TREE-STEM TRAPDOOR SPIDER (*Aganippe castellum*) CONSERVATION PLAN

2008-2013

Illustration of a female (left) and a male (right) Tree-stem trapdoor spider (*Brad Durrant*)

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Australian Government

Government of Western Australia

AVON CATCHMENT COUNCIL

Department of Environment and Conservation

WWF

FOREWORD

This species conservation plan has been developed by the Department of Environment and Conservation Western Australia (DEC) on behalf of the Avon Catchment Council.

Although this species is found outside the Avon River Basin (ARB), this plan relates to the management of the species within the ARB. The implementation of recommendations and associated costs contained within this plan do not reflect current funding capacity. The availability of funding will determine the capacity to implement.

Information in this Species Conservation Plan was accurate at April 2008. This plan will operate from May 2008 to May 2013 but will remain in force until withdrawn or replaced.

ACKNOWLEDGEMENTS

Meg Green (former Ecologist, DEC Wheatbelt Region) contributed significantly towards the compilation of the first draft for this conservation plan.

Professor Barbara York Main (University of Western Australia), Dr. Mark Harvey (Western Australian Museum), Mick Davis (WWF – Australia) and Monica Russel (Edith Cowan University) provided historical and current information regarding trapdoor spider biology and locations.

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CONTENTS

SUMMARY

Tree-stem trapdoor spider *Aganippe castellum* Main 1986

Family: Idiopidae.

NRM Regions: Avon, Northern Agricultural Region.

Current status of taxon: Endangered.

Description: The Tree-Stem Trapdoor Spider is a medium-sized spider, dark brown to black in colour, and has large anterior lateral eyes that project beyond the edge of the carapace (Burbidge, 2004). The length of the carapace ranges from 6.8-8.8mm and the width ranges from 5.2-6.2mm (Main, 1986).

Females are distinguished by thorn-like spinules which cover the labium, sternum, anterior edge of the carapace, membranous margin of the carapace and are also found in the foveal crevice (*Figure 1*). The abdomen is hirsute and the internal genitalia broad-based. Males have marginal spines on the carapace, the tarsi lack spines, and the palpal tarsus possesses about six apical spines. The embolus has a narrow flange and sharp, subterminal ventral projection, with dorsal spines on the abdomen (Main, 1986).

Breeding habitat: Burrows in flood-prone depressions, and flats that support myrtaceous shrub communities.

Feeding habitat: Catches prey on stem of burrow located at the base of the "host" plant.

Habitat critical for survival:

The habitat critical to survival of important populations of *A. castellum* consist of flood-prone depressions and flats which support myrtaceous shrub communities. In particular, those areas supporting Broombush (*Melaleuca uncinata*) and Sheoaks (such as *Allocasuarina acutivalvis*) in sandy loam soils are critical to the survival of this species

Conservation plan objective:

To maintain, and if possible enhance, the condition of *in situ* populations of *Aganippe castellum*.

Recovery Criteria:

Criteria for success:
The number of populations has increased and/or the number of mature individuals has increased by fifteen percent or more over the term of the plan.

Criteria for failure:
The number of populations has decreased and/or the number of mature individuals in the known populations has decreased by fifteen percent or more over the term of the plan.

Conservation Actions:

1. Establish a Mygalomorph Conservation Team
2. Determine the population characteristics of known populations & ongoing monitoring
3. Undertake a threat assessment for each population
4. Address threats to specific populations
5. Conduct surveys to identify new populations
6. Promote awareness

Conservation Team: The formation of a Mygalomorph Conservation Team is recommended as part of this and other Mygalomorph conservation plans.

Conservation plan time frame:

This plan will be [1]implemented, updated and continually evaluated over a 5 year period from 2008 - 2013.

[1] The degree of implementation will depend on the availability of future funding and resources.

1. INTRODUCTION

The Tree-stem Trapdoor Spider (*Aganippe castellum*) belongs to the suborder Mygalomorphae, commonly known as "Trapdoor" and "Funnel-web" spiders. They are primarily terrestrial burrowing spiders which occasionally make tubular silk nests on tree trunks. Mygalomorphs are able to persist in small isolated areas due to their low dispersion powers, long life cycle and sedentary life style (Main, 1987a).

Mygalomorph spiders take several years to reach reproductive maturity, and females can live up to and exceeding twenty years. Mature males leave their burrows during moist conditions in search of females, and die shortly after mating (Main, 1985, Yen & Butcher, 1997). Females lay their eggs in a silk cocoon in the burrow, and after spending several months confined to the parent burrow, spiderlings emerge approximately one year after the parental mating (Main, 1982).

