Acknowledgement

Many individuals and organisations have assisted with the development of the Plan. These include the members of the Community, Technical and Agency Advisory Groups, focus group participants, and many hundreds of interested people from the broader community. All repeatedly demonstrated their commitment to the future wellbeing of Lake Hume through their participation in consultative forums and their contributions. We wish to thank them all and acknowledge their input.

Our thanks and appreciation also to Hyder Consulting, the Regional Development Company and George Ward Consulting for their assistance with this project.
Vision for Lake Hume

It is the year 2050... Lake Hume is an important water supply storage that also provides recreational, social and economic benefits for the broader community. There is a strong sense of shared responsibility between upstream, downstream and local users to ensure a healthy and sustainable future for the lake, its surrounding environment and the water resource.
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1 Executive Summary

Lake Hume is a crucial asset, which supports a large and diverse range of values and uses including water for irrigation, urban use in towns and cities, stock and domestic use, recreation and tourism. These provide immense economic, social and cultural benefits to local and downstream communities along the Murray River. Good water quality is essential to protect these values and it is critical that these multiple uses are managed in an integrated way to ensure long-term sustainability.

The Lake Hume Land and On-water Management Plan provides a strategic approach to management of land and on-water issues at Lake Hume. Numerous strategies and plans have been produced over the years to address various issues at Lake Hume. This Plan will not override other strategies; it consolidates existing strategies and required actions into one strategic plan.

The Plan aims to identify and protect important values associated with the lake by outlining priority land and on-water management issues and identifying key actions to be implemented during the next five years. Most importantly, the Plan aims to increase communication, consistency, co-ordination and co-operation between agencies, stakeholder groups and the community to protect the lake’s values and attributes.

As well as producing the Lake Hume Land and On-water Management Plan, the project aims to achieve acceptance of management recommendations and responsibilities. To achieve this aim, an ongoing comprehensive stakeholder and community consultation program was facilitated and a technically robust and defensible process for its implementation.

Four formal rounds of consultation have been carried out during the development of the Plan. A separate Implementation Plan has also been developed outlining key actions for implementation, targets and assessment criteria.

Ongoing, consultation, education and increased awareness will be critical to achieving goals set out in the Plan. A Community Reference Group will be set-up to play an important role in the community engagement process during long-term management of Lake Hume. The Community Reference Group will have a number of responsibilities. It will help prioritise actions in the Lake Hume Land and On-water Management Plan, and to provide advice on implementation. The Community Reference Group will also advise on community engagement activities, such as informing and raising community awareness on the importance of environmental issues in the local area.

The Lake Hume Land and On-water Management Plan is a dynamic document and will continue to evolve as the various actions and strategies that it identifies are developed and implemented.

It is proposed that this Plan be reviewed every five years.
2 Objectives of this Plan

The main objectives of the Lake Hume Land and On-water Management Plan are to:

- Identify and protect Lake Hume’s environmental, social (including recreational) and economic values by outlining key actions to be implemented during the next five years;
- Improve formal and informal processes and planning instruments in place to manage the lake and surrounding foreshore; and
- Improve the management of development pressures around the foreshore of the lake; and
- Protect natural and cultural values by obtaining broad-scale agreement between agencies on principles for sustainable use and development of the lake and surrounding foreshore.

3 Context

3.1.1 Storage Operations

The Lake Hume Land and On-water Management Plan cannot make any specific decisions regarding the management of water levels in Lake Hume. Operational issues including lake levels and the management of releases from Hume and Dartmouth Dam are ‘bigger picture’ questions beyond the scope of this Plan.

Operational issues have been extensively reviewed in previous years, and will be reviewed on an ongoing basis. Issues associated with the management of water resources are currently being addressed at a national level.

The Murray-Darling Basin Commission (MDBC) will review the operations of Hume and Dartmouth in response to the current drought. However this must be part of a broader review of the operation of the Murray-Darling system as a whole. Lake Hume was built primarily for downstream water supply for irrigation and urban use and its operational and management costs are funded by water users. Any operational decisions must consider potential effects on downstream users and regional communities.

3.1.2 Legal Status

The Lake Hume Land and On-water Management Plan has no legal status. It will not impose any new legal or statutory requirements, but through influencing policy, may lead to future changes in legislation that will assist in meeting the objectives of the Plan.

3.1.3 Land Status

In Victoria, Goulburn-Murray Water (G-MW) owns and manages most of the lake bed and immediate foreshore land on the Victorian side of the lake on behalf of the MDBC. This land is public land, existing as either freehold title in the name of G-MW, Crown Land vested in G-MW, or Crown land reserved for water supply purposes under the control and management of G-MW.

In NSW most of the land surrounding the lake is freehold title in private ownership with easements to flood attached with a few distinct Crown allotments.

3.1.4 Study Area

The geographic scope of this project is limited to the lake, the foreshore and the surrounding areas. Figure 1 (page 52) illustrates Lake Hume and the catchment to Lake Hume. Direct management control of water authorities is limited to areas of lake bed and foreshore public land, which are predominantly in Victoria. While the Plan focuses on the lake and foreshore areas it also aims to positively influence activities throughout the broader catchment, consistent with MDBC responsibilities under the Murray Darling Basin Agreement.

3.1.5 Management Roles and Responsibilities

Numerous agencies have some role in the management of land and water issues at Lake Hume. Current management roles and responsibilities are summarised in Appendix D.
4 Community Engagement

During the early 1990s the MDBC instigated a project to develop management plans for Lake Mulwala and Lake Hume. It was evident the primary function of water storages had evolved to encompass broader community expectations. Water storages provided multiple-uses and urban development pressures were encroaching upon the dam surrounds, resulting in a decline in water quality. This led to the need for a strategic, longer-term approach to planning and management of Lake Mulwala and Lake Hume and the surrounding catchments. Programs and initiatives put in place in the 1990s did not achieve objectives and it was not until August 2000 that the program was rejuvenated and a brief was prepared by the MDBC to develop a land use management plan for Lake Mulwala and Lake Hume.

In May 2002, a reference group was commissioned to identify issues and discuss the approach to the development of a land and on-water management plan for Lake Hume.

Five community meetings were held at different locations around Lake Hume in late July 2003. About 200 people attended meetings in Granya, Bellbridge, Tallangatta, Table Top and Albury. Issues raised at the meetings combined with issues raised by other key stakeholders formed the basis of the Lake Hume Land and On-water Management Plan: Issues Summary Paper produced in 2004.

Active development of the Lake Hume Land and On-water Management Plan was delayed from 2004 to mid-2006 while background studies were delivered and resources diverted to developing and implementing the Lake Mulwala Land and On-water Management Plan, which was considered more urgent at the time.

In November 2006, the draft Lake Hume Land and Water Management Plan commenced. A Community Consultation Plan was also developed to accompany the draft Plan.

Objectives of the Community Consultation Plan were to provide effective and targeted input into the preparation of the Plan including:

- Identifying key issues relating to the lake and surrounding environment;
- Prioritising key issues and risks;
- Developing a 50-year vision for Lake Hume;
- Canvassing the array of views on recommended land and recreational uses;
- Discussing options related to the recommended land management controls;
- Obtaining feedback on the draft Plan; and
- Gaining community support, ownership, awareness and understanding of the Plan.

Four formal consultation phases were completed, including:

- Preliminary review of the issues and development of a 50-year vision;
- Prioritisation of issues and risks;
- Development of key objectives and management controls; and
- Feedback on the draft Lake Hume Land and On-water Management Plan.

Community consultation was based around two broad categories of stakeholders: those likely to be impacted by the Lake Hume Land and On-water Management Plan and those who will play a key role in longer-term implementation of the Plan.

Members of the general public have been involved, including organised groups such as Save Lake Hume, boating and recreational groups, upper catchment landholders, landholders around the lake and downstream water users. All local government areas surrounding the lake have been consulted and most have played a vital role in shaping the issues and actions to address those issues. All relevant NSW and Victorian Government departments, including water and planning authorities and the North East and Murray Catchment Management Authorities (CMAs) have been involved.
The Community Advisory Group, established in 2002, comprised interested local landholders, recreation users, tourism operators, and local government representatives. In early 2007 this group was expanded to include agency and technical representatives. The combined stakeholder group met six times since the Plan commenced in September 2006. The group’s role was to review input from the general public on issues and actions, prioritise issues to be addressed and develop objectives to address the issues including agreement on responsibility for actions to be undertaken.

Three focus groups of self nominated and interested community members (about 60 people in total) met on three occasions to develop a 50-year vision for the Plan, review the nominated priority issues and develop and refine key actions.

Open days in the first phase of consultation were held in February 2007 in Tallangatta, Lake Hume, Wodonga and AlburyCity Centre, involving 155 members of the general public who identified 337 issues and possible actions for consideration for the Plan. These meetings, media coverage and mail-outs attracted members of the public to self-nominate for the focus groups.
5 Why a Plan is Important

Lake Hume is one of Australia’s most significant and important water storages. Lake Hume provides water for a range of uses, including irrigated agriculture, human consumption, stock consumption, industry and the environment. Many downstream towns and cities including Adelaide depend on the Murray for water supply. The economic and social benefits to regional economies provided by this infrastructure are estimated at billions of dollars annually.

Lake Hume is a significant recreational area, popular for swimming, sailing, waterskiing, caravanning, camping, picnicking, yachting, rowing, canoeing, fishing and sightseeing.

However, an integrated, overarching plan has never existed for the management of land and on-water issues at Lake Hume. If poorly managed, land and on-water activities can impact on water quality and the overall health of the lake. This in turn will affect social and economic benefits gained from Lake Hume.

The Lake Hume Land and On-water Management Plan will drive education and awareness raising activities on a number of high priority issues, including threatening processes that impact on water quality, regulations developed to protect health and safety of lake users, and the history and heritage of the lake and surrounds.

More specifically the Lake Hume Land and On-water Management Plan provides a mechanism to develop and implement key actions to enhance the visitor experience and recreational values of the lake; and to protect and preserve water quality, ecosystem health and the water resource.

The Plan will also increase communication between the numerous agencies and stakeholders involved in management of the lake and will co-ordinate planning and future development activities.

Although the Plan has no legal status, it will be used to guide the management decisions and policy development of the MDBC, State Water NSW, and G-MW. The Plan may also be used as a reference document for all other responsible authorities.

6 Implementing the Plan

The Lake Hume Land and On-water Management Plan aims to ensure long-term sustainable use of Lake Hume and its surrounds.

To achieve this, the Plan focuses on a number of key outcomes including:

- Better communication, consistency and a co-ordinated approach to planning and future development at Lake Hume;
- Improved water quality in the lake;
- Improved ecological health of the lake;
- Safe use of the lake; and
- A community commitment to sustainable use of the lake.

The Plan has a five year focus for the implementation of the key actions, underpinned by a 50 year vision for the future of the lake.

An Implementation Plan will be prepared outlining a simple and effective strategy to execute key actions in the Plan alongside targets, performance assessment criteria and an adaptive management framework which will allow for review and progress assessment, and changes in the implementation planning if required.

It is intended that this document will be reviewed every five years, providing an opportunity to incorporate changes due to the dynamic nature of planning processes and changes in stakeholder roles, responsibilities and strategic directions.
7 How to Use This Plan

The Plan is structured around seven key headings listed below:

- Community Awareness and Involvement
- Recreation and Tourism
- Water Quality
- Healthy Ecosystems
- Agricultural Land Use
- Planning and Development
- Cultural Heritage

A quick-find index (on page 1) is designed to help identify information on the issues of interest.

Under each heading there is a vision statement followed by a number of key issues. Each issue contains explanatory text, the objective relating to the management of the issue and actions to address the issue. The roles and responsibilities for implementation of each of the actions are also outlined.

The summary of management actions can be found on pages 38–46 (Appendix A).

Some issues are addressed in more than one section of the Plan. For example, safe boating in relation to submerged and floating timber can be found under Recreation and Tourism and also under Healthy Ecosystems. The Plan refers the reader to other relevant sections of the Plan when an issue is discussed in more than one section. It is important to follow the links between sections in order to fully appreciate the approach to management in relation to a particular issue.
8 A Plan for the Management of Lake Hume

8.1 Community Awareness and Involvement

Developing and managing the lake for all users and landholders through improved community engagement, education and shared information.

The community has a great interest in the management of Lake Hume and the recreational, environmental, social and economic issues associated with the lake and surrounds. Greater community involvement helps to ensure managers understand stakeholder and community issues and values and promotes better understanding of the reasons for management policies to protect the lake and foreshore.

Everyone who uses the lake including recreational and downstream users, has a role to play in the protection of water quality and the surrounding environment.

8.1.1 Community Reference Group

Many community members have a strong sense of ownership of Lake Hume. It is also apparent that members of the community have differing values and ideas on how the lake should be managed. It is important that the community has the opportunity to be involved in decision-making processes that affect them and to participate in the development of trade-offs where competing interests arise.

The establishment of a Lake Hume Plan Community Reference Group is proposed as an important step in engaging the community in the management of Lake Hume. This will assist with the implementation of actions and recommendations in the Plan by providing a clear mechanism for the community to clarify and communicate issues of concern to responsible agencies.

The role of the Lake Hume Plan Community Reference Group will be to:

- Provide direct advice to G-MW, State Water NSW and the MDBC on implementation of the Plan;
- Help prioritise implementation of actions outlined in the Plan;
- Advise on community engagement activities, such as informing and raising community awareness on the importance of environmental issues in the local area and balancing downstream and local community views;
- Provide feedback to community interest groups;
- Identify other initiatives in the Lake Hume region;
- Provide advice on consultation strategies and play an active role in ongoing consultation;
- Monitor and evaluate the implementation of the Plan; and
- Assist with a review of the Plan every five years.

Membership of the Community Reference Group will consist of:

- An impartial and respected Chair;
- An elected councillor from Towong, Wodonga, Albury, Hume and Indigo councils; and
- At least five community representatives with specific interests and broad representation across the community, including downstream water users.

Representatives of other agencies and groups will be invited to attend meetings either as observers or in an advisory capacity as appropriate.

There will be a call for expressions of interest for Community Reference Group members soon after the Plan is released.

To further enhance community involvement opportunities, it is proposed that community forums hosted by the Community Reference Group are held at least annually. These would provide an opportunity to discuss planning and recreation topics, to suggest solutions to issues of concern and enable a public voice in the management of Lake Hume.

Objectives

To establish community-based reference groups to assist with the management of Lake Hume.

Actions

1. Establish a Lake Hume Plan Community Reference Group to guide the implementation of the Plan and communicate priorities within the Plan.

Implementation: Roles and Responsibilities

G-MW is responsible for this action.
8.1.2 Community Education and Awareness

The actions and behaviour of locals and visitors play an important role in the sustainable management of Lake Hume. The choices that people make while boating, camping or as property owners along the foreshore, can affect the health and long-term sustainability of the lake.

An awareness raising program is needed to show how different activities can impact on the lake and to inform people about the lake’s purpose. Lake users should be aware of, or able to easily obtain regulations and policies for recreational activities, planning and development at Lake Hume. People should know who to talk to about issues relating to the lake and what role different agencies play in its management. Lake users should understand that Lake Hume is a vital part of a much larger system relied upon by many downstream communities.

The success of these efforts will be demonstrated by a sense of shared responsibility between the community and agencies, locals and visitors, upstream and downstream users alike.

Throughout the development of the Lake Hume Land and On-water Management Plan, community members expressed interest in obtaining materials and information on a variety of issues. Education campaigns and provision of materials will play an important role in raising community awareness. Various mechanisms will be used to increase education and awareness, including interactive interpretive signage, websites, media and school programs, and a visitor education centre. The visitor education centre would be a source of information about Lake Hume, the catchment and the broader Murray-Darling Basin.

Objectives
An informed and involved community working co-operatively with agencies to find shared solutions to the land and water management challenges faced at Lake Hume.

