Gulbali PhD scholarship prospectus 2025

Challenge Project: Biosurveillance of Emerging Zoonotic Viruses in Australia

Charles Sturt University

Who we are

Charles Sturt University is Australia's leading regional university – with a global perspective.

Our history of innovation and educational empowerment reaches back as far as 1895 with the establishment of the Bathurst Experimental Farm. That was the first step in connecting people, communities and industry to make a real difference. Professionally. Socially. Economically.

Formally incorporated in 1989, we are Australia's largest regional university. We have campuses across New South Wales, and teaching partnerships in Canberra, Goulburn and Wangaratta.

We also have diverse international partnerships and provide online education nationally and across the globe.

Our university is grounded in the qualities we draw from our regional roots – our sense of community, our will for hard work, and our resilience when times get tough. We have turned the challenge of connecting multiple campuses across hundreds of kilometres into an opportunity – to apply the lessons we have learned to connect students across Australia and the world.

Our student body – numbering some 43,500 – stretches from the banks of the Murrumbidgee River to the oceans in Port Macquarie. And our alumni – 220,000 strong and counting – are applying their learning everywhere too, from the red centre and the white wilds of Antarctica, to the heart of the world's megacities.

And that's not just the case for our students. We have research and industry partnerships that reach across the nation and around the globe – sharing knowledge, driving change, fostering growth.

Yindyamarra winhanganha

It means the wisdom of respectfully knowing how to live well in a world worth living in. And it's what we strive for. Every day. How? By making connections.

Connecting our students with the knowledge and wisdom to shape the world and reach their potential.

Connecting our research to real-world issues.

Connecting new technologies with traditional wisdom to protect ecosystems and forge a more sustainable future.

And connecting people, industry and government to share ideas, build knowledge and find innovative solutions to today's – and tomorrow's – challenges.

Our vision

Our vision as Australia's leading regional university, is to advance the careers of our students, inspire research excellence and drive regional outcomes with global impact.

We seek to empower the leaders of tomorrow through innovative education and applied research, and we have a strong commitment to learning from and working with Australia's First Nations Peoples.

It's why we are committed to the transformative University Strategy 2030. It's our commitment to our communities. To our partners. To our students. To our regions. A long-term strategy deepens our relationships, enabling us to build a stronger tomorrow together.

Students	Research	People	Social responsibility
We connect our students with the knowledge and wisdom to shape the world	We collaborate with our partners on research with impact	We are capable, inspired and empowered to deliver excellence	We engage regionally and globally to drive sustainable prosperity

Studying in Australia

An experience like no other

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Gulbali Institute

Agriculture, Water and Environmental Research

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The Institute will undertake multi- and interdisciplinary research and innovation, focusing on large scale programs in the field of:

- Biosecurity
- Agricultural Innovation,
- New Food and Beverages,
- Sustainable Aquatic Systems
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Find out more

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The Gulbali PhD program

Details and rationale

The Gulbali PhD program is a range of prestigious scholarships for both domestic and international research candidates. In most cases, these scholarships are available to Australian or New Zealand citizens or Australian permanent residents. We are seeking highly talented researchers who are global thinkers, seeking to address grand challenges, which align with the key Gulbali research institute focal areas.

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a) Previous Academic Performance: This assessment considers the level of the applicant's highest, relevant, qualification in line with CSU entry requirements for PhD courses (See note** on Page 6).

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c) Research Alignment and Supervisor Capacity at Charles Sturt: Alignment with both CSU and/or industry strategic research priorities and strengths. This includes the strength of alignment with the Charles Sturt 2030 Research strategy: the supervisory capacity, FoR alignment with Coaldrake, and the expected impact and end user engagement of the proposed research.

d) Degree of support from Gulbali projects, teams and/or supervisors.

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The first stage will require applicants to complete an online form and submit, along with a professional CV and transcripts.

Candidates will then be shortlisted and top applicants, and supervisors, will be invited to complete the Charles Sturt admissions process.

Closing date for EOIs is **8th February 2025.**

Shortlisting will take place in **late February 2025**, with highly ranked students invited to submit enrolment applications by **2 Match 2025**.

Key Details

Commencement:
Students must commence in **Session 2 2025.**

Study load:
Only full-time applicants will be accepted for shortlisting.

Stipend:
This scholarship is valued at $35,000 per annum, payable in fortnightly instalments. First Nations applicants will have a stipend valued at $50,000 per annum.

Top Ups:
Various industry and university top ups of up to $10,000 per year are available, by application, following acceptance of enrolment. The principal Supervisor will advise eligibility.

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Domestic candidates: Fee exemption for a period equivalent to four years (eight sessions) for PhD at full-time study.

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A weighting system will be established to rank candidates. Shortlisting will take place by an expert committee of research active academics.

Visa:
International students will require a valid student visa and insurance to commence. Processing can take up to 4 months. Limited relocation funds (up to $5,000) are available.

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Shortlisted International students must upload evidence of English language proficiency, as part of the enrolment process, in line with any of the following minimum CSU standards:

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4. Level 109 of the ELS examination with a score above B (reading and writing) and above P (speaking and listening) in the last 12 months

5. Applicants can request (in writing) that alternative evidence be considered. These are individually decided by the Pro Vice Chancellor (Research and Innovation).

Charles Sturt University Doctor of Philosophy entry requirements:

**Note on CSU Doctor of Philosophy entry eligibility:

Applicants must have achieved at least one of the following:

a. Qualified for the award of a master by research with an acceptable level of performance.

b. Completed a bachelor degree followed by a one-year honours degree with class 1 or class 2(1) honours, specialising in the same discipline or a closely similar discipline.

c. Gained class 1 or class 2(1) honours in a bachelor degree of at least four years full-time duration, specialising in the same discipline or a closely similar discipline.

d. Commenced a masters by research at the University and shown exceptional ability in a research project that is clearly capable of being extended to a doctoral level.

e. Qualified for the award of a coursework masters:

   i. including a research component subject or research component subjects totalling at least 16 Charles Sturt University points, or equivalent; and

   ii. normally with a grade average equivalent at class 2(1) honours or better.

f. Completed another appropriate combination of undergraduate and postgraduate qualifications (such as relevant graduate diplomas) and research experience that demonstrates capacity for research at a doctoral level.

Critical dates

Dates are fixed and tied around the need to allow sufficient time for proposals, assessments, enrolment, screening, and (if applicable) visa applications. The timeline below is targeting census date 2024 teaching session one.

The timeline below is targeting census date 2025 teaching session two.

- By 20th December 2024: Call of EOI's opens.
- By 8th February: EOI's due to be submitted to challenge program lead.
- By 28th February: Challenge program lead submits three preferred students to Gulbali.
- By Thu 2nd March: Gulbali Leadership team review recommended candidates.
- By Fri 3rd March. Challenge program lead makes verbal offer to students.
- By 15th March. CSU issues written offer and student accepts.
- By 31st March. Student submits Visa application (if applicable).
- By 8th August. Student commences in second session.

Challenge Project

Biosurveillance of Emerging Zoonotic Viruses in Australia

Project Summary

The Biosurveillance of Emerging Zoonotic Viruses in Australia (BEZVA) project is aligned with Gulbali grand challenges on biosecurity to combat invasive species and viruses so that we can produce the highest quality farm produce and enable healthy communities. The BEZVA is also addressing the Gulbali Grand Challenge of climate change adaptation and the series of grand challenges that flow from it. CSU, in partnership with leading national and international research institutes, will play a pivotal role in safeguarding Australia's public health, agricultural economy, and biodiversity. The four-year BEZVA project will work on exotic viruses' threats to animals to humans, especially in the context of Australia's multibillion-dollar agricultural sector. The BEZVA project will address this by building local and national expertise in key areas such as viral detection, molecular virology, disease modeling, and biosurveillance.

