DRAFT SPECIES CONSERVATION PLAN

WESTERN SPINY-TAILED SKINK
(*Egerni stokesii badia*)

CONSERVATION PLAN FOR THE AVON POPULATIONS 2008-2013

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Western Spiny-Tailed Skink (Photo from B. Maryan (23/10/2004)

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FOREWARD

This species conservation plan has been developed by the Department of Environment and Conservation Western Australia (DEC) with support from the Avon Natural Diversity Alliance (ANDA) on behalf of the Avon Catchment Council (ACC). ANDA is a joint cooperative between DEC, World Wildlife Fund (WWF) Australia, and Greening Australia (Western Australia) for the ACC. The work currently undertaken on the Western Spiny-Tailed Skink *Egernia stokesii badia* is conducted under the ND002 'Back from the Edge' project which forms part of the ACC's Natural Resource Management Strategy 2005. It is supported through the Natural Heritage Trust and the National Action Plan for Salinity and Water Quality programs and is focused on the recovery of threatened species and ecological communities in the Avon River Basin. The project aims to implement management strategies that protect threatened species and communities and to recognize local conservation concerns and assist with on-ground works, advice and funding.

Although this species is also 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.

Information in this Species Conservation Plan was accurate at June 2008.

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Summary

The Western Spiny-Tail Skink *Egernia stokesii badia*, (WSTS) is a medium lizard restricted to woodland habitats in the in the central to northern wheatbelt region of Western Australia (How et *al*. 2003) and is listed nationally as endangered under the Environmental Protection and Biodiversity Act. 1999 (EPBC). The WSTS has a scattered distribution across its range and surveys carried out over the past 30 years suggest the WSTS has disappeared from many of its former habitats (How et *al*. 2003). The main threats to the survival of the WSTS appear to be loss of habitat and increased predator pressure from both natural and introduced species (Cogger et *al.* 1993; How et *al.* undated). This Conservation Plan (The Plan) looks specifically at the WSTS in the central Wheatbelt within the Avon River Basin (ARB) and the direct threats affecting its life history. The Plan also looks to identify a number of actions aimed at improving the conservation status of the WSTS, and focuses on improving understanding of current distribution, ecology, management needs and conservation status of the species as well as assisting landholders in managing known populations. On-ground recovery actions are directed at implementing habitat protection and conservation around key populations, and undertaking predator control work in areas where there is evidence of fox and cat predation.

Part A

1. Contextual and Ecological Information

In July 2000 the WSTS was listed as endangered under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Knowledge of current distribution is derived largely from surveys of preferred habitat and known populations carried out by members of the Western Australian Museum (WAM) and DEC. Most preserved museum specimens of the WSTS were collected by exploration parties or museum workers in the 1960's, 70's and 80's (How *et al*.undated), with only a few additional specimens being collected since these initial collections. Extant populations have recently been found at several sites where there had not been any previous records, however many former localities appear to be currently uninhabited by the WSTS.

It is thought that prior to the 1950's the WSTS would have inhabited much of the woodland areas in South West Australia (Cogger *et al.* 1993). Since then much of this land has been cleared for

wheat cultivation and grazing sheep (Cogger *et al.* 1993), resulting in fragmentation and total destruction of suitable habitat.

1.1 Appearance and color polymorphism

The WSTS is an extremely robust member of the skink genus. Like all *Egernias* they have a stout body with a short depressed tail. The tail of the WSTS is covered in spines and lacks the ability to be dropped like many members of the skink group (Bush et *al*. 2007). They have 4 well developed limbs each with 5 digits with the fourth toe being much longer than the third (Storr et *al.* 1999). The WSTS can grow up to 190mm (8 inches) from snout to vent (Storr et *al.* 1999) and has widely separated nasal openings and very narrow ear openings that are nearly vertical (Storr *et al.* 1999). Mid-body scales appear in rows of 32-38 across the centre of their back (Storr et *al.* 1999).

