology and behavioural sciences
- One Health and indigenous knowledge systems
- AMR biosecurity challenges and agricultural production risks
- Environmental AMR and public health
- AMR risk management in the water cycle
- AMR in a changing environment

EDAR8 will be held at the Brisbane Convention & Exhibition Centre, a world-class venue in the heart of South Bank, offering exceptional facilities, cutting-edge technology and easy access to Brisbane's cultural and dining precincts.

The conference's social program includes a Welcome Reception, Poster Happy Hour and Conference Gala Dinner, creating space for connection and collaboration throughout the week.

Following the conference, delegates can take part in an optional immersive On-Country Workshop on Minjerribah (North Stradbroke Island), 8–10 August.

Key dates

Early-bird registrations close: 29 May

Standard registrations close: 6 July

Join the global AMR community at EDAR8 and be part of shaping the future of environmental AMR.

Register now to secure your place by visiting edarconference.com

Strengthening Connections:

SAAFE Consortium Engagement in 2025

Throughout 2025, SAAFE continued to build a vibrant, connected consortium committed to tackling AMR through a One Health approach. A comprehensive program of national events, conferences and partner engagements strengthened collaboration across research, industry and government, while expanding capability and visibility for SAAFE's mission.

Consortium engagement continued to grow over the year, supported by increased digital and collaborative activity across SAAFE's network, and driven by such things as the launch of AMR News, SAAFE's monthly newsletter and SAAFE's research webinar series. A coordinated approach to World Antimicrobial Awareness Week 2025 saw SAAFE work closely with partners to align communications, amplify shared messaging under the theme Act Now: Protect our present, secure our future, and promote partner-led activities, strengthening the visibility of One Health AMR messages across the sector.

Connecting with SAAFE researchers

A major highlight was the AMR Research Roadshow, which took SAAFE's research program and collaboration team to Brisbane, Sydney, Perth and Melbourne and attracted more than 170 participants. The Roadshow focused on onboarding new researchers, embedding a shared One Health methodology and deepening existing and building prospective partnerships while helping SAAFE better understand partner capabilities and industry priorities. Practical workshops on industry engagement, impact delivery and milestone reporting equipped participants with tools to translate research into real-world outcomes. The first in-person gathering of SAAFE Foundation Fellows marked a significant milestone, fostering peer networks and launching foundational Education and Training content. Scholars also showcased their work, gaining valuable mentoring and professional development experience.

Maintaining industry and sector connections

SAAFE's presence at major sector conferences further strengthened cross-sector engagement. At Next Water 2025, researchers, Fellows and Scholars contributed presentations and posters across program themes, positioning AMR as an emerging contaminant of concern for the water industry. SAAFE Scholars also benefited from the WaterRA Student Orientation Day, building networks across the water sector and showcasing AMR-focused research to peers and supervisors.

A joint post-conference workshop with WaterRA explored future priorities for the water industry and reinforced SAAFE's role as a facilitator of coordinated action. Engagement continued at the SETAC Australasia Conference, where a SAAFE-sponsored session and workshop advanced dialogue on incorporating microbial processes and AMR into environmental risk frameworks.

The HEAL 2025 Conference provided another platform for collaboration, connecting SAAFE with Asia-Pacific leaders in climate and health. Contributions from Research Director Professor Erica Donner and Postdoctoral Fellow Dr Sopheak Hem highlighted the importance of integrating One Health thinking into food, soil and water security.

Engagement with professional and industry audiences remained strong. At ANZCVS Vet Science Week, SAAFE leaders explored environmental AMR dynamics relevant to animal health, while the CEAStAR Industry Symposium demonstrated SAAFE's connection with national efforts in practical, systems-based solutions. The inaugural Australian One Health Symposium, hosted by the interim Australian Centre for Disease Control (CDC), enabled SAAFE to share its collaborative operating model and contribute

"Real impact on AMR depends on people working across boundaries—our 2025 engagement program showed what's possible when researchers, industry and policymakers learn and design solutions together."

