

# Information Sheet on Ramsar Wetlands

*Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.*

**1. Date this sheet was completed/updated:**

October 2002.

FOR OFFICE USE ONLY.

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Designation date

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Site Reference Number

**2. Country:**

Australia

**3. Name of wetland:**

Banrock Station Wetland Complex

**4. Geographical coordinates:**

Latitude: 34° 11' South ; Longitude: 140° 20' East

**5. Altitude:**

The floodplain wetland zone is 5 - 10 metres above sea level, the adjoining mallee buffer zone rises 40-50 metres above the floodplain, and the highest point on the site is 62 metres above sea level.

**6. Area:**

The total area of the designated site is 1375 hectares which includes the floodplain wetland zone of 1068 hectares and the mallee woodland buffer zone of 307 hectares.

The Banrock Station property also includes a viticultural zone (426ha), which includes an area planted to vines, pump sites, pipelines and buildings, and is not included in the designated area.

**7. Overview:**

The Banrock Station Wetland Complex is a floodplain wetland located on the River Murray in South Australia. Following 67 years of permanent inundation, the site was severely degraded. In 1992 the water regimes in the wetland were restored by reinstating wetting and drying cycles that are semi-natural and intermittent. Threats including grazing and invasive species have been actively managed, and revegetation activities undertaken to restore the wetland and adjoining areas.

The site adjoins a commercial viticultural enterprise which is managed in a manner complementary to conservation of the wetland. The nearby Wine and Wetland Centre promotes wetlands conservation and ecologically sustainable land use practices, and offers commercial sales of wines. Walking trails and boardwalks around the wetland provide interpretive information which explains the importance of the wetland, how the site has been rehabilitated and the principles and approaches to ecologically sustainable development. This combination of wetland conservation and rehabilitation, with raising awareness of wetland values and functions, and private enterprise, is a good demonstration of the Ramsar wise use concept.

**8. Wetland Type:**

**marine-coastal:** A B C D E F G H I J K



**inland:** L M N O P Q R Sp Ss Tp Ts

U Va Vt W Xf Xp Y Zg Zk

man-made: 1 2 3 4 5 6 7 8 9

Please now rank these wetland types by listing from the most to the least dominant:

P, N.

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9. Ramsar Criteria:

1 2 3 4 5 6 7 8

Please specify the most significant criterion applicable to the site: 3

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10. Map of site included? Please tick *yes*  -or- *no*.

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## 11. Name and address of the compiler of this form:

Compiled for BRL Hardy Wine Company by Dr Bill Phillips, Director, MainStream Environmental Consulting Pty Ltd (phone +61 2 6281 7470, email: bill.phillips@bigpond.com).

Amendments resulting from consultation with government agencies and the public were compiled by Mr Jason Ferris, Assistant Director, Wetlands Section, Environment Australia (Commonwealth Department of the Environment and Heritage), Ms Michaela Birrell, Senior Scientific Officer, Wetlands, National Parks and Wildlife SA, South Australian Department for Environment and Heritage, and Mr Tony Sharley, Manager, Banrock Station Wine & Wetland Centre, BRL Hardy Wine Company.

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## 12. Justification of the criteria selected under point 9, on previous page.

### Criterion 1

As one of only 20 sites in region which has been returned to intermittent inundation, the Banrock Station Wetland Complex is a unique example of restoration of a site in the Murray-Darling Depression to a near-natural hydrological regime. It is also important as a 'demonstration' of wetland rehabilitation and wise use for other similar floodplain wetlands throughout the entire Murray-Darling Basin.

The site plays a substantial role in the overall 'health' of the lower River Murray. For example, during times of flood it provides a natural fish passage around Lock 3.

As a result of restoration, the site has increased physical and biological capacity to remove nutrients and particulates.

### Criterion 2

The Banrock Station Wetland Complex supports the following regionally, or nationally threatened species:

- Regent Parrot *Polytelis anthopeplus monarchoides* is listed as Vulnerable nationally and in South Australia. It favours habitats of Mallee *Eucalyptus socialis* and breeds in hollows in River Red Gum *Eucalyptus camaldulensis* trees close to water. The Banrock Station Wetland Complex has both habitats and supports a breeding population estimated at 100 birds. Ongoing restoration activities on the site should provide for growth in this population.
- Southern Bell Frog *Litoria raniformis* is listed as Vulnerable nationally and in South Australia. Currently, the size of the population at the Banrock Station Wetland Complex is not known, but further survey work is planned (see Section 24).
- River Snail *Notopala hanleyi* was once common in the wetlands of the lower River Murray and is now considered rare due to predation by introduced European Carp. With the reduction in the population of European Carp within the Banrock Station Wetland Complex, efforts are underway to re-introduce the River Snail. The early indications are that a breeding population is becoming established.