The WSTS has brown to reddish brown markings across its back with white spots on back and ventral side, base of tail and legs. Their colour pattern is unique to each individual, with sloughing of the skin occurring approximately every 2-3 months renewing the scales to reveal a shiny new set of scales (McGill *pers comm*.).

Their characteristic spiny tail is covered in hard keeled scales that are thought to have been adapted to prevent their extraction from hollows and tight spaces (Cogger 2000).

Colour polymorphism is common among several species of *Egernia* (Chapple 2003), and there is some evidence that a black morph of *Egernia stokesii badia* does occur in the northern extremes of its current range (Maryan pers. comm.). Further research is required to determine whether this is an actual morph or an entirely new species.

1.2 Life history

The life history strategy of most *Egernia* can be characterised by large body size, delayed maturity and large offspring (Chapple 2003), of which the WSTS seems to display all of. Records of new born WSTS suggest a relatively large snout vent length (SVL) for the genus of around 65-95mm (Chapple 2003). Many species of *Egernia* are known to live in family groups, with evidence that the WSTS is a social skink, living in complex family groups (How *et al.* undated). There are records of *Egernia stokesii* remaining in their natal groups until they reach maturity at

around five years (Duffield *et al*. 2002). The trend amongst the genus seems to be that size is directly correlated to age and as a consequence a skink which grows to an adult SVL rapidly reaches maturity quickest (Hickman 1960; Rawlinson 1974). The life span of the WSTS is thought to be between 10-25 years (Cogger 2000).

Mating is thought to occur in… with live young being born in … to… (). There is one record of young being born in August however this was a captive female being kept in a shoe box and held under artificial lighting and diet conditions (… & Nankivell pers coms.).

1.3 Sociality

Although complex social organization is thought to be rare in squamate reptiles there have been many records of seemingly complex social congregations occurring amongst the *Egernia stokesii* family (Gardner 1999). In many instances this evidence has been circumstantial with no evidence to suggest the degree of complexity involved in the associations (Chapple 2003). Long term studies have shown strong evidence of stable social groups comprised of genetically similar individuals (Duffield *et al*. 2002). Genetic evidence showed stable social aggregations consisted of a breeding pair, their offspring of at least one season prior and several other closely related members (Gardner *et al.* 2001). Family groups were seen to be made up of 2-17 individuals with up to 100% of these being permanent group members (Duffield *et al.* 2002). Apart from a few temporary members the group appeared stable and occupied a very restricted home territory, with all members utilising the same basking areas and communal scat pile (Duffield *et al*. 2002).

Group and kin recognition based on chemical cues appears to be utilised by the WSTS when recognising group and non-group members (Bull *et al*. 2000) as well as being displayed during mother offspring recognition (Main *et al.*1996).

1.4 Mating Systems and Monogamy

Monogamy within and between seasons is thought to be a common mating strategy amongst WSTS's. In a study of laboratory born litters, 75% were fathered by a single father and no male contributed to more than one litter (Gardner *et al.* 2002). Longer term field studies utilising DNA microsatellites found that some females bred with the same partner for the entire study. The

results of both studies showed a high proportion of males and females having several cohorts of offspring from different seasons with the same breeding partner (Gardner *et al.* 2002). Despite these stable breeding populations there appears to be a low level of inter-relatedness among groups, suggesting there is mechanisms in place to avoid inbreeding (Gardner *et al* 2001).

