BIOLOGICAL SURVEY OF

THE SOUTHERN LITTLE SANDY DESERT

Project (N706)

Final Report

December 1996

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PRECIS

BIOLOGICAL SURVEY OF THE SOUTHERN LITTLE SANDY DESERT

Project N706

Fifteen permanent biological sampling quadrats have been established in the southern portion of the Little Sandy Desert. In addition to these biological sampling sites, an additional sixteen permanent flora sampling quadrats have also been established. Cumulatively these quadrats represent the array of biotic assemblages present in the project area. These quadrats have been sampled repetitively and systematically on two occasions, June and October 1996. A total of 277 person hours have been amassed while systematically and opportunistically sampling the biota in the project area. This survey effort has culminated in a 2 400 pitfall, 4 250 Elliott and 300 cage trap trapping effort.

During the year, 520 plant specimens representing approximately 412 taxa were collected or recorded in the study area. Several new populations of Eucalyptus rameliana *were discovered along with several populations of* Calothamnus 'footeana'. *A* Halosarcia *taxon which has not previously been recorded in the scientific literature was also collected.*

One hundred species of bird were observed during the year. Interesting observations were of nesting Cygnus atratus *(Black Swans) on Savory Creek and* Hamirosta melanosternon *(Black-breasted Buzzards) over most sandstone ridges. Twenty species of indigenous mammals were recorded in the study area including* Psuedomys chapmanii *(Pebble-mound mouse),* Dasycersus cristicauda *(Mulgara),* Pseudantechinus macdonnellensis *(Fat-tailed Pseudantechinus) and* Sminthopsis longicaudata *(Long-tailed Dunnarts). Seventy nine species of reptile and four species of amphibian were also collected. The most noticeable reptile records were for* Lerista ips, L. macropisthopus remota *and an undescribed* Ramphotyphlops sp. nov. *(Blind Snake).*

The development of specimen databases, the identification of vouchers and their incorporation into the appropriate repositories is continuing. The acquisition and development of GIS themes has also continued, as highlighted by a joint investigation with the Leeuwin Centre, into NDVI stochasticity throughout the project area over the past five years.

TITLE OF PROJECT:

Biological Survey of the Southern Little Sandy Desert

AGENCY:

Western Australian Department of Conservation and Land Management (CALM), Science and Information Division.

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AIM OF PROJECT:

To conduct a comprehensive biological survey of the southern Little Sandy Desert, Keartland Botanical District, to facilitate an evaluation of the region's nature conservation values and make recommendations for reservation.

SCOPE:

1. Continue to refine an overview and appraisal of the physical environment (geology, geomorphology, soils and climate), including a description of gradients and patterns and extent, of the southern part of the Little Sandy Desert Biogeographic Region.

2. Continue to review the systematic survey design for the flora and fauna (flora/vegetation, animals, birds, reptiles, amphibians and ants) within the Little Sandy Desert Biogeographical Region using existing biophysical information (surveys, maps, reports, remote sensing data) as well as field inspections. Ensure sites selected represent the array of assemblages typical of the southern portion of the Little Sandy Desert.

3. Undertake the first and second of three systematic surveys of landform units, biotic composition, habitat types and vegetation associations of the southern portion of the Little Sandy Desert in June and October 1996, respectively.

4. For the data compiled and collected above, commence data entry into computer databases (for use in GIS mapping and analysis) and undertake preliminary data checking.

5. Begin the identification of the conservation values of the area with reference to species and communities of conservation significance, together with the broader nature conservation values of the region.

6. Begin the analysis of the representativeness of the existing reserve system with reference to species and communities of conservation

significance, together with the broader nature conservation values of the region.

7. Begin the identification of the threatening processes impinging on the nature conservation values of the region.

8. Begin the identification of the range of appropriate conservation management options available to the Department of Conservation and Land Management for mapping the conservation values identified within the region. Discuss the costs and benefits of these options to all stakeholders in the area.

9. Begin the formulation of management guidelines and priorities for any proposed additions to the reserve system.

10. Begin the identification of the resources required to define the hierarchy of biophysical sub-regions within the study area from existing resource survey information.

PROGRESS TOWARDS COMPLETION OF SCOPE ITEMS:

During 1996 considerable progress has been made towards completion of many of this project's scope items. The majority of the research effort over the past twelve months has been directed towards undertaking two systematic sampling trips, processing the numerous flora and fauna specimens collected and continuing the development and enhancement of specimen databases and GIS themes. Considerable preparatory effort was also directed towards organisation of the two field trips which were undertaken in June and October.

Progress on this project, addressing each of the Scope items, is outlined below.

Scope 1:

No new data on the biological and ecological attributes of the project area has been identified. This is despite thorough literature and bibliographic searches of the libraries of various government agencies, namely the Department of Minerals and Energy, Land Administration, Agriculture Western Australia and The Battye Library of the Library and Information Services of Western Australian. No additional information was located on Ernest Giles other than that already cited in his narrative of his 1876 expedition through the project area which was published in "Australia Twice Traversed: The Romance of Exploration"[1]. Endeavours are still underway to obtain information on F. H. Hann's expedition through the project area in 1902. Informative accounts of the project area prepared by A. W. Canning and R. J. Anketell in 1905-06 during the survey and construction of the No 1 Rabbit Proof Fence have been cited in the book "The

[1] Giles, E. (1889). *Australia Twice Traversed: The Romance of Exploration. Vol. II.* Sampson Low, Marston, Searle and Rivington Ltd. London.

Longest Fence"[2]. Efforts are still underway to locate Canning's journals which may provide more information on the project area. Similarly, the surveyor Newman also worked in the project area during the early 1900's, although no record of his journal has been forthcoming.

Knowledge of the geology and geomorphology of the project area has been enhanced through the revision and re-publication of the Bullen 1:250 000 geological survey map[3]. Similarly, the publication "Geology of the Savory Basin"[4] has provided a greater appreciation of the project area.

Knowledge of the botanical attributes of the project area were enhanced through an interrogation of the Western Australian Herbarium Specimen Database (WAHERB). This interrogation identified 210 plant taxa which have been collected in the Little Sandy Desert, Keartland Botanical District. Many of these species may occur in the project area.

Scope 2:

A systematic survey design has been developed for this study which will encompass the array of representative biological assemblages present in the project area. This survey design incorporates 30 permanent benchmark quadrats in which all targeted biota (flora, vegetation, birds, mammals, reptiles, amphibians and selected invertebrate groups) are being sampled in a systematic, repetitive manner. These quadrats are replicated twice within 15 survey sites and are positioned across the project area (Figure 1).

In addition to these biological quadrats, an additional 16 permanent benchmark flora quadrats have also been established (Figure 1). These quadrats are located throughout the project area and are of an identical design to the biological quadrats. The rationale behind the establishment of these flora quadrats was to sample community types not captured by the biological quadrats. These communities are not dominant within the project area, however, are sufficiently abundant to warrant sampling and documentation as they contribute to the array of biota and assemblages typical of this biogeographic region. Information gathered from these flora quadrats will not only add to the botanical database for the project area but will also enhance the opportunity to justify observed environmental patterns. It is envisaged that the majority of these flora quadrats will be sampled only once, however, where and when the opportunity arises a secondary sampling will occur. It is also envisaged that additional flora quadrats will be establish as new sections of the project area are visited.

The edaphic attributes (chemistry, nutrient status, texture) of each quadrat are being delimited with the assistance of the Chemistry Centre (WA). This biophysical information will provide an important tool which will assist with

[2] Broomhall, F. H. (1991). *The Longest Fence in the World.* Hesperian Press, Perth.

[3] Williams, I. R. (1995). *Bullen, W.A. 1:250 000 Geological Series Explanatory Notes.* 2nd Edition. Western Australian Geological Survey. Perth.

[4] Williams, I. R. (1992). *Geology of the Savory Basin, Western Australia.* Geological Survey of Western Australia, Bulletin 141.

justifying the patterns of environmental heterogeneity and stochasticity observed across the project area.

In an effort to identify areas of high biological activity/productivity, an analysis of Normalised Difference Vegetation Index (NDVI) imagery for the project area was undertaken with the assistance of the Department of Land Administration at the Leeuwin Centre. This analysis consisted of calculating the mean and variance in NDVI twice-monthly over the project area between 1991 and 1995. The interrogation of the NDVI data over this time frame was designed to minimise the impact of temporal fluctuations promoted by rainfall events and fire and to reduce the impact of noise in the imagery promoted primarily through atmospheric conditions (cloud and smoke).

A total of 105 samples were interrogated to produce the final greyscale imagery. Figure 2 illustrates the results of the mean NDVI interrogation with dark pixels indicating low greenness while lighter pixels indicate a higher greenness index. Inherently, drainage lines (eg. Ilgarari Creek) and drainage run-on areas are depicted as almost white pixels while water shedding areas (eg. Bullen Hill) are a dark grey on the image. Figure 3 illustrates the results of the variance NDVI interrogation. Dark pixels illustrate areas of low variation in the greenness index while lighter pixels indicate areas which are more variable. This image demonstrates that between 1991 and 1995 the northern portion of the study area was less variable than the southern portion.

Further analyses and interrogation of these NDVI data sets is planned. Comparisons between the NDVI variance imagery and vegetation type maps/imagery would appear to be useful and will be pursued.

Scope 3:

During 1996 two systematic sampling trips to the southern portion of the Little Sandy Desert were conducted. Ten research staff from CALM, two personnel from Kings Park Botanic Gardens and two CALM volunteers were involved in fieldwork in the project area during 1996 (Table 1). Cumulatively, 277 person days were spent in the field during these trips. During this time the biota in all permanent quadrats was systematically sampled on two occasions. Considerable opportunistic sampling was also undertaken within the project area, especially for flora, through vehicle and foot traverses. Data collected from these opportunistic collecting trips will be used to augment the flora specimen database. A summary of ground traverses within the project area is provided in Figure 4.

Soil samples were collected from all permanent quadrats and have been forwarded to the Chemistry Centre (WA) for chemical and physical analysis.

