



Dr Mark Kennard
Australian Rivers Institute, Griffith University, Brisbane
m.kennard@griffith.edu.au
Phone (07) 3735 7401

Developing conservation and management priorities for aquatic biodiversity

The Northern Australia Hub is one of five hubs informing the Australian Government's National Environmental Research Program. The hub brings together more than 100 researchers and land managers, drawing on expertise from a range of disciplines and backgrounds. The Northern Australia Hub aims to improve biodiversity conservation in northern Australia through sound planning, innovative policy and strong partnerships.

- 1 Australia's tropical northern rivers have high conservation values, but many of them are not adequately protected. New species of fish are still being found.
- 2 Researchers are using a variety of fish collection methods to sample fish in Kakadu National Park and the Daly River and comparing them with the location of habitats and threats.
- 3 New data on fish, turtle and waterbird distribution across the Daly and Alligator rivers will soon be available.
- 4 This research will help identify conservation targets and develop recommendations about how to better protect northern Australia's freshwater biodiversity.



4

1

2

3



WHY THIS RESEARCH IS NEEDED

Northern Australian rivers, wetlands and estuaries support unique and diverse aquatic plants and animals that are highly valued by people. Our knowledge of the processes that support aquatic biodiversity and its distribution across the landscape is rapidly improving, but key challenges to effective conservation and management are emerging. For example, new species are still being discovered and our research suggests that the real amount of unique biodiversity present in the aquatic ecosystems of northern Australia is greatly underestimated, and may not be effectively managed.

The high conservation values of northern Australia's tropical rivers, even in protected areas, are under increasing threat from feral animals, weeds, overgrazing, catchment clearing, and fire. Increased development and climate change pose new challenges. Quantifying the ways in which aquatic biodiversity responds to these threats and identifying where to undertake efficient and effective conservation management actions is an important goal.

3.3 Biodiversity patterns, conservation planning and resilience of freshwater fauna



How will this research help?

This research will help identify priority areas to conserve aquatic biodiversity, and develop recommendations about how these areas can be effectively and efficiently managed to help ensure their long-term resilience.

Project activities

There are four sub-projects being conducted as part of this research:

- ▶ *Cryptic aquatic biodiversity in northern Australia*
Cryptic species look similar but are genetically unique species. Using genetics, researchers are quantifying the extent of cryptic freshwater fish diversity in the Daly River catchment. They are developing models to explain and predict the environmental and ecological processes responsible for determining these patterns.
- ▶ *Estuarine biodiversity in the Alligator rivers region*
Researchers are using a variety of fish trapping methods including gill netting, beam trawl, electrofishing, and seine netting to collect fish in the Alligator rivers region in Kakadu National Park. This knowledge will be used to assess potential effects on northern Australia's estuarine fish biodiversity caused by climate change, sea level rise and other threatening processes in the region and to design management strategies to minimise their impact.

Genetically viable populations as conservation targets in the Daly River

Researchers are using existing data and new sampling in the Daly River to determine the minimum number, size and spatial arrangement of riverine habitats needed to sustain genetically viable populations of fish over the long term. This information will be used to identify priority areas for conservation management.

Socio-economic costs of freshwater conservation management actions

Using a modelling approach, researchers are mapping the distribution of freshwater biodiversity (eg fish, turtles, waterbirds) and aquatic habitats (eg rivers, lakes, wetlands) in the Daly River. They are also mapping threats to these aquatic ecological assets, and identifying the potential benefits of different management actions aimed at rehabilitating or conserving them. This will contribute important information to other projects (in particular NERP NAH project 1.1) about the costs and socio-economic impacts of conservation actions for affected stakeholders (including Indigenous landholders and pastoralists).

All of these sub-projects will help inform management decisions on the best priority areas and strategies for conservation management.

Research outputs

- ▶ New data on the aquatic biodiversity present in northern Australia, and predictive models of their distribution.
- ▶ A comprehensive list of the estuarine fishes in the Alligator rivers region.
- ▶ Estimates of the ecological response and socio-economic costs of various conservation management actions in the Daly River region.
- ▶ Conservation priorities for freshwater fish in the Daly River.

Who is on the team?

The project team is from Griffith University, led by Dr Mark Kennard, and includes Joel Huey, Jane Hughes, Brad Pusey, Virgilio Hermoso and Simon Linke. The team is also working closely with researchers from Charles Darwin University and James Cook University.

Where is the research happening?

Kakadu National Park and the Daly River catchment in the Northern Territory.