Department of Environment and Conservation
Our environment, our future

# SUMMARY ANNUAL REPORT

## THREATENED SPECIES AND/OR COMMUNITIES RECOVERY TEAM

| PROGRAM INFORMATION | |
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| **Recovery Team name** | Aquatic Root Mat Community of Caves of the Swan Coastal Plain (Yanchep) |
| **Reporting Period (Calendar Year)** | **Calendar year 2008** |

**Current membership**

| Member | | Representing |
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| 1. Chair | **Paul Brown** | Dept of Environment and Conservation |
| 2. EXEC OFFICER | **Natalia Huang** | Dept of Environment and Conservation |
| 3. | **Andrew Paton** | Department of Water |
| 4. | **Jill Pryde** | Dept of Environment and Conservation |
| 5. | **Brenton Knott** | University of Western Australia |
| 6. | **Andrew Storey** | University of Western Australia |
| 7. | **Wayne Bartley** | Water Corporation |
| 8. | **Alison Pritchard** | Dept of Environment and Conservation (Acting Yanchep National Park Manager) |
| 9. | **Lex Bastian** | Speleologists Association |

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| **Dates meetings were held** | 27th May, 9th December 2<br>There were multiple technical meetings on and off site regarding plant infrastructure. |
| **One to two paragraph summary of achievements suitable for *WATSNU*** | The groundwater within the Yanchep Caves continues to be adversely impacted by the dry climate and resultant drop in the Gnangara Mound groundwater levels. A major rewatering project was tested in 2005 and a filtering system to remove iron and manganese from bore water was built in 2007. However, the mechanical interface between the filtering and distribution system has caused delays in commissioning and the system will not be switched on until 2009.<br>A taxonomic review of key cave stream invertebrates is well advanced and this will better define the component fauna of this TEC. |
| **List of actions undertaken by Recovery Team (from** | **1. Establish a Recovery Team**<br>The Recovery Team was established in 1997 with a broad inter- |

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| **actions in Recovery Plan)** | agency membership and has met regularly since then.<br><br>**2. Monitor cave fauna and respond to results of monitoring as appropriate**<br>Cave invertebrate fauna have been monitored annually by DoE-DoW since 1999 through Dr Brenton Knott and Dr Andrew Storey from the University of WA. The 2008 report will be submitted to DoW in 2009.<br><br>**3. Urgently implement recommendations in Management Plans for Yanchep National Park likely to benefit root mat communities**<br>A Yanchep National Park Cave Management Committee has been established and determines public access requirements and management of individual caves. This committee is facilitated by the DEC and includes a number of representatives of the Speleologists Association. The Committee meets three times a year and is kept informed of Recovery Team actions and proposals. Yanchep National Park has a Community Advisory Committee that is also kept informed of the Team's activities, and their comments are sought on recovery actions. The Recovery Team Chair attended one Cave Management Committee and one Community Advisory Committee meeting in 2007.<br>A new Park Management Plan is being prepared and a draft is planned for release in 2008/2009. This Plan will include revised recommendations relating to the Yanchep Caves and the root mat TEC.<br><br>**5. Disseminate information about the community**<br>An article on the filtration system was printed in the local Sun City News in November 2007. Fiona Felton (Executive Officer/Technical Officer) conducted a TV interview with Today Tonight in April 2007 regarding the efforts made to sustain the TEC. The Yanchep Caves Rewatering Project was featured on the TV documentary "Fish out of Water" hosted by Ian Thorpe. The Yanchep National Park also has an extensive school activity program and visitor tours. All tours into Crystal Cave (four times a day) discuss the Yanchep Caves Root Mat Community and the recovery actions being undertaken.<br><br>**6. Undertake research**<br>In 2008, Danny Tang from UWA completed a taxonomic review of *cyclopoids* and *harpacticoids* of the caves and mound springs. The manuscript has been published. Danny Tang has now commenced a similar review of the amphipods in the same region and is due to complete this report in 2009.<br>A report providing an economic analysis of the Park user's propensity to pay to protect the Yanchep Caves TEC was produced in 2008 by CSIRO and a student from UWA.<br><br>**7. Review data monthly from transect bores near areas of private abstraction**<br>See Action 8.<br><br>**8. Continue to assess the adequacy of the bore network**<br>Groundwater levels and selected water quality attributes are |

checked and collated across the Gnangara Mound by the DoW monthly. Data are available to the DEC.

