

# Links between Gulf rivers, coastal productivity & migratory shorebirds



Northern Australia  
Environmental  
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National Environmental Science Programme

World class research to support sustainable  
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Michele Burford, Griffith University

This research on the Flinders, Gilbert and Mitchell Rivers in the Gulf of Carpentaria is supporting water planning, fisheries management and shorebird conservation through increasing our understanding of the links between river flows, estuaries and ecosystem assets such as migratory shorebirds, prawns and fishes. Our work to date has sampled prawns, water and sediment from multiple sites in the three rivers. Analysis has shown that prawns are ultimately pushed out into the prawn fishery when the river flows during the wet season. The productivity of estuarine mudflats has also been examined. This is because mudflats provide an important food source for prawns, shorebirds and other aquatic animals. The final year of work will involve field and laboratory work, as well as lots of data analysis. At the end of the projects we will have a greater understanding of how these systems respond to river flow and how future water development may impact on these environmental and economic assets.

- The macrobenthos collected from three sampling trips to the Flinders, Mitchell and Gilbert Rivers have been analysed. We found that the density of these animals in the Flinders River system is greater than other studied Australian systems. Flooding reduced the densities of macrobenthos, and therefore on the food availability for migratory shorebirds and banana prawns.
- Our collaborators from the Carpentaria Land Council Aboriginal Corporation (CLCAC) have been counting shorebirds in the Flinders River on multiple occasions, including March 2019. They found lower numbers of birds than previously, likely linked to poor food availability as a result of the floods in February 2019. These surveys will provide rigorous and valuable data on shorebird numbers to complement the QWSG surveys.
- The Queensland Wader Study Group (QWSG) conducted shorebird surveys at the same time as our sampling in the Gulf rivers. They found shorebird sites, e.g. the mouth of the Gilbert River, that had not previously been characterised.
- We have estimated the number of juvenile banana prawns in each estuary by combining data on the densities of prawns from our sampling in November 2016 and 2017 with our measured area of available prawn habitat. We found large variations in the number of juvenile prawns in each estuary from year-to-year, which is likely related to variation in river flows and how many prawn larvae migrate into the estuary.

## What's new?

- The extensive flooding of the Flinders River in February 2019 gave us a great opportunity to sample the river during this one-in-50-year flood event. We chartered a helicopter so that we could sample the river's flood plume at the peak of flooding.
- We sampled all three rivers – Flinders, Gilbert and Mitchell – in March 2019 as freshwater flows were decreasing. We spent two weeks collecting samples to analyse for water quality and macrobenthos – animals like worms and crustaceans that shorebirds and prawns feed on.



Godwits and knots flying, photo Carpentaria Land Council Aboriginal Corporation.



*Normanton Ranger surveying birds in the Gulf, photo Carpentaria Land Council Aboriginal Corporation.*

- We've developed a model that links historical data on annual prawn catches with flows down the three Gulf rivers in this study. This will help us understand how future changes to river flows are likely to affect the Gulf's prawn fishery.
- Queensland's Department of Agriculture and Fisheries collected water and barramundi otolith (ear bone) samples from the Flinders and Gilbert Rivers. This is being used to compare the chemistry of the water samples with the microchemistry of the otoliths to help us understand how barramundi use river habitats and how changes to river flows might affect this.
- We have mapped the extent of wetlands in the Gilbert River using remote sensing to determine the productivity hotspots in the landscape.
- We also travelled to Karumba in October to meet fishers and discuss the costs of barramundi harvesting. Our environmental economists are using this information to understand how changes in river flows might affect the profitability of the Gulf's barramundi fishery.
- In late August 2019, Hub researchers joined CLCAC to undertake a joint survey of shorebirds at high tide roost sites on the Flinders River.
- We've been presenting our progress to the project's stakeholders. In February 2019 we delivered presentations to the North Queensland Agricultural Projects State Agency

Committee in Cairns and at the Hub's research forum in Canberra. In August we briefed the Hub's steering committee during their visit to Karumba and Normanton.

## What's next?

- Our last sampling trip to collect data on shorebird food resources will be in December 2019. The significant rainfall in the rivers' catchments this year gives us an opportunity to track how macrobenthos respond to the changes in salinity and nutrients in the estuaries as floodwaters recede, and how this influences shorebird numbers.
- We are mapping the area of mudflat available to banana prawns in estuaries to complement our measurements of mangrove area.
- We're continuing to map hotspots of primary productivity on the floodplains. The method that has been developed for the Mitchell River as part of a project to assess the river's environmental water needs will be extended to the Flinders and Gilbert Rivers.
- As our data collection phase finishes, our focus will shift to sample analysis and data interpretation.
- We're developing conceptual models of how variation in river flows affects estuary productivity to assist in our communications with stakeholders.
- We'll continue to meet with stakeholders and share our research findings.



## Project summary

The river catchments of the Gulf of Carpentaria support many ecological assets of high value that are likely to be threatened by intensive water resource development and climate change. Of particular conservation concern are the migratory shorebirds that are present in vast numbers along the Gulf of Carpentaria's south-east coastline, especially from September to April. This project is aiming to quantify the importance of a range of river flows to flood-driven aquatic production from both an environmental and economic perspective. The research is: (1) examining the relative contribution of major southern Gulf of Carpentaria rivers to floodplain and coastal productivity and the key species that depend on that flow, and (2) predicting the consequences of changes in flow regimes on flood-driven subsidies in the Flinders, Gilbert and Mitchell Rivers so that we can better understand other potential risks associated with these changes. This will provide key information needed for prioritising rivers for development as part of future water planning.



This project focuses on the estuaries of the Mitchell, Gilbert and Flinders rivers.



Flinders River in flood, February 2019, photo Stephen Faggotter.

## Further information

Contact project leader, Michele Burford at [m.burford@griffith.edu.au](mailto:m.burford@griffith.edu.au)

The project page can be found on the [Hub website](#), along with the project start-up factsheet.

This research is due for completion in September 2020.



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[nespnorthern.edu.au](http://nespnorthern.edu.au)

[nesp.northern@cdu.edu.au](mailto:nesp.northern@cdu.edu.au)



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