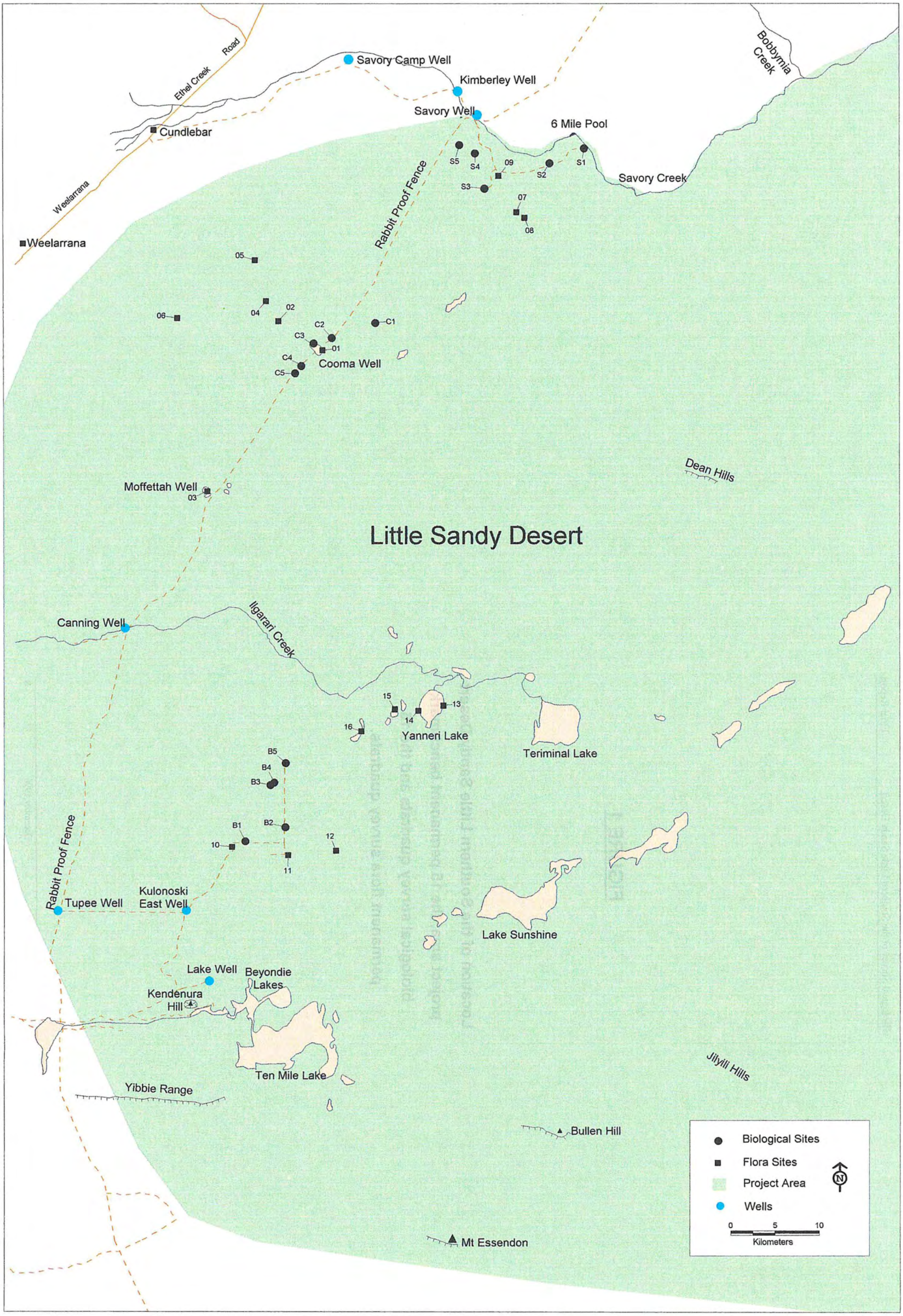
Savory Camp Well
Kimberley Well
Savory Well
Ethel Creek
Road
Cundlebar
Weelarrana
Weelarrana
Rabbit Proof Fence
6 Mile Pool
Savory Creek
Bobbymia Creek
S5
S4
09
S3
S2
S1
07
08
05
04
02
06
C2
C1
C3
01
C4
C5
Cooma Well
Moffettah Well
03
Dean Hills
Little Sandy Desert
Canning Well
Ilgarari Creek
15
14
13
16
Yanneri Lake
Teriminal Lake
B5
B4
B3
B2
B1
10
12
11
Rabbit Proof Fence
Tupee Well
Kulonoski East Well
Lake Sunshine
Lake Well
Beyondie Lakes
Kendenura Hill
Ten Mile Lake
Yibbie Range
Jilyili Hills
Bullen Hill
Mt Essendon
Biological Sites
Flora Sites
Project Area
Wells
0
5
10
Kilometers
N

FIGURE 1

Location of the Southern Little Sandy Desert project area, the 15 permanent benchmark biological survey quadrats and the 16 permanent flora survey quadrats.

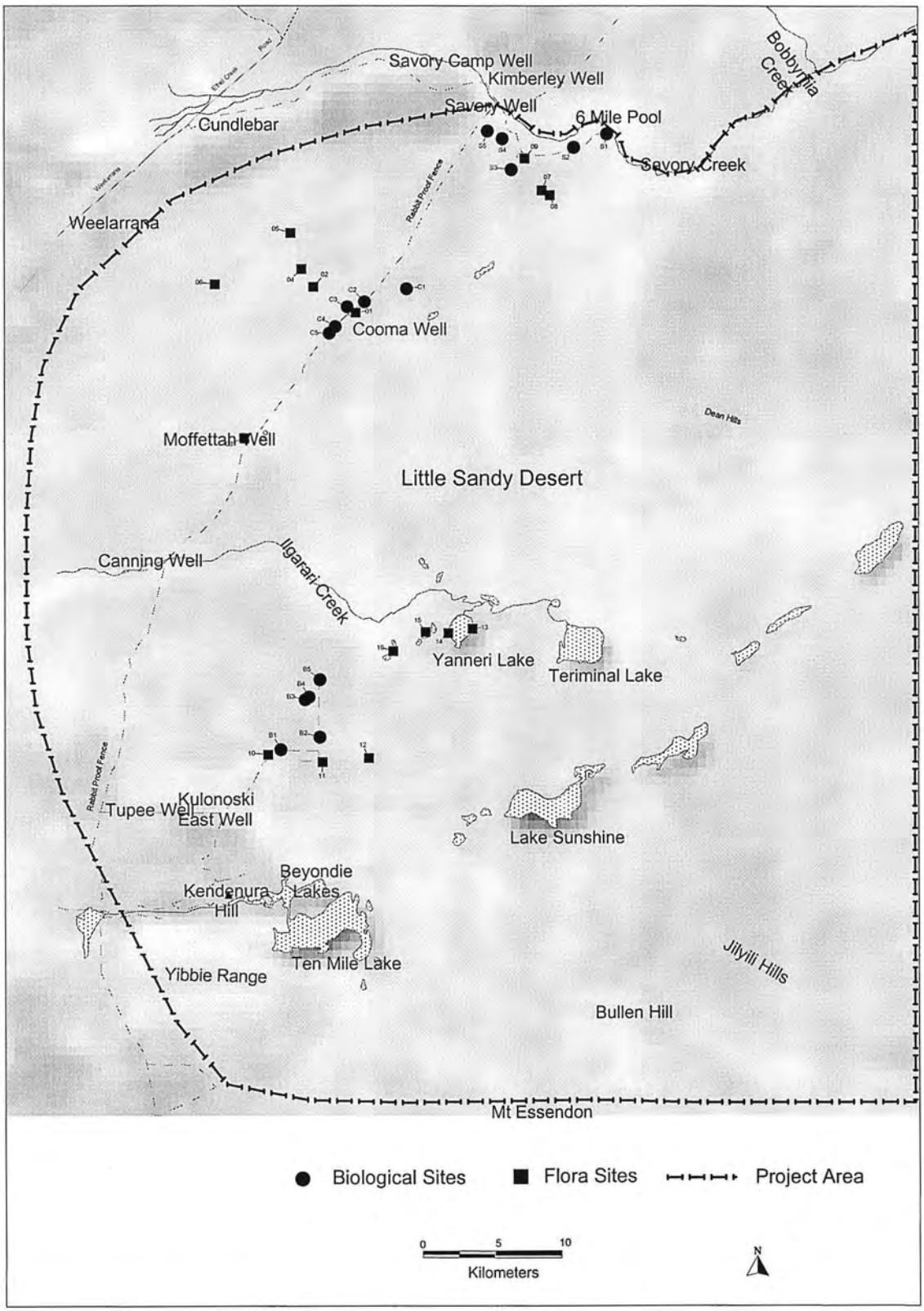

Figure 2 **Mean NDVI imagery of the Southern Little Sandy Desert project area between 1991 and 1995.** (dark pixels indicate low greenness, light pixels indicate high greenness)