Actions
2. Develop a communication and awareness campaign on recreation, water quality issues and other land and water management issues, dam operations and water level issues;
3. Develop a central facility and service for the community to access all information about Lake Hume and the broader Murray Darling Basin;
4. Develop an interactive website containing maps, plans, zones, FAQs, management arrangements and by-laws;
5. Develop an education program for existing regional visitor information centre; and
6. Develop interactive interpretive and educational signage at recreation reserves advising the community of the history and heritage of Lake Hume and the ‘land and on-water’ aspects of Lake Hume.

Implementation: Roles and Responsibilities
G-MW, State Water NSW and the MDBC are primarily responsible for these actions.
8 A Plan for the Management of Lake Hume

8.2 Recreation and Tourism

Improved facilities and infrastructure and a useable lake all year round.

Lake Hume is an asset for North East Victoria and southern NSW due to its recreational and tourism values. The lake attracts tourists from NSW and Victoria and is a popular location for active recreation pursuits, including boating, waterskiing, and swimming.

The lake is also very popular for passive recreational pursuits including sightseeing, fishing, picnicking, walking and camping at all times of year.

These uses need to be managed and balanced against Lake Hume’s primary role as an irrigation storage.

8.2.1 Boating

Lake Hume is one of the most significant inland water storages for high-speed boating, waterskiing, sailing, canoeing/kayaking and the use of other personal watercraft such as jet skis.

Under the Marine Safety Legislation (Lakes Hume and Mulwala) Act 2001, Lake Hume is divided at Bethanga Bridge between Victoria and NSW for boating purposes. All vessels north of Bethanga Bridge are operating in NSW waters, where the NSW Maritime Authority is responsible for management of boating activity. G-MW is the designated boating authority for Victorian waters, however enforcement of boating rules is usually carried out by Victoria Police. The Lake Hume Volunteer Coast Guard based at the Lake Hume Resort also provides search and rescue and boating education services.

Boating rules differ between NSW and Victoria, which can be a cause of confusion. For example, in Victoria, when the lake falls below 10 percent capacity, boating on the Mitta Mitta arm and all waters downstream of the Bethanga Bridge on the Murray arm is restricted to four knots for public safety due to the numerous large sawn-off stumps which emerge at 6-8 percent capacity. In NSW there is no restriction.

Furthermore, in Victoria, under the present zoning there are numerous speed limited and boating prohibited zones, gazetted under Schedule 95 (Waters - Lake Hume) of the Marine Act 1988, section 15 Vessel Operating and Zoning Rules for Victorian Waters of Lake Hume. The current zones are poorly delineated, not widely understood and are difficult to manage due to rapidly fluctuating water levels in the lake. A review and revision of boating zone rules in consultation with key stakeholders is proposed.

High-speed boating and jet skiing safety issues include the potential to swamp or capsize other watercraft and the threat to swimmers in near-shore areas. The use of boats fitted with wake enhancing devices is increasingly popular at Lake Hume. These devices create enhanced wave action for the purposes of trick skiing. NSW Maritime advises that the effects of wake boating are the subject of a current study, though the study is not complete and findings of the study are not yet available.

High-speed boating activity may also cause shoreline erosion however, this has never been quantified. Foreshore erosion could impact on archaeological sites although this has never been assessed.

Concerns about the impact high-speed boating, particularly boats with wake-enhancing devices, will be investigated and addressed as appropriate.

Noise from some high powered boats can be a nuisance, and fuel for powering boats used on the lake also needs to be managed to protect the aquatic environment and water quality.

Lake Hume contains extensive areas of dead trees and other snags. These can obstruct boating but also provide valuable fish habitat that should be preserved. While public safety issues can be managed with zoning rules, in limited cases relocation of specific snags will be considered to assist in maintenance and enhancement of navigable areas, subject to the endorsement of Victorian and NSW Fisheries and peak fishing representative groups such as VRFish (also refer to Section 8.4.1).

Houseboats and other boats with sleeping accommodation are prohibited on Lake Hume. At low lake levels the useable area of the lake is not sufficient for these types of boats and there is potential for conflict with other on-water activities. Wave action on the lake poses a potentially
dangerous situation for houseboats. There are also serious concerns about the potential impact of grey-water discharge on water quality. There are no mooring licences for vessels on the lake and no appropriate mooring facilities or other necessary infrastructure for houseboats.

Community events at Lake Hume are encouraged and Lake Hume is used for a number of boating and waterskiing events each year. Such events must be planned and licensed as appropriate through G-MW (for events south of Bethanga Bridge) or NSW Maritime Authority (for events north of Bethanga Bridge) to ensure they do not conflict with other lake users and are conducted in a manner that does not compromise public safety or the environment.

**Objectives**

Improved boating rules to enhance access and protect the safety of recreational users of the lake.

**Actions**

7. Review existing boating zones to resolve inconsistencies in cross-border regulations, improve safety and practicality for boating, swimming and waterskiing;

8. Assess, and where appropriate, implement recommendations from recent studies on boats with wake-enhancing devices, particularly on safety and erosion impacts; and

9. Consider limited tree stump removal combined with fish habitat enhancement in areas south of Bethanga Bridge, subject to endorsement of NSW Department of Primary Industries (DPI) Fisheries, and Victorian DPI Fisheries, relevant landowners and peak fishing representative bodies.

**Implementation: Roles and Responsibilities**

G-MW and NSW Maritime Authority are primarily responsible for actions 7 and 8. Boating and tourism operators, user groups and other relevant stakeholders should take responsibility for progressing action 9.
8 A Plan for the Management of Lake Hume

8.2.2 Fishing

Fishing is a popular recreational activity at Lake Hume. The Lake is classified as a multiple fishery and Golden Perch, Murray Cod, Silver Perch, Carp, Rainbow Trout, Brown Trout and Redfin can be found in the lake (DPI, 2006). Many anglers fish Lake Hume specifically targeting Redfin.

In 2002, Lake Hume including Victorian and NSW waters, was designated as Victorian waters for licensing and fishery management and the Victorian DPI has primary responsibility in this regard. This arrangement between NSW and Victoria is implemented through an agreement under the Victorian Fisheries Act 1995 and the NSW Fisheries Management Act 1994. However, NSW DPI Fisheries still retains responsibility for the protection of fish habitat in NSW waters.

Lake Hume is stocked with Golden Perch, Murray Cod and Brown Trout by the Victorian DPI. Stocking occurs after the annual consultation process involving the Victorian recreational fishing peak body (VRFish), water and CMAs, Fisheries Victoria and other relevant stakeholders (DPI, 2007).

Lake Hume should be managed to ensure that fisheries and fishing related activities are sustainable in the long term. Protection of fish habitat is essential to maintain and enhance fish stocks. Habitat for native fish in Lake Hume includes primarily submerged or partially submerged dead trees. These features are at odds with some recreational activities which require extensive stretches of open water (also refer to Section 8.4.1).

In Victoria, the North East Fishery Management Plan has recently been released which contains recommendations and actions for managing fishing activities in areas including Lake Hume. There is currently no equivalent plan in NSW. The Native Fish Strategy for the Murray Darling Basin 2003-2013 contains recommendations and objectives directed at improving the status of native fish populations in the Basin. This strategy does not make specific reference to Lake Hume.

Objectives

To maintain and enhance native and stock fisheries within Lake Hume.

Actions

10. Implement recommendations within the North East Fishery Management Plan that relate to recreational fishing in Lake Hume; and

11. Assess and implement fish stocking requirements, in consultation with peak fishing bodies.

Implementation: Roles and Responsibilities

The Victorian DPI Fisheries is primarily responsible for these actions.
8.2.3 Camping

Opportunities for camping at Lake Hume are limited. Current by-laws prohibit camping on the Victorian foreshore outside designated camping areas, without approval of the landowner (G-MW). Camping is permitted in the caravan parks and in NSW on private land around the lake only with the landowners’ permission.

Camping restrictions are difficult to enforce due to the extent of the shoreline, limited resources and poorly defined management arrangements. Bush camping remains a popular activity, particularly along the Murray arm of the lake. In Victoria, the foreshore of the lake along the Murray River, east of Talgarno Point is easily accessible from the road, which is mostly unfenced, and the area is secluded making it popular for camping.

There are no recent reliable estimates of the numbers of campers accessing the Lake Hume foreshore. Anecdotal evidence suggests that numbers increase substantially over public holiday periods and during the Victorian duck hunting season.

Potential concerns related to uncontrolled bush camping include: rubbish and waste management issues; vehicle access to the lake bed; impacts on foreshore vegetation and archaeological sites; increased fire risk; lack of adequate toilet facilities; trespass and interference with legitimate grazing activity; risks to public safety; noise, excessive alcohol consumption and general anti-social, nuisance behaviour. However this Plan recognises that the majority of campers are responsible, and there is a legitimate demand for well-managed camping along the Lake Hume foreshore.

Establishing new camping reserves is a possibility provided sites are away from existing commercial facilities, areas with high value environmental values, archaeological sites or where they will interfere with neighbouring private landowners.

Potential areas for new public camping sites include Bowna, Vincent’s, and Kennedy’s reserves. Consultation between management agencies, campers and the local community is required to develop an appropriate management approach to camping at Lake Hume.

New camping areas should not be established until they can be adequately resourced and satisfactory management arrangements are in place. Camping management policy and procedures should be consistent with those employed by Parks Victoria and NSW National Parks and Wildlife Service at similar areas. A designated Lake Hume ‘ranger’ position has often been suggested by the community to monitor and manage camping and related activity.

Objectives
To manage impacts of camping on water quality, public safety and the foreshore environment. To promote designated and well-managed areas for camping.

Actions
12. Develop a camping policy for Lake Hume;
13. Define current and future levels of demand to inform possible establishment of defined camping areas;
14. Evaluate and if practicable establish designated camping areas on the Lake Hume foreshore;
15. Develop an education program to inform campers of designated areas and the importance of minimising impacts on the environment; and
16. Fund a ‘Lake Hume’ ranger/public use officer with enforcement powers to manage illegal camping, littering and other issues such as safety, trespass and interference with grazing.

Implementation: Roles and Responsibilities
G-MW will take a lead role in co-ordinating these actions, in consultation with Parks Victoria, NSW National Parks and Wildlife Service, local governments, tourism representatives and the local community.
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8.2.4 Public Access

Public access to Lake Hume should be improved provided it does not compromise public safety, water quality and the environment or the operations of the lake.

Opportunities for public access to the lake environs vary. In Victoria, most foreshore and lake bed areas are either Crown land vested in G-MW, or more commonly G-MW freehold land. This land is managed as public land, and as a general principle the public can access this land for passive recreational purposes such as fishing, sightseeing and walking.

Access to Victorian public land is also subject to compliance with various agency by-laws applicable to public land. Specifically G-MW’s By-law No. 7 – Recreational Areas has provisions relating to boating, vehicle access, camping and fires, shooting, management of dogs and other animals. Of particular note are provisions which prohibit unauthorised vehicle access to areas other than roads and tracks, and provisions prohibiting camping in non-designated areas.

In NSW, the opportunity for public access is more limited as most of the foreshore land is private freehold land, which can only be accessed with the permission of the relevant land owner.

Several community based clubs are located at Lake Hume, including the Hume Boat Club, the Albury-Wodonga Yacht Club and the Hume Angling Club.

Current access arrangements to Lake Hume are confusing and poorly delineated. Distinguishing between private and public land is difficult, and there is some risk of deliberate or inadvertent trespass onto adjacent private land. Access issues vary with changing water levels and areas that require managed access are large and expansive, making it difficult to manage efficiently.

The general public mostly accesses the lake via public reserves scattered around the lake (also refer to Section 8.2.5). Much of the Victorian foreshore and lake bed areas are licensed for grazing purposes and while public access for recreational pursuits such as fishing and duck hunting is currently allowed, it must not interfere with or impact on legitimate grazing activity.

Considerable work has been undertaken in recent years by Parklands Albury Wodonga in partnership with community groups such as the Bonegilla and Tallangatta Rail Trail Advisory Groups on the High Country Rail Trail project to refurbish the old railway line and railway land abutting the southern margins of the lake as a shared pathway for pedestrians and cyclists.

AlburyCity Council recently completed a comprehensive planning project The Murray River Experience. The project focuses on enhancing public facilities and access to the lake and improving reserves and connections between reserves and the Murray River along the NSW shoreline from Hume Dam to Tabletop Reserve.

There is great opportunity and need for similar foreshore master plans at other focal points around the lake, such as the Wodonga reserves, and the Bellbridge and Tallangatta foreshore areas.

Significant potential exists for improved public access via shared pathways linking key access points and nearby townships. Possibilities for linking the High Country Rail Trail with the weir wall, the Murray Experience Trail and Hume and Hovell trails should be further explored.

These projects are supported by this Plan, but will require interested parties to fund both construction and maintenance.

Community events at Lake Hume are encouraged, though events must be planned and licensed as appropriate through G-MW in Victoria or the relevant landowner in NSW to ensure they do not conflict with other lake users and do not compromise public safety or the environment.

Objectives
To provide safe access for recreational use and inform the broader community about reasons for controlled and well-managed public access.

Actions
17. Clearly designate private and public land through the production of maps, including signage, illustrating private and public spatial zones;

18. Develop an educational and awareness raising campaign to inform the broader community about reasons for controlled and managed access;

19. Encourage and facilitate access for community groups and not-for-profit organisations;
20. Develop shared pathways linking the High Country Rail Trail with the weir wall, the Murray trail and Hume and Hovell trails; and

21. Develop detailed landscape master plans for key foreshore areas.

**Implementation: Roles and Responsibilities**

G-MW is primarily responsible for coordinating actions 17, 18 and 19. Parklands Albury-Wodonga, community groups and the relevant local governments have lead responsibility for facilitating action 20. Local government agencies and G-MW have a lead role in facilitating action 21.

### 8.2.5 Public Reserves

There are 20 public reserves on the Lake Hume foreshore, some of which have minimal or no infrastructure or signage and are not widely known or utilised. Examples include Merkels, Drummonds, Vincents, Wymah, Granya Bay and Kennedy’s reserves.

Other reserves such as Bowna, Tabletop, Kookaburra Point, Ludlows, Ebden, Huon, Apex Park, Tallangatta and Bellbridge are better utilised and include boat ramps and other facilities such as toilets and picnic areas. However most of the infrastructure is now dated.

In NSW, reserves are managed by AlburyCity Council and Greater Hume Shire Council. In Victoria, management arrangements and requirements for the reserves are poorly defined and unclear. Most of the reserves are located on G-MW land, and local government involvement in reserve management varies. Reserve management is poorly funded and cost sharing arrangements are unclear.

These problems should be rectified. An equitable, co-ordinated and consistent approach to reserve management and funding is required.

AlburyCity Council’s Murray River Experience project identifies several areas with potential for development into additional public reserves, including public land at Bowna, Bells and Knobles Road areas. Similarly there is potential for new reserves immediately below the weir wall.

**Objectives**

Manage existing public reserves at Lake Hume to a high standard. Seek to develop new reserves to enhance open space and connections to the lake for leisure and recreational use and better access to Lake Hume.

**Actions**

22. Consider the development of new public reserves at Bells and/or Knobles Road areas;

23. Consider the development of a new reserve immediately below the weir wall;

24. Develop a Memorandum of Understanding (MoU) to clearly specify management arrangements and agreed levels of service for the public reserves at Lake Hume;

25. Establish an equitable cost-sharing model through the MoU for funding to manage reserves; and

26. Establish licence agreements between G-MW and the relevant local governments to manage Victorian reserves.

**Implementation: Roles and Responsibilities**

AlburyCity Council and Wodonga City Council will take a lead role in implementing actions 22 and 23. G-MW acting on behalf of the MDBC will facilitate agreement on Actions 24, 25 and 26.
8.2.6 Facilities and Infrastructure

Most public infrastructure at Lake Hume reserves was built during the 1960s and 1970s. Today many of the facilities are degraded and the roles and responsibilities for upkeep and maintenance are not clearly defined. In some areas there is little infrastructure, with the lack of public toilets at some reserves a concern. Vandalism is an ongoing problem, particularly at the more remote reserves.

