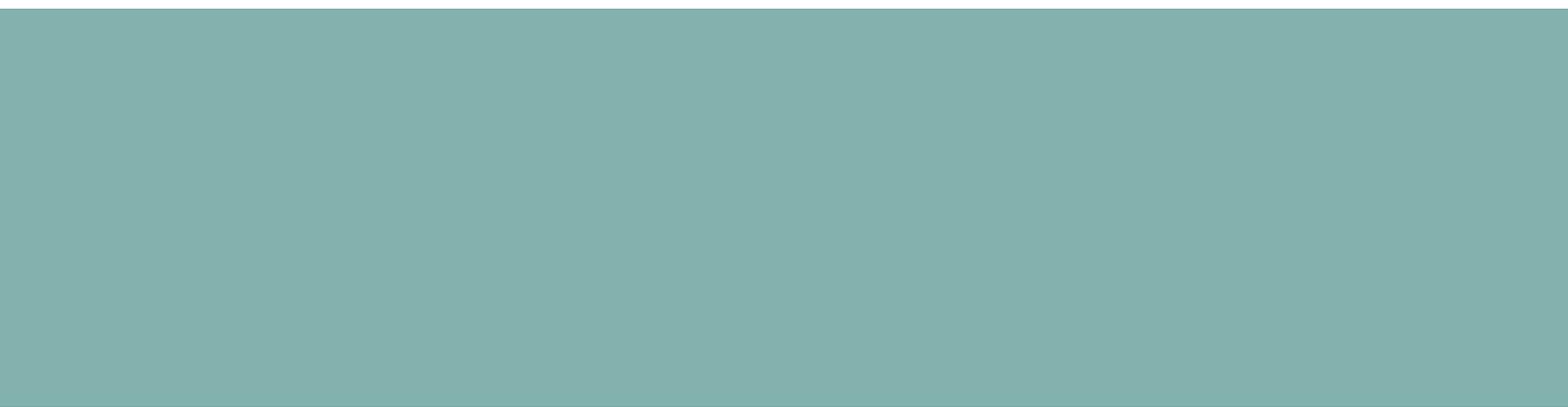




Kow Swamp

Land and On-Water Management Plan



Goulburn Murray Water acknowledges and respects that Yorta Yorta Nation Aboriginal Corporation refers to *Kow Swamp as Ghow Swamp*. For the purpose of this document, Goulburn Murray Water will use the spelling *Kow Swamp* in accordance with the registration of this place under the Register of Geographic Names.



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Executive Summary

Kow Swamp is a large expanse of water, swampy wetlands and vegetation, and is recognised for the maintenance and conservation of biological diversity. It has long been accepted at a local, state and national level as a high value site of Aboriginal cultural significance. Ancestral remains at Kow Swamp date to the Pleistocene era and have been dated at least 13,000 years. The Kow Swamp archaeological site constitutes the world's largest single population of ancestral remains from the late Pleistocene era (120,000 - 5,000 years ago). Kow Swamp's name derives from the Aboriginal word Ghow, which describes the white gypsum soil found at the swamp.

European heritage is also significant at Kow Swamp. Settlement took place in the Cohuna region after the heyday of mining in the 1850s and 60s. The passing of the McPherson Grant Land Act in 1869 changed land tenure and use. The Act provided that individual farmers could select areas up to 320 acres to be held under licence for three years. Sheep, cattle, dairy and grain crops were the main sources of income during early settlement. From 1881- 1888, drought highlighted the need to safeguard water and to secure an effective irrigation storage.

Kow Swamp has also been valued as a place for recreation and enjoyment by European settlers and surrounding communities.

In the early 1900s, Kow Swamp was converted into water storage by the construction of the Box Creek Regulator that raised the full supply level of the natural wetland. Today, Kow Swamp allows water to be harvested from the River Murray at significant rates and stored for use during periods of high demand. Kow Swamp can be drawn down as required to pass water into other Victorian Mid Murray Storages (VMMS).

Kow Swamp is a popular fishing spot, particularly below the Box Creek weir where golden perch

aggregate and are caught in large numbers in late spring each year. Boaters fishing the Box Creek channel and inflowing Taylor's Creek are also rewarded with Murray cod and golden perch. Over the last three years, Fisheries Victoria has stocked 200,000 Murray cod and 180,000 golden perch fingerlings into the Swamp.

There are many social, cultural and environmental issues around the swamp that require urgent action. The Kow Swamp Land and On-Water Management Plan provides a strategic approach to management of these issues. The Plan aims to identify and protect the important values associated with the storage by outlining priority land and on-water issues, and identifying key actions to be implemented during the next five years. Most importantly, the Plan aims to increase collaboration between agencies, stakeholder groups and the community to protect the swamp's values and attributes.

As well as producing the Kow Swamp Land and On-Water Management Plan, the project aims to achieve acceptance of management recommendations and responsibilities. An ongoing, comprehensive stakeholder and community consultation program has been facilitated, with a technically robust and defensible process for its implementation established. A Project Reference Group (PRG) was formed to provide advice and feedback on the consultation and development of the Plan.

Two 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 Kow Swamp Implementation Group will be set up to play an important role in the community engagement process during long-term management of the swamp. The Implementation Group will have a number of responsibilities. It will help prioritise actions in the Kow Swamp Land and On-Water Management Plan and provide advice on implementation. The Implementation Group will also advise on community engagement activities, such as informing and raising community awareness on the importance of cultural heritage and environmental issues in the local area and the legislative responsibilities that Goulburn Murray Water have in relation to these issues.

Objectives of the Plan

Land and On-Water Management Plans are viewed as an integral component of GMW's water storage management planning portfolio. The Plans are intended to be a key reference document, not only for GMW but also for the communities and the many stakeholders that interact with these storages.

The main objectives of the Kow Swamp Land and On-Water Management Plan are to:

- Recognise the diverse range of values and uses associated with the storage.
- Provide a strategic framework for management of the storage.
- Identify important social, economic and environmental issues, and develop a series of actions to address these issues to be implemented over the next 1–5 years.
- Protect the natural and cultural values by obtaining broad-scale agreement between agencies on principles relating to sustainable use and development of the swamp and surrounding foreshore.
- Protect the long-term quality of the water resource for local and downstream users.

- Assist GMW in meeting legislative requirements of state and federal cultural and environmental laws.

As well as the production of the Plan, the aim is to obtain acceptance of the management recommendations and responsibilities. A comprehensive stakeholder and community consultation program, and a technically robust and defensible process for the preparation of the plan, will achieve this.

Historically, GMW has maintained an operational focus on water levels in Kow Swamp for the Torrumbarry Irrigation Area. It has become increasingly clear during the development of this Plan that maintaining a purely operational focus will not identify and/or address many social, cultural and environmental issues around the swamp that require prioritised action.

Kow Swamp is part of an extensive “Kerang Lakes” wetland system. Many of the social and ecological forces impacting on Kow Swamp such as native fish recovery, carp, fishing, bird habitat and hunting are regional issues. This plan seeks to support ‘landscape’ approaches to these issues.



Context

Vision for Kow Swamp

The following vision statement describes clear and inspirational long-term desired change resulting from the prioritisation and implementation of key actions outlined in this Plan. The Kow Swamp Implementation Group will play a key role in achieving this vision.

An actively managed storage servicing customer water supply demands and the cultural heritage, ecological and recreation needs of stakeholders.

Kow Swamp

Kow Swamp is located approximately 4.6 km west of the township of Gunbower, in north-central Victoria. It is located in the Campaspe Shire. The swamp is a large expanse of water, swampy wetlands and vegetation, and is recognised for the maintenance and conservation of biological diversity. Kow Swamp has long been recognised at a state and national level as a high value site with respect to Aboriginal cultural significance. Kow Swamp is located within the traditional Yorta Yorta land area covered under the Cooperative Management Agreement with the Yorta Yorta Nation Aboriginal Corporation (YYNAC).

Kow Swamp was converted to a water storage in 1900 by construction of the Box Creek Regulator, which raised the full supply level of the natural wetland by approximately 1 metre. In more recent times, the storage has been incorporated into the Victorian Mid Murray Storages where the objective is to capture, store and release water for both Torrumbarry and River Murray water entitlement holders. The swamp plays some role in flood mitigation during winter and spring.

Kow Swamp fills from the east via Taylor's Creek (regulated), from the River Murray (Torrumbarry Weir), and from the south via Mount Hope Creek (unregulated; and of which the Bendigo Creek is one of its tributaries). Whilst some local surface drainage and groundwater inflows occur, these are considered to be small. Of the two surface water inflow sources, Taylor's Creek is by far the greater contributor.

Scope of the Plan

The geographic scope of this Plan is limited to the swamp and the land immediately surrounding the full supply level. While the Plan focuses on the lake and foreshore areas, it also aims to positively influence activities throughout the broader catchment.