Mary Carr
SAAFE Head of Collaboration

to shaping a national One Health vision. Ongoing engagement with key stakeholders across the water, horticulture and agriculture sectors also reinforced relationships and ensured research remains aligned with end-user needs.

Building international connections

SAAFE also continued to collaborate with leading AMR researchers to support the development of global actions and initiatives in partnership with the United Nations Environment Programme (UNEP) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). International visibility grew further through Scholar participation at Water Micro 25 in the Netherlands and the Pacific Basin Consortium Conference in Vietnam, strengthening SAAFE's connections with the global AMR research community and showcasing Australian leadership in One Health–focused AMR science. These engagements helped position SAAFE as an active contributor to international dialogue on AMR monitoring, risk assessment and data harmonisation.

Connecting SAAFE research with industry

Our project teams played a key role in strengthening our collaborative community through scientific and sector-focused forums in Australia and internationally. Presentations at the Australian Wine Industry Technical Conference and Australasian Plant Pathology Society Conference demonstrated how SAAFE research is supporting sustainable disease management in viticulture by translating global best practice into practical, industry-ready solutions for Australian producers. Project findings were also presented at the Fisheries Research and Development Corporation Conference, the 5th Conference of the International Society of Fish and Shellfish Immunology, and the Australian Apple and Pear Symposium.

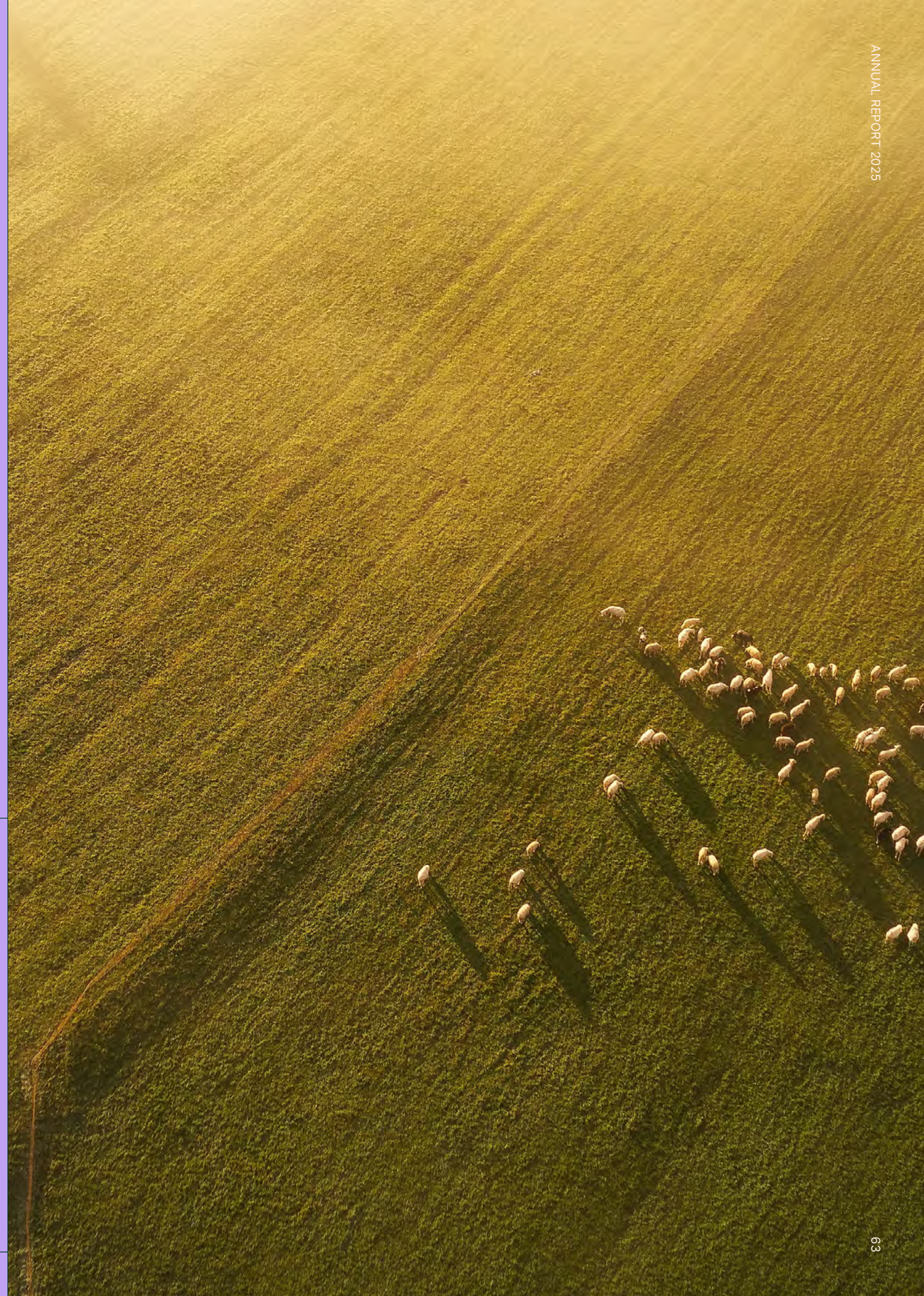
Together, these activities reflect a year of significant momentum. By connecting people, disciplines and sectors, SAAFE has strengthened the foundations for a national community capable of delivering lasting impact against AMR.