G-MW and some of the local government authorities undertake regular risk assessments of facilities and infrastructure at the reserves. However, more work is required to assess the facilities in detail to determine priorities for investment based on visitor numbers and responsibilities for upgrades.

Recent enhancements to boating facilities have included low-level extensions of boat ramps at Ludlow’s and Ebden reserves by the Wodonga City Council and a new low-level access public boat ramp at Butko Reserve south of Bellbridge. Works were carried out by G-MW with Victorian Government funding through Marine Safety Victoria’s Boating Safety and Facilities program.

The MDBC, via G-MW, currently provides funding to some Victorian local government bodies to assist with maintenance of public facilities at the reserves. However responsibility for upgrading or replacing infrastructure is unclear.

In other foreshore and lake bed areas there are often items of private infrastructure such as diversion pumps located on public land managed by G-MW and other agencies. Structures that pose an unacceptable public safety or environmental risk are not permitted on foreshore lands controlled by government agencies. Any existing structures or new structures must be licensed or removed.

Objectives

To improve public infrastructure and clearly define roles and responsibilities for upgrade and maintenance.

Actions

27. Review existing risk assessments to determine priorities for investment in infrastructure and facilities;
28. Clarify and formalise the roles and responsibilities for upgrade and maintenance of infrastructure incorporating minimum standards;
29. Investigate alternative technologies and systems to manage sewerage such as composting toilets in the foreshore environment;
30. Develop consistent signage at all access points with a specific ‘Lake Hume brand’; and
31. Develop interactive signage for recreation reserves on the history of Lake Hume and the heritage of the ‘land and on-water’ aspects of Lake Hume.

Implementation: Roles and Responsibilities

Reserve managers including G-MW and local government agencies will be responsible for facilitating these actions.
8.2.7 Solid Waste

Management of solid waste is a concern in many areas of the lake frequented by the visiting public. Inappropriate disposal of rubbish and litter, particularly broken glass containers is a common problem, and presents aesthetic, water quality and public health and safety issues. In NSW, AlburyCity Council and Hume City Council are directly responsible for waste management on reserves. In Victoria, the Wodonga City Council undertakes routine waste management services at Kookaburra Point, Jacksons Point, Ludlows and Ebden reserves under an agreement with G-MW. Similarly, Towong Shire Council provides waste management services by agreement with G-MW on the Tallangatta foreshore. G-MW contributes a level of funding to Victorian local governments to perform these services.

However, there are no formal arrangements in place for waste management on other public areas along the Victorian foreshore of Lake Hume. Management is largely ad-hoc arrangements that have developed over time and facilities are often rudimentary at best. A co-ordinated, consistent approach is required.

In Victoria the North East Regional Waste Management Group (NevRwaste) works in partnership with Environment Protection Authority (EPA) Victoria and Sustainability Victoria to “implement the state’s solid waste management and resource efficiency programs in north east Victoria” (NevRwaste website). NevRwaste works with local government within their region on educational programs and infrastructure development to minimise waste and litter. The Wodonga City Council, Towong Shire Council and Indigo Shire Council cover the region managed by NevRwaste.

Objectives

To minimise litter at public foreshore and reserve locations around the lake.

Actions

32. Develop an MoU between Wodonga City Council, Towong Shire Council, Indigo Shire Council, AlburyCity Council, Greater Hume Shire Council and MDBC for a solid waste management plan for the Lake Hume area.

Implementation: Roles and Responsibilities

On behalf of the MDBC, G-MW will facilitate this action, in consultation with the Wodonga City Council, Towong Shire Council, Indigo Shire Council, AlburyCity Council and the Greater Hume Shire Council.
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8.2.8 Recreation and Tourism Development

Hume Dam was built to supply water for irrigation, towns and cities and other downstream users along the Murray River. Economic benefits provided to regional economies by the lake are estimated at billions of dollars annually. Dam operation and maintenance, lake and foreshore monitoring and management costs are funded from fees levied from downstream water users, predominantly irrigators, for the provision of a regulated water supply.

However over many years a local recreation and tourism industry has developed around Lake Hume, and the significant economic and social benefits to the local region that this provides are acknowledged.

The value of recreation, tourism and irrigation generated by Lake Hume to the local, regional and national economies, has not been adequately assessed. This requires further investigation.

Lake Hume is an operating storage with water levels that fluctuate annually. But despite this, the lake is a relatively secure body of water compared to most other inland storages and there is potential to promote Lake Hume as a recreation and tourism destination. Promotional activity by local governments, tourism bodies and private interests has lacked co-ordination in the past. A specific ‘Lake Hume brand’ is suggested. Varying lake levels present challenges and opportunities for recreation and tourism development.

Recreation and tourism ventures that will not adversely impact on lake operations, water quality, environmental values or public safety and access are encouraged. Recreation and tourism developments which do not have a critical dependency on stable water levels, but can adapt to fluctuating water levels are preferred.

Funding of recreation and tourism infrastructure and management costs has long been a problem, as downstream water users are reluctant to subsidise these costs which have little benefit to them. Where possible, the ‘user pays’ principle should be applied, though difficulties with this approach at Lake Hume are acknowledged. There is also opportunity to explore the possibility of profitable development opportunities such as user pays arrangements for the use of the foreshore for events to offset costs of recreational facility management. A Lake Hume Tourism Committee comprising industry representatives has been suggested, to ensure a coordinated, consistent approach to recreation and tourism development at Lake Hume. Peak local tourism bodies such as Destination Albury-Wodonga are best placed to facilitate this type of committee.

Objectives

Evaluate the economic value of the lake to all users and the relative value of Lake Hume to downstream users and the local regional economy.

Promote the lake as a high quality recreation and tourism destination.

Promote recreation and tourism ventures that will not adversely impact on lake operations, water quality, environmental values or public safety and access.

Actions

33. Conduct a study to evaluate the economic benefits of recreation and tourism and the value of the lake to downstream irrigation and communities;

34. Evaluate profitable development opportunities to offset costs of recreational management of the lake; and

35. Develop a ‘Lake Hume brand’.

Implementation: Roles and Responsibilities

G-MW is responsible for facilitating Action 33. Local government, private operators and G-MW are responsible for Action 34. Local government and tourism industry representatives are responsible for Action 35 and 36.

8.2.9 References


MacroPlan, 2000, Lake Hume Foreshore Recreation Master Plan.


Department of Primary Industries, 2006, North East Fishery Management Plan.

8.3 Water Quality

Protection and maintenance of water quality for human consumption (indirect), irrigation, recreation, and the environment.

Good water quality is critical for communities to use the water for irrigation, drinking, commercial, agricultural and recreational activities. Good water quality is also important for the preservation and health of aquatic habitat and ecosystems.

Water quality can be measured through chemistry and biology, for its suitability for specific uses such as drinking. The most common indicators used to assess water quality are salinity, turbidity, sediment and nutrient concentrations, and temperature.

Nutrients, along with other factors such as temperature and sunlight intensity, contribute to blue-green algae blooms. Nutrients, particularly phosphorus and nitrogen, enter waterways attached to soil particles and sediments and from sewage and other industrial/commercial waste that enter rivers and their tributaries. Blue-green algae levels are compared against three alert levels known as low alert, medium alert, and high alert which guide responses to the bloom and possible risks involved (MDFRC, 2005). A low alert is not considered bloom level but has algae in sufficient numbers that a bloom could rapidly develop. At the medium alert level it is common for musty smells to be present, algae to be visible as green specks in the water and water treatment or alternative sources need to be considered for drinking water. At high alert level it is considered to be an algal bloom and humans, stock and pets are at risk from the water and alternative water sources need to be found (MDFRC, 2005).

While many factors known to cause blue-green algal blooms occur in Lake Hume, historically blue-green algal blooms are not very common. However between 2002 and 2004 there were several high alert blue-green algal (cyanobacterial) blooms recorded. Notably, the last three periods of high alert blue-green algal blooms have coincided with severe droughts in south eastern Australia (MDFRC, 2006b). An extensive research and monitoring project is underway to enhance understanding of the relationship between drought and water quality in Lake Hume.

A number of strategies that have been developed to protect and enhance water quality within the North East CMA and Murray CMA regions. These include the Upper North East Water Quality Strategy (DNRE, 1999), the Murray CMA Catchment Action Plan (2007) and the North East Regional River Health Strategy (NECMA, 2006). These strategies all recommend reducing nutrient and sediment inputs in local waterways and the Murray River.

8.3.1 Land Use in the Upper Catchment

Land use in the upper catchment has significant impacts on water quality in Lake Hume. Nutrient loads are exported from various diffuse and point sources, however it is believed land use practices in the upper parts of the Lake Hume catchment are significant sources of nutrients to the lake.

The majority of the catchment to Lake Hume comprises uncleared native forests on public land, and areas reserved for forestry. Forestry activities are undertaken both in native State forests and large pine plantations. The lower more accessible land in the catchment is mostly cleared and generally used for stock grazing (see Figure 1). The upper parts of the catchment and the Murray River upstream of Lake Hume contribute most of the sediments into the lake. A recent study suggests that about 86 percent of suspended material in the lake is derived from the Murray River, approximately 12 percent from the foreshore of the lake and about 2 percent from the Mitta Mitta River (CSIRO, 2003). Most of this sediment is thought to be delivered during ‘event’ flows corresponding to high rainfall events. Bushfire in forested parts of the catchment has the potential to impact significantly on water quality, particularly if followed soon after by heavy rainfall events.

Another emerging issue is a trend towards gradually increasing acidity of surface waters, which may also be linked in part to catchment land use practices (MDFRC, 2005).

The Victorian catchment to Lake Hume is a Declared Water Supply Catchment. Declared Water Supply Catchments are the basis for catchment planning and management under the provisions of the Catchment and Land Protection Act, 1994.
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Under this Act, Declared Special Areas (Water Supply Catchments) officially recognise designated catchments for water supply purposes. This process highlights to the community, land managers and planners, the importance of the catchment for water supply purposes.

Both the Murray CMA (NSW) and the North East CMA (Victoria) have strategies, such as the Regional Catchment Strategy and Regional River Health Strategy (NECMA, 2006) in Victoria and the Catchment Action Plan (Murray CMA, 2007) in NSW for the improved land use and restoration of rivers and streams, with specific Resource Condition Targets and Management Actions Targets to manage and protect inland water assets. The CMAs also have other programs in place such as the Murray CMA’s ‘Meeting in the Middle’ program for grazing best management practice for example. This program encourages best practice in grazing, particularly near streams and tributaries.

Under Part V of the Murray-Darling Basin Agreement (2006), the state governments of New South Wales and Victoria must take effective measures to protect the portions of the catchment of the Hume Reservoir within their respective states from erosion. Each of those contracting governments must forward an annual report to the Commission on the condition of the portion of the catchment of the Hume Reservoir within its territory, the measures taken and work carried out and future of measures and works proposed.

Given the dominance of sediment and nutrient inflows from the upper catchments, a focus on improved land management practices in the catchments to Lake Hume is essential if water quality objectives are to be realised.

Establishing new wetlands on the upper reaches of Lake Hume has been suggested as a means of filtering out sediments before they reach the lake.

Objective
To influence land use in the upper catchment and impacts on water quality in Lake Hume.

Actions
36. Ensure that state government complies with Part V of the Murray-Darling Basin Agreement;
37. Develop and prioritise riparian works programs in the upper Murray catchment in conjunction with North East CMA and Murray CMA;
38. Implement recommendations of the North East CMA Regional River Health Strategy (2006), Murray CMA Catchment Action Plan (2007) and other relevant strategies that relate to land use in the catchments to Lake Hume; and

Implementation: Roles and Responsibilities
MDBC is responsible for Action 36. G-MW, the North East CMA and the Murray CMA have lead responsibility for implementing actions 37 and 38. G-MW is responsible for action 39.

8.3.2 Siltation
Over time, water storages trap sediments. Once sediments enter a storage they may cause detrimental impacts such as loss of storage capacity and reduced water quality. Sediment delivered to the lake transports nutrients and contaminants (internal loading) (Davis, 1996). Release of the substances into the water column presents a risk to water quality and the more likely occurrence of algal blooms (CSIRO Land and Water, 2003). Nutrients already stored in the sediments could maintain high levels of nutrients in the lake for some time (MDFRC, 2005).

Shortly after the dam was constructed, siltation survey lines were set up within the lake by the Department of Water Resources and Rural Water Commission. Results were inconclusive but low sedimentation rates were indicated. In 2003, sedimentation rates in Lake Hume were estimated for the National Land and Water Resources Audit for a MDBC study (CSIRO, 2003). The study also identified and quantified the major sources of sediment into the lake. A change in deposition rates was identified, with higher sedimentation rates after European settlement and an increase in sediment trapping since 1936 when the dam became operational (Olley and Caithcheon 2003). Some sediments that erode from streambanks in the upper and middle parts of the catchment are transported through the stream network to Lake Hume.

High resolution aerial photography is being developed for the lake and surrounding foreshore areas. The low level of water in the lake provides a good opportunity to conduct the aerial survey to...
determine the areas in the basin of the lake where sediment has accumulated.

As discussed in Section 8.3.1, recent work suggests about 86 percent of suspended material in the lake comes from the Murray River upstream of the lake.

**Objectives**
To monitor and manage the impact of sediments on water quality in Lake Hume.

**Actions**
40. Develop and prioritise riparian works programs in the upper Murray catchment in conjunction with North East CMA and Murray CMA (also refer to Section 8.3.1);
41. Implement recommendations of the North East CMA Regional River Health Strategy (2006), Murray CMA Catchment Action Plan (2007) and other relevant strategies that relate to land use in the catchments to Lake Hume (also refer to Section 8.3.1); and
42. Ensure periodic siltation surveys are continued.

**Implementation: Roles and Responsibilities**
G-MW, the North East CMA and the Murray CMA are responsible for Actions 40 and 41. State Water NSW is responsible for Action 42.

**8.3.3 Foreshore Erosion**

Foreshore erosion occurs where wave action erodes the banks, undercutting the toe of the slope and causing bank failure. The waves initiating this process may be generated by natural processes such as wind or human activity for example, the use of powerboats close to the shore (Davis, 1996).

The shoreline of the lake has been stripped of the surface soil, which largely happened very early during the filling phase of the lake (National Heritage Consultants, 2007). The types of erosion along the lake’s shore include sheet and rill erosion, gullying, tunnel erosion, and slumping of the soil at the full supply level where there is often a sizeable erosion scarp.

Foreshore erosion is primarily a concern when the lake reaches full supply. Studies suggest boating areas do not necessarily coincide with areas of shoreline erosion. However, this does not mean powerboat generated waves do not initiate shoreline erosion, it is simply that other factors influencing shoreline stability such as wind generated waves, fluctuating water levels and loss of vegetation are overriding (Davis, 1996).

Motor vehicles are another known cause of damage and degradation to lake shore areas, although this has never been quantified at Lake Hume. On the Victorian side of Lake Hume by-laws prohibit recreational vehicle access on the lake bed and foreshore, other than on a road, track or parking area. However, no restrictions apply on the private land which comprises much of the NSW side of the lake. Management of illegal vehicle activity is problematic, due to the impracticability of fencing and policing access to the entire Victorian foreshore. Numerous road culverts and discharge points also contribute to foreshore erosion.

To date there have been no specific monitoring studies completed at Lake Hume to assess the severity and relative effects of lake-shore erosion and erosion hazards.

Erosion control measures such as rock beaching and foreshore revegetation are carried out on a needs basis at various locations around the foreshore, with an emphasis on asset protection works. Protection of the entire Lake Hume shoreline from erosion is cost prohibitive and impracticable, and remedial works have to be prioritised to ensure efficient and cost effective use of resources.

**Objectives**
To proactively monitor, prioritise and address erosion and erosion hazards around the Lake Hume foreshore.

