



Michele Burford

The Northern Prawn Fishery is a very productive fishery in the Gulf of Carpentaria that could be affected by water extraction from Gulf rivers.

IMPACT STORY 2020

# What a catch! Understanding links between Gulf river flows and fisheries

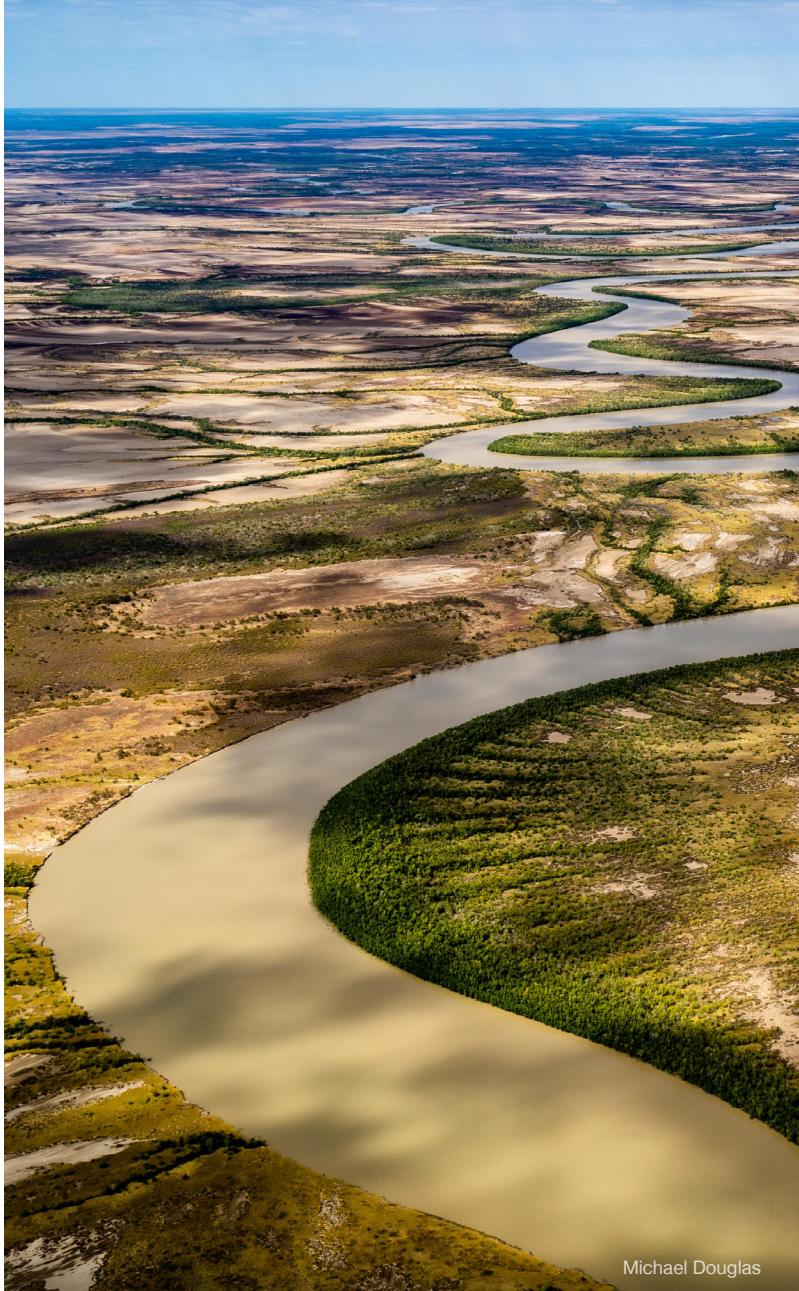
River flows in the Gulf of Carpentaria are an essential part of the lifecycle of numerous important fishery species in the Gulf, particularly prawns and barramundi. Hub research has built on long-term partnerships with these fisheries and used a combination of on-water sampling, data analysis and satellite imagery to improve understanding of the possible impacts of water extraction from Gulf rivers on these fisheries.

► **Find out more about this project**



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Michael Douglas

Gulf rivers have not been subjected to much water extraction and remain in near-pristine condition.

There has been very little water resource development of the rivers that flow into the Gulf of Carpentaria. They remain in near-pristine condition and support species important to commercial fisheries, including banana prawns and barramundi.

The Northern Prawn Fishery (NPF) targets prawns in northern Australian waters. It is a carefully regulated Commonwealth fishery managed using licensing allocations, total catch across the fishery, net size limitations and adjustments to the fishing season as required.

The barramundi fishery in the Gulf of Carpentaria is managed between Queensland and Northern Territory government departments for their respective regions of the Gulf.

The NPF is particularly productive, with a catch value between \$80 and \$150 million per year. Since the early 2000s, the fishery has also substantially improved its sustainability to ensure operations into the future. This has included collaborating with researchers such as Hub Project Leader Professor Michele Burford of Griffith University to help guide their management decisions.

Austral Fisheries manage 11 boats in the NPF, which comprises around 20% of the fleet, and has valued the opportunity to develop long-term partnerships with researchers to understand more about their target species.

"This is the beauty of Michele Burford and her team studying our fishery over the last 30 years. Each time we meet with the team, they build a better picture, a more complete picture that starts to tie in all these environmental factors into the productivity of our fishery."