In areas that experience drought, mygalomorph spiderlings disperse from their mother's nest during or following rainy weather, and establish a new burrow in rain-softened soil. During this process, juveniles are vulnerable to predation by birds, mammals, lizards, frogs and other arthropods (Main, 1985).

Predators of *A. castellum* include other arthropods (eg. Centipedes and Scorpions) which enter burrows, Goannas and Bandicoots which dig out burrows and Pompilid Wasps, some of which specialize in preying upon burrowing spiders (Main, 1985). A major threat to *A. castellum* includes the loss or alteration of habitat due to their specialized habitat requirements, which may restrict them to microhabitats that have only subtle differences to adjacent ones. As a result, physical disturbance to these microhabitats can cause local extinction of populations (Main, 2002).

2. TREE-STEM TRAPDOOR SPIDER ECOLOGY AND LIFE HISTORY

2.1 History and Taxonomic Relationships

The Tree-Stem Trapdoor Spider, (*Aganippe castellum*) was first identified by Barbara Main in 1986. The species name *castellum* is translated from Latin to mean 'fortress' or 'tower', describing the above-ground burrow structure which distinguishes this species from other trapdoor spider species.

Any cross-breeding with other spider species is unknown, but thought to be unlikely due to the morphological distinction of this species and the short dispersal distance of offspring from the parent burrow.

2.2 Description

A. castellum is a medium-sized spider, dark brown to black in colour, and has large anterior lateral eyes that project beyond the edge of the carapace (Burbidge, 2004). The length of the carapace ranges from 6.8-8.8mm and the width ranges from 5.2-6.2mm (Main, 1986).

Females are distinguished by thorn-like spinules which cover the labium, sternum, anterior edge of the carapace, membranous margin of the carapace and are also found in the foveal crevice (*Figure 1*). The abdomen is hirsute and the internal genitalia broad-based. Males have marginal spines on the carapace, the tarsi lack spines, and the palpal tarsus possesses about six apical spines. The embolus has a narrow flange and sharp, subterminal ventral projection, with dorsal spines on the abdomen (Main, 1986).

2.3 Distribution, Habitat and Movements

There are currently 22 known populations of *A. castellum* which have an extent of occurrence of approximately 25,000 km^2 (determined by enclosing known populations in a spatial polygon). The area of occupancy is likely to be considerably smaller due to the short dispersal distances of offspring. It is thought that each population occupies no more than 1 km^2 and has an abundance ranging from 6 to 190 individuals (Russell, 2006).

Figure 1: Photograph of a female Tree-stem trapdoor spider. (Photo: Monica Russell)

The 22 known populations of *A. castellum* occur in the south-west of Western Australia. They extend to the north as far north as Pintharuka Nature Reserve (Morawa Shire), south to the Merredin townsite, and east to Southern Cross (*Figure 2*). The population at Pintharuka is the only known population that exists outside of the Avon Catchment Council (ACC) NRM (Natural Resource Management) Boundary. Details regarding the location, tenure, population size and date of last onsite monitoring etc for each known population are included in *Appendix 1*.

A. castellum prefer habitats in flood-prone depressions and flats that support myrtaceous shrub communities. The burrows of this species are specially designed with an aboveground entrance to withstand occasional sheet flooding (Main, 1987a).

2.4 Biology and Ecology

A. castellum live in individual nests throughout their entire lives. The nests structure of *A. castellum* is unique to this particular species. These spiders generally build their nests against the stems of trees such as broombush (*Melaleuca uncinata*), Sheoaks (such as *Allocasuarina acutivalvis*) and other Myrtaceous shrubs in sandy loam soils (Freegard, 2003).

The silk lining of the burrow extends up out of the ground and attaches to the tree or shrub (*Figure 3*), with the rim facing up the stem and the door opening away from the stem (Main, 1986, Burbidge, 2004). Attached to the rim is a fan of twig-lines which hang down to the ground and act to direct prey (primarily ants) past the opening of the burrow (Main, 1986).