Looking to 2026, EDAR8 will be the central catalyst for collaboration, complemented by targeted activities that deepen partnerships and drive measurable impact.

"Our strength lies in relationships. Bringing people together across disciplines and sectors is how we turn complex AMR challenges into shared, achievable action."

Erica Donner
SAAFE Research Director

Education and Training



Developing the next generation of leaders in AMR across research, industry and government entities is central to SAAFE's mission and long-term impact. Our Education and Training program is designed to build the capability and capacity needed to tackle AMR through a One Health approach. The program focusses on four key strategic pillars - building transdisciplinary skills, communication, futurism and One Health AMR literacy, which supports students, early career researchers and industry professionals to develop both deep technical expertise and the skills required to translate research into real-world solutions. Through structured education and training, professional development support, and industry engagement, participants gain the knowledge, hands-on experience, networks and confidence to work across disciplines and sectors.

From PhD scholarships and Foundation Fellowships to industry-linked projects, skills workshops and leadership development, SAAFE's Education and Training activities are creating a connected national community equipped to address complex AMR challenges spanning the food, agriculture and environment sectors.

By investing in people, fostering collaboration and embedding impact into learning, SAAFE is strengthening Australia's capacity to manage AMR now and into the future.

Welcoming our new SAAFE Foundation Fellows

In 2025, SAAFE welcomed two outstanding researchers as Foundation Fellows - Dr Nijoy John and Dr Joel Haywood, who joined the existing cohort of Fellows who are hosted by SAAFE's major research partners.

SAAFE's Foundation Fellows reflect our commitment to excellence, collaboration and impact, and to investing in the people who will help shape the future of food, agriculture and environmental health. We look forward to working with Nijoy and Joel, and to the contributions they will make across the SAAFE consortium.

Dr Nijoy John
WEHI

"AMR in water is invisible, but its impacts are everywhere."

Dr Nijoy John is a molecular microbiologist and environmental health researcher using advanced molecular diagnostics to understand how AMR moves through drinking, waste and recreational water systems.

As part of SAAFE's Monitoring Program, Nijoy is identifying, mapping and tracking AMR genes across water treatment chains, from influent to effluent, to understand how resistance survives, spreads and potentially enters the environment and food systems.

"We want to know how AMR genes persist through treatment and how they move between organisms, so we can support effective monitoring and mitigation strategies," he says.

