

# Translating science into practice: *Is 'best practice' the best option?*

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## Abstract

While it is imperative to have scientifically defensible hypotheses for wetland management, our ability to apply the science and achieve success largely depends on the strength of partnerships developed with private landholders. This paper addresses the importance of using local knowledge and science in an active adaptive management framework to improve overall wetland health. More specifically it uses a "typical" farm in the west Wimmera as a case study to illustrate the benefits and limitations of such an active adaptive management system. From this case study it is shown that in order to effectively manage wetlands in the Wimmera, local knowledge and experience in addition to scientific hypotheses is necessary to engage the community to achieve improvements in productivity and wetland health.

## Keywords

Wetlands, active adaptive management, demonstration, community

## Introduction

It is becoming increasingly important to gather and communicate both scientific and local knowledge and understanding of wetland systems in order to effectively manage them in a productive farming environment, while increasing the net overall health of our wetlands. Landholders within the west Wimmera community are becoming increasingly aware of the impacts of their land practices on their wetlands; whilst the Wimmera Catchment Management Authority (CMA) has substantially improved the level of scientist data available on wetlands in the region.

Throughout the west Wimmera, landholders are increasingly interested in wetland protection and enhancement and wish to further their knowledge through the opportunity to view examples of wetlands, or wetland systems, in a productive farming environment that are being managed effectively for both their ecological and economic values. The Wimmera CMA is charged with protecting and enhancing waterway assets which include wetland (WMCA, 2006). These groups, while seemingly from opposites of the spectrum, share common goals. It has been through these commonalities that have led to the development of the Wimmera CMA Wetlands Active Adaptive Management project. It was viewed that by establishing wetland restoration demonstration sites, key issues may be addressed, providing not only the opportunity to build on local knowledge, but equally for Wimmera CMA to harness the knowledge and experience held within the farming community, to assist in wetland management issues in the protection and enhancement of waterway assets, in particular wetlands.

The Active Adaptive Management paradigm has guided the implementation of this project. In the adaptive management paradigm, local knowledge is valued and the distinction between science and local experience and knowledge is blurred. Rational science is used as a hypothesis for addressing management concerns and questions, with the program designed to facilitate questioning and reflection rather than being primarily driven by project auditing requirements. Active adaptive management is focused on learning rather than implementation, but may use a range of treatments/field trials and management practices designed to achieve strategic goals and to test 'best practice' (Allan & Curtis, 2003). These were among some of the adaptive management principles that have guided the implementation of the project.

## Building knowledge and understanding of Wimmera wetlands

The wetlands and streams of the Wimmera River Basin and the Millicent Coast Basin have been identified as unique assets. Wimmera CMA, as the caretaker of waterway health, is responsible for the protection of the ecological, social and economic values of the surface waters in the Wimmera, by maintaining, enhancing and protecting biodiversity and surface water quality and advverting works that unduly impact on the natural flow (2003-2008 Wimmera Regional Catchment Strategy, 2003)