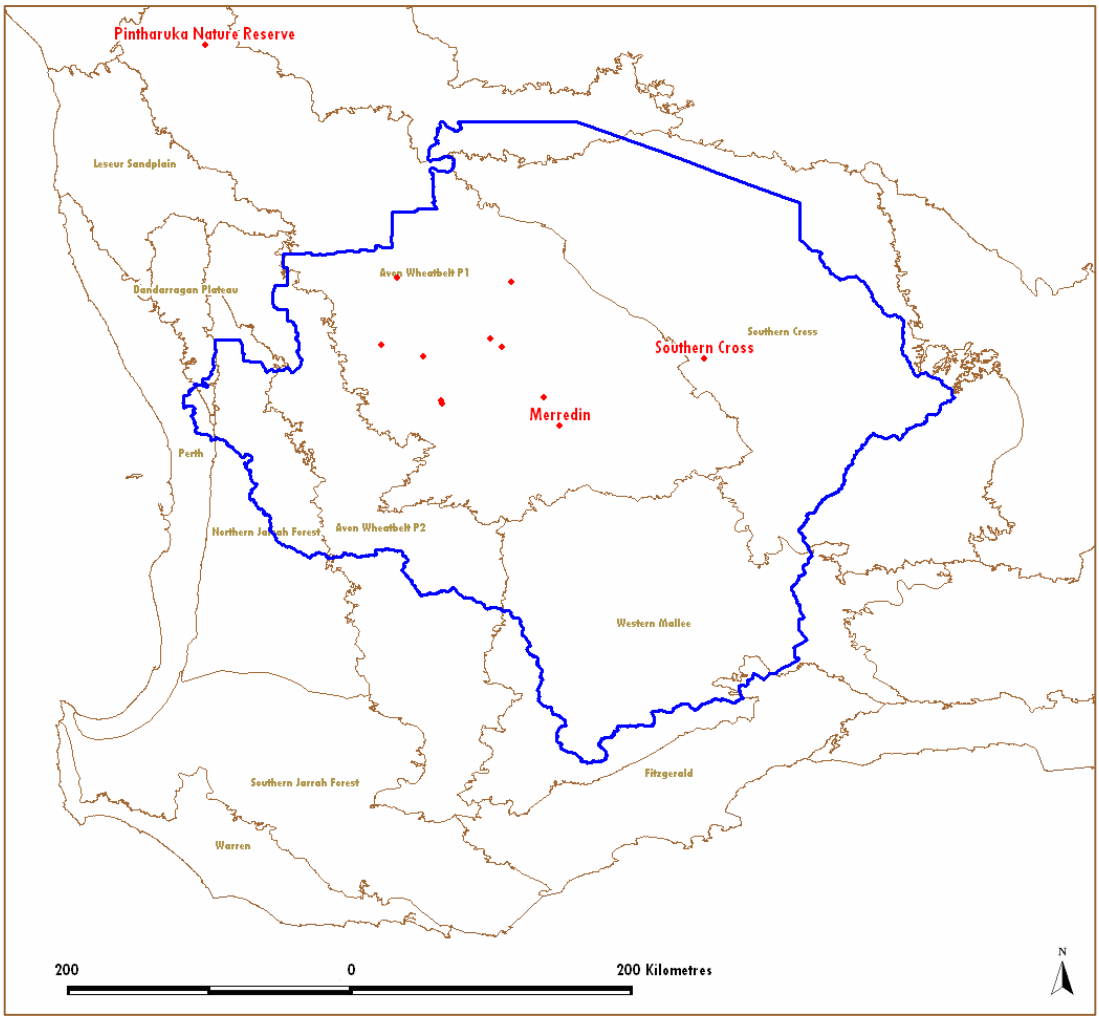

Figure 2. Locations of known populations of Tree-Stem Trapdoor Spiders (*A. castellum)* in south-west Western Australia. The red points represent the GPS localities of the twelve populations, the blue line marks the Avon Catchment Council NRM Boundary, and the brown divisions show the different IBRA (Interim Biogeographical Regionalisation of Australia) subregions.

Female Tree-stem Trapdoor Spiders spend their entire lives in the same burrow, while males leave their burrows during winter months to search for females and breed (Burbidge, 2004). These spiders are estimated to live for approximately twenty years and take several years to mature. Spiderlings do not disperse far from the mothers burrow and cannot move between vegetation remnants (Burbidge, 2004).

As this species is dependent on the underlying moisture of the soil, changes in the hydrology of an area can significantly affect the survival of this species. An example of this occurred at the North Bungulla Nature Reserve and Heitman's Scrub sites (both sites occur within the Shire of Tammin), where an upslope quarry caused a shift in the drainage and caused the total mortality of emergent juveniles at these two locations (Main, 1987b).

Figure 3. Typical burrow of Tree-stem Trapdoor Spider (Photo: M. Davis / WWF)

2.5 Conservation Status

The Tree-stem Trapdoor spider (*A. castellum*) is listed under the Western Australian *Wildlife Conservation Act 1950* as Schedule 1 Fauna (fauna that is rare or likely to become extinct), and is ranked as Endangered under the World Conservation Union (IUCN) Red list criteria A2c.

3. HABITAT CRITICAL TO SURVIVAL

Habitat means the biophysical medium or media: (a) occupied (continuously, periodically or occasionally) by an organism or group of organisms; or (b) once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced (*Environment Protection and Biodiversity Conservation Act 1999*).