**Actions**
43. Develop and implement an erosion action plan for Lake Hume including a summary of threats, mapping of high risk areas and a prioritised works program; and
44. Assess and implement recommendations from recent studies on the impacts of high-speed boating on erosion.

**Implementation: Roles and Responsibilities**
G-MW is responsible for co-ordinating these actions, in collaboration with the CMAs.
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8.3.4 Streambank Erosion

Erosion of stream bed and bank processes may contribute most of the nutrient and sediment load from grazed catchments.

Past and present practices causing this sort of erosion includes modification of vegetation cover in riparian zones and across the catchment, regulation of river flows, mining, dredging, stock access to streams and weed infestation of streambanks (North East CMA, 2001).

Streambank erosion is predicted to be most active in the middle reaches of the Lake Hume catchment. Sediment eroded from channel banks is readily available for transport through the stream network to Lake Hume. Channel bank erosion in the lower reaches of the Mitta Mitta also has the potential to contribute significant sediment loads to the Mitta Mitta arm of Lake Hume (CSIRO, 2003).

The North East CMA Regional River Health Strategy outlines programs and activities that impact on Lake Hume. On the Mitta Mitta River above Lake Hume, NECMA undertakes a program of streambank erosion control works on behalf of the MDBC. The Murray CMA does not have a water quality strategy in place, however the Murray CMA Catchment Action Plan (2007) includes targets to address soil erosion and sedimentation in high priority areas. The Murray CMA also has an incentive delivery program in place for erosion control on the South West slopes area.

Other agencies including the NSW Department of Water and Energy and Snowy Hydro have programs in place on the upper Murray and its tributaries to address streambank erosion. Private landholders and community based groups and organisations such as Landcare also make a major contribution to stream protection programs.

Typical stream stabilisation techniques include bank stabilisation, rock chutes, channel shaping, fencing and revegetation.

Objectives

Improve streambank erosion management in the catchments to Lake Hume to increase stream stability, improve the riparian zone and reduce the movement and transport of sediment and nutrients to Lake Hume.

Actions


46. Investigate the possibility of Living Murray funding for river management works in the upper Murray.

Implementation: Roles and Responsibilities

The North East CMA and Murray CMA are responsible for Action 45. The Murray-Darling Basin Commission is responsible for Action 46.

8.3.5 Gully Erosion

Gully erosion contributes significant nutrient and sediment loads to waterways. Treatment of gullies on farmland is seen as an effective nutrient management activity.

Gullying occurs when overland water flow is concentrated into unstable drainage lines. The water causes soil particle movement and sediment is delivered to streams through gully deepening, scour, headward erosion and gully-side erosion (NECMA, 2001).

Small areas of moderate to high gully density occur immediately north of Lake Hume on the Murray arm and in some middle reaches of the catchment (CSIRO, 2003). Gullies in these parts of the catchment have the potential to contribute directly to the Murray River sediment load.

Common gully stabilisation techniques include the installation of rock chutes, farm dams, fencing and revegetation.

The North East CMA Upper North East Water Quality Strategy outlines a specific program to address gully erosion in the Hume catchment. This document is currently being reviewed. The Murray CMA Catchment Action Plan includes targets to address soil erosion and sedimentation in high priority areas.

Objectives

To remediate gullies to decrease nutrient and sediment movement and transport to Lake Hume. Ensure gully remediation works complement streambank and bed protection works.
Actions


48. Develop a gully erosion control works incentive program for the land immediately surrounding Lake Hume in conjunction with the North East CMA and the Murray CMA.

Implementation: Roles and Responsibilities
Landholders have some responsibility for these actions. The North East CMA, Department of Primary Industries and the Murray CMA also have responsibility for these actions.

8.3.6 Wastewater Management

Human effluent from reticulated and non-reticulated wastewater management systems (septic tanks) can impact on water quality in Lake Hume, affecting recreational and other users of the lake.

Specific instances of accidental effluent discharge from wastewater systems have been recorded in recent years. The impact of septic tanks can affect water quality individually, particularly from systems in close proximity to the lake, or as diffuse source pollution from the cumulative effects of numerous failing septic systems.

The Upper North East Water Quality Strategy outlines a specific program with a number of actions to address the impacts of reticulated and non-reticulated wastewater management systems in the Hume catchment.

In addition to the Strategy, a Memorandum of Understanding (MoU) between the Victorian Government and the North East Region Water Authority was signed in 1998. The MoU states that all sewage treatment plants will discharge effluent consistent with State Environment Protection Policy (Waters of Victoria) by 2001 and that all towns within the North East Region Water Authority’s region with a population over 500 people and non-reticulated water supplies unless exempted by the EPA will be sewered by 2001 (North East CMA, 2001).

The five municipalities bordering the lake have domestic wastewater management plans and strategies with specific recommendations and management requirements for wastewater systems.

Septic systems require regular inspections. Unfortunately, they are often badly maintained and prone to leakage. Local government is responsible for implementing inspection and monitoring programs. An education program for property owners is also required.

EPA Victoria guidelines, including the Guidelines for Environmental Management, Septic Tanks Code of Practice, Publication No 891 and the Code of Practice for Small Wastewater Treatment Plants, Publication 500 provide the basis for wastewater management in Victoria.

On the Victorian side of the lake, all domestic effluent treatment and disposal systems must be installed or upgraded to meet EPA guideline requirements. Septic tanks or effluent lines are prohibited on G–MW foreshore land.

In NSW, On-site Sewage Management for Single Households produced by the NSW Department of Local Government provides guidelines for the on-site management of domestic sewage and wastewater while protecting and enhancing the quality of public health and the environment.

Objectives

To reduce the movement and transport of pollutants from reticulated and non-reticulated wastewater management systems and protect Lake Hume’s water quality.

Actions

49. Implement wastewater management recommendations within local government and North East Water wastewater management plans; and.

50. Investigate alternative technologies and systems to manage sewerage such as composting toilets in the foreshore environment.

Implementation: Roles and Responsibilities

Local government, North East Water and EPA are primarily responsible for Action 49. G–MW and local government will investigate the practical application of composting toilets in the near shore environment.
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8.3.7 Stormwater Management

Stormwater run-off from roads and paved surfaces in developed urban areas often contains oils, greases and other hydrocarbons, nutrients and organic matter, pathogens and other pollutants.

Stormwater pollutants can reduce aquatic diversity and threaten ecosystems.

Impacts of urban stormwater at Lake Hume have never been quantified, though impacts are likely to be minor on a whole of lake scale, relative to agricultural and catchment sources (MDFRC, 2005). On a local scale impacts may be more significant. Significant potential sources within the immediate catchment to the lake include the townships of Tallangatta, Bellbridge and Bethanga and the Hume Village, where untreated stormwater is discharged directly to the lake or its immediate tributaries (for example Bethanga Creek). In some instances untreated stormwater is discharged to areas often frequented by swimmers in summer (for example Bellbridge and Tallangatta foreshore and Bethanga Bay).

The Upper North East Water Quality Strategy (DNRE, 1999) outlines a specific program with a number of actions to address the impacts of stormwater in the Hume catchment.

In addition, the five local governments surrounding Lake Hume have developed stormwater management plans. The Towong Shire Council Stormwater Management Plan identifies actions specifically relating to Lake Hume.

Objectives

To implement improved stormwater design and management practices to protect and enhance Lake Hume and its tributaries.

Actions

51. All existing and new development must be in accordance with local government stormwater management plans, and Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO) 1999.

Implementation: Roles and Responsibilities

Towong Shire Council, Indigo Shire Council, Albury City Council, Wodonga City Council and the Greater Hume Shire Council are primarily responsible for this action. Local water authorities also have an interest in ensuring that stormwater impacts on Lake Hume are minimised.

8.3.8 Grazing

Refer to Section 8.5.1.

8.3.9 Mining

Gold exploration and mining in the Lake Hume catchment dates back to the 1850s. From 1854 extensive alluvial gold deposits were worked along the Mitta Mitta River and its tributaries – Sandy, Tallandoon, Callaghan’s and Lightning creeks. Hydraulic mining, which began in 1860, concentrated on the higher river terraces. Auriferous quartz reefs were mined from the 1870s to 1920s at Mitta Mitta, Granite Flat, Bethanga, Granya, Tallandon, Eskdale and Mount Elliot near Corryong (National Heritage Consultants, 2007).

Deep lead and reef mining operations began at Bethanga near the shore of the future Lake Hume in 1875, where 1,000 people worked the reefs in 1877. In 1868 there were also 1,000 people at Granite Flat. Tin mining occurred along the upper Murray arm of Lake Hume at Granya and several other locations (National Heritage Consultants, 2007).

By the end of the 1870s alluvial mining in the upper Murray River area had declined in importance. Large-scale mining and smelting operations still occurred at Bethanga, and the Mitta Mitta, Tallandoon and Eskdale mines continued to be worked until 1905. Concern about potential adverse impacts of mining on the proposed Hume Reservoir meant that dredging ceased in the Mitta Mitta Valley in 1913, and the last mine in the district closed in 1946 (National Heritage Consultants, 2007).

Mining activity has resulted in land clearing, erosion, gullying, leaching of soils, contamination of water courses from tailings and destruction of native vegetation. Alluvial mining involved the removal of riparian and swamp vegetation and the creation of humps and hollows (National Heritage Consultants, 2007).

The potential for water contamination from abandoned mines is not well documented or understood and requires further investigation (MDFRC, 2005). Of particular note is potential for residual contamination in the Bethanga Bay area of Lake Hume originating from extensive historical gold and copper mining activity at Bethanga.
Objective
To investigate contamination from historical mining in Lake Hume to form the basis for remediation works and strategies.

Actions
52. Engage with EPA Victoria to discuss and consider a broad scale study into potential contamination of lake sediments and water quality from historical mining activity.

Implementation: Roles and Responsibilities
G-MW, MDBC and EPA Victoria are primarily responsible for this action.

8.3.10 Water Quality Monitoring
Accurate water quality monitoring is important to improve our understanding of the trends in biophysical and chemical parameters in inland rivers, water storages and streams. Understanding these trends allows water resource managers to develop strategies, actions and frameworks to address water quality decline and any threatening processes impacting on the water resource.

The National Health and Medical Research Council and the Agriculture and Resources Management Council of Australia and New Zealand have developed a National Water Quality Management Strategy, 1992, providing an overarching framework for water quality monitoring programs.

Under Part V of the Murray Darling Basin Agreement, (2006), the MDBC must establish, maintain and operate an effective and uniform monitoring system for River Murray water quality, which includes Lake Hume.

Routine water quality monitoring is currently managed by the NSW Department of Water and Energy on behalf of the MDBC, with water samples collected by State Water NSW staff based at Hume Dam. The program is part of a broader surveillance program for the Murray River as a whole, which is not focussed on the unique characteristics and requirements of individual sites, such as Lake Hume. The program includes regular monitoring for a limited number of routine parameters, but does not include event (flow) based monitoring.

The NSW Department of Health also manages blue-green algae sampling and reporting in accordance with the Murray Regional Algal Coordinating Committee's Regional Algal Contingency Plan which is reviewed annually to ensure timely and effective response to outbreaks of blue-green algae in the lake.

The urban water authorities North East Water and AlburyCity Council also monitor the quality of water from offtake points within Lake Hume and downstream, prior to treatment and use for human consumption or potable use.

A comprehensive compilation and review of all existing water quality monitoring data and reports was undertaken by the Murray Darling Freshwater Research Centre in 2004-05. This report identified many information gaps and made specific recommendations for improved data collection and monitoring programs.

Additional sampling programs are taken periodically in response to circumstances such as bushfire and drought. The MDBC is sponsoring an integrated study to improve understanding of the effects of drought and low-water levels on water quality in Lake Hume.

An integrated, co-ordinated and resource efficient approach to water quality monitoring, evaluation, public notification and reporting is required. Current monitoring programs should be reviewed and improved to avoid duplication and ensure programs are aligned with relevant state and national frameworks. Similarly, monitoring points, frequency, water quality parameters and reporting requirements all require review to ensure data collected today will meet current and future needs. An adaptive management approach is required.
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Objective
To review and develop a comprehensive, coordinated and effective water quality monitoring, evaluation and reporting program for Lake Hume.

Actions
53. Clarify existing water quality monitoring programs in place that relate to Lake Hume;
54. Co-ordinate an integrated water quality monitoring, evaluation and reporting strategy for Lake Hume; and
55. Develop and adopt water quality criteria specific to Lake Hume.

Implementation: Roles and Responsibilities
The MDBC is responsible for these actions.

8.3.11 References
CSIRO Land and Water, 2003, A Pilot Study to identify the Major Sources of Sediment in Lake Hume.
Davis, J 1996, Catchment Management for the Control of Sediment Delivery: the Case of the Eppalock Catchment, Victoria.
Murray - Darling Freshwater Research Centre 2006b, Cyanobacterial (Blue-Green Algal) Blooms in Lake Hume.
Murray Regional Algal Coordinating Committee, 2007 Regional Algal Contingency Plan.
North East CMA, 2006, North East Regional River Health Strategy.
8.4 Healthy Ecosystems

A healthy and sustainable lake and surrounding environment

The Lake Hume environment has been significantly modified since early European settlement and the construction of the dam, however the lake and its surrounds are increasingly recognised for the maintenance and conservation of biological diversity.

Two main ecosystems under consideration at Lake Hume are the aquatic and terrestrial ecosystems. Remnant woodland vegetation around the lake provides important habitat for native species and protects water quality by filtering nutrients, reducing the inflow of sediment to the lake and stabilising the foreshore and streambanks of connecting tributaries. The body of water provides habitat for a range of aquatic species, including fish, macro invertebrates and a variety of plants. It is also an important food source for an array of birds and other native fauna.

8.4.1 Aquatic Fauna and Habitat

Aquatic fauna in Lake Hume includes bacteria, viruses, fungi, algae, aquatic flora, zooplankton, invertebrate fauna, and vertebrate fauna. Vertebrate fauna are primarily fish and include Golden Perch, Murray Cod, Silver Perch, Carp, Rainbow Trout, Brown Trout and Redfin. Lake Hume is stocked with Golden Perch, Murray Cod and Brown Trout by the DPI (also refer to Section 8.2.2).

Water quality, invasive pests and loss of habitat pose threats to aquatic fauna within Lake Hume and its tributaries.

Lake Hume should be managed to ensure that fisheries and fishing related activities are sustainable in the long term. Protection of fish habitat is essential to maintain and enhance fish stocks. Submerged and dead-standing timber provide important habitat for many fish species. Trees and dead-standing timber provide areas for fish to shelter from fast currents, take refuge from predators and find shade, feeding sites, spawning sites, and nursery areas for juveniles. Many bird and invertebrate species also rely on trees and woody debris for resting or breeding (DSE, 2007).

In Victoria, the Fisheries (Inland Fish Habitat) Notices aim to prevent damage or removal of dead timber because it provides aquatic habitat. Dead timber is often taken from inland waters when water levels are low. Notice is made under section 152 of the Fisheries Act, 1995 and prohibits a person from damaging, cutting, burning or removing dead wood from any point below the high water mark in a number of Victorian waters including Lake Hume.

While trees, dead-standing timber and tree stumps provide important habitat for many species of fish, in Lake Hume they have been identified as a public safety issue by recreational users particularly during periods of low water levels. In particular, tree stumps have been commonly cited as a health and safety issue in areas where there is a high level of boating activity.

Generally, relocating dead trees (standing or fallen) from Lake Hume will only be permitted in clearly justified operational or safety circumstances. In limited cases, consideration will be given to relocation of specific tree stumps to assist in the maintenance and enhancement of navigable areas, subject to the endorsement of Victorian and NSW Fisheries and peak fishing representative groups such as VRFish. Wherever practical, any timber or large woody debris removed will be safely relocated within the lake. An important criterion for any approval of these proposals should be a net habitat enhancement.