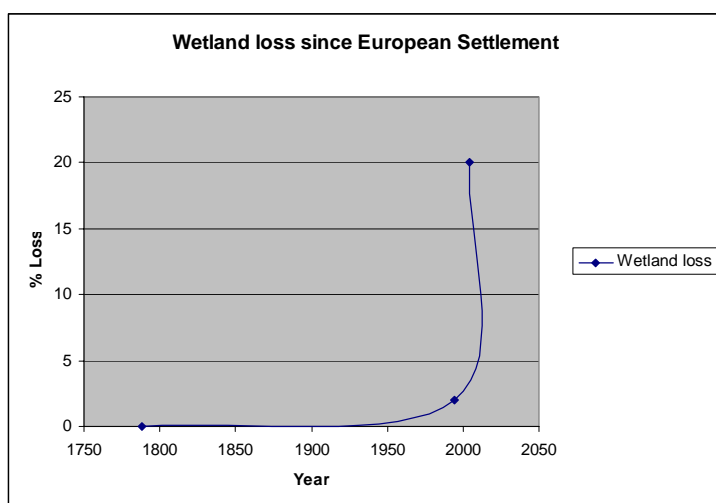
### West Wimmera wetlands

The Wimmera region covers approximately 2.35 million ha and contains 3215 wetlands (Corrick Classification Method), comprising of approximately, over 25% of Victoria's wetlands, the majority of which are located in the west Wimmera region (also known as the Millicent Coast). The wetlands are valued for their ecological significance, heritage, amenity, tourist and recreational values (WCMA, 2003). The wetlands of west Wimmera are valuable ecosystems that support a wide variety of aquatic and terrestrial life. The health of the region is directly related to the health of its rivers, streams and wetlands.

Water is a scarce and valuable resource. Large portions of the wetlands in west Wimmera have been cleared of native vegetation, drained or altered, thus changing the number of wetlands since settlement. Ecological investigations have identified that the majority of wetlands have been altered and now are degraded significantly (Table 1). The Wimmera Wetland Extend and Drainage Line Mapping Project (2006) revealed that 344 wetlands with a total area 3119.4ha that are now classed as "No Longer Evident" and nearly 50% of all wetlands are modified in some way (Table 1) (SKM, 2006). Since 1994, ten times the number of wetlands have been lost than those lost between European settlement and 1994 (Figure 1) (WCMA, 2006)

**Table 1. Modification statistics for Wimmera wetlands. Source: Sinclair Knight Merz (2006, Pg. 14).**

Modification Statistics : 1788- 2004 Wetlands	Number	Area (m <sup>2</sup> )
Total Wetlands with a Modification Flag	1,764	29,273.7
Total Wetlands Modified by Dam	1,082	14,981.3
Total Wetlands Modified by Drain	843	14,528.1
Total Wetlands Modified by Bank	210	7,016.9
Total Wetlands Modified by Cropping	408	7,424.6
Total Existing Wetlands with a Modification Flag	1,420	26,154.3
Total Existing Wetlands with no Modification Flags	1,265	44,769.3
Total Wetlands No Longer Existing with a Modification Flag	344	3,119.4
Total Wetlands with 2 or more Modification Flags	678	12,697.6
Total Existing Wetlands with 2 or more Modification Flags	514	10,717.0



**Figure 1. Wetland loss since European settlement. Source: Sinclair Knight Merz (2006, Pg. 14).**

In 2003, Wimmera CMA produced a Wetlands Discussion Paper to identify key knowledge gaps with respect to wetlands. Since its release, Wimmera CMA has focused on addressing key knowledge gaps, particularly scientific data. Some of the major projects included the geomorphic classification of wetlands in the Millicent Coast Basin (MCB), the classification of wetlands in the MCB in terms of their groundwater and surface water interaction, the updating of the 1994 wetlands Corrick classification mapping (including especially accurate wetland extent mapping) and the identification of wetland catchment areas. All projects utilise the Wimmera digital terrain model as input data.

While it is imperative to have scientifically defensible hypotheses for wetland management; our ability to apply the science and achieve success largely depends on the strength of partnerships developed with private landholders. For partnerships between management Authorities (such as the Wimmera CMA) and Landholders to be possible, an understanding of what the drivers and constraints are for landholders to participate in wetland restoration and conservation is imperative. In recognising this, Wimmera CMA completed a study on the Social and Economic Drivers of Wetland Rehabilitation specifically for the Wimmera region. The report highlighted that the diversity of farmers and their attitudes, matches the diversity and extent of wetlands in west Wimmera (SKM, 2005). Understanding the diversity of farmers needs and attitudes is a key component in the ability for management authorities to adapt its science based knowledge to the needs of specific farmers, while still achieving ecological benefits.

### **Wetland management: combining scientific and community knowledge and understanding**

A Wimmera Wetlands Active Adaptive Management (WAAM) site is currently being established on the Porter property, Llanthro, near Apsely in West Wimmera, following a seminar and workshop held on the site as part of the Wimmera CMA's 'On Farm Seminar Series...farming and healthy wetlands'. Wetland ecologist Damian Cook facilitated the development a wetland restoration plan on the Apsley farm, of which participating landholders contributed their knowledge, which was combined with wetland science.