### Criterion 3

Within the Murray-Darling Depression biogeographic region, the majority of the river corridor including the floodplain wetlands has been subjected to altered flow regimes, salinity, overgrazing and introduced pest species. In the South Australian portion of the region, the river corridor is considered a “threatened habitat area” by Kahrmanis *et al.* (2001).

Whilst 70% of the lower River Murray wetlands have changed from intermittent to permanently inundated, the Banrock Station Wetland Complex is one of only 20 sites that have been returned to intermittent inundation and a near-natural hydrological regime. As such, the Banrock Station Wetland Complex will play an increasingly important role as a biodiversity ‘reservoir’ for the region and will be a source of biodiversity for reintroductions and recolonisation into the adjoining areas.

In the semi-arid environment in which it is found, the Banrock Station Wetland Complex offers a refuge during adverse conditions to sustain species’ populations during times of drought.

The restoration of plant communities and wildlife habitats at the site will continue to support the reintroduction and recolonisation of displaced flora and fauna. The reintroduction of a near-natural hydrological regime has favoured reestablishment of plant communities which are important for maintaining the biological diversity of the region. These include:

- Lignum *Muehlenbeckia florulenta* Shrubland, is a threatened plant community in the South Australian Murray-Darling Basin, due to the impacts of grazing, un-natural water regimes and salinity (Kahrmanis *et al.* 2001). This plant community has recovered strongly within the Banrock Station Wetland Complex and is now a dominant part of the wetland ecosystem.
- Common Reed *Phragmites australis* /Narrow-leaf Bulrush *Typha domingensis* Sedgeland communities are regionally threatened in the South Australian Murray-Darling Basin, and susceptible to threat from changed water regimes and grazing (Kahrmanis *et al.* 2001). Recognised for their importance as habitat for terrestrial and aquatic invertebrates, birds, fish and frogs, the re-establishment of these communities at the Banrock Station Wetland Complex offers a significant resource for biodiversity conservation in the region.

Revegetation programs are also being implemented to restore plant communities on the red sand dunes adjacent to the floodplain:

- Blue Mallee *Eucalyptus cyanophylla* Open mallee community is considered “poorly conserved” in South Australia (Neagle 1995) with just 75 hectares of the total area of nearly 6,500 hectares in South Australia managed within protected areas. At the Banrock Station Wetland Complex, the community naturally occurs in the mallee buffer zone. The range of the community within the site is being expanded through direct seeding and natural regeneration. This will add to the area of Blue Mallee being managed for conservation.

### Criterion 4

The Banrock Station Wetland Complex provides seasonal habitat for migratory birds listed under the *Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment* (JAMBA) and/or the *Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment* (CAMBA). These include:

- Great Egret *Ardea alba*
- White-bellied Sea Eagle *Haliaeetus leucogaster*
- Greenshank *Tringa nebularia*
- Red-necked Stint *Calidris ruficollis*
- Long-toed Stint *Calidris subminuta*
- Sharp-tailed Sandpiper *Calidris acuminata*

- Caspian Tern *Sterna caspia*
- Fork-tailed Swift *Apus pacificus*

The site also contains Mallee and Redgum habitat which is critical to the lifecycle of the nationally vulnerable Regent Parrot.

It is also an important pathway for fish migrating around the Lock 3 fish barrier during spring floods, and provides fish breeding and nursery habitats in warm shallow flood waters overlying the floodplain.

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### **13. General location:**

The Banrock Station Wetland Complex is located on the River Murray floodplain, opposite the township of Overland Corner, 26 km north west of Berri in the state of South Australia. The site is in the Murray-Darling Depression Bioregion of the Interim Biogeographic Regionalisation of Australia (Version 5, 2001).