To date, all of the Land and On-Water management Plans developed by Goulburn Murray Water do not address water levels in the storage. This Plan differs to the other Plans that have been developed and incorporates one action to investigate whether the water levels can be adjusted to protect culturally significant places and landscapes from erosion while maintaining management responsibilities to the Victorian Mid Murray Storages and Torrumbarry Irrigation Area.

Storage Operations

The Victorian Mid Murray Storages (VMMS) incorporate four storages including Lake Boga, Lake Charm, Kangaroo Lake and Kow Swamp. These storages are also part of the Torrumbarry Irrigation Area (TIA) which is under the control of Goulburn Murray Water's Central Murray Operations.

Kow Swamp allows water to be harvested from the River Murray at significant rates and stored for use during periods of high demand. This capacity is useful when there are short-lived surplus flow events on the River Murray because Kow Swamp can be rapidly filled then drawn down as required to pass water into other Victorian Mid Murray Storages (VMMS).

The Kow Swamp Land On-Water Management Plan cannot make specific recommendations regarding the management of water levels in Kow Swamp. Operational issues, including lake levels and the management of releases, are questions beyond the scope of this Plan. Further information about the operation of water releases from Kow Swamp can be found in Appendix C.

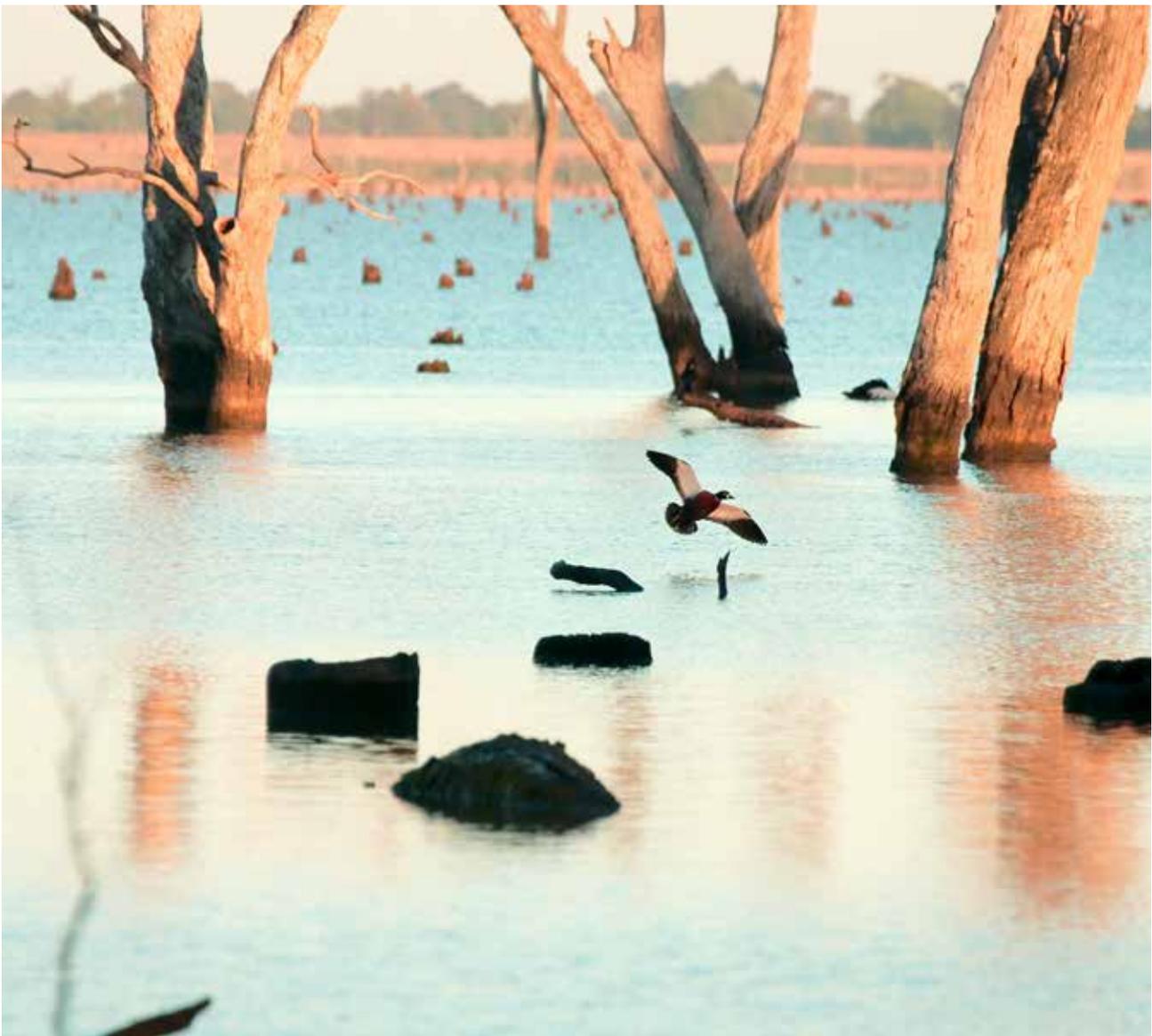
Land Status

Kow Swamp is located in a public water reserve vested in GMW. The reserve footprint is classified as a Public Conservation and Resource Zone (PCRZ) in the Shire of Campaspe's Planning Scheme. The purpose of the PCRZ is to protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values. Currently, there is mixed management responsibility of land immediately surrounding Kow Swamp, which needs to be addressed. Consideration needs to be given to whether areas of crown land abutting the water reserve will eventually be amalgamated with the water reserve area for GMW to manage.

Kow Swamp was approved as an Aboriginal Place on the 3rd of June 2015. A Victorian Aboriginal Heritage Council 'Cultural Heritage Audit,' identified Kow Swamp as the most significant place (ancestral remains) in Victoria.

Legal Status

The Kow Swamp Land and On-water Management Plan has no legal status. It will not impose any new legal or statutory requirements but may influence policy, potentially leading to legislation changes to help meet the objectives of the Plan. The Plan does not override any local government planning schemes or legislation.



A Plan for the Management of Kow Swamp

Plan Implementation

During the development of the Kow Swamp Land and On-Water Management Plan, participants involved in the consultation expressed support for the formation of an Implementation Group for the Plan. An Implementation Group can be used as a vehicle to enhance communication between Implementation Group members, increase understanding about issues relating to the swamp and, most importantly, guide the implementation of the Plan.

For this Plan it was agreed that an Implementation Group would be established that would include community representatives, the Yorta Yorta Nation Aboriginal Corporation (YYNAC) and key agency representatives. The Shires of Campaspe and Gannawarra support the Kow Swamp Land and On-Water Management Plan, recognising the Plan as an important step in communication and cooperation between agencies, stakeholder groups and community to ensure the long-term sustainability of the swamp. Loddon Shire Council is not part of the Implementation Group as Kow Swamp is not within its jurisdiction. There are no local communities within Loddon Shire Council that are located close to the storage.

Principles of collaboration, integrated management and a partnership approach to funding applications and the implementation of high priority actions is paramount to the Implementation Group.

Kow Swamp Implementation Group

The Kow Swamp Implementation Group will play an important role in enabling the Kow Swamp community and various user groups to have ongoing input into the implementation of the actions identified in this Plan. It will also help to identify and manage any new issues that arise. The Implementation Group will:

- Assist with the implementation and monitoring of actions in the Plan.

- Engage representatives from community groups, including the Aboriginal community, recreational users and landholders, to provide input into the implementation of actions.
- Provide a forum for agency representatives and the community to exchange ideas about the management of the swamp and to discuss policy and regulatory changes relevant to its management.
- Discuss infrastructure planning, media issues and management.

The Kow Swamp Implementation Group should include but not be limited to:

- A Goulburn Murray Water Managing Director or nominee.
- A representative from the Yorta Yorta Nation Aboriginal Corporation (YYNAC).
- An independent chairperson.
- One representative each from the Shires of Campaspe and Gannawarra nominated by the CEO (Kow Swamp is not located in the Gannawarra Shire however the Shire sees benefit from being involved due to Kow Swamps close proximity to its communities).
- Four community members representing a broad range of interests including landholders, recreational users and tourism.
- A representative from Department of Environment, Land, Water and Planning (DELWP) nominated by the Regional Manager.
- A representative from Department of Economic Development, Jobs, Transport, and Resources (DEDJTR) nominated by the Regional Manager.
- A representative from the North Central Catchment Management Authority (NCCMA).

Issues

- Ongoing communication and cooperation between agencies, stakeholder groups and community to ensure the long-term sustainability of the swamp.

Objectives

- To establish a Kow Swamp Implementation Group to provide advice on the implementation of the Plan.

- To encourage the Implementation Group to take ownership of the vision for Kow Swamp.

Actions

1. Establish an inter-agency Implementation Group to guide the implementation of the Plan, public communications and future development decisions.
2. Develop Terms of Reference and roles and responsibilities for the Implementation Group. Terms of reference to include principles of integrated management, collaboration and a partnership approach to funding applications and the implementation of high priority actions.
3. Secure a clear GMW management focus on the overall VMMS assets.
4. Conduct a review of the Plan and its implementation in five years.