Habitat critical to survival and important populations of Tree-stem Trapdoor Spiders comprises:

- Areas currently occupied by the spiders;
- Areas not currently occupied by the spiders, but adjacent to areas that are currently occupied by the spiders;
- Areas of suitable vegetation within the recorded range in which undiscovered spider populations may exist and; and
- Areas of suitable habitat previously occupied by *A. castellum*, but that are currently unoccupied.

The habitat critical to survival of important populations of *A. castellum* consist of flood-prone depressions and flats which support myrtaceous shrub communities, and in particular those areas supporting Broombush (*Melaleuca uncinata*) and Sheoaks (such as *Allocasuarina acutivalvis*) in sandy loam soils.

4. GUIDE FOR DECISION MAKERS

The availability of accurate data of known *A. castellum* populations and sites with a high prospect of supporting *A. castellum* populations is essential to decision-making.

Section five provides details of current and potential threats to *A. castellum*. Any ground disturbance works (clearing, firebreaks, road works involving roadside vegetation or changes to drainage, burning, drainage etc) in the immediate vicinity of known *A. castellum* populations will require assessment. Proponents should demonstrate that the work will not have an impact on this species.

Ground disturbance or other operations which may have a direct or indirect impact on the habitat or hydrology of known *A. castellum* population will require an Environmental Impact Assessment (EIA) to ensure that the species is not adversely affected. A pre-disturbance survey to determine the presence / absence of *A. castellum* in habitat that may reasonably be expected to contain an *A. castellum* population is encouraged

Encouraging landowners / managers to conserve populations occurring on their properties is critical to the protection of these populations. When a new population is identified on private property, the land owner will be contacted in person by DEC staff to discuss the management needs of the *A. castellum* populations as well as any concerns the owner may have. A letter will be provided to the land owner as a formal notification of the presence of the population and a request to advise DEC of any change in ownership.

Working closely with landowners will improve the capacity to identify and address any land use related threats.

Where the land manager is a local or state government authority, the letter will require the agency to implement measures to ensure that the population will not be adversely affected by land use. These measures will include advising DEC of any land use that may impact on the survival of the population.

The DEC provides advice on the location and protection of threatened species and communities to telecommunication, water and power providers to ensure that these areas are managed as Environmentally Sensitive Areas (ESA). DEC will ensure this advice includes information on the relatively immobile nature of these fauna species.

The DEC is responsible for assessing notifications of intent to clear under the clearing of native vegetation provisions of the Environmental Protection Act 1986. This process considers the potential impact of the proposed work on threatened fauna species.

DEC also provides advice to the Commissioner for Soil and Land Conservation in respect to notifications of intent to drain and the potential impact that these proposals may have on threatened species and other conservation values.

The sedentary nature of these species increases their vulnerability to disturbance. Therefore a Regulation 15 license to take fauna for educational or public purposes is required if disturbance will occur in or immediately adjacent to these populations. Applications for this license are made through the Department of Environment and Conservation. Failure to obtain a license may result in a breach of the Wildlife Conservation Act 1950.

5. THREATS

A. castellum possess certain characteristics that make them more susceptible to threats than other wheatbelt fauna. These include poor dispersal capabilities, confinement to disjunct habitats and low fecundity. These characteristics require a similar management approach to the conservation actions undertaken for Declared Rare Flora.

The limited knowledge of the ecology of this species and the nature of individual populations restricts the capacity to conserve these species. The implementation of the conservation actions described in section 12 of this plan will address this knowledge gap and the threats to the survival of this species.

The main threatening processes (not necessarily in order of priority) are:

1. Lack of ecological resources to support viable populations,
2. Impacts of introduced plants and animals,
3. Inappropriate fire regimes,
4. Salinity/altered hydrology,
5. Impacts of competing land use (mining).

These threats singularly and collectively contribute towards reduced ecological viability of populations and their habitats.

5.1 Lack of ecological resources to support viable populations

Lack of ecological resources to support viable populations relates to the:

- Availability of basic resources for survival & reproduction, where availability of food, shelter and access to mates limits population size. The survival of populations can be directly threatened when restricted gene flow and insufficient habitat are below the levels necessary to maintain a viable population.
- Restricted gene flow and insufficient habitat can increase a population's susceptibility to other threats. Example a small remnant may be totally consumed by fire providing no available habitat for the species to persist in before the affected habitat returns to suitable pre-fire condition.

Land clearing associated with agriculture, mining and infrastructure has resulted in habitat loss and fragmentation of habitat which in turn results in the lack of ecological resources available to support viable populations.