Central to BEZVA is its focus on the One Health approach, which emphasises the interconnectedness of human, animal, and environmental health. By integrating this multidisciplinary perspective, the project will provide a comprehensive framework for understanding and preventing the transmission of zoonotic diseases at their source. High-risk hosts such as bats and rodents, which are natural reservoirs for numerous viruses, including coronaviruses, henipaviruses, and lyssaviruses, will be the primary focus of the biosurveillance efforts. These animals are often implicated in viral spillover events, which can result in outbreaks of diseases that have the potential to affect both livestock and human populations. Through extensive molecular and serological testing of both archived and newly collected samples, the project will enhance Australia's ability to identify and characterise these emerging viral threats in a timely manner. The project's risk-based sampling framework is a key innovation. This approach strategically targets regions and species that are most likely to experience viral spillover, amplification, and transmission, based on environmental, ecological, and behavioral factors. By focusing on these high-risk areas, BEZVA will not only provide an early warning system for zoonotic disease threats but also contribute critical data to inform national and global disease mitigation strategies. The integration of climate change modelling into these efforts further strengthens the project's ability to predict how shifts in human and animal distributions, driven by environmental changes, will affect viral spillover rates. This multidisciplinary approach will not only improve Australia's preparedness for future zoonotic disease outbreaks but also contribute to global efforts to understand and address the complex interplay between climate change and disease emergence.

Beyond its immediate scientific goals, the BEZVA project is also focused on building long-term infrastructure and capacity for zoonotic disease surveillance and response. The project will foster collaboration between Australia's CDC secretariat, regional stakeholders, and international partners, including the Australian Centre for Disease Preparedness (ACDP), the World Health Organization (WHO), and the United States Centers for Disease Control and Prevention (CDC). These partnerships will be essential in creating robust, collaborative systems for detecting and managing zoonotic diseases, both domestically and globally. Partnerships with institutions such as the ACDP, USDA, and NIH will play a crucial role in enhancing Australia's role in global health security. These collaborations will help ensure that the biosurveillance systems and strategies developed through BEZVA can serve as a model for other nations facing similar challenges. The project will also drive innovation in zoonotic disease prevention by fostering collaboration between academic institutions, governmental bodies, and international organizations. Key objectives of the BEZVA project include developing a comprehensive bio-surveillance system specifically targeting zoonotic viruses in bats and rodents in Australia, building local expertise in zoonotic disease modelling, molecular virology, and disease surveillance, and establishing enduring partnerships with national and international organisations. The project will also investigate the environmental and behavioral factors that influence zoonotic spillover risks, particularly in the context of climate change. These findings will be instrumental in shaping public health strategies, biosecurity measures, and policy reforms aimed at reducing the risk of zoonotic disease emergence in Australia. On a global scale, zoonotic diseases continue to pose a significant threat to both human and animal populations. The BEZVA project's focus on high-risk interfaces in Australia places it in a unique position to address critical gaps in biosurveillance, both within the country and beyond. The project's findings will have important implications, contributing valuable data and insights that can be used by the international community to prevent and manage future pandemics.

Project outcomes and outputs

The BEZVA project is well-positioned to deliver significant outcomes that will strengthen Australia's capacity to respond to emerging zoonotic threats and enhance CSU's standing as a leader in global health security research. Central to these outcomes is the training and development of the next generation of infectious disease researchers. Three PhD fellows will be supervised by an interdisciplinary team of leading experts in molecular virology, structural biology, epidemiology, and bio-surveillance. These fellows will gain critical skills in zoonotic disease detection, virus characterisation, and disease modelling, positioning them to make substantial contributions to Australia's infectious disease workforce and deliver critical insights into the molecular mechanisms driving zoonotic spillover events. Their successful completion of the project will not only enhance their individual careers but also contribute to strengthening the workforce both nationally and globally, addressing the critical shortage of specialists equipped to tackle future epidemic and pandemic threats. As part of the project's broader impact, CSU will build highly efficient, interdisciplinary One Health research teams. These teams will integrate expertise across the fields of animal health, biology, environmental science, and human health to address complex zoonotic disease challenges. By fostering collaboration across sectors, BEZVA will contribute to a stronger research infrastructure at CSU, increasing the university's capacity to attract external funding, build long-term research partnerships, and serve as a national and global leader in zoonotic disease research. One of the tangible financial outcomes of the project is the generation of approximately $2.5M in additional revenue for the Higher Education Research Data Collection (HERDC), reflecting the high-impact research outputs expected from the project.

The BEZVA project will deliver a range of significant outputs, advancing both Australia's capacity for zoonotic disease research and global efforts to combat emerging infectious threats. A key deliverable is the production of >20, Q1 peer-reviewed publications in leading scientific journals (targeting Science, Nature, PNAS, Cell and Lancet publishing group). These papers will focus on viral discovery, transmission dynamics, and innovative bio-surveillance strategies, helping to shape global knowledge on zoonotic diseases. Such publications will also enhance the academic reputation of CSU, contributing to the institution's growing profile in infectious disease research. Importantly, the papers will provide evidence-based recommendations for global health policy, particularly around mitigating zoonotic risks and preventing future pandemics.

Beyond research outputs, the BEZVA project will establish robust interdisciplinary research teams within CSU, applying a One Health approach to infectious disease challenges. These teams will integrate expertise from animal health, environmental science, and human health, building a collaborative framework for addressing complex zoonotic transmission issues. By fostering this multidisciplinary research environment, CSU will increase its research capacity and become a leader in One Health initiatives, attracting top-tier talent and competitive research funding. This structure will provide a long-lasting legacy for the university, solidifying its role in addressing global health security challenges.

Additionally, USDA has expressed their interest in the BEZVA project – this has significant potential to expand its biosurveillance research hub into Pacific Island countries. This expansion is particularly critical given the diverse zoonotic risks posed by these regions, which act as potential gateways for the introduction of emerging viral threats into Australia. By extending biosurveillance efforts to these neighboring areas, the project will not only help detect and mitigate zoonotic risks at their source but also enhance Australia's early-warning system for infectious diseases that could threaten both human health and the agricultural sector.

In terms of practical outcomes, BEZVA will develop new capabilities in the fields of molecular virology, disease modelling, and epidemiology that will directly contribute to Australia's ability to prevent and respond to future zoonotic disease threats. The project will generate actionable data on emerging viruses circulating in Australia's wildlife, contributing to the development of diagnostic tools, vaccines, and therapeutic strategies. These innovations will not only be of immediate benefit to Australia but will also be shared globally, supporting international efforts to mitigate the risks of zoonotic diseases.

In summary, the anticipated outputs of the BEZVA project include the publication of high-impact research, the establishment of interdisciplinary One Health research teams, and the formation of strategic partnerships with both national and international research organisations. These outputs will not only elevate CSU's role in global zoonotic disease research but also leave a lasting impact on Australia's capacity to prevent and respond to future zoonotic threats. The project's legacy will extend beyond its immediate outcomes, establishing a foundation for ongoing contributions to global health security, biosecurity, and pandemic prevention efforts.

PhD Project: 01

Research Question

What factors drive spillover risk of coronaviruses and henipaviruses to Australians?

Principal supervisor

Dr. Ariful Islam

Faculty/institute

Gulbali Institute

Proposed campus

Wagga Wagga

PhD project abstract

This project will focus on epidemiology and virology of emerging zoonotic viruses circulating in bats and rodents across Australia. This research will explore the hypothesis that environmental changes drive the emergence of zoonotic diseases by altering viral diversity in wildlife populations. We will investigate how factors such as human and livestock interaction with wildlife facilitate opportunities for viral spillover. By applying ecological theories of species distribution to viral communities, we aim to understand the role of environmental and host factors in shaping virus transmission and spread. The project will involve longitudinal monitoring of viral populations to track changes in geographic and host distribution, genetic sequences, and viral evolution. Expanding the characterisation of these viruses will enhance our understanding of their genetic diversity, geographic range, and potential to cause human and animal outbreaks. A key aspect of this research will be the use of a risk-based sampling strategy, targeting regions and conditions most likely to foster viral spillover, amplification, and transmission. This will ensure the efficient detection of viruses in prioritised viral families and contribute to a better understanding of factors driving disease emergence in Australia. Ultimately, this research will support the development of more effective surveillance and prevention strategies for zoonotic diseases in Australia.

Preferred candidate experience, skills and knowledge

This project will seek a highly motivated student with skills and knowledge in novel viral discovery, bioinformatics and disease surveillance. Previous experience on collecting biological samples from wild bats and rodents would be an advantage.

Campus location and place of work

This work will be undertaken at the Wagga Wagga campus of Charles Sturt University. Some work activities will be undertaken at partner facilities of ACDP, Geelong.