It is the responsibility of the proponents and beneficiaries of any tree removal including boating and tourism operators, to facilitate discussion between representative fishing groups in Victoria and NSW such as VRFish, the agencies responsible for fish management (NSW and Victorian DPI), landowners, G-MW, and the broader community to address this issue.

Fisheries legislation in NSW and Victoria also regards floating timber as fish habitat, and relocation requires consultation with fisheries authorities. The practical difficulties associated with this approach are acknowledged.
8 A Plan for the Management of Lake Hume

In Victoria, the North East Fishery Management Plan has recently been released with recommendations and actions for managing fishing activities within the North East Fishery. There is no equivalent plan in NSW. The Native Fish Strategy for the Murray Darling Basin 2003-2013 contains recommendations and objectives to improve the status of native fish populations in the Basin. This strategy does not make specific reference to Lake Hume.

Objectives
To manage the health of aquatic fauna in Lake Hume by addressing significant threats to water quality and to preserve and maintain healthy habitat for aquatic and terrestrial flora and fauna.

Actions
56. Co-ordinate an integrated water quality monitoring, evaluation and reporting strategy for Lake Hume (also refer to Section 8.3.10);
57. Develop a community education program on water quality issues and management;
58. Consider limited tree removal combined with fish habitat enhancement in areas south of Bethanga Bridge, subject to endorsement of NSW Department of Primary Industries (DPI) Fisheries, and Victorian DPI Fisheries, relevant landowners and peak fishing representative bodies (also refer to Section 8.2.1); and
59. Implement North East Fishery Management Plan recommendations relating to the maintenance of fish habitat in Lake Hume.

Implementation: Roles and Responsibilities
G-MW acting on behalf of the MDBC is primarily responsible for Actions 56 and 57.

Boating and tourism operators user groups and other proponents must take responsibility for progressing action 58 if desired.

The DPI (Fisheries Victoria) is primarily responsible for implementation of action 59.

8.4.2 Foreshore Vegetation Management
Lake Hume foreshore vegetation has been extensively modified through clearing and pasture improvement practices over many years. The original floodplain was inundated resulting in loss of considerable areas of riverine vegetation communities, however the remnant woodland vegetation communities which remain on the foreshore and nearby lands provide important habitat for native species and contribute an important ecological service by filtering nutrients, reducing sediment inflows and stabilising the foreshore and streambanks of surrounding tributaries.

Livestock grazing along waterways or riparian zones degrades vegetation. The extent to which vegetation is affected will depend on plant species, livestock preferences, timing of grazing, intensity and vegetative community composition. River Red Gums and other native species would benefit from minimising grazing on parts of the lake that are infrequently inundated, although well managed grazing can help control weeds.

A number of revegetation projects have been undertaken at Lake Hume in recent years and anecdotal evidence suggests community support for continuing these works, subject to appropriate fire and weed management practices. Strategic restoration of foreshore zones on public lands will be undertaken on a prioritised basis. Local Landcare groups and the CMA’s will have an important role to play in supporting and delivering these programs. Locally indigenous plant species are favoured. In areas of private land ownership revegetation will also be encouraged on foreshore land and tributaries through incentive programs.

Objectives
To implement improved management practices to protect and re-establish riparian vegetation.

Actions
60. Continue existing foreshore revegetation programs on public land and develop an incentive program to facilitate revegetation of private foreshore and near-foreshore land;
61. Develop a revegetation incentive program for private landowners on the foreshore and surrounds which includes stock watering and fencing;
62. Consider establishing new riverine wetlands as ‘filters’ on upper reaches of Lake Hume (also refer to Section 8.3.1); and

63. Conduct a detailed assessment of the lake foreshore zone to determine any areas grazing should be ceased to protect riparian vegetation, prevent erosion or re-establish River Red Gums or other important biodiversity values.

**Implementation: Roles and Responsibilities**

G-MW is responsible for these actions, in collaboration with CMA’s, DWE and local Landcare groups.

### 8.4.3 Pest Plants and Animals

If poorly managed, weeds can impact on neighbouring private and public lands, compromise stock grazing and decrease biodiversity values of lands surrounding the lake.

In Victoria, weed control on public foreshore and lake bed areas of Lake Hume are undertaken by grazing licence holders as a condition of their licences and by G-MW. In the past, G-MW has focused on controlling Noogoora Burr (*Xanthium oxidentale*). The program has now broadened to target a number of other weeds, including Black Willow, Bathurst Burr, Paterson’s Curse, Blackberry, Privet and several other species. The program has been successful in controlling weeds to manageable levels but is expensive and time consuming with little prospect of complete eradication of priority weeds using current methods. Innovative weed control measures and technologies should be reviewed for inclusion in the Hume weed management program.

In NSW, weed control on private and public lake bed and foreshore areas is primarily the responsibility of landowners and local government. In NSW, landowners are obligated to eradicate pest animals and weeds under the Rural Land Protection Act, 1998, and the NSW Noxious Weeds Act 1993. The Murray CMA is developing weeds and pest animal strategies, primarily focused managing their impacts on environmental values.

Pest animals are also a major concern for both private land and water managers and government. They represent one of the most significant threats to economic productivity and to environmental values. Pest animals of most concern in the Lake Hume area include rabbits, foxes, cats, wild dogs, deer and carp. Carp have been introduced into Australia both deliberately, in an attempt to imitate the European environment, and accidentally, through the escape of ornamental or aquaculture fish (DSE, 2007). Carp are one of the most abundant large freshwater fish in many parts of Australia, including most of the Murray-Darling Basin and are believed to have detrimental effects on native aquatic plants, animals and river health, particularly through their destructive feeding habits (DSE, 2007).

**Objectives**

To manage pest plant and animals on the lake bed and surrounds.

**Actions**

64. Investigate alternative management controls for Noogoora Burr and other priority weeds; and

65. Investigate the application of innovative carp control programs for Lake Hume.

**Implementation: Roles and Responsibilities**

G-MW is primarily responsible for these actions.

### 8.4.4 References


Department of Primary Industries, 2006, North East Fishery Management Plan.


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8.5 Agricultural Land Use

Well-managed agricultural pursuits in the upper catchment and immediate foreshore to improve water quality, environmental values and public safety, management of weeds and prevention of erosion.

8.5.1 Grazing

The main agricultural practice in the catchment and around the lake is stock grazing. There has been no accurate measurement of the number of domestic animals grazing the lake bed, although numbers have been estimated at about 5,000 head of stock, on average (MDFRC, 2006). Anecdotal evidence suggests cattle grazing is more common than sheep or other stock on the lake bed and foreshore at Lake Hume (MDFRC, 2006).

Cattle have been grazed on the foreshore and lake bed for many generations. The lake provides a low cost and convenient water supply for stock. Well managed grazing can help to control weeds and nuisance vegetative growth in the lake bed and foreshore lands. Grazing animals are net exporters of nutrients from the lake bed, and may also be useful in areas where herbicides cannot be applied (for example, near water) or are prohibitively expensive due to large infestations (MDFRC, 2006).

In Victoria there are approximately 80 grazing licences on foreshore land owned by G-MW. Grazing licences are conditional, with requirements that licensees maintain the land, including the control of weeds and pests, maintenance of fencing and various other conditions. However the licences are mostly non-specific in nature, and have not been reviewed for many years.

In NSW most of the land surrounding the lake is freehold title in private ownership with easements attached with a few distinct Crown allotments. Therefore management authorities have no power to control or direct grazing practices in NSW, however many landowners have already demonstrated a willingness to modify grazing practices for environmental gains.

Possible impacts of grazing on water quality have been raised as an issue of concern to many people. In 2006, a study was completed by the Murray Darling Freshwater Research Centre on impacts of domestic grazing animals on the water quality of Lake Hume. The conclusions and key recommendations of this study are:

- Most of the sediment delivery into Lake Hume comes from streambed erosion in the upper catchment and only about 12 percent comes from the foreshore (through a variety of mechanisms including grazing). Therefore, restricting grazing from the lake bed and foreshore would have little impact on sediment delivery to Lake Hume. Attention should be given to land management practices and streambank erosion in the upper catchment to limit sediment delivery to the lake.

- It is estimated that nutrient generation from the foreshore zone of Lake Hume accounts for less than 5 percent of the nitrogen and phosphorus entering the lake. Removing grazing from the lake bed and foreshore will have little impact on nutrients in Lake Hume. It is also estimated that there is a significant pool of nutrients, particularly phosphorous, already locked up in the sediments of Lake Hume.

- Estimates of pathogen numbers, particularly Cryptosporidium sp., suggest that pathogen contamination from faecal material has the potential to pose a significant risk to water quality in Lake Hume, particularly during calving season. Data suggests the main source of pathogens to Lake Hume is from upstream sources, though local (lake bed and foreshore) sources may also be significant contributors in localised areas poorly connected to the main lake body. Anecdotal evidence and limited monitoring data available tempers these concerns, however it is strongly recommended that a detailed study be undertaken at Lake Hume to determine the source, fate and virulence of pathogens (particularly Cryptosporidium oocysts derived from livestock faecal matter). As a precaution, G-MW should consider limiting the number of pregnant cows and newborn calves grazing on lake bed areas under its control.
• The immediate foreshore zones of Lake Hume are already highly modified. Without grazing, weed infestations would probably increase requiring active management intervention. However, removal of grazing from parts of the lake that are only infrequently inundated may favour the re-establishment of River Red Gums.

There are a number of opportunities to improve the management of grazing on the foreshore including the investigation of innovative stock control technologies to control the movement of stock, which would allow for some removal of wire fencing below the full water supply level (also refer to Section 8.5.5) and foreshore revegetation and incentive programs (also refer to Section 8.4.2).

Stock must also be managed to prevent impacts on important archaeological sites around the foreshore.

**Objectives**
Well managed, innovative grazing programs to manage the impacts of stock on riparian vegetation, water quality and archaeological sites in Lake Hume.

**Actions**
66. Conduct a study to determine the source, fate and virulence of pathogens in Lake Hume;
67. Develop a grazing licence document which details shared responsibilities of both G-MW and the licence holder for Victorian lands under their control;
68. Conduct an assessment of the lake foreshore to determine any areas where grazing should be suspended, removed or better managed to protect riparian vegetation, prevent erosion or encourage the re-establishment of foreshore vegetation;
69. Exclude stock from areas where there are significant high-priority archaeological sites requiring protection from stock grazing activities; and
70. Develop a revegetation incentive program for the foreshore and surrounds which includes stock watering and fencing.

**Implementation: Roles and Responsibilities**
G-MW is responsible for co-ordinating these actions.
8 A Plan for the Management of Lake Hume

8.5.2 Land Use in the Upper Catchment

Refer to Section 8.3.1.

8.5.3 Cropping on Lake Bed

Cropping is currently not permitted on the foreshore or lake bed areas managed by G-MW. Cropping on the lakebed in NSW is possible as the NSW Government owns easements to flood but not freehold title. NSW landowners may decide to crop the lake bed when lake levels permit. The extent to which cropping helps control erosion and weeds is not well understood. Cropping for fodder might also be one means of reducing the high nutrient levels in the surface sediment layer of the lake bed.

Monitoring of the impacts of lake bed cropping through a pilot program is recommended before more widespread application as a means of managing erosion, weeds and nutrients is endorsed. It is proposed that GMW will work with private landholder(s) on a trial program on their land in NSW to assess impacts and improve understanding.

Crops would have to be correctly selected and managed, and carefully managed to ensure no damage to cultural heritage or water quality. There are many possible crops, differing in potential benefits and adaptability to climates and rotational schemes. Crop species would be selected for their ability to take up large amounts of nutrients from the rooting profile of the soil. The potential for summer fodder crops such as hay and silage, rye grass and millet, to remove Phosphorus and Nitrogen from the soil and assist weed management should be investigated.

Cropping practices would have to be viable without the use of fertilisers, herbicides and pesticides. Soil cultivation would not be permitted due to the risk of inadvertent impacts on buried archaeological artefacts and sites.

Objectives

To investigate the impact of lake bed cropping on erosion, weeds, nutrients (and indirectly water quality).

To assess whether there is merit in extending lake bed cropping to GMW controlled lands in Victoria as a means of enhancing water quality.

Actions

71. Support a pilot trial on private land in NSW to determine the costs, benefits and practicalities of broadcast cropping on the lake bed.

Implementation: Roles and Responsibilities

G-MW is primarily responsible for this action.

8.5.4 Stock and Domestic Water Supply

Lake Hume and its tributary rivers are an important source of stock and domestic water supply for numerous adjacent landholders and grazing licence holders. Some access the lake and streams directly, while others use diversion pumps to fill off-stream water storages.

In Victoria, diversion licensing is managed by G-MW’s diversions operations group. Diversion licence applications are considered subject to water availability and other constraints, including cultural heritage and environmental and public safety considerations. Issued licences place conditions on the type of pumps allowable.

In NSW, diversion licensing is managed by the NSW Department of Water and Energy, which similarly applies criteria for assessing and licensing diversions.

 Licensing and monitoring of diversion pumps is important to ensure they can be managed to prevent impacts on public safety and the environment, including spills from fuel-powered pumps, and archaeological sites; and to ensure all water diversions are properly accounted for. It is preferable that diversion pumps and associated infrastructure are located on private freehold land well above the full supply level of the lake.

Stock access to water needs to be managed to prevent further degradation of water quality, foreshore land and riparian vegetation around the Lake Hume foreshore and tributaries. In some areas this would mean exclusion of direct stock access and provision of off-stream watering points, and resources should be made available to support and encourage graziers to achieve these objectives. It is acknowledged that this will not be practicable in all areas.
**Objectives**
Provision of well-managed stock and domestic water supply to prevent impacts on water quality and the environment, cultural heritage and public safety.

**Actions**
72. All diversions from Lake Hume to be licensed and managed to prevent impacts on cultural heritage, public safety and the environment; and
73. Develop a revegetation incentive program for private landowners for the foreshore and surrounds which includes provision for off-stream stock watering (also refer to Section 8.4.2).

**Implementation: Roles and Responsibilities**
G-MW and the NSW Department of Water and Energy are primarily responsible for co-ordinating these actions.

### 8.5.5 Fencing

Fencing existed on the bed of Lake Hume and foreshore areas prior to the construction of the dam, and continues to be used for stock management by private land owners (in NSW) and grazing licence holders (in Victoria). Fence types vary depending on stock type and topography. Most are simple post and wire fences, although many landholders now also use electric fences.

Many licence holders/landowners experience difficulties managing fences due to the rapidly fluctuating water levels in Lake Hume, where a 1-2 percent change in water level can result in the shoreline moving hundreds of metres. In many cases, co-operative informal arrangements exist between neighbouring licence holders/landowners.

Construction of new fences in areas likely to be submerged is discouraged to the extent practicable, however the removal of all existing remnant fences would be impracticable while grazing continues on the lake bed. Lake users are warned via signage at most boating access points and ramps.

Traditional fencing methods are expected to remain at Lake Hume for the foreseeable future. New innovative technologies such as ‘virtual fencing’ should be explored as they are developed and become commercially available to reduce risks to public safety.

**Objectives**
To manage the impacts of fencing for the protection of the health and safety of recreational users of the lake.

**Actions**
74. Minimise fencing below full supply level to the extent practicable and remove old fences; and
75. Investigate possibilities for ‘virtual fencing’ and other innovative approaches to stock management on the lake bed to reduce the need for traditional fencing.

**Implementation: Roles and Responsibilities**
G-MW is responsible for these actions.

### 8.5.6 Pest Plants
Refer to Section 8.4.3.

### 8.5.7 References
8 A Plan for the Management of Lake Hume

8.6 Planning and Development

Co-ordinated, consistent, sustainable and forward looking planning and development.

Planning future urban and rural residential development around Lake Hume is managed by the relevant local government planning authorities. Several of the five local government areas surrounding the lake see the lake and its environs as a key attraction and opportunity for urban and rural residential development. This is a key issue to consider for the future management of Lake Hume.