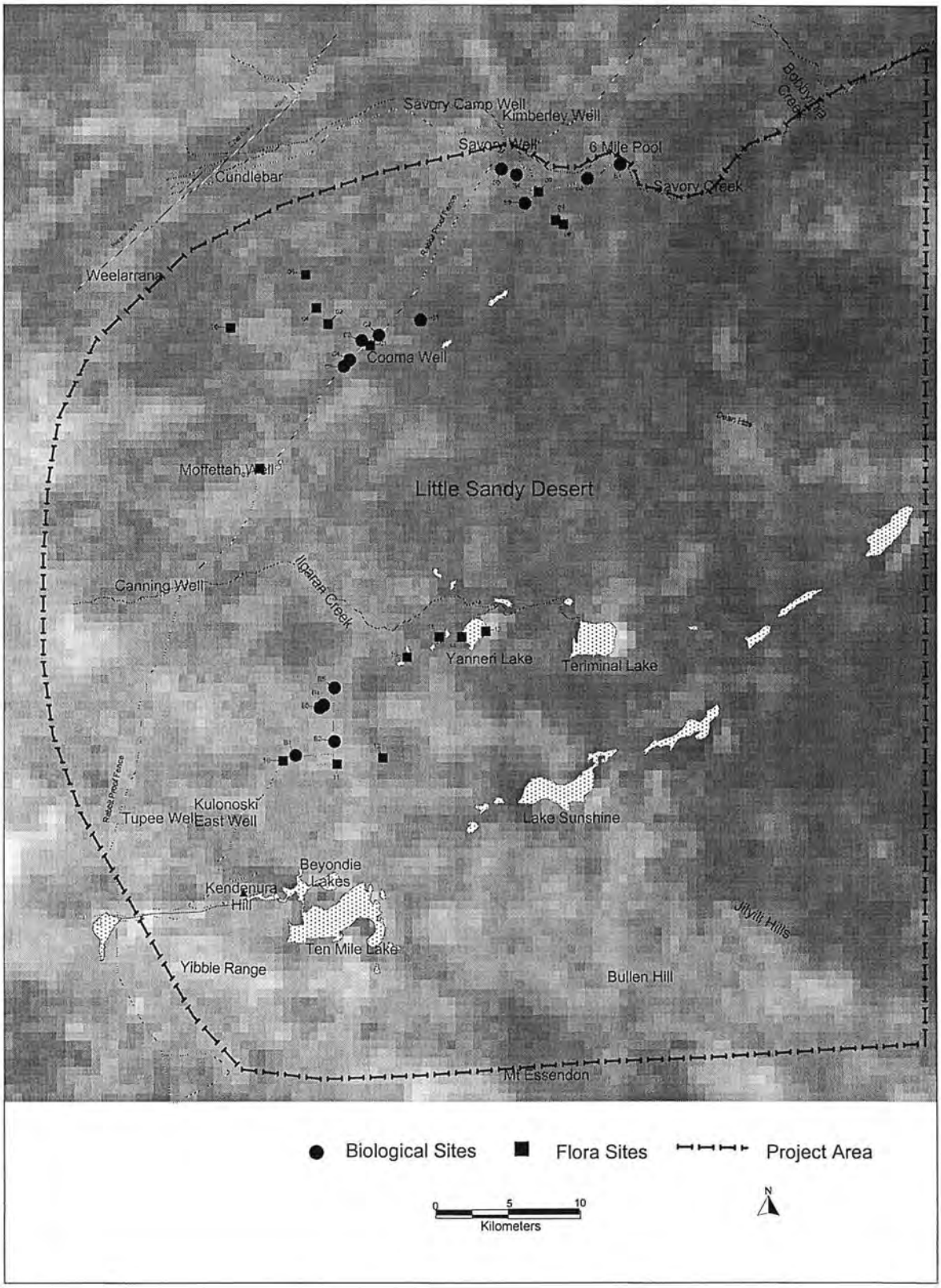

Figure 3 **Variance in NDVI imagery of the Southern Little Sandy Desert project area between 1991 and 1995.** (dark pixels indicate low variation in the greenness index, light pixels indicate high variation in the greenness index)

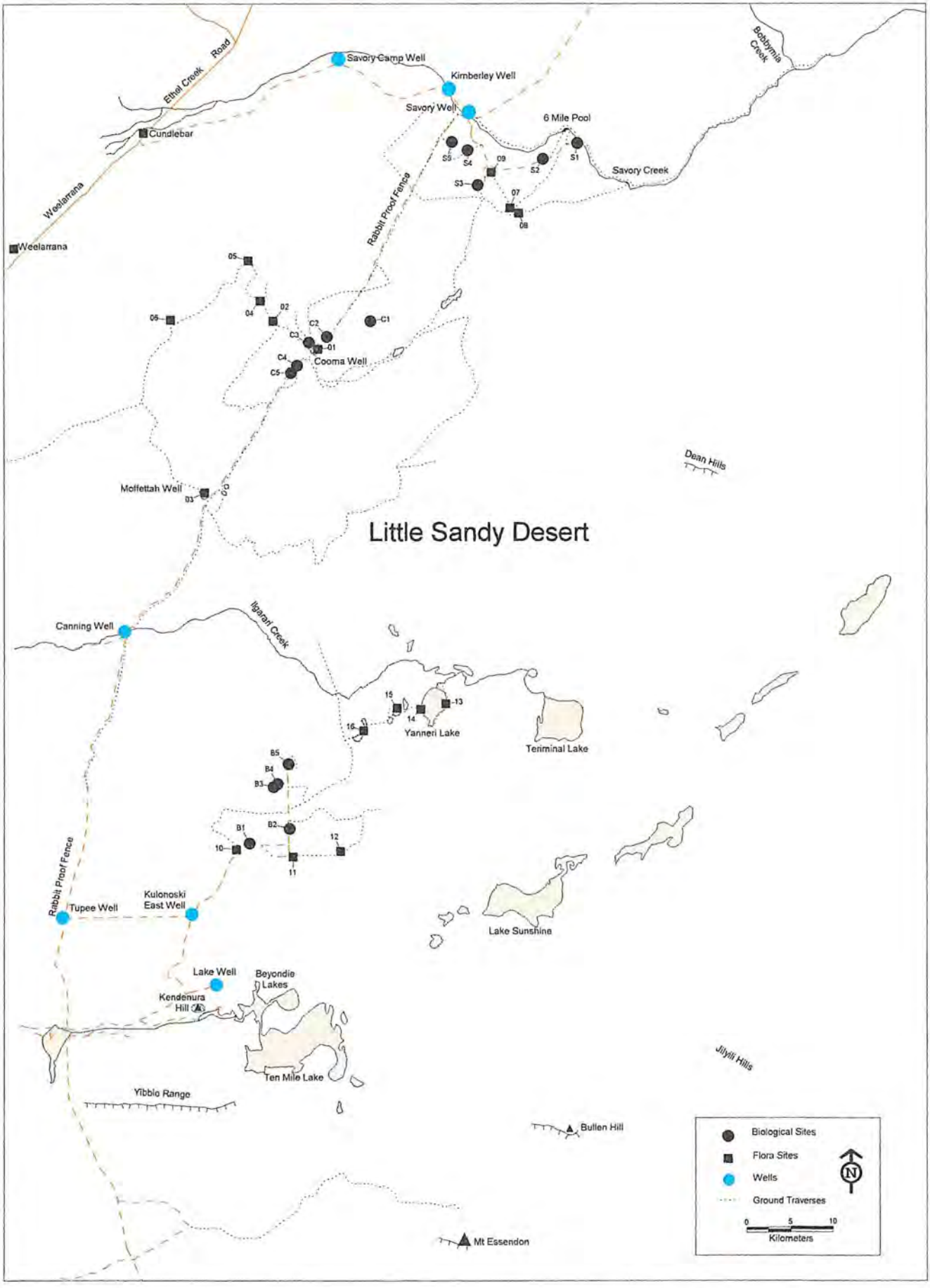

Figure 4 Location of ground traverses throughout the Southern Little Sandy Desert project area.

Table 1. Personnel involved in the 1996 field program.

Personnel	Organisation	Duties
June Field trip		
Stephen van Leeuwen	CALM - Science & Information	Project leader - Flora
Bob Bromilow	CALM - Science & Information	Technical support - Flora
Tony Start	CALM - Science & Information	Vertebrate Fauna
Phil Fuller	CALM - Science & Information	Avifauna
Andrew Chapman	CALM - Goldfield Region	Terrestrial Fauna
Kim Phillips-Jones	CALM - Goldfield Region	Technical support - Fauna
Stephen Hopper	Kings Park Board	Flora opportunistic
Luke Sweatman	Kings Park Board	Flora opportunistic
October Field trip		
Stephen van Leeuwen	CALM - Science & Information	Project leader - Flora
Bob Bromilow	CALM - Science & Information	Technical support - Flora
Phil Fuller	CALM - Science & Information	Avifauna
Norm McKenzie	CALM - Science & Information	Bat Fauna
Bill Muir	CALM - Science & Information	Technical support - Bat Fauna
Peter Kendrick	CALM - Pilbara Region	Vertebrate Fauna
John Angus	CALM - Pilbara Region	Terrestrial Fauna
David Knowles	CALM volunteer	Reptiles & Amphibians
Brad Marrion	CALM volunteer	Reptiles & Amphibians

Scope 4:

During the 1996 field trips, 520 plant specimens were collected representing 412 taxa (Appendix 1). Many of these plant specimens represent taxa which are poorly known and not well represented in herbarium collections. Some specimens appear to represent novel taxa not previously recorded in the scientific literature.

While many specimens await identification, it would appear that the flora of the project area is dominated by taxa within the families Mimosaceae, Chenopodiaceae, Poaceae and Myrtaceae with 54, 36, 34 and 30 taxa respectively. Dominant genera appear to be *Acacia*, *Eucalyptus, Eremophila*, *Ptilotus* and *Senna* with 54, 16, 15, 15, and 14 taxa respectively (Appendix 1). Considerable difficulty has been experienced with distinguishing and determining *Triodia* species in the project area as sterile specimens are notoriously difficult to identify. Hopefully, summer rains or the passage of a tropical depression through the project area will promote flowering in these plants as well as many other annual and ephemeral species.

Interesting flora records obtained during 1996 trips include:

- The identification of several new populations of *Eucalyptus rameliana*. These new populations extend the range of the species to the approaches of Savory Creek and provide many infill locations between the core population area around Cooma - Moffettah Wells and the Carnarvon Range (Figure 5). The species is currently known from 30 populations representing approximately 15 000 individuals over a geographic range of 115 km. The new populations located during 1996 were generally small, consisting of less than 50 plants, although one new population west of Cooma Well was estimated to contain approximately 300 plants.