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### **14. Physical features:**

The Banrock Station Wetland Complex has the following physical features:

**Landform:** The wetlands exist as discrete depositional basins and active channels on an incised ancestral floodplain. The adjoining 'buffer' zone rises 40-50 metres above the floodplain, and the highest point on the site is 62 metres above sea level.

**Geology:** A sequence of horizontally bedded Tertiary limestones and sandstones covered by a layer of recently deposited Pleistocene calcrete and alluvium.

The Banrock Station Wetland Complex is part of two geomorphological zones, the Murray Gorge and the broad floodplain.

**Soils:** Deep, grey, self mulching, cracking clays occur in the low lying floodplain and river terrace sections, the higher plain areas are underlain by red calcareous earths (Laut *et al.* 1977; Pressey 1986; Wetlands Working Party 1989).

**Climate:** Average annual rainfall is 260 mm; average annual evaporation is 1960 mm. Average summer maximum temperature is 31.6° Celsius and minimum 16° Celsius. In winter months these fall to 17° Celsius and 5.5° Celsius, respectively.

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### **15. Hydrological values:**

The Banrock Station Wetland Complex is a part of the floodplain of the permanent River Murray. In 1925 Lock 3 was installed in the River adjacent to the Banrock Station Wetland Complex. This structure increased the river water level upstream by 3 metres. This radically modified the hydrological regime of the site, permanently inundating what was previously a seasonally flooded system of wetlands. Prior to the Lock being installed the river and associated floodplain experienced regular natural floods. The wetland ecosystem was dependent on this wetting and drying cycle, particularly the small-sized floods which were common.

In 1992 the previous owners of the site, working in partnership with Wetland Care Australia, installed flow control gates on the water inlet and outlet streams of the wetland. These regulatory structures allowed for the management of wetting and drying regimes similar to those that occurred prior to river regulation. This, combined with other management actions (removal of grazing sheep, rabbits etc.) has seen a remarkable transformation take place at Banrock Station.

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### **16. Ecological features:**

The Banrock Station Wetland Complex comprises two main ecosystem types; these being the floodplain wetlands and the adjoining open mallee-box woodland community.

The floodplain wetlands are dominated by lignum and sedge with expanses of open water which provide habitat for a wide range of species including 51 species of waterbirds and several locally, regionally or nationally threatened species.

Prior to the re-introduction of wetting and drying cycles, and related management actions, the Banrock Station Wetland Complex was a highly degraded system and landscape. The rehabilitation of the site, which is ongoing, has seen the re-emergence of many plant species and the return of waterbird species that used the site previously. Active human intervention is also encouraging further re-establishment of vegetation communities and this will continue to provide for recolonisation by plant and animal species that were once found there.

The adjoining mallee-box woodland community is intimately linked to the floodplain wetland system. Species such as the vulnerable Regent Parrot depend on River Red Gums in the wetland (in which it breeds), and the adjacent mallee ecosystem.

The Blue Mallee *Eucalyptus cyanophylla* Open mallee plant community found at Banrock Station is considered poorly conserved in South Australia (Neagle 1995).

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### 17. Noteworthy flora:

Section 12 outlined the notable flora found at the site when demonstrating the values of the site against the Ramsar site designation criteria. Other notable flora includes the following species and vegetation communities:

- Blue Mallee *Eucalyptus cyanophylla* Open mallee is a plant community that is regionally threatened in the South Australian Murray-Darling Basin (Kahrimanis *et al.* 2001). While this plant community does not have a conservation rating at the State level, it has been identified as a priority for protection in South Australia (Davies 1999). At the Banrock Station Wetland Complex the area of this plant community is being expanded through direct seeding.
  - Lignum *Muehlenbeckia florulenta* Shrubland is a threatened plant community in the South Australian Murray-Darling Basin (Kahrimanis *et al.* 2001), but is not considered threatened at a State level. Management action at the Banrock Station Wetland Complex since 1992 has seen this plant community recover strongly and it is now a dominant part of the wetland ecosystem.
  - Common Reed *Phragmites australis* /Narrow-leaf Bulrush *Typha domingensis* Sedgeland is a regionally threatened plant community in the South Australian Murray-Darling Basin (Kahrimanis *et al.* 2001). This community is recognised as important habitat for terrestrial and aquatic invertebrates, birds, fish and frogs.
  - River Red Gum *Eucalyptus camaldulensis* Woodland is a regionally threatened plant community in the South Australian Murray-Darling Basin (Kahrimanis *et al.* 2001). Associations of River Red Gum *Eucalyptus camaldulensis* and Mallee *Eucalyptus socialis* are also notable as they provide habitat for the vulnerable Regent Parrot *Polytelis anthopeplus monarchoides* at Banrock Station.
  - River Box *Eucalyptus largiflorens* Woodland is a regionally threatened plant community in the South Australian Murray-Darling Basin (Kahrimanis *et al.* 2001).
  - Active restoration of the threatened River Saltbush *Atriplex rhagodioides* vegetation association commenced in 1996 in degraded areas.
  - It is possible that the threatened Nitre Goosefoot *Chenopodium nitriariaceum* Shrubland vegetation association may be restored as rehabilitation of the site continues.
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### 18. Noteworthy fauna:

Section 12 outlined some of the notable fauna found at the site when demonstrating the values of the site against the Ramsar site designation criteria. These include the presence of the following:

- Regent Parrot *Polytelis anthopeplus monarchoides*
- Southern Bell Frog *Litoria raniformis*

- River Snail *Notopala hanleyi*

Migratory birds listed under the *Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment* (JAMBA) and the *Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment* (CAMBA).

There have been 159 species of birds (including 51 waterbird species), 8 species of amphibians, 7 species of mammals, and 46 species of reptile recorded from the site (see Appendix 1).

There are also several other threatened species which, based on historical records and habitat predictions (see Kahrmanis *et al.* 2001) can be expected to be found at the Banrock Station Wetland Complex, either now (as further surveys are done) or in the future as the rehabilitation of the site continues. These include the following:

- Red-lored Whistler *Pachycephala rufogularis*  
- listed as Vulnerable nationally, and in South Australia
- Australasian Bittern *Botaurus poiciloptilus*  
- listed as Vulnerable in South Australia
- Great Crested Grebe *Podiceps cristatus*  
- listed as Vulnerable in South Australia
- Bush Stone-curlew *Burhinus grallarius*  
- listed as Vulnerable in South Australia
- Latham's Snipe *Gallinago hardwickii*  
- listed as Vulnerable in South Australia
- Major Mitchell Cockatoo *Cacatua leadbeateri leadbeateri*  
- listed as Rare in South Australia
- Striated Grasswren *Amytornis striatus*  
- listed as Rare in South Australia
- Striped honeyeater *Plectorhyncha lanceolata*  
- listed as Rare in South Australia

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### **19. Social and cultural values:**

The Banrock Station Wetland Complex is recognized for its cultural significance to Indigenous Australians. Around the wetland are numerous indications of former habitation such as camp fires, stone implements and tools, shield and canoe trees.

In planning education and recreation activities at the site, great care has been taken to respect places of importance to the local Indigenous community, and planning of these activities has been undertaken in close consultation with the community. Consultations will be ongoing to ensure Indigenous people's concerns are respected and recognized appropriately in the Plan of Management for the site.

In terms of the social and cultural significance of the wetland to the early European settlers in Australia, Banrock Station was formerly part of a larger holding called Thurk Station. Today there is a monument near the north-west boundary of the site which commemorates the spot where two South Australian policemen drowned while attempting to cross the River Murray in 1847.

The site has growing social significance for the region and the local community. Apart from the scientific, education and recreation activities outlined in Sections 25, 26 and 27, the site provides a model or demonstration for how degraded floodplains common along the River Murray can be restored to their former 'healthy' and productive ecosystems. This is an important social asset offered by the Banrock

**20. Land tenure/ownership:**

- a) Site
- b) Surrounding area

The Banrock Station Wetland Complex is Crown land under perpetual lease to BRL Hardy Wine Company. The Banrock Station Wetland Complex is bounded to the north-west, north and east by the River Murray. Land adjoining the site to the south and south-west is privately held. To the south-east, across the River Murray is the Loch Luna Game Reserve managed by the South Australian Department of Environment and Heritage, and the Overland Corner floodplain managed by the National Trust of South Australia, and some smaller parcels of privately held land.