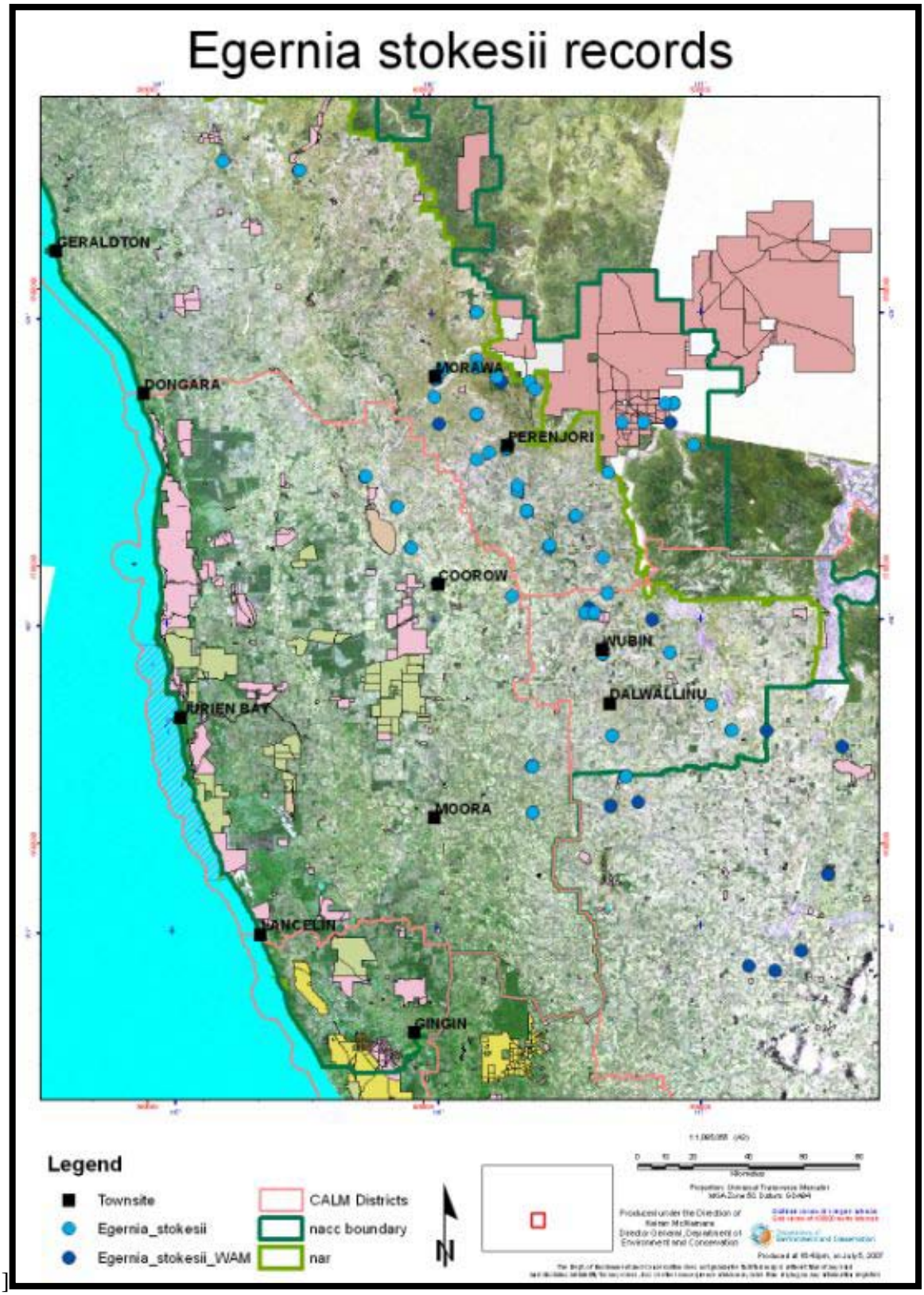
1.5 Foraging Behaviour and Diet

As no conclusive diet studies have been carried out we cannot determine exactly what the WSTS diet is. It can be assumed that the WSTS may have a diet similar to that of its close relatives with similar life histories (Brown 1991). Members of the *Egernia* genus tend to exhibit atypical patterns in their feeding habits, and tend to have a predominately invertebrate based diet with the ingestion of plant materiel increasing in relation to body size (Chapple 2003). In a preliminary inspection of WSTS scats that were recently found at an active woodpile, it appeared that a high percentage of their diet was black beetles and other invertebrates. As WSTS seem to have quite a defined home range it can be assumed that like similar *Egernia* species, they are opportunistic feeders preying on insects in and around the habitat that they shelter in (Brown 1991).

