LA TROBE UNIVERSITY

Centre for Freshwater Ecosystems

Fact Sheet

MMCP Collaboration

Linking flow variability to foodweb and ecosystem function outcomes

This project, is one of five research themes that make up MMCP. This research theme examines the importance of macroinvertebrates to riverine foodwebs.

Food web

- Food quantity and quality are just two elements that can be important in determining community structures, thus influencing top predators such as fish.
- Amount of energy available can be measured in terms of total biomass available as prey.
- Higher organisms have a dietary requirement for essential fatty acids as they are unable to be synthesised by the animals themselves.
- Healthy and productive fish communities rely on the underlying food web to provide all of its energetic and nutritional needs.
- Macroinvertebrates are central to riverine food webs.

Macroinvertebrates

- Macroinvertebrates represent one form of prey item for consumers, a change in the type of prey items, due to the change in macroinvertebrates, could mean:

  ⇒ That the overall energy available for consumers may have altered, and/or

  ⇒ The nutritional landscape for consumers has changed.

Further information

MMCP Collaboration (MMCP) is a project supported by the Joint State Governments and the Murray-Darling Basin Authority to generate and adopt freshwater ecological knowledge through collaboration, to maintain research capability and contribute supporting science to underpin the Basin-Wide Watering Strategy.

MMCP Collaboration Final report: doi.org/10.26181/5d19927544b20

Food web report: doi.org/10.26181/5d19a39e717ea

Other food web factsheets: doi.org/10.26181/5c64f2c433c3b

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Yabbies

- Are a major source of food for fish.
- Are omnivorous (i.e. feed on both plant and animals).
  - ⇒ Considerable opportunity to consume foods of varied nutritional quality.
- Reduced nutritional quality of yabbies, could manifest itself through the food web to higher consumers such as fish.
- Changes in flows that change the environment, and food sources, can lead to changes in nutritional value.

The key findings

1. Can flow variables be used to predict the quantity and quality of food resources in rivers?

- ⇒ An analysis of 30 years' data on the abundance and species richness of benthic invertebrates in the Murray River showed abundance increased across all sites following flooding in 1993 and declined after peaking during the millennium drought. Richness was more variable with respect to sites.
- ⇒ Our modelling showed no relationship between species richness, overall nutritional value and flow.
- ⇒ Flow alone isn't a limiting factor, and our results suggest that other factors limit growth.

2. Do primary food resources alter the growth rates and nutritional quality of key fish prey?

- ⇒ Diet had a profound effect on the growth of yabbies; food with a very high C:N ratio provided nourishment for yabbies, but they barely increased their body mass over the entire experiment (figure1).
- ⇒ Yabbies fed a diet of commercial pellets grew faster than yabbies fed bloodworms or detritus
- ⇒ Consumption of commercial pellets produced greater growth

3. Does floodplain connectivity lead to any improved nutritional quality of key fish prey?

- ⇒ Yabbies have different nutritional values (measured as carbon: nitrogen ratio) depending on the origin of their food sources
- ⇒ Rivers and wetlands each provided a specific enriched source of one or more fatty acids.

Management implications

Macroinvertebrate community responses to flow:

- Taken in isolation, macroinvertebrate abundance can not necessarily be predicted for a series of flow variables and should be considered in combination with other factors that are likely to promote increased abundance, e.g. woody debris.
- Measuring food availability needs to be a component of complimentary measure implementation (e.g. addition of woody debris), and carried out in conjunction with flow modifications.

Project team

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