A Recovery Plan for the Great Desert Skink (*Egernia kintorei*) 2001-2011

Prepared by Steve McAlpin

On behalf of the Arid Lands Environment Centre

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Cover photo: Great Desert Skink outside its burrow at Uluru-Kata Tjuta National Park.

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Contents

Figures

Tables

Executive summary

The Great Desert Skink (*Egernia kintorei*) is a large burrowing lizard restricted to sandy and gravelly habitats in the western deserts region of Central Australia. Listed nationally as vulnerable, the Great Desert Skink has a scattered distribution across its range, and is known to have disappeared from former habitats, particularly in the Gibson Desert, Great Victoria Desert and Great Sandy Desert regions.

All currently known populations are on Aboriginal lands, and population strongholds appear to be in the Tanami Desert in the Northern Territory, within Uluṟu-Kata Tjuṯa National Park, and on Ngaanyatjarra Lands in the vicinity of Patjarr (Karilywara) and Kiwirrkura Communities in Western Australia (Table 1). Population estimates put the total population size at less than 6,250 individuals, however this should be taken as a very rough guide only, given the absence of significant survey work in remote parts of the species' range outside of the intensively studied population within Uluṟu-Kata Tjuṯa National Park.

The main threats to the ongoing survival of the Great Desert Skink appear to be inappropriate fire regimes and, to a lesser extent, feral predator pressure. A national Recovery Team for Tjakuṟa (Great Desert Skink) was set up in 1999 to identify management priorities and to coordinate the national recovery effort. Recovery actions detailed within this document are focussed on improving our understanding of current distribution and abundance, ecology, management needs and conservation status of the species. On-ground recovery actions are directed at implementing fire management (specifically re-establishing patch burning regimes) around key populations, and undertaking predator control work in areas where the impact of fox and cat predation on Great Desert Skink populations is shown to be unsustainable.

The Recovery Team will annually review progress toward objectives detailed in this Plan, and results of these reviews and any changes to the Recovery Plan made as a result of new information or trends shown in monitoring programs will be made available to all stakeholders and groups or individuals with an interest in the recovery of the Great Desert Skink.

The recovery actions relating to fire management and predator control detailed in this document are likely to benefit other threatened arid zone fauna, particularly the Greater Bilby (*Macrotis lagotis*) and the Mulgara (*Dasycercus cristicauda*). Both species co-occur with the Great Desert Skink at several locations (see Table 1), and these species are also threatened by cat and fox predation and inappropriate fire regimes. The Recovery Team will continue to liaise with members of both the Bilby and Mulgara national Recovery Teams to ensure that recovery programs for these species link into the actions detailed in this Plan, and to encourage development of multiple species recovery projects.

Table 1. Summarised data on known populations of the Great Desert Skink

Location of current known population	State	Tenure	Estimated population upper limit	Habitat	Major threats	Other threatened species present
Patjarr (Karilywara) & proposed Gibson Desert IPA	WA	Ngaanyatjarra Council	< 2500	Rira (gravelly undulating plain) with scattered black gidgee (*Acacia pruinocarpa*) or mulga (*A. aneura*) over *Triodia basedowii* and low shrubs.	Inappropriate fire regimes, predation by cats and foxes.	Bilby, mulgara, marsupial mole, Alexandra's parrot.
Kiwirrkura community & surrounds including vicinity of Lake Mackay	WA	Ngaanyatjarra Council	< 500	Sandplain with spinifex (*Triodia* spp.) and scattered shrubs (*Acacia* spp., *Eucalyptus* spp., *Hakea* spp., *Grevillea* spp.).	Inappropriate fire regimes, predation by cats and foxes.	Bilby, mulgara, marsupial mole, Alexandra's parrot.
Rudall River National Park	WA	CALM	Unknown	Unknown	Unknown	Unknown
Tanami Desert including Rabbit Flat-Sangster's Bore-The Granites, and near Kintore	NT	Various Aboriginal Lands Trusts	< 2250	Sandplain with spinifex (*Triodia* spp.) and scattered shrubs and occasional trees (*Acacia* spp., *Eucalyptus* spp., *Hakea* spp., *Grevillea* spp.).	Inappropriate fire regimes, predation by cats and foxes.	Bilby, mulgara, marsupial mole, Alexandra's parrot
Uluru-Kata Tjuta National Park (includes part of the Yulara borefields area). Yulara lease lands and surrounding Land Trust lands (includes part of the borefields area).	NT	Uluru-Kata Tjuta Land Trust leased to Parks Australia Ayers Rock Resort Corporation and Katiti Land Trust.	< 500 <350	Sandplain with spinifex (*Triodia basedowii* and *T. pungens*.) and scattered shrubs and occasional trees (*Acacia* spp., *Allocasuarina decaisneana*., *Hakea* spp., *Grevillea* spp.).	Inappropriate fire regimes, predation by cats and foxes. Tourism infra-structure development.	Mulgara and marsupial mole.
Anangu-Pitjantjatjara Lands	SA	Anangu-Pitjantjatjara Council	< 50	Sandplain with mulga and minyura over woollybutt grass (*Eragrostis eriopoda*) and spinifex.	Inappropriate fire regimes, predation by cats and foxes.	Marsupial mole.

Part A

1. *Contextual and ecological information*

The Great Desert Skink (*Egernia kintorei* : Scincidae) is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A Great Desert Skink Recovery Team was formed in March 1999 to coordinate national recovery actions in South Australia, the Northern Territory and Western Australia. The team is made up of representatives from the Arid Lands Environment Centre NT (ALEC), Uluru-Kata Tjuta National Park (UKTNP); Threatened Species Network NT (TSN), Central Land Council (CLC), Parks and Wildlife Commission NT (PWCNT); Alice Springs Desert Park (ASDP); Ngaanyatjarra Council; Department of Conservation and Land Management WA (CALM), South Australian Museum (SAM); Anangu-Pitjantjatjara Council Land Management (AP Land Management); and Department of Environment and Heritage SA (DEH).

This Recovery Plan has been prepared and written by Steve McAlpin for the Arid Lands Environment Centre with the assistance of a management team of Dr. Colleen O'Malley (TSN) and Dr. Craig James (CSIRO), and with input from the Recovery Team.

