WATER SECURITY FOR NORTHERN AUSTRALIA PROGRAM (WSNA)

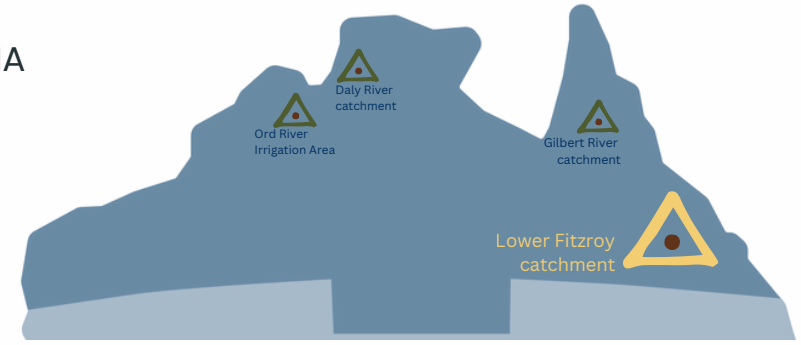
LOWER FITZROY CATCHMENT

Central Queensland

Node contact: Prof John Rolfe
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Project 4.1 Prospects for new agricultural technology across Northern Australia

Timeline: 2023 to 2025



The focus of the project is on the lower Fitzroy region. Research is being performed within the context of Northern Australia to maximise extrapolation of results



The Lower Fitzroy is one of the four nodes in the Water Security for Northern Australia program. The Lower Fitzroy catchment includes the Rookwood Weir which is nearing completion, however more research is required to reduce the risks for investors and new agricultural enterprises in the region. Some horticultural tree and specialty crops have promise but high value cropping will not automatically be created, in part because suitable soils are scattered along the river system.

Agriculture is entering a period of transformation with the so-called Agriculture 4.0 or fourth agricultural revolution. Digital technologies, automation and new agtech products and services can greatly improve productivity, profitability and sustainability of farming systems.

Project (4.1) will establish a process for identifying and assessing agtech products and services with the highest potential to benefit emerging cropping industries in Northern Australia. Independent assessment of emerging agtech is crucial for rapid adoption of technologies, and combined with farm evaluation trials for grower testing, can support increased agricultural investment. Regions like the Lower Fitzroy are in a strong position to capture the benefits of agtech as new developments can incorporate the technologies at establishment stage rather than retrofitting into existing systems. Engagement of agtech will involve assessment of grower needs, establishing new technology connections and increased knowledge within industry networks.

research topics

- Identify core industry needs that may be addressed using emerging digital technologies.
- Identify commercially available (and late-stage commercialisation) technologies applicable to northern cropping systems.
- Develop an evaluation methodology to assess the performance and value for end-users of relevant technologies.
- Presenting key opportunities to growers to identify interest and design of on-farm trials.

what's happening

The project has an end-user perspective, and is designed to assist producers evaluate and assimilate agtech into their production systems.

Evaluation of commercially available agtech products and services by producers to facilitate broader industry adoption via information dissemination through trusted producer networks.

Identifying barriers and facilitators of agtech integration into emerging higher-value cropping systems.

did you know?

Digital technologies hold the potential to increase the gross value of Australian agricultural production by over $20 billion, an increase of 25% over current production!



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Project 4.2 Optimising water quality monitoring

Timeline: 2023 to 2025



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The design of a water quality monitoring program in Northern Australia is complex with environmental factors, highly variable weather systems and flow events, combined with impacts from prior land uses, and limited availability of baseline data.

Project (4.2) will investigate options to streamline monitoring programs, including incorporating continuous monitors and automatic samplers into the monitoring program. The project will look for ways to better target pesticides (and other toxicants) for testing based on farm records or plans, and to use modelling approaches to extrapolate for data gaps. These, and other options will help to identify the risks, costs and benefits of various sampling regimes. There are increasing requirements for supplemented water and irrigation schemes to demonstrate minimal impacts on downstream water quality.

research topics

- Defining high flows and ambient flows for monitoring purposes.
- Designing monitoring programs to identify impacts (location, timing, pollutants).
- Opportunities for smarter systems to collect water quality data (e.g. passive samplers).
- Integration of monitoring data into modelling and decision support systems.

what's happening

High flow events, especially in the wet season can flush nutrient and sediment loads through the system. However, the definition of high flow events for water quality sampling and objectives is not consistent, so will be investigated.

Manual water sampling is time consuming and dangerous, particularly in high flow events. This project will trial different approaches to automating sampling, including of continuous loggers.

The potential to integrate land and water management plans from farmers with sampling programs will be explored to allow more purposeful targeting of effort.

did you know?

Purchasers of water from Rookwood weir for agricultural purposes will have to provide detailed land and water management plans as a condition of ownership.