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**21. Current land use:**

- a) Site
- b) Surroundings/catchment

Within the Ramsar site (that is the mallee buffer zone and core floodplain wetland zone) the land uses are conservation, education, science and recreation – all of which are described in detail in the appropriate sections below. The attached aerial photo and map of the site shows the zoning approach taken to the management of the site in more detail. The grape growing operations on the higher slopes around the site are managed according to stringent environmental conditions. They are irrigated using water efficient drippers (rather than flood irrigation or overhead sprinklers) and water use is constantly monitored and regulated to minimise use. This approach ensures that BRL Hardy meets its commitment to minimise salinity problems in this region.

At present the water to irrigate the vines is sourced from the wetland. In future BRL Hardy plan to relocate the irrigation pumps to the main river channel to increase flexibility in managing the hydrological regime in the wetland.

The land within the viticultural area that has not been planted to vines will be considered for revegetation with appropriate native plant communities.

The site is bounded to the north-west, north and east by the River Murray. Land adjoining the site to the south and south-west is privately held horticultural land primarily used for grape growing. To the south-east, across the River Murray is the Loch Luna Game Reserve managed by the South Australian Department of Environment and Heritage and the Overland Corner heritage sites and floodplain managed by the National Trust of South Australia. Both properties are managed for conservation.

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**22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects:**

- a) Site
- b) Around the site

At the site itself the major threats which have been addressed, and are continuing to be addressed, are as follows:

- **Alteration to the natural hydrological regime**— in 1925 Lock 3 on the River Murray came into service, and the once seasonally flooded Banrock Station Wetland Complex was permanently inundated (see Section 15). The impacts included the widespread death of River Red Gums *Eucalyptus camaldulensis* and the loss of diverse ecological communities and species previously found at the site.

- The reduction in frequency of small and medium sized floods also resulted in stress to vegetation communities on the more elevated areas of the floodplain. This reduced breeding opportunities for native animals and reduced the regeneration of native plants.
- **Rising saline groundwater** – evidence of this problem is very obvious at Banrock Station in the form of the many dead trees still standing on the floodplain. While some of these River Red Gums *Eucalyptus camaldulensis* drowned when the wetland was permanently filled in 1925, many others on slightly higher ground died from the accompanying rise in the water table. Around the margins of the wetland, salt-tolerant species such as Samphire are evident and show the most salt-affected areas.
- **Introduced European Carp** – the presence of the highly destructive European Carp was a major factor in the degradation of the wetland prior to 1992.
- **Introduced Mosquito Fish *Gambusia holbrooki*** are present in the Banrock Station Wetland Complex, and remain an ongoing challenge for management.
- **Rabbits** – grazing by the introduced the European Rabbit *Oryctolagus cuniculus* was a significant threat to the Banrock Station Wetland Complex, through suppression of regrowth of vegetation.
- **Sheep** – up until 1992 the Banrock Station property was grazed by sheep. This grazing is also likely to have contributed to suppression of regrowth of vegetation.
- **Feral cats and foxes** – threaten small mammal and bird fauna at the site. They are widespread pests in southern Australia and persist in the Banrock Station Wetland Complex despite ongoing control measures.
- **Human visitation to the site** – Sections 25, 26 and 27 describe scientific, educational and tourism activities at the site. Each of these activities is carefully managed to minimise impacts on the environmental and cultural values of the site.

**Surrounding Land Use** – The existing horticultural and conservation activities in the viticultural area on Banrock Station and on neighbouring properties do not pose any direct threat to the Banrock Station Wetland Complex.

**Decreasing water quality** - long term monitoring by the Murray-Darling Basin Commission has demonstrated that salinity, nutrient levels and turbidity have increased in the lower Murray and are likely to continue to increase if land use practices are not changed and if sufficient environmental flows are not provided. The decline in water quality is considered to have caused a major decline in biological diversity in the lower River Murray.

**Competition for water resources** – Access to a water allocation for environmental purposes is critically important to ongoing rehabilitation of the Banrock Station Wetland Complex. Water allocations are managed under the *Water Allocation Plan for the River Murray Prescribed Water Course* (2002).

### **23. Conservation measures taken:**

Section 22 outlined the actions that have been taken to address specific threats at the site. In summary these include the following:

#### **Reinstating a more natural wetting-drying cycle for the floodplain**

As outlined in Section 15, flow control structures were installed on the inlet and outlet channels to the wetland from the River Murray in 1992. These allow the water level to be adjusted and the timing, duration and depth of floods to be manipulated to mimic small floods (up to the equivalent of 55,000 ML per day flow in the river). Larger floods cannot be replicated as they are above the capacity of the regulatory structures. With the return of part of the natural flooding regime there has been dramatic rehabilitation of the ecosystems in the Banrock Station Wetland Complex.