Drawing on expertise in PCR, next-generation sequencing and emerging methods such as EPIC-PCR and spatial omics, Nijoy links resistance genes to the microbes that carry them and assesses whether they remain viable and transmissible. This work provides critical evidence for water utilities, regulators and public health agencies to manage AMR risks.

Working with SAAFE aligns with Nijoy's commitment to a One Health approach and to translating science into practical tools. "Ultimately, I hope my work supports proactive, risk-based approaches that safeguard public and environmental health."

Dr Joel Haywood
Curtin University

"Fungicide resistance is a moving target — and we need to understand it at the molecular level to stay ahead of it."

Dr Joel Haywood is a structural biologist and SAAFE Foundation Fellow based at Curtin University's Centre for Crop and Disease Management. His research focuses on understanding the molecular and structural mechanisms that drive fungicide resistance and using that knowledge to discover new herbicides and novel modes of action.

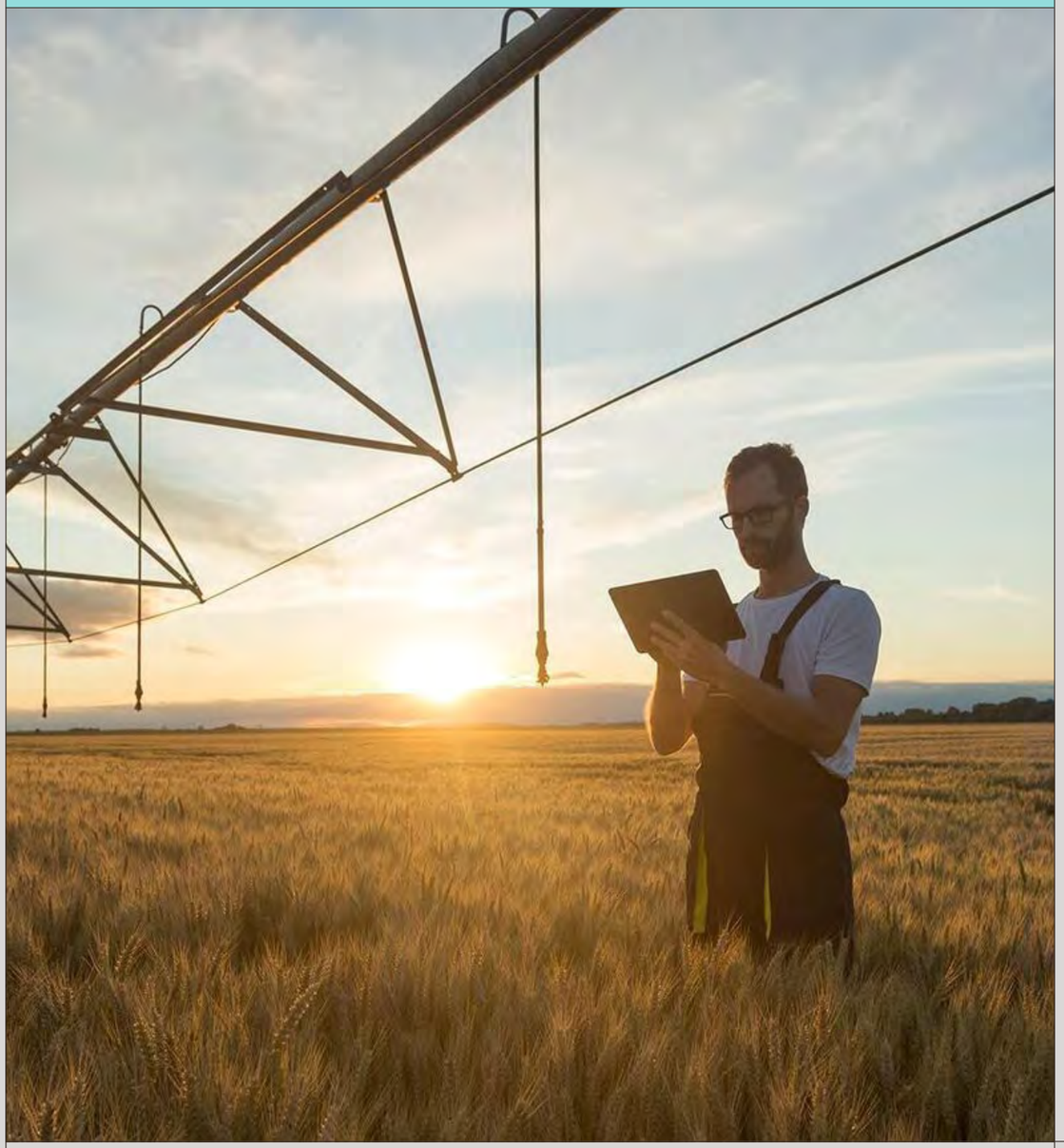
Joel applies protein structure–based approaches to reveal how resistance mutations alter target proteins and reduce the effectiveness of existing crop protection tools. By linking molecular insight with applied agricultural challenges, his work helps inform better resistance management strategies and guide the development of more durable, sustainable disease controls.