Habitat fragmentation reduces the capacity of the species to increase population size, restricts gene flow through preventing the movement of individuals and makes the population more susceptible to other disturbance events. It is likely that the highly fragmented landscape of the Western Australian wheatbelt, may account for the limited occurrence of this species.

5.2 Impacts of introduced plants and animals

Introduced animal species have the capacity to cause local extinctions of *A. castellum* populations. Grazing by livestock results in compaction of the soil and a reduction in leaf litter, which affects the ability of the spiders to burrow and forage. Livestock can also cause direct damage to burrows and their entrances (Main, 2001).

Grazing by rabbits causes a reduction in the ground cover that is necessary for the survival of this spider species. Rabbits may also disturb the soil profile in some spider habitats, and their diggings can directly destroy trapdoor spider burrows (Burbidge *et al*., 1999).

Invasion by introduced plant species cause a change in the structure of vegetation communities, which in turn may affect the survival of *A. castellum*.

5.3 Inappropriate fire regimes

Fire represents a direct threat to *A. castellum* as intense wildfires have the capacity to result in direct mortality to individuals. Fire also represents an indirect threat through the reduction in the ground litter required for reconstructing burrows and to support the litter-dependant invertebrate food source for *A. castellum*.

The ecological functions of fire include: removing competition, making light / nutrients available, reduces levels of parasites, triggering seed release / germination and maintains balance and diversity of the various components of flora communities.

While fire regimes provide a number of important ecological functions, inappropriate fire regimes may threaten the survival of *A. castellum* populations.

Inappropriate fire regimes relate to:

- Frequency Fires that are too frequent or too infrequent
- Season Fires occurring when a species is particularly vulnerable
- Intensity Fires are too intense resulting in high mortality
- Spatial Fires are too large resulting in no unburnt refuge areas

5.4. Impacts of competing resource use (Gravel extraction & mining)

Mining and gravel extraction represents a threat to known *A. castellum* populations either directly (destruction of habitat/burrows) or indirectly (nearby mining causing a change in hydrological cycles). Several extant populations of *A. castellum* occur within or in close proximity to mining tenements and gravel pits (for full details see *Appendix 2*).

Areas subjected to mining and gravel extraction are sometimes used as waste disposal sites (official and unofficial). This practice constitutes a further threat through increased fire risk, creation of harbourage for invasive species and chemical contamination via disposal of pesticide and herbicide containers that may contain residues of contracted chemicals.

5.5 Salinity/Altered Hydrology

Salinity and changes in hydrology (surface and ground water) are threats to *A. castellum* due to the effect they have upon habitats. Both salinity and altered hydrology can cause changes in vegetation structure and soil composition, which can affect the ability of *A. castellum* to forage, burrow and breed. Inundation of the upper soil profile through flooding or rising ground water may result in burrows becoming waterlogged and unusable.

Events such as climate change and changes in the local hydrology of an area (resulting in a drying or excessive wetting of the habitat) must be considered as threats. The impact of surface and ground water management proposals on *A. castellum* populations needs to be considered. Similarly it may be necessary to implement surface and or ground water management to conserve known populations threatened by altered hydrology.

6. INTERNATIONAL OBLIGATIONS

The Tree-stem Trapdoor Spider (*A. castellum*) has not been listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

7. AFFECTED PARTIES

The main parties likely to be affected by this species Conservation Plan are:

- Avon Catchment Council (ACC);
- Department of Environment and Conservation (DEC);
- Landowners / managers where *A. castellum* populations are found on their property;
- Local Government Authorities;
- Mining companies (mining exploration and / or production activities which may potentially impact on *A.castellum* populations); and
- Public utility agencies (e.g. Western Power, Westnet rail and Water Corporation) whose activities may potentially impact on *A.castellum* populations.

8. INDIGENOUS PEOPLE

According to the Department of Indigenous Affairs Aboriginal Heritage site register, no registered sites of Aboriginal significance are recorded at or near populations / occurrences of *A. castellum*. Where actions recommended by the plan have the potential to impact on Noongar cultural values, further consultation will be undertaken to ensure such impact is avoided. Opportunities for Noongar individuals / groups to be involved with implementing actions including cultural interpretation and awareness of *A. castellum* will be considered.

The advice of (one or more of the following):

- The relevant NRM indigenous reference group (s)
- South West (Yamatji – Midwest) Aboriginal Land and Sea Council, and/or
- Department of Indigenous Affairs, and/or
- Native title claimants
- Specific groups/individuals identified as having an interest

….will be sought to assist in the identification of Noongar cultural values for land occupied by threatened species, or groups with a cultural connection to land that is important for *A. castellum* conservation. Continued liaison with the Noongar community will identify areas in which collaboration will assist implementation of conservation plans. Consultations with indigenous groups will be made through the ACC's Aboriginal NRM Coordinator.