Access to water for environmental purposes for the Banrock Station Wetland Complex will be secured as part of the management plan for the site through the provisions of the *Water Allocation Plan for the River Murray Prescribed Water Course* (2002).

### **Revegetation in and around the wetland**

With the re-introduction of the wetting-drying cycle at Banrock Station, it has been possible to start to re-colonise salt-affected areas with Black Box *Eucalyptus largiflornes*, River Red Gum *E. camaldulensis*, River Saltbush *Atriplex rhagodioides* and semi-aquatic vegetation.

Direct seedling in the surrounding mallee landscapes has increased the cover of Blue Mallee *Eucalyptus cyanophylla*.

### **Reduction in the numbers of introduced European Carp**

Carp exclusion screens were installed as part of the flow management structures in 1992. While the screens do not prevent very small carp entering the wetland, they have been successful in preventing large, breeding age carp from gaining access. When the wetland was dried in 1993 (for the first time since Lock 3 was installed in 1925) 60 tonnes of carp were stranded and perished. Today it is estimated that less than 2 tonnes of carp remain in the wetland, and this is progressively reduced with the drying out of the wetland every one to two years. The increasing populations of waterbirds such as Australian Pelican *Pelecanus conspicillatus* and Cormorants *Phalacrocorax spp.* on the Banrock Station Wetland Complex is also believed to be contributing to the control of carp.

### **Reduction in the numbers of introduced *Gambusia holbrooki***

The small size of *Gambusia* means that exclusion devices such as those employed to manage European Carp are not effective. The now regular drying out of the wetland does assist with managing this problem, and it is expected that the increasing numbers of waterbirds will reduce the impact of *Gambusia*.

### **Control of rabbits**

With the release of the Rabbit Calicivirus Disease in Australia in 1996 the rabbit population on the Banrock Station Wetland Complex was decimated. With the marked reduction in grazing pressure, many ground cover, shrub and tree species are regenerating, and it has been possible to embark on replanting and direct seeding programs to accelerate this rehabilitation of the landscape and wetland.

### **Removal of sheep grazing**

Grazing of sheep on Banrock Station was discontinued in 1992. Since then many plant species have begun to re-emerge, such as Emu Bush *Eremophila divaricata*.

### **Feral cats and foxes**

Eradication of these widespread pests is not feasible and ongoing baiting and trapping control programs to limit their populations will remain as part of the management regime.

**Human visitation to the site** – see Sections 25, 26 and 27 which describe scientific, educational and tourism activities at the site and how human impacts are managed to minimise disturbance.

**Biological surveys of the site** – To support the development of the management plan and guide future management, surveys of the plant, macroinvertebrate, dragonfly, frog, reptile, bird and mammal populations found on the site are being planned and undertaken to establish an authoritative baseline for the ‘ecological character’ description. Some of these surveys are described in Section 25.

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## **24. Conservation measures proposed but not yet implemented:**

A management plan for the site will be developed and submitted to the South Australian Minister for Environment and Conservation and the Commonwealth Minister for Environment and Heritage as soon as possible after designation as a Ramsar site. Thereafter the plan will be subject to review on a five

yearly cycle, or modified sooner should the signatories to the Memorandum of Understanding agree that such modifications are required to ensure the ‘ecological character’ of the site is maintained.

The reintroduction of species such as Magpie Geese *Anseranas semipalmata*, Bush Stone-curlew *Burhinus grallarius*, and Brush-tailed Bettongs *Bettongia penicillata*, formerly found at the site, will be considered.