Working with SAAFE reflects Joel's commitment to translating fundamental science into practical outcomes for growers and industry. His research supports more targeted intervention, improved stewardship of existing products, and the design of next-generation crop protection solutions that are both effective and environmentally responsible.

By bridging structural biology and real-world crop protection, Joel is helping strengthen the resilience of agricultural systems in the face of evolving disease threats.

The SAAFE Scholars Program

Growing the next generation of AMR leaders



The SAAFE Scholars Program is more than a training pathway, it's a launchpad for the next generation of leaders tackling AMR across food, agriculture and the environment.

In 2025, Scholars benefited from a rich mix of research, leadership and industry-facing experiences designed to build both technical excellence and real-world impact. Scholars presented their work to SAAFE's Board, developed their communication and collaboration skills through national conferences such as NextWater2025, and connected with peers and partners through SAAFE's AMR Research Roadshow, many meeting face-to-face for the first time.

A major milestone this year was the launch of the program's first structured education and training content, delivered through the Foundation Fellows and Research Project Leads roadshow training session. This training lays the foundations for One Health AMR research, covering everything from study design and sampling through to systems thinking and interdisciplinary collaboration. The course will be available online in February 2026 via SAAFE's learning platform, with plans underway to evolve it into a multi-day residential program.

The program also supports Scholars through journal clubs, professional development planning, mentoring and targeted skills training, including genomic surveillance workshops planned for early 2026. With six PhD students already active and more than a dozen starting in 2026, alongside new industry-linked PhD opportunities, the program is rapidly growing a connected national cohort.

Two Scholars, Foundation Fellow Dr Claire Hayward and PhD student Stephanie Faulks exemplify the program's impact. Both presented their work directly to SAAFE's Board, developing confidence, leadership and the ability to communicate complex science to diverse audiences.

"Crafting a presentation for the Board pushed me to simplify intricate ideas into a clear narrative," said Stephanie. "It was a chance to do uncomfortable things and grow."

Claire highlighted the program's long-term value: "We're not just developing technical skills, we're growing into research leaders, building collaborations and engaging with end users in meaningful ways."

SAAFE Director Tony Peacock agrees, "SAAFE Scholars have to be industry-savvy and become advocates, roles that go well beyond normal science training."

For those considering applying in 2026, the message is clear - the SAAFE Scholars Program offers more than a PhD or postdoctoral role, it offers a supported, connected, high-impact research environment where emerging leaders can thrive.

As Stephanie puts it: "If you want great support, meaningful projects and access to incredible networks — the SAAFE Scholars Program is absolutely worth pursuing."

SAAFE is ready to welcome the next cohort of future AMR leaders with applications opening in 2026.