Knowledge of the current distribution of the Great Desert Skink was derived largely from consultations with Aboriginal people living in the western deserts region, plus the few scientific records from survey or monitoring work in the region during the past 20 years. Most museum specimens of *Egernia kintorei* were collected by exploration parties or museum workers in the late 19th or early 20th century. 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 Great Desert Skink. Key populations have been documented in the course of this project and recommendations are made for their regional management.

Historically the Great Desert Skink occurred over a vast area (Fig. 1), from the northern Great Sandy Desert, south to the south-eastern Great Victoria Desert, and from the central-west of Western Australia (near Wiluna) east to the Tanami Desert in the Northern Territory. This area - over 20% of the landmass of continental Australia - is referred to here as the western deserts region (this definition differs slightly from the western desert region referred to by linguists working on Central Australian Aboriginal languages). The area is extremely remote from large population centres. Access for survey or research is difficult or impossible due to lack of roads. The tenure of much of this land is either Aboriginal Freehold or Leasehold Aboriginal Trust Land.

1.1 Species description

The Great Desert Skink is a large burrowing skink that grows to about 440mm total length and weighs up to 350g. The tail is slightly longer than the head and body and in good seasons becomes swollen at the base where fat is stored. The dorsal surface ranges from a bright orange-brown colour, similar to the desert sand, through to dull brown or light grey in some northern specimens. The ventral surface of adults ranges from a brilliant lemon-yellow in southern specimens to cream or grey in northern specimens. Adult males tend to have blue-grey flanks while females and juveniles may have either plain brownish flanks or vertically barred with orange and cream. Males attain greater body weight than females and have a broader head. New-born juveniles measure 70-80mm snout to vent length and weigh about 9-13g.

1.2 Life history

The Great Desert Skink constructs large burrow systems to a depth of over 1m and up to 10m in diameter. The burrow may start as a simple single tunnel with one entrance. New tunnels are added progressively and over a period of two summers a complex with 5-10 entrances and a network of connected tunnels five or six metres across may develop. A burrow system that is inhabited for many years may become very large. On the surface the burrow system of the Great Desert Skink is identifiable by at least one large external latrine. Scats are deposited in the latrine by the occupants of the burrow system and a large number of scats may accumulate over an area of one to three square metres.

Burrows of other animal species are also sometimes taken over, adapted and enlarged. The burrows of the Mulgara (*Dasycercus cristicauda*), Spinifex Hopping Mouse (*Notomys alexis*), Night Skink (*Egernia striata*), and Sand Goanna (*Varanus gouldii*) have been recorded as being appropriated and adapted by Great Desert Skinks (McAlpin 1997). Conversely, Mulgara, Dunnarts (*Sminthopsis* spp)and Ningaui (*Ningaui ridei)* have also been recorded using the burrows systems of the Great Desert Skink, and the occupancy of a single burrow may transfer from one species to another (McAlpin 1997, 1998).

Despite the seemingly large effort that goes into constructing a burrow system, occupancy appears to be dynamic, with some lizards moving between burrow systems (McAlpin 1998) and some burrows eventually becoming deserted. The reasons for this dynamism are not well understood, but may relate to the search for a mate, formation of new pair bonds, mortality, or predation pressure. A large burrow is generally occupied by an adult pair and juveniles from the current and previous year. Up to 10 individuals may inhabit one burrow system. Females give birth to from one to seven live young in early summer (S. McAlpin, D. Pearson unpublished data).

Great Desert Skinks are omnivorous, eating a wide range of invertebrates (principally termites) and also any vertebrates small enough to be swallowed. During good seasons they consume leaves, flowers and fruits from several species of plants including Bush Tomato (*Solanum* spp.) fruits, Parakeelya (*Calandrinia* spp.) leaves and Paper Daisy (*Leucochrysum stipitatum*) flowers (McAlpin 1997). Young Great Desert Skinks grow rapidly and during good seasons reach sexual maturity in their second year. Maximum size is reached in the third year but young males are unlikely to participate in breeding until they are fully grown and living in a well-established burrow system. Great Desert Skinks may live to a considerable age, as other species in the genus appear to live for over 20 years in captivity (Swan 1990).

Lizards disperse from their natal burrow in their second year. Young males attempt to establish a burrow system and attract a mate. Many of these lizards are apparently unsuccessful as most small, newly established burrows fail (McAlpin 1999). The reasons for this are unknown, but a small, simple burrow would offer less protection from predators than large, burrow complexes with many tunnels. It is highly likely that predation pressure is greatest on this age-class of lizards.

1.3 Biodiversity and cultural benefits

In Central Australia during the past 100 years numerous species, mostly mammals, in the critical weight range (CWR: 30-1500g) have either become totally extinct or have been reduced to relict populations (Burbidge and McKenzie 1989). This catastrophic species loss is thought to be due to the combined pressures of exotic predators, competing feral herbivores, and the cessation of traditional Aboriginal burning practices.

The Great Desert Skink is an important species of some habitats in the extensive western deserts region. These habitats supported a diverse mammal fauna until the early to mid 20th century, when

extinctions began to take place. Great Desert Skinks are near the peak of the food chain for these habitats. Their large, elaborate burrow systems are utilised by many other species including a listed vulnerable species - the Mulgara.

Habitat management through regular patch burning is seen as the most important tool for the recovery of the Great Desert Skink. Patch-burning regimes had been in place for many thousands of years prior to European settlement. By burning while hunting and traversing their country Aboriginal people are believed to have created a mosaic of different fire-age habitats on a relatively fine scale (see Kimber, 1983; Gill 2000). The maintenance of this mosaic of different fire-age vegetation meant that wildfires were less likely to carry into areas of regenerating vegetation. The burnt patches are likely to have remained 'fire-proof' (from wildfires - though they are likely to have been deliberately burned on a more frequent interval, depending on the season) for a period of up to 15-20 years in southern desert areas. In northern areas, where rainfall is greater, the inter-fire interval is believed to have been around 5-10 years (see estimates in Allan and Southgate in press). The scale of patches burnt by Aboriginal people under these regimes is not known, but is believed to have ranged in size from tens of hectares to a few hundred thousand hectares depending on the frequency of travel through an area (Gill 2000).

With the cessation of intensive patch burning regimes over much of the western deserts region (approximately 60 years ago), the fire regime has reverted to a cycle of fuel build up during high rainfall seasons followed by extensive wildfires that burn through large tracts of country. For example, in late 2000 large wildfires burned significant portions of the Tanami and Great Sandy Deserts, with over 87,000 square kilometres of the Northern Territory part of the Tanami bioregion (*ie* 30% of the land area) being burnt in a series of wildfires that spread through the region (G. Allan *pers. comm.*). The full implications of this unmanaged fire regime for the longterm survival of remnant populations of the Great Desert Skink are not well understood, but this Recovery Plan adopts an adaptive approach to addressing fire management needs for the species.