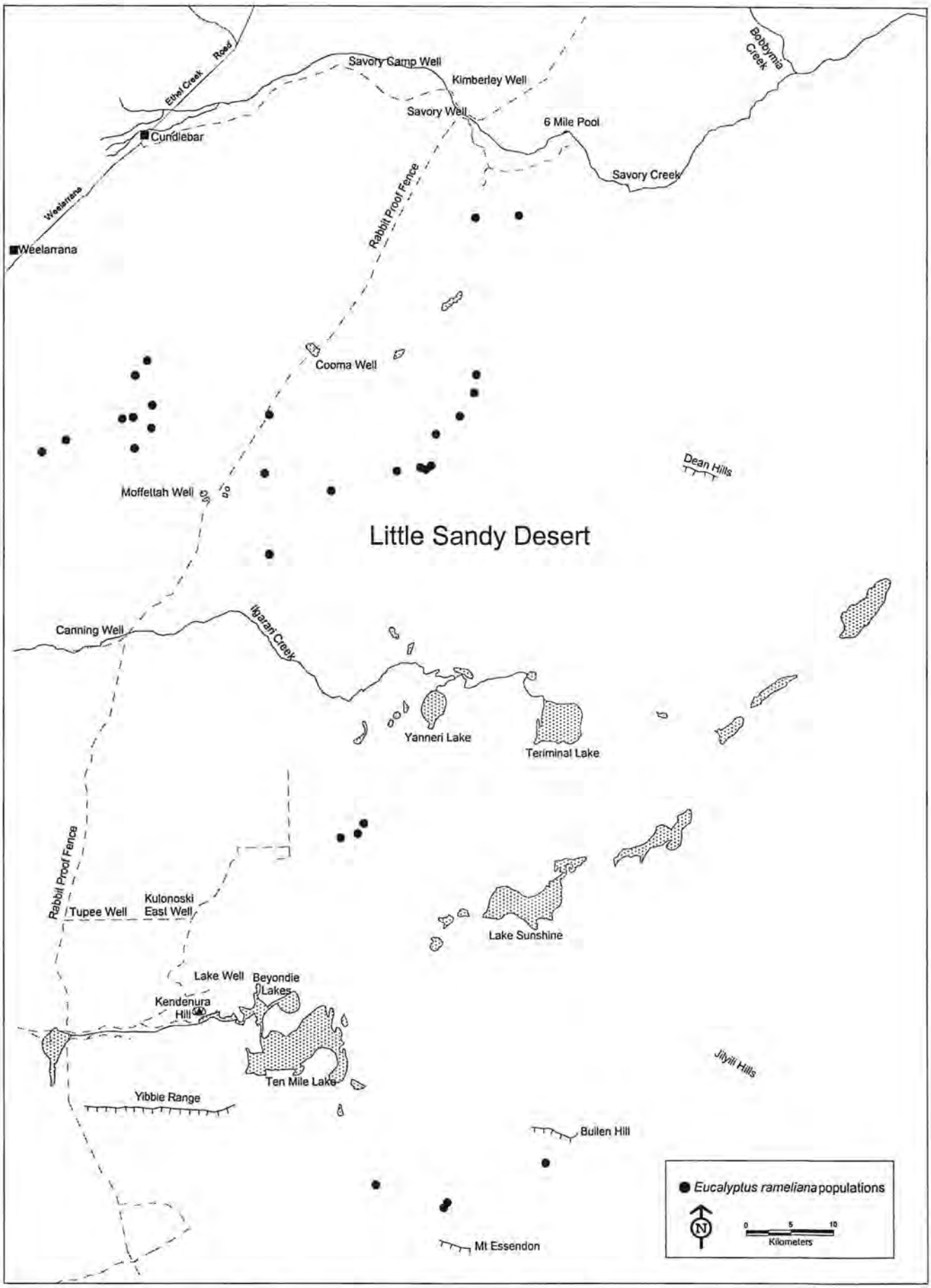

Figure 5 Location of populations of *Eucalyptus rameliana* within the Southern Little Sandy Desert project area.

Interesting ecological records were obtained of flowering phenology and birds, particularly honeyeaters, visiting inflorescences of E. rameliana. Observations of plants in bud and full flower in October indicate that this species has a protracted flowering season which may extend into the peak of summer.

- Several new populations of *Calothamnus 'footeana'* were also located, especially along the approaches to Savory Creek. All populations consisted of numerous plants.

The collection of a *Halosarcia* which has been confirmed as a novel taxon (Paul Wilson personal communication). This taxon was found on several playas in the vicinity of Yanneri Lake where it is represented by several thousand individuals. On the apron around Yanneri Lake this taxon is the dominant species emergent from other sandfire vegetation and growing amongst spinifex on small dunes and adjacent swales. The taxon was collected in bud in October, however, further material is required for the preparation of a diagnostic description. Additional material is also required to confirm the relationship of this taxon to other species within the genus. Fruiting material will be collected during a March 1997 trip to the project area.

- Several new populations of *Eucalyptus mannensis* were also located, further extending the geographical range of this species. These populations were in the vicinity of Moffettah Well. This taxon was previously restricted to the Gascoyne - Murchison Region, however, it has now been recorded on numerous occasions in the project area.

Numerous fauna records were obtained during field work undertaken in 1996. A total of 100 species of avifauna were observed in the project area during the year. Most records were obtained from within the permanent benchmark quadrats, however, considerable opportunistic observation augmented these records. This opportunistic observing concentrated on habitats not represented by the permanent benchmark quadrats. Interesting records included the observation of nesting *Cygnus atratus* (Black Swans) on Savory Creek and *Hamirosta melanosternon* (Black-breasted Buzzards) overhead at most sandstone ridges sites. A total of 106 species of avifauna have now been recorded in the project area during this investigation (Appendix 2).

A noticeable difference in the abundance of some bird species was apparent between the three study sites and between the sampling sessions. The most conspicuous changes in abundance were observed for the transient honeyeaters which were essentially absent from the project area in October, with the exception of some localised concentration around flowering *Eucalyptus rameliana* and *Grevillea eriostachya* plants. A noticeable zonation in the abundance of all avifauna was observed along a north-south gradient throughout the project area with the greatest species richness and numerical abundance of individuals being towards Savory Creek.

During the two sampling sessions in 1996, 110 terrestrial vertebrates were recorded in the project area. These vertebrates were recorded through trapping in pitfall, Elliott and cage traps and through intensive hand foraging and searching activities. A total trapping effort of 2 400 pitfall, 4 250 Elliott and 300 cage trap nights were amassed during 1996. This trapping effort was entirely focused on the permanent benchmark biological survey quadrats. Hand foraging and searching primarily focused on these quadrats also, however, other habitats were also examined. Hand foraging and searching involved both diurnal and nocturnal searches and included collection techniques such as mist netting, ultrasonic recording, shooting, raking, spinifex burning and hand collecting.

Twenty seven species of mammal were recorded during the 1996 field program (Appendix 3). Seven of these mammals were introduced species. Of the twenty indigenous mammals recorded, twelve were marsupials, six were rodents, one was a monotreme while the remaining taxon was the dingo. Intensive searching for bats was undertaken during the October field program, however, comprehensive details on the bat fauna are not currently available. Preliminary interrogation of ultrasonic signatures suggest that up to eight species of bat may be present in the project area. Interesting mammal records obtained during 1996 included:

- The collection of *Psuedomys chapmanii* (Pebble-mound Mouse) and the identification of several active mounds. These mounds were located on sandstone screes and breakaways in the vicinity of the Savory Creek. This location represents a link between western populations in the Hamersley and Collier Ranges and those found to the east in the Rudall River National Park and Throssell Range. This species is current gazetted as Schedule 1 Threatened Fauna in Western Australia.

- The collection of *Dasycersus cristicauda* (Mulgara). This species is known from isolated populations predominantly throughout the arid zone of central Australia. Populations of Mulgara have previously been located at Marymia and in the Collier Range National Park, sites approximately 150 km removed from the project area. This species is current gazetted as Schedule 1 Threatened Fauna in Western Australia. Two individuals of this species were caught in sandplain country near Cooma Well (site C4). Upon closer inspection of this habitat many distinctive burrows of this species were located.

- The collection of several specimens of the *Sminthopsis longicaudata* (Long-tailed Dunnart). This rodent was previously thought to be extinct, however, it has been collected on several occasions over the past decade from remote and rough regions of the Pilbara and adjacent deserts. This species was collected from sandstone habitats at the Savory Creek and Beyondie study areas. This species is currently under consideration for addition to the Schedule of Threatened fauna.

- The collection of *Sminthopsis hirtipes* (Hairy-footed Dunnart). This is a poorly known species which until recently was presumed to be rare. The use of more appropriate capture methods (pitfall traps) has revealed, however, that it is more abundant than previous assumed. Specimens of

this taxon were collected from the Cooma and Beyondie study sites and represent a north western range extension for this species.

- The collection of *Sminthopsis youngsoni* (Lesser hairy-footed Dunnart). This species was recorded on several occasions from all three camp sites. These populations represent a southerly range extension for the species from more northern localities like the Rudall River National Park.

- The recording of several abandoned nests of *Leporillus apicalis* (Lesser Stick-nest Rat) on sandstone ridges in the Cooma study area. This species is now extinct.

Seventy nine species of reptile and four species of frog were recorded during the 1996 field program (Appendix 4). Members of the skink and gecko families were the most abundant with species in the genus *Ctenotus, Lerista* and *Diplodactylus* dominating. The collection of nine species of *Varanus* is also noteworthy. Interesting records obtained included the following:

- The collection of *Ctenophorus scutulatus* (Lozenge-marked Dragon) from both Savory and Beyondie sites which are at the margins of its previously recorded distribution.

- The collection of *Ctenotus ariadnae* in the project area. These Little Sandy Desert records extend the species distribution west and out of the Gibson Desert and northern Goldfields.

- Several specimens of *Egernia depressa* (Pygmy Spiny-tailed Skink) were collected from mulga woodland at the Beyondie study area. This location represents a link between the species main distribution and disjunct outliers further east.

- The collection of several specimens of *Egernia striata* (Night Skink) which extends the species distribution further west from typical central desert regions.

- The collection of several specimens of *Lerista ips* which previously was only known from a few collections in the Great Sandy Desert and adjacent Northern Territory. These Little Sandy Desert collections considerably extend the species distribution to the south and west.

- The collection of several specimens of the recently recognised *Lerista macropisthopus remota*. Previously only one voucher of this species was recorded in Museum collections. This voucher was collected from the Jiggalong area which is north of the current project area.

- The collection of one specimen of *Moloch horridus* (Mountain Devil) at the Beyondie study area. This collection fills a gap in the species distribution for the central western portions of Western Australia.

- The collection of several *Ramphotyphlops* (Blind Snake) specimens which appear to represent a taxon not previously recognised in the scientific literature. An examination of Museum specimens is required to determine if this taxon has previously been collected.

- The collection of *Vermicella bertholdi* (Jan's Banded Snake) in the project area. This species in essentially a southern Australian taxon although its range does extend into the southern Pilbara and northern Goldfields. Records from the project area represent a north easterly extension to the species current distribution.

Sorting of invertebrate samples collected during the June and October 1996 field programs will commence early in 1997. Targeted invertebrate groups will include Formicidae (ants), Arachnida (except Acari) (spiders, scorpions and allies) and Myriapoda (centipedes, millipedes and allies). These invertebrate groups were selected for investigation during this project primarily because they are easy to sample and are relative well known taxonomically the and easy to identify. The availability of data for some of these invertebrate groups from adjacent biogeographical regions also influenced the selection process.

Identification, confirmation, processing and incorporation of voucher specimens collected during 1996 is continuing. Similarly the deposition of vouchers into the appropriate repository is underway. Development of specimen databases for each biotic group has occurred and will continue as additional specimens are processed and identified. Some specimen identifications are being undertaken by specialist taxonomists with expertise in particular groups of plant or animals.