Cultural Heritage

The management and protection of Aboriginal and European heritage is the responsibility of all government agencies in control of land management activities. State and Commonwealth legislation provides protection for Aboriginal and European heritage. There are also guidelines that set standards for identification, listing and conservation of heritage places. Further to 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.

Aboriginal Cultural Heritage

Kow Swamp has long been recognised at a local, state and national level as a high-value site of Aboriginal cultural significance. The Yorta Yorta people are the Indigenous Australians who traditionally lived around the junction of the Goulburn and Murray Rivers in present-day north-central Victoria. The Yorta Yorta people also inhabited the land around Kow Swamp. Yorta Yorta Family Groups include the Bangerang, Kailtheban, Wollithiga, Moira, Ulupna, Kwat Kwat, Yalaba Yalaba and Nguaria-iliam-wurrung clans.

For Yorta Yorta people, the swamp has always been known as a sacred resting place for their ancestors, with documented evidence that Yorta Yorta people were still occupying the swamp when Europeans first arrived in the region. The human remains at Kow Swamp are the world's largest single population of human remains from the late Pleistocene era and are at least 13,000 years old. Archaeological excavations took place between 1968 and 1972 which uncovered the partial and complete skeletal remains of many individuals. Some of these remains were excavated and removed.

There are numerous burial sites, oven mounds, shell middens and scarred trees along the margins of the swamp. Many of these sites have been damaged or destroyed by channel construction and earthworks that took place when the swamp was converted to a storage, and after subsequent irrigation works and agricultural processes. Sites have also been damaged by ongoing grazing of cattle around the shoreline, which has caused extensive pugging on



Photographed sourced from G. Sutherland Yorta Yorta Nations.

wet ground, damage to vegetation, and subsequent erosion and disturbance to mound sediments. Retention of water at an artificially high level has contributed to shoreline erosion and the degradation of significant sites.

In 1972 the Victorian Archaeological and Aboriginal Relics Preservation Act came into effect. Under this legislation, any activity that results in the disturbance or destruction of Aboriginal sites is an offence. The legislation also made it illegal to possess or display skeletal material without permission from the Minister. This legislation and subsequent amendments finally allowed Yorta Yorta people to have some say in what was happening to their burial grounds and the ancestral remains of their people.

The Victorian Archaeological Survey was formed under the Act and in the 1980s was responsible for protection of Aboriginal cultural heritage. In 1983 a site inspection report was prepared following a report of exposed burials at Kow Swamp (Hotchin & Evans 1983). The report found all the Aboriginal places inspected were under threat from cattle trampling and shoreline encroachment, and were considered to be in immediate danger. Although site inspection reports were prepared many years ago identifying the risks to significant places and landscapes, adequate protection measures are still not in place to preserve and protect these values and sites. Consideration should be given, not just to the sites themselves but also to the broader landscape and surrounding environment to reflect the history and cultural significance of the Yorta Yorta people. The following quote from the YYNAC Native Title Claim transcript indicates the importance of cultural heritage being seen as part of the cultural landscape.

‘The ability may have become easier for us to protect sites because there has been various legislation that had not been there previously. But, we were given the ability to be able to protect the site itself, but not the environment around the site. We’ve got instances where the creeks or billabongs in which midden sites or burial sites may be, but you look at the environment around, and it makes us very sad that the environment around doesn’t reflect the history of why that midden was there. Why our people lived there and what was available in regards to plant foods, or bird life, or animals. We also reflect on the condition of the river. We believe the river has declined in its condition a lot. That’s of concern to us’ (Monica Morgan – Yorta Yorta Elder, Transcript pp. 1277–8).

In 2004, a Cooperative Management Agreement was signed between the YYNAC and the State of Victoria. The objectives of the agreement are to:

- Facilitate the active and resourced involvement of the Yorta Yorta people in decisions about the management of Designated Areas, including the integration of Yorta Yorta knowledge, internal decision-making processes

and perspectives into management planning and works programming.

- Development of mutual recognition and trust between the Yorta Yorta people and the State.
- Identify and promote employment, training and economic development opportunities for the Yorta Yorta people.

The YYNAC were recognised in 2007 as the Registered Aboriginal Party for the land including Kow Swamp under the Aboriginal Heritage Act 2006. This Victorian Act sets up a strong framework for the protection of Aboriginal cultural heritage that provides a legal requirement for land managers to protect and prevent harm to Aboriginal cultural heritage.

Of key importance to Registered Aboriginal Party recognition is the need for substantive consultation and partnership with the YYNAC to protect culturally significant places and landscapes, and to increase community awareness and understanding of Aboriginal cultural heritage at Kow Swamp. Implementing substantive consultation and partnership should include involvement of the YYNAC in the implementation of the Land and On-Water Management Plan for Kow Swamp, including ongoing representation on the Kow Swamp Implementation Group.

Increasing community awareness and understanding should include the development of programs to communicate information about the nature, origin and purpose of culturally significant objects, sites, places and landscapes.

The Aboriginal Heritage Amendment Act 2016 commences on the 1st of August 2016, the changes will improve protections for Aboriginal heritage and promote Aboriginal Cultural Heritage.

Objectives

- To protect, preserve and raise community awareness of the importance of Aboriginal cultural heritage associated with Kow Swamp.

Issues

- Absence of meaningful YYNAC planning involvement in Kow Swamp over many years.
- Damage caused by uncontrolled stock access to the riparian area of the swamp. The pugged ground on the swamp margin is easily eroded. Trampling by cattle is also destroying the mounds by compressing and spreading the mound sediments.

- Significant public misunderstanding by agency and freehold landholders regarding the role and responsibility of the YYNAC, and a lack of understanding of legislative responsibilities under the Aboriginal Heritage Act 2006.
- An identified need for YYNAC to assist GMW in urgent monitoring and protection measures required for recently exposed and previously identified burial sites at Kow Swamp.
- Lake level being held at current full supply level is problematic. High water levels have eroded foreshore areas and burial sites are now being eroded. It would also appear that some burial sites are below the full supply level and are only presented when lake levels are drawn down for operational purposes.

Actions

5. Secure active YYNAC inputs into development programs at Kow Swamp.
6. Establish fencing to better protect known culturally significant places and the landscape as a whole.
7. GMW to investigate whether the full supply level can be adjusted to protect culturally significant places and landscapes from erosion while maintaining management responsibilities to VMMS and TIA.
8. In partnership with the YYNAC, develop a program to increase agency and community awareness and understanding of Aboriginal cultural heritage at Kow Swamp.

Land Management

GMW is responsible for management of most of the foreshore surrounding Kow Swamp. Land surrounding Kow Swamp must be managed responsibly by the public land manager so that it provides a buffer for the protection of water quality and environmental and cultural heritage assets. Examples of land management issues at Kow Swamp include management of erosion, impacts of grazing on water quality, and absence of fencing to prevent cattle from entering the foreshore. Pest plants and animals and the preservation and protection of cultural heritage assets are also important land management issues. Developing and implementing a foreshore vegetation management plan to comprehensively address these issues is an

important action contained within this Plan.

Distinguishing the boundary between private and public land around Kow Swamp is sometimes difficult. There is mixed management responsibility of land immediately surrounding the swamp that needs to be addressed to protect important assets and the water reserve as a water supply storage into the future.

Management Responsibility

Kow Swamp is located in a public water reserve vested in GMW. The reserve footprint is classified as a Public Conservation and Resource Zone (PCRZ) in the Shire of Campaspe's Planning Scheme. The Gannawarra Shire and Loddon Shire Planning Scheme also affect land surrounding the storage. Currently, there is mixed management responsibility of land immediately surrounding Kow Swamp that needs to be addressed. Consideration should be given to whether areas of Crown land abutting the water reserve will eventually be amalgamated with the water reserve area for GMW to manage.

It should also be noted that Kow Swamp is a designated area under the Cooperative Management Agreement 2004 which was signed between the YYNAC and the State of Victoria. One of the key objectives of this agreement is to facilitate the active and resourced involvement of the Yorta Yorta people in decisions about the management of Designated Areas, including the integration of Yorta Yorta knowledge, internal decision-making processes and perspectives into management planning and works programming.

Mixed management responsibility and associated issues can be described as follows:

- On the north to north-east shoreline and on the southern shoreline, parcels of Crown land are designated for public access and are the management responsibility of DELWP.
- Freehold land directly fronts the water reserve on the south-western side and stretches for approximately 4 km along the edge of the storage.
- There is a small section of land on the eastern side of the swamp managed by Campaspe Council (Dehne Road Park) in partnership with the Leitchville Lions Club.