Direct enquiries to

Dr. Ariful Islam @ aislam@csu.edu.au

PhD Project: 02

Research Question

What are serological patterns and spillover factors for henipaviruses, coronaviruses, and filoviruses?

Principal supervisor

Dr. Ariful Islam

Faculty/institute

Gulbali Institute

Proposed campus

Wagga Wagga

PhD project abstract

In this student project, we will collect serum samples from bats and rodents (linked to PhD Project 1) to conduct high-throughput serological testing, focusing on henipaviruses, coronaviruses, and filoviruses. Since viral infections in hosts are often self-limiting, traditional PCR tests targeting viral shedding or high-throughput molecular assays typically detect fewer positive cases compared to serological tests, which can identify up to 100% of individuals previously exposed to a virus. Using advanced serological techniques, we will screen for serological evidence of viruses carried by bats and rodents, focusing on their potential to spill over into livestock, humans, and peri-domestic animals in Australia. We will assess whether bats and rodents exhibit co-immunity – immune responses to one viral family that may affect susceptibility or immunity to others – thereby improving our understanding of the dynamics of viral infections within and between species. We will also investigate the ecological and behavioral factors driving the risk of spillover from bats and rodents to humans, livestock, and peri-domestic animals in Australia. This will include studying changes in habitat use, migration patterns, and interactions with livestock or humans, which may affect the likelihood of transmission. By analysing these factors, we aim to identify the specific conditions under which spillover occurs and the viral strains most likely to cross species barriers.

Preferred candidate experience, skills and knowledge

The applicant should have a background in epidemiology or data science and an ability to work with GIS, R, or Python. You will be able work in a team environment, interacting with epidemiologist, disease ecologists and virologist, and have excellent communication and scientific writing skills. Previous experience on collecting biological samples from wild bats and rodents would be an advantage.

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This work will be undertaken at the Wagga Wagga campus of Charles Sturt University. Some work activities will be undertaken at partner facilities of ACDP, Geelong.

Direct enquiries to

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PhD Project: 03

Research Question

How do molecular differences in zoonotic strains of coronaviruses, and lyssaviruses affect host-virus interactions and the potential for cross-species transmission in the context of bio-surveillance and disease spillover risk?
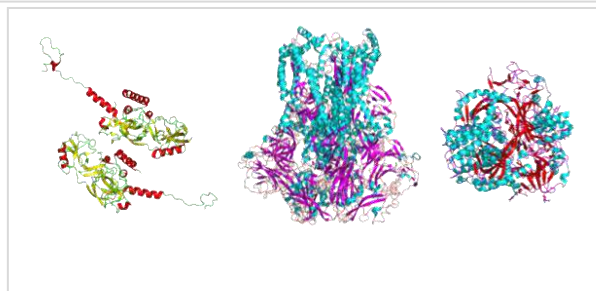
Principal Supervisor

Dr Crystall Swarbrick

Faculty/Institute

Gulbali Institute

Proposed campus

Wagga Wagga

PhD project abstract

This student project will utilise structural biology to investigate the molecular differences between zoonotic strains of coronaviruses, betacoronaviruses, henipaviruses and lyssaviruses. Utilising a One Health approach, the project will explore how these molecular variations influence host-virus interactions, providing insights into viral evolution, host adaptation, and potential risks to both animal and human health, particularly in high-risk Australian ecosystems. The student will employ advanced structural biology techniques, including cryo-electron microscopy (cryoEM), alongside biophysical assays, to analyse novel sequences identified through the BEZVA project's bio-surveillance efforts. The research will focus on viral tropism, with proteins from target species being expressed and purified to rapidly investigate novel viral sequences.

Preferred candidate experience, skills and knowledge

The ideal candidate will have an honours or master's degree in molecular biology or virology. They should be passionate about research and be able to work within a regional research environment setting. They should be able to work well within a team and carry out their own independent research.

Campus location and place of work

National Life Sciences Hub (NaLSH), Wagga Wagga campus

Direct Enquiries to:

Dr Crystall Swarbrick at cswarbrick@csu.edu.au

Gulbali PhD scholarship prospectus 2025

Challenge Project: Using fire to promote biodiversity in south-eastern Australia

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Applicants must have achieved at least one of the following:

    a.   Qualified for the award of a master by research with an acceptable level of performance.

    b.   Completed a bachelor degree followed by a one-year honours degree with class 1 or class 2(1) honours, specialising in the same discipline or a closely similar discipline.

    c.   Gained class 1 or class 2(1) honours in a bachelor degree of at least four years full-time duration, specialising in the same discipline or a closely similar discipline.

    d.   Commenced a masters by research at the University and shown exceptional ability in a research project that is clearly capable of being extended to a doctoral level.

    e.   Qualified for the award of a coursework masters:

        i.   including a research component subject or research component subjects totalling at least 16 Charles Sturt University points, or equivalent; and

        ii.   <u>normally</u> with a grade average equivalent at class 2(1) honours or better.

    f.   Completed another appropriate combination of undergraduate and postgraduate qualifications (such as relevant graduate diplomas) and research experience that demonstrates capacity for research at a doctoral level.

Critical dates

Dates are fixed and tied around the need to allow sufficient time for proposals, assessments, enrolment, screening, and (if applicable) visa applications.

The timeline below is targeting census date 2025 teaching session two.

- By 20th December 2024: Call of EOI's opens.
- By 8th February: EOI's due to be submitted to challenge program lead.
- By 28th February: Challenge program lead submits three preferred students to Gulbali.
- By Thu 2nd March: Gulbali Leadership team review recommended candidates.
- By Fri 3rd March. Challenge program lead makes verbal offer to students.
- By 15th March. CSU issues written offer and student accepts.
- By 31st March. Student submits Visa application (if applicable).
- By 8th August. Student commences in second session.

Challenge Project

Using fire to promote biodiversity in south-eastern Australia

Project Summary

Fire-prone landscapes face growing challenges under the pressures of climate change and land-use intensification. In southeastern Australia, inappropriate fire regimes threaten biodiversity, impacting critical habitats and pushing vulnerable species toward extinction. Fire management in these regions requires a nuanced understanding of ecological and cultural dimensions to safeguard species and maintain ecosystem integrity. The Gulbali Institute is at the forefront of integrating science and cultural knowledge to address these challenges. This project represents a strategic collaboration between the Gulbali Institute, Victorian and New South Wales government agencies, and First Nations groups. Together, we aim to develop ecologically sound fire regimes, bridge cultural and Western fire management practices, and critically evaluate the impacts of fire intervals on biodiversity. Joining this project places you at the heart of efforts to protect biodiversity and guide sustainable fire management. The integrated nature of the program offers exceptional support, access to a diverse research network, and opportunities for career development, ensuring impactful contributions well beyond the Gulbali Institute.

Project outcomes and outputs

The Gulbali Institute is addressing the critical challenges of fire management in southeastern Australia, where inappropriate fire regimes threaten biodiversity and ecosystem resilience. These projects aim to develop evidence-based, wildlife-friendly fire management strategies that support both species survival and habitat recovery. Key outcomes include a deeper understanding of how fire affects the biodiversity of south-eastern Australia. Through field methods, such as camera trapping, GPS tracking, and vegetation surveys, the research reveals how animals adjust their movements, habitat use, and foraging behaviours in response to fire, while also identifying species and plant communities at risk of local extinction due to short fire intervals or 'interval squeeze.' The projects employ innovative data synthesis and modelling approaches to analyse extensive biodiversity datasets. This allows researchers to identify combinations of fire regime variables that favour the persistence of threatened species and promote ecosystem health. Outputs include actionable recommendations for adaptive fire management practices, guidelines for implementing tolerable fire intervals, and tools for predicting the effects of fire on biodiversity under varying conditions.