The action plan prepared outlines specific techniques to address issues identified at Mr Porter's Stockyard and Pritchard paddock wetlands. The plan recommends trialling a number of restoration techniques such as *weed and animal pest control, pre-planting soil preparation, revegetation and wetland management through fencing*. The success of this project will be measured not only by findings from the outcomes of the wetland restoration work, but by the level of interest and involvement from the community, peer support generated, knowledge contributed by the community and the relationships formed between the landholders involved and WCMA.

#### *Llanthro*

The Porter property, Llanthro, near Apsley in west Wimmera was selected from the expressions of interest to be involved in the project. Apsley farmers Tom and Susie Porter's views of wetlands on farms have changed dramatically over the years. Like other west Wimmera farmers, Tom and wife Susie have many wetlands on their property and were eager to gain a greater understanding of how to best manage them for both their production and conservation values. "In the past, my forebears and I have attempted to convert certain wetlands into farming areas that were never going to prove productive," (Porter *pers.com*, 2006)

"When our focus moved to cropping, I became interested in draining our wetlands. At that time I saw them just as areas where water collected. I wanted to make more of my farm available for cropping, so I attempted to move water from areas where, in some cases, water would not move." Tom realised that he was putting a huge amount of resources into areas that would not increase his wealth. "Finding a balance between managing the natural resources on our farm and the highly productive areas is essential to our wealth creation," (Porter *pers.com*, 2006). Like many landholders in west Wimmera, the challenge was to decide which areas to restore as healthy wetlands and which areas to develop to enhance production. Tom had discovered some of his wetlands were worth more to him as functioning wetlands, presenting no or few production values. Such wetlands are clearly the type that often possess multiple environmental values, including ecological diversity and habitat.

This site was selected due to the ability to achieve our desired aims, following the adaptive management paradigm. This is due particularly to the Porter's representing the most common farming style in the region.

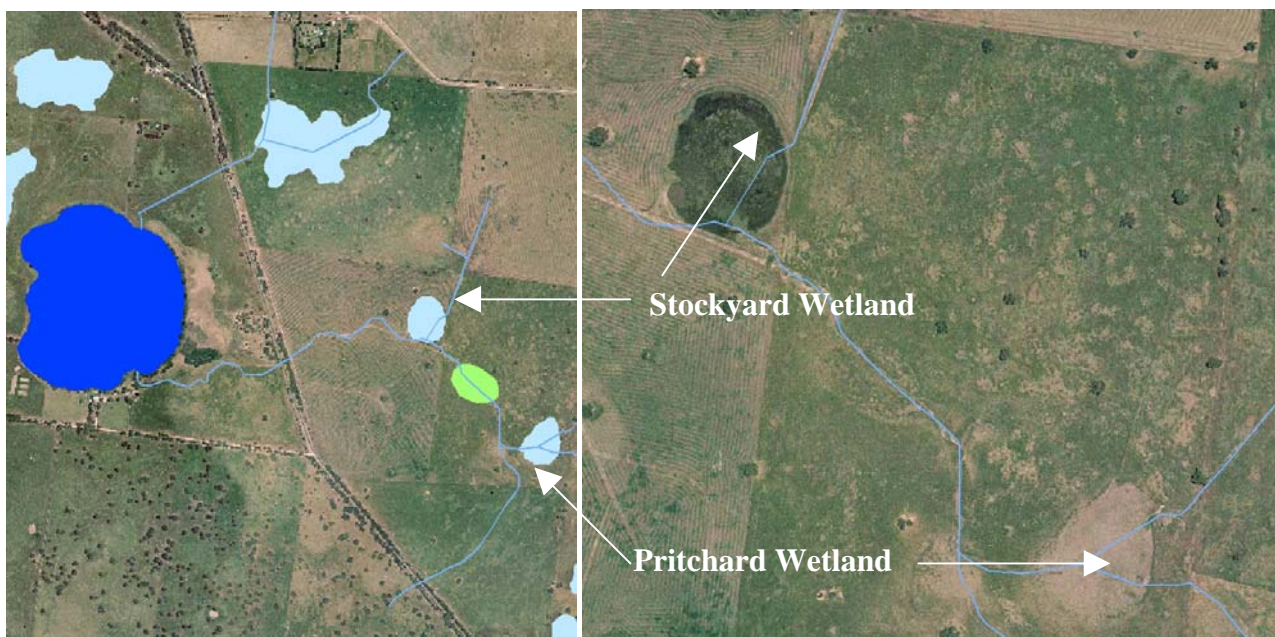
The Social and economic drivers of wetland rehabilitation study (WCMA, 2005) identified a range of farming styles within west Wimmera. *Farming Style 2* is business orientated, has a positive towards “technology and innovation”, “planning and risk management” and employment labour, has a positive attitudinal profile, particularly in relation to planning ahead, suggesting that they would be open to a range of wetland protection programs, they agree more strongly than average that they are interested in protecting swamps “to conserve flora and fauna” and less likely to indicate that “fencing off will mean no grazing” - less likely to say that this is reason for not undertaking works, they are less likely to nominate the barriers to wetland protection with the exception of ‘loss of control’ issues (SKM, 2005).