9. BENEFITS

The conservation actions carried out to protect the habitat of *A. castellum* will contribute to the preservation of the biodiversity of these areas, and protection against further degradation. This will contribute to the protection of biodiversity in Western Australia.

As predators, occurrence of *A. castellum* indicates the presence of a sufficient number of other invertebrates. Because they are at the apex of food pyramids, these spiders are good indicators of the general balance of communities, and can be used to assess the status of other invertebrates in their community (Main, 1987a).

10. SOCIAL AND ECONOMIC IMPACTS

The implementation of this Conservation Plan is not expected to cause adverse economic impacts. Section 4 (Guide for decision makers) describes the process for identifying and assessing work that may impact on threatened fauna species.

No adverse social impacts are expected to result from the implementation of this Conservation Plan. The plan provides potential social benefits in terms of awareness raising and community capacity building programs.

11. CONSERVATION OBJECTIVES AND CRITERIA

11.1 Conservation plan objective:

To maintain, and if possible enhance, the condition of *in situ* populations of *Aganippe castellum.*

11.2 Recovery Criteria:

Criteria for success:

The number of populations has increased and / or the number of mature individuals has increased by fifteen percent or more over the term of the plan.

Criteria for failure:

The number of populations has decreased and / or the number of mature individuals in the known population has decreased by fifteen percent or more over the term of the plan.

11.3 Evaluation

The plan will be reviewed within five years of its implementation. The implementation of these conservation actions and any changes to these actions will be documented accordingly.

12. CONSERVATION ACTIONS

The purpose of conservation actions is to provide operational guidelines for the implementation of on-ground actions. A number of conservation actions were commenced in 2006 as part of the ACC's 'Back from the Edge' program. This program has resulted in a number of significant successes including the discovery of 12 new populations of A. castellum and an increase in the public's awareness of this species.

Determining current population and site-specific information (population size, type and severity of threats) is the first step in conserving this species.

Conservation actions will provide the following on-ground management advantages:

- Allow for site-specific operational guidelines to be compiled for each population. This will provide a framework to ensure that internal DEC operations and the activities of external agencies such as Westrail, local government, and mining companies are undertaken in a manner that ensures the Tree-stem Trapdoor spider populations and their habitats are not adversely affected;
- Provide a basis for prioritising the implementation of conservation actions i.e. those populations that are under imminent threat.

  Note: Permission is to be obtained from land managers before conservation actions are undertaken.

The following conservation actions are presented in order of descending priority, but this should not prevent the implementation of 'lower' priority actions where opportunities arise and funding is available. The indicative budget and timeframes included in each conservation action depends on the availability of resources.

12.1 Establish a Mygalomorph Conservation Team

A Mygalomorph Conservation Team will be established with representatives from the Avon Catchment Council, community, government agencies and experts with a knowledge or interest in spider taxonomy, ecology and conservation. This team will focus on conservation efforts for *A. castellum* as well as other threatened Mygalomorph spiders found in the Avon River basin. These species include:

- **Tree-stem Trapdoor Spider** *Aganippe castellum*
- Shield-backed Trapdoor Spider (*Idiosoma nigrum*)
- Minnivale Trapdoor Spider (*Teyl* sp.)
- Yorkrakine Trapdoor Spider (*Kwonkan eboracum*)

Action: Establish a Mygalomorph Conservation Team

Completion date: **on-going**

Cost: $2,500/year

(This action has also been recommended in the other trapdoor spider conservation plans). The cost listed in this action is a total amount for all four species.

12.2 Determine the population characteristics of known populations & ongoing monitoring

Ground work will be required in order to determine the population characteristics and confirm the continued existence of known *A. castellum* populations. A search will be conducted at all known sites in the ACC NRM Region. Areas adjacent to the habitat of extant populations will also be surveyed in order to investigate whether these populations have dispersed out of their known area of occupancy.

On-ground monitoring should preferably be undertaken in the months following the first winter rains, when burrows are open and easier to locate. When it is not possible to survey at this time, consideration should be given to minimising the disturbance of burrows associated with on-ground monitoring activities.

The information obtained from the monitoring will be used to create and update *A. castellum* distribution maps. Data is currently stored at the DEC Yilgarn District office in Merredin and the DEC Species and Communities Branch in Perth.

Monica Russell, a student from Edith Cowan University is undertaking a Masters thesis on *A. castellum* due for completion during 2007. This study has so far confirmed the existence of the twelve populations of *A. castellum* (Section 2.3), and will provide valuable information for the management of the known populations in the ACC NRM Region.