2. Distribution and habitat

2.1 Distribution

As a result of surveys carried out by DEC and WAM since the early 1970's, it is evident that low numbers of individuals are distributed widely throughout semi-arid habitats in the central wheatbelt and mid-west (see Map 1). Since initial surveys to the current day, populations seem to be in decline as a direct consequence of loss of habitat and increased predation (How *et al*. undated). New populations that were discovered in 2008 have been as a result of land owners directly reporting the presence of the skink on their property. Investigative surveys of previously recorded populations WSTS have so far failed to find evidence of the population's persisting



MAP 1. Official Records of *Egernia stokesii badia* populations in the central and north western wheatbelt

2.2 Habitat and Survey Results

Individuals of previously recorded WSTS populations have most commonly been found wedged in tight spaces and log hollows in York Gum (*Eucalyptus loxophleba*), Gimlet (*Eucalyptus salubris*) and Salmon Gum (*Eucalyptus salmonophloia*) woodland (How *et al.* 1999). Before European settlement and clearing of woodlands for agriculture this would possibly have been the predominant habitat for the WSTS (How *et al.* undated).

Populations have been known to persist in woodland patches as small as 1 ha with some completely isolated by cleared crop paddocks.

Historically, sites with the greatest number of individuals have had numerous fallen logs and a low intensity of grazing by domestic stock (How *et al*. undated), however recent surveys have predominantly found evidence of skink activity in artificial habitats such as back yard wood piles, steel pipes and between sheets of corrugated tin that have remained undisturbed for longer than 10 years (see Table.1).

Table. 1 Confirmed populations of *Egernia stokesii badia* in the northern and central agricultural regions Western Australia 1953-2008

DATE	AREA	HABITAT DISCOVERED IN	PRESENCE CONFIRMED BY	METHOD OF LOCATION	IMMEDIATE THREATS
March 08	Beacon	Pile of tin. Undisturbed for >10 years	Live animals present x 3	Avons Most Wanted sighting form*	
March 08	Bencubbin	1 gimlet log on side of road, surrounded by cleared broad acre crop paddocks.	Live animal present	Avons Most Wanted sighting form*	Isolation from other habitat
March 08	Koorda	Outdoor laundry/store room	Fresh scat piles	Avons Most Wanted	Domestic cats, human

				sighting form*	interference
April 08	Balidu	Wood heap – old floor boards Undisturbed for >10 years	Live animals x 5 including 1 juvenille	Liason with local bushrangers group	Domestic cats and dogs. Human interference
April 08	Balidu	Woodheap – power poles.	Fresh scat piles	Liason with local bushrangers group	Domestic cats and dogs. Human interference
April 08	Perenjori	Woodheap	Live individuals	Public report	Human interference.**
January 98	Perenjori	Disused sleepers – town site	Live individual	Survey based on previous records	
January 98	Bowgada NR	York Gum hollow	Live individual	Survey based on previous records	
January 98	Perenjori	Abandoned house south of town site	Live individuals	Survey based on previous records	
January 98	Buntine NR	Gimlet hollow	Live individual	Survey based on previous records	
1972	Buntine NR	Gimlet hollow	Live individuals	WA Museum survey	
1953	Buntine NR	Gimlet hollow	Live individuals	Random Survey	

***A sighting form produced by DEC and WWF, distributed to households in the ARB wheatbelt region.**

**** Individuals translocated due to woodheap being removed**

3. Threats, Predation and Defense

Threats to the WSTS are thought to be habitat loss due to land clearing and human activity (Cogger *et al.*1993) as well as possible predation from feral predators such as foxes and cats and increased predation from natural predators due to lack of suitable habitat and shelter.

There is considerable anecdotal evidence that the fox and the cat are the main predators of the WSTS. Foxes catch skinks after dark when the lizards are actively foraging out from their burrows (Chapple 2003). The extent of this predation is unknown as is the overall threat to the species or to individual populations and requires further research.

