

Wimmera Catchment Management Authority

Geomorphic Categorisation and Stream Condition Assessment of the Wimmera River Catchment

Section Four: Implications for Management &

Recommendations

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Introduction

This investigation has identified stream types, their location, length and condition in the Wimmera River Catchment. The investigation provides a greater understanding of geomorphic and ecological processes within the catchment. The output from the investigation can be used to assist in the development of stream management programs within the Wimmera River region. However, any prioritisation of actions first requires a clear and agreed set of objectives for management.

This section of the report provides some recommended actions reflecting both the findings of the stream categorisation and condition assessment process and five recommended waterway management actions.

A Framework for Defining Management Objectives

Wimmera CMA Waterway Action Plans

The Wimmera Catchment Management Authority has prepared Waterway Action Plans (WAPs) for priority waterways identified through previous investigations. The WAPs are based on the regional objectives for stream condition outlined in Table 4.1.

Table 4.1: Wimmera CMA Regional Objectives

Objective	Description
Objective 1	Preserve areas with near pristine values
Objective 2	Restore areas of high value
Objective 3	Rehabilitate areas that place other values at risk or provide good opportunity for restoring values
Objective 4	Maintain degraded areas to prevent values declining to unacceptable levels

Source: Wimmera CMA, 2003

Victorian River Health Strategy

The Victorian River Health Strategy was published in 2002 by the Department of Natural Resources and Environment. The management approach outlined in the Strategy includes the four key elements outlined in Table 4.2.

Table 4.2: Key Elements in the Victorian River Health Strategy's Management Approach

Key Element	Description
Element 1	Protecting the rivers that are of the highest community value from any decline in condition
Element 2	Maintaining the condition of ecologically healthy rivers
Element 3	Achieving an 'overall improvement' in the environmental condition of the remainder of the State's rivers
Element 4	Preventing damage from future management activities

Source: (VRHS, 2002)

The VRHS priorities for protection and restoration are set on the basis of:

- Protection of existing high value areas of areas in good condition
- Restoration of those areas where there is:
 - The highest environmental and community gain for the resources invested
 - Real community commitment towards long term improvement of river health (VRHS, 2002)

Recommended Management Actions

The Wimmera Regional River Health Strategy (RRHS) had not been produced at the time of writing this report. It is anticipated that objectives for management will be developed for the Wimmera River catchment as a component of the development of the Wimmera RRHS. It is expected that the strategies included in the Wimmera RRHS will be consistent with those in the VRHS.

Taking both the Wimmera CMA Regional Management Objectives and the VRHS Key Elements into account, a series of Recommended Management Actions has been developed. Refer to Table 4.3.

Table 4.3: Recommended Management Actions for the Wimmera CMA

Action	Description
Action 1	Protection of Rare Stream Types
Action 2	Protection of Streams in Good Condition
Action 3	Protection of Stream System Function and Diversity
Action 4	Protection of Heritage Rivers
Action 5	Defining Template Reaches using Representative Rivers as a basis

The selected actions listed in Table 4.3 provide a basis for the provision of some preliminary stream management recommendations that can be drawn from the results of this investigation. The list of actions is not exhaustive and is likely to be modified as a component of the development of a Regional RHS.

Action 1: Protection of Rare Stream Types

A number of stream types in the Wimmera River Catchment have been found to be rare and / or unusual both within the catchment and through South East Australia. These stream types are likely to have distinctive ecological communities and are considered worthy of high priority for protection.

Discontinuous Anabranching Chain of Ponds

Comment

The lower MacKenzie River was categorised as a Discontinuous Anabranching Chain of Ponds. This section of waterway has intact geomorphic form, is rare as a stream category within the Wimmera River catchment and is unusual in southeast Australia. The lower MacKenzie River has limited flows downstream from Distribution Heads, upstream from which the Mackenzie River is used as a water transport channel (Refer to the Hydrology Map in Appendix J). At Distribution Heads, water is diverted into the Wimmera Mallee Stock and Domestic Supply System.

The sand-bedded lower MacKenzie River still has an intact channel system. The system shows no evidence of instability, excessive incision or deposition. Similar systems have been identified in the Mt Lofty Ranges of South Australia (see Figure 4.1). The two systems contain similar geomorphic forms and riparian vegetation.



Mt Lofty system



Lower MacKenzie River

Figure 4.1: Discontinuous Anabranching Chain of Ponds

The ISC Streamside Zone Sub-index scores for the lower MacKenzie River sites were all 7/10 or 8/10 indicating that the riparian zone is in good to very good condition. The ISC Physical Form Sub-index scores were between 6/10 and 8/10. Hydrology of the lower MacKenzie is seriously affected by water being extracted in some sections and other sections being used for water transfer.