PhD Project: 01

Research Question

Incorporating behavioural responses of animals into fire management

Principal supervisor

Professor Dale Nimmo

Faculty/institute

School of Animal, Environmental and Veterinary Sciences/Gulbali Institute

Proposed campus

Albury/Wodonga

PhD project abstract

Fire is a natural disturbance that shapes terrestrial ecosystems, yet the behavioural responses of animals to different fire types and regimes remain poorly understood. As fire frequency and intensity increase due to climate change, understanding how animals adapt to these disturbances is critical for their survival and for guiding effective fire management strategies. This project will explore the behavioural responses of terrestrial animals to varied fire types. Using methods such as camera trapping, GPS tracking, and behavioural observations, the research will identify how species adjust their movements, foraging behaviours, and habitat use in response to fire. By linking these behavioural adaptations to specific fire types, the project aims to determine how fire management can be modified to better support animal survival. Through a combination of fieldwork and advanced data analysis, this research will provide evidence-based recommendations for wildlife-friendly fire management, directly contributing to the conservation of biodiversity in fire-prone terrestrial ecosystems.

Preferred candidate experience, skills and knowledge

A background in ecology, zoology, environmental science, or related fields, with a focus on animal behaviour, conservation, or fire ecology being advantageous.
Experience with fieldwork, particularly in terrestrial environments, and familiarity with wildlife monitoring techniques such as camera trapping, telemetry, or behavioural observations.
Skills in data analysis and statistical modelling, with proficiency in software such as R or Python.
Experience working with spatial data or movement ecology is desirable.
Knowledge of fire ecology, animal behavioural ecology, or disturbance ecology is beneficial.
Demonstrated cultural competency, including the ability to engage respectfully with diverse communities, particularly Indigenous groups

Campus location and place of work

Albury/Wodonga campus of Charles Sturt University.

Direct enquiries to

Professor Dale Nimmo   dnimmo@csu.edu.au

PhD Project: 02

Research Question

Testing the validity of tolerable fire intervals using field data
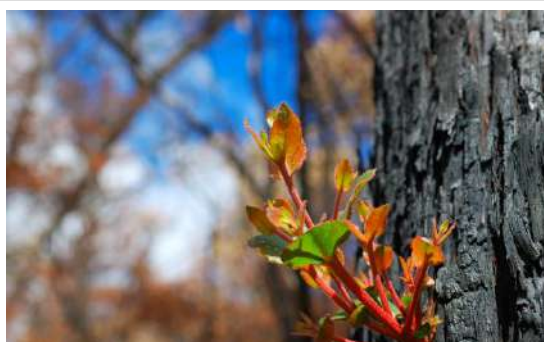
Principal supervisor

Associate Professor Jodi Price

Faculty/institute

School of Animal, Environmental and Veterinary Sciences/Gulbali Institute

Proposed campus

Albury/Wodonga

PhD project abstract

The development of tolerable fire intervals aims to balance ecological burning with the life cycles of fire-prone plant communities. These intervals are designed to ensure that fire-sensitive species have sufficient time to reach reproductive maturity while also maintaining species that depend on fire for regeneration. Such strategies are essential for enabling plant communities to recover and for preserving critical ecological processes. However, the scientific basis and effectiveness of these fire management strategies have rarely been rigorously tested, raising concerns about their reliability. This project aims to critically evaluate the theoretical underpinnings of current fire management practices by identifying species at risk of local extinction in areas experiencing 'interval squeeze'—where fire intervals are too short for species recovery. Through comprehensive field surveys, this research will investigate whether these increasingly prevalent narrow fire intervals are driving species towards extinction. By providing empirical evidence of the impacts of current fire management practices, the project seeks to inform and refine ecological fire management strategies, ensuring they are both evidence-based and effective in conserving biodiversity.

Preferred candidate experience, skills and knowledge

A strong background in ecology, conservation biology, or environmental science, with a focus on plant or fire ecology.
Experience with fieldwork in remote or challenging environments, particularly conducting vegetation surveys.
Skills in data analysis and statistical modelling, preferably using R or similar platforms.
Knowledge of fire ecology, plant life cycles, or fire management.
Cultural competency, including the ability to respectfully engage with diverse communities, particularly Indigenous groups

Campus location and place of work

Albury/Wodonga campus of Charles Sturt University.

Direct enquiries to

Associate Professor Jodi Price joprice@csu.edu.au

PhD Project: 03

Research Question

Identifying desirable fire regimes of threatened plants and animals

Principal supervisor

Professor Dale Nimmo

Faculty/institute

School of Animal, Environmental and Veterinary Sciences/Gulbali Institute

Proposed campus

Albury/Wodonga

PhD project abstract

This project will synthesise extensive datasets on animal and plant distributions within fire-prone regions and apply advanced modelling techniques—potentially integrating artificial intelligence—to identify optimal combinations of fire regime variables that support the persistence of threatened species. The resulting insights will provide fire managers with practical guidance for actively working towards 'desirable states' that promote biodiversity conservation. While primarily desk-based, the project also offers opportunities to incorporate field surveys to validate the models and enhance their ecological applicability.

Preferred candidate experience, skills and knowledge

Proficiency in data analysis and ecological modelling, including experience with R or Python.
A solid background in ecology, conservation biology, or environmental science, with an interest in fire ecology and biodiversity monitoring.
Familiarity with geospatial tools (e.g., GIS) and the ability to synthesise and analyse large datasets.
Strong written and verbal communication skills, with the ability to work effectively in interdisciplinary teams.
Willingness to learn and apply cutting-edge tools, such as machine learning or AI, to ecological problems.
Experience with biodiversity monitoring or species surveys, particularly in fire-affected landscapes, is advantageous.

Campus location and place of work

Albury/Wodonga campus of Charles Sturt University.

Direct enquiries to

Professor Dale Nimmo dnimmo@csu.edu.au

Gulbali PhD scholarship prospectus 2025

Challenge Project: Shared Water Landscapes

Charles Sturt University

Who we are

Charles Sturt University is Australia's leading regional university – with a global perspective.

Our history of innovation and educational empowerment reaches back as far as 1895 with the establishment of the Bathurst Experimental Farm. That was the first step in connecting people, communities and industry to make a real difference. Professionally. Socially. Economically.

Formally incorporated in 1989, we are Australia's largest regional university. We have campuses across New South Wales, and teaching partnerships in Canberra, Goulburn and Wangaratta.

We also have diverse international partnerships and provide online education nationally and across the globe.

Our university is grounded in the qualities we draw from our regional roots – our sense of community, our will for hard work, and our resilience when times get tough. We have turned the challenge of connecting multiple campuses across hundreds of kilometres into an opportunity – to apply the lessons we have learned to connect students across Australia and the world.

Our student body – numbering some 43,500 – stretches from the banks of the Murrumbidgee River to the oceans in Port Macquarie. And our alumni – 220,000 strong and counting – are applying their learning everywhere too, from the red centre and the white wilds of Antarctica, to the heart of the world's megacities.

And that's not just the case for our students. We have research and industry partnerships that reach across the nation and around the globe – sharing knowledge, driving change, fostering growth.

Yindyamarra winhanganha

It means the wisdom of respectfully knowing how to live well in a world worth living in. And it's what we strive for. Every day. How? By making connections.

Connecting our students with the knowledge and wisdom to shape the world and reach their potential.

Connecting our research to real-world issues.

Connecting new technologies with traditional wisdom to protect ecosystems and forge a more sustainable future.

And connecting people, industry and government to share ideas, build knowledge and find innovative solutions to today's – and tomorrow's – challenges.

Our vision

Our vision as Australia's leading regional university, is to advance the careers of our students, inspire research excellence and drive regional outcomes with global impact.

We seek to empower the leaders of tomorrow through innovative education and applied research, and we have a strong commitment to learning from and working with Australia's First Nations Peoples.

It's why we are committed to the transformative University Strategy 2030. It's our commitment to our communities. To our partners. To our students. To our regions. A long-term strategy deepens our relationships, enabling us to build a stronger tomorrow together.

Students	Research	People	Social responsibility
We connect our students with the knowledge and wisdom to shape the world	We collaborate with our partners on research with impact	We are capable, inspired and empowered to deliver excellence	We engage regionally and globally to drive sustainable prosperity

Studying in Australia

An experience like no other

At Charles Sturt, we're geographically gifted. We have five campuses across regional Australia in Albury-Wodonga, Bathurst, Wagga Wagga, Orange and Port Macquarie.

Our campuses are safe, close-knit communities. Your lectures, tutorials, practical workshops, cafés, gym and the all-important library, are just a short walk from one another.

Our PhD Supervisors have small student cohort sizes which means targeted and specialised tuition.