Action:	Determine the size of known *A. castellum* populations
Completion date:	**on-going**
Cost:	$3,500

12.3 Undertake a threat assessment for each population

A threat / risk assessment for each population (including habitat health assessment) will be conducted during the population monitoring referred to in Section 12.2 of this plan.

The presence and significance of threats will be assessed, recorded and conservation actions recommended for each population. Threats considered will include the following (but not be limited to):

- introduced plants and animals;
- competing land use;
- pollution;
- inappropriate fire regimes; and
- salinity / waterlogging.

Action: Identify/confirm threats to each population

Cost: Incorporated into sections 12.2 and 12.3

12.4 Address threats to specific populations

Specific conservation actions are expected to be developed from the planned assessment of existing populations (conservation actions 12.2 and 12.3). Conservation actions may include fencing to exclude stock and/or rabbits, rabbit control, weed control, revegetation (to provide habitat and connectivity between habitats/populations), fire management and management of competing resource use.

Where it is necessary to protect a population from physical disturbance, areas can be demarcated using Environmental Sensitive Area (ESA) markers similar to those markers used to demarcate Declared Rare Flora (DRF) populations.

The costs described below are nominal and relate to minor work associated with the demarcating populations and controlling grazing / weeds. Addressing threats of salinity & altered hydrological processes may require action of a larger scale with greater costs.

Action: Undertake population specific conservation actions

Completion date: On - going
Cost: $1,000/year

12.5. Conduct surveys to identify new populations

Areas of potential habitat will be identified through a process to map the critical habitat.

The critical habitat mapping can be undertaken by a GIS desktop assessment by using the following GIS datasets:

- Geology and soil types;
- Presence of remnant vegetation;
- Beards vegetation association;
- Rainfall;
- Associated flora and /or fauna species; and
- Any other habitat specific information that may be relevant.

Those sites identified as having a high probability of supporting *A. castellum* populations will be subject to a field survey to determine the presence of this species. Similarly other areas to be surveyed will include: sightings reported from the public or other groups and recommendations from experts.

A specific target will be set with regard to the number of new populations that are found. This target will be determined by the criteria (for e.g. number of new populations) that will be required to downgrade the current threatened conservation status of the Tree-stem Trapdoor Spider to a lower conservation status category.

Action: **Conduct surveys to identify new populations**
Completion date: ongoing
Cost: $2,000/year

12.6 Promote public awareness

Knowledge of most invertebrates is generally limited, both in the scientific and public arenas. It is therefore necessary to promote awareness on the ecological importance of invertebrates. A public awareness campaign has been initiated to inform the wider community about the importance of *A. castellum* and other Trapdoor spiders. This campaign is expected to assist in the discovery of new populations with landowners providing information about possible populations on their properties.

This campaign will aim to improve the public's appreciation of these animals while also encouraging the reporting of sightings of these animals.

A brochure containing information and images of *A. castellum* and its burrow has been mailed out to all landowners in the Avon River Basin, and a poster sent to all schools in the region to further improve its profile. Future work may involve investigating reports of sightings, delivering presentations to school and community groups and producing more copies of the brochure / poster.

A one day "spider-blitz" was conducted in 2007 at East Yorkrakine Nature Reserve involving community members, research specialists and staff from DEC and WWF. The spider-blitz was successful in raising public awareness of these species while also obtaining valuable information on the Shield-backed Trapdoor Spider (*Idiosoma nigrum*). Plans are underway to conduct another spider-blitz for *Teyl* sp. in 2008 and possibly other species / other locations in future years.

This action has also been recommended in three other trapdoor spider conservation plans. The budgeted amount listed in this action is a total amount for all four species and is not to be implemented four individual times.

Action:	Promote public awareness
Completion date:	on-going
Cost:	$500 / year

13.0 SUMMARY OF CONSERVATION ACTIONS

Action	2008	2009	2010	2011	2012	Total
12.1 Establish a Mygalomorph Conservation Team	$2,500	$2,500	$2,500	$2,500	$2,500	**$12,500**
12.2 Determine the population characteristics of known populations & ongoing monitoring	$3,500	$3,500	$3,500	$3,500	$3,500	**$17,500**
12.3 Undertake a threat assessment for each population	Included in above costs	Included in above costs	Included in above costs	Included in above costs	Included in above costs	
12.4 Address threats to specific populations	$ 1,000	$ 1,000	$,1000	$ 1,000	$ 1,000	**$5,000**
12.5 Conduct surveys to identify new populations	$ 2,000	$ 2,000	$,2,000	$ 2,000	$ 2,000	**$10,000**
12.6 Promote public awareness	$500	$500	$500	$500	$500	**$2,500**
Cost	**$9,500**	**$9,500**	**$9,500**	**$9,500**	**$9,500**	**$47,500**