**9. Manage water levels in likely catchment areas for cave streams**

The Gnangara Sustainability Strategy (GSS) will evaluate the land management in the groundwater catchment area of the Yanchep Caves during 2008/09. This will include evaluation of recharge from prescribed burning native woodlands and the long term land use of the Pinjar pine plantation. The report is due to be released in 2009.

**10. Monitor water levels in cave streams that contain the root mat community, and initiate short-term management solutions where necessary**

The DEC monitors water levels using the observation bores both in and around the caves on a weekly basis to establish long-term trends. All staff involved in monitoring water levels follow the procedure in the monitoring manual.

Localised small-scale rewatering systems are in place in Crystal, Cabaret, Boomerang, Water and Carpark Caves. These are monitored three times a week to ensure they are functioning effectively. A new monitoring network for root-mat distribution in the cave streams in Crystal, Cabaret, Boomerang and Carpark Caves was established in 2007 and was continued throughout 2008.

**11. Design and establish a semi-permanent system for remote monitoring and watering of caves**

The Yanchep Caves Recovery Project (the large-scale rewatering system) was established in 2005. The system was completed and run into Crystal Cave, but was de-commissioned due to the production of a red iron precipitate within the cave. Trials were carried out to remove this precipitate which resulted in the appointment of Worley Parsons and subsequent recommendation for the GE filtration system. This system has a DMI65 media - a catalytic coated sand media, which, based on laboratory trials, removes both iron and manganese.

In September 2007, all filtration system infrastructure was installed at the Yanchep Beach Road site. Technical problems with the interface between the distribution system and filter system have severely delayed the commissioning of the project. It is expected that filtered water will be pumped into Crystal Cave in 2009, as soon as all issues have been resolved and iron and manganese levels are at satisfactory levels.

**13. Manage water quality in likely catchment areas for cave stream. Management strategy to be included in full Recovery Plan for the community.**

Although water quality within the catchment does not appear to be affecting the cave streams, the DEC and the DoW maintain regular water quality monitoring and strictly manage operations that have the potential to pollute the groundwater.

**15. Ensure land use planning and development control processes effectively safeguard against potentially adverse impacts upon the cave systems**

Land use changes and developments are assessed by the DEC for potential impacts on caves and cave streams. As part of the

Gnangara Sustainability Strategy (GSS), land use values will be managed in a manner which will minimise the impact of development on the cave systems.

**18. Wherever possible create a buffer between the caves and any tracks or trails**

This action is taken into consideration in the day to day workings of the National Park. Where appropriate, unused tracks have been closed and rehabilitated. All road upgrades include full assessment of all underlying cave systems.

**19. Manage fire regimes**

The fire regime within the Yanchep National Park Management Plan is designed to avoid damage to the Tuart trees above and around the caves with the TEC and also to assist in groundwater recharge. In recent years, prescribed burning has specifically targeted areas upstream of the caves within the groundwater catchment in an attempt to promote greater recharge and to assist in increasing or maintaining local groundwater levels until a more permanent rise in regional levels can be achieved. In 2005 a large wildfire burnt across the top of most of the caves that contain the root mat community; and subsequent Tuart regeneration appears healthy.

**20. Report on success of management strategies for cave communities**

During 2008, the following reports were received and/or prepared by the Recovery Team:

a. 2007 Annual Report for the Yanchep Cave Recovery Team, by Natalia Huang and Paul Brown

b. 2008 Annual Invertebrate Monitoring Report for DoW from UWA

c. Freshwater cyclopoids and harpacticoids (Crustacea: Copepoda) from the Gnangara Mound Region of Western Australia by Danny Tang and Brenton Knott at UWA (Abstract only received).

It is proposed that in 2009, the DEC will prepare full documentation of the infrastructure associated with the Yanchep Caves Recovery Project and Danny Tang will submit a manuscript on the taxonomy of amphipods from the Yanchep Caves.

