Final Report to the Commonwealth:

Implementation of recovery actions for priority EPBC listed threatened species and ecological communities in Western Australia

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Project ID 45061439

Title: Lake Richmond Threatened Ecological Communities (TECs)

Detailed description of activities: The major activity of this project changed when DEC became aware of recent data that indicated that the use of herbicide adjacent to microbial communities, such as those listed as a TEC in Lake Richmond, can cause serious damage or kill them. As weed control was the major focus of this project other methods of weed control were investigated but found to be not suitable to control the weeds (*Cynadon dactylon* in particular) at this site, other than a small amount of hand removal of *Euphorbia terracina* which was undertaken around the lake's edge. As a result a variation to the contract was approved so that funds originally allocated to weed control at Lake Richmond were reallocated to Action 4 (Blackberry control at mound spring occurrence) and newly created Actions 8 (Fencing of northern ironstone) and Action 9 (Plant cages for *Diuris micrantha*). The original activity of producing interpretive material was achieved and is discussed below.

A structure to house the interpretive signage as well as six free standing structures for the walk trail have been constructed and will be installed upon the completion of the TEC signage. Due to a combination of insufficient funding and the project deadline the additional cost of the signage will be paid by the City of Rockingham. Throughout the project on-going liaison with the City of Rockingham (the City) and the Naragebup Environment Centre regarding the style of the structure and details of the text for the signs to be placed around Lake Richmond has been successful. These discussions have been guided by the Management Plan currently in place for Lake Richmond. This project has further strengthened the existing relationship between DEC, the City and the Environment Centre.

A reprint of the brochures for the microbial and sedgelands TECs has been achieved (refer to attachments). The original brochures were reviewed, updated and printed and will now be distributed to the local landowners through the rates notices and/or a letterbox drop. The brochures will also be placed at the Naragebup Environment Centre and be made available at the local library and DEC offices. A magnet of the Lake Richmond microbial TEC was also produced and will be distributed with the brochures (see attachment).

All of the interpretive material produced, including the information structures and signage are extremely valuable in educating the community of the significance of the Lake and the TECs which surround it. It turn this will result in a greater protection of the microbial and sedgelands communities.

A minimal amount of weed control was achieved for one exotic species, *Euphorbia terracina*. Plants were scattered throughout the sedgelands TEC occurring around the lake. The technique used to eradicate this species was hand removal of the large mature plants. These were targeted as they were the most likely to seed first. No chemical was applied. Follow up will be required again this year.

Threatened communities

Why is Lake Richmond important?

WA contains the greatest number and most diverse array of microbial structures known anywhere on Earth. Perhaps the best-known structures built by microbes are the world-renowned stromatolites at Hamelin Pool, Shark Bay. Lake Richmond contains limestone structures similar in appearance and function to those at Shark Bay. The structures at Lake Richmond are thrombolites. They are said to have a clotted internal structure where stromatolites have a layered internal structure.

Similar to Shark Bay, the microbial community that forms the limestone structures in Lake Richmond is a complex association of several species of bacteria and algae that, while growing, remove dissolved minerals (calcium carbonate) from the water and build up new 'rock' material, resulting in the formation of the obvious domed rock-like formations. Lake Richmond contains the only known example of this particular critically endangered microbial community. 'Critically endangered' means that it faces destruction in the immediate future if threats are not managed.

Microbial communities similar to those at Shark Bay and Lake Richmond are believed to have been crucial in the history of the Earth. Fossilised stromatolites are the earliest record of life on Earth and it is believed that the bacteria that form these structures were the dominant form of life from 3.5 billion to 600 million years before present (the Pre-Cambrian period). Stromatolites occurred when the Earth's atmosphere was too hostile to support life as we know it. The bacterial community that forms stromatolites and thrombolites is believed to have been responsible for generating the first atmospheric oxygen, thereby making the biosphere habitable for all other life. This is perhaps the most critical event in the Earth's history.

Plant community in danger

Lake Richmond is also surrounded by another critically endangered community known as 'Sedgelands in Holocene dune swales'. Surrounding the lake's adge, the sedgelands at Lake Richmond represent about 10 per cent of the remaining area of this community type.

This sedgeland community mainly occurs in the Rockingham area.

The sedgelands that surround Lake Richmond are also a critically endangered community. Photo – Val English

If you would like more information about the microbial community in Lake Richmond, please contact DEC's **Swan Region office** on **9423 2900** or the **Naragebup Rockingham Regional Environment Centre** on **9591 3077.**

Where is Lake Richmond?

Lake Richmond is located immediately inland of Point Peron, between Safety Bay Road and Parkin Street in the City of Rockingham. This reserve forms part of the Rockingham Lakes Regional Park and comprises several land parcels. Most of the land is managed by the City of Rockingham.