Scope 5:

Identification of the conservation values of the project area has commenced. Preliminary results indicate that several species of flora and fauna in the project area are of conservation significance. These species are primarily *E. rameliana*, *C. 'footeana'*, the novel *Halosarcia*, *P. chapmanii, D. cristicauda, S. longicaudata* and *Lerista ips.* Undoubtedly, other species of conservation significance will be identified as more of the specimens collected during the 1996 field program are processed, identified and databased.

Several communities of conservation significance have already been identified. They include:

- The alluvial flats along the fringe of Savory Creek. These alluvial flats support a diverse assemblage of annual plants many of which appear to be at the limit of their distribution.

- The sandstone rises and ridges within the project area which support populations of S. *longicaudata* and provide suitable habitats for *P. chapmanii.*

- Sandplain country around Cooma Well which supports populations of *D. cristicauda.*

- Playa systems in the vicinity of Yanneri lake which support populations of the novel *Halosarcia*.

- Dune fields and sandstone ridges to the west and east of Cooma and Moffettah Wells which support large populations of *E. rameliana* and *C. 'footeana'*.

- *Allocasuarina decaisneana* woodlands to the east of Cooma Well as they represent an atypical vegetation association in the project area. These woodlands are extensive and support a diverse understorey dominated by shrub mallee and *Acacia* thickets.

Scope 6:

As there are no existing reserves in the project area or in close proximity, it appears that the existing nature conservation reserve system inadequately represents the species and communities present in the project area. The closest conservation reserve is Collier Range National Park, approximately 70 km to the west of the project area. This reserve, located in the Gascoyne Biogeographical Region, has an underlying geology dominated by sandstone. It contains only a small dune field and appears to be predominantly vegetated by *Acacia* and *Eremophila* shrub savanna. While no comprehensive flora and fauna list is available for Collier Range National Park, there appears to be large inconsistencies in species composition between this reserve and the project area. This is highlighted by the absence of *E. rameliana*, *C. 'footeana'* and *A. decaisneana* from Collier Range. Incongruity between this reserve and the project area is also emphasised by the absence of a playa system in the former which supports populations of the novel *Halosarcia*. Nevertheless, this reserve and the project area are similar in that they both support populations of *D. cristicauda* and *P. chapmanii*.

Rudall River National Park is the only conservation reserve in the Little Sandy Desert Biogeographical Region. Many of the flora species collected in the project area also appear to occur at Rudall River, however, dune fields dominated by communities of *E. rameliana* and *C. 'footeana'* are not represented in this conservation reserve. No comparison can be made for the fauna at present as records for Rudall River are limited and have not been databased.

Land included in the proposed Carnarvon Range National Park may encompass a representative example of the flora and fauna of the project area, however, further examination of this reserve proposal is required. Problems may exist with this reserve proposal as mineral prospects are considered to be significant.

No adequate assessment of the representativeness of the existing and proposed reserve system and the project area can be made until more biological data has been collected and analysed.

Scope 7:

Several threatening processes within the project area have been identified. They include:

- Grazing by *Camelus dromedarius* (Camel) and *Equus asinus* (Donkey). Camels are common throughout the project area especially in the vicinity of Savory Creek, Ilgarari Creek and Beyondie Lake. During the October field trip an estimated 200 camels and 100 donkeys were observed over five days while working at sites in the vicinity of Savory Creek. Superficially, their impact appears to be minimal, however, on closer examination they seem to have a marked affect on the chenopod scrub communities fringing some playas. This effect is manifested through grazing and trampling. Grazing pressure by camels also appears to be responsible for the 'lollipop' appearance of *Brachychiton* trees, where the canopy skirt is neatly trimmed to camel-reach height. Similarly, grazing by camels may be responsible for the general absence of any *Brachychiton* seedlings or juvenile plants. Camel grazing may also be having a similar affect on *A. decaisneana* plants.

  Donkeys are abundant on areas adjacent to Savory Creek and appear to be having a noticeable effect on the riverine vegetation. Donkeys were also observed foraging on the lateritic and sandstone rises adjacent to Savory Creek.

  Feral cats were observed at all three camp sites. Accordingly, they are undoubtedly having an impact on the fauna.

- Grazing by cattle and horses along Savory Creek and in the vicinity of Beyondie Lake may also be having an affect, however, this is a legitimate activity on these pastoral lease areas.

- Fire may also be considered a threatening process as the project area generally appears to have been unburnt for a long period and consists of relatively homogeneous fuels. Examination of thematic Landsat imagery indicates a few fire scars in the project area. These scars appear to be confined to shrublands adjacent to sandstone ridges and on lateritic rises. In the dune fields, fire scars are small and appear to be restricted to swale areas. The apparent homogeneous nature of the project area with respect to fire may indicate that the area is not susceptible to large conflagrations. Anecdotal evidence supporting this proposition is provided through the persistence of extensive *Acacia aneura* (mulga) woodlands in the project area. These woodlands, and in particular individuals of *A. aneura,* are fire sensitive and usually restricted to refugial sites (fire avoiding) in environments where fire is a frequent habitat modifying force.

Scope 8:

Management options to ensure the conservation of the flora and fauna in the project area include:

- The reservation of an appropriate representative area of the southern Little Sandy Desert. This reservation will ensure that the biota of the project area is protected and will provide a legislative framework for the implementation of future land management programs. The formalisation of such a reserve proposal will also facilitate discussion and negotiation with other landusers (Native Title, miners, pastoralists) who have aspirations for the project area. Such discussions and negotiations will hopefully resolve any conflicting landuse issues.

- The implementation of a feral animal control program. This program will be designed to reduce the impacts of grazing by camels and donkeys on the project area. Adjacent leaseholders will benefit from such a program as a reduction in feral animal numbers will reduce competition with stock for natural pastures and will also mitigate damage to infrastructure like fences and improved waters.

- The development and implementation of a fire management strategy which mitigates any deleterious burning impacts. To reduce the potential for large conflagrations it may be appropriate to implement fire management strategies which aim to create a heterogeneous mosaic of fire histories across the project area. This management aim may be implemented through controlled burning with the aid of aerial ignition. CALM currently implement similar fire management strategies in the Gibson and Great Victoria Deserts.

Scope 9:

The selection of priority areas within the project area for addition to the reserve system has begun, however, it is currently in its infancy and is not based on any quantifiable data. Preliminary discussions with colleagues, field inspections and interrogation of existing GIS data sets indicate that a reserve in the vicinity of Moffettah and Cooma Wells, which encompasses the Dean Hills and the Ilgarari Creek system and its associated lakes (Yanneri and Terminal), may be appropriate (Figure 6). Such a reserve would encompass all the landforms and vegetation associations present in the project area, although the representativeness of the biota cannot yet be determined.

Reserves along Savory Creek and in the vicinity of the Beyondie study sites are also worthy of consideration.

Scope 10:

Resources required to identify the biophysical sub-regions in the project area using the information collected during this survey will primarily focus on the use of satellite imagery. Preliminary ideas focus on the use of Landsat imagery to identify and delimit the extent of those geological and landscape themes which govern the distribution of biota, especially the vegetation, in the project area. Further sampling and analysis of the biota throughout the project area and comparison with information from adjacent areas in the same and neighbouring Biogeographical Regions is required, however, before the suitability of this approach to the identification of bio-physical sub-regions can be undertaken.

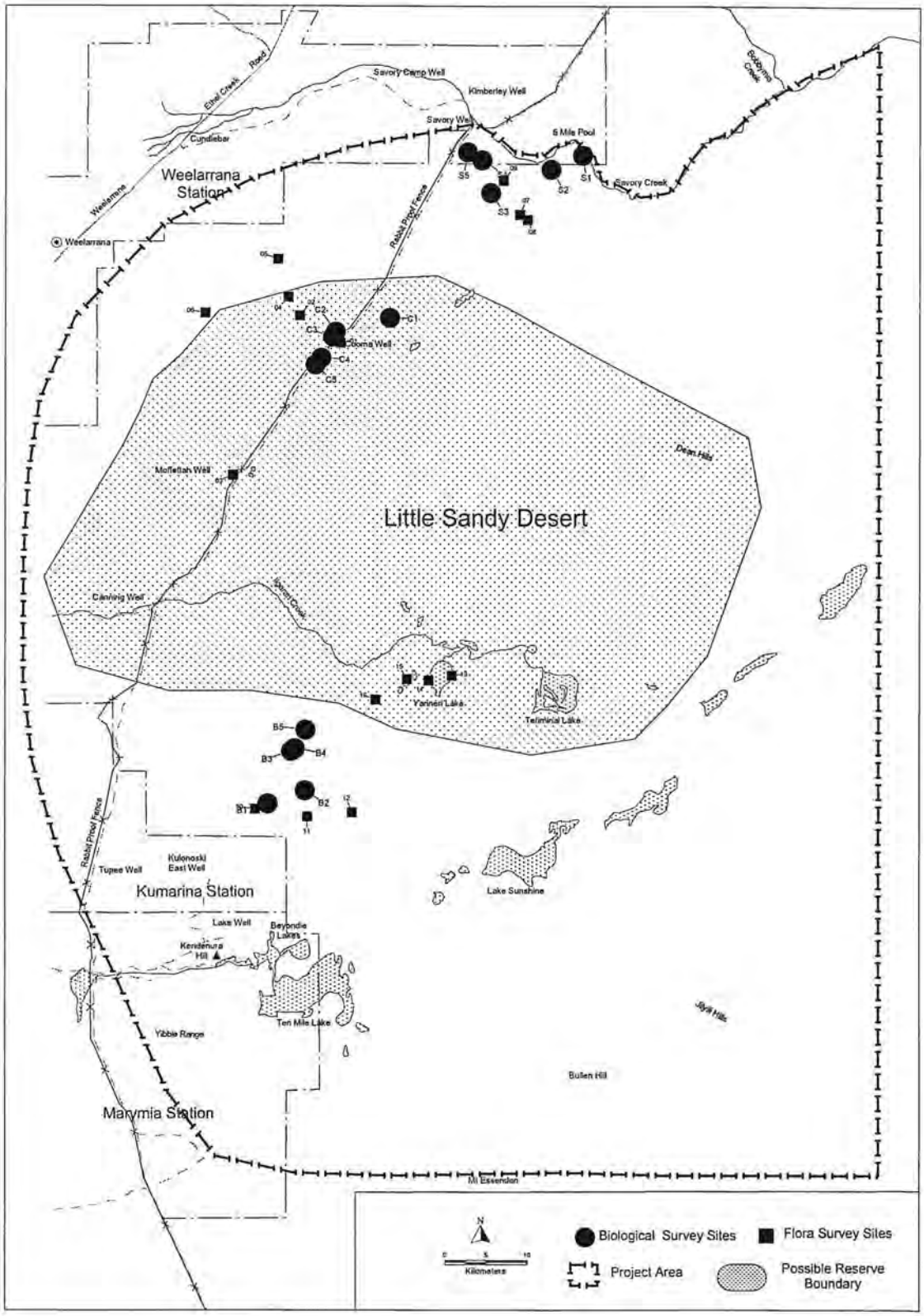

Figure 6 **Location of the principal conservation priority area in the southern portion of the Little Sandy Desert.**

PLANNED ACTIVITIES TOWARDS COMPLETION OF SCOPE ITEMS:

Work is continuing on this project. Voucher specimens collected during the 1995 and 1996 field programs are still being processed, identified and databased. Specimen and GIS databases are continually being developed and augmented with the addition of new records and themes.