**21. Identify and liaise with additional landholders/ land managers**

There is extensive whole of Government informal and formal liaison on the declining groundwater levels on the Gnangara Mound with all key agencies (Water Corporation, DoW, FPC, Department of Planning and Infrastructure (DPI), CSIRO, the Department of Agriculture & Food and the Department of Premier and Cabinet). This liaison is facilitated through the Gnangara Coordinating Committee and the Gnangara Sustainability Strategy Taskforce which will provide an effective management strategy for the Gnangara Mound and its environmental values, water resources and land use by June 2009. This may result in increased recharge to assist in raising the groundwater levels and therefore help the root mat community and other water dependent ecosystems to survive. The DEC is an active member of both groups through its Chair, Paul Brown.

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| **Assessment of progress towards meeting criteria for success (from Recovery Plan)** | Six of the 21 recovery actions were completed prior to 2008, while the remaining 15 recovery actions above were ongoing in 2008.<br>Until the large-scale rewatering system is commissioned and operated successfully for a time in 2009, it will be difficult to assess the criteria for success for this TEC.<br><br>The current Interim Recovery Plan (IRP) covers the period 2000-2003 and states that the criteria for success are<br>1) **No known occurrences of the root mats dry out** - Known occurrence of Aquatic Root Mat Communities continue to be artificially supplemented using small scale rewatering systems as required. Twilight cave was closed in 2006 due to safety concerns and is therefore no longer supplemented with water.<br>2) **Maintenance of all the Gondwanan species in the aquatic root mat assemblages** – Due to falling watertables and limitations of the small scale rewatering systems species richness and abundance in the known occurrences has not shown any signs of recovery (Knott *et al*., 2008). Until the large-scale rewatering system is commissioned and operating for an extended period of time the ultimate status of these species in this area will not be known. If the species continue to exist in inaccessible areas of the karst system, large scale rewatering may result in re-colonisation of occurrences.<br>3) **Maintenance of trees that currently or are likely to future supply roots to the caves that contain the aquatic root mat Communities** – Trees above and around the caves within the National Park continue to be protected.<br>4) **The Pinjar Pine Plantation to achieve the target basal area of 11m$^2$/ha** - In May 2008 the basal area of Pinjar Plantation was 13m$^2$/ha. In 2008 Forrest Products Commission continued to thin the plantation. In January 2009 a wildfire impacted the Pinjar Plantation and following the current salvage operation it is expected that the plantation will be at 11m$^2$/ha. It has not been established whether the plantation will be replanted to pine (pers. comm. Parker 2009) |
| **Assessment against criteria for failure (from Recovery Plan)** | The current Interim Recovery Plan (IRP) covers the period 2000-2003 and states that the criteria for failure is significant loss of area or further modification of the threatened ecological community, including the complete drying up of the root mats in any single cave, or loss of individual fauna species.<br>It cannot be determined at this point if any individual fauna species has been lost. The Recovery Team have discussed the concerns regarding the potential extinction of the Crystal Cave Crangonyctoid. The Recovery Team cannot determine at this point that the status of Crystal Cave crangonyctoid *Hurleya* sp. (WAM#642-97) has changed or if it is extinct.<br><br>The following management actions relating to the Crystal Cave Crangonyctoid were undertaken in 2008:<br>• The small 'well' style ponds have been retained in Crystal Cave throughout the past five years.<br>• The development of an environmentally appropriate filtering system for the rewatering of Crystal Cave has been designed, contracts let and a filtering system installed.<br>• There remain some compatibility issues with the established rewatering system and the filtering systems (valves, override systems) that should be rectified by the consultants soon. The |

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| | water will then start being pumped back into Crystal Cave.<br>• Detailed monitoring protocols for the root mats and cave stability have been established in manual form. Pre-watering monitoring is complete.<br>• Checking the water quality and quantity, cave stability, mechanical operation of equipment and appropriate final water levels for the new rewatering system will occur in the six weeks following system opening. The operation of the system will then be following established processes.<br><br>In addition, a contract has been let with UWA for taxonomic assessment and publishing of descriptions of the Amphipods of the Yanchep Cave and Mound Spring threatened ecological communities. This group (in addition to the first two groups that were reviewed in 2007) appear to be most likely to contain endemic species. |