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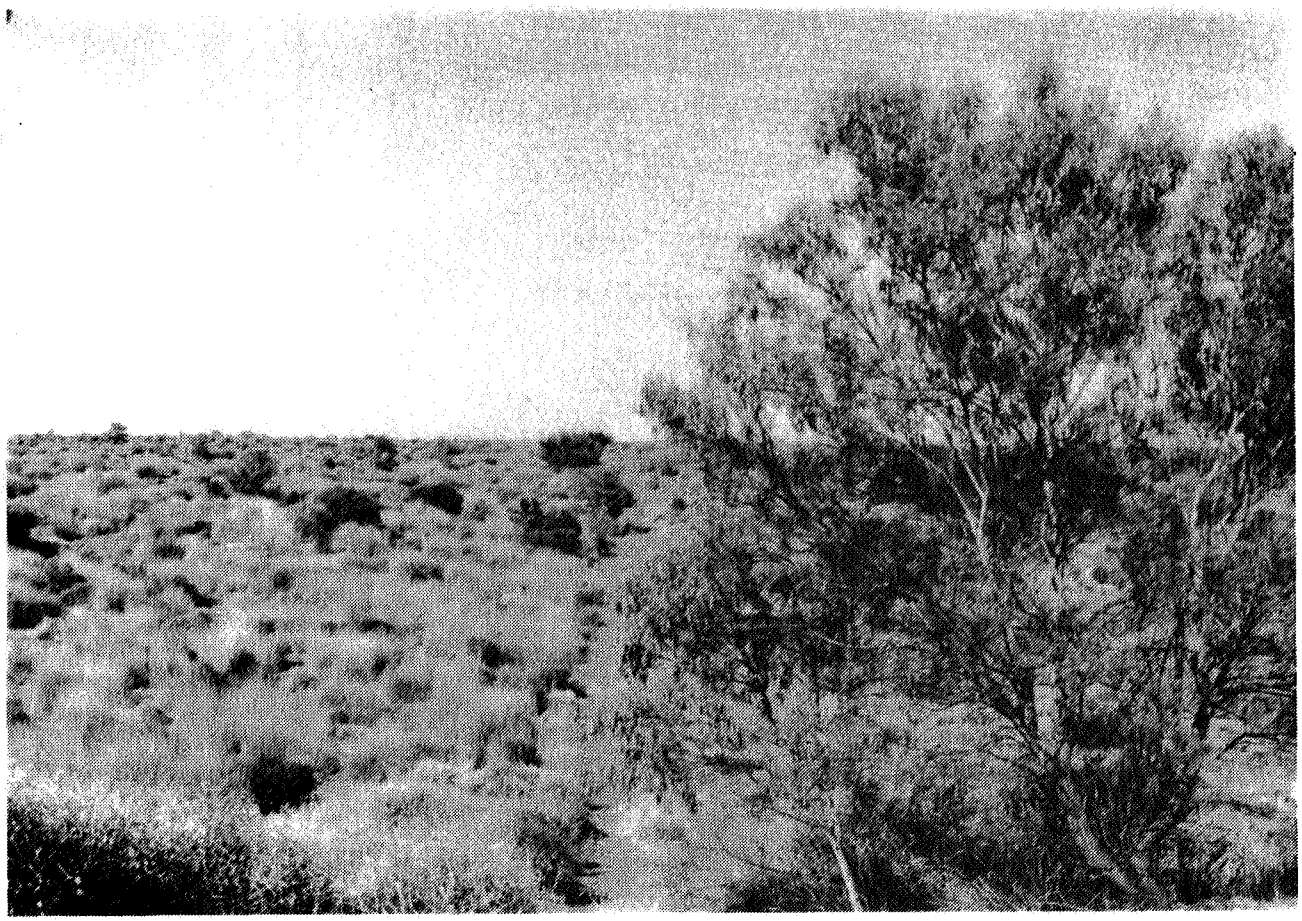
DRAFT MANAGEMENT PLAN

Simpson Desert Conservation Park



NATIONAL PARKS AND WILDLIFE SERVICE: A DIVISION OF THE DEPARTMENT OF ENVIRONMENT AND PLANNING

DRAFT MANAGEMENT PLAN

Simpson Desert Conservation Park

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Cover Photograph
Regeneration along old seismic track.
N.P.W.S. permanent monitoring point,
Simpson Desert.
(G. Rowberry)

FOREWORD

The Simpson Desert Conservation Park in the remote northern extremity of the State is one of South Australia's true wilderness parks. Until the past decade it has been only very infrequently visited by European man and formerly only occasionally by Aboriginal man during very favourable climatic periods.

European penetration of the Simpson Desert region began in 1845 with Sturt's expedition to the interior of Australia, and it seems probable that this expedition was followed soon after by the ill-fated expedition of Leichhardt in 1848. Pastoral expansion in the 1870s and 1880s saw a number of Government surveys in the region including that of the South Australian-Queensland border by Augustus Poeppel. Most did not venture into the interior of the desert, and the first European crossing is attributed to David Lindsay in 1886.