Examples of current plans under consideration include Towong Shire Council’s plans to expand the Bellbridge and Tallangatta townships and to establish two rural living areas adjacent to the lake. Another is the draft Albury Land Use Strategy recently prepared by Albury City Council, which refers to the planned development of Lake Hume Village and Thurgooana.

Future urban and rural residential developments must be carefully planned to ensure they meet best practice planning standards and do not compromise the environmental, social and economic values of Lake Hume. A consistent, co-operative approach between the five local governments and two states bordering the lake is highly desirable.

As part of the development of the Lake Hume Land and On-water Management Plan, a review of the current planning scheme of each local government area surrounding Lake Hume was undertaken (George Ward Consulting, 2006). This review is contained in the Plan’s, Review of Planning and Environmental Regulatory Regime. This review highlights some of the inconsistencies in the zones, overlays and policies on urban and residential development between the municipalities.

Opportunities may exist for more co-ordinated, consistent approaches to planning at Lake Hume by influencing regional approaches and strategies. Examples include any proposed review of the Murray Regional Environmental Plan No. 2 (NSW Dept of Planning 1994), or the current cross-border development of the Murray Valley Land Use Project.

8.6.1 Co-ordination and Communication

Co-ordination and communication between the five local governments is desirable to ensure all future development is environmentally, socially and economically sustainable.

Some of the local governments surrounding Lake Hume (Wodonga and Hume) have planning schemes committing to regional co-operation and working with neighbouring local government and those across the border. The aim of this commitment is to achieve growth and development and protect sensitive agricultural areas and the environment.

Some local governments have also established a policy link between the CMAs and their Regional Catchment Strategies and the local government planning system.

A much greater level of co-ordination and communication is desirable. Better co-ordination and communication between local governments will facilitate discussion and agreement on common and consistent principles and approaches to planning and development. Furthermore, this will allow a consistent approach to controls applying to rural areas between municipalities including subdivision minimums, setbacks and the application of zones and overlays to land surrounding Lake Hume.

Objectives

A consistent and co-ordinated approach to all urban and rural residential development around Lake Hume.

Actions

76. Develop an MoU between Wodonga City Council, Towong Shire Council, Indigo Shire Council, Albury City Council, Greater Hume Shire Council and MDBC on agreed principles and processes to manage the impacts of planning and development on the lake; and

77. Establish a Lake Hume planners forum to meet once or twice a year to discuss and resolve planning issues specific to Lake Hume ensuring a consistent and co-ordinated approach.

Implementation: Roles and Responsibilities

G-MW, Department of Planning and Communities (DPC), and the NSW Department of Planning will facilitate these actions on behalf of the MDBC.
8.6.2 Environmentally Sustainable Development (ESD)

Conventional design and construction methods often produce buildings and spaces that impact on the environment. These buildings contribute to excessive resource consumption, waste generation and pollution.

Poorly planned infrastructure and development around Lake Hume could significantly impact on the lake's water quality, the visual amenity of the lake and foreshore and agricultural grazing land surrounding the lake.

Environmentally Sustainable Development (ESD) is about providing good design, incorporating innovative, adaptable and technologically advanced development that caters for environmental, social and economic needs. ESD is fast becoming a critical aspect in terms of delivering project outcomes that respond to the needs of all stakeholders involved in a new development. There are a number of frameworks and tools that are becoming increasingly relied upon by developers and local government for sustainable design, building and development.

Objective
To encourage local governments surrounding Lake Hume to have consistent policy in relation to sustainable design, development and assessment.

Actions
78. Develop an MoU to establish consistent policy for sustainable building design and development. This MoU may encourage use of well known and industry accepted environmentally sustainable design and assessment frameworks; and
79. Develop an MoU to include principles to manage the impacts of development on the visual aesthetics of the Lake Hume foreshore.

Implementation: Roles and Responsibilities
Local government, DPC and NSW Department of Planning are responsible for these actions.

8.6.3 Landscape Management Plans

Landscape management plans for focal points around Lake Hume are required to guide development and protect important values and assets around the lake. Landscape management plans could enhance the visual amenity and recreational experience around the foreshore and help preserve and maintain biological diversity and areas of high ecological value.

More specifically the plans could improve walking and cycle paths, allow for the provision of quality amenities in open space, identify areas for residential development, increase access to the lake with boating and canoe launching facilities and car access and designate areas of high ecological value requiring protection.

AlburyCity Council recently released a plan for the Murray River and Lake Hume titled the Murray River Experience. The 25-year plan is an innovative investigation into Albury City's open space areas (existing and future) which converge on the Murray River and foreshore of Lake Hume. The Murray River Experience provides a good example of an approach which could be applied to key focal points around Lake Hume.

Objective
To preserve and enhance the amenity, ecological values and recreational facilities and experience around Lake Hume.

Actions
80. Develop landscape plans or foreshore master plans for priority areas which will preserve lake and foreshore values and enhance the recreational use and facilities of the land surrounding the lake.

Implementation: Roles and Responsibilities
Local government and G-MW are primarily responsible for this action.

8.6.4 Wastewater

Refer to Section 8.3.6.

8.6.5 Stormwater

Refer to Section 8.3.7.

8.6.6 References


NSW Dept of Planning 1994, Murray Regional Environmental Plan No. 2
8 A Plan for the Management of Lake Hume

8.7 Cultural Heritage

Improved awareness and protection of cultural heritage at Lake Hume.

A growing awareness of the Aboriginal and European heritage at Lake Hume and its catchment has led to an obligation and responsibility for all government agencies in control of land management activities and private landowners, to protect this heritage. The upper Murray region including Lake Hume has a long history of Aboriginal occupation. Material evidence of human subsistence and settlement includes sediments containing stone artefacts, trees scarred from the removal of bark for making canoes, shields and other artefacts, and rock shelters with paintings. The region also has a rich and varied European history, and within Lake Hume and its immediate surrounds there is considerable evidence of early European settlement including former townships, homesteads, wells, former mine sites, and graves.

State and Commonwealth legislation provides levels of protection for Aboriginal and non-Aboriginal heritage. There are also guidelines and regulations that set standards for identification, listing and conservation of heritage places. However further to the legislative requirements, there is a moral responsibility for government agencies and individuals to strive to preserve Australia’s cultural heritage for present and future generations.

Identifying and recording this cultural heritage, and public education, are essential components of heritage management at Lake Hume.

8.7.1 Aboriginal Cultural Heritage

In NSW, the most fundamental Act is the National Parks and Wildlife Act 1974 (as amended). Currently, the guidelines for assessment and reporting of Aboriginal heritage are under review by the Department of Environment and Climate Change.

In Victoria the Aboriginal Heritage Act 2006 and Aboriginal Heritage Regulations 2007 protect Aboriginal cultural heritage, formalise Aboriginal community involvement in decision-making arrangements and provide a consistent approach to managing Aboriginal cultural heritage land-use and development proposals. In particular, the Act enables all relevant interests to be easily identified and consulted on development issues.

Commonwealth legislation also applies, with the Commonwealth Aboriginal & Torres Strait Islander Heritage Protection Act 1984 designed to provide protection when it is not adequately provided at the state or territory level.

Until very recently Aboriginal cultural heritage at Lake Hume was poorly understood. In 2004, G-MW, acting on behalf of the MDBC, commissioned the Lake Hume Aboriginal Cultural Heritage Study (National Heritage Consultants, 2007). This study was overseen by a steering committee comprising representatives of both government and Aboriginal community organisations. The study involved thorough background research on existing records, consultation and interviews with Indigenous people, a joint field survey of the lake bed and immediate foreshore with Aboriginal community representatives, and recording of over 400 sites. Separate studies of biodiversity and geodiversity values, Aboriginal plant resources and erosion processes at archaeological sites were carried out in tandem with the archaeological survey. The report provides a comprehensive review of Aboriginal heritage at Lake Hume and recommendations about managing and conserving this heritage.

A review of historical records shows that information about the Indigenous people who inhabited the Murray River east of Albury is at best sketchy (NHC, 2007). Aboriginal groups in the region were subjected to catastrophic dislocation during the 19th century. Virulent diseases such as smallpox, influenza and measles, the loss of traditional lifestyle and resources resulted in rapid depopulation. Definitions of traditional language or tribal boundaries have been based on language and dialect group distributions recorded during the nineteenth century, and are not necessarily reliable. However, in general, contemporary evidence indicates that the Murray River was a natural boundary between Wiradjuri speakers in the north and Dhudhuwo speakers in the south.

The field survey results indicate that there are a large number of cultural heritage sites within Lake Hume and on the land surrounding the lake. An inventory of 441 Aboriginal sites was recorded during the survey, comprising lithic scatters, sometimes with hearths, and isolated stone artefacts, scarred trees, and an Aboriginal historical site. In general, these archaeological sites are both below and above the lake’s full supply level.

The Lake Hume Aboriginal Cultural Heritage Study also makes general and site-specific recommendations to mitigate or minimise impacts. Of key importance is the need for substantive consultation with relevant Aboriginal organisations and individuals in developing protocols for inspecting and monitoring works activities at or near known Aboriginal sites, and, where necessary, obtaining consents to disturb Aboriginal sites.
It is proposed that the recommendations will be used as the basis for the development of a cultural heritage management plan for public lands within the Victorian part of the lake in accordance with standards prescribed under provisions of the new Aboriginal Heritage Act 2007.

In NSW, private landowners will be advised about known Aboriginal cultural heritage sites at Lake Hume and of the legislative protection for such sites.

**Objectives**

To protect, preserve and raise community awareness of the importance of Aboriginal cultural heritage at Lake Hume.

**Actions**

81. Implement recommendations of the Lake Hume Aboriginal Cultural Heritage Study;

82. Develop a cultural heritage management plan for Lake Hume, in accordance with the Aboriginal Heritage Act 2006 and the Aboriginal Heritage Regulations 2007; and

83. Develop a program to increase community appreciation of Aboriginal heritage at Lake Hume.

**Implementation: roles and responsibilities**

G-MW will co-ordinate these actions.

**8.7.2 European Cultural Heritage**

State and Commonwealth legislative provisions guide agencies in managing European heritage sites. There are few historical records for the initial period of British settlement of the region around Lake Hume. Explorers Hume and Hovell crossed into Victoria in November 1824 several miles above what is now Hume Dam. Soon thereafter the first wave of colonial settlement in northern Victoria occurred between 1835 and 1840 in an area east and north of the Ovens River (National Heritage Consultants, 2007).

British explorers were quickly followed by ‘overlanders’ and squatters. Overlanding activities involved moving large numbers of stock from NSW to new land in the Port Phillip district between the 1830s and 1850s in response to new markets created by gold rushes.

The region attracted many settlers and by 1856 both sides of the Murray River were well populated. By the 1860s there were over 100 holdings in the vicinity of Albury. Within a decade selectors were displacing the squatters and by 1917 all the easily accessible arable land had been cleared. The descendents of many of these early settler families live in the region today and their names are perpetuated in the list of rural property owners at Lake Hume.

Mining also had a profound impact in the region during the late 19th and early 20th centuries. Evidence of this activity remains to this day (also refer to Section 8.3.9).

Notable twentieth century works and sites of cultural significance are many, not least of which is the construction of the Hume Dam itself, a massive public works undertaking between 1919 and 1936, further extended during the 1950’s. Construction of the dam involved establishment of large workers’ villages at Mitta Mitta and Hume, while the resultant flooding of the Murray and Mitta Mitta valleys inundated numerous homesteads and several townships, including Old Tallangatta and Bowna.

Bethanga Bridge was constructed through the period 1927 -1930 and is listed on both the NSW and Victorian State Heritage Registers.

The military presence in the area was first established with a camp at Bonegilla in 1940. Bonegilla also saw the establishment of a migrant camp in 1947, which was Australia’s largest and longest operating migrant reception centre prior to its closure in 1971. Block 19 has been conserved and has been nominated for listing on the National Heritage List.

In addition to the recorded history of the Lake Hume area, there is considerable unrecorded oral history within the local community, since many local residents are directly descended from early settlers in the region. It is important that this information is documented and a comprehensive compilation of landowners surrounding Lake Hume is proposed as an initial step.

**Objectives**

To protect, preserve, and raise community awareness about the importance of non-Aboriginal cultural heritage at Lake Hume.

**Actions**

84. Undertake a comprehensive community survey of European cultural heritage;

85. Identify, preserve and protect significant European cultural heritage at Lake Hume; and

86. Develop a program to increase community appreciation of European cultural heritage at Lake Hume.

**Implementation: roles and responsibilities**

G-MW will co-ordinate and facilitate these actions in consultation with key stakeholders.

**8.7.3 References**

Aboriginal Heritage Act 2007.

Commonwealth Aboriginal & Torres Strait Islander Heritage Protection Act, 1984.


## Appendix A - Summary of Management Actions

<table>
<thead>
<tr>
<th>Topic</th>
<th>Action</th>
<th>No.</th>
<th>Responsible Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community Awareness and Involvement</strong></td>
<td>Establish a Lake Hume Plan Community Reference Group to guide the implementation of the Plan and communicate priorities within the Plan.</td>
<td>1</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop a communication and awareness campaign on recreation, water quality and other land and water management issues, dam operations and water level issues.</td>
<td>2</td>
<td>Lead agencies – G-MW, State Water NSW MDBC and peak tourism bodies.</td>
</tr>
<tr>
<td></td>
<td>Develop a central facility and service for the community to access all information about Lake Hume and the broader Murray Darling Basin.</td>
<td>3</td>
<td>Lead agencies – G-MW, State Water NSW MDBC and peak tourism bodies.</td>
</tr>
<tr>
<td></td>
<td>Develop an interactive website containing maps, plans, zones, FAQs, management arrangements and by-laws.</td>
<td>4</td>
<td>Lead agencies – G-MW, State Water NSW and MDBC.</td>
</tr>
<tr>
<td></td>
<td>Develop an education program for existing regional visitor information centres.</td>
<td>5</td>
<td>Lead agencies – G-MW, State Water NSW and MDBC.</td>
</tr>
<tr>
<td></td>
<td>Develop interactive interpretive and educational signage at recreation reserves advising the community of the history and heritage of Lake Hume and the ‘land and on-water’ aspects of Lake Hume.</td>
<td>6</td>
<td>Lead agencies – G-MW, State Water NSW and MDBC.</td>
</tr>
<tr>
<td>Topic</td>
<td>Action</td>
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<td>Responsible Authority</td>
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</tr>
<tr>
<td>Recreation and Tourism</td>
<td>Review existing boating zones to resolve inconsistencies in cross-border regulations, improve safety and practicality for boating and waterskiing.</td>
<td>7</td>
<td>Lead agency – G-MW and NSW Maritime Authority.</td>
</tr>
<tr>
<td></td>
<td>Assess, and where appropriate, implement recommendations from recent studies on boats with wake-enhancing devices, particularly on safety and erosion impacts.</td>
<td>8</td>
<td>Lead agencies – G-MW and NSW Maritime Authority.</td>
</tr>
<tr>
<td></td>
<td>Consider limited tree removal combined with fish habitat enhancement in areas south of Bethanga Bridge, subject to endorsement of NSW Department of Primary Industries (DPI) Fisheries, and Victorian DPI Fisheries, relevant landowners and peak fishing representative bodies.</td>
<td>9</td>
<td>Boating and tourism operators and user groups.</td>
</tr>
<tr>
<td></td>
<td>Implement recommendations within the North East Fishery Management Plan that relate to recreational fishing in Lake Hume</td>
<td>10</td>
<td>Lead agency – Department Primary Industries (DPI Vic).</td>
</tr>
<tr>
<td></td>
<td>Assess and implement fish stocking requirements, in consultation with peak fishing bodies.</td>
<td>11</td>
<td>Lead agency – DPI (Vic).</td>
</tr>
<tr>
<td></td>
<td>Develop a camping policy for Lake Hume.</td>
<td>12</td>
<td>Lead agency – G-MW in consultation with Parks Vic, NSW Parks and Wildlife, local government, tourism representatives and the community.</td>
</tr>
<tr>
<td></td>
<td>Define current and future levels of demand to inform possible establishment of defined camping areas.</td>
<td>13</td>
<td>Lead agency – G-MW in consultation with Parks Vic, NSW Parks and Wildlife, local government and the community.</td>
</tr>
<tr>
<td></td>
<td>Evaluate and if practicable establish designated camping areas on the Lake Hume foreshore.</td>
<td>14</td>
<td>Lead agency – G-MW in consultation with Parks Vic, NSW Parks and Wildlife, local government and the community.</td>
</tr>
</tbody>
</table>
## Appendix A - Summary of Management Actions