Recovery actions undertaken for the Great Desert Skink are also likely to benefit several other species listed under the EPBC Act - the 'Vulnerable' Mulgara, the 'Vulnerable' Bilby (*Macrotis lagotis*), the 'Endangered' Northern Marsupial Mole (*Notoryctes caurinus*) and the 'Endangered' Southern Marsupial Mole (*Notoryctes typhlops*). The Great Desert Skink is often found in association with the Mulgara and Marsupial Mole at Uluṟu (McAlpin *pers. obs*.). In the Tanami Desert the Bilby and Mulgara are often found at the same localities as the Great Desert Skink (Masters *et al* 1997).

The Great Desert Skink is well known to senior Aboriginal people throughout the western deserts region, and is known as Tjakuṟa (or Tjakurra) in Pitjantjatjara, Yankunytjatjara, Ngaanyatjarra and Pintupi languages, Warrarna (Warlpiri), or Tjalapa (Pintupi speakers around Kintore). Many old people grew up hunting this species and celebrating it through story and ceremony. It is an important component of Tjukurpa (or Law) in the western deserts, and Tjukurpa sites for the Great Desert Skink are spread across the region. The skink retains an important status for many traditional people who continue to hunt and gather on their lands. Central to this, is the facility to teach following generations about the range of traditional activities undertaken, and also of all the species present within country and of their significance.

Several Aboriginal communities will be affected by the Great Desert Skink Recovery Plan. It is considered that benefit to these communities will be derived through opportunities to participate in recovery actions. With the reinstatement of patch burning over greater areas, there is likely to be an improvement in habitat quality for important game species (Red Kangaroo, Emu, Bustard, and Goannas).

2. *Distribution and habitat needs*

2.1 Distribution

Knowledge of the distribution of the Great Desert Skink is likely to remain imprecise, due to the remoteness and inaccessibility of much of the potentially suitable habitat that exists within the species' 1 500 000 sq km range in the western deserts region of the Northern Territory, Western Australia and South Australia.

Historically the Great Desert Skink has been recorded from widely scattered localities across the western deserts region (Fig. 1 – *nb* each symbol may represent more than one record for a location). Prior to 1980, museum specimens had been collected in Western Australia from the vicinity of Broome (given as Roebuck Bay), the northern end of the Canning Stock Route, Kathleen Valley (between Wiluna and Leinster), north west of Warburton adjacent to the Rawlinson Range, and from south of Warburton at Skipper Knob. The type specimen was collected in 1891 from the northern Great Victoria Desert, about 150km south-east of Warburton. The only historical record from South Australia is of a single museum specimen collected in 1934 at Pundi Rockhole, between the Everard Ranges and Emu Junction. In the Northern Territory specimens were collected prior to 1980 from Mt Liebig, Angus Downs Station, near Yuendumu, and in the Tanami Desert in the vicinity of The Granites gold mine. Recent records (Fig. 1) have added several additional localities in both Western Australia (near Patjarr, Kiwirrkura and Lake Mackay) and the Northern Territory (near Kintore, Sangster's Bore, and from Uluru-Kata Tjuta National Park), and one from South Australia (near Watarru in Anangu Pitjantjatjara Lands).

Currently the strongholds for the Great Desert Skink appear to be the Tanami Desert, Uluru and an area of the Gibson Desert north of Warburton. An extensive sandplain of several hundred square kilometres to the east of Kiwirrkura (in the Gibson Desert) also contains a significant population (Fig. 1). There may also be a significant population within the Rudall River National Park (in the Great Sandy Desert), and recommendations for survey and monitoring in this area are made later in this document. Populations known from reserved areas are those in Uluru-Kata Tjuta National Park, the recently declared Watarru Indigenous Protected Area on AP Lands, and the population recorded from Rudall River NP in the 1990 (Walsh 1996).

Aboriginal people living in remote communities have led wildlife managers and consultants to previously undocumented populations. Two sisters, Mary Pan and Illawanti Ken, rediscovered *E. kintorei* on their traditional lands at Watarru in north-western South Australia in 1997, thus providing the first record of the species in SA in 63 years (Daniel 1999). The knowledge of local Aboriginal people lead CALM scientists to a new locality north of Warburton in Western Australia in 1997, producing the first museum specimen of the Great Desert Skink from that state in 33 years (Pearson *et al.*, submitted).

Undoubtedly other populations will be documented following further fieldwork. Nevertheless many other populations appear to have become locally extinct within senior Aboriginal people's lifetimes. A series of interviews was conducted with senior Anangu who had grown up in widely scattered areas but were now living at Uluru. Most stated that the skinks were no longer found at sites they had known them from in their youth (P. Hookey and L. Rive, *unpub*.). Senior Traditional Owners at Watarru also recalled the skink as being common and frequently eaten back in the 1940's and 1950's, despite now being known from only one locality on AP Lands (Daniel 1999). On a recent survey in the Gibson Desert Nature Reserve (WA) several Traditional Owners showed surprise and alarm that no Great Desert Skink burrows were located at all during this 3-day transect. People were confident at the start of the journey that Great Desert Skinks occurred 'all across the rira country' that we drove through (McAplin, *pers. obs.*). Similarly, senior men living at Yuendumu recently reported two former localities near Yuendumu where Great Desert Skink were once found but no longer occur.

There are several historic localities that have not produced specimens since the original records. Some of these localities, such as Kathleen Valley (now Wanjarri National Park) have been the focus of recent general fauna surveys, but no extant populations have been located. A recent broad-scale survey of the Little Sandy Desert failed to locate any specimens of the Great Desert Skink (P. Kendrick *pers. comm*.), and although there are no historic records from this region, large areas of potentially suitable sandplain habitat exist. Systematic broad-scale survey work across the Great Victoria Desert in South Australia over the last decade has also failed to locate Great Desert Skink populations (P. Copley, *pers. comm.*).

2.2 Habitat critical to survival of the Great Desert Skink

Although incomplete distribution data make it currently impossible to define critical habitat for the Great Desert Skink in terms of specific geographic locations, prescriptive fire-age, or structural detail of vegetation, it is possible to describe commonalities in the habitats occupied by known populations.