- There is a small rectangular area to the south of Kow Swamp which is a school reserve managed by the Department of Education and Early Childhood Development.
 - There are areas to the north of Kow Swamp managed by DELWP and licensed for grazing purposes. Some of the licence holders in this area are grazing cattle directly on the foreshore of the swamp (between the swamp and the contour channel).
 - There are some small parcels of private land surrounded by Crown land alongside Bendigo Creek. Currently, farming infrastructure and agricultural activity is taking place on Crown land.
 - At full supply level Kow Swamp extends above Normans Bridge. There is a need for an agreed Crown land/freehold land boundary for the management of the foreshore downstream of Norman's Bridge between GMW, NCCMA, landholders and DELWP.
 - Stakeholders at Kow Swamp would like to see Crown land management responsibility changed so that they only have to liaise with one agency in relation to land management issues.
 - Negotiations with landholders should take place and options explored, e.g. that provide benefit to landholders, water quality, riparian vegetation and cultural heritage assets, to better manage Crown land around the perimeter of Kow Swamp.
 - Land along the western boundary between Pyramid Creek and Bendigo Creek is within the Loddon Shire and is zoned 'Farming.'
 - Land between Hancocks Road and Pyramid Creek at the northern end is within the Gannawarra Shire and is zoned Farming.
- » The need to establish management responsibility for areas to the north of Kow Swamp so that landholders with a grazing licence only have to liaise with one agency in relation to land management issues.
 - » The need for a recognised boundary for the management of the foreshore downstream of Norman's Bridge needs to be agreed upon by GMW, DELWP and NCCMA.
- Options should be explored, that provide benefit to landholders, water quality, riparian vegetation and cultural heritage assets, to better manage Crown land around the perimeter of Kow Swamp.

Actions

9. GMW to initiate an investigation to enable the transfer of public land around Kow Swamp to a single agency owner, including areas to the north of Kow Swamp managed by DELWP and licensed for grazing purposes.
10. GMW to liaise with DELWP and NCCMA to determine a recognised boundary for management of the foreshore/tributary downstream of Norman's Bridge.
11. GMW and DELWP to investigate options to manage Crown land around the perimeter of Kow Swamp.

Grazing

Cattle have been grazed on the foreshore surrounding Kow Swamp for many years. Freehold land directly fronts the water reserve on the south-western side and stretches for approximately 4 km along the edge of the storage. In most areas where Crown land and/or freehold land directly abuts the water reserve and/or the riparian zones on Gap Creek and Mt Hope Creek, the absence of fence lines is noticeable. The majority of landholders who have land that directly fronts the water reserve do not have a grazing licence.

The swamp provides a low-cost and convenient water supply for stock, however the impacts of grazing on archaeological sites, water quality, vegetation and erosion have been raised as issues of concern to many people. Ongoing grazing and management of cattle around the shoreline has caused extensive damage to wet ground and vegetation, and subsequent erosion and damage

Objectives

- To protect the water reserve as a water supply storage into the future.
- To ensure that public land surrounding the storage is actively managed by GMW to protect important values, including water quality, cultural heritage and riparian vegetation.

Issues

- The need to address mixed management responsibility to ensure clear lines of responsibility and management into the future including:

to Aboriginal burial sites, shell middens and oven mounds. Other impacts include increased nutrients in the water storage, contributing to potentially toxic algal blooms. Due to the tendency of cattle to graze the riparian zones when allowed access, phosphorus and nitrogen can either be washed into waterways through overland flow or be directly deposited into the water by the animals. Damage to riparian vegetation by cattle can impact on the habitat of native animals.

Objectives

- Manage the impacts of stock on water quality, erosion, cultural heritage assets and riparian vegetation.

Issues

- Poorly managed grazing resulting in damage to Aboriginal burial sites, shell middens and oven mounds, water quality decline, erosion, and damage to riparian vegetation.
- Areas being grazed which are not under licence.

Actions

12. Determine boundaries between public and private land and establish fencing where appropriate.
13. Investigate a revegetation incentive program engaging private landholders on the foreshore and surrounds that includes stock watering and fencing.

Erosion

Currently, erosion is encroaching on public and private land and areas where council roads exist. Erosion should be addressed through improved water level management within the swamp and possible protective beaching. Erosion is most noticeable at the Dehne Road Park and south along Gunbower-Pyramid Road. Gunbower-Pyramid Road is recognised as a tourism route by Vic Roads.

GMW has been approached by YYNAC about recently exposed Aboriginal burial sites in the vicinity of the Mt Hope Creek inlet as a result of shoreline erosion. YYNAC is seeking support to undertake temporary works/actions to secure these sites.

Objectives

- To pro-actively monitor, prioritise and address erosion and erosion hazards around the foreshore of Kow Swamp.

Issues

- Aboriginal burial sites are being damaged and exposed as a result of shoreline erosion.
- Erosion is encroaching on public and private land.

Actions

14. GMW to investigate whether the full supply level can be adjusted to protect culturally significant places and landscapes from erosion while maintaining responsibilities to VMMS and TIS.
15. Develop and implement a foreshore management plan to manage pest plants, protect riparian vegetation, prevent erosion, and encourage the establishment of foreshore vegetation.
16. Investigate options to stabilise further erosion.

Public Access

Kow Swamp is a popular fishing spot, although it has dense tree cover and snags and requires careful boating. There is no formal public boating access to the swamp. The informal boat ramp at the Box Creek end of the swamp has operated for decades but will be removed as part of GMW's irrigation infrastructure upgrade works. Further studies are being undertaken to identify a preferred location for a boat ramp and/or fishing platforms, and to improve boating access and safety at the swamp.

Public access has been raised as a concerning issue for land managers and adjoining landholders and community, particularly in relation to public safety. The concern emanates from the public using unauthorized means to access fishing and camping sites/activities, especially in peak recreation periods. Unauthorized public access also poses risks to GMW assets, and environmental and cultural heritage assets and values. It is also reported that freehold landholders are supporting public camping activities on their properties.

Objectives

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

Issues

- Public using unauthorized means to access fishing and camping sites/activities, especially in peak recreation periods, posing risks to health and safety, GMW assets, and environmental and cultural heritage assets and values.
- Freehold landholders supporting public camping activities on their properties.

Actions

17. Undertake an assessment to identify the safety, infrastructure, cultural and environmental issues associated with accessing the storage at varying levels and locations including Taylor's Creek, Box Creek and Norman's Bridge.
18. Enforce restricted access based on the outcomes of the assessment.
19. Investigate potential sites for formal public access to the foreshore on the eastern edge near Taylor's Creek to enable land-based fishing whilst protecting GMW assets and cultural heritage values.

Pest Plants

If poorly managed, pest plants can impact on neighbouring private or public lands, decrease biodiversity, and pose a fire risk. At Kow Swamp, improvement to the frontage and riparian zone of the swamp has been consistently raised as a management priority.

There are widespread blackberry infestations on the foreshore and pale yellow waterlily and parrot's feather have started to establish. Continual bi-annual monitoring and treatment for pale yellow waterlily, parrot's feather, arrowhead and alligator weed is required. At this point in time, no arrowhead or alligator weed has been detected. A program is also required for the eradication of some willows where they continue to spread. Not all varieties of willow are pest plants and in some locations they may help to prevent erosion.

It is apparent that agency management of these aspects has fallen to an unacceptable level. It has also been noted that a priority operational focus is required for these areas, and that in the longer term a frontage management plan requires development and implementation to address the issues.

Objectives

- To manage pest plants on the storage bed and surrounds to minimise impacts on native flora and fauna, recreational and agricultural activities, and minimise fire risk.

Issues

- Pest plants can impact on neighbouring private or public lands, decrease biodiversity and pose a fire risk.
- Agency management of pest plants at Kow Swamp has fallen to an unacceptable level.

Actions

20. Develop a prioritised monitoring and weed control program in response to aquatic and terrestrial weeds.
21. Develop and implement a foreshore management plan to manage pest plants, protect riparian vegetation, prevent erosion, and encourage the establishment of foreshore vegetation.

Irrigation Drainage

Freehold land use fringing the storage is mainly dedicated to irrigated cattle grazing and fodder production. More intensive animal industries are also present in this area. Irrigation development extends outwards from the swamp, especially on the 'fingers' of the Mount Hope Creek, Taylor's Creek and Gap Creek.

In some cases, irrigation farm drainage systems are incorporated with irrigation diversion infrastructure. The potential risk of nutrient-laden drainage runoff returning to the storage is high.

GMW has very limited data on irrigation areas drained and drainage outfall destinations for lands within the Kow Swamp area.

Objectives

- To secure improved farm drainage systems to protect and enhance the water quality within Kow Swamp.

Issues

- Limited data on irrigation areas drained and outfall destinations for lands within the Kow Swamp area.

Actions

22. Identify all irrigation land that generates drainage flows to Kow Swamp.
23. Ensure irrigation drainage is secured on-farm.

