

Diversity in a Piped System

October 2004 – October 2006

Summary

Development of the Wimmera Mallee pipeline will introduce major changes to the availability of water to wildlife in the agricultural landscape. A research trial has been established to measure the current biodiversity values of farm dams, channels, stock troughs, an experimental water trough and areas with no available water.

The distribution and abundance of birds, mammals, reptiles and frogs is being determined at 36 study sites within the channel/dam areas and pipeline areas of the Wimmera-Mallee. Results to date show a dependence of some species on available open water, and a higher abundance of species at woodland sites and dam sites. Analysis of results will allow the relative values of the different water access points to be assessed, the significance of any differences determined and recommendations made on how biodiversity values can be maintained in a landscape with a piped water delivery system.

Background

This two year project aims to utilise a unique window of opportunity in the development of the Wimmera-Mallee Pipeline to evaluate from a biodiversity perspective the compatibility of different water delivery systems and water access points within the northern Wimmera and southern Mallee agricultural environment.

A change from open water supply systems to closed water supply systems introduces changes in landscape and animal population dynamics. There are 24,000 dams and over 16,000 km of channel within the Wimmera-Mallee system that will not be required in 5-10 years time as a result of the construction of the Wimmera-Mallee Pipeline.

Currently a diverse array of wildlife use the open water system (dams and channels) for their water requirements. Reducing the availability of open water will change native animal population dynamics in the Wimmera-Mallee environment. Understanding the relative values to wildlife of the different water delivery systems and water access points will allow informed decisions to be made on better on-farm environmental management and the maintenance of biodiversity and habitat function in a changing agricultural landscape.

Methodology

A replicated research trial has been designed to sample fauna distribution, abundance and habitat use at the different water access points. Twelve study sites have been established in the southern Mallee, in areas already within a piped water delivery system, and 24 sites in the northern Wimmera, within the existing channel/dam delivery system. Table 1 lists the study sites, habitats and water delivery points sampled.

Table 1: Study Sites.

Study Site	Southern Mallee	Northern Wimmera
Standard practice	Stock water trough in an open paddock, grazed by sheep.	Farm dam in open paddock, grazed. Farm dam in woodland area, ungrazed. Channel in open paddock, grazed. Stock trough in open paddock, grazed.
New design	Experimental in-ground water trough in a woodland area, ungrazed.	Experimental in-ground water trough in a woodland area, ungrazed.
Control site	Woodland area, ungrazed, with no available water.	Woodland area, ungrazed, with no available water.
Four replications of each site	12 sites	24 sites

The distribution of study sites in relation to the existing channel network and Northern Mallee Pipeline is shown in Figure 1.

A two hectare survey area has been established at each of the 36 study sites. Within each 2 ha area, birds and diurnal mammals are sampled concurrently for 20 minutes. Reptiles and frogs are sampled for 30 minutes. Night surveying is conducted for 20 minutes to record all nocturnal animals plus calling frogs. These faunal groups are sampled once per season at each study site.

Results

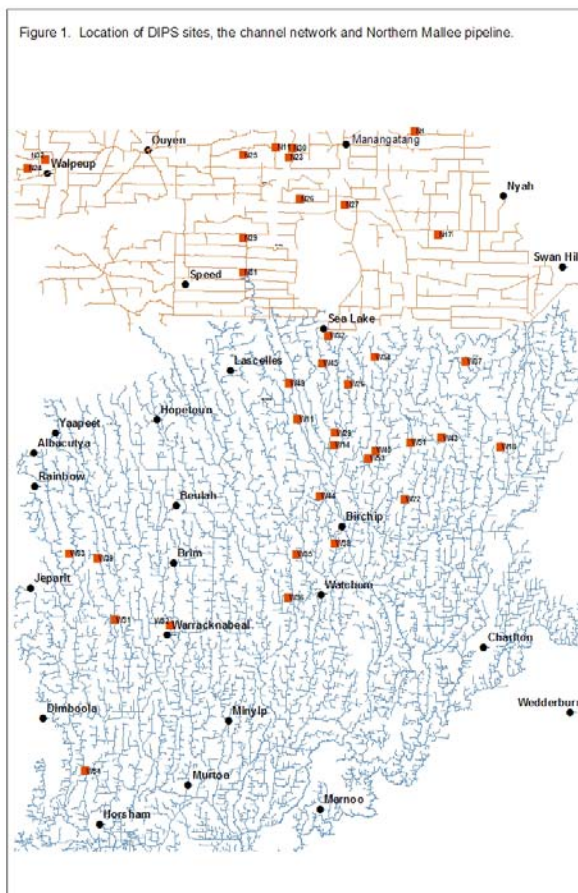
During the first year (2004/05) sites were selected, the monitoring program established, baseline data collected and the experimental (trial) water troughs installed. The second year (2005/06) will see further data collected, analysis of results and an extensive communication program implemented.

Surveys of channel and dam sites in the northern Wimmera were timed to coincide with the winter release of water down the channels and the filling of dams. This was essential for channel sites as there are only a few weeks in a year when water is present. Surveying dams after a fill is important as it is a trigger event in the life cycle of aquatic invertebrates, for frog spawning and for growth of wetland plants. Incidental observations of frog occurrence in both regions were also recorded.

Frogs were detected in three of the eight dam sites and two of the four channel sites in the northern Wimmera. No frogs have yet been observed using the experimental water troughs. In the southern Mallee, no frogs have been recorded at any of the study sites; the only frogs found were in storm water drains flooded after rain.