14.0 REFERENCES

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Appendix 1: Summary of *A. castellum* extant populations

Pop. No.	Location	Shire	Vesting	Type	Tenure	Most Recent Record Date
1	East of Southern Cross	Yilgarn		Main Roads	Crown	7/04/1957
2	North Bungulla NR	Tammin	Conservation Commission of WA	Nature Reserve	Crown	25/09/1983
3	Minnivale	Dowerin		Private Property	Freehold/ Lease	6/05/1984
4	Pintharuka	Morawa		Private Property	Freehold/ Lease	13/04/1994
5	Heitman's Scrub	Tammin		Private Property	Freehold/ Lease	1/01/1999
6	Kwelken	Nungarin	Shire of Nungarin	Gravel reserve/ Shelter reserve	Crown	29/06/1999
7	Korrelocking	Wyalkatchem	Shire of Wyalkatchem	Recreation reserve	Crown	12/12/2002
8	Koorda	Koorda	Water corporation	Water and Recreation reserve	Crown	1/09/2003
9	Welbungin	Mt Marshall		Private Property	Freehold/ Lease	2/10/2003
10	Caw St, Merredin	Merredin	Shire of Merredin	Road reserve		8/04/2004
11	Depot Dam Rd, Merredin	Merredin	Shire of Merredin	Road reserve		1/05/2004
12	Kununoppin	Trayning	Shire of Trayning	Water and Recreation reserve	Crown	1/09/2004
13	Wialki	Mt Marshall		Private Property	Freehold/ Lease	
14	Minnivale NR	Dowerin	Conservation Commission of WA	Nature Reserve	Crown	22/11/2007
15	North Tammin NR	Tammin	Conservation Commission of WA	Nature Reserve	Crown	1/11/2007
16	Billyacatting	Trayning	Water corporation	Water and Recreation reserve	Crown	27/11/2007
17	Reserve No 29370	Mt Marshall	Shire of Mt Marshall	for government requirements	Crown	4/12/2007
18	Westonia common	Westonia	Shire of Westonia	Common	Crown	15/09/2007
19	Maughn NR	Merredin	Conservation Commission of WA	Nature Reserve	Crown	31/08/2007
20	North Beacon NR	Mt Marshall	Conservation Commission of WA	Nature Reserve	Crown	19/03/2008
21	Tamma Parkland	Merredin	Shire of Merredin	Crown reserve	Crown	1/06/2005
22	Wyalkatchem Water reserve	Wyalkatchem	Shire of Wyalkatchem	Water and Recreation reserve	Crown	7/12/2007

New populations discovered as part of the ACC “Back from the Edge” program

Pop. No.	Location	Shire	Vesting	Type	Tenure	Most Recent Record Date
To be advised	Minnivale NR	Dowerin	Conservation Commission of WA	Nature Reserve	Crown	22/11/2007
To be advised	North Tammin NR	Tammin	Conservation Commission of WA	Nature Reserve	Crown	1/11/2007
To be advised	Billyacatting	Trayning	Water corporation	Water and Recreation reserve	Crown	27/11/2007
To be advised	Reserve No 29370	Mt Marshall	Shire of Mt Marshall	for government requirements	Crown	4/12/2007
To be advised	Westonia common	Westonia	Shire of Westonia	Common	Crown	15/09/2007
To be advised	Maughn NR	Merredin	Conservation Commission of WA	Nature Reserve	Crown	31/08/2007
To be advised	North Beacon NR	Mt Marshall	Conservation Commission of WA	Nature Reserve	Crown	19/03/2008
To be advised	Wyalkatchem Water reserve	Wyalkatchem	Shire of Wyalkatchem	Water and Recreation reserve	Crown	7/12/2007
To be advised	Wongan Hills Nature Reserve	Wongan - Ballidu	Conservation Commission of WA	Nature Reserve	Crown	23/05/2008
To be advised	Fowler Gully Nature reserve	Wongan - Ballidu	Conservation Commission of WA	Nature Reserve	Crown	23/05/2008
To be advised	Rogers Nature reserve	Wongan - Ballidu	Conservation Commission of WA	Nature Reserve	Crown	23/05/2008
To be advised	Elphin nature reserve	Wongan - Ballidu	Conservation Commission of WA	Nature Reserve	Crown	22/05/2008

Appendix 2: Extant *A. castellum* populations associated with mining tenements

POPULATION NUMBER	POPULATION NAME	MINING TENEMENTS	SHIRE	END DATE
11	Depot Dam Road	Unsurveyed, Exploration Licence (close proximity)	Merredin	31/12/2999
12	Kununoppin	Unsurveyed, Exploration Licence (within)	Trayning	29/12/2009