Water Quality

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

To meet legal obligations as a water storage manager under the Safe Drinking Water Act 2003 and Safe Drinking Water Regulations 2005 (SDWA&R), GMW is required to prepare, implement and review risk management plans (RMP) in relation to the supply of water to an urban water supplier. Although no townships are supplied with water directly from Kow Swamp, water is taken from an irrigation channel downstream of the storage to supply the township of Kerang. It must be noted that, as a water storage manager, GMW has a responsibility to identify and, where possible, manage risks associated with the provision of raw water only; there is no responsibility to supply water of a particular quality. Water suppliers who receive raw water from GMW are responsible for ensuring that the potable water they supply to their customers meets appropriate water quality standards.

Water quality within Kow Swamp can be influenced by a number of factors including adjacent land use, storage activities, in-storage processes and the quality of inflows to the storage. Examples of land uses that pose a high risk to water quality include dairy farming, grazing and cropping. These land uses can lead to animals (mainly stock) accessing the storage causing faeces, urine and sediment (from

erosion) to enter the storage directly or via runoff. Other activities that could impact on water quality at Kow Swamp include piggery operations which are located on land that drains to the storage, land and on-water recreation including fishing and erosion of the foreshore through wave action. The use of diesel pumps for water extraction poses a risk of oil and fuel spills if the pump and fuel storage is poorly constructed and managed. Unregulated inflows from tributaries and the supply of water via the National Channel and Taylor's Creek also influence the quality of water in the storage.

Water Quality Monitoring

The monitoring of water quality at storages is important for understanding processes that may impact on the quality of water. 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 pH, salinity, turbidity, suspended solids, dissolved oxygen, nutrient concentrations and temperature. Nutrients, along with other factors such as temperature, sunlight intensity and flow regimes, may contribute to blue-green algal blooms. Nutrients, particularly phosphorus and nitrogen, enter waterways attached to sediments and from sewage and other industrial/commercial waste entering rivers and their tributaries. Understanding trends in chemical and biological parameters allows water resource managers to develop strategies that can mitigate on-water/in-storage or catchment processes that may be impacting on water quality.

Kow Swamp is not monitored for any parameters other than blue-green algae. This monitoring is undertaken during the irrigation season, usually from October to May of the following year. Frequency of monitoring is usually fortnightly but may be more frequent if alert levels are detected.

Blue-green algae are naturally occurring bacteria that have the potential to be harmful to people and animals. Blue-green algae are monitored by GMW to meet its obligations as a local water manager, as directed by the DELWP and the Department of Health (DHS). DELWP and DHS set a maximum level considered safe and GMW issues warnings when that level is exceeded. GMW has developed incident response plans for the Torrumbarry Irrigation Area, which includes Kow Swamp.

In more recent times, blue-green algal blooms occurred at Kow Swamp in February to March 2007, October to December 2010, and October to December 2012 (GMW 2014).

Aerial photographs and site inspections indicate that the water is highly turbid but no recent data is available for turbidity. Historical data for water in Kow Swamp shows salinity values typically of 100 to 500 EC.

Objectives

- Targeted and effective monitoring to improve understanding of processes affecting water quality in the storage.
- The development of strategies and frameworks to address current water quality status.

Issues

- There are a number of land uses leading to hazardous events that could impact on the water quality in Kow Swamp.
- Currently there is no regular water quality monitoring of Kow Swamp other than for blue-green algae during the irrigation season.

Actions

24. Investigate the requirement for a water quality monitoring, evaluation and reporting strategy for Kow Swamp including:
 - a. Determination of the parameters that should be monitored, and
 - b. Justification of how the data may be used.
25. Develop a risk-mitigation program for all diesel and tractor-driven diversion sites to identify landholder options to reduce pollution risks.
26. Effectively manage recreational use on and around the storage to reduce impacts on water quality.

Water quality is also impacted by grazing, erosion and irrigation drainage discussed in previous sections of the Plan.

Healthy Ecosystems

Kow Swamp is a large expanse of water, swampy

wetlands and vegetation, and is recognised for the maintenance and conservation of biological diversity. The swamp is listed in “A Directory of Important Wetlands in Australia, Environment Australia, Canberra”.

The swamp was converted to a water storage by the construction of the Box Creek Regulator, which raised the full supply level of the natural wetland by approximately 1 metre. The large size (2,760 Ha) and habitat diversity of Kow Swamp supports a number of rare, near threatened and endangered species (See Appendix E). The swamp also provides a refuge for a number of migratory bird species listed under the China Australia Migratory Bird Agreement (CAMBA) and the Japan Australia Migratory Bird Agreement (JAMBA).

At least 5 species of exotic fish are present in the swamp including carp, redfin, goldfish, tench and mosquito fish. There are widespread blackberry infestations on the foreshore and pale yellow waterlily and parrot’s feather have started to establish.

Distinct types of habitat surrounding Kow Swamp include shallow open water, river red gum forest, dead timber (mainly black box), and rushes and reeds. Most of the eucalyptus vegetation in Kow Swamp is standing dead timber rather than living trees. The dead timber has some ecological value. Hollow logs provide breeding and shelter for native fish, as well as habitat for macro invertebrates. Dead wood itself is a long-term food supply for a range of aquatic animals such as chironomids. Algal and bacterial biofilms growing on the moist wood provide an indirect food source for a range of animals such as aquatic snails. The standing dead wood provides perching and nesting sites for water birds.

The current management regime applied to Kow Swamp contributes significantly to its degraded environmental condition. Water levels are maintained at a high and constant level for long periods of time, including over summer when the natural regime would see the wetland dry out to some (variable) extent.

Much of the foreshore of the swamp is comprised of cleared or semi-cleared land that is grazed or under pasture. This accounts for the degraded nature of the riparian vegetation. At times, nutrient concentrations in the water are high and it is likely that sediments are also nutrient-enriched. This creates a large “internal loading” that encourages algal blooms. Water quality

problems are due to both local activities and impacts from the upstream catchments, including Bendigo Creek.

Foreshore Vegetation Management

Kow Swamp foreshore vegetation has been significantly modified by clearing, pasture improvement and the grazing of cattle over many years. The remnant vegetation communities on the foreshore provide important habitat for native species and contribute an important ecological service by filtering nutrients, reducing sediment inflows, and stabilising the foreshore and stream banks of surrounding tributaries. River red gums and other native species would benefit from fencing and prohibiting grazing to protect other foreshore riparian values.

No foreshore revegetation programs have been undertaken at Kow Swamp and any strategic restoration of foreshore zones on public land needs to be undertaken on a prioritised basis. Local Landcare groups, GMW, YYNAC and the NCCMA have important roles to play in supporting and delivering these programs. Strategic restoration and revegetation of the foreshore will also help prevent erosion and protect important Aboriginal heritage assets.

Locally indigenous plant species will be used in revegetation works. In areas of private land ownership, revegetation should be encouraged on lands abutting foreshore and riparian zones on tributary streams through incentive programs.

Objectives

- To protect and re-establish riparian vegetation.

Issues

- Clearing, pasture improvement and the grazing of cattle have significantly modified foreshore vegetation at Kow Swamp.
- No revegetation and restoration programs have been undertaken at the swamp.
- Remnant vegetation communities on the foreshore provide important habitat for native species and contribute an important ecological service.

Actions

27. Develop and implement a foreshore management plan to manage pest plants, protect riparian vegetation, prevent erosion, and encourage the establishment of foreshore vegetation.
28. Investigate a revegetation incentive program for private landholders on the foreshore and surrounds that includes stock watering and fencing.
29. Investigate the potential for Kow Swamp public and neighbouring private land to be used for offset planting.

Aquatic Fauna and Habitat

Aquatic fauna in Kow Swamp includes bacteria, viruses, fungi, algae, zooplankton, invertebrate fauna and vertebrate fauna. Vertebrate fauna are primarily fish, including silver perch, Murray cod and golden perch. Water quality, invasive pests and loss of habitat pose threats to aquatic fauna within Kow Swamp and its tributaries.

Kow Swamp 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 currents, take refuge from predators, and find shade, feeding sites, spawning sites and nursery areas for juveniles. Many bird and invertebrate species rely on trees and woody debris for resting and breeding. While dead trees, dead standing timber and tree stumps provide important habitat for many species of fish in Kow Swamp, they have also been identified as a public safety issue, particularly for boating during periods of low water levels and/or windy conditions.

There is currently no regional fishery management plan for the greater Loddon Murray region. Native fish management and stocking programs are key elements to be considered in the development of a regional fishery management plan.

Objectives

- To manage the health of aquatic fauna in Kow Swamp by addressing significant threats to preserve and maintain healthy habitat for aquatic and terrestrial flora and fauna.

Issues

- Invasive pests such as European carp and loss of habitat pose threats to aquatic fauna within Kow Swamp and its tributaries.
- Fallen and dead timber that creates risks to health and safety also provides important habitat for fish and birds.
- No regional fishery management plan has been developed that includes Kow Swamp.