SAAFE was pleased to welcome six new SAAFE Scholars in 2025:

- Stephanie Faulks
  (University of South Australia),
- Mostarak Munshi
  (University of Western Australia),
- Ophelia Phraphone
  (University of Technology Sydney)
- Xiangrui Ding and Van Hoang Pham
  (University of Technology Sydney)
- Donna McCann
  (Curtin University).

Together, they bring a diverse range of expertise and perspectives that strengthen SAAFE's research capability and its impact across food, agriculture and the environment.

We look forward to supporting their development and working with them as they contribute to tackling antimicrobial resistance through collaborative, high-impact research.

Mostarak Munshi
University of Western Australia

"Antimicrobial resistance is not just a human health issue but a complex environmental problem that affects all ecosystems."

Mostarak Munshi is a PhD researcher in soil science at the University of Western Australia, specialising in soil microbial diversity and antimicrobial resistance in agricultural systems. His work explores how different farming practices influence soil health, microbial communities and the presence of AMR genes.

Through his collaboration with SAAFE, Mostarak is comparing AMR in conventional and biological farming systems, working with industry partner Troforte to identify practices that reduce resistance risks and support healthier soils. His research aims to inform more sustainable, resilient agricultural systems that balance productivity with environmental stewardship.

Mostarak values SAAFE's collaborative approach, bringing together researchers, industry and government to address AMR from a One Health perspective. He is motivated by the opportunity to turn scientific insight into practical change that benefits farmers, ecosystems and communities.

Outside research, Mostarak enjoys cricket, time outdoors, and connecting with friends and family.

Ophelia Phraphone
University of Technology Sydney

"I feel like a detective, setting out with a hypothesis and experimenting to find answers."

Ophelia Phraphone is a PhD researcher at the University of Technology Sydney working with SAAFE and Sydney Water on genomic surveillance of antimicrobial resistance in wastewater systems. Her research focuses on tracking E. coli and resistance genes through treatment processes to better understand how AMR moves through urban water environments.

Ophelia's background spans microbiology, nanomaterials and antibiofilm research, with earlier studies at the Australian Institute for Microbiology and Infection and the University of Westminster in London. This interdisciplinary training supports her ability to connect fundamental science with practical monitoring challenges.

Through SAAFE, Ophelia is part of a collaborative network translating research into tools and insights for industry and regulators. She values teamwork, curiosity and shared problem-solving in tackling complex issues like AMR.

When she's not in the lab, Ophelia enjoys running, motorsport and time with friends, and is motivated to encourage more young women to pursue careers in STEM.

Stephanie Faulks
University of South Australia

"SAAFE's united approach to tackling AMR is what drew me in, it's inspiring to work alongside people so driven to make a real impact."

Stephanie Faulks is a PhD researcher with SAAFE at the University of South Australia, focusing on modelling antimicrobial resistance (AMR) in environmental and agricultural systems. Her work uses quantitative microbial risk assessment and ecological–epidemiological modelling to understand how AMR emerges, persists and spreads, and to inform practical risk management options for industry and regulators.

Stephanie's interest in AMR began during her Honours research at Griffith University, where she used Bayesian modelling to study resistant organisms in advanced water treatment systems. That work now underpins her doctoral research, which aims to translate complex system dynamics into decision-support tools for agribusiness, food production and environmental management.

She was drawn to SAAFE by its collaborative, cross-sector approach and is motivated by the opportunity to contribute to meaningful, real-world impact.

In addition to her research activities, Stephanie enjoys hiking, camping, reading fantasy novels and exploring Adelaide's café scene.

Donna McCann
Curtin University

"Understanding how antibiotics persist in our water systems is crucial to protecting people and the environment."

Donna McCann is a chemistry PhD candidate at Curtin University specialising in analytical chemistry and water research. Her doctoral project, supported by SAAFE, investigates how antibiotics persist in wastewater, recycled water and receiving environments, and how they relate to antimicrobial resistance genes within a One Health framework.