– Mr Andy Prendergast, Northern Fleet General Manager, Austral Fisheries

Prawns and barramundi use the river, estuarine and ocean ecosystems in different ways, but both species respond to altered river flow.

The banana prawns live in the estuaries during their juvenile phase. They arrive as juveniles, fatten up and grow, and then move out into the fishery. The barramundi move up and down the rivers but need the floodplains as breeding and feeding areas when these rivers flood in the wet season.

These species use the rivers in quite distinct ways but maintaining the seasonal flow patterns of the rivers is essential for the lifecycles of both of these important fishery species.

The Gulf has 6,000 km of coastline and about 100 different rivers that all provide critical habitat for target species at various times in their lifecycle. However, due to the pressures from water development, this work focused on the Flinders, Mitchell and Gilbert rivers in Queensland.

Hub researchers found that the contribution of these rivers to fisheries varies from year to year and river to river, but not in any consistent pattern between the rivers.

"When we look at density of banana prawns in this system, there's no difference between these three rivers and the density in each river varies from year to year. So, we can't generalise about which rivers are more important for the fishery. All these rivers are important."

– Professor Michele Burford, Project Leader, Griffith University

These rivers are all connected to one another and function best as a collective, so much so that their importance cannot be ranked – Gulf fishery species rely on productivity across all the estuarine and river systems.



Professor Burford's team has investigated the links between flows of the Flinders, Gilbert and Mitchell rivers and the productivity of coastal fisheries in the Gulf of Carpentaria. These three rivers make the south-east corner of the Gulf a productive area.

Basic relationships between river flows and total catch for these major fisheries are already known – for example, in a low-flow year, we would expect the catch of barramundi and prawns to go down – but this Hub research is unpacking the more nuanced connections between river flows and how these species respond.

This research is supporting these fisheries to make decisions that will secure their long-term sustainability and stability, and the health of their target species.

“Even though as fishers, we only see the prawns at one part of their life cycle, we have a reasonably good understanding of the biology of the species thanks to the efforts of Michele Burford and other researchers in the area. They’ve educated us about the links between all the environmental factors that go into making a good ecosystem.”

– Mr Andy Prendergast

The natural annual variation in flows from these rivers can also have significant effects on subsequent years’ catches. Near-shore coastal waters in the Gulf are nutrient-poor and rely on big flooding events

to ‘recharge’ nutrients required for growth and productivity from the base of the food web up to prawns and barramundi.

High-flow years not only carry invaluable nutrients downstream – which leads to big catches in the season that follows the flooding – but also support increased growth and productivity for future years.

“Strong flooding events change the salinity and give the prawns the cue to leave the estuary and get out into the Gulf. It’s critical that as many prawns get out to sea as early as possible. This helps them get away from catfish, barramundi, and all the other fish that are preying on them. When they get out to sea early, the signal for them to grow is also very strong and they start growing quickly.”

– Mr Andy Prendergast

Hub research is not just supporting good management of the existing fisheries, it’s also ensuring that water planners can fully understand the consequences of any future water extraction proposals on these fisheries and make informed choices about future water development.



Michele Burford

Banana prawns rely on a freshwater flooding cue to migrate out to sea. Water extraction during low-flow years could eliminate this cue and drastically reduce prawn catch.



Michele Burford

Prawn trawlers in the Gulf of Carpentaria.

## Research outputs

### Scientific papers

- Impact of water development on river flows and the catch of a commercial marine fishery (Jul 2020)
- Predicting hot spots of aquatic plant biomass in a large floodplain river catchment in the Australian wet-dry tropics (Jun 2020)
- Satellite-derived changes in floodplain productivity and freshwater habitats in northern Australia (Apr 2020)

### Reports

- Contribution of three rivers to floodplain and coastal productivity in the Gulf of Carpentaria (Aug 2020)



- Floodplain productivity of the Gilbert and Flinders Rivers catchments (Jun 2020)

### Factsheets

- Links between Gulf rivers, coastal productivity and migratory shorebirds (project update, Sep 2019)
- Links between Gulf rivers and coastal productivity (project update, Oct 2018)
- Links between Gulf rivers and coastal productivity (project update, May 2017)
- Links between Gulf rivers and coastal productivity (start-up factsheet, Oct 2016)

### Videos and presentations

- Links between Gulf rivers and fisheries (Science Week video, Aug 2020)
- Understanding risks to shorebirds and fisheries from reduced Gulf river flows video and PDF (Feb 2019)
- Gulf of Carpentaria river research (Apr 2018)
- Effect of flow alteration on estuaries in the Gulf of Carpentaria (Apr 2018)

### Impact stories

- Telling our stories face to face (Jun 2019)
- Working with government staff (Sep 2018)

### Media

- Flood the lifeblood for Gulf of Carpentaria as researchers find nutrient levels lacking (ABC Online, Oct 2020)

### Project webpage

- Links between Gulf rivers and coastal productivity

## Attributions

We acknowledge Aboriginal and Torres Strait Islander Peoples as the traditional custodians of the lands on which we work. We pay our respects to Elders of the past and present, and acknowledge their spiritual connection to Country. In particular we would like to acknowledge the Gkuthaarn, Kukatj, Kurtijar, Gangalidda, and Garawa people of the region where this project took place.

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