<table>
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<tr>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>Recreation and Tourism</td>
<td>Develop an education program to inform people of designated areas and the importance of minimising impacts on the environment.</td>
<td>15</td>
<td>Lead agency – G-MW in consultation with Parks Vic, NSW Parks and Wildlife, local government and the community.</td>
</tr>
<tr>
<td></td>
<td>Fund a Lake Hume ranger or public use officer with enforcement powers to manage illegal camping, littering and other issues such as safety, trespass and interference with grazing.</td>
<td>16</td>
<td>Lead agency – G-MW in consultation with Parks Vic, NSW Parks and Wildlife, local government and the community.</td>
</tr>
<tr>
<td></td>
<td>Clearly designate private and public land with maps, including maps in the form of signage, illustrating private and public spatial zones.</td>
<td>17</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop an educational and awareness raising campaign to inform the broader community about the reasons for controlled and managed access.</td>
<td>18</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Encourage and facilitate access for community groups and not-for-profit organisations.</td>
<td>19</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop shared pathways linking the High Country Rail Trail with the weir wall, the Murray trail and Hume and Hovell trails.</td>
<td>20</td>
<td>Lead agencies – Parklands Albury Wodonga, local government and community groups.</td>
</tr>
<tr>
<td></td>
<td>Develop detailed landscape master plans for key foreshore areas.</td>
<td>21</td>
<td>Lead agency – local government and G-MW.</td>
</tr>
<tr>
<td></td>
<td>Consider the development of new public reserves at Bells and/or Knobles Road areas.</td>
<td>22</td>
<td>Lead agencies – Albury City Council and Wodonga City Council.</td>
</tr>
<tr>
<td></td>
<td>Consider the development of a new reserve immediately below the weir wall.</td>
<td>23</td>
<td>Lead agencies – Albury City Council and Wodonga City Council.</td>
</tr>
<tr>
<td></td>
<td>Develop a Memorandum of Understanding (MoU) to specify management arrangements and agreed levels of service for the public reserves at Lake Hume.</td>
<td>24</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td>Topic</td>
<td>Action</td>
<td>No.</td>
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</tr>
<tr>
<td>Recreation and Tourism</td>
<td>Establish an equitable cost-sharing model through the MoU for funding to manage reserves.</td>
<td>25</td>
<td>Lead agency – G-MW and local government.</td>
</tr>
<tr>
<td></td>
<td>Establish licence agreements between G-MW and the relevant local governments to manage Victorian reserves.</td>
<td>26</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Review existing risk assessments to determine priorities for investment in infrastructure and facilities.</td>
<td>27</td>
<td>Lead agencies – G-MW and local government.</td>
</tr>
<tr>
<td></td>
<td>Determine and formalise the roles and responsibilities for upgrading and maintaining infrastructure incorporating minimum standards</td>
<td>28</td>
<td>Lead agencies – G-MW and local government.</td>
</tr>
<tr>
<td></td>
<td>Investigate alternative technologies and systems to manage sewerage such as composting toilets in the foreshore environment.</td>
<td>29</td>
<td>Lead agencies – G-MW and local government.</td>
</tr>
<tr>
<td></td>
<td>Develop consistent signage at all access points with a specific ‘Lake Hume brand’.</td>
<td>30</td>
<td>Lead agencies – G-MW; tourism representatives and local government.</td>
</tr>
<tr>
<td></td>
<td>Develop interactive signage for recreation reserves on the history of Lake Hume and the heritage of the ‘land and on-water’ aspects of Lake Hume.</td>
<td>31</td>
<td>Lead agencies – G-MW; tourism representatives and local government.</td>
</tr>
<tr>
<td></td>
<td>Develop an MoU between Wodonga City Council, Towong Shire Council, Indigo Shire Council, AlburyCity Council, Greater Hume Shire Council and MDBC for a solid waste management plan for the Lake Hume area</td>
<td>32</td>
<td>Lead agencies – G-MW and local government.</td>
</tr>
<tr>
<td></td>
<td>Conduct a study to evaluate the economic benefits of recreation and tourism and the value of the lake to downstream irrigation and communities.</td>
<td>33</td>
<td>Lead agency G-MW and peak tourism representatives.</td>
</tr>
<tr>
<td></td>
<td>Evaluate profitable development opportunities to offset costs of recreational management of the lake.</td>
<td>34</td>
<td>Lead Agencies – local government, G-MW and private operators.</td>
</tr>
<tr>
<td></td>
<td>Develop a ‘Lake Hume brand’.</td>
<td>35</td>
<td>Lead Agencies – local government.</td>
</tr>
</tbody>
</table>
## Appendix A - Summary of Management Actions

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<th>Action</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Water Quality</td>
<td>Ensure that state government complies with Part V of the Murray-Darling Basin Agreement.</td>
<td>36</td>
<td>Lead Agencies – MDBC and state government</td>
</tr>
<tr>
<td></td>
<td>Develop and prioritise riparian works programs in the upper Murray catchment in conjunction with the North East CMA and the Murray CMA.</td>
<td>37</td>
<td>Lead Agencies – G-MW, North East CMA and Murray CMA.</td>
</tr>
<tr>
<td></td>
<td>Implement recommendations of North East CMA Regional River Health Strategy, Murray CMA Catchment Action Plan and other relevant strategies that relate to land use in the catchments to Lake Hume.</td>
<td>38</td>
<td>Lead Agencies – G-MW, North East CMA and Murray CMA.</td>
</tr>
<tr>
<td></td>
<td>Consider establishing new wetlands as ‘filters’ on the upper reaches of Lake Hume.</td>
<td>39</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop and prioritise riparian works programs in the upper Murray catchment in conjunction with North East CMA and Murray CMA.</td>
<td>40</td>
<td>Lead Agencies – G-MW, North East CMA and Murray CMA.</td>
</tr>
<tr>
<td></td>
<td>Implement recommendations of the North East CMA Regional River Health Strategy, Murray CMA Catchment Action Plan and other relevant strategies that relate to land use in the catchments to Lake Hume.</td>
<td>41</td>
<td>Lead Agencies – G-MW, North East CMA and Murray CMA.</td>
</tr>
<tr>
<td></td>
<td>Ensure periodic siltation surveys are continued.</td>
<td>42</td>
<td>Lead Agency - State Water NSW.</td>
</tr>
<tr>
<td></td>
<td>Develop and implement an erosion action plan for Lake Hume including a summary of threats, mapping of high risk areas and a prioritised works program.</td>
<td>43</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Assess and implement recommendations from recent studies on the impacts of high-speed boating on erosion.</td>
<td>44</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Implement recommendations relating to streambank erosion outlined in the North East CMA Regional River Health Strategy and the Murray CMA Catchment Action Plan.</td>
<td>45</td>
<td>Lead agencies – North East CMA and Murray CMA.</td>
</tr>
<tr>
<td></td>
<td>Investigate the possibility of Living Murray funding for river management works in the upper Murray.</td>
<td>46</td>
<td>Lead agency – MDBC.</td>
</tr>
<tr>
<td></td>
<td>Implement recommendations relating to gully erosion outlined in the Upper North East Water Quality Strategy and the Murray CMA Catchment Action Plan.</td>
<td>47</td>
<td>Lead agencies – North East CMA and Murray CMA. Landholders are also responsible for this action.</td>
</tr>
<tr>
<td>Topic</td>
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</tr>
<tr>
<td>Water Quality</td>
<td>Develop a gully erosion control works incentive program for the land immediately surrounding Lake Hume in conjunction with the North East CMA, DPI and the Murray CMA.</td>
<td>48</td>
<td>Lead agencies – North East CMA and Murray CMA. Landholders also have responsibility for this action.</td>
</tr>
<tr>
<td></td>
<td>Implement recommendations within local government and North East Water wastewater management plans relating to wastewater management.</td>
<td>49</td>
<td>Lead agencies – local government, North East Water and Environment Protection Authority.</td>
</tr>
<tr>
<td></td>
<td>Investigate alternative technologies and systems to manage sewage such as composting toilets in the near shore environment.</td>
<td>50</td>
<td>Lead agencies – G-MW and local government.</td>
</tr>
<tr>
<td></td>
<td>All new development must be in accordance with local government stormwater management plans, and Urban Stormwater: Best Practice Environmental Management Guidelines (CSIRO) 1999.</td>
<td>51</td>
<td>Lead agencies – local government.</td>
</tr>
<tr>
<td></td>
<td>Engage with EPA Victoria to discuss and consider a broad scale study into potential contamination of lake sediments and water quality from historical mining activity.</td>
<td>52</td>
<td>Lead agencies – G-MW, EPA and MDBC.</td>
</tr>
<tr>
<td></td>
<td>Clarify existing water quality monitoring programs in place that relate to Lake Hume.</td>
<td>53</td>
<td>Lead agency – MDBC.</td>
</tr>
<tr>
<td></td>
<td>Co-ordinate an integrated water quality monitoring, evaluation and reporting strategy for Lake Hume.</td>
<td>54</td>
<td>Lead agency – MDBC.</td>
</tr>
<tr>
<td></td>
<td>Develop and adopt water quality criteria specific to Lake Hume.</td>
<td>55</td>
<td>Lead agency – MDBC.</td>
</tr>
</tbody>
</table>
## Appendix A - Summary of Management Actions

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<th>No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Healthy Ecosystems</strong></td>
<td>Co-ordinate an integrated water quality Monitoring, Evaluation and Reporting Strategy for Lake Hume.</td>
<td>56</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop a community education program on water quality issues and management.</td>
<td>57</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Consider limited tree removal combined with fish habitat enhancement in areas south of Bethanga Bridge, subject to endorsement of NSW Department of Primary Industries (DPI) Fisheries, and Victorian DPI Fisheries, relevant landowners and peak fishing representative bodies.</td>
<td>58</td>
<td>Boating and tourism operators and user groups.</td>
</tr>
<tr>
<td></td>
<td>Implement recommendations within the North East Fishery Management Plan that relate to the maintenance of fish habitat in Lake Hume.</td>
<td>59</td>
<td>Lead agency – DPI.</td>
</tr>
<tr>
<td></td>
<td>Continue existing foreshore revegetation programs on public land, and develop an incentive program to facilitate revegetation of private foreshore and near-foreshore land.</td>
<td>60</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop a revegetation incentive program for private landowners on the foreshore and surrounds which includes stock watering and fencing.</td>
<td>61</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Consider establishing new riverine wetlands as ‘filters’ on upper reaches of Lake Hume.</td>
<td>62</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Conduct a detailed assessment of the lake foreshore zone to determine any areas grazing should be ceased to protect riparian vegetation, prevent erosion or re-establish River Red Gums or other important biodiversity values.</td>
<td>63</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Investigate alternative management controls for Noogoora Burr and other priority weeds.</td>
<td>64</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Investigate the application of innovative carp control programs for Lake Hume.</td>
<td>65</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td>Topic</td>
<td>Action</td>
<td>No.</td>
<td>Responsible Authority</td>
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</tr>
<tr>
<td><strong>Agricultural Land Use</strong></td>
<td>Conduct a detailed study to determine the source, fate and virulence of pathogens in Lake Hume.</td>
<td>66</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop a grazing license document which details shared responsibilities (including weed management) of both G-MW and the license holder for Victorian lands under their control.</td>
<td>67</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Conduct a detailed assessment of the lake foreshore to determine any areas of the lake where grazing should be removed where possible or better managed to protect riparian vegetation, prevent erosion or encourage the re-establishment of foreshore vegetation.</td>
<td>68</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Exclude stock from areas where there are significant high-priority archaeological sites that require protection from stock grazing activities.</td>
<td>69</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop a revegetation incentive program for the foreshore and surrounds which includes stock watering and fencing.</td>
<td>70</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Support a pilot trial on private land in NSW to determine the costs, benefits and practicalities of broadcast cropping on the lake bed.</td>
<td>71</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>All diversions from Lake Hume to be licensed and managed to prevent impacts on cultural heritage, public safety and the environment.</td>
<td>72</td>
<td>Lead agencies - G-MW and NSW Department of Water and Energy</td>
</tr>
<tr>
<td></td>
<td>Develop a revegetation incentive program for private landowners for the foreshore and surrounds which includes provision for off-stream stock watering.</td>
<td>73</td>
<td>Lead agencies - G-MW in collaboration with and NSW Department of Water and Energy</td>
</tr>
<tr>
<td></td>
<td>Minimise fencing below full supply level to the extent practicable and remove old fences.</td>
<td>74</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Investigate possibilities for virtual fencing and other innovative approaches to stock management on the lake bed to reduce the need for traditional fencing.</td>
<td>75</td>
<td>Lead agency – G-MW.</td>
</tr>
</tbody>
</table>
## Appendix A - Summary of Management Actions

### Planning and Development

<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
<tr>
<td></td>
<td>Develop an MoU between Wodonga City Council, Towong Shire Council, Indigo Shire Council, Albury City Council, Greater Hume Shire Council and MDBC on agreed principles and processes to manage the impacts of planning and development on the lake.</td>
<td>76</td>
<td>Lead agencies – G-MW, Department of Planning and Communities (DPC) and NSW Department of Planning</td>
</tr>
<tr>
<td></td>
<td>Establish a Lake Hume Planners Forum to meet once or twice a year to discuss and resolve planning issues specific to Lake Hume and ensure a consistent, coordinated approach.</td>
<td>77</td>
<td>Lead agencies – G-MW, DPC and NSW Department of Planning.</td>
</tr>
<tr>
<td></td>
<td>Develop an MoU to provide consistent policy on sustainable building design and development. This MoU could encourage use of well known and industry accepted environmentally sustainable design and assessment frameworks</td>
<td>78</td>
<td>Lead agencies – DPC and NSW Department of Planning.</td>
</tr>
<tr>
<td></td>
<td>Develop an MoU to include principles to manage the impacts of development on the visual aesthetics of the Lake Hume foreshore.</td>
<td>79</td>
<td>Lead agencies – DPC and NSW Department of Planning.</td>
</tr>
<tr>
<td></td>
<td>Develop landscape plans or foreshore master plans for priority areas to preserve the values of the lake and foreshore and enhance recreational use and facilities of the land surrounding Lake Hume.</td>
<td>80</td>
<td>Lead agencies – local government and G-MW.</td>
</tr>
</tbody>
</table>

### Cultural Heritage

<table>
<thead>
<tr>
<th>Topic</th>
<th>Action</th>
<th>No.</th>
<th>Responsible Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Implement appropriate recommendations of the Lake Hume Aboriginal Heritage Study.</td>
<td>81</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop a cultural heritage management plan for Lake Hume, in accordance with the Aboriginal Heritage Act 2006 and the Aboriginal Heritage Regulations 2007.</td>
<td>82</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop a program to increase community appreciation of Aboriginal heritage at Lake Hume.</td>
<td>83</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Undertake a comprehensive community survey of European cultural heritage.</td>
<td>84</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Identify, preserve and protect significant European cultural heritage at Lake Hume.</td>
<td>85</td>
<td>Lead agency – G-MW.</td>
</tr>
<tr>
<td></td>
<td>Develop a program to increase community appreciation of European cultural heritage at Lake Hume.</td>
<td>86</td>
<td>Lead agency – G-MW.</td>
</tr>
</tbody>
</table>
Appendix B – Hume Facts and Figures

The Hume Dam impounds the waters of the Murray and Mitta Mitta rivers just below their junction, about 12 kilometres east of Albury in NSW. The dam has a capacity of 3,038 gigalitres (GL)* at full capacity, a surface area of 202.5km², a maximum depth of 41.4 metres and a foreshore length of about 370 kilometres (MDBC Website http://www.mdbc.gov.au).