Action 1: Recommendations for Discontinuous Anabranching Chain of Ponds

The hydrology and ecology of the lower MacKenzie River have been severely affected by water harvesting. The condition of this reach of river should be a focus for management and a management plan should be developed. This plan should consider:

- Restoring flows which mimic natural flow regimes
- A detailed assessment to identify any specific risks due to sediment input and / or channel incision
- A monitoring program should be developed to assess changes in the waterway condition and identify risks within the system

The identification of specific threats should then also be treated and managed. An important part of the management program should also be to educate the local landholders and the public about the system.

Distributary Systems

Comment

The distributaries of Yarriambiack and Dunmunkle Creeks are rare hydrological systems within southeastern Australia. These systems distribute floodwaters across the lower Wimmera catchment and into the southern Mallee. Yarriambiack Creek distributary terminates in Lake Coorong, an ephemeral lake that overflows into the southern Mallee. Dunmunkle Creek flows also terminate in the southern Mallee.

The distributaries may once have been Wimmera River channels. They are similar to flood channels associated with the anabranching fine grained systems on the Wimmera River, such as Datchak Creek. However, they do not rejoin the channel. The distributary systems contain similar geomorphic forms to the contemporary Wimmera River. However, both Yarriambiack and Dunmunkle creeks are slowly filling with fine sediment and losing their original geomorphic form.

The intermittent flows associated with these channels may have some rare or distinctive floral and or faunal associations.

Two ISC sites were assessed on Dunmunkle Creek in 2002. The aerial photograph interpretation indicated that Dunmunkle Creek has <20% overstorey vegetation cover. The ISC scores for Physical Form were 5/10 and for Streamside Zone were 4/10 and 6/10.

No sites were assessed on Yarriambiack Creek in 2002. Yarriambiack has overstorey vegetation cover that is mostly <20%, with some sections having 20-80% overstorey vegetation coverage. Three ISC sites were completed in 1999 on Yarriambiack Creek and received 4,5, and 6/10 for Physical Form and 5,8, and 7/10 for Streamside Zone.

Action 1: Recommendations for Distributary Systems

The distributary systems of Yarriambiack and Dunmunkle Creek are a rare hydrological system within southeastern Australia. These systems need to be further studied to gain an understanding of their past flows regimes. This understanding may allow the development of an environmental flow and release program.

These distributary systems also need to undergo further ecological assessment to determine their significance ecologically.

Terminal Systems

Comment

The Natimuk Creek system is a small terminal system that occurs west from Horsham. While Natimuk Creek is part of the Wimmera River catchment, it is an isolated system, which is only connected to the rest of the catchment in the event of very large flows. Geomorphically and hydrologically, Natimuk Creek has more in common with the terminal systems of the Millicent Coast, west from the Wimmera River Catchment. Generally, Natimuk Creek has a poor stream condition.

Action 1: Recommendations for Terminal Systems

The Natimuk Creek system is not a significant system in the Wimmera River catchment as it is not a rare stream type. It is recommended that Natimuk Creek should be managed in conjunction with the terminal systems of the Millicent Coast region.

Chain of Ponds

Comment

The distinctive and uncommon Chain of Ponds fluvial systems of southeastern Australia occur on Glenlofty Creek and on part of the upper Wimmera River. The Chain of Ponds once covered a large proportion of the upper Wimmera River stream length. This investigation has revealed that up to 50 % of stream length in the Wimmera River Catchment was of the discontinuous stream type, a large proportion of which would have been Chain of Ponds. The Chain of Ponds systems have been drained and subjected to incision processes. Only a very limited length (0.6%) of the Chain of Ponds stream type now remains in the Wimmera River catchment.

The 2002 ISC scores for the Chain of Ponds sites are 3/10 to 5/10 for the Streamside Zone Sub-index and 4/10 to 6/10 for the Physical Form sub-index. The relatively low physical form scores can be partly attributed to limitations in the ISC methodology, which does not take into account the unique physical form of the Chain of Ponds system. However, the low physical form score is also a reflection of contemporary infilling of the Chain of Ponds with sediment from upstream erosion and other sediment liberation processes.

Action 1: Recommendations for Chain of Ponds

The Chain of Ponds systems on Glenlofty Creek and the Wimmera River are now rare in the catchment and within SE Australia. The remaining Chain of Ponds systems require protection from ongoing processes. The Physical Form and Streamside Zone Sub-index scores for these sites generally indicate poor to moderate condition. As these sites are geomorphically significant, they should be a priority for management. A management program should aim to monitor the system, improve its condition and inform the public on the nature of the Chain of Ponds and their rarity within the catchment.