Actions

30. Support the development of a regional fishery management plan that includes Kow Swamp.
31. Support regional investigations and actions to reduce populations of European carp.
32. Consider additional fish habitat enhancement, subject to endorsement and/or in collaboration with DEDJTR and the NCCMA.

Erosion and pest plants discussed in previous sections of the Plan also impact aquatic fauna and habitat.

Birds

Birds at Kow Swamp attract bird watchers as recreational users. Bird observers report that Kow Swamp is a locally important roosting and feeding area for wetland birds. It provides safe refuge to large numbers of Ibis which roost there. The extensive reed beds are home to Swamp Harrier, Nankeen Night Heron, Purple Swamphen and Black-tailed Native-hen and, on occasion, the nationally-threatened Australasian Bittern has been recorded there. Fish-eating species are prevalent, including Australian Pelican and Pied Cormorant. (See Appendix E)

Both Caspian and Whiskered Terns feed over the open water areas, and White-bellied Sea-Eagles are regularly seen. In summer both the Sacred and the Azure Kingfisher are often found near the weir at the northern end of the swamp, whilst the Yellow Rosella is resident in the remaining fringing River Red Gums.

Migratory waders frequent the swamp as they require gently-sloping mud flats in the vicinity of rushes and

reeds (for protection). Their numbers appear to be decreasing owing to the loss of feeding grounds along their migratory pathways.

Bird observers also report relatively low numbers of ducks, possibly due to artificial water levels, inflowing and storage water turbidity and the presence of Carp, which contribute to a reduction in aquatic submerged vegetation in shallow waters, a key habitat ingredient for many duck species. Prior to 1928, Kow Swamp was used for hunting. Duck hunting is currently not permitted at Kow Swamp under the Wildlife Act. If this were to change, issues of community acceptance, public access and the current sanctuary status of Kow Swamp would need to be resolved.

Zones of shallow water have the potential to be significantly improved from their current state, by grazing restrictions and foreshore vegetation management leading to better water quality and an increased area of habitat for a wide range of flora and fauna (including migratory waders).

Objectives

- To improve foreshore vegetation and habitat for a wide range of flora and fauna including migratory waders.

Issues

- Kow Swamp is a locally important roosting and feeding area for wetland birds and migratory waders.
- Migratory waders are believed to be decreasing in numbers owing to the loss of feeding grounds along their migratory pathways.
- The foreshore around Kow Swamp has the potential to be significantly improved from its current state, by grazing restrictions and revegetation works.

Actions

33. Develop and implement a foreshore management plan to manage pest plants, protect riparian vegetation, prevent erosion and encourage the establishment of foreshore vegetation.

Recreation and Tourism

Kow Swamp is listed in 'A Directory of Important Wetlands in Australia' as a wetland of importance. It is classified as 'permanent open freshwater wetland'. Attributes include its large size, habitat diversity and its provision of breeding opportunities for water birds.

Kow Swamp is an important local destination for passive recreational pursuits including fishing and boating, picnicking and bird watching. There is a small section of Crown land on the eastern side of the swamp managed by the Shire of Campaspe (Dehne Road Park) in partnership with the Leitchville Lions Club. This site provides toilets and picnicking facilities. The foreshore area within the park is badly eroded and requires remediation work to improve public safety. The Shire of Campaspe does not view this facility as a significant destination point or a significant recreation/public open space reserve. The area holds historical interest for the local community, in particular with the Lions Club, and it is used predominately by local community members. There is currently no data available which defines current levels of visitation to Kow Swamp or that can inform future demand for access.

There are no caravan parks or formal camping grounds at Kow Swamp. The nearest facilities are at Gunbower and Cohuna. A self-catering accommodation facility is located at the south-east edge of the swamp.

There are no signage or information boards at Kow Swamp to enhance the visitor experience.

Fishing and Boating

Before commercial inland fishing was banned in 2002, Kow Swamp was one of the most productive inland fisheries in the state. Record numbers of large native fish, including Murray cod and golden perch, were regularly harvested and sold locally and to Melbourne, Adelaide and Sydney. Today, Kow Swamp is a popular fishing spot, particularly below the Box Creek weir where golden perch aggregate and are caught in large numbers in late spring. Boaters fishing the Box Creek channel and inflowing Taylor's Creek are also rewarded with Murray cod and golden perch. Over the last 3 years, Fisheries Victoria has stocked 200,000 Murray cod and 180,000 golden perch fingerlings into Kow Swamp.

The development of a fishway at the Box Creek site is expected to further improve the productivity of Kow Swamp as a recreational fishery.

There are a number of factors that hold back the recreational fishing and tourism potential of Kow Swamp, including the lack of formal public boating access. One informal boat ramp at the Box Creek end of the swamp that has operated for decades will be removed as part of GMW's refurbishment of irrigation infrastructure works. Unauthorised public access poses risks to freehold landholders, the environment, GMW assets, cultural heritage, and public health and safety. There is no formal designated waterway manager for Kow Swamp.

Other factors restricting recreational fishing potential include the abundance of tree stumps just below the water which makes it difficult to navigate, the high water turbidity, and large areas exposed to wind that can become choppy very quickly and create further hazards for boaters.

Objectives

- To maintain a native-stocked fishery in Kow Swamp.
- To maximise opportunities that improve the management and safety of boating at Kow Swamp.
- To protect the environment and cultural heritage, and improve public safety around GMW assets.

Issues

- Development of formal boating access and/or fishing platform/s.
- Boating safety.
- No designated manager for the waterway and associated recreational fishing infrastructure.
- Maintenance of recreational fishing infrastructure.
- Unauthorised public foreshore access and risks to environment, GMW assets, cultural heritage, and public health and safety.

Issues

34. Support a project for Kow Swamp to:
 - a. Undertake an assessment and provide recommendation on the establishment of a Waterway Manager for Kow Swamp.

- b. Undertake a risk analysis of the waterway and access to, to inform further decisions in relation to the establishment of boat ramps and fishing platforms.
 - c. Undertake a feasibility study to investigate and determine possible locations for a boat ramp and/or fishing platforms to support recreational fishing and safe public access.
 - d. Develop an informed boat ramp and fishing platform design based on the preferred locations for safe access and ease of management.
 - e. Improve public safety for recreational fishing and/or boating at Kow Swamp
35. Assess requirements and implement native fish recovery in Kow Swamp in consultation with peak fishing bodies.

Open Space

With the exception of Dehne Road Park, which provides toilets and picnicking facilities, there is no space around Kow Swamp that has been designated as a picnic facility or recreational reserve. Severe slumping and erosion of the foreshore at Dehne Road Park poses risks to recreational users because access to the foreshore for swimming and fishing is unsafe.

There is no other infrastructure to cater for visitors to the swamp. Opportunities for additional picnicking facilities around the eastern side of the swamp should be explored.

Objectives

- To determine the need for open space provision for recreational activity around Kow Swamp.

Issues

- Limited understanding and evidence of service need for existing or additional picnicking and recreation space.
- Limited points for safe public access to Kow Swamp.
- Public safety due to severe slumping and erosion of the foreshore at Dehne Road Park.

- Mixed management of public land around the foreshore of Kow Swamp.

Actions

- 36. Investigate the service need for open space including what type of space is required for foreshore access, picnic areas, ecological and cultural interpretation information spaces, active or passive recreation spaces, and toilet facilities.
- 37. Identify the most appropriate locations for open space.
- 38. Determine the land management model and organisation responsible for public open space around Kow Swamp.
- 39. Investigate options to stabilise further erosion of public land to minimise risk to public safety and protect public, ecological and cultural assets.

Health and Safety

There are a number of health and safety issues at Kow Swamp that should be addressed, particularly in relation to fishing and boating. The abundance of tree stumps either just above or just below the water, depending on supply level and weather conditions, can make it difficult to navigate the storage. There are large shallow areas exposed to wind that can become choppy very quickly. The lack of a formal boat ramp and areas designated for public access pose a number of risks to health and safety, including accidents at the informal ramp and conflict between powered boating and people fishing on the shoreline. These risks are exacerbated in peak recreational periods. Safe vehicle access at the informal boat ramp at the Box Creek end of the swamp is an ongoing concern. In addition, there is no designated manager for the waterway and associated recreational fishing infrastructure.

Other issues relating to health and safety surrounding the swamp include the installation of a number of electric- powered diversion sites. Many of these sites were installed years ago and have not been assessed to identify operator/maintenance risks. There are also concerns about road safety risks, particularly near the Box Creek Regulator.

Objectives

- To ensure improved health and safety for recreational waterway users, visitors, local residents and landholders.

Issues

- No formal boating access and/or fishing areas.
- Boating safety.
- Entrance and exit road safety near the Box Creek Regulator.
- Health and safety risks associated with unauthorised public access and risks to environment, GMW assets and cultural heritage sites.
- Electric-powered diversion sites that have not been re-assessed to identify risks to health and safety.