At Charles Sturt, we have a strong student community. You'll study alongside students from across the country and the world - 24% of our students are international students from 113 countries - making lifelong friends along the way.

Gulbali Institute

Agriculture, Water and Environmental Research

We acknowledge and pay respect to our Wiradjuri First Nations people by using their native language in the naming of this research institute.

"Gulbali ngurambang" is Wiradjuri which translates to "to understand country". After consultation with First Nations people, we use this phrase respectfully as the name of our research institute.

The Gulbali Institute creates impactful integrated agriculture, water and environment research, grounded in Charles Sturt's footprint across the Murray-Darling Basin, but with impact across Australia and globally.

We emphasize return on investment to increase productivity for farmers, improve natural environments, and reduce risk in agricultural and environmental management.

The Gulbali Institute will maintain Charles Sturt's existing research program and its strong relationships, particularly with Research Development Corporations, key State and Commonwealth departments and agencies, and private industry to achieve outstanding outcomes.

The Institute will undertake multi- and interdisciplinary research and innovation, focusing on large scale programs in the field of:

- Biosecurity
- Agricultural Innovation,
- New Food and Beverages,
- Sustainable Aquatic Systems
- Cultural Connection and Environmental stewardship

Find out more

→ https://www.csu.edu.au/research/gulbali

The Gulbali PhD program

Details and rationale

The Gulbali PhD program is a range of prestigious scholarships for both domestic and international research candidates. In most cases, these scholarships are available to Australian or New Zealand citizens or Australian permanent residents. We are seeking highly talented researchers who are global thinkers, seeking to address grand challenges, which align with the key Gulbali research institute focal areas.

Selection Criteria

a) Previous Academic Performance: This assessment considers the level of the applicant's highest, relevant, qualification in line with CSU entry requirements for PhD courses (See note** on Page 6).

b) Research and/or Professional Experience: Evidence of an applicant's research achievements and relevant professional experience. This includes such aspects as peer-reviewed research outputs, high esteem academic awards and prizes, relevant research and/or professional experience.

c) Research Alignment and Supervisor Capacity at Charles Sturt: Alignment with both CSU and/or industry strategic research priorities and strengths. This includes the strength of alignment with the Charles Sturt 2030 Research strategy: the supervisory capacity, FoR alignment with Coaldrake, and the expected impact and end user engagement of the proposed research.

d) Degree of support from Gulbali projects, teams and/or supervisors.

e) Research Question and proposed methodology.

Who is eligible?

• Prospective PhD students interested in joining Gulbali projects and/or teams and/or propose a project with a strategic link to the Gulbali institute mission/objectives

• High quality international and domestic students meeting minimum requirements for Charles Sturt University

• Students considering entry into a PhD program into session 2 2025.

How to apply?

Gulbali will run a two-stage EOI process which will be advertised on the Charles Sturt University scholarships page and through national media.

The first stage will require applicants to complete an online form and submit, along with a professional CV and transcripts.

Candidates will then be shortlisted and top applicants, and supervisors, will be invited to complete the Charles Sturt admissions process.

Closing date for EOIs is **8th February 2025.**

Shortlisting will take place in late February, with highly ranked students invited to submit enrolment applications by **2 Match 2025**.

Key Details

Commencement:
Students must commence in session 2 **2025.**

Study load:
Only full-time applicants will be accepted for shortlisting.

Stipend:
This scholarship is valued at $35,000 per annum, payable in fortnightly instalments. First Nations applicants will have a stipend valued at $50,000 per annum.

Top Ups:
Various industry and university top ups of up to $10,000 per year are available, by application, following acceptance of enrolment. The principal Supervisor will advise eligibility.

Tuition Fees:
<u>Domestic candidates:</u> Fee exemption for a period equivalent to four years (eight sessions) for PhD at full-time study.

<u>International candidates</u>: Fee exemption for a period equivalent to three years (six sessions) for PhD at full-time study.

Operating Funds:
Scholarship candidates are allocated an allowance to assist with the reimbursement of costs associated with a candidate's research. The annual amount reflects whether the project is linked to specific field or education codes, lab-based, non-lab based and/or First-Nations focused.

Selection:
A weighting system will be established to rank candidates. Shortlisting will take place by an expert committee of research active academics.

Visa:
International students will require a valid student visa and insurance to commence. Processing can take up to 4 months. Limited relocation funds (up to $5,000) are available.

English language proficiency:
Shortlisted International students must upload evidence of English language proficiency, as part of the enrolment process, in line with <u>any</u> of the following minimum CSU standards:

1. Providing evidence of having completed a sufficient standard of study in English.

2. Having obtained an Academic IELTS (or equivalent) within the last 2 years with a minimum overall score of 6.5 and no individual score below 6.0

3. Written evidence of a degree that was conducted and examined solely in English.

4. Level 109 of the ELS examination with a score above B (reading and writing) and above P (speaking and listening) in the last 12 months

5. Applicants can request (in writing) that alternative evidence be considered. These are individually decided by the Pro Vice Chancellor (Research and Innovation).

Charles Sturt University Doctor of Philosophy entry requirements:

**Note on CSU Doctor of Philosophy entry eligibility:

Applicants must have achieved at least one of the following:

a. Qualified for the award of a master by research with an acceptable level of performance.

b. Completed a bachelor degree followed by a one-year honours degree with class 1 or class 2(1) honours, specialising in the same discipline or a closely similar discipline.

c. Gained class 1 or class 2(1) honours in a bachelor degree of at least four years full-time duration, specialising in the same discipline or a closely similar discipline.

d. Commenced a masters by research at the University and shown exceptional ability in a research project that is clearly capable of being extended to a doctoral level.

e. Qualified for the award of a coursework masters:

    i. including a research component subject or research component subjects totalling at least 16 Charles Sturt University points, or equivalent; and

    ii. <u>normally</u> with a grade average equivalent at class 2(1) honours or better.

f. Completed another appropriate combination of undergraduate and postgraduate qualifications (such as relevant graduate diplomas) and research experience that demonstrates capacity for research at a doctoral level.

Critical dates

Dates are fixed and tied around the need to allow sufficient time for proposals, assessments, enrolment, screening, and (if applicable) visa applications.

The timeline below is targeting census date 2025 teaching session two.

- By 20th December 2024: Call of EOI's opens.
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- By 31st March. Student submits Visa application (if applicable).
- By 8th August. Student commences in second session.

Challenge Project : Shared water landscapes

Preserving the ecological values of freshwater ecosystems in flow managed landscapes

Project Summary

Freshwater environments are under significant threat. Over 70% of freshwater turtles, 30% of freshwater fishes, and 70% of migratory waterbirds are threatened with extinction. The Murray-Darling Basin (MDB) is Australia's largest river system, supporting people from over 50 First Nations, Ramsar and other nationally significant wetland systems, and over 30 federally listed threatened and migratory species. It is also Australia's most significant agricultural area, growing over 40% of Australia agricultural produce. The protection of ecological values within shared water landscapes presents significant challenges. It demands holistic, integrated knowledge frameworks capable of conceptualising the diverse ways of knowing and understanding ecosystems, along with concurrent threats and opportunities.

The Gulbali Institute's Shared Water Landscapes Team is recognised as a leader in the protection of ecosystems and biodiversity in shared water landscapes. Working closely in partnerships with State and Commonwealth environmental water managers, First Nations people and Irrigation communities, the teams is focused on developing high impact on-ground solutions to critical environmental challenges. Our extensive research network will place you at the centre of efforts to protect threatened species, freshwater ecosystems and to promote social justice. The integrated nature of the program provides a high level of support and opens opportunities for career development and network building well beyond the Gulbali supervisor team.

Project outcomes and outputs

The pathway to real change from these three projects lies in integrating ecological health, species conservation, and community wellbeing into freshwater ecosystem management.

Research on environmental flows and community wellbeing will provide evidence that water allocations benefit not only ecosystems but also social and cultural wellbeing, particularly for First Nations communities, informing more inclusive water management policies.

The fish conservation seeks to develop actionable insights through predictive models, enabling targeted water interventions to promote species recovery and ecosystem health.

The applied acoustic ecology project will introduce innovative, scalable monitoring methods to continuously track ecosystem responses to water management, making interventions more adaptive and effective.