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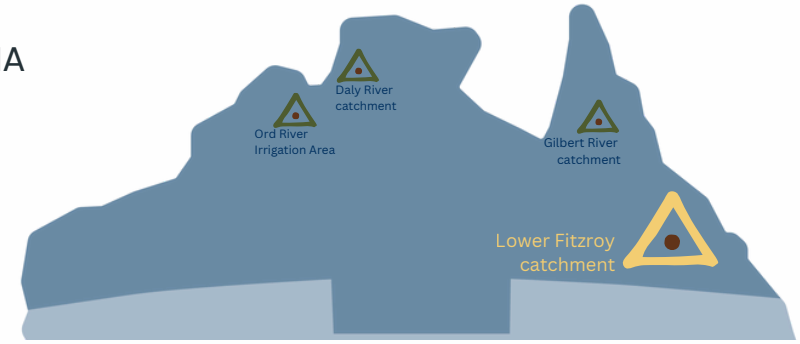
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Project 4.3 Prospects for specialty crops

Timeline: 2023 to 2025



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On-farm crop performance trials and qualitative data from growers on farming system decision making processes will be needed to support the transition to higher value farming systems that utilise new irrigation infrastructure.

Project (4.3) will identify the potential for specialty and higher value crops and cropping systems and technologies to be introduced that can generate greater economic benefits to the Lower Fitzroy region. The research will compile existing information of potential cropping options and will incorporate social science research to gain an understanding of current farming strategies, and motivations and barriers to developing new farming systems and practices. Research trials evaluating new crops, new technologies and new production systems will be conducted with participating growers to build confidence for broader adoption of these innovations.

research topics

- Conduct mixed social science research with local farmers to gain a deeper understanding of farming systems and practices in the catchment.
- Develop a series of crop evaluation trials with producers and incorporate trial data into crop performance models.
- Conduct new technology (linked to project 4.1) and farming systems trials with growers, concurrently with phase 2 crop trials.
- Grower-led demonstrations of new cropping options, technologies and production system components.

what's happening

Engagement with growers to identify potential crops and technologies they're interested in trialing. Having active participation and on-farm trials will support rapid adoption.

Assessing new farming systems with farmers for efficiency including management practices and new technologies.

Northern Australia has very different opportunities for cropping compared to the south. Identifying options and support needed is an important priority.

did you know?

Black sesame is showing early promise as a speciality cropping option for Australian farmers, with trials conducted near Rockhampton in Queensland. Researchers and industry have been running trials on Foxwell Farming's property at Alton Downs to assess the viability of the crop.



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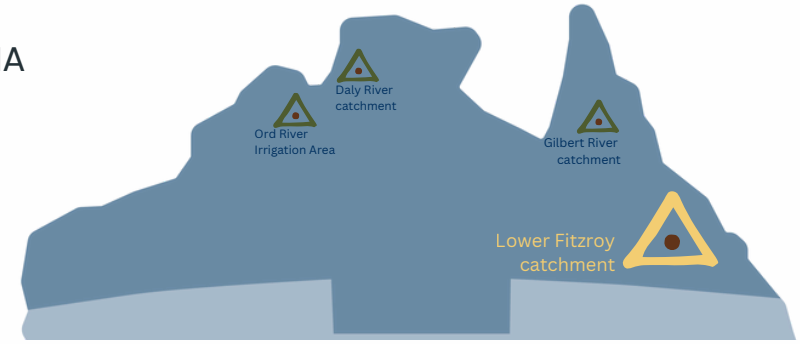
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Project 4.4 Modelling upstream and downstream agricultural supply chain needs

Timeline: 2023 to 2025



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Current and future water availability in the Lower Fitzroy region will create opportunities for new crop and value added industry development; however, we are yet to know how the current and emerging crops and industries can create synergies and generate efficiency in the production systems. This project aims to develop a predictive input-output tool for agricultural supply chain needs for the Lower Fitzroy agricultural precinct. The tool would be relevant to other northern irrigation precincts like the Ord in WA.

Project (4.4) will combine direct engagement and modelling to build a prediction tool for agricultural supply chain requirements and outputs. It will focus on predicting needs for key inputs by certain crops, so that changes in water allocations or crop mixes will generate changes in input requirements. The framework can then be used to extrapolate potential solutions, such as the housing and training needs of new labour force estimates, or total fertiliser requirements at a precinct or district level. The framework can also be used to model indirect outputs, like greenhouse emissions or nutrient emissions. This enables the changes in crop mix, moves to renewables or biofuels, or changes in farm management to be estimated.

research topics

- Development of a precinct production system model that shows linkages to upstream and downstream supply chain elements.
- Identifying inputs that could be supply risks to new agricultural developments.
- In depth analysis of circular and downstream supply chain issues focusing on feedlots.
- Analysis of the energy requirements, greenhouse emissions, fertiliser and herbicide uses under different scenarios.

what's happening

Labour force requirements for different crop mixes will be modelled to identify if supply is possible at the regional level given population, housing availability and other factors.

The cost of essential inputs such as fertilizer and power is a key risk to potential investors. Identifying needs at the district level will allow opportunities for more systematic solutions. e.g. attracting local fertiliser manufacturing.

Modelling how new irrigation affects greenhouse emissions and the change with different crops and mixes of inputs will help to identify low emissions pathways for development.

did you know?

Mort & Co. will build a feedlot at Gogango close to the Rookwood weir with capacity for 36,500 head of cattle and an annual turnover of about 125,000 head of cattle. A novel feature will be a $15 million fertiliser plant to repurpose 43,000t of manure each year, contributing to a circular economy in CQ.



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