The main use is for the provision of irrigation water flows. Flows greater than 20,000 megalitres (ML) per day can be released from the dam to supply irrigation and South Australian water entitlements.

The water level in the dam fluctuates on a regular annual cycle and is typically drawn down between November and May each year to between 10 and 50 percent capacity. Typically the lake stores water in winter and spring and spills one in two years on average, although may go many years without spilling during periods of low rainfall.

Lake Hume has a catchment area of approximately 15,280km². Approximately 80 percent of the catchment is forested and approximately 20 percent has been cleared for agriculture.

Appendix C – Operation of Lake Hume

The Lake Hume Land and On-water Management Plan does not incorporate recommendations relating to the operation of Lake Hume or the storage and release of water stored in the lake. These are bigger picture questions that must be considered in a whole of basin context.

The Plan recognises a connection between land and on-water uses and water levels.

The following section provides an overview of how Lake Hume is operated.

Lake Hume, with a capacity of 3,038 GL or 3,038,000 ML, is the MDBC’s primary regulating storage. Inflows from the Hume catchment, excluding flows from Dartmouth Dam and the Snowy Mountains Scheme, are variable but about equal, on average, to the storage capacity. Inflows in a drought year are only about 10 percent of those in a flood year. Releases from Dartmouth Reservoir are controlled by MDBC and releases from the Snowy Mountains Scheme are controlled by the Snowy Mountains Hydro-Electric Authority (MDBC Website http://www.mdbc.gov.au).

The water level of Hume storage fluctuates on a fairly regular annual cycle. The usual pattern is that it is drawn down between November and May, primarily to supply water for irrigation, to between 10 percent and 50 percent of capacity. It typically stores water in winter and spring, and historically spills about one year in two on average, though in dry sequences such as the current drought it may not spill for many years on end.

Hume and Dartmouth are operated in a co-ordinated manner, with releases being made from Dartmouth to share the available “airspace” between the two storages, (airspace is the difference between the volume of water actually in the storage and the volume which would be held in the storage if it was full). This “harmony” operation shares the potential to mitigate floods in the valleys below the two storages. The primary aim of the co-ordinated operation of the two storages is that Dartmouth will be full by the time water stops spilling at Hume, usually in late spring. A secondary aim is to do that in a way that retains the maximum possible capacity to mitigate floods along the rivers below the two dams.

There are four main phases of operation of Hume storage; filling, release, pre-release and spilling (MDBC Website http://www.mdbc.gov.au).

The Lake Hume catchment covers less than 1.5 percent of the total area of the Murray-Darling Basin but contributes 37 percent of the total inflow to the Murray River in an average year.

Approximately one third of the inflow to the lake is derived from the Mitta Mitta River and the remainder is sourced from the upper Murray River. An average transfer of 580 GL of water is sourced from the Snowy Mountains Scheme.
Appendix C – Operation of Lake Hume

Filling Phase
During the filling phase minimum releases are maintained for as long as possible. The minimum release from the storage is 600 megalitres per day (ML/d), and this is increased if necessary to ensure that a minimum flow of 1,200 ML/d is maintained at Doctor’s Point, immediately downstream of the junction with the Kiewa River, a few kilometres below Hume Dam. The intent is to provide sufficient flow for riparian and environmental needs. Typically the filling phase runs from the end of the irrigation season in mid-May to some time in the late winter or spring, depending on seasonal conditions and irrigation demand (MDBC Website http://www.mdbc.gov.au).

Release Phase
Daily demand in South Australia and the irrigation areas along the Murray River during peak farming season can exceed 30,000 ML/d. This is considerably more than the flow that can pass along the river channel without causing flooding. To avoid the need to supply such high flows, efforts are made to get the required water down to mid-river storages such as Lake Victoria over a longer period earlier in the season. The river channel between Hume and Yarrawonga has a capacity to pass 25,000 ML/d without flooding. Further downstream at the Barmah Choke, which is at the western end of the Barmah-Millewa Forest, the maximum flow before flooding occurs is about 8,500 ML/d. Flows greater than 8,500 ML/d cause flooding in the forest which can be undesirable in certain seasons of the year. When it is necessary to transfer water downstream, at rates greater than can pass through the Barmah Choke, alternative routes through the Mulwala canal and the Edward River, may be used to pass up to about 2,000 ML/d. Such transfers are usually required when Darling River resources and downstream tributary flows, are low.

As far as possible, releases to satisfy downstream needs are kept below channel capacity to minimise disruption for people living and working along the river. Downstream needs include irrigation, stock and domestic and industrial consumption, as well as estimated river losses and any transfers to downstream storages (the calculations include adjustments for contributions from tributary flows and storages downstream). Requirements are reviewed on a daily basis with the aim of conserving water while still meeting expected water needs. Water released from Hume takes about a month to reach the South Australian border, so releases must be made up to a month in advance (MDBC Website http://www.mdbc.gov.au).

Pre-release Phase
When the storage level and inflows are high, usually in winter/spring, pre-releases may be made in excess of downstream needs, to provide airspace to mitigate floods. Pre-releases are calculated so that the storage will just fill if inflows subsequently drop to the lowest level that might be expected given the historical inflow records and the existing inflow levels (in technical terms, using ‘minimum serially correlated inflows’). This means that the chance of the pre-releases reducing the volume of stored water which will be available to supply downstream water users in the summer, is small.

Pre-releases are initially made at rates up to channel capacity. However when the storage is near full, pre-releases at rates above channel capacity are sometimes made after consultation with affected landholders downstream.

Spilling (Flood) Phase
When the reservoir is full or near full, the spillway gates at the dam are used, together with the power station and irrigation valves, to pass flood inflows downstream. The aims of flood operation are:

- To pass the flood without endangering the safety of the dam;
- To mitigate, or at least not worsen, the effects of downstream flooding; and
- To ensure as far as possible that the storage is near full after the flood so there is no loss of resources.

If substantial airspace is available prior to the arrival of the flood, significant mitigation is possible. If not, the spillway gates are used to release water downstream at or below the rate at which water is entering the storage.

During the recession of a flood, the size of the flow is generally decreased at a rate which matches the decreasing inflows until flows at Albury recede to channel capacity.
However, in some cases the rate of water releases may be kept higher than inflows, in consultation with landholders downstream, to increase the volume of airspace available in the storage for flood mitigation. This may extend the duration of above-channel flows.

Overall, Hume Reservoir provides significant flood protection downstream. It can fully absorb many floods during the filling stage, typically during autumn and early winter, and significantly mitigate later floods. However, once the storage has filled, its flood mitigation potential is very limited until it is again drawn down (MDBC Website http://www.mdbc.gov.au).

**Power Station**

Part or all of the water discharged from Hume, is usually released through the power station, which is owned and operated by Eraring Energy under an agreement with the Commission. There is no regulating pondage below the power station, nor is any water entitlement set aside for power generation, so releases from the dam are not affected in any way by the operation of the station. If the power station units are out of service, releases are made through the irrigation valves or spillway gates instead. The power station stops operation when the downstream water level rises during a flood or when the lake level is very low (MDBC Website http://www.mdbc.gov.au).

**Rates of Rise and Fall in Murray River**

Limits to the rates of rise and fall of the river downstream of Hume have been adopted to provide adequate warning of river level changes and to minimise riverbank slumping (riverbank slumping can result when water logged banks are left exposed by a rapid fall in river height. A slower rate of fall allows them to drain and reduces the risk of collapse). The limits to the rate of fall are:

- 20 centimetres per day (cm/d) at Heywoods, immediately downstream of the Dam;
- 15 cm/d at Doctor’s Point, downstream of the junction with the Kiewa River and
- Larger changes in level are allowed when releases are being increased.

**Special Circumstances**

Operations may be adjusted from time to time for special circumstances including:

- Maintenance or construction requirements. For example maintenance work on the irrigation outlets may require the reservoir level be above the spillway crest so that releases can be made over the spillway and divers can safely approach the outlets;
- Special needs at a downstream storage. For example maintenance works at Yarrawonga Weir may affect Hume releases at times;
- Water quality concerns downstream. Algal blooms are sometimes dissipated by extra releases for a short period; and
- Short-term flow reductions to assist police search and rescue operations.
## Appendix D – Roles and Responsibilities

<table>
<thead>
<tr>
<th>Agency</th>
<th>Roles and Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Murray-Darling Basin Commission (MDBC)</td>
<td>The MDBC is the executive arm of the Murray-Darling Basin Ministerial Council and is responsible for: managing the Murray River and the Menindee Lakes system of the Lower Darling River, and advising the Ministerial Council on matters related to the use of the water, land and other environmental resources of the Murray-Darling Basin. The Commission funds and has ultimate responsibility for the management of Lake Hume.</td>
</tr>
<tr>
<td>River Murray Water</td>
<td>River Murray Water is an internal business division of the Murray-Darling Basin Commission established for the specific purpose of operating and managing the Murray River system. At Lake Hume River Murray Water is responsible for directing State Water operators at Lake Hume with regard to the timing and rates of release from the dam.</td>
</tr>
<tr>
<td>State Water Corporation (NSW)</td>
<td>State Water is a wholly state-owned corporation spread across 46 locations in NSW, including Hume Dam. State Water Corporation delivers bulk water in regional and rural NSW, to all authorised users such as river pumpers, irrigation companies, towns, farms, mines and electricity generators. State Water also delivers water for the environment as well as unlicensed stock and domestic users on regulated rivers. Under the Murray-Darling Basin Agreement the State of New South Wales is responsible for the management of the Hume Dam and State Water Corporation is the designated management or ‘constructing’ authority for Hume Dam. Services provided include the ongoing maintenance and monitoring of the Hume Dam structure, management of storage operations (water storage and releases as directed by River Murray Water).</td>
</tr>
<tr>
<td>Goulburn-Murray Water (G-MW)</td>
<td>G-MW manages water storage, delivery and drainage systems involving 70 percent of Victoria’s stored water. This includes harvesting, storing and delivering water, and ensuring water is available for all of its customers. It operates on a cost recovery basis and provides for the ongoing refurbishment of infrastructure of the system. At Lake Hume, G-MW manages Victorian public lake bed and foreshore land on behalf of the MDBC. G-MW is the boating authority for Victorian waters (all waters south of Bethanga Bridge), and delivers various projects and programs on behalf of the MDBC. By agreement G-MW has appointed a land and water management officer for Lake Hume to oversee the management of all foreshore lands around the lake for and on behalf of the Murray-Darling Basin Commission. G-MW is also primarily responsible for the project management and delivery of the Lake Hume Land and On-Water Management Plan on behalf of the MDBC.</td>
</tr>
<tr>
<td>Victorian Department of Sustainability and Environment (DSE)</td>
<td>The DSE is one of 10 Victorian Government departments. The DSE is Victoria’s leading government agency responsible for promoting and managing the sustainability of the natural and built environment.</td>
</tr>
<tr>
<td>Victorian Department of Primary Industries (DPI Vic)</td>
<td>The DPI promotes the sustainable development of primary industries for the benefit of all of Victoria. It is one of 10 Victorian Government departments and reports to the Minister for Agriculture and the Minister for Energy and Resources. DPI is responsible for the management of fisheries in Victoria including the management of fisheries in Lake Hume. Under a new agreement in 2004, recreational fishing compliance (licenses, size and bag limits etc) in Lake Hume became the responsibility of Victoria.</td>
</tr>
<tr>
<td>Agency</td>
<td>Roles and Responsibilities</td>
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</tr>
<tr>
<td>NSW Department of Primary Industries (DPI NSW)</td>
<td>The NSW DPI is responsible for the protection, conservation and rehabilitation of aquatic habitats by administering the Fisheries Management Act to control certain activities impacting on aquatic habitats. This includes reviewing development and works proposals that may impact on aquatic habitats to ensure they meet the requirements of the Act.</td>
</tr>
<tr>
<td>Department of Water and Energy</td>
<td>The Department of Water and Energy (DWE) commenced operating in April 2007 and provides policy, legislative, regulatory and management advice in relation to water and energy matters in NSW. The Department works towards achieving a sustainable allocation of water between the environment, communities, farmers and industry. More specifically, for Lake Hume and its catchment DWE implements stream rehabilitation works programs; manages diversion licencing (in NSW) and coordinates water quality monitoring programs including the blue green algal monitoring and response program.</td>
</tr>
<tr>
<td>NSW Maritime</td>
<td>NSW Maritime is the State’s maritime regulator. NSW Maritime is a statutory state government body classified by NSW Treasury as a non-budget dependent general government agency. NSW Maritime is a self-funded entity. At Lake Hume, NSW Maritime is the boating authority for all waters to the north of Bethanga Bridge.</td>
</tr>
<tr>
<td>North East Catchment Management Authority (North East CMA)</td>
<td>Under the Catchment and Land Protection Act, 1994, Victoria is divided into 10 catchment regions and a CMA is established for each region responsible for waterway and catchment management. The CMA’s are statutory authorities with a board that is directly accountable to the Minister. The North East Catchment Management Authority is responsible for co-ordinating integrated catchment management and sustainable land and water use in Victoria’s North East region. This is primarily achieved through the preparation, coordination and implementation of the North East Region Catchment Strategy, where the CMA has operational responsibility for waterway and floodplain management in priority areas.</td>
</tr>
<tr>
<td>Murray Catchment Management Authority (Murray CMA)</td>
<td>The NSW Murray CMA sets the future direction for natural resource management in the Murray catchment (NSW). The CMA’s Catchment Action Plan provides a strategic framework and direction for the technical and financial support of natural resource management. The key objective of the CMA is to actively involve the Murray Catchment’s community in biodiversity, land and water management and resource condition improvement. The active management of water quality, soil health, flora and fauna are key shared responsibilities of the Murray CMA and the Lake Hume Land &amp; On-water Management Plan.</td>
</tr>
<tr>
<td>Environment Protection Authority (VIC)</td>
<td>EPA Victoria is a statutory authority established under the Environment Protection Act, 1970. It exists to ensure the protection of beneficial uses of air, water and land from the adverse impacts of waste and unwanted noise.</td>
</tr>
<tr>
<td>Department of Environment and Climate Change (NSW)</td>
<td>The Department of Environment and Climate Change (DECC) is a newly formed Department which manages the states natural resources. The new department’s wide-ranging responsibilities include climate change and greenhouse issues, air and water quality, noise control and regulation of chemicals, programs to reduce waste, toxicity litter and illegal dumping, management of national parks and reserves, threatened species and native vegetation management, protection of soils and land and catchment management, environmental water management and Aboriginal cultural heritage and historic site management.</td>
</tr>
<tr>
<td>Rural Lands Protection Board (NSW)</td>
<td>Rural Lands Protection Boards play a key role in protecting rural lands in NSW. They deliver services to rural ratepayers and others in each district at the frontline in the management of animal health, pest animal and insect control, travelling stock reserves, stock movement, stock identification and drought relief.</td>
</tr>
</tbody>
</table>
Figure 1. – Map of the Upper Murray River (Hume) Catchment
Vision for Lake Hume

It is the year 2050... Lake Hume is an important water supply storage that also provides recreational, social and economic benefits for the broader community. There is a strong sense of shared responsibility between upstream, downstream and local users to ensure a healthy and sustainable future for the lake, its surrounding environment and the water resource.
Acknowledgement

Many individuals and organisations have assisted with the development of the Plan. These include the members of the Community, Technical and Agency Advisory Groups, focus group participants, and many hundreds of interested people from the broader community. All repeatedly demonstrated their commitment to the future wellbeing of Lake Hume through their participation in consultative forums and their contributions. We wish to thank them all and acknowledge their input.

Our thanks and appreciation also to Hyder Consulting, the Regional Development Company and George Ward Consulting for their assistance with this project.