The threatened microbial community of Lake Richmond: a significant wetland

Fire in buffer vegetation can be a major threat to water quality in the lake. Photo – Bob Goodale

Front cover and above *Thrombolites in Lake Richmond. Photo – Bob Goodale*

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Information current at May 2010

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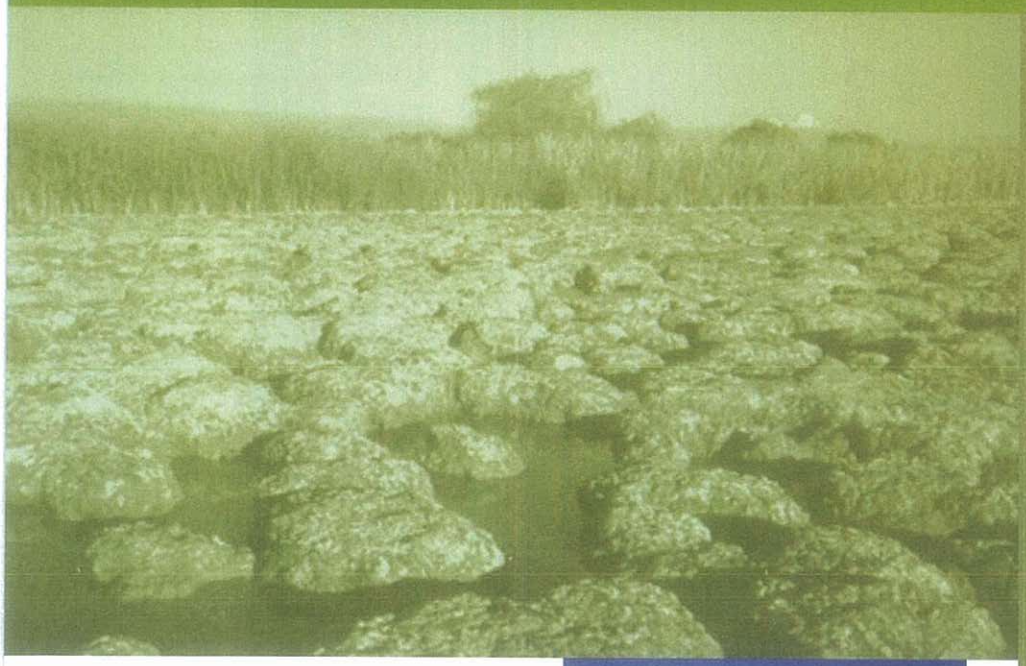

Important birds

There are also a number of significant migratory bird species that use Lake Richmond on a seasonal basis, for example, common greenshanks (*Tringa nebularia*) and red-necked stints (*Calidris ruficollis*). These birds are protected under international agreements between Japan and Australia, and China and Australia.

Aboriginal significance

Aboriginal beliefs relate to Lake Richmond. A member of the local Naramya Aboriginal Corporation is consulted about management planning for the lake and also provides information about Aboriginal culture for lake visitors.

Microbial community in danger

Lake Richmond is a freshwater lake that is fed by storm water and ground water. The health of the lake and its microbial community are under threat from declining water quality as a consequence of some land uses around the lake, such as residential developments and runoff from roads. In addition, when the microbial structures become exposed during summer, they are fragile and very vulnerable to crushing underfoot. Too-frequent fire can also impact the microbial community by increasing flows of sediment that can smother the microbial community and cause a decline in the water quality.

The microbial structures in Lake Richmond are very vulnerable to crushing underfoot. Photo – Val English

Recovery of this threatened ecological community

The Department of Environment and Conservation (DEC) is committed to ensuring that critically endangered ecological communities are not destroyed. This is done through the preparation of Interim Recovery Plans, which outline actions that are required to urgently address threatening processes most affecting the ongoing survival of the communities, and begin the recovery process.

DEC has set up a recovery team for the microbial community of Lake Richmond to coordinate the implementation of recovery actions that address the greatest threats to the survival of the community. This team consists of representatives from DEC, the Naragebup Rockingham Regional Environment Centre that manages the lake on behalf of the City of Rockingham, and various government agencies.

Recovery actions that have been, and will be, progressively implemented to protect the threatened ecological community include:

- installation of a boardwalk and viewing platform over looking the lake
- monitoring the health of the lake and the microbial community
- ensuring developments on adjacent lands have minimal impact on the lake
- ensuring that current water quality and levels are maintained
- installation of interpretive signage
- seeking to prevent fire from occurring too frequently in buffer vegetation around the lake's edge.

You, as a near neighbour, are vitally important in protecting this precious lake.

What can you do to look after this important lake?

Don't walk on the thrombolites.

The structures are fragile and easily crushed underfoot.

Keep to the tracks.

Walking off the tracks can crush vegetation that provides a buffer to the lake.

Report fires.

Too-frequent fire affects the sedgelands that act as a buffer to the lake and that help to prevent pollutants entering the waters. Please report all fires or any unusual behaviour that could relate to arson to the Fire and Emergency Services Authority.

Don't put it down the drain.

Chemicals such as oil can end up in the drains into Lake Richmond and other wetlands. Dispose of liquid wastes properly.

Become involved.

Contact the Naragebup Rockingham Regional Environment Centre for ways to become involved at Lake Richmond.

Threatened communities

Why are these wetlands important?

The Rockingham-Becher Plain, on which these wetlands occur, was formed through the build-up of sandy Holocene sediments during the past 10,000 years.