Reptiles were not active during winter. The warmer weather and increasing day length during spring saw reptiles come out of winter hibernation. In the study sites, small skinks were found in all woodland sites but few paddock sites. No nocturnal reptiles have yet been found. Few mammals have so far been found and the nocturnal surveys have not yielded much data.

Birds comprise the largest faunal group surveyed. The results of bird surveys from the different study sites are shown in Figures 2 and 3.



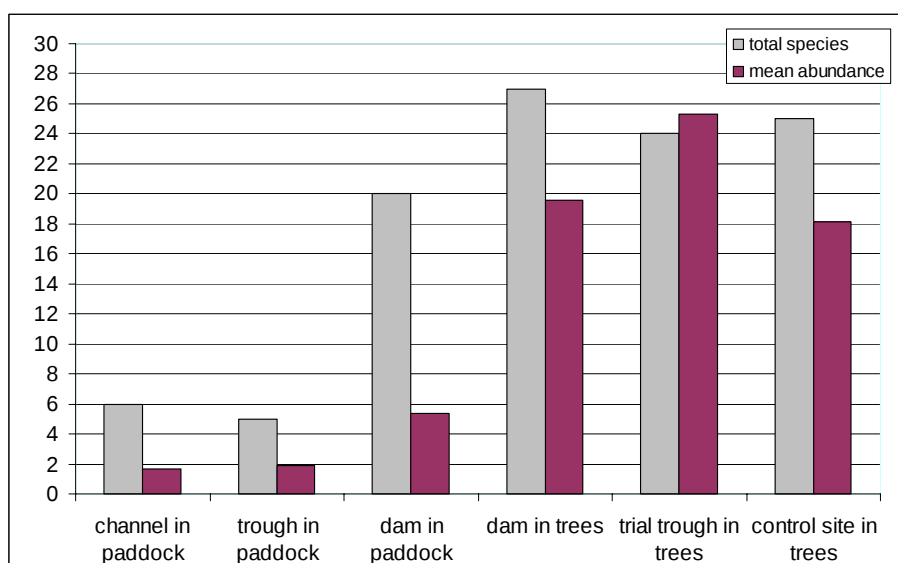


Figure 2: Species diversity and abundance at study sites in the northern Wimmera.

The results for the channel/dam region of the northern Wimmera (channel/dam country) show that few bird species were found at channels and stock troughs. Nearly four times as many species were found at dams in paddocks. However, the mean or average number of individual birds was low for all three paddock sites. This means that birds are not very abundant in paddocks even though dams attract a greater range of species. The three woodland sites all showed a high diversity of different species and that birds were more abundant there. Interestingly, the presence of water (dams and trial troughs) appears to make little difference to bird populations.

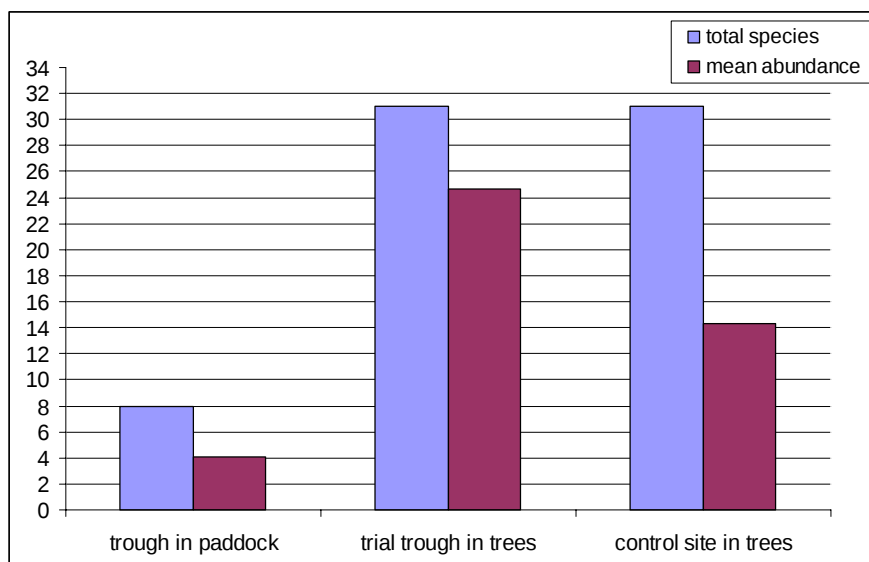


Figure 3: Species diversity and abundance at study sites in the southern Mallee.

In the pipeline country of the southern Mallee, stock troughs in paddocks showed low species diversity and abundance, very similar to the trough in paddock sites in the northern Wimmera. The trial troughs and control sites showed the same high level of species diversity but birds

were significantly more abundant at the trial trough sites (where water is available) than the control sites (no water).

The lower bird abundance between in sites in the channel/dam country compared with control sites in the pipeline area is difficult to explain. Although the pipeline area sites showed a slightly greater diversity of bird species present there were just fewer of them.



Photo 1: Red-rumped Parrots coming to drink at one of the experimental water troughs.

Conclusion

Data collected to date has revealed some trends in the value of vegetation and water points to wildlife. The significance of the findings and the impact of water on species diversity will become apparent after completion of the second year of surveys and analysis of results.

With a sound understanding of the relative importance of existing water access points to biodiversity, the project will be able to provide farmers with recommendations and guidelines that allow them to implement an on-farm water delivery system that both meets their farming requirements and maintains biodiversity values on their property.

Acknowledgements

This project is funded by the Rural Industries Research and Development Corporation (RIRDC) for two years between October 2004 and October 2006. The project is managed by BCG in collaboration with Mallee CMA, Wimmera CMA, North Central CMA, CSIRO and GWM Water. Project Officer is Jonathan Starks.