A scientific party led by C. T. Madigan crossed the desert in 1939 after which there was little activity in the area until petroleum exploration commenced in the 1960s. Since this time, the area has exhibited significant potential as a source of petroleum, and while still in a relatively early exploration phase, extensive seismic surveys have now been undertaken. These activities have significant implications for the future management of the Simpson Desert Conservation Park in terms of the likelihood of commercial oil finds, subsequent localised intensive drilling operations and associated developments. An increased traffic flow of tourists into the region using the system of access tracks established by oil exploration activities also needs to be considered.

The location of the park on the Northern Territory and Queensland borders with South Australia, the surrounding pastoral interests in the land and the unique ecological associations of the region are further interrelated factors which require consideration for land managers.

This plan consequently examines the Simpson Desert Conservation Park and surrounding areas and derives a series of objectives and guide-lines for future management which, it is anticipated, will minimise potential land-use conflicts and personal hazards for unwary travellers. At the same time, the plan gives a summary of the natural resources of the desert region and the natural and historic values to the people of South Australia, in particular, and to all Australians. It also provides a basis for field managers to ensure that the natural characteristics and values of the area are maintained while still enabling justifiable commercial activities and sound use of the region to continue.

This draft plan is now available for public comment for a period of two months from the date shown on the enclosed copy of the *South Australian Government Gazette* announcement.

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The staff of the CSIRO Rangelands Research Centre, Deniliquin, for valuable discussions and for making available prepublication drafts of technical memoranda on the Simpson Desert region.

The Queensland National Parks and Wildlife Service for comments on early, prepublication, drafts of the plan and also for their co-operation on a number of strategies presented in the plan for managing various uses of the Simpson Desert region.

Tamworth Four Wheel Drive Club which made available for examination the Visitors Log Book which they had placed at Poeppel Corner on 3 September 1978 and replaced on 4 September 1981.

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INTRODUCTION

The Simpson Desert Conservation Park, in the far north of South Australia (Figure 1), preserves part of the southern Simpson Desert, an extensive sandy desert in the driest part of the continent, characterised by long, straight and parallel sandridges. The park is the second largest reserve in South Australia, comprising almost 7 000 square kilometres of the Simpson Desert. It has within it a variety of desert landscapes, flora and fauna—varied dune systems and extensive playa lakes, Spinifex grasslands and *Acacia* woodlands—but the representation and protection of the most noted desert landscapes are poor.

The park was originally dedicated in 1967 as South Australia's contribution to a proposed Queensland-South Australian-Northern Territory Simpson Desert National Park. The Simpson Desert National Park (Queensland), adjacent to the park, was also dedicated at the same time, protecting a further 5 000 square kilometres of the eastern Simpson Desert and fringes. Unfortunately, the Northern Territory proposal did not proceed, and future dedication of the final segment of the tri-State park is now most unlikely.

At the time of dedication of the park, the desert was poorly known and the park area largely inaccessible wilderness. The park, however, overlies the Pedirka Basin, a potential oil and gas source, and petroleum exploration over the last fifteen years has made much of the park and surrounding desert relatively accessible. More ready access has resulted in an increasing amount of information becoming available about the desert because increasing numbers of people are now visiting the area. Although there are still many gaps in our knowledge of the desert in general and the park in particular, sufficient information exists to provide a reasonable basis for management planning.

Plans of management are required for all reserves under Section 38 of the *National Parks and Wildlife Act* 1972-1981. Plans should provide proposals for the management and improvement of reserves, and indicate the means by which relevant objectives in the Act might be achieved. Broad objectives which must be considered are listed in Section 37 of the Act and are as follows:

1. The preservation and management of wildlife.
2. The preservation of historic sites, objects and structures of historic or scientific interest within reserves.
3. The preservation of features of geographical, natural or scenic interest.
4. Destruction of dangerous weeds and the eradication or control of noxious weeds and exotic plants.
5. The control of vermin and exotic animals.
6. The control and eradication of disease and injurious affection of animals and vegetation.
7. The prevention of bushfires and other hazards.
8. The encouragement of public use and enjoyment of reserves and education in, and a proper understanding and recognition of, their purpose and significance.
9. Generally the promotion of the public interest.

These points have been considered in the preparation of this draft management plan.

Management of the Simpson Desert Conservation Park is complicated by the continuing petroleum exploration in and about the park. The exploration has a degree of precedence over nature conservation objectives, both historically and legally. Petroleum exploration commenced in the area prior to dedication of the park, and the park was declared subject to the *Petroleum Act* 1940-1969. This precedence of exploration is likely to be maintained for the foreseeable future. It is in both the State and national interest to seek to maintain, and increase if possible, Australia's partial self-sufficiency in oil production, and in South Australia's interest to secure gas supplies. Hence, oil or gas field development must be expected in the event of commercially viable finds, whether in or out of the park.