Donna completed her undergraduate chemistry degree in 2022 before gaining industry experience as an analytical chemist in a NATA-accredited minerals laboratory. She returned to research with first-class Honours in 2024, studying disinfection by-product formation in blends of desalinated seawater, groundwater and surface water from north-west Western Australia. In 2025 she completed a CEEDWA Scholar program with the Water Corporation, examining UV-LED technology for drinking water disinfection, work now informing upcoming trials in WA.

Through SAAFE, Donna is translating analytical chemistry into practical insights for water utilities and regulators. She values the program's collaborative approach and the opportunity to connect science with real-world decision making.

In addition to her research, Donna enjoys exploring environmental science in action and contributing to interdisciplinary solutions that protect water quality and public health.

Van Hoang Pham
University of Technology Sydney

"I want to turn laboratory discoveries into practical tools that make water safer for communities and the environment."

Van Hoang Pham is a PhD candidate at the Centre for Technology in Water and Wastewater at the University of Technology Sydney and a SAAFE Scholar. His research explores the use of ozone nanobubbles to control microbial regrowth and AMR in recycled water systems, comparing this emerging technology with conventional disinfection.

Hoang completed his BE (Hons) and ME in Environmental Engineering at Hanoi University of Science and Technology before working as a researcher on a Vietnam–Belgium collaboration converting biowaste to energy. He also gained industry experience in carbon markets for green forestry projects, strengthening his focus on applied environmental solutions.

Through SAAFE, Hoang is developing lab-scale and portable pilot systems to track resistant pathogens and genes, aiming to deliver validated protocols and techno-economic models for Australian water utilities. He values the opportunity to work closely with industry partners and translate research into real-world impact. Beyond his studies, Hoang is motivated by solutions that support safe water recycling, lower emissions, and more sustainable communities.

Xiangrui Ding
University of Technology Sydney

"Understanding the microbes in our treatment systems is key to stopping resistance before it spreads."

Xiangrui Ding is a PhD researcher at the University of Technology Sydney and a SAAFE Scholar working on AMR in wastewater recycling. His research focuses on membrane bioreactors, a core technology for water reuse, and how microbial communities within these systems influence the persistence and removal of AMR genes.

Using metagenomics and multi-omics approaches, Xiangrui identifies the key microorganisms that drive resistance and explores bio-augmentation strategies to enhance AMR removal. His work aims to deliver practical tools that help water utilities optimise treatment performance and produce safer recycled water.

Xiangrui completed a Masters in Resources and Environmental Engineering at China Agricultural University and a Bachelor's in Environmental Engineering at China University of Petroleum. He brings strong expertise in microbial ecology and advanced sequencing to real-world water challenges.

Through SAAFE, Xiangrui values the opportunity to connect cutting-edge science with industry needs and to contribute to resilient, sustainable water systems that protect communities and the environment.

Our Major Partners

**In future reports, the newly-formed Adelaide University will replace University of South Australia as a major partner of SAAFE CRC.*

Our People

Board Members

The Hon. Karlene Maywald
Chair

A passionate water industry professional whose career has been underpinned by her mission to achieve safe and sustainable water for all, Karlene acutely understands the threat that AMR poses to agriculture, food and the environment.

As the South Australian Water Ambassador and Chair at WaterAid Australia and Cancer Council SA, Karlene has a recognised ability to establish solid relationships with key stakeholders at local, state, national and international levels.

Her time as a Member of Parliament (1997-2010) and a Cabinet Minister in the South Australian government (2004-2010) gave her extensive experience in high-level strategic planning, budget oversight, change management and problem solving across a broad range of high-risk sectors including water security, regional development and science and information.

Karlene has been Director of SA Water and Chair of the National Water Commission among many other high-profile roles.