Great Desert Skinks occupy a variety of habitat types within the western deserts region. They generally occur on hummock grass sandplains and some adjacent dunefield swales. In the Tanami Desert and parts of the Great Sandy Desert they also inhabit paleodrainage lines characterised by lateritic soils, giant termite mounds, and titree (*Melaleuca* spp.) shrubs. The recently discovered population at Watarru (in northern South Australia) was located in an area of open mulga (*Acacia aneura*) and minyura (*Acacia minyura*) woodland over woollybutt grass (*Eragrostis eriopoda*) and spinifex. Extensive areas of dunefields, rocky ranges and mulga woodlands occur through the western deserts and are considered unsuitable habitat. However the area of potentially suitable habitat within the region is tens of thousands of square kilometres.

Sandplain vegetated by spinifex (*Triodia* spp.) and scattered shrubs seems to be the habitat type most widely used. The extent of these sandplains ranges in size from a few hundred hectares to tens of thousands of hectares. They are characterised by a dominant cover of spinifex grasses, usually *Triodia basedowii*, but also *T. pungens* and *T. schinzii*. Growing among the spinifex hummocks are scattered shrubs and occasional trees from the genera *Acacia*, *Eremophila*, *Grevillea*, *Hakea*, and occasionally *Eucalyptus*. Why some sandplains are currently occupied while others are not is unknown, but may relate to recent fire history. The swales of dunefields adjacent to sandplains may also be occupied by Great Desert Skinks. The vegetation in these adjacent swales is generally similar to the sandplain.

Large areas of the Gibson Desert are characterised by low, undulating lateritic gravel hills. This habitat is known locally as ri̲a.. The surface of the hills and upper slopes is covered in lateritic gravel and small stones. The lower slopes and valleys have a more sandy surface. The soil under the laterite cover is a fine sand that also contains numerous laterite pieces. In mature areas of this habitat hard spinifex (*Triodia basedowii*) is the dominant plant and few other species are present. Sparsely scattered shrubs of Desert Fireweed (*Rulingia loxophylla*), *Keraudrenia nephrosperma*, Desert Raisins or Bush Tomatoes (*Solanum* spp.), Parakeelya (*Calandrinia* spp.), Rusty Sand-sage (*Dicrastylis exsuccosa*) and Black Gidgee (*Acacia pruinocarpa*) and patches of mulga often occur on the hilltops. The lowest valleys may be lined with *Acacia* and *Grevillea* shrubs. In this country Great Desert Skinks inhabit the open areas on the hilltops and slopes. They appear to be absent from the interspersed heavily shrub-lined valleys, rocky hills and sand dunes.

Presence – absence data exist from two separate surveys that searched for Great Desert Skinks across a range of habitat types. Fifteen of 190 sites surveyed at Uluṟu had Great Desert Skinks present (McAlpin 1997). In this study lizards were not found in mallee woodland, mulga woodland or areas burnt more than 25 years previously. The majority of burrows at Uluṟu were in habitat burnt within the past 15 years (McAlpin 2000). In a survey in the Tanami Desert, Great Desert Skinks were present at seven of 165 sites. Five of the seven burrow systems were located

in sites that had been burnt within the previous 4 years. During the same survey, Mulgara were recorded at 34 of the 165 sites, and Bilby at 41 of the 165 sites (Masters *et al.* 1997). Bilbies were present at six of the seven sites where Great Desert Skinks were recorded, while Mulgara co-occurred at two of the seven sites. Feral cats (4 out of 7 sites), foxes (2 out of 7 sites) and camels (4 out of 7 sites) were also recorded at Great Desert Skink sites during the study.

2.3 Population dynamics related to vegetation fire age

Great Desert Skinks appear to be well adapted to a patch-burning regime, whereby loose colonies of lizards are able to move into adjacent, recently burnt habitat when necessary. Under such a strategy all the sandplain habitat is never occupied at any one time, as some portions will always be of an unsuitable fire age – either too young or too old. In areas that are intensively managed using an interpretation of Aboriginal traditional patch-burning methods, patches will be burnt as soon as they are able to carry a fire, and thus patches are highly unlikely to become too old to provide suitable habitat. Cessation of these traditional burning practices and the consequent proliferation of large-scale wildfires greatly limits recolonisation opportunities for Great Desert Skinks. Instead of numerous small patches of varying fire-age vegetation, vast areas become a single fire age that may be either too old, or too young for successful habitation. Wildfire cycles in Central Australia appear to be tied to cumulative rainfall totals (see Allan and Southgate in press, for examples). In the driest parts of Great Desert Skink's range (south of approximately 23 degrees latitude) this between-fire period is thought to be about 15-20 years, while in the northern part of its range rainfall is more reliable and annual totals are considerably higher. Spinifex growth is comparatively rapid and wildfires may occur every 5-10 years (see Allan and Southgate in press).

Great Desert Skinks generally occupy areas of habitat that have been burnt within the previous 3-15 years. In 1998 within Uluru-Kata Tjuta National Park 57% of active burrows were in habitat burnt greater than 15 years previously. In 2000 this had fallen to 36%, with another 36% of active burrows in habitat burnt less than 10 years previously (McAlpin 2000). The research at Uluru also suggests that recently burnt habitat provides a better opportunity for successful reproduction. The number of juveniles recorded in burrow systems was greatest in areas burnt within the past 10 years. In 1999, 38% of burrows in habitat burnt in 1976 produced juveniles, whereas 59% of the burrows in habitat burnt in 1991 produced juveniles (McAlpin 1999). This greater breeding success may relate to an overall increase in plant species diversity and productivity in recently regenerating habitat.

Surviving a large-scale fire may be difficult or impossible for this species. During a hot wildfire virtually all vegetation is removed over a very large area. Most of the invertebrates and small vertebrates that live in the vegetation are also destroyed. While Great Desert Skinks are able to survive the initial effects of the fire down in their burrow, the subsequent lack of cover and food resources may mean the lizards are unable to persist. A large fire may create distances that are too great, or too hazardous, for lizards to be able to cross to successfully colonise a new area.