Together, these projects will promote a holistic approach to water management, integrating environmental, social, and cultural dimensions. They emphasise the importance of community engagement, especially with First Nations stakeholders, ensuring that policies are aligned with cultural values. This combination of scientific innovation, community involvement, and evidence-based policymaking fosters more sustainable, adaptable, and inclusive management strategies for freshwater ecosystems, leading to long-term biodiversity conservation and improved wellbeing that are applicable to water management challenges around the world.

PhD Project: 01

Research Question

Applied acoustic ecology to protect freshwater ecosystems.
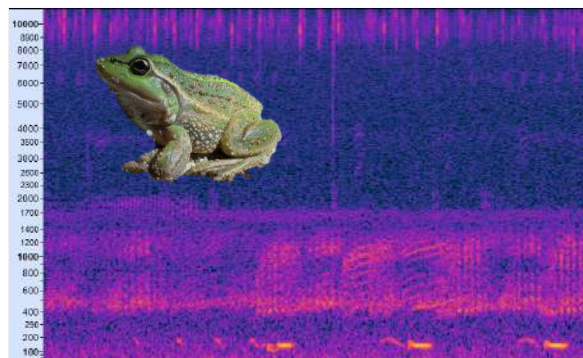
Principal supervisor

Skye Wassens

Faculty/institute

School of Animal, Environmental and Veterinary Sciences

Proposed campus

Albury/Wodonga

PhD project abstract

Wetland ecosystems are dynamic in space and time, yet our understanding of these dynamic systems is often limited to discrete survey events. The project employs novel approaches in acoustic monitoring to gain insights into biodiversity and ecosystem health, showcasing an advanced, interdisciplinary method to address environmental challenges. You will develop your skills in applied acoustic ecology, with the opportunity to build on existing datasets and undertake targeted field-based experiments to link vocalisations of indicator species to climate, the biophysical environment and hydrological regime. The project will represent a mix of field-based deployment and computer-based data analysis. Working closely with a dedicated field research team and Industry partners your work will directly support conservation of freshwater wetland ecosystems and threatened species.

Preferred candidate experience, skills and knowledge

Interest in acoustic ecology or conservation biology

Interest in developing skills in Acoustic ecology, statistical modelling, or machine learning metadata analysis

Ability to work with multidisciplinary teams, including ecologists, water managers, First Nations groups and other local stakeholders.

Campus location and place of work

Albury/Wodonga campus of Charles Sturt University. Study area Mid and lower Murrumbidgee floodplain, Southeastern Australia.

Direct enquiries to

Professor Skye Wassens – swassens@csu.edu.au or Dr Liz Znidersic eznidersic@csu.edu.au

PhD Project: 02

Research Question

Can environmental water prevent a fish extinction crisis?

Principal supervisor

Dr Gordon O'Brien

Faculty/institute

Gulbali Institute

Proposed campus

Albury/Wodonga

PhD project abstract

Australia's freshwater ecosystems are facing a crisis, with native species facing extinction, being impacted by habitat loss, environmental disruptions, and competition from invasive species. This project will focus on developing evidence-based risk frameworks to represent the middle and lower Murrumbidgee Basin ecosystems and their fish. The models will be used to determine environmental water needs and the socio-ecological consequences of alternative water resource management scenarios including, alternative water availability scenarios, non-flow stressor conditions such as barriers and climate-related ecological shocks. By employing adaptive, probabilistic modeling, the project aims to support the recovery of native fish populations. Ultimately, it seeks to provide recommendations for enhancing fish communities and promoting a healthy ecosystem in the Murrumbidgee River and floodplain.

Preferred candidate experience, skills and knowledge

Interest in fish ecology, freshwater ecology or conservation biology, field and office work.

Interest in developing statistical modelling skills such as Relative-Risk Modeling and Bayesian Networks.

Ability to work with multidisciplinary teams, including ecologists, water managers, First Nations groups and other local stakeholders.

Campus location and place of work

Albury/Wodonga campus of Charles Sturt University. Field work along the Mid and lower Murrumbidgee floodplain, South Eastern Australia.

Direct enquiries to

Dr Gordon O'Brien gordon.obrien@csu.edu.au

PhD Project: 03

Research Question

What is the role of environmental water in human wellbeing?

Principal Supervisor

Professor Troy Meston

Faculty/Institute

Gulbali Institute

Proposed campus

Albury/Wodonga

PhD project abstract

Water holds profound significance for First Nations peoples, intricately woven into identity, culture, and spirituality. The health of rivers, creeks, and wetlands is not just an environmental issue; it is central to the wellbeing of communities and Country. This PhD project invites a First Nations scholar to lead important social research on the cultural impacts of environmental water management, particularly focusing on the Murrumbidgee catchment. This research will explore how water management influence the physical, mental, social, cultural, and spiritual wellbeing of communities. It will focus on how access to water bodies, such as rivers and wetlands, is deeply connected to cultural traditions, community cohesion, and spiritual practices. Furthermore, it will consider how the degradation of these water bodies affects the holistic health of communities and Country. Central to this research is the understanding of the interwoven ecological and social values tied to water. First Nations perspectives on water management and environmental flows will be prioritised, recognising the spiritual role that water plays in nurturing Country and sustaining community life. The project aims to elevate the voices and views of First Nations people, ensuring that cultural knowledge and practices are integrated into water management decisions that shape both the environment and community wellbeing.

Preferred candidate experience, skills and knowledge

This a First Nations identified opportunity

The project approach will be guided by the specific interests of the selected student and could emphasise any combination of a number of experiences/skills/knowledges

Interest in developing qualitative and quantitative research skills, participatory approaches and collaborative methodologies and policy analysis

Cultural knowledge and competence in engaging Australian First Nations communities, and Indigenous methodologies.

Campus location and place of work

Based at the Albury campus of Charles Sturt University, with field work in the Murrumbidgee catchment (in districts including Balranald, Hay, Narrandera, Jerilderie). Flexible arrangements negotiable.

Direct Enquiries to:

Professor Troy Meston tmeston@csu.edu.au

Gulbali PhD scholarship prospectus 2025

Challenge Project: Novel Weed Control Approaches in grain production systems.

Charles Sturt University

Who we are

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Yindyamarra winhanganha

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Students	Research	People	Social responsibility
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Gulbali Institute

Agriculture, Water and Environmental Research

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We emphasize return on investment to increase productivity for farmers, improve natural environments, and reduce risk in agricultural and environmental management.

The Gulbali Institute will maintain Charles Sturt's existing research program and its strong relationships, particularly with Research Development Corporations, key State and Commonwealth departments and agencies, and private industry to achieve outstanding outcomes.

The Institute will undertake multi- and interdisciplinary research and innovation, focusing on large scale programs in the field of:

- Biosecurity
- Agricultural Innovation,
- New Food and Beverages,
- Sustainable Aquatic Systems
- Cultural Connection and Environmental stewardship

Find out more

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The Gulbali PhD program

Details and rationale

The Gulbali PhD program is a range of prestigious scholarships for both domestic and international research candidates. In most cases, these scholarships are available to Australian or New Zealand citizens or Australian permanent residents. We are seeking highly talented researchers who are global thinkers, seeking to address grand challenges, which align with the key Gulbali research institute focal areas.

Selection Criteria

a) Previous Academic Performance: This assessment considers the level of the applicant's highest, relevant, qualification in line with CSU entry requirements for PhD courses (See note** on Page 6).

b) Research and/or Professional Experience: Evidence of an applicant's research achievements and relevant professional experience. This includes such aspects as peer-reviewed research outputs, high esteem academic awards and prizes, relevant research and/or professional experience.

c) Research Alignment and Supervisor Capacity at Charles Sturt: Alignment with both CSU and/or industry strategic research priorities and strengths. This includes the strength of alignment with the Charles Sturt 2030 Research strategy: the supervisory capacity, FoR alignment with Coaldrake, and the expected impact and end user engagement of the proposed research.

d) Degree of support from Gulbali projects, teams and/or supervisors.

e) Research Question and proposed methodology.

Who is eligible?

• Prospective PhD students interested in joining Gulbali projects and/or teams and/or propose a project with a strategic link to the Gulbali institute mission/objectives

• High quality international and domestic students meeting minimum requirements for Charles Sturt University

• Students considering entry into a PhD program into session 2 2025.

