

# Floodplain foodwebs

Floodplain-river ecosystem and food web linkages

## Who's eating who

Food webs describe “who is eating who” in an ecosystem – from the microscopic algae at the bottom of the food chain to the top predators such as fish and crocodiles. These complex interrelationships are a cornerstone of ecology – they govern how floodplains function and help explain patterns of biodiversity. Essentially they tell us how ecosystems are “put together”.

## Staying connected

Most rivers in the tropical north of Australia retain strong connection with their floodplains, contributing to the diversity and abundance of life in both ecosystems. As the wet season flows overtop river banks, fish and other animals make the most of expanded feeding grounds, moving out onto the floodplains. As the floodwaters recede, these animals take the nutrients and energy obtained from the floodplain, back to the river channel. This “subsidy” of nutrients and carbon between the food webs of each ecosystem is important to understand if the effects of changes in land management such as weed invasion or altered patterns of fire are to be understood, predicted and managed.

This project will describe floodplain food webs, quantify the contribution of subsidies to and from the floodplain, and determine how some current land management practices are affecting the floodplain food webs of northern rivers.

## The building blocks of life

The building blocks of food webs are nutrients and energy (carbon). Researchers will firstly summarise our current understanding of the sources and fate of the carbon and nutrients in floodplain food webs. This will draw on work previously undertaken in the Alligator Rivers region (Northern Territory) and the Ord River (Western Australia).



Photo: Ian Dixon

Using remote sensing methods coupled with on-ground measurement taken in different habitats, researchers will estimate levels of primary production (plant growth) for an entire floodplain. Plant growth will be estimated over different stages of the flooding and drying cycle, when it would be otherwise difficult to access sampling sites.

## You are what you eat

Researchers will measure components of plant life, fish and waterbirds as well as carbon and nutrients in the water as it flows between river and floodplain. In times gone by, scientists would look at the stomach contents of wildlife to determine what they ate. In more recent times, stable isotope methods have also been used to unravel the complex relationships in food webs. TRaCK scientists will use these methods to identify the major sources of organic carbon that support aquatic consumers such as fish and waterbirds



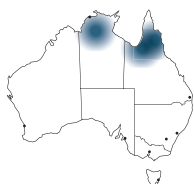
feeding on inundated floodplains. The method measures the different forms (stable isotopes) of carbon and nitrogen which occur naturally in the environment. The ratios of these different (non-radioactive!) forms in an organism are its "signature". The signature of algae and other plants is passed on to the animals that eat them so by analysing the tissue of an organism we can see what type of things it has been eating. The technique can lead to unexpected discoveries – for example, very few creatures eat Para Grass (an introduced pasture grass) despite its high densities in some tropical river floodplains and creek banks.

### Changing patterns

Current land management practices and invasive species may be affecting floodplain food webs. Researchers will compare the growth of native floodplain plants with weeds and examine their use by birds and fish. Weeds can also change the frequency and intensity of fires in the floodplain so scientists will also target floodplain animals such as turtles to see how fire changes the quantities of carbon and nutrients moving through floodplain ecosystems.

### Who is on the team?

The project is led by Professor Stuart Bunn (Griffith University) along with researchers from Griffith University, Charles Darwin University, Environmental Research Institute of the Supervising Scientist, University of Western Australia and CSIRO.



### Where is the research happening?

After initial field trials in the Alligator Rivers region (NT), the field research will be undertaken in the Flinders and possibly Mitchell river systems (Qld). The project started in May 2007 and will finish in 2010.

### How will this research help?

The processes and materials that underpin food webs are often not immediately apparent, even for people living or working in a catchment. You can't see that fewer nutrients are being transported from a floodplain to a river, for example. This research will provide a framework for explaining and predicting why river and floodplain ecosystems may change in response to pressures such as future development or global climate change.



Photo: Michael Douglas

This will assist government natural resource managers and organisations to better predict the potential impacts from various development options and identify sustainable development and land management practices for catchments.

Commercial and recreational fisherman will benefit from an improved understanding of the implications of nutrient and energy movement between rivers and floodplains for fish production. Likewise, pastoralists will be in a better position to understand how a change in river-floodplain connection might affect the productivity of floodplain grazing lands. And indigenous communities will gain new insight into how valued species of fish, waterbirds and turtle will be affected by land use changes or weed invasion.

### Team contacts

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Water, Heritage and the Arts**

**Land & Water Australia**

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