Excerpt from Honours Project by Claire Sives, 2011
Supervisor: Dr Kim Jenkins
Co-supervisor: Dr Debashish Mazumder

How important is River Red Gum carbon as an energy source in floodplain ecosystems?

Introduction

Carbon is the energy currency that drives floodplain foodwebs. This study looked at carbon in three different flood regimes- high (1-3 years), medium (4-7 years) and low frequency (8+ years between floods).

Specifically we were interested in:
- The availability of River Red Gum carbon in floodplain sediments.
- What zooplankton will emerge from sediments when flooded?
- Will the zooplankton use River Red Gum carbon as an energy source?

This research is important to determine the knock-on impacts of the reduction of RRG due to altered flooding regimes in the Marshes.

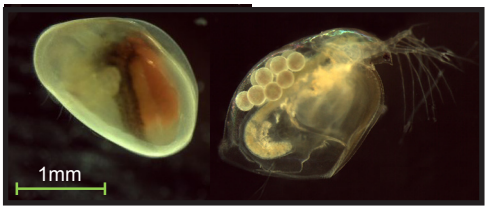
Methods

Dry topsoils from the three different flood regimes were inundated in the lab and sampled over time to determine carbon content and consumption by emerging zooplankton. How do we know whether RRG carbon was there and being consumed? Each plant (and algae) has its own carbon stable isotope signature (a ratio of 13C/12C), this signature can be detected in plants, water, sediment, detritus and the creatures in floodplain waters.

Results

High flood frequency contained fresh River Red Gum, medium flood frequency areas contained aged Red Gum and low frequency flood areas contained chenopods and grasses. Highest diversity and abundances of zooplankton emerged in high flood frequency areas, less in medium and few in low flood frequency areas. Cladocerans, consumed River Red Gum where is was available and switched to chenopods and grasses in low flood frequency areas. Ostracods did not consume the predominant carbon resources and were in far lower abundances than cladocerans.

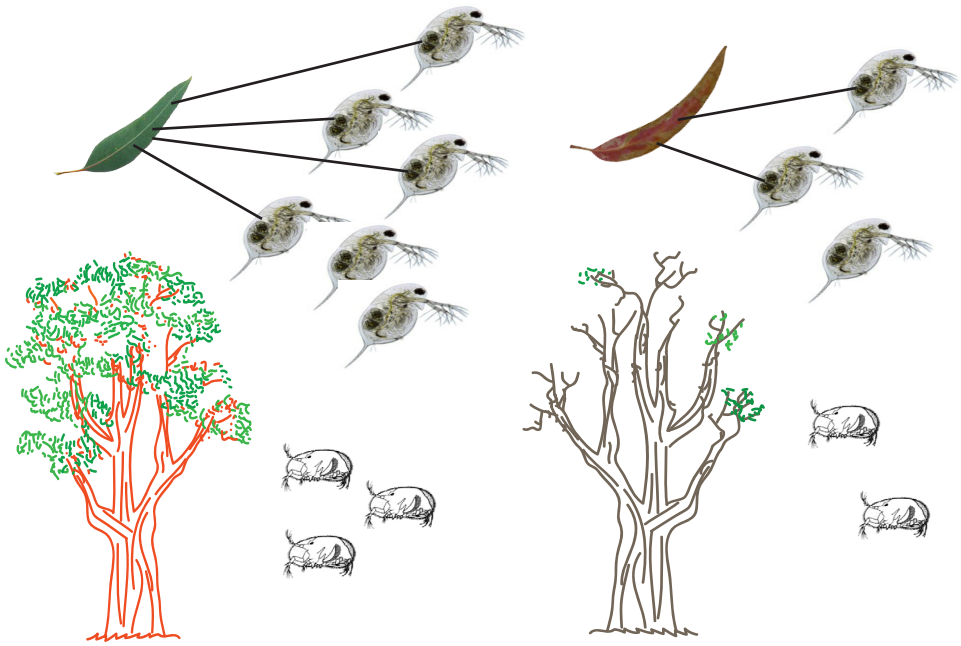
Ostracods - Cladocerans

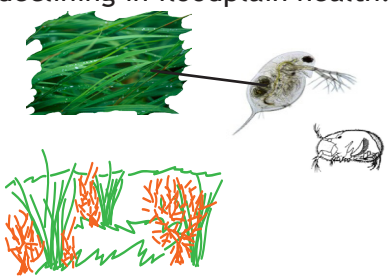


Conclusion

The study indicated that
- some microinvertebrates consume basic floodplain carbon resources
- and extended drying of floodplain wetlands may impact carbon sources that support floodplain foodwebs.

We also found that stable isotope analysis is a useful tool in floodplain management. This method can detect changes in floodplain resources and micro-scale linkages at a basic trophic level. This is particularly pertinent as changes in microinvertebrate ecology are often early warning signs of declining in floodplain health.





High flood frequency
- Healthy River Red Gum -

Medium flood frequency
- Unhealthy/dead RRGum -

Low flood frequency
- Chenopods/grasses -

Thanks go to Leonie and Adam Coleman at 'Wilgara', Garry and Leanne Hall at 'The Mole', Doug and Chris Andrews at 'Messines' and Ray Jones, Field Officer out in the beautiful Macquarie Marshes Nature Reserve.