How to apply?

Gulbali will run a two-stage EOI process which will be advertised on the Charles Sturt University scholarships page and through national media.

The first stage will require applicants to complete an online form and submit, along with a professional CV and transcripts.

Candidates will then be shortlisted and top applicants, and supervisors, will be invited to complete the Charles Sturt admissions process.

Closing date for EOIs is **8th February 2025.**

Shortlisting will take place in **late February 2025**, with highly ranked students invited to submit enrolment applications by **2 March 2025.**

Key Details

Commencement:
Students must commence in **Session 2 2025.**

Study load:
Only full-time applicants will be accepted for shortlisting.

Stipend:
This scholarship is valued at $35,000 per annum, payable in fortnightly instalments. First Nations applicants will have a stipend valued at $50,000 per annum.

Top Ups:
Various industry and university top ups of up to $10,000 per year are available, by application, following acceptance of enrolment. The principal Supervisor will advise eligibility.

Tuition Fees:
Domestic candidates: Fee exemption for a period equivalent to four years (eight sessions) for PhD at full-time study.

International candidates: Fee exemption for a period equivalent to three years (six sessions) for PhD at full-time study.

Operating Funds:
Scholarship candidates are allocated an allowance to assist with the reimbursement of costs associated with a candidate's research. The annual amount reflects whether the project is linked to specific field or education codes, lab-based, non-lab-based and/or First-Nations focused.

Selection:
A weighting system will be established to rank candidates. Shortlisting will take place by an expert committee of research active academics.

Visa:
International students will require a valid student visa and insurance to commence. Processing can take up to 4 months. Limited relocation funds (up to $5,000) are available.

English language proficiency:
Shortlisted International students must upload evidence of English language proficiency, as part of the enrolment process, in line with any of the following minimum CSU standards:

1. Providing evidence of having completed a sufficient standard of study in English.

2. Having obtained an Academic IELTS (or equivalent) within the last 2 years with a minimum overall score of 6.5 and no individual score below 6.0

3. Written evidence of a degree that was conducted and examined solely in English.

4. Level 109 of the ELS examination with a score above B (reading and writing) and above P (speaking and listening) in the last 12 months

5. Applicants can request (in writing) that alternative evidence be considered. These are individually decided by the Pro Vice Chancellor (Research and Innovation).

Charles Sturt University Doctor of Philosophy entry requirements:

**Note on CSU Doctor of Philosophy entry eligibility:

Applicants must have achieved at least one of the following:

    a.   Qualified for the award of a master by research with an acceptable level of performance.

    b.   Completed a bachelor degree followed by a one-year honours degree with class 1 or class 2(1) honours, specialising in the same discipline or a closely similar discipline.

    c.   Gained class 1 or class 2(1) honours in a bachelor degree of at least four years full-time duration, specialising in the same discipline or a closely similar discipline.

    d.   Commenced a masters by research at the University and shown exceptional ability in a research project that is clearly capable of being extended to a doctoral level.

    e.   Qualified for the award of a coursework masters:

        i.   including a research component subject or research component subjects totalling at least 16 Charles Sturt University points, or equivalent; and

        ii.   <u>normally</u> with a grade average equivalent at class 2(1) honours or better.

    f.   Completed another appropriate combination of undergraduate and postgraduate qualifications (such as relevant graduate diplomas) and research experience that demonstrates capacity for research at a doctoral level.

Critical dates

Dates are fixed and tied around the need to allow sufficient time for proposals, assessments, enrolment, screening, and (if applicable) visa applications.

The timeline below is targeting census date 2025 teaching session two.

- By 20th December 2024: Call of EOI's opens.
- By 8th February: EOI's due to be submitted to challenge program lead.
- By 28th February: Challenge program lead submits three preferred students to Gulbali.
- By Thu 2nd March: Gulbali Leadership team review recommended candidates.
- By Fri 3rd March. Challenge program lead makes verbal offer to students.
- By 15th March. CSU issues written offer and student accepts.
- By 31st March. Student submits Visa application (if applicable).
- By 8th August. Student commences in second session.

Challenge Project Summary

Project Summary

Research activities are focussed on addressing the question of "What are the opportunities and requirements that ensure the effective and ongoing use of novel weed control technologies in grain production systems" that provide sustainable crop protection and food security. The challenge of diminishing weed control will be addressed through the three linked PhD projects:

PhD project 1: Development of novel weed control technologies suited for use in grain production. Research activities will identify novel weed control treatments that control major weed species (e.g. annual ryegrass, brome grass, wild oats and wild radish) of cropping systems. The influence of environmental factors (e.g. soil moisture, temperature, humidity) and treatment application methods (e.g. growing point vs whole plant) on efficacy will also be determined.

PhD project 2: Identify the period available for the deployment of novel weed control technologies. Research will identify the effective weed control period as influenced by varying production environments. Collected information will allow the development of predictive decision support tools that identify weed control opportunities according to expected environmental conditions.

PhD project 3: Characterising and mitigating the threat of weed adaptation to weed recognition systems. The potential adaptation in weed plants/species to avoid weed recognition and therefore, control with site-specific treatments will be determined. Evidence will be collected on variations in morphological traits that occur in weed plants exposed to weed recognition selection. Changes in weed recognition algorithm detection accuracy on successive generations of selected weed populations will identify any progression towards adaptation (resistance) to weed recognition.

Collectively these linked and interacting projects will focus on developing novel weed control technologies, identifying their use case, and ensuring their ongoing efficacy prevent the loss of weed control resources. Due to the loss of herbicides the productivity and sustainability of the Australian grain production systems is threatened. Across the 25M ha annual grain production area herbicide use is essential to preventing weed interference with crop growth and preserving grain yield and quality.

Project outcomes and outputs

Characterising the opportunities and requirements that ensure the effective and ongoing use of novel weed control technologies in grain production systems will identify effective and resilient approaches to the use of precision weed control technologies for grain production systems.

i)   **Which novel weed control technologies are most suited for use in Australian grain production systems?** The outcomes from this research will focus development and drive the commercialisation of these systems. Project activities will facilitate the introduction of alternative nonchemical weed control option for grain production.

ii) **How much time is there for late-season weed control to prevent viable seed production of in-crop weeds surviving early post-emergence treatments?** Identifying the appropriate timing the approaches to delivery of novel weed control treatments the introduction of these technologies will be streamlined and efficient.

iii) **Are combinations of weed recognition technologies needed to prevent adaptation to avoid weed detection?** Accurate weed recognition and subsequent effective control represents a high-level selection intensity that will drive adaptation towards resistance to the effective use of this technology. With these adaptive processes identified, strategies that reduce/prevent adaptation can be developed and then tested to ensure enduring weed recognition (and control) capability.

The conduct and completion of the linked PhD research programs will provide industry guidance and knowledge for the sustainable use of site-specific weed control technologies in Australian grain production. Achieving the goals of the three proposed PhD research projects will create the enduring ability to specifically control identified problematic weeds with novel weed control technologies. This research output enables enhanced crop protection capability by providing low-cost sustainable weed control techniques.

PhD Project: 01

Research Question

Which novel weed control technologies are most suited for use in Australian grain production systems?

Principal supervisor

Professor Michael Walsh

Faculty/institute

Gulbali Institute

Proposed campus

Wagga Wagga

PhD project abstract

A range of alternative weed control options are needed to diversify and sustain weed management programs as well as to mitigate/prevent the evolution of resistance to weed control tactics (chemical and non-chemical). Preliminary evaluations and reviews have identified a range of techniques that are suitable for use as site-specific weed control treatments in grain production systems. These include lasers, electrical weeding, waterjet cutting, directed energy (blue light + mid-wave infrared radiation) and inter-row mowing. To develop commercial interest in these technologies the weed control capability in the Australian grains context needs to be clearly identified. Technology specific research and development will be undertaken to identify weed control efficacy, appropriate delivery timing/s and suitability for use in grain production systems.

Preferred candidate experience, skills and knowledge

Understanding of the principles involved in the design and conduct of glasshouse studies.

Expertise in data collection, analysis and interpretation.