Many incised or modified systems in the Wimmera River Catchment were once Chain of Ponds. In some waterways, a process of infilling by sediment is occurring. This is a recovery phase of the process in which the Chain of Ponds systems attempt to return to their original geomorphic form.



FS #38: Glenlofty Creek



FS#39 Glenlofty Creek upstream

Figure 4.2: Chain of Ponds examples

Action 2: Protection of Streams in Good Condition

There can be considerable economic advantage in protecting existing streams in good condition as a first step in maintaining and improving the health of rivers in a catchment.

The aerial photograph interpretation highlighted that waterways in the Wimmera River catchment with greater than 80% overstorey vegetation cover are likely to be found in the Grampians National Park, the Pyrenees Region and the Heritage River section of the Wimmera River. High value reaches of waterway are likely to be found in these areas.

Several sites have been highlighted in the ISC assessments as having good Physical Form and Streamside Zone condition. These sites were selected, as both of the ISC Sub-index scores were 7/10 or higher, indicating that the site was in good condition.

A selection of streams with high physical and streamside zone vegetation conditions and with a largely intact hydrologic regime are provided in Table 4.4 and shown in Figure 4.3.

Table 4.4: Sites in the Wimmera River catchment in good condition

Field Site No.	Stream Name	ISC Physical Form Score	ISC Streamside Zone Score
FS#12	Boggy Creek	8	9
FS#17	Seven Dials Creek	7	9
FS#20	Golton Creek	8	7
FS#21	Golton Creek	8	7
FS#34	Glenpatrick Creek	8	9
FS#35	Spring Creek	7	7



FS#12 – Bogy Creek
Streamside Zone Score: 9
Physical Form Score: 8



FS#17 Seven Dials Creek
Streamside Zone Score: 9
Physical Form Score: 7



FS#20 – Golton Creek
Streamside Zone Score: 7
Physical Form Score: 8



FS#21 – Golton Creek
Streamside Zone Score: 7
Physical Form Score: 8



FS#34 – Glenpatrick Creek
Streamside Zone Score: 9
Physical Form Score: 8



FS#35 – Spring Creek
Streamside Zone Score: 7
Physical Form Score: 7

Figure 4.3: ISC Sites with high scores and largely intact hydrology

Action 2: Recommendations

In order that streams in good condition are protected, the following steps should be considered:

- The waterways identified as being in good condition should be monitored regularly to identify any possible threats to their condition
- The land tenure of each waterway should be identified and, where the land is publically owned, the Wimmera CMA should work with the relevant land managers to determine the way in which the waterways should be managed
- Where a private landholder is involved, the Wimmera CMA should provide the landholder with all information available to ensure that the status of the waterway is recognised and managed appropriately. In such a case, the Wimmera CMA should work cooperatively with the land manager to protect the waterway
- The waterways that have been recognised as being in good condition should be used as template reaches for the management and restoration of other waterways throughout the Wimmera River catchment. This concept is discussed in Action 5.

Action 3: Protection of Stream System Function and Diversity

There have been major changes in the hydrologic regime in the Wimmera River catchment associated with water harvesting and use of streams for water supply distribution.

Much more subtle changes in hydrology have taken place in the upper reaches, associated with the conversion of the discontinuous streams into incised alluvial discontinuous streams. The discontinuous systems, including Chain of Ponds, served to store water and release it over a period of time. The gullies result in water being retained for a shorter period in these areas. Consequently, downstream reaches, that once had permanent flow because of the slow release from the ponds, are now more ephemeral and variable in their function.

This has implications for instream ecological processes and water quality:

- Loss of ecological systems due to a loss of the Chain of Ponds
- Loss of ecological systems based on downstream flow regime from the Chain of Ponds
- Reduced nutrient processes through Chain of Ponds and therefore reduced downstream water quality



FS #38: Glenlofty Creek

Figure 4.4: Example of a Chain of Ponds

Action 3: Recommendations

The objectives of managing the Chain of Ponds systems have been largely covered by previous discussions in this report. An important objective to be set is one identifying the length of stream in each stream type and defining the length of each stream order within each stream type that should be in excellent condition.

The assessment of uncommon discontinuous systems, such as floodouts and cut & fills, should be undertaken. Approximately 50% of discontinuous waterways in the Wimmera River catchment have been lost to incision. Floodouts and cut and fills are naturally rare and threatened in the catchment.

Action 4: Protection of Heritage Rivers

Heritage Rivers – Lower Wimmera River

Although riparian and instream vegetation, woody debris and geomorphic condition provide excellent structural habitat in the lower Wimmera River, its hydrology has been significantly affected by anthropogenic activities upstream.