The population at Uluru has been studied since 1996. Initially the basic biology and ecology was documented (McAlpin 1997). All burrows that could be located in the Park were then mapped and a monitoring program was established (McAlpin 1998). One hundred and two active burrows were originally mapped in 1998. In 2000 only 50 of these burrows remained active, though there were still roughly the same total number of active burrows in the Park (McAlpin 2000). The population at Uluru appears to be extremely dynamic, with lizards moving out of habitat that is 15-25 years old and establishing burrows in more recently burnt areas. At Uluru sub-populations are found as clustered sets of active burrows, while large areas of similar, adjacent habitat remain unoccupied. The populations at Kiwirrkura and Warburton appear less clustered and more evenly spread across larger areas. This may be as a result of hunting pressure and a more intricate fire history in these latter areas.

Following the breeding season at Uluru in 1998, about 45% of the population were adults, 40% were juveniles and 15% were subadults. This relatively low percentage of subadults suggests that mortality is high when subadults leave the natal burrow.

The population at Uluru is the only one to have been studied intensively, yet much remains to be learnt about population dynamics in response to post-fire plant succession and resource availability. No study has been undertaken on the dynamic between feral predators and the Great Desert Skink. Overall, most populations of *E. kintorei* appear to be small, scattered and usually isolated. Vast areas of potentially suitable habitat appear to be totally unoccupied or are at extremely low population densities. Historically, when patch burning was undertaken across most of the potential habitat and Great Desert Skink populations were relatively contiguous across their range, gene flow was probably constant. Given the highly fragmented populations that exist under contemporary fire regimes gene flow is all but impossible, except if augmented by managed translocations.

The total population size of the Great Desert Skink is difficult to estimate with any certainty. There are undoubtedly undetected populations in remote areas of the western deserts region. The population within the Uluru-Yulara area is about 800, while total numbers in the Tanami Desert are unlikely to be greater than 2250. The total population in Western Australia may exceed 3000, while in South Australia it is likely that fewer than 50 individuals exist (Table 1).

3. *Threats*

There is considerable anecdotal evidence of a general decline in the overall population of the Great Desert Skink, and it has disappeared from many sites during the past 50 years (McAlpin 1997; and refer to Fig. 1). Many Aboriginal people have reported local extinctions or dramatic population declines for Great Desert Skinks in areas where they had once been common (McAlpin 1997; McAlpin *pers. obs*).

The cessation of traditional land management practices over most of the western deserts region has created new fire regimes. Vast areas remain unburnt for many years. When a fire eventually burns in these unmanaged areas, either by lightning strike or through human intervention, it is likely to be a very hot, extensive fire that creates a huge swath of burnt country with few patches of unburnt habitat within it. Small animal populations at the edge of such a fire may be able to survive, but the chance of finding a suitable patch of unburnt habitat for most animals within the fire zone is greatly diminished. Over time such a fire regime is likely to eliminate most populations of fire-sensitive species, until only a few fragmented, small populations persist. The arrival of two efficient feral predators - the cat and fox - adds to the pressure on these isolated remnant populations. This appears to be what has occurred to the Great Desert Skink.

Both the fox and cat have been identified as predators of Great Desert Skinks. Cats prey on the skinks, particularly juveniles, by sitting near a burrow entrance and waiting to pounce on a lizard when it emerges (S. McAlpin *pers. obs*.). Foxes catch skinks after dark when the lizards are actively foraging out from their burrows (A. Robertson and K. Noble *pers. comm*.), however the extent of fox predation is unknown. Mulgara are also known to prey on Great Desert Skinks (S. McAlpin *pers. obs.*), possibly concentrating on juvenile or hibernating lizards. The impact of other native predators such as the dingo, or of raptors (particularly in recently burnt areas) is currently unknown, and further work is needed to assess the total predator pressure sustained by remnant Great Desert Skink populations.

Rabbits have been recorded moving in to one active burrow system of the Great Desert Skink, causing the lizards to abandon the burrow system (McAlpin 1997). Rabbits are known to occur in low numbers across most of the lizard's range, but the impact of their presence on Great Desert Skink populations is currently unknown.

Populations at Yulara (near Uluṟu) are currently under threat from increasing tourism development. Tourism infrastructure at Yulara and within Uluṟu-Kata Tjuṯa National Park has occasionally been inadvertently sited close to active Great Desert Skink burrows, resulting in burrow abandonment, or mortality of lizards on roads. A very significant population of Great Desert Skinks occurs in the Yulara borefields area, where the water supply for Yulara township is sourced. There are some concerns that planned increases in the volume of artesian water harvested may impact on the biologically diverse borefield's flora and fauna - including Great Desert Skink populations. Spinifex harvesting conducted as part of a fire management program associated with tourism infrastructure at Yulara is also thought to pose a threat to resident populations of Great Desert Skinks in this area. By regularly mowing spinifex areas the equivalent of a constant-age vegetation community is created, with few opportunities for plant succession processes to create the composition and structural diversity preferred by Great Desert Skinks. Further studies are required to assess the impact of this management practice on resident skink and Mulgara populations.

The only known populations of the Great Desert Skink that appear to be relatively secure are found in areas that currently have intensive fire management occurring. One of these populations is in Uluṟu-Kata Tjuṯa National Park where patch burning has been recommenced to enhance biodiversity conservation as well as to mitigate the threat of extensive wildfire. In other populations (such as around Patjarr, Kiwirrkura and Kintore) intensive fire management has occurred as a result of continuous traditional hunting practices. Optimal patch-burn size for the Great Desert Skink is as yet unknown. Current adaptive management practices at Uluṟu, combined with continued population monitoring, should enable a patch burning prescription to be developed for possible application in other parts of the western deserts region.

4. *Scope of this Recovery Plan*

The actions listed in this Recovery Plan do not commit the identified potential stakeholders, organisations or agencies to any works or to allocation of funds for works, but, rather, act as a guide for planning management for Great Desert Skinks in a coordinated way across the species' range.

The timeframe for the actions listed in this Recovery Plan is ten years. The main reason for opting for a ten-year management period relates to the characteristic variability of arid environments in which large seasonally-related fluctuations in populations are normal, such that a ten-year monitoring cycle is necessary to show actual trends in populations unrelated to this climatic variability. Other reasons for this extended management timeframe relate to the remote nature, and resourcing needs of the region in which Great Desert Skinks live. Major constraints to implementation of this Plan are the high costs associated with work in remote regions, and the absence of any existing regional threatened species management programs across much of the Aboriginal Lands in which Great Desert Skink populations survive.