The spiny tail of the skink is believed to assist in its defense through inhibiting their extraction from logs and tight spaces (Cogger 2000). Depending on their stage of metabolism, dependant on the amount of solar heat available, (Morgan 1988) when disturbed the WSTS is capable of moving as quickly as 1 metre per second allowing it to flee from predators (Lanham 2003).

4. Scope of this Conservation Plan

The actions listed in this Plan are intended as a guide for planning future management for the WSTS in a coordinated way across the species' range. The actions outlined in the Plan are intended to be implemented over a five year time frame. This will allow significant time for populations to be monitored and to potentially see new members recruited within the family groups. It also allows time for actions to be gradually implemented over several seasons.

Management actions listed in the Plan focus on collecting further basic data on which to assess current conservation status, population trends and threatening processes. Other actions are focused on key populations and represent adaptive management approaches based on the current data. In the course of implementation of the Plan, these actions may need to change to take into consideration new information or newly emerging threats.

The Plan is intended to be used in areas of known populations of the WSTS in the central wheatbelt region. Conservation of this species is likely to rely on ongoing management both of

habitat and predators, and therefore requires ongoing commitment from agencies and communities living in the surrounding area of populations.

Part B

4. Conservation Objectives and Criteria

The key conservation objectives of this Conservation Plan are:

In partnership with the community, to conserve and (wherever possible), restore the condition and number of populations of Western Spiny Tailed Skinks in the wild.

11.1 Criteria for success

- Within the Avon River Basin, the viability (capacity of population to persist indefinitely) of known WSTS populations is enhanced.

  and

- Community support for WSTS conservation has been maintained or increased, with community members actively participating in management programs.

  and

- The implementation of this plan increases our knowledge on site-specific WSTS population abundance and condition trends.

11.2 Criteria for failure

- Within the Avon River Basin the viability of known WSTS populations has not been enhanced.

  or

- Community support for WSTS conservation has diminished

  or

- no further knowledge is gained on the known populations of WSTS

Overall Objectives

1) To maintain or improve the conservation status of the Western Spiny Tailed Skink over 5 years

2) Promote community awareness and encourage support from stakeholders.

2) To improve feral animal management within the focus areas of the Avon Region to benefit populations of the Western Spiny Tailed Skink

1. Planning Table

Specific Objective	Performance criteria	Actions	Stakeholders	Approximate cost
1.1 To collect sufficient data to determine the extent of the current population range, and assess causal factors in recent declines or local extinctions in known locations, and to determine critical habitat.	1.1.1 Reduce the gaps in the knowledge of current range and produce a current distribution map.	1.1.1.1 Identification & fact sheet to be distributed to land holders, local communities & wildlife management agencies.	DEC, WWF community groups	$
		1.1.1.2 Records database established in 2008 and incoming information used to compile current distribution map.	DEC	$

		1.1.1.3 Fauna survey of central wheatbelt completed by 2008.	DEC ???	$
		1.1.1.4 Management recommendations made for any Western Spiny-Tailed Skink populations identified	DEC, WWF	
	1.1.2 Identify causes of population loss from the Central Wheatbelt	1.1.2.1 Identify sites from which the Western Spiny-Tailed Skink has disappeared in the last 20 years based on land holder knowledge & recent survey results and collect data on vegetation condition, fire history and predator loads.	DEC & ??	$
	1.1.3 Critical habitat determined and mapped by 2008	1.1.3.1 Use records database, comparative locality data and monitoring data to determine critical habitat and produce	DEC Recovery Team and agencies and organisations represented.	$

		critical habitat map by 200….		
1.2 To manage by 2013 the key populations to maintain or improve population levels as measured against an initial baseline figure derived from monitoring data collected over five seasons to account for seasonal population fluctuations.	1.2.1 Monitor and record a An increasing trend in numbers of active population sites in the Avon region over the period 2008 to 2013	1.2.1.1 Continue to map active and abandoned sites within the Avon Region on an annual basis, and record information on habitat structure, fire history and signs of predator activity within immediate and surrounding habitat	DEC, WAM	$
		1.2.1.2 Monitor predator impact around active sites using track surveys and predator scat analysis.	DEC , Landholders	$
		1.2.1.3 Translocation of populations seen to be in immediate threat from predation or habitat to suitable natural habitat or secure artificial habitat.		
		1.2.1.4 Encourage further research into likely biodiversity impacts	University Research	N/A