Dr Tony Peacock
Director

An innovation advocate, as well as a longtime researcher and manager in the pork industry, Tony is well versed in the threat that antimicrobial resistance poses to our food industry and the value of AMR stewardship and solutions.

He has been working with industry for more than 20 years on the responsible use of antibiotics, and chairs the Australasian Pork Research Institute, where reducing the routine use of antibiotics is his top priority. Tony also invested in and previously managed Wintermute Biomedical Pty Ltd and Ten Carbon Chemistry – a medical and an industrial company, respectively, both aimed at reducing AMR.

Formerly CEO of the CRC Association, the Invasive Animals CRC and the Pig R&D Corporation, he has been a researcher at the universities of Sydney, Melbourne and Saskatchewan. Tony chairs the SAAFE Education and Training Committee.

Liz Riley
Director

A consulting viticulturist in wine grapes with expertise in agrichemicals, biosecurity, and pests and diseases, Liz's interest in AMR began in the 90s when she encountered significant resistance problems with botrytiscides, which pushed the crops close to market failure.

This experience brought home the realities of managing agrichemical modes of action to minimise the risk of AMR and spurred her desire to effectively measure resistance levels in the field to support decision making.

Liz was Director of the Australian Wine Research Institute for 12 years, and Vice President and Chair of Research & Development of the NSW Wine Industry Association. She was most recently named the first female recipient of the NSW Legend of the Vine. Liz sits on the SAAFE Education and Training Committee.

John Merakovsky
Director

A trained molecular biologist and seasoned technology executive, John brings a unique lens and broad suite of experience to our board.

Driven by a desire to leverage his scientific training and commercial experience to positively impact a priority issue for the country and all Australians, he's a valuable member of the SAAFE team.

Most recently, John was CEO of Flybuys and previously CEO/MD of ASX-listed company Integrated Research, GM of Seek Learning and CEO of Experian among other executive and senior leadership positions. He is also a non-executive director of OpenLearning Ltd (NSW), Chair of Orijin Plus (WA), Chair of Experimenta Media Arts (Vic) and an Advisory Board Member of Drop Bio (NSW). John sits on the SAAFE Audit, Finance and Risk Committee.

Julie Orr
Director

Julie is a financial services executive and director with extensive experience on ASX-listed, government and non-listed boards across funds management, superannuation, stockbroking, research, ESG, biodiversity and sport.

She is currently a director of Australian Ethical Investments, and a director of AvSuper Ltd. Julie also serves on the Audit & Risk Committee of the NSW Biodiversity Conservation Trust. Originally joining SAAFE as a member of the Audit, Finance and Risk Committee, Julie was appointed to the Board in December 2023.

Scott Ashby
Director

Scott has more than 20 years' senior government experience, spanning primary industries, biosecurity, animal and plant health, natural resource management and water management.

He's well-versed in the threat posed by AMR, having previously served as the Chief Executive at both the South Australian Department of Primary Industries and Regions (PIRSA) for seven years and the Department for Water, Land and Biodiversity Conservation (DWLBC), among myriad other government leadership positions, including CEO of Onkaparinga Council.

Scott brings to the SAAFE Board unique perspectives from leading applied science programs and working collaboratively with industry. He is currently the Executive Director of Basin Science and Knowledge at the Murray Darling Basin Authority. Scott chairs the SAAFE Audit, Finance and Risk Committee.

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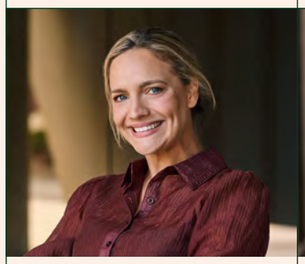

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WEHI (Walter and Eliza Hall Institute of Medical Research)

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Advisory Committees

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**The SAAFE research community brings together researchers, industry, government and regulators to enable the development and delivery of high quality, collaborative applied research projects. This list is a snapshot of SAAFE project participants and advisors, current at the time of writing.*

SAAFE CRC

crcsaafe.com.au