Evaluating the effectiveness of riparian restoration on lowland streams of the Murray- Darling Basin: The Riparian Restoration Experiment

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Abstract:

The restoration of riparian zones is being carried out across streams throughout Australia, costing millions of dollars annually. These efforts are motivated by an understanding that the overall health of our streams is intimately linked with the condition of the riparian zone. However, the magnitude, rate and timing of ecosystem recovery once restoration activities have commenced is far less certain. There is also a need to better understand the specific mechanisms involved in recovery and the key factors that might indicate success. In most cases the responses of a stream to riparian rehabilitation is not monitored, and where monitoring is conducted no consistent methods is used. With the support of the Murray-Darling Basin Commission, and CMAs we hope to address this knowledge gap.

Project Aim:

To evaluate the ecological impacts of livestock exclusion and replanting on lowland streams.

Methods;

A rigorous experimental design comprising multiple locations (5 creeks in the southern MDB), with sampling conducted before and after restoration at control and restored sites. Each control site is located upstream of an impact site so it stays largely unaffected by any works. Each experimental site is roughly 1km in length and includes both sides of the stream to an average width of ~20m. Replanting is carried out by local CMAs following current best practice guidelines. Short-term (1-2 yrs), medium-term (3-6 yrs) and long-term (10 yrs+) indicators have been identified. These will be measured with the aim of improving our understanding of the processes, rates, timing and spatial extent of responses that reflect both physical and ecological structure and function.

Preliminary Results

Despite long periods of record rainfall deficits across all experimental sites, planted tube-stock have been reasonably successful. For example, since planting in spring 2005, overall mortality of individuals at Faithful Creek has been less than 30%, with several *Acacia* species almost doubling in height between February 2006 and 2007 (See Fig. 1). Natural recruitment of river red gum within the fenced areas along Faithful Creek has tapered off since an initial pulse of seedlings appeared soon after stock exclusion. This compares to almost no recruitment at our control reach over the same period. Since 2005, there has been a ~5% increase in bare ground at the control reach compared to a ~10% reduction at the restored reach. The increase in bare ground at the control reach probably reflects the prevailing dry conditions and increased stock pressure, whereas a reduction in bare ground at the treatment reach was accompanied by an increase in litter (predominantly grass litter). Data collected from our experimental sites demonstrate that coarse particulate organic matter (CPOM) begins to consistently accumulate once canopy cover exceeds ~40%. This relationship has been observed at all our Victorian study sites, and was recently confirmed at new experimental locations in southern NSW.

Application to Management/works to be undertaken

There is little doubt that the prevailing drought across much of south-eastern Australia has had profound impacts upon the physical and biological condition of our experimental sites. This is demonstrated starkly by the two the decline and eventual absence of several native fish species at our sites. It is probable that many of the short-term ecological responses we expected to result from de-stocking and replanting have been constrained and/or altered by drought. Nevertheless, positive responses to the restoration have been detected. These conditions have provided a

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golden opportunity to test the efficacy of restoration in the face of natural disturbance. Stream flow data gathered from our experimental sites will allow us to better understand the impact of low flow conditions on biota and conceivably alter the outcomes of stream restoration. Our data will enable us to document ecological change during drought and follow recovery, whilst also allowing us to delineate the effects of drought from those of restoration activities.

Project Photographs

Further Reading

Stewardson, M.J., Cottingham, P., Schreiber, S. and Rutherfurd, I.D. (2002) Evaluating the Effectiveness of Stream Habitat Reconstruction in the Rivers. Technical Report 04/11, Cooperative Research Centre for Catchment Hydrology, Melbourne, Australia.

Anderson, B., Reich, P., Lake, P.S., Quinn, G., Rutherfurd, I.D. and Stewardson, M.J. (2004) The Riparian Rehabilitation Experiment: Evolution of a practical methodology. Fourth Australian Stream Management Conference, Launceston. pp.40-46.

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