2.1 To improve community knowledge of the Western Spiny Tailed Skink and increase community involvement in recovery management.	2.1.1 Increase in reported sightings by community groups, schools and land holders. Increase community awareness.	2.1.1.1 Establish a records database (see 1.1.1.1 & 1.1.1.2) for the Western Spiny Tailed Skink and advertise its existence among Aboriginal Communities, community groups, schools, landholders and agencies working in region.	DEC, WWF	
		2.1.1.2 Identification & fact sheet to be distributed to land holders, local communities & wildlife management agencies.		
2.2 To secure ongoing funding for implementing recovery actions identified in this Conservation Plan.	2.2.1 Funding secured for high priority recovery actions identified in the Plan.	2.2.2.1 ND002?	DEC	N/A
3.1 To implement feral predator	3.1.1 Predator levels around	3.1.1.1 Establish permanent predator		$

control programs that lead to sustained reductions in feral predator loads around the identified focus populations of Western Spiny Tailed Skink over the next 5 years.	monitoring sites in the Avon Region maintained at levels where impact on Western Spiny-Tailed Skink populations appears to be minimal (as determined by numbers of juveniles recorded each season).	track transects in the vicinity of the study sites and record predator numbers/scats regularly in course of monitoring work.		
		3.1.1.2 Undertake regular predator control work around monitoring sites using baiting programs where appropriate.	Landholders, DEC	$

2. Guide for Decision Makers

At this stage there are insufficient data on the distribution of the Western Spiny Tailed Skink and on the conservation status of individual populations to recommend against certain activities in the vicinity of specific known populations. These guidelines therefore apply generally to the species and to all locations which support known WSTS populations. As further survey data becomes available this Conservation Plan will be updated to include management recommendations for particular populations considered to be key to the ongoing survival of the species in the Avon Region and across its distribution range.

The following actions may negatively impact on population viability and recovery of the Western Spiny Tailed Skink:

1. Clearance of native habitat;
2. disturbance or removal of artificial habitats where stable populations currently exist;
3. Predation from foxes and cats and failure to implement predator control in the area.

3. Monitoring, reporting and review.

The progress of recovery actions listed in this Plan will be monitored and evaluated on an annual basis by ND002 Team members and reported according to recommendations in the Plan. To assess progress ND002 Team members will review the activities of individual projects and evaluate outcomes against actions and performance criteria listed in the Plan. If deficiencies are identified, or if the timeframes set for particular actions are not being met, ND002 Team will reassess the importance of the particular action, and if deemed to be a priority, will work with the appropriate stakeholder group to ensure completion of the project. Where additional funding is identified as a constraint to completing an action the ND002 Team will assist the stakeholder group in accessing funds from sponsors or Commonwealth or state funding agencies.

The ND002 Team will use data from the sightings database and additional survey data from community groups, schools and landholders to update the distribution map for the Western Spiny Tailed Skink on an annual basis.

The ND002 Team will evaluate community involvement and awareness on a annual basis by assessing the numbers of sightings and enquiries from the general public and requests for assistance in protecting known populations on their property. The ND002 Team will be responsible for reviewing the progress of this Conservation Plan in 2013 and ensuring the document will be made available to all relevant stakeholders.

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ABBREVIATIONS

CALM	Department of Conservation and Land Management
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEC	Department of Environment and Conservation Western Australia (formerly CALM)
DEH	Department of Environment and Heritage SA
EA	Environment Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
TSN	Threatened Species Network
WAM	Western Australian Museum
WSTS	Western Spiny Tailed Skink
WWF	World Wide Fund for Nature

Avon Conservation Plan for the Western Spiny-Tailed Skink (*Egernia stokesii badia*) 2008-2013