The dunes and swales are of high geomorphological significance because they provide a relatively undisturbed record of soil development, from the older inland soils to the younger soils deposited recently near the coast. They provide an insight into the evolutionary record of sea-level history, shoreline and climatic changes.

These wetlands are examples of a threatened ecological community, which is a particular group of plants and animals that occur together in a particular habitat, and are considered to be under threat of destruction. This community is classified critically endangered which indicates that it is under threat of immediate destruction unless high-level threats can be managed.

The typical wetland in which this threatened community occurs is known as a dampland, which means that in winter it becomes waterlogged, and in summer it remains quite damp near the soil surface.

Some of the wetlands contain surface water during the winter months while others contain limited amounts of surface water for most of the year. These types of wetlands are known as sumplands.

These dampland and sumplands are generally narrow and linear, but may also be circular.

The composition of species that occurs in this threatened ecological community varies between occurrences. Typical and common native species include the shrubs: climbing lignum (*Muehlenbeckia adpressa*), orange wattle (*Acacia saligna*) and balga (*Xanthorrhoea preissii*); the sedges: bare twig-rush (*Baumea juncea*), knotted club-rush (*Ficinia nodosa*), and coastal sword-sedge (*Lepidosperma gladiatum*); and the grass: *Poa porphyroclados*. One sub-set of this community has trees such as melaleucas, banksias or tuart forming an overstorey.

Examples of the two sub-types of the critically endangered sedgeland community — sedgelands in Holocene dune swales (above) and woodland over sedgelands in Holocene dune swales (top).

The threatened sedgelands in Holocene dune swales: a significant wetland

Where do these wetlands occur?

These important wetlands, known as 'sedgelands in Holocene dune swales', are mostly found in the Rockingham area.

They are mainly located in the Shires of Rockingham and Mandurah, with a few occurrences in the City of Wanneroo and the Shire of Capel. They occur within linear wetlands in dips known as swales, that occur between sand dunes. The wetlands occur on land vested in the City of Rockingham, in regional parks and on private land.

Location of the Sedgelands in Holocene dune swales community.

If you would like more information about the sedgeland community near you, please contact DEC's **Swan Region office** on **9423 2900**.

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Front cover and above Threatened sedgeland community. Photo – Val English

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Plant community in danger

Less than 200 hectares of this critically endangered community are now found in the world, and only a small percentage of this area is in protected reserves.

Some of the areas of the community are proposed to be cleared. The health of the sedgeland community is also under threat from declining water quantity and quality resulting from the drying climate and high water use on surrounding lands such as residential developments, golf courses and other grassed sporting grounds. While this community is relatively resilient, too-frequent fire has a significant impact on it and encourages the invasion of weeds. Weeds compete with the native species and further increase the risk of fire.

Top Surveying the threatened wetlands. Photo – DEC

Above Frequent fire has greatly increased weeds in this area of the community. Photo – DEC

Aboriginal significance

Aboriginal beliefs relate to some areas of this community type. One of the sites has been identified as a hunting area, and another as containing artefacts.

Recovery of this threatened ecological community

The Department of Environment and Conservation (DEC) is committed to ensuring that critically endangered ecological communities are not destroyed. This is done through the preparation of Interim Recovery Plans, which outline the actions that are required to urgently address threats that have the greatest impact on the community, and begin the recovery process.

DEC has set up a recovery team for the 'Sedgelands of Holocene dune swales' to oversee the implementation of recovery actions that address the greatest threats to the survival of the community. This team consists of representatives from DEC, the City of Rockingham and a community-based wetland conservation group.

The sedgelands in Holocene dune swales, pictured in very good condition in Rockingham Lakes Regional Park. Photo – DEC

Recovery actions that will be progressively implemented with the help and support of neighbours:

- **monitoring the groundwater within this community to help ensure that current water quality and levels are maintained**
- **ensuring developments on adjacent lands have minimal impact on the community**
- **seeking to prevent fire from occurring too frequently in the community**
- **controlling weeds within the community**
- **fencing occurrences of this community to help ensure its protection.**

What can you do to look after these important wetlands?

Don't dump rubbish.

These wetlands are of high conservation value, and activities such as dumping rubbish, especially garden waste that contains lawn clippings or seeds, degrade them. Dispose of rubbish properly.

Reduce fertiliser use.

The nutrients from fertilisers can end up in the drains into the wetlands and reduce water quality.

Keep to the tracks.

Walking off the tracks can crush the vegetation. Please use paths and boardwalks.

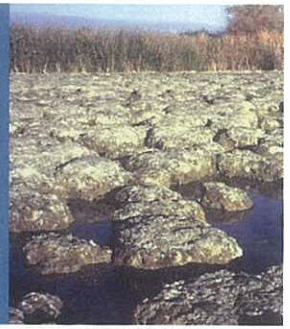
Report fires.

Too-frequent fire has a huge impact on this sedgeland community by increasing weeds that out-compete native species. Please report all fires or any unusual behaviour that could relate to arson to the Fire and Emergency Services Authority.

Help protect the threatened thrombolites of Lake Richmond

Your local wetland is worth protecting

Please contact DEC on 9423 2900.



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