The next trip to the project area is planned for February-March 1997. Personnel on this trip will be Stephen van Leeuwen (Chief Investigator, flora) and Bob Bromilow (technical support). The primary purpose of this trip will be to empty and replenish the permanent invertebrate sampling pits. Opportunistically fora and fauna collecting will also be undertaken.

During 1997, another major sampling trip is planned to the project area. Scheduling for this trip has not been formalised but timing will be significantly influenced by the success of the coming wet season and its associated rains. At present it is planned to undertake this trip in July/August. Tentatively, the survey team will consist of Stephen van Leeuwen (Chief Investigator, flora), Bob Bromilow (technical support), Phil Fuller (birds), Andrew Burbidge (mammals), Tony Start (mammals and bats), Mark Harvey (invertebrates), David Robinson (reptiles) and Brad Marrion (reptiles).

* * * * * * * * * * *

APPENDIX 1

Appendix One

Vascular plant species collected in the Southern Little Sandy Desert project area during the 1996 field program.

This list of vascular plants includes all specimens collected during the 1996 field program and subsequently identified before 1 December 1996. Taxa are listed alphabetically in the order of genus and species in their respective families. The family sequence follows approximately the classification presented in Green (1985) "Census of the Vascular Plants of Western Australia". Nomenclature generally follows Green *op. cit.* and that employed by the Western Australian Herbarium, apart from a few exceptions where recent taxonomic revisions have suggested alternative classifications.

APPENDIX 1

ADIANTACEAE

Cheilanthes brownii
Chielanthes sieberi

MARSILEACEAE

Marsilea sp. (SVL 2604)

POACEAE

Amphipogon caricinus
Amphipogon sp. (SVL 2503)
Aristida contorta
Aristida sp. (SVL 2363)
Chrysopogon fallax
Cymbopogon sp. (SVL 2559)
Enneapogon caerulescens
Enneapogon polyphyllus
Enneapogon sp. (SVL 2962)
Eragrostis dielsii
Eragrostis sp. (SVL 2349)
Eragrostis sp. (SVL 2478)
Eragrostis sp. (SVL 2512)
Eragrostis sp. (SVL 2513)
Eragrostis sp. (SVL 2626)
Eragrostis sp. (SVL 2829)
Eragrostis sp. (SVL 2830)
Eragrostis sp. (SVL 2946)
Eriachne aristidea
Eriachne dominii
Eriachne mucronata
Eriachne sp. (SVL 2491)
Paraneurachne mulleri
Paraneurachne sp. (SVL 2846)
Paspalidum sp. (SVL 2592)
Plectrachne schinzii
Setaria sp. (SVL 2606)
Triodia pungens
Triodia wiseana
Triodia sp. (SVL 2440)
Triodia sp. (SVL 2498)
Genus sp. nov. (SVL 2418)
Genus sp. nov. (SVL 2538)
Genus sp. nov. (SVL 2620)

CYPERACEAE

Cyperus bulbosa
Genus sp. nov. (SVL 2661)
Genus sp. nov. (SVL 2912)

DASYPOGONACEAE

Lomandra leucocephala subsp. *robusta.*

XANTHORRHOEACEAE

Xanthorrhoea thorntonii

ANTHERICACEAE

Caesia sp. (SVL 2639)

COLCHICACEAE

Wurmbea aff. *deserticola* (SVL 2642)

CASUARINACEAE

Allocasuarina decaisneana
Casuarina cristata

MORACEAE

Ficus platypoda var. *minor.*

PROTEACEAE

Grevillea eriostachya
Grevillea spinosa
Grevillea striata
Grevillea wickhamii subsp. *aprica*
Grevillea sp. (SVL 2351)
Grevillea sp. (SVL 2358)
Grevillea sp. (SVL 2365)
Grevillea sp. (SVL 2532)
Grevillea sp. (SVL 2619)
Hakea preissii
Hakea rhombales
Hakea suberea

SANTALACEAE

Anthobolus leptomerioides
Exocarpus sp. (SVL 2389)
Exocarpus sp. (SVL 2640)
Santalum accuminatum
Santalum lanceolatum
Santalum sp. (SVL 2400)

LORANTHACEAE

Amyema aff. *bifurcatum* (SVL 2388)
Amyema fitzgeraldii
Amyema preissii

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Amyema sp. (SVL 2399)
Lysiana murrayi

CHENOPODIACEAE

Dysphania knappii
Dysphania melanoma
Dysphania sp. (SVL 2484)
Enchyleana tomentosa
Halosarcia sp. (SVL 2944)
Halosarcia sp. (SVL 2947)
Halosarcia sp. (SVL 2948)
Halosarcia sp. (SVL 2972)
Halosarcia sp. (SVL 2973)
Halosarcia sp. (SVL 2992)
Halosarcia sp. (SVL 3019)
Halosarcia sp. (SVL 3020)
Halosarcia sp. (SVL 3022)
Maireana melanocoma
Maireana planifolium
Maireana villosum
Maireana sp. (SVL 2429)
Rhagodia eremaea
Rhagodia sp. (SVL 2448)
Rhagodia sp. (SVL 2949)
Rhagodia sp. (SVL 2965)
Salsola kali
Scleroleana cuneata
Scleroleana sp. (SVL 2385)
Scleroleana sp. (SVL 2945)
Scleroleana sp. (SVL 3021)
Scleroleana sp. (SVL 3023)
Tecticornia sp. (SVL 2653)
Genus sp. nov. (SVL 2570)
Genus sp. nov. (SVL 2583)
Genus sp. nov. (SVL 2599)
Genus sp. nov. (SVL 2621)
Genus sp. nov. (SVL 2636)
Genus sp. nov. (SVL 2659)
Genus sp. nov. (SVL 2832)
Genus sp. nov. (SVL 2997)

AMARANTHACEAE

Amaranthus sp. (SVL 2561)
Ptilotus aff. *aphyllus*
Ptilotus astrolasius
Ptilotus exaltatus
Ptilotus fusiformis
Ptilotus helipteroides
Ptilotus aff. *helipteroides* (SVL 2884)
Ptilotus macrocephalus
Ptilotus obovatus
Ptilotus rotundifolius
Ptilotus sp. (SVL 2362)
Ptilotus sp. (SVL 2405)
Ptilotus sp. (SVL 2593)
Ptilotus sp. (SVL 2871)
Ptilotus sp. (SVL 2925)
Ptilotus sp. (SVL 2940)

GYROSTEMONACEAE

Codonocarpus cotinifolius
Gyrostemon ramulosum
Gyrostemon sp. (SVL 2923)

AIZOACEAE

Trianthema sp. (SVL 2424)
Trianthema sp. (SVL 2611)

PORTULACACEAE

Calandrinia sp. (SVL 2356)
Calandrinia sp. (SVL 2396)

CARYOPHYLLACEAE

Polycarpaea sp. (SVL 2488)

LAURACEAE

Cassytha sp. (SVL 2549)

CAPPARACEAE

Capparis lasiantha

BRASSICACEAE

Lepidium pedicellatum
Lepidium sp. (SVL 2603)
Lepidium sp. (SVL 2605)

PITTOSPORACEAE

Pittosporum phylliraeoides

SURIANACEAE

Stylobasium spathulatum
Stylobasium sp. (SVL 2464)

MIMOSACEAE

Acacia abrupta

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Acacia adoxa
Acacia adsurgens
Acacia aff. *adsurgens* (SVL 2454)
Acacia ancistrocarpa
Acacia aneura
Acacia aff. *aneura* (SVL 2334)
Acacia aff. *aneura* (SVL 2419)
Acacia aff. *aneura* (SVL 2525)
Acacia aff. *aneura* (SVL 2545)
Acacia aff. *aneura* (SVL 2898)
Acacia bivenosa
Acacia aff. *bivenosa* (SVL 2643)
Acacia aff. *catenulata* (SVL 2432)
Acacia coriacea
Acacia coriacea subsp. *seriophylla*
Acacia daviesioides
Acacia aff. *dictyophleba* (SVL 2360)
Acacia aff. *dictyophleba* (SVL 2434)
Acacia aff. *dictyophleba* (SVL 2453)
Acacia eriopoda
Acacia hilliana
Acacia inaequilatera
Acacia aff. *kempeana* (SVL 2443)
Acacia aff. *kempeana* (SVL 2455)
Acacia aff. *kempeana* (SVL 2629)
Acacia ligulata
Acacia aff. *ligulata* (SVL 2449)
Acacia aff. *ligulata* (SVL 2865)
Acacia maitlandii
Acacia marramamba
Acacia miniura
Acacia pachyacra
Acacia pruinocarpa
Acacia retivenia
Acacia rhodophloia
Acacia aff. *rhodophloia* (SVL 2428)
Acacia spondylophylla
Acacia stowardii
Acacia aff. *stowardii* (SVL 2451)
Acacia aff. *stowardii* aff. (SVL 2872)
Acacia synchronicia
Acacia tetragonophylla
Acacia aff. *tetragonophylla* (SVL 2397)
Acacia validinervia
Acacia aff. *validinervia* (SVL 2401)
Acacia wanyu
Acacia aff. *wanyu* (SVL 2878)
Acacia aff. *xiphophylla* (SVL 2433)
Acacia sp. (SVL 2450)
Acacia sp. (SVL 2470)
Acacia sp. (SVL 2573)
Acacia sp. (SVL 2627)
Acacia sp. (SVL 2930)