An understanding of Australian grain production systems and weed control needs

Campus location and place of work

Wagga Wagga campus, glasshouses, field areas and agronomy lab

University of Western Australia, Centre for Engineering Innovation

Texas A&M for lab studies on Directed Energy system

Direct enquiries to

Professor Michael Walsh, E: michwalsh@csu.edu.au, M: 0448 847 272

PhD Project: 02

Research Question

What time is available for late-season in-crop site-specific weed control with novel control technologies?

Principal supervisor

Professor Michael Walsh

Faculty/institute

Gulbali Institute

Proposed campus

Wagga Wagga

PhD project abstract

With the development and introduction of site-specific weed control capability and autonomous systems there is the potential for continuous and precision targeting of weeds that have survived initial herbicide treatments. In-crop weed control is focussed on the early post-emergence phase when it is most critical to remove weed interference to preserve yield potential. After this period established crops are mostly resistant to weed competition and therefore, the focus of weed control is switched to preventing viable seed production and future weed problems. In these situations, autonomous weed control platforms can be used to target the frequently low density (<1.0 plants / $10m^{-2}$) weed populations that survive initial weed control applications, potentially due to herbicide resistance. The effective development and use of these systems is reliant on an understanding of the weed control opportunity and in particular the time available for effective weed control delivery between identified survival and the viable seed production.

Preferred candidate experience, skills and knowledge

Capability and understanding in the conduct of field research.

Understanding of the principles involved in the design and conduct of glasshouse studies.

Expertise in data collection, analysis and interpretation.

An understanding of Australian grain production systems.

Campus location and place of work

Wagga Wagga campus, glasshouses, field areas and agronomy lab

University of Western Australia for WA field data collection

University of Adelaide for SA field data collection

University of Queensland for field data collection

Direct enquiries to

Professor Michael Walsh, E: michwalsh@csu.edu.au, M: 0448 847 272

PhD Project: 03

Research Question

Can combinations of weed recognition technologies prevent adaptation to avoid weed detection?

Principal Supervisor

Professor Michael Walsh

Faculty/Institute

Gulbali Institute

Proposed campus

Wagga Wagga

PhD project abstract

Weed detection technologies will be compared for their ability to select for weed biotypes adapted to avoid detection via crop mimicry. Recognition algorithms will be developed from images of crop (wheat and canola) and weed (annual ryegrass and wild radish) plants collected using single and multiple devices. The developed algorithms will be used in a selection process on pot grown weed populations. This involves detected plants (i.e. >90% accuracy) assumed as potentially controlled and discarded. Plants less accurately detected (i.e. < 50% accuracy) will be assumed survivors and will be retained for regeneration. This process will be repeated over generations with the progeny of unselected populations compared for their morphological similarity to the crop species. These studies will identify the technology stacks that are required to prevent the evolution of weed avoidance (adaptation) to the use of weed recognition.

Preferred candidate experience, skills and knowledge

Expertise in the design and conduct of research trials.

Strong background in crop agronomy and weed management

Understanding of weed control practices in crop production systems

Understanding of weed recognition systems desirable but not essential

Campus location and place of work

Wagga Wagga campus, glasshouses, field areas and agronomy lab

University of Copenhagen for a series of pot trials in growth chambers

Direct Enquiries to:

Professor Michael Walsh, E: michwalsh@csu.edu.au, M:0448 847 272

Expression of Interest

Gulbali Research Institute PhD Scholarship Scheme (2025 intake)

Personal Details

Full Name	
Cell/Mobile Phone Number +	
What's App number (if applicable)	
Contact Email address	
Personal website (if applicable)	

Country of Citizenship		
Do you hold an Australian visa?	Yes	No
If yes, please provide visa type and number		

Highest degree obtained	
Year of graduation	
Name of University where degree was obtained	

Proposed Charles Sturt University campus

Do you identify as a First Nations / indigenous Australian?	Yes	No

English Language Test Completed?		Yes	No		Not applicable
TOEFL (if applicable)	**Total**	**Read**	**Write**	**Listen**	**Speak**
Scores					
Or IELTS (if applicable)	**Overall**	**Read**	**Write**	**Listen**	**Speak**
Scores					
Or explain your case / eligibility for English Language Proficiency Exemption as per CSU guidelines (https://study.csu.edu.au/ international/how-to-apply/course-entry-requirements)					

Are you a current CSU honours or masters student?	Yes	No
If yes, are you expecting to graduate in 2024?	Yes	No
If yes, expected thesis submission date		

ORCID ID
Google Scholar URL
LinkedIn account
CSU CRO account link (if applicable)

Project Details

NOTE: most fields have character limits set, your responses will need to adhere to these limits

What challenge project are you applying for?

Please include a link to relevant Field of Research (FOR) code NOTE: Challenge Project lead will need to supply this code

Which specific PhD project, within the challenge project, are you interested in?

Briefly describe why you are interested in this particular project

Tell us about your experience/skills/knowledge in relation to the research project

Describe how your research philosphies align with the values of the Gulbali Research Institute

Please describe your approach to the PhD project, including a brief overview of key methods

Previous publication

If relevant, please detail the impact/relevance of your top 2 research papers/reports

Output type	Link to DOI/ URL	Two sentence statement of impact/importance	Number of citations (google scholar)

Referee Details

Please provide details of a referee who we can contact to discuss your research ambitions and past performance

Name of Referee	
Position and institution/organisation	
Email	
Mobile / Cell phone	+

Challenge Project Confirmation

Project lead to complete this section

Name of challenge project lead	
Email address	
Mobile / Cell phone	+
Name/s of proposed co-supervisors (if known)	
Confirmatory statement from challenge project lead and/or principal supervisor	

Note:

- Applications that do not include clear supervisory endorsement will not be accepted.
  By including the confirmatory statement, above, the student submitting the EOI hereby confirms that the confirmatory statement has been provided by the proposed principal supervisor AND that the proposed supervisor has endorsed the statement. A separate email from the proposed principal supervisor must be attached to the EOI and the supervisor must be copied into the email when submitting the EOI.

![Charles Sturt University logo]

EOI Submission Checklist

Please complete the checklist below and submit your EOI form to the challenge program lead and cc'd as per the instructions below by the closing time/date.

EOI submitted; addressed to challenge project lead; cc'd to directorgulbali@csu.edu.au and gulbali@csu.edu.au

Subject Line **Gulbali 2025 HDR Scholarship EOI – "Your Surname"**

Completed EOI form with **all** sections attempted

Certified* academic transcripts **attached** (must be in English OR a certified translation)

Certified* copy of IELTS/TOEFL score **attached** (if applicable)

Supporting email from your proposed principal supervisor **attached**

Copy of your CV/resume **attached**

EOI to be submitted before 2300 8th February 2025 (AEST)

A 'certified copy' of an original document is a copy that has been verified as being a true copy of an original document. This is done by a person who is authorised to certify copies[1] of original documents and is required as per CSU policy regarding document authenticity. For applicants who are overseas, notarial services[2] can be provided at the Australian embassy.

PLEASE NOTE:
We expect to receive a very high number of applications for scholarships. Applications which do not attach ALL required documents to the EOI submission email will not be considered further.

❖ If you have trouble submitting your documentation OR if you do not receive acknowledgment of your documentation from the Gulbali Institute by 14 February 2025, please email gulbali@csu.edu.au with "Gulbali 2025 HDR Scholarship EOI – Your Surname" in the subject line.

Applicant Certification

By endorsing below and submitting my EOI, I certify that:

✓ I have read the *Gulbali Institute 2025 scholarship prospectus* document.
✓ I have determined that I meet the minimum entry requirements for a PhD at Charles Sturt University.
✓ I have assessed the nominated stipend, relocation allowance and, where relevant, insurance coverage.
✓ I agree that, if I am selected, I am prepared and able to commence in session 2 2025.
✓ I have discussed my project with the challenge project lead and they have endorsed my EOI submission by reviewing this form and providing a separate email substantiating this claim.

Name of applicant	**Applicant endorsement**	**Date**
	I certify the above is true and correct	

Please submit a completed version of this EOI form, together with a copy of your current full CV, academic transcript, IELTS/English proficiency score and your principal supervisor's supporting email in a single email submission to directorgulbali@csu.edu.au by 8 February 2025.

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[1] Authorised to certify copies
[2] Notarial services