

Horseshoe Lagoon

The Great Barrier Reef Coastal Wetlands Protection Program Pilot Program was commissioned by the Australian Government to deliver on-ground actions for the sustainable management of 22 priority wetlands in the Great Barrier Reef catchment. The \$2 million program was delivered over two years by a consortium led by Conservation Volunteers Australia and involved partnerships between government, community and landowners to identify and protect these wetlands.

Project summary

This Pilot Program project at Horseshoe Lagoon has:

- substantially elevated the profile and management needs of this site
- paved the way for future improvements
- provided erosion control measures
- improved aquatic weed control
- developed grazing and fire management regimes
- planned construction of an interpretive shelter overlooking a waterfowl roosting area.

An impediment to the project, however, was the difficulty in gaining agreement from all stakeholders to manipulate the hydrology (and thus improve fish habitat and other qualities of the lagoon ecosystem).

About the site

Horseshoe Lagoon is a 70-hectare off-stream lagoon on the right bank of the Haughton River. It is an important component of the Burdekin–Haughton wetlands aggregation, and is a declared Conservation Park with the Queensland Parks and Wildlife Service (QPWS).

Horseshoe Lagoon receives its water mainly through groundwater and irrigation tailwater, and in large flood events through bank overflow from the Haughton River. The tailwater inputs usually keep the lagoon at full water level, which is an unnatural state that alters its natural wetting and drying cycle. Water exits Horseshoe Lagoon via a constructed channel, although during large flood events it flows out across a broader area.



Photo 1: Aerial photo of Horseshoe Lagoon (photo: Jim Tait)

Since at least 1998, the water surface of Horseshoe Lagoon has been largely covered by floating aquatic weeds. The Burdekin Dry Tropics Natural Resource Management Group used the Burdekin Shire Council's aquatic weed harvester to clear these weeds from the lagoon in 2003–04. Water hyacinth mats have been cleared again subsequently as part of an ongoing maintenance programme.



Queensland
Wetlands Programme



Australian Government

Riparian vegetation around the lagoon's margin is sparse, and mostly dominated by introduced para grass and hymenachne. A few remnant melaleuca and leichhardt trees survive on the banks, although some of these are now severely stressed by frequent hot fires and constant waterlogging.



Photo 2: Paperbarks dead as a result of hot fires and weakening by waterlogging (photo: Jim Tait)

Horseshoe Lagoon is acknowledged in the *NQ tropical birding trails: birdwatching tourism feasibility study (2006)*, as an important site for both nature-based tourism and specialist birdwatching. The lagoon supports a range of small waterfowl at its edges, with diving ducks and cormorants in the deeper water. Significant birds include the magpie goose, black swan, cotton pygmy-goose and white-browed crane.



Photo 3: Magpie geese at Horseshoe Lagoon (photo: Jim Tait)

Challenges

The ecological condition of Horseshoe Lagoon has been affected by a number of **exotic weeds** including hymenachne and para grass on the lagoon's margins and riparian areas, particularly along the outlet channel, and water hyacinth and salvinia on the waterbody itself. Impacts of these weed species include:

- degraded water quality (particularly loss of dissolved oxygen) through rotting organic matter and biological oxygen demand
- competitive exclusion of native aquatic plants at the water's edge
- blockage and sedimentation of flow channels
- creation of large dry-season fire fuel loads (para grass).

The constructed outlet channel, where water exits the lagoon, frequently becomes invaded with hymenachne. The weed invasion results in degraded water quality and blockages to normal water flow. Additionally, floodwaters can dislodge and rip out the weed, often taking with it the sediment in which it is rooted and exacerbating **erosion**.

Grazing and fire burning regimes within the lagoon area have caused major damage to the ecological condition of Horseshoe Lagoon. The riparian vegetation has been affected by fires that are too hot and too frequent. Excessive stocking and grazing pressure have caused:

- ground compaction
- vegetation trampling
- loss of ground cover
- increased nutrient loading.

Floodplain lagoons such as Horseshoe Lagoon are important fish habitat and nursery grounds. Fish surveys within the lagoon failed to find evidence of any active or significant **recruitment**, especially barramundi and some other migratory or estuarine breeding fish species. This indicates that fish are not passing from downstream estuarine areas into the lagoon. The barriers are thought to be both physical and chemical:

- a road crossing, the constructed outlet, a coastal levee, and a downstream culvert (physical)
- depleted oxygen in the water, caused by weed infestations (chemical).