Management actions listed in the Recovery Plan focus on collecting further basic data on which to assess current conservation status, population trends and threatening processes. On-ground actions are focussed on key known populations and represent adaptive management approaches to fire and predator control based on the best currently available 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. As always, there is also a need to include recovery actions focussed on providing educational resources to the major stakeholders in the region (Aboriginal communities and Land Councils, mining and tourism operators, and Aboriginal service agencies).

The Recovery Plan focuses management actions around three key populations of Great Desert Skink: i) Uluṟu-Kata Tjuṯa National Park; ii) on Ngaanyatjarra Lands in the Gibson Desert; iii) on Aboriginal Lands in the Tanami Desert in the vicinity of Sangster's Bore-Rabbit Flat-The

Granites. The reasons for focussing the Plan this way were largely logistical. It is not considered feasible to plan effective management over the entire western deserts region given the vast area and the species' remoteness from community living areas in many instances. Recovery of this species (as with many other threatened desert fauna) is likely to rely on ongoing management both of fire and predators, and therefore requires ongoing commitment from communities living in the vicinity of populations. Lastly, the difficulty in resourcing recovery work on extensive Aboriginal lands required the choice of focus areas.

i) At Uluru an ongoing Great Desert Skink monitoring program was established in 1998. Cooperative management programs involve both Anangu Rangers and Park staff. A patch burning program is currently in place, and a recent review of the Park's Fire Management Plan has been undertaken (Williams, 2000). A Vertebrate Pest Management Strategy for the Park is currently being formulated. Mulgara, and less frequently Marsupial Moles, co-occur with Great Desert Skinks at Uluru, and so the potential exists for planning recovery programs likely to benefit these threatened species also.

ii) On Ngaanyatjarra Lands in the Gibson Desert an Indigenous Protected Area is currently being planned by Ngaanyatjarra Council and the WA Department of Conservation and Land Management. Patch burning, predator control and threatened species monitoring activities are currently being undertaken by Ngaanyatjarra Council staff and Aboriginal community members. Bilbies, Mulgara and Marsupial Moles are known to occur within the range of Great Desert Skinks in this region.

iii) In the Sangster's Bore-Rabbit Flat-The Granites area there has been on-going threatened species monitoring work carried out by Parks and Wildlife Commission NT staff with assistance from Aboriginal people. Sangster's Bore area is an important biological refuge area, and until the early 1990s supported the last known mainland population of Mala (*Lagorchestes hisutus*). Bilby, Mulgara and Great Desert Skinks are all known from the area. During 2000, a trial predator management project involving Aboriginal people was established in the Sangster's Bore area, and further funding is currently being sought by the Threatened Species Network to expand this project. There is detailed fire history data for most of this area (G. Allan *pers. comm.*) which will be a useful baseline to study the influence of patch size and fire frequency or timing on Great Desert Skink (and Mulgara, Bilby, and possibly Marsupial Mole) population dynamics.

The major focus of the plan is on land management through the continuation and expansion of traditional patch burning practices. This approach will be combined with feral predator control, viewed as the second tier of threat to *E. kintorei* populations. For the success of this Plan Aboriginal co-management and involvement in recovery actions is critical. Several Aboriginal communities exist near Great Desert Skink populations and all currently known populations are on Aboriginal land. The bulk of knowledge on patch burning resides in these communities, and it is expected that much can be learnt by developing cooperative management projects. Increasing our understanding about the fire management needs of the Great Desert Skink is likely to benefit other threatened fauna of spinifex desert ecosystems (Mulgara, Bilby, and Mala), and if active landscape-scale fire management can be implemented across these regions to recreate the patchy habitats Aboriginal people formerly managed, there are likely to be significant general biodiversity benefits.

Part B

1. Overarching recovery objectives

1) To maintain or improve the conservation status of the Great Desert Skink over the next ten years

2) To change fire and feral animal management in three focus areas of the western deserts to benefit populations of the Great Desert Skink

Table 2. Recovery actions 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 particular locations, and to determine critical habitat.	1.1.1 Reduce the gaps in the knowledge of current range and produce a distribution map by 2004.	1.1.1.1 Identification factsheet and record datasheet produced and disseminated to Aboriginal communities, Aboriginal service agencies, wildlife management agencies, ecotourism operators, mining industry and 4WD networks by 2002.	Recovery Team and agencies and organisations represented.	$1,500
		1.1.1.2 Records database established in 2001 and incoming information used to compile current distribution map by 2004.	Recovery Team and agencies and organisations represented.	$250
		1.1.1.3 Searches of Rudall River National Park completed by 2003, and management recommendations made for any Great Desert Skink populations identified. Further searches of areas in the Great Victorian Desert and Gibson Desert undertaken as funding becomes available.	CALM, and appropriate Aboriginal communities.	$ 8,500

Specific Objective	Performance criteria	Actions	Stakeholders	Approximate cost
1.1 (contd.) To collect sufficient data to determine the extent of the current population range, and assess causal factors in recent declines or local extinctions in particular locations, and to determine critical habitat.	1.1.1 **(contd.)**Reduce the gaps in the knowledge of current range and produce a distribution map by 2004.	1.1.1.4 Further survey work on Anangu-Pitjantjatjara Lands in SA completed by 2002. Use fire history data to identify potential habitat and focus searches in these areas. Searches of location of original Finlayson record (1930's) also undertaken.	AP Land Management, DEH	$5,750
		1.1.1.5 Liaise with researchers undertaking subfossil deposit studies and include any historic Great Desert Skink records to database.	Recovery Team, WA Museum, SAM, NT Museum.	$250
	1.1.2 Causes of recent population loss from at least two areas established by 2006.	1.1.2.1 Identify two sites from which the Great Desert Skink has disappeared in the last 20 years (based on Traditional Owner knowledge), and collect data on vegetation condition, fire history and predator loads. Compare this with data from sites with current populations, and determine likely causes for local extinctions. Use this data to update Recovery Plan actions.	Recovery Team and agencies and organisations represented, various Aboriginal community members, NT Bushfires Council.	$15,000
	1.1.3 Critical habitat determined and mapped by 2006.	1.1.3.1 Use records database, comparative locality data and monitoring data to determine critical habitat and produce critical habitat map by 2006.	Recovery Team and agencies and organisations represented.	$5,000