CAESALPINIACEAE

Petalostylis cassioides
Senna artemisioides subsp. *artemisioides*
Senna artemisioides subsp. *helmsii*
Senna artemisioides subsp. *oligophylla*
Senna aff. *artemisioides* subsp. *oligophylla* (SVL 2422)
Senna artemisioides subsp. nov. (SVL 2346)
Senna artemisioides subsp. nov. (SVL 2462)
Senna artemisioides subsp. nov. (SVL 2550)
Senna artemisioides subsp. nov. (SVL 2628)
Senna artemisioides subsp. nov. (SVL 2963)
Senna glutinosa subsp. *glutinosa*
Senna glutinosa subsp. *leurssenii*
Senna glutinosa subsp. *pruinosa*
Senna sp. (SVL 2347)
Senna sp. (SVL 2409)

PAPILIONACEAE

Crotolaria cunninghamii
Daviesia sp.
Gastrolobium grandiflorum
Gompholubium polyzygum
Indigofera monophylla
Indigofera sp. (SVL 2390)
Jacksonia sp. (SVL 2515)
Kennedia prorepens
Leptosema sp. (SVL 2575)
Psoralea sp. (SVL 2586)
Pultenaea sp. (SVL 2517)
Swainsona sp. (SVL 2568)
Swainsona sp. (SVL 2591)
Templetonia sp. (SVL 2999)
Genus sp. nov. (SVL 2535)
Genus sp. nov. (SVL 2563)
Genus sp. nov. (SVL 2581)
Genus sp. nov. (SVL 2595)

ZYGOPHYLLACEAE

Tribulus suberosa
Tribulus sp. (SVL 2968)
Zygophyllum sp. (SVL 2417)
Zygophyllum sp. (SVL 2569)

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Zygophyllum sp. (SVL 2608)

EUPHORBIACEAE

Euphorbia boopthona
Euphorbia aff. *drummondii* (SVL 2631)
Euphorbia sp. (SVL 2610)
Euphorbia sp. (SVL 2852)
Phyllanthus sp. (SVL 2602)
Phyllanthus sp. (SVL 2638)
Genus sp. nov. (SVL 2852)

CELASTRACEAE

Maytenus sp. (SVL 2883)

STACKHOUSIACEAE

Macgregoria racemigera
Stackhousia sp. (SVL 2866)
Stackhousia sp. (SVL 2995)
Genus sp. nov. (SVL 2598)

SAPINDACEAE

Diplopeltis sp. (SVL 2391)
Dodonaea coriacea
Dodonaea lanceolata
Dodonaea lanceolata subsp. *spathulatum*
Dodonaea petiolaris
Dodonaea sp. (SVL 2998)

TILIACEAE

Corchorus aff. *sidoides* (SVL 2556)
Corchorus sp. (SVL 2402)

MALVACEAE

Abutilon sp. (SVL 2527)
Abutilon sp. (SVL 2630)
Hibiscus coatsii
Hibiscus sp. (SVL 2908)
Lawrencia sp. (SVL 2567)
Lawrencia sp. (SVL 2585)
Lawrencia sp. (SVL 2655)
Lawrencia sp. (SVL 2847)
Sida arenicola (SVL 2548)
Sida aff. *fibulifera* (SVL 2485)
Sida aff. *fibulifera* (SVL 2486)
Sida aff. *fibulifera* (SVL 2967)
Sida sp. (SVL 2412)
Sida sp. (SVL 2666)
Sida sp. (SVL 2964)
Genus sp. nov. (SVL 2383)
Genus sp. nov. (SVL 2487)
Genus sp. nov. (SVL 2562)
Genus sp. nov. (SVL 2845)

STERCULIACEAE

Brachychiton gregorii
Keraudrenia integrifolia
Rulingea rotundifolia

FRANKENIACEAE

Frankenia sp. (SVL 2601)
Frankenia sp. (SVL 2994)

VIOLACEAE

Hybanthus aurantiacus

MYRTACEAE

Calothamnus "footeana" (SVL 2539)
Calytrix carinata
Corymbia aff. *aspera* (SVL 2342)
Corymbia chippendalei (SVL 2411)
Corymbia deserticola
Corymbia terminalis
Corymbia aff. *terminalis* (SVL 2885)
Eucalyptus gamophylla
Eucalyptus kingsmillii
Eucalyptus mannensis
Eucalyptus oldfieldii
Eucalyptus aff. *oldfieldii* (SVL 2663)
Eucalyptus oleosa
Eucalyptus pachyphylla
Eucalyptus rameliana
Eucalyptus striaticalyx
Eucalyptus trivalvis
Eucalyptus victrix
Eucalyptus sp. (SVL 2471)
Eucalyptus sp. (SVL 2662)
Eucalyptus sp. (SVL 2668)
Eucalyptus sp. (SVL 2881)
Eucalyptus sp. (SVL 3001)
Lamarchea sulcata
Melaleuca eleuterostachya
Melaleuca sp. (SVL 2338)
Melaleuca sp. (SVL 2607)
Melaleuca sp. (SVL 2624)
Melaleuca sp. (SVL 2656)
Melaleuca sp. (SVL 2834)
Melaleuca sp. (SVL 2835)

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Melaleuca sp. (SVL 2849)
Melaleuca sp. (SVL 2925)
Melaleuca sp. (SVL 2969)
Melaleuca sp. (SVL 2978)
Thryptomene maisonneuvei
Thyptomene sp. (SVL 2862)

HALORAGACEAE

Haloragis gossei

APIACEAE

Xanthosia sp. (SVL 2374)

ASCLEPIADACEAE

Gymnema sp. (SVL 2407)
Gymnema sp. (SVL 2459)
Marsdenia sp. (SVL 2874)
Sarcostemma viminale subsp. *australe*
Genus sp. nov. (SVL 2413)

CONVOLVULACEAE

Bonamia sp. (SVL 2369)
Evolvulus alsinoides
Porana commixta

BORAGINACEAE

Halgania solanacea (SVL 2521)
Halgania sp. (SVL 2966)
Heliotropium sp. (SVL 2520)
Trichodesma zeylanicum

VERBENACEAE

Clerodendrum sp. (SVL 2398)

CHLOANTHACEAE

Dicrastylis georgei
Dicrastylis sp. (SVL 2364)
Dicrastylis sp. (SVL 2367)
Dicrastylis sp. (SVL 2557)
Dicrastylis sp. (SVL 2870)
Newcastelia sp. (SVL 2641)
Genus sp. nov. (SVL 2410)
Genus sp. nov. (SVL 2933)
Genus sp. nov. (SVL 2937)

LAMIACEAE

Prostranthera sp. (SVL 2479)

SOLANACEAE

Nicotina rosulata
Solanum centrale
Solanum aff. *centrale* (SVL 2379)
Solanum horridum
Solanum lasiophyllum
Solanum phlomoides
Solanum aff. *phlomoides* (SVL 2508)
Solanum sturtianum
Solanum sp. (SVL 2917)

SCROPHULARIACEAE

Genus sp. nov. (SVL 2536)
Genus sp. nov. (SVL 2537)

MYOPORACEAE

Eremophila cunefolia
Eremophila aff. *cunefolia* (SVL 2408)
Eremophila exilifolia
Eremophila forrestii
Eremophila "jucunda" (SVL 2421)
Eremophila lanceolata
Eremophila latrobei
Eremophila aff. *latrobei* (SVL 2461)
Eremophila aff. *latrobei* (SVL 2474)
Eremophila longifolia
Eremophila margarethae (red) (SVL 2576)
Eremophila margarethae (yellow) (SVL 2577)
Eremophila sp. (SVL 2469)
Eremophila sp. (SVL 2618)
Eremophila sp. (SVL 3012)

RUBIACEAE

Canthium attenuatum
Canthium latifolium
Canthium lineare
Hedyotis crouchiana
Pomax aff. *umbellata* (SVL 2468)

CAMPANULACEAE

Wahlenbergia sp. (SVL 2928)

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LOBELIACEAE

Lobelia sp. (SVL 2861)

GOODENIACEAE

Dampiera candicans
Dampiera sp. (SVL 2404)
Dampiera sp. (SVL 2511)
Dampiera sp. (SVL 2522)
Goodenia prostrata
Goodenia aff. *stobbsiana* (SVL 2382)
Goodenia aff. *stobbsiana* (SVL 2514)
Goodenia triodiophylla
Goodenia sp. (SVL 2442)
Goodenia sp. (SVL 2510)
Goodenia sp. (SVL 2572)
Goodenia sp. (SVL 2594)
Goodenia sp. (SVL 2637)
Goodenia sp. (SVL 2657)
Goodenia sp. (SVL 2926)
Goodenia sp. (SVL 3006)
Scaevola amblyanthera
Scaevola parvifolia
Scaevola spinescens
Velleia connata
Velleia sp. (SVL 2938)

BRUNONIACEAE

Brunonia australis

STYLIDIACEAE

Stylidium sp. (SVL 2502)
Stylidium sp. (SVL 2927)

ASTERACEAE

Brachycome sp. (SVL 2582)
Calocephalus sp. (SVL 2831)
Olearia sp. (SVL 2415)
Podolepis sp. (SVL 2590)
Podolepis sp. (SVL 2833)
Rhodanthe helipterioides
Rhodanthe humboltianum
Genus sp. nov. (SVL 2578)
Genus sp. nov. (SVL 2589)
Genus sp. nov. (SVL 2597)
Genus sp. nov. (SVL 2600)
Genus sp. nov. (SVL 2931)
Genus sp. nov. (SVL 2968)
Genus sp. nov. (SVL 3000)

UNSPECIFIED

Genus sp. nov. (SVL 2609)
Genus sp. nov. (SVL 2644)
Genus sp. nov. (SVL 2645)
Genus sp. nov. (SVL 2651)

APPENDIX 2

Appendix Two

Avifauna recorded in the

Southern Little Sandy Desert project area during the 1996 field program.