The culvert is being rectified with Recreational Fishing Grant funding.

High flow events, normally characteristic of the wet season, have been significantly reduced by the changes in hydrology. This is harmful to the fish population because fish need changes in flow to trigger breeding and/or migration.

Rehabilitation actions

The lack of **fish recruitment** into Horseshoe Lagoon was thoroughly investigated, along with biodiversity and water quality, in a scientific assessment conducted by the Australian Centre for Tropical Freshwater Research (Veitch & Burrows 2007: see 'Further reading' below). Management solutions suggested by the research report include:

- construction of a downstream rock ramp (in progress)
- mechanical removal of in-stream emergent and floating weeds along the length of the channel and downstream watercourse, combined with an ongoing spraying programme.

To control aquatic weeds within the lagoon proper, Burdekin Shire Council secured written agreements and funding from key stakeholders (i.e. landholders, Sunwater and QPWS) to carry out a three-year **weed control program**. The program involves the use of herbicide sprayed from a boat four times a year while infestations are minor, to avoid heavy reinfestation (see 'Further reading' below). The weed control program has so far been very effective.

Preliminary investigations were completed and a detailed design prepared for a **water control structure** to help manage water levels. This work included extensive consultation with stakeholders. After further negotiations, agreement was obtained to install two minor rock erosion control structures across the outlet drain; but this is merely a short-term measure to mitigate the risk of erosion at the discharge drain if there is major flooding (see 'Further reading' below).



Photo 4: Rock erosion control structure installed in outlet channel of Horseshoe Lagoon (photo: Jim Tait)

Management of grazing and fire regimes was accepted by stakeholders as a means of promoting good ecological condition. This required fencing of remnant vegetation and reintroduction of cattle to:

- reduce exotic grass biomass (i.e. hymenachne) and therefore fuel loads
- encourage regeneration of native trees.



Photo 5: Fences erected to allow strategic heavy grazing, control invasive exotic grasses and encourage natural regeneration of riparian vegetation (photo: Jim Tait)

Other actions undertaken to encourage **native species regeneration** included:

- a trial of cattle-proof tree guards to protect naturally regenerating seedlings
- selective use of herbicide
- construction of an internal fence along the foreshore of the lagoon to protect leichhart plantings, complementing the native regeneration of livistona palms and tea-tree.

Innovations

It is planned to construct an **interpretive and birdwatching shelter** at the site. This facility will provide a comfortable place from which visitors can view the birdlife on the lagoon. It will also educate them about the functions of wetlands (water quality, fish, birds, agricultural productivity), promote the Pilot Program, and acknowledge the cooperation of stakeholders.

Lessons learnt

The Horseshoe Lagoon project highlighted a need to negotiate formal agreements with landholders. Although a management plan and memorandum of understanding were prepared in consultation with stakeholders, there was little response from landholders. Furthermore, after the investigations and design had been completed, a key landholder withdrew permission to allow construction of the structure for regulating seasonal water levels. Short-term erosion structures were constructed instead, but further negotiations are now necessary to achieve longer-term solutions.

Further reading

Garnett, ST, Preece, N & van Oosterzee, P 2006, 'Feasibility study prepared for North Queensland tropical birding trails', unpublished report to NQBTB.

WetlandCare Australia 2006, *Horseshoe Lagoon plan of management*, prepared by WetlandCare Australia for the Horseshoe Lagoon Management Committee, December 2006.

WetlandCare Australia 2007, *Memorandum of understanding between partners involved in establishment of outlet erosion control works and associated plan of management at Horseshoe Lagoon in the Burdekin Shire*.

Sunwater Engineering Services 2006, Horseshoe Lagoon drainage works design report.

Veitch, V & Burrows, D 2007, *Investigation of potential barriers restricting fish passage into Horseshoe Lagoon, Burdekin-Haughton Floodplain, North Queensland*, Australian Centre for Tropical Freshwater Research, report no. 07/16.

Contacts

Burdekin Shire Council

Phone: (07) 4783 9800
www.burdekin.qld.gov.au

Australian Centre for Tropical Freshwater Research

Phone: (07) 4781 4262
www.actfr.jcu.edu.au

WetlandCare Australia

Phone: (02) 6681 6169
www.wetlandcare.com.au

Photos courtesy of WetlandCare Australia



Australian Government