Specific Objective	Performance criteria	Actions	Stakeholders	Approximate cost
1.2 To manage by 2010 at least two 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 Overall, an increasing trend in numbers of active burrows recorded in Uluru-Kata Tjuta National Park over the period 2001 to 2010.	1.2.1.1 Continue to map active and abandoned burrow systems within UKTNP on an annual basis, and record information on spinifex structure, fire history and predator sign along permanent transects. Enter all data onto GIS database.	Parks Australia in collaboration with Office of Joint Management and Anangu Rangers.	$5,000 p/a
		1.2.1.2 Continue the patch burning program around burrow sites at UKTNP, and monitor impact on burrow occupancy. Enter data on GIS database. Undertake further research to determine links between spinifex and plant community age or structure and frequency of burrow occupation.	Parks Australia in collaboration with Office of Joint Management and Anangu Rangers.	$3,300 p/a
		1.2.1.3 Monitor predator impact around active burrows using track surveys and predator scat analysis. If necessary, undertake predator control work in accordance with UKTNP Vertebrate Pest Management Strategy. In winter months collect Mulgara scats within monitoring sites and analyse these for possible predation on hibernating lizards (to get a better understanding of Mulgara – Great Desert Skink population dynamics).	Parks Australia in collaboration with Office of Joint Management and Anangu Rangers.	$2,560 p/a

Specific Objective	Performance criteria	Actions	Stakeholders	Approximate cost
1.2 **(contd.)** To manage by 2010 at least two 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 **(contd.)**Overall, an increasing trend in numbers of active burrows recorded in Uluru-Kata Tjuta National Park over the period 2001 to 2010.	1.2.1.4 Produce educational materials for organisations with infrastructure adjacent to Great Desert Skink populations to encourage conservation management measures and to discourage further development in these sensitive areas.	Recovery Team	$1,200
		1.2.1.5 Encourage further research into likely biodiversity impacts of further increases in amount of water drawn from the Yulara borefields.	Recovery Team	N/A
	1.2.2 Baseline data on at least two key populations on Ngaanyatjarra Lands or in the Tanami Desert collected by 2007. Overall population trends at these sites shown to increase over a ten year period.	1.2.2.1 Establish monitoring sites in at least two locations on Ngaanyatjarra Lands and in the Tanami Desert by 2002. Collect annual burrow activity data at these sites, and use five consecutive years' data to estimate baseline population levels by 2007.	Ngaanyatjarra Council, CALM, TSN, CLC, PWCNT.	$12,800 p/a
		1.2.2.2 (See 2.1.1.1) Undertake regular patch burning and predator control work at monitoring sites. Map patch-burn boundaries and enter data into GIS database. Record burrow occupancy status within patches.	Ngaanyatjarra Council, CALM, TSN, CLC, PWCNT.	$7,800 p/a
		1.2.2.3 Analyse stomach contents of feral predators during predator control work, and collect and analyse predator scats in vicinity of Great Desert Skink populations.	Ngaanyatjarra Council, CALM, TSN, CLC, PWCNT.	$2,500

Specific Objective	Performance criteria	Actions	Stakeholders	Approximate cost
1.3 To improve community knowledge of the Great Desert Skink and increase community involvement in recovery management.	1.3.1 Increased involvement of Aboriginal people in management programs for the Great Desert Skink.	1.3.1.1 Ensure that all projects focusing on Great Desert Skink management have strong involvement of Aboriginal people. Include funding for wages for Aboriginal participants in monitoring, fire management and predator control work.	Recovery Team	N/A
		1.3.1.2 Undertake training in contemporary survey and monitoring techniques and predator control with Anangu at UKTNP, From communities in the Tanami Desert and on Ngaanyatjarra Lands by 2003.	Parks Australia, OJM, Anangu Rangers, Ngaanyatjarra Council, CALM, TSN, CLC, PWCNT.	$10,500
	1.3.2 Increase in reported sightings by mining companies, ecotourism operators and 4WDers by 2005.	1.3.2.1 Establish a records database (see 1.1.1.1 & 1.1.1.2) for the Great Desert Skink and advertise its existence among Aboriginal Communities, ecotourism operators, the 4WD community, mining companies and agencies working in the western deserts region in 2002.	Recovery Team	See previous costing.
		1.3.2.2 Develop education material by 2002 to circulate to environmental consultants and environmental staff of mining companies in the region, focusing on identification of Great Desert Skink burrows and latrines. Encourage survey work by these groups.	Recovery Team	$600

Specific Objective	Performance criteria	Actions	Stakeholders	Approximate cost
1.4 To secure ongoing funding for implementing recovery actions identified in this Recovery Plan.	1.4.1 Funding secured for at least 70% of the Recovery actions identified in the Plan.	1.4.1.1 Seek sponsorship from mining companies for Great Desert Skink recovery work in the Gibson, Great Sandy Desert and Tanami Desert.	Recovery Team	N/A
		1.4.1.2 Seek funding from philanthropic trusts for collaborative recovery projects with Aboriginal communities.	Recovery Team	N/A
2.1 To determine the best fire regime that leads to sustained or increased populations of Great Desert Skink over a 10 year timeframe.	2.1.1 Improved understanding of scale, frequency, timing and patterning of fires to benefit Great Desert Skinks by 2010.	2.1.1.1 Create GIS database for data on fire history, patch-burn size, spinifex structure and burrow occupancy, and use this to record monitoring data from the 3 focal areas.	Recovery Team, Bushfires Council NT, CSIRO.	$2,750
		2.1.1.2 Correlate fire history data from areas within UKTNP and parts of the Tanami Desert with presence/absence data for Great Desert Skinks. Produce a predictive map of potential Great Desert Skink habitat based on fire patchiness. Continue to refine map with survey and monitoring data collected over the next decade.	Recovery Team, Bushfires Council NT, CSIRO, Post-graduate student.	$5,875
	2.1.2 Increase in the patchiness of habitat around monitoring sites at UKTNP and on Ngaanyatjarra Lands by 2008.	2.1.2.1 Maintain patch burning program at UKTNP, with up to 5% of suitable habitat burnt each year, and not less than 10% burnt over any 3 year period. Record all fire data on GIS database.	Parks Australia, OJM and Anangu Rangers.	$4,500 p/a