APPENDIX 2

DROMAIIDAE

Dromaius novaehollandiae (Emu)

PODICIPEDIDAE

Tachybaptus novaehollandiae (Australian Grebe)

ANHINGIDAE

Anhinga melanogaster (Darter)

ARDEIDAE

Ardea novaehollandiae (White-faced Heron)
Ardea pacifica (Pacific Heron)

ANATIDAE

Anas gibberifrons (Grey Teal)
Anas superciliosa (Pacific Black Duck)
Chenonetta jubata (Maned Duck)
Cygnus atratus (Black Swan)
Malacorhynchus membranaceus (Pink-eared Duck)
Tadorna tadornoides (Australian Shelduck)

ACCIPITRIDAE

Accipiter cirrhocephalus (Collared Sparrowhawk)
Accipeter fasciatus (Brown Goshawk)
Aquila audax (Wedged-tailed Eagle)
Circus assimilis (Spotted Harrier)
Haliastur sphenurus (Whistling Kite)
Hamirostra melanosternon (Black-breasted Buzzard)
Hieraaetus morphnoides (Little Eagle)
Milvus migrans (Black Kite)

FALCONIDAE

Falco berigora (Brown Falcon)
Falco longipennis (Australian Hobby)
Falco cenchroides (Australian Kestrel)

TURNICIDAE

Turnix velox (Little Button-quail)

RALLIDAE

Fulica atra (Eurasian Coot)

OTIDIDAE

Ardeotis australis (Australian Bustard)

CHARADRIIDAE

Charadrius melanops (Black-fronted Plover)
Charadrius ruficapillus (Red-capped Plover)
Erythrogonys cinctus (Red-kneed Dotterel)
Vanellus tricolor (Banded Lapwing)

RECURVIROSTRIDAE

Himantopus himantopus (Black-winged Stilt)

SCOLOPACIDAE

Bartramia longicauda (Common Sandpiper)

LARIDAE

Chlidonias hybrida (Whiskered Tern)

COLUMBIDAE

Geopelia cuneata (Diamond Dove)
Ocyphaps lophotes (Crested Pigeon)
Petrophassa plumifera (Spinifex Pigeon)
Phaps chalcoptera (Common Bronzewing)

CACATUIDAE

Cacatua roseicapilla (Galah)
Cacatua sanguinea (Little Corella)

POLYTELITIDAE

Nymphicus hollandicus (Cockatiel)

PLATYCERCIDAE

Barnardius zonarius (Port Lincoln Ringneck)
Melopsittacus undulatus (Budgerigar)
Psephotus varius (Mulga Parrot)

CUCULIDAE

Cuculus pallidus (Pallid Cuckoo)
Chrysococcyx basalis (Horsfield's Bronze-cuckoo)

STRIGIDAE

Ninox novaeseelandiae (Southern Boobook)

APPENDIX 2

PODARGIDAE

Podargus strigoides (Tawny Frogmouth)

AEGOTHELIDAE

Aegotheles cristatus (Australian Owlet-nightjar)

CAPRIMULGIDAE

Caprimulgus guttatus (Spotted Nighljar)

ALCEDINIDAE

Halcyon pyrrhopygia (Red-backed Kingfisher)

ALAUDIDAE

Mirafra javanica (Singing Bushlark)

HIRUNDINIDAE

Cecropis nigricans (Tree Martin)
Cheramoeca leucosternum (White-backed Swallow)

MOTACILLIDAE

Anthus novaeseelandiae (Richard's Pipit)

CAMPEPHAGIDAE

Coracina maxima (Ground Cuckoo-shrike)
Coracina novaehollandiae subpallida (Black-faced Cuckooshrike)
Lalage sueurii (White-winged Triller)

MUSCICAPIDAE

Colluricincla harmonica rufiventris (Grey Shrike-thrush)
Melanodryas cucullata (Hooded Robin)
Microeca leucophaea (Jacky Winter)
Oreoica gutturalis (Crested Bellbird)
Pachycepala rufiventris (Rufous Whistler)
Petrocica goodenovii (Red-capped Robin)
Rhipidura leucophrys (Willie Wagtail)

ORTHONYCHIDAE

Cinclosoma cinnamomeum (Cinnamon Quailthrush)

TIMALIIDAE

Pomatostomus superciliosus (White-browed Babbler)
Pomatostomus temporalis rubeculus (Grey-crowned Babbler)

SYLVIIDAE

Cinclorhamphus mathewsi (Rufous Songlark)
Eremiornis carteri (Spinifex bird)

MALURIDAE

Amytornis striatus (Striated Grasswren)
Cinclorhamphus cruralis (Brown Songlark)
Malurus lamberti assimilis (Variegated Fairy-wren)
Malurus leucopterus leuconotus (White-winged Fairy-wren)
Stipiturus ruficeps (Rufous-crowned Emu-wren)

ACANTHIZIDAE

Acanthiza apicalis (Inland Thornbill)
Acanthiza chrysorrhoa (Yellow-rumped Thornbill)
Acanthiza robustirostris (Slaty-backed Thornbill)
Acanthiza uropygialis (Chestnut-rumped Thornbill)
Aphelocephala leucopsis (Southern Whiteface)
Aphelocephala pectoralis (Banded Whiteface)
Gerygone fusca (Western Gerygone)
Smicrornis brevirostris (Weebill)

NEOSITTIDAE

Daphoenositta chrysoptera pileata (Varied Sittella)

MELIPHAGIDAE

Acanthagenys rufogularis (Spiny-cheeked Honeyeater)
Certhionyx niger (Black Honeyeater)
Certhionyx variegatus (Pied Honeyeater)
Lichmera indistincta (Brown Honeyeater)
Lichenostomus keartlandi (Grey-headed Honeyeater)
Lichenostomus penicillata (White-plumed Honeyeater)
Lichenostomus virescens (Singing Honeyeater)
Manorina flavigula (Yellow-throated Miner)
Phylidonyris albifrons (White-fronted Honeyeater)

EPHTHIANURIDAE

Ephthianura aurifrons (Orange Chat)
Ephthianura tricolor (Crimson Chat)

APPENDIX 2

PARDALOTIDAE

Pardalotus striatus (Striated Pardalote)

PLOCEIDAE

Emblema picta (Painted Firetail)
Poephila guttata (Zebra Finch)

GRALLINIDAE

Grallina cyanoleuca (Australian Magpie-lark)

ARTAMIDAE

Artamus cinereus (Black-faced Woodswallow)
Artamus minor (Little Woodswallow)
Artamus personatus (Masked Woodswallow)

CRACTICIDAE

Cracticus nigrogularis (Pied Butcherbird)
Cracticus torqualtus (Grey Butcherbird)
Gymnorhina tibicen (Australian Magpie)

CORVIDAE

Corvus bennetti (Little Crow)
Corvus orru (Torresian Crow)
Corvus sp. (Little Crow or Torresian Crow)

APPENDIX 3

Appendix Three

Mammals recorded in the

Southern Little Sandy Desert project area during the 1996 field program.

APPENDIX 3

TACHYGLOSSIDAE

Tachyglossus aculeatus (Short-beaked Echidna)

DASYURIDAE

Dasycercus cristicauda (Mulgara)
Dasykaluta rosamondae (Little Red Kaluta)
Ningaui ridei (Wongai Ningaui)
Planigale maculata (Common Planigale)
Pseudantechinus macdonnellensis (Fat-tailed Pseudantechinus)
Pseudantechinus wooleyae (Woolley's Pseudantechinus)
Sminthopsis hirtipes (Hairy-footed Dunnart)
Sminthopsis longicaudata (Long-Tailed Dunnart)
Sminthopsis macroura (Striped-faced Dunnart)
Sminthopsis youngsoni (Lesser hairy-fooled Dunnart)

MACROPODIDAE

Macropus robustus (Euro)
Macropus rufus (Red Kangaroo)

MURIDAE

Leporillus apicalis (Lesser Stick-nest Rat)
Mus musculus (House Mouse)
Notomys alexis (Spinifex Hopping-mouse)
Pseudomys chapmani (Western Pebble-mound Mouse)
Pseudomys hermannsburg. (Sandy Inland Mouse)
Pseudomys 'long tail'
Pseudomys 'short tail'

CANIDAE

Canis lupus dingo (Dingo)

FELIDAE

Felis cattus (Feral Cat)

LEPORIDAE

Oryctolagus cuniculus (Rabbit)

EQUIDAE

Equus asinus (Donkey)
Equus caballus (Brumby)

BOVIDAE

Bos taurus (Cattle)
Camelus dromedarius (One-humped Camel)

APPENDIX 4

Appendix Four

Reptiles and Amphibians recorded in the

Southern Little Sandy Desert project area during the 1996 field program.

APPENDIX 4

AGAMIDAE

Ctenophorus caudicintus
Ctenophorus inermis
Ctenophorus isolepis gularis
Ctenophorus scutulatus
Diporiphora aff. *valens*
Gemmatophora longirostris
Molloch horridus
Pogona minor

GEKKONIDAE

Diplodactylus ciliaris aff. *aberrans*
Diplodactylus conspicillatus
Diplodactylus elderi
Diplodactylus pulcher
Diplodactylus stenodactylus
Gehyra punctata
Gehyra purpurascens
Gehyra variegata
Heteronotia binoei
Nephrurus laevissimus
Nephrurus levis
Oedura marmorata
Rhynchoedura ornata

PYGOPODIDAE

Delma aff. *bulteri*
Delma nasuta
Delma pax
Lialia burtonis
Pygopus nigriceps

SCINCIDAE

Carlia tricantha
Cryptoblepharus carnabyi
Cryptoblepharus plagiocephalus
Ctenotus ariadnae
Ctenotus atlas
Ctenotus brooksi brooksi
Ctenotus calurus
Ctenotus dux
Ctenotus grandis
Ctenotus helenae
Ctenotus leae
Ctenotus leonhardii
Ctenotus nasutus
Ctenotus pantherinus ocellif
Ctenotus piankai
Ctenotus quatturodecimlineatus
Ctenotus schomburgki
Egernia depressa
Egernia striata
Eremiascincus fasciolata
Eremiascincus richardsoni
Lerista amicorum
Lerista bipes
Lerista goerlingi
Lerista ips
Lerista macropisthopus remota
Lerista neander
Lerista aff. *vermicularis*
Menetia greyi
Morethai ruficauda
Teliqua multifasciata

VARANIDAE

Varanus acanthurus
Varanus brevicauda
Varanus aff. *caudolineatus*
Varanus eremius
Varanus giganteus
Varanus gilleni
Varanus gouldi
Varanus panoptes
Varanus tristis

BOIDAE

Morelia perthensis

ELAPIDAE

Demansia rufescens
Demansia sp.
Furina ornata
Pseudonaja modesta
Pseudonaja nuchalis
Rhinoplocephalus monarchus
Vermicalla fasciolata
Vermicella anomala
Vermicella bertholdi

TYPHLOPIDAE

Ramphotyphlops grypus
Ramphotyphlops sp.

APPENDIX 4

CHELIDAE

Chelodina steindachneri

HYLIDAE

Cyclorana maini
Litoria rubella

LEPTODACTYLIDAE

Neobatrachus sp.
Notaden nichollsi