Actions

40. Undertake an assessment to identify the safety, infrastructure, cultural and environmental issues associated with accessing the storage at varying levels and locations including Taylor's Creek, Box Creek and Norman's Bridge.
41. Enforce restricted access based on the outcomes of the assessment.
42. Develop a traffic management plan for Kow Swamp, including restricting speed limits to minimise identified risks.
43. Develop a risk-mitigation program for electric-powered diversion sites to ensure safety issues are not presenting ongoing operational/maintenance risks to landholders.

Public access issues are also relevant to health and safety discussed in previous sections of the Plan.



Implementation Actions and Strategies

No.	Action	Responsible agency
1	Establish an inter-agency Implementation Group to guide the implementation of the Plan, public communications, and future development decisions.	GMW
2	Develop Terms of Reference and roles and responsibilities for the Implementation Group. Terms of Reference to include principles of integrated management, collaboration and a partnership approach to funding applications and the implementation of high priority actions.	GMW
3	Secure a clear GMW management focus on the overall VMMS assets.	GMW
4	Conduct a review of the Plan and its implementation in five years.	GMW, Implementation Group
5	Secure active YYNAC input into development programs at Kow Swamp.	GMW, YYNAC
6	Establish fencing to protect known culturally significant places and the landscape as a whole.	GMW, YYNAC
7	GMW to investigate whether the full supply level can be adjusted to protect culturally significant places and landscapes from erosion while maintaining management responsibilities to VMMS and TIA.	GMW
8	In partnership with YYNAC, develop a program to increase community awareness and understanding of Aboriginal cultural heritage at Kow Swamp.	GMW, YYNAC
9	GMW to initiate an investigation to enable the transfer of public land around Kow Swamp to a single agency owner, including areas to the north of Kow Swamp managed by DELWP and licensed for grazing purposes.	GMW, DELWP
10	GMW to liaise with DELWP and NCCMA to determine a recognised boundary for management of the foreshore/tributary downstream of Norman's Bridge.	GMW, DELWP, NCCMA
11	GMW and DELWP to investigate options to manage Crown land around the perimeter of Kow Swamp.	GMW, DELWP, YYNAC
12	Determine boundaries between public and private land, and establish fencing where appropriate.	GMW, Landholders, DELWP
13	Investigate a revegetation incentive program for private landholders on the foreshore and surrounds that includes stock watering and fencing.	GMW, NCCMA
14	GMW to investigate whether the full supply level can be adjusted to protect culturally significant places and landscapes from erosion while maintaining responsibilities to VMMS and TIS. See Action 7.	GMW
15	Develop and implement a foreshore management plan to manage pest plants, protect riparian vegetation, prevent erosion and encourage the establishment of foreshore vegetation.	GMW, DELWP, NCCMA
16	Investigate options to stabilise further erosion.	GMW
17	Undertake an assessment to identify the safety, infrastructure, cultural and environmental issues associated with accessing the storage at varying levels and locations including Taylor's Creek, Box Creek and Norman's Bridge.	GMW
18	Enforce restricted access based on the outcomes of the assessment.	GMW
19	Investigate potential sites for formal public access to the foreshore on the eastern edge near Taylor's Creek to enable land-based fishing whilst protecting GMW assets and cultural heritage values.	GMW, DELWP, DEDJTR
20	Develop a prioritised monitoring and weed control program in response to aquatic and terrestrial weeds.	GMW, DELWP

No.	Action	Responsibility / Lead Agency
21	Develop and implement a foreshore management plan to manage pest plants, protect riparian vegetation, prevent erosion and encourage the establishment of foreshore vegetation. See also Action 15.	GMW, DELWP
22	Identify all irrigation land that generates drainage flows to Kow Swamp.	GMW
23	Ensure irrigation drainage is secured on-farm.	GMW, Landholders
24	Investigate the requirement for a water quality monitoring, evaluation and reporting strategy for Kow Swamp including: <ul style="list-style-type: none"> a. Determination of the parameters that should be monitored, and b. Justification of how the data may be used. 	GMW
25	Develop a risk-mitigation program for all diesel and tractor-driven diversion sites to identify landholder options to reduce pollution risks.	GMW
26	Effectively manage recreational use on and around the storage to reduce impacts on water quality.	GMW
27	Develop and implement a foreshore management plan to manage pest plants, protect riparian vegetation, prevent erosion and encourage the establishment of foreshore vegetation. See Actions 15 and 21.	GMW, DELWP
28	Investigate a revegetation incentive program for private landowners on the foreshore and surrounds that includes stock watering and fencing. See Action 13.	GMW, Landholders, DELWP
29	Investigate the potential for Kow Swamp public and neighbouring private land to be used for offset planting.	GMW, DELWP
30	Support the development of a regional fishery management plan that includes Kow Swamp.	DEDJTR
31.	Support regional investigations and actions to reduce populations of European carp.	DEDJTR
32.	Consider additional fish habitat enhancement subject to endorsement and/or in collaboration with DEDJTR and the NCCMA.	GMW, DEDJTR, NCCMA
33.	Develop and implement a foreshore management plan to manage pest plants, protect riparian vegetation, prevent erosion and encourage the establishment of foreshore vegetation.	GMW, DELWP, NCCMA
34.	Support a project for Kow Swamp to: <ul style="list-style-type: none"> a. Undertake an assessment and provide recommendation on the establishment of a waterway manager for Kow Swamp. b. Undertake a risk analysis of the waterway and access to, to inform further decisions in relation to the establishment of boat ramps and fishing platforms. c. Undertake a feasibility study to investigate and determine possible locations for a boat ramp and/or fishing platforms to support recreational fishing and safe public access. d. Develop an informed boat ramp and fishing platform design based on the preferred locations for safe access and ease of management. e. Improve public safety for recreational fishing and/or boating at Kow Swamp. 	GMW, MSV, DEDJTR, Council
35.	Assess requirements and implement native fish recovery in Kow Swamp in consultation with peak fishing bodies.	DEDJTR, NCCMA, GMW

No.	Action	Responsible agency
36.	Investigate the service need for open space including what type of space is required for foreshore access, picnic areas, ecological and cultural interpretation information spaces, active or passive recreation spaces, toilet facilities.	GMW, Council(s)
37	Identify the most appropriate locations for open space.	GMW, Council(s)
38	Determine the land management model and organisation responsible for public open space around Kow Swamp	GMW, Council(s)
39.	Investigate options to stabilise further erosion of public land to minimise risk to public safety and protect public, ecological and cultural assets.	GMW
40.	Undertake an assessment to identify the safety, infrastructure, cultural and environmental issues associated with accessing the storage at varying levels and locations including Taylor's Creek, Box Creek and Norman's Bridge.	GMW
41.	Enforce restricted access and enable approved access based on the outcomes of the assessment.	GMW
42.	Develop a traffic management plan for Kow Swamp, including restricting speed limits to minimise identified risks.	Vic Roads
43.	Develop a risk-mitigation program for electric-powered diversion sites to ensure safety issues are not presenting ongoing operational/maintenance risks to landholders.	GMW

Appendix B - Summary of Community Consultation

- NCCMA and DEPI (Now DEDJTR & DELWP) NRM (6 attendees)
- Campaspe Shire Council (9 attendees)
- Gannawarra Shire Council (4 attendees)
- Leitchville Lions Club (8 attendees)
- Yorta Yorta Nations Aboriginal Corporation (8 attendees)

Preparation of Draft Plan

Approximately 90 people were involved in the consultations to develop the Kow Swamp Land and On Water Management Plan - draft for public consultation.

A Project Reference Group (PRG) consisting of agency representatives from GMW, Campaspe Shire, Gannawarra Shire, Yorta Yorta Nations Aboriginal Corporation (YYNAC) and North Central Catchment Management Authority (North Central CMA), provided guidance to development of the plan.

Consultations to develop the draft for public consultation included:

Focus groups

- GMW (7 attendees)

Interviews

- Transport Safety Victoria
- DEPI (Now DEDJTR) – Fisheries
- Vic Police – Cohuna
- Murray River Tourism
- Local landholders

Public Have-a-Say – (publicised by media release, advertisements in the Northern Times, flyers distributed locally and GMW web site)

Public consultation at Leitchville including (32 attendees)

Phone calls from individuals (4)

Written responses on GMW website (5)

Comments on Draft

The Draft for public consultation was distributed to agencies, individuals who provided email contact details, and individuals who requested hard copies. A media release, interview on ABC local radio, advertisement in the Northern Times and the GMW website publicised opportunities for providing feedback on the draft plan.

Feedback on the draft plan was received in person, by written submission and phone calls from:

- 14 attendees at a public consultation at Leitchville.
- Agencies, including GMW, Campaspe Shire, Gannawarra Shire, NCCMA and YYNAC.
- Community organisations and individuals including landcare, progress associations, anglers, hunters, and service club.
- Recreational users including, bird observers, hunters, anglers, campers.
- Neighbouring landholders.