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## **25. Current scientific research and facilities:**

The Banrock Station Wetland Complex has been, and is expected to continue to be, the subject of a range of scientific activities. These include the following:

- Students from the nearby Glossop High School have been analysing water samples and will help with the revegetation of Mallee and floodplain ecosystems.
  - The Australian Landscape Trust at nearby Calperum Station is conducting research into physico-chemical features of the water, and its plant, zooplankton and animal communities and is advising on the development of a systematic monitoring program including terrestrial and aquatic plants and animals. The initial focus is on waterbirds and bat fauna.
  - Students from Adelaide University and Flinders University have undertaken various undergraduate and postgraduate studies at the Banrock Station Wetland Complex.
  - Australian Water Environments and the Loxton to Bookpurnong Local Action Planning Group are undertaking a groundwater survey and developing a groundwater – surface water model for the site.
  - The South Australian Museum Herpetology Group is undertaking surveys of reptiles and small mammals.
  - The Banrock Station Wetland Complex staff are participating in a coordinated census of frogs at sites across South Australia.
  - Primary Industries and Resources South Australia is advising on a comprehensive vegetation management program for Banrock Station.
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## **26. Current conservation education:**

The Banrock Station Wetland Complex has been established to offer an ‘education experience’ for its visitors; both in terms of the wise use of a wetland, but also in terms of the rehabilitation of a wetland and its adjoining habitats, and for sustainable farming (in this case wine growing) practices.

This ‘education experience’ starts with the Wine and Wetland Centre (see the following section) which is designed to capture the imagination and interest of those that come to the site. This is done through the design of the building, and its location overlooking the floodplain wetland, mallee woodland buffer zone and the grape growing areas. Information panels within the Centre are designed to inform visitors and encourage them to take one of the walks available which will provide them with more detailed information about the site and its integrated management regime.

Banrock Station offers two self-guided walks around the wetland; one of 2.5 kilometres and one of 7 kilometres. Both provide the visitors with an insight into the historical management of the site, the degradation that resulted from earlier less sustainable practices, and the rehabilitation which sees the site as it is today. Along both walking trails there are regular information tags describing aspects of the landscape, history or current management of the site which are ‘interpreted’ in the Walking Trail Guide. Along each trail there are also strategically placed Story Centres and Information Shelters which also provide detailed information about the site.

In designing the walking trails, care was taken to ensure they are set back from the waters' edge to minimise disturbance of the wildlife. To allow visitors to see all of the site, boardwalks have been installed in two locations (see Section 10). The siting of these was also done to minimise disturbance of the bird life in particular, with the areas of narrowest open water chosen for the boardwalks.

Along the walking trails there are four bird hides which allow visitors to observe the wetland and wildlife at closer quarters. This, combined with the set-back distance for the walking trail, ensures that visitor use of the site is closely regulated, and that foot traffic is restricted to those areas of least sensitivity.

Approximately 25,000 people walk the trails each year.

In deciding the route of the walking trails, and the siting of board walks, information shelters and story centres, consultations were held with the local indigenous community, and areas of cultural significance were avoided.

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### **27. Current recreation and tourism:**

The Banrock Station Wetland Complex is used extensively for recreation and tourism; all activities being carefully planned, controlled and monitored. These recreational activities are integrated with the education activities described in detail above.

As a practicing 'demonstration site' for the wise use of a wetland, the Banrock Station Wetland Complex has a visitor education and wine tasting centre which allows for awareness raising about the wetland ecosystem from a prominent location overlooking the site.

This facility provides information panels describing the importance of the wetland, its rehabilitation and the overall ethos for the integrated management of the winegrowing areas, the mallee 'buffer' zone and the core wetland ecosystem. The visitor information and wine tasting centre has approximately 100,000 visitors annually.

The Wine and Wetland Centre also stresses issues such as water and electricity conservation practices through its recycling and solar energy generation infrastructure.

As described in the preceding section, the Banrock Station Wetland Complex provides and promotes opportunities for its visitors to appreciate the many functions, services and benefits provided by the wetland ecosystem. This aspect of the management of the site is closely monitored and managed to minimise disturbance of the biota.

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### **28. Jurisdiction:**

The management of the Banrock Station Wetland Complex is the responsibility of BRL Hardy Wine Company. Management is undertaken in consultation with Wetland Care Australia, Australian Landscape Trust, the Riverland Aboriginal community and the South Australian and Commonwealth Governments under a formal Memorandum of Understanding.

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### **29. Management authority:**

The day to day management of the site is the responsibility of the manager and staff of the Banrock Station Wine and Wetlands Centre. Under the Memorandum of Understanding, the owners and managers of the site have committed to ensuring that the 'ecological character' of the wetland, as described in this Ramsar Information Sheet, is maintained – as required by the Convention on Wetlands and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

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### **30. Bibliographical references:**

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