#### *Restoring the southern system*

The property has two significant creek systems flowing through it; one to the north goes to the Naracoorte Creek system while the southern system goes to the Mosquito Creek. The Porter’s have already revegetated 25 to 25 hectares of wetlands in the northern system. The southern system, or Worrynyook Creek, is the location of *Wetlands Active Adaptive Management* project.

As part of the process of involving the landholder in the development of the plan and capturing peer knowledge, a seminar and workshop were held on the property as part of the Wimmera CMA's On Farm Breakfast Series...Farming and Healthy Wetlands. Director of Australian Ecosystems, Damian Cook outlined the steps involved in planning a wetland restoration project. Almost 40 participants heard the first step in restoring a wetland was having an understanding of that wetland over time. Attributes of wetlands that provide useful insight into wetland health include cover and diversity of native and exotic plants, evidence of native animals and their habitat, algal blooms and salinity levels (Cook *pers.com*, 2006).

Following the seminar, participants looked at the two wetlands involved (Figure 2), which were devoid of trees and shrubs around its edge and have been heavily grazed for many years. Eight native wetland species were found in the wetland bed, with few weeds present. Participants learnt that this was a great starting point for wetland restoration, despite the absence of most terrestrial vegetation.



**Figure 2. Wimmera wetlands active adaptive management site**

#### *Landholder contribution to the action plan*

Participants expressed key aims for wetland restoration, common to many farmers. These were incorporated into the action plan. These included provide habitat for ducks and other water birds, increasing farm sustainability, ensuring a balance between agriculture and nature, the integration of wetland areas into whole farm planning, improve stock management, to show pride in protecting and managing the farm’s wetland ecosystems and to increase the farm’s real estate value (by maintaining tree health and creating practical fencing).

Objectives identified by Wimmera CMA included:

- Protect biodiversity;
- Promote summer pasture (appropriately timed and only after revegetation works are well established);
- Improve water quality and management;
- Provide practical demonstration of wetland restoration; and
- Preserve cultural assets for both indigenous and non-indigenous Australians.

The objectives of the participating landholder and Wimmera CMA are entirely compatible, despite being driven by varied management focuses. Community drivers, or motivation for wishing to undertake wetland conservation and restoration in this case allows for the application of scientific knowledge.

Australian Ecosystems drafted the Wimmera Wetland Restoration Action Plan, Stockyard and Pritchard Paddock Wetlands on the 'Llanthro' Porter Property (July 2006). The key aim of the plan is to apply, learn from, and adapt in response to trialled 'best practice' wetland management.