Appendix C - Overview of Storage Operations

Located at the end of Taylor's Creek, Kow Swamp allows flows to be harvested from the River Murray at significant rates (approximately 3,000 ML/d maximum). This capacity is useful when there are short-lived surplus flows events on the River Murray. Kow Swamp can be rapidly filled then drawn down as required to pass water into other VMMS storages.

The Kow Swamp full supply level is 83.13 m (AHD). The effective operational range is between 83.13 m (AHD) and 82.28 m (AHD). At 82.28m (AHD) the storage holds 30,700ML. It is to be noted that when the level of Kow Swamp is below 82.60 m (AHD), gravity supply via the No 2 regulator to the No 2 channel fails.

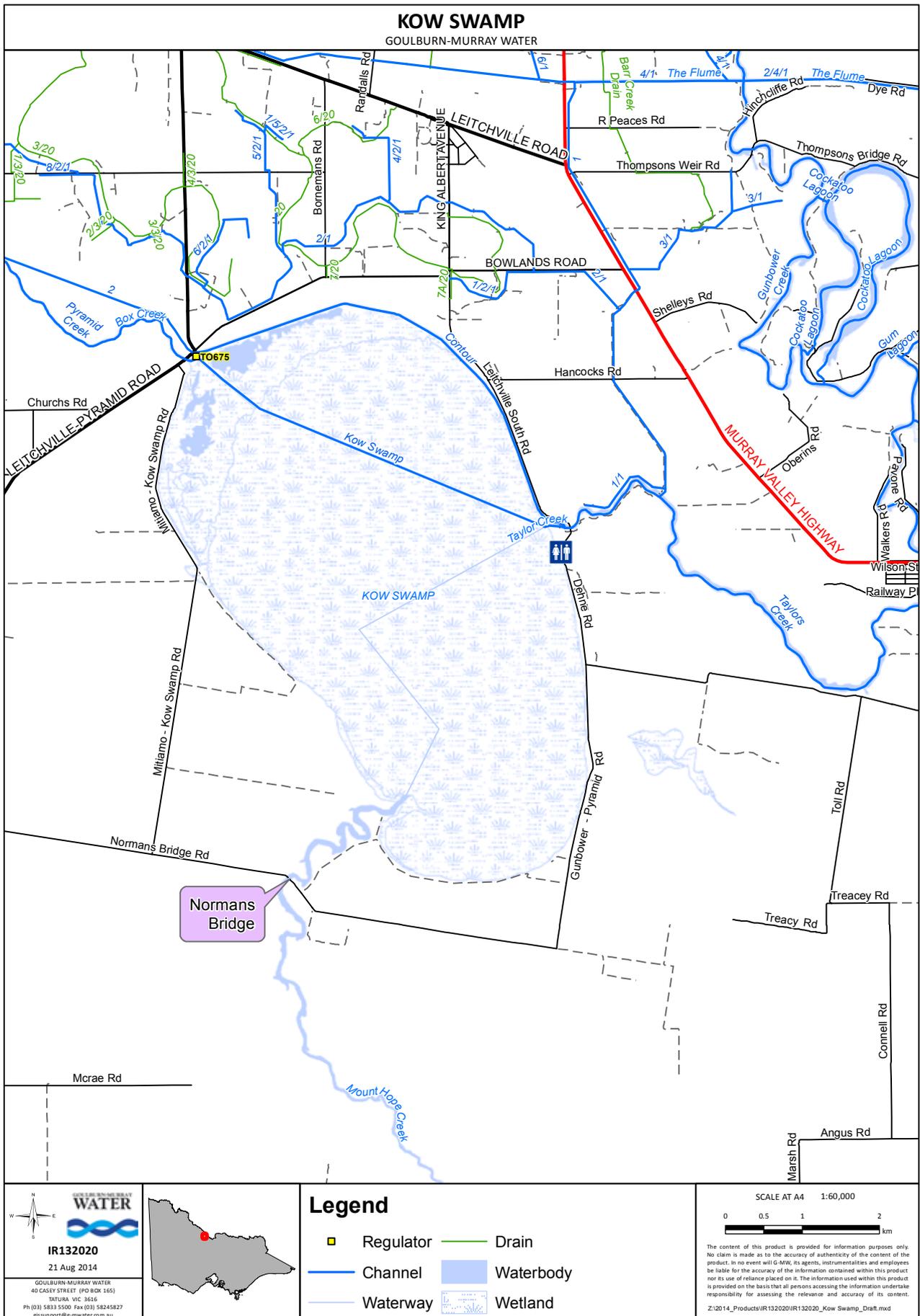
Maintaining a low level at the end of the irrigation season allows the harvesting of excess winter flows into Kow Swamp. This avoids the need to run channels unnecessarily during winter to fill other parts of the VMMS. Water harvested in Kow Swamp over winter can be transferred at the start of the irrigation season, utilising available channel capacity.

If conditions are wet through winter and spring and there is no significant demand, airspace for flood mitigation purposes will be maintained. Filling to an interim level will occur between late September and November to maintain approximately 3,000 ML of airspace. If conditions start to dry and strong demand emerges, then Kow Swamp can be filled to capacity by December (or earlier if required).

Water can be released from Kow Swamp into Pyramid Creek then into the Kerang Weir Pool, to be passed over Kerang Weir. Depending on operational/salinity constraints in releasing water from Lake Boga and Lake Charm, Kow Swamp may be used to supply demands in the River Murray from time-to-time if there is excess capacity in Pyramid Creek.

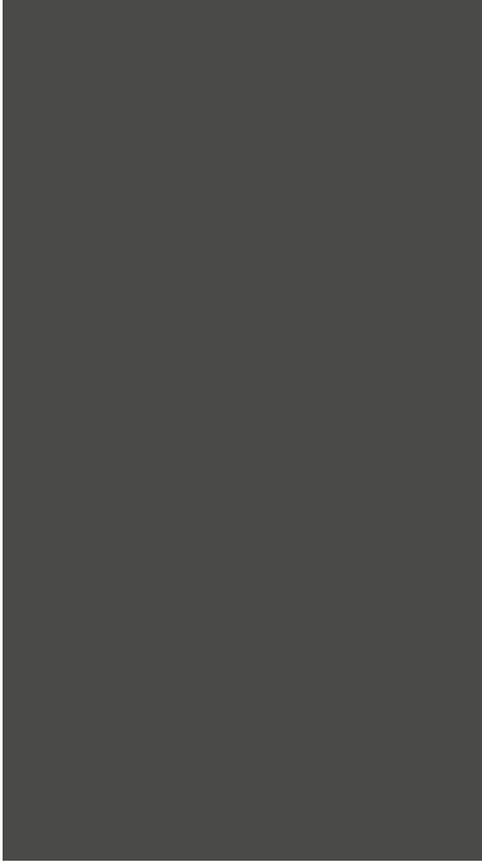
GMW has a memorandum of understanding with NCCMA for operation of the Loddon River downstream of the Kerang Weir. As Kow Swamp operations may affect this reach of the river, GMW will consult with NCCMA before utilising the Lower Loddon River (downstream of the Kerang Weir) for releases into the River Murray to optimise the delivery pattern. The aim of the consultation is to discuss how releases (within operational constraints, demand, capacity, etc.) can be undertaken to maximise any environmental benefits to the Lower Loddon.

Appendix D - Map of Kow Swamp



Appendix E – List of Vulnerable, Near Threatened and Endangered Species

Common Name	Scientific Name	Victorian Status	Listed under FFG Act	EBPBC (federal) status
Brolga	<i>Grus rubicunda</i>	vulnerable	Yes	
Brown Treecreeper (south- eastern ssp.)	<i>Climacteris picumnus victoriae</i>	near threatened		
Carpet Python	<i>Morelia spilota metcalfei</i>	endangered	Yes	
Eastern Great Egret	<i>Ardea modesta</i>	vulnerable	Yes	
Freckled Duck	<i>Stictonetta naevosa</i>	endangered	Yes	
Freshwater Catfish	<i>Tandanus tandanus</i>	endangered	Yes	
Golden Perch	<i>Macquaria ambigua</i>	near threatened		
Growling Grass Frog	<i>Litoria raniformis</i>	endangered	Yes	Vulnerable
Hardhead	<i>Aythya australis</i>	vulnerable		
Latham's Snipe	<i>Gallinago hardwickii</i>	near threatened		
Murray Cod	<i>Maccullochella peelii</i>	vulnerable	Yes	Vulnerable
Murray-Darling Rainbowfish	<i>Melanotaenia fluviatilis</i>	vulnerable	Yes	
Nankeen Night Heron	<i>Nycticorax caledonicus hillii</i>	near threatened		
Pied Cormorant	<i>Phalacrocorax varius</i>	near threatened		
Royal Spoonbill	<i>Platalea regia</i>	near threatened		
Swift Parrot	<i>Lathamus discolor</i>	endangered	Yes	Endangered
Whiskered Tern	<i>Chlidonias hybridus javanicus</i>	near threatened		
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	vulnerable	Yes	



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