Specific Objective	Performance criteria	Actions	Stakeholders	Approximate cost
2.1 **(contd.)** To determine the best fire regime that leads to sustained or increased populations of Great Desert Skink over a 10 year timeframe.	2.1.2 (**contd.)** Increase in the patchiness of habitat around monitoring sites at UKTNP and on Ngaanyatjarra Lands by 2008.	2.1.2.2 Establish a fire management program at monitoring sites on Ngaanyatjarra Lands by 2003. Annually record data on timing and extent of fires and enter this data with burrow occupancy data onto GIS database.	Ngaanyatjarra Council and CALM.	$6,500 p/a
	2.1.3 Development of fire prescriptions for management of Great Desert Skink populations, and incorporation of these into fire management plans at UKTNP, within the IPA areas on Ngaanyatjarra lands and AP Lands by 2010.	2.1.3.1 Based on 10 years of data from UKTNP and Ngaanyatjarra Lands, develop fire management prescriptions for Great Desert Skink populations and ensure that this information is used in planning management programs.	Recovery Team, Bushfires Council, Parks Australia, OJM, AP Land Management, Ngaanyatjarra Council.	N/A
2.2 To reduce number, impact and extent of destructive wildfires in Great Desert Skink focus areas over the next decade.	2.2.1 A reduction in the frequency and size of wildfires on a regional scale in the vicinity of Great Desert Skink populations at UKTNP, the Tanami and Ngaanyatjarra Lands focus areas by 2010.	2.2.1.1 Form working group of stakeholders, scientific experts and Bushfires authorities to prioritise areas for fire management and to plan strategic control burns.	Recovery Team, CSIRO, Bushfires Council NT, CLC, CALM.	$4,500
		2.2.1.2 Involve Aboriginal communities in implementing strategic control burns outside of UKTNP, in parts of the Tanami Desert and Ngaanyatjarra Lands IPA.	Recovery Team, Ngaanyatjarra Council, CALM, CLC, Bushfires Council NT.	$7,800

Specific Objective	Performance criteria	Actions	Stakeholders	Approximate cost
2.3 To implement feral predator control programs that lead to sustained reductions in feral predator loads around two focus populations of Great Desert Skinks over the next 10 years.	2.3.1 Predator levels around monitoring sites at UKTNP and Ngaanyatjarra Lands maintained at levels where impact on Great Desert Skink populations appears to be minimal (as determined by numbers of juveniles recorded each season).	2.3.1.1 Establish permanent predator track transects in the vicinity of the study sites at UKTNP and on Ngaanyatjarra Lands and record predator numbers regularly in course of monitoring work. Collect and analyse predator scats.	Parks Australia, OJM, and Anangu Rangers, Ngaanyatjarra Council, CALM.	$2,500 p/a
		2.3.1.2 Undertake regular predator control work around monitoring sites using both traditional tracking and hunting, and contemporary baiting programs where appropriate.	Parks Australia, OJM and Anangu Rangers, Ngaanyatjarra Council, CALM	$4,200

2. Guide for decision makers

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

The following actions may negatively impact on population viability and recovery of the Great Desert Skink:

1) Siting of new roads, tracks or built infrastructure within 2 km of known populations of the Great Desert Skink;

2) Mining activities sited within 3 km of active burrows of the Great Desert Skink;

3) Spinifex harvest activities or other vegetation clearance carried out within 1 km of active burrows of the Great Desert Skink.

Specific to the population located within the Yulara borefields area adjacent to Uluṟu-Kata Tjuṯa National Park it is recommended that no further development be allowed within this key population site. It is further recommended that a study be urgently undertaken into the likely biological impacts on the borefields' biodiversity (particularly on populations of the Great Desert Skink and Mulgara) of projected water use for Yulara township.

3. Monitoring, reporting and review.

The progress of recovery actions listed in this Plan will be monitored and evaluated on an annual basis by Recovery Team members and reported to relevant funding agencies, project sponsors, Aboriginal Land Councils and wildlife management agencies. To assess progress Recovery 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, the Recovery 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 Recovery Team will assist the stakeholder group in accessing funds from sponsors, philanthropic groups or Commonwealth or state funding agencies.

Biological data on fire management and fire regime impacts on burrow occupancy, and data on predator abundance and impacts will be compiled by the Recovery Team from individual projects on an annual basis, and included in the annual progress report.

The Recovery Team will use data from the sightings database and additional survey data from agencies, ecological consultants and Aboriginal organisations to update the distribution map for the Great Desert Skink on a biennial basis. This map will be made available to Aboriginal organisations and communities, wildlife management agencies and mining companies and tourism ventures with operations in the region.

The Recovery Team will evaluate community involvement and awareness on a biennial basis by assessing the numbers of Aboriginal people participating in recovery work, and reviewing the numbers of reported sightings of Great Desert Skink made by the general public. The Recovery Team will actively encourage the production of plain-language, pictorial-style "big books" for each Aboriginal Community participating in recovery work. These books are a very useful record of community involvement and encourage ownership of projects, as well as being useful education tools for younger people.

The Recovery Team will be responsible for reviewing the progress of this Recovery Plan in 2006, and again in 2011. These reports will be made available to all relevant stakeholders, sponsors and funding agencies and to Environment Australia.

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Abbreviations

ALEC	Arid Lands Environment Centre
AP Land Management	Anangu Pitjantjatjara Council Land Management Section
ASDP	Alice Springs Desert Park
CALM	Department off Conservation and Land Management
CLC	Central Land Council
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEH	Department of Environment and Heritage SA
EA	Environment Australia
EPBC Act	Environment Protection and Biodiversity Conservation
OJM	Office of Joint Management (Uluru-Kata Tjuta NP)
PWCNT	Parks and Wildlife Commission NT
SAM	South Australian Museum
TSN	Threatened Species Network
UKTNP	Uluru-Kata Tjuta National Park
WWF	World Wide Fund for Nature

Appendix 1. Current Recovery Team Membership

Steve McAlpin	Arid Lands Environment Centre (RT Chairperson)
Peter Copley	DEH SA
Matt Daniel	Anangu-Pitjanjatjarra Council Land Management (until end 2000)
Glenn Edwards	PWCNT
Greg Fyfe	Alice Springs Desert Park
Mark Hutchinson	SA Museum
Ro McFarlane	Ngaanyatjarra Council (from 9/00)
Sean Moran	Central Land Council (until Jan 2001)
Keith Noble	Ngaanyatjarra Council (until 9/00)
Colleen O'Malley	Threatened Species Network
David Pearson	CALM
Sam Rando	Uluru-Kata Tjuta National Park
Arthur Robertson	Ngaanyatjarra Council