The plan recommends trialling a number of restoration techniques which focus on:

- Weed control- Scalping, cultivation, spraying and manipulating water levels
- Pest control - Guarding options, vermin proof fencing, vermin eradication, and habitat destruction
- Pre-planting soil preparation - Scalping, deep ripping, soil cultivation and the introduction of soil mycorrhiza and biota and/or bryophytes
- Revegetation - Intensive tube stock planting and direct seeding options
- Wetland management:

Weed management actions involved the identification and mapping of dense areas of weeds in the wetlands with the view of concentrating initially on eradicating isolated or scattered individual weeds and digging out or spot spray isolated individual weeds before seed set. Areas infested with weeds were to be sprayed with a Glyphosate-based herbicide, and replanted with appropriate species if natural recruitment does not occur within the subsequent years

Re-vegetate drainage lines flowing into the wetlands to filter excess nutrients and chemicals and undertake supplementary planting to increase species richness if necessary .

Native animal habitat enhancement work was suggested to re-instate natural ecological processes. For example nest boxes could be erected to encourage water birds to breed at the wetlands, or large logs could be placed within and around the wetlands to provide habitat for reptiles, frogs and birds. Link the wetlands to other areas of native vegetation such as roadsides and scattered trees on the farm with wildlife corridors

#### *Adapting the plan through further community input*

Andrew Bradey of Triffard Trees was engaged to implement the action plan and provide further input being a local farmer and contractor of vegetation restoration. Species lists, restoration options and the timing of works were adapted according to seed availability and Andrew's experience as a farmer and restoration contractor. Landholder experience has shown poor success rates of direct seeding tree species on this particular soil type. The action plan suggested direct seeding overstorey, this option was not implemented due to landholder experience. Similarly, landholder knowledge of climatic conditions also influenced the timing of implementation, which varied from that suggested in the action plan. The monitoring and evaluation plan was heavily influenced by landholder resources and capacity.

Site preparation and seed collection has commenced and a monitoring and evaluation plan established to be implemented by the Porter's. Following the implementation of all planned trials, a further community seminar and workshop will be held and learning's from the project to date shared.

## Discussion

The success of the project will be measured not only by the outcomes of the restoration work, but by the level of interest and involvement from the community, peer support generated, knowledge contributed by the community and the relationships formed between the landholders involved and Wimmera CMA.

This active adaptive management project is focused on learning and building relationships, rather than forming a rigorous scientific trial. It is designed to test the hypotheses, or what is considered 'best practice' through observation and reflection (Allan & Curtis, 2003). It is not our aim to suggest to the community that science has the complete answer, but is able to be used as part of a total management strategy. We are seeking to create an opportunity for questioning the management of wetlands in a productive farming environment where profit is the landholders highest priority. This questioning of knowledge from both Wimmera CMA and the community allows for more flexibility and the evolution of locally based management recommendations (Allan & Curtis, 2003). We are seeking to challenge landholder's traditional views on the compatibility of wetland conservation and the generation of wealth. There is obvious limitation, through not being able to build a greater scientific understanding through the site not being established as a scientifically replicated trial. Monitoring and evaluation will be conducted by the landholders which may lead to gaps in the information over time. It will therefore be important to maintain peer and Wimmera CMA support throughout the establishment phase and into the future.

## Conclusion

In order to effectively manage wetlands in the Wimmera, local knowledge and experience in addition to scientific hypothesis is necessary. Understanding landholder drivers and constraints of wetland conservation is an important step towards gathering that local knowledge. The active adaptive paradigm has guided our approach to initiating the establishment of a wetland restoration demonstration site on a west Wimmera property. This project has taken steps towards enhancing engagement by the community in wetlands and address some of their key issues and concerns, as identified in the *Social and Economic Drivers of Wetland Rehabilitation Study (2005)*. Community involvement in the project has been strong, landholder views have been challenged and local knowledge and experience has been combined with scientific understanding in the development of the wetland restoration action plan. The success of the project will not be measured solely on the outcomes of the restoration trials but also on the involvement by the community and the relationships formed between those involved and Wimmera CMA.

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