Datchak Creek is a significant anabranch / flood channel of the lower Wimmera River. However, it is under significant pressure from the local agricultural industry as only a limited riparian zone buffers it from surrounding land uses. Datchak Creek retains a good geomorphic condition.

Lake Hindmarsh, Lake Albacutya and Outlet Creek are in reasonable geomorphic condition, though they are suffering from a lack of regular flows. The flooding regimes in these systems have been changed by the significant diversion and harvesting of water in the upper Wimmera catchment. Lake Albacutya is one of Victoria's eleven listed Ramsar wetlands. According to the Victorian River Health Strategy, the status of Lake Albacutya is '...heavily dependent on river condition'. (NRE, 2002).

Action 4: Recommendations

Important considerations for management of the lower Wimmera River include:

- The retention and protection of its current geomorphic form
- Improving and maintaining riparian vegetation
- Improving and maintaining in-stream features such as woody debris

The return of a flow regime similar to the natural regime would significantly increase the ecological value of the river, the terminal system consisting of Lake Hindmarsh and Lake Albacutya and the overflow system of Outlet Creek. It is recommended that the Wimmera CMA investigate the environmental flow requirements of these terminal systems.

The addition of Datchak Creek to the Heritage Wimmera River Corridor may increase the protection of a major geomorphic and hydrologic feature of the lower Wimmera River system.

Action 5: Defining Template Reaches using Representative Rivers as a basis

Representative Rivers

The Victorian River Health Strategy (VRHS) (NRE, 2002) defines Representative Rivers as those that are:

“...rivers in an ecologically healthy condition that can be used to represent the major river classes that once occurred naturally across Victoria.”

A statewide target that is set in the VRHS is:

“By 2021, there is at least one major river reach in each of the river regions represented in Victoria that meets the definition of ecologically healthy”

Action 5: Recommendations for Representative Rivers

Although there are no suggested Representative Rivers, as defined in the VRHS, in the Wimmera River catchment, there are two on the Avoca River and two on the Glenelg River. It is recommended that the Wimmera CMA investigate the existing representative rivers and use them as templates for similar waterways in the Wimmera River catchment.

Representative Sites

Representative Sites provide templates for stream condition assessments and for stream rehabilitation efforts. Representative streams provide an opportunity to gain an understanding of the different stream categories that occur within the Wimmera River Basin. Gaining an indication of the features that control the position and formation of such waterways would be a useful outcome.

Action 5: Recommendations for Representative Sites

The identification, assessment and recording of representative sites are recommended. The features that could be assessed to gain this understanding include:

- Catchment area
- Cross section analysis
- Longitudinal profiles
- Flow data (if available)
- Catchment and Riparian vegetation, including exotic and native species

A thorough documentation of those representative sites found in the catchment will capture the diverse and unique nature of the Wimmera Catchment and its streams. This information could then be explored for the establishment of template sites for rehabilitation works in the rest of the catchment.

The identification of representative high value sites in a completely natural state for all stream categories is difficult in the Wimmera River Basin. In particular, suitable representative high value sites for some of the uncommon stream categories are difficult to find.

However, waterways that may contain reaches with representative high value sites are shown in Table 4.5.

Table 4.5: Representative High Value Sites

Stream Type	Waterways
Steep Headwater	Seven Dials Creek and Bovine Creek
Confined	Glenpatrick Creek and Boggy Creek
Gorge	Upper MacKenzie River and Golton Creek
Partly Confined 1	Upper MacKenzie River and Spring Creek
Partly Confined 2	MacKenzie River
Partly Confined 3	Bovine Creek
Alluvial Continuous 1	Sheepwash Creek, Mt William Creek and Lower Wimmera River
Alluvial Continuous 4	Mt William Creek and Lower Wimmera River
Alluvial Continuous 5	Station Creek, Brimpaen
Anabranching fine grained	Lower Wimmera River, Marma State Forest
Intact Valley Fill	Unknown 3 & Unknown 5
Chain of Ponds	Glenlofty Creek
Discontinuous Anabranching Chain of Ponds	Lower MacKenzie River
Cut and Fill	Unknown 7
Floodout	Unknown 13
Distributary Systems	Yarriambiack Creek
Flood Channel	Datchak Creek

It is recommended that the Wimmera CMA further investigate the use of the waterways included in Table 4.5 as template reaches to aid rehabilitation plans in the remainder of the catchment.

References

NRE (2002) Healthy Rivers Healthy Communities & Regional Growth – Victorian River Health Strategy. Department of Natural Resources and Environment