The crucial questions for this draft management plan have been whether the petroleum exploration has adversely affected conservation values, or is likely to in the future; how any adverse effects might be minimised; how an accommodation might be reached between the conservation objectives and the petroleum exploration; and possible future development needs.

On present information, it appears that the impacts of petroleum exploration are relatively minor and transient: they may alter park values and modify local ecosystems in the short-term, but the self-repair capacity of most of the desert landscapes is such that the impacts of exploration will disappear over a relatively short time, provided a degree of environmental control is exercised both during exploration operations and over any subsequent use. This may come as a considerable surprise to many, as the general impression given by arid landscapes is one of fragility. Effort has, therefore, been made, within the background information sections of this plan, to explain in some detail the physical and ecological processes which are responsible for the desert's remarkable resilience. Also in the interests of better understanding, an outline is given of the methods of petroleum exploration; their objectives, requirements and limitations; and the basic geological reasons for the search being concentrated about the park.

For this information, the plan relies heavily on published literature. The natural systems within the park itself are still poorly known in a number of respects. Therefore, whenever necessary, information has been drawn from studies of the Simpson Desert beyond the immediate park boundaries. Considering the Simpson Desert as a whole also allows the park to be placed in its regional context.

Increasing numbers of visitors have entered the park over the past decade, using the petroleum exploration track network for access. Continued undirected use may have two undesirable consequences. First, continued use of exploration tracks by visitors may result in an otherwise transient impact becoming permanent. Secondly, the level of public risk is increased. The attraction of the park and the Simpson Desert is the sense of remoteness and wilderness experienced by visitors. This plan endeavours to provide proposals which will retain this attraction, increase levels of public safety, and at the same time avoid any increased impacts.

The primary purpose of the Simpson Desert Conservation Park is the protection of representative desert land-forms, flora and fauna, while providing for some forms of wilderness recreation. The plan recognises that the extent of petroleum exploration works, particularly the access provided, means that the park cannot currently be considered a true wilderness area. Nevertheless, the transient nature of most exploration impacts allows the option of an eventual return of at least part of the area to wilderness, even in the event of commercial oil or gas field development. At present, the location of any eventual commercial development cannot be predicted. The thrust of planning has, therefore, been to maintain the option of future return to wilderness over most of the park area,

accepting that some of the present area may be required in a future oil or gas development. A major extension of park boundaries is proposed, partly with this eventuality in mind, but also to ensure a more representative and ecologically viable wilderness reserve.

Part 1:

Background Information

DESCRIPTION OF THE AREA

LOCATION

The Simpson Desert Conservation Park lies in the southern Simpson Desert in the extreme far north of South Australia (Figure 1). It is the second largest reserve in the South Australian park system and covers 692 680 hectares. Its northern boundary is the State border, latitude 26° south. About 60 per cent of this boundary, west from the South Australian-Queensland-Northern Territory junction at Poeppel Corner, abuts vacant Crown Land in the Northern Territory. East of Poeppel Corner, the northern boundary abuts Queensland's Simpson Desert National Park which covers an area of some 505 000 hectares.

The southern boundary lies along latitude 26°30' south, and the western and eastern boundaries respectively on longitudes 137°15' east and 138°30' east. The eastern boundary of the Simpson Desert National Park (Queensland) intersects the Queensland-South Australian border some 20 kilometres further east, at latitude 138°42' east, than the eastern boundary of the South Australian park.

The Simpson Desert is a sandridge desert of some 150 000 square kilometres, with segments in South Australia, Queensland and the Northern Territory. It is roughly triangular in shape, with its apex at Lake Eyre. The desert is bounded to the east by the floodplains of the Mulligan and the Warburton creeks, and to the west by the floodplains of the Finke and Macumba rivers. The Simpson Desert Conservation Park (South Australia) and the Simpson Desert National Park (Queensland) together provide statutory protection to slightly under 8 per cent of the Simpson Desert.

The Simpson Desert Conservation Park was originally gazetted a National Park under the then *National Parks Act* 1966 as Section 48 North Out of Hundreds. It was reconstituted a Conservation Park under the present *National Parks and Wildlife Act* 1972-1981.

The only other park in the region is the Elliot Price Conservation Park on the shores of Lake Eyre (Figure 1).

PHYSICAL FEATURES

Climate

There are no substantial data on the climate of the Simpson Desert in general or the park in particular, although some records of limited periods do exist. Most climatic information is an extrapolation from records of meteorological stations bordering the desert.

The Simpson Desert is within the most arid core of the continent. Almost all of the desert lies within the 130 millimetre annual rainfall isohyet (Buckley 1981c). This low average rainfall decreases to the south. The area about Lake Eyre is the driest part of the continent with average annual rainfall between 100 and 150 millimetres, and the twelve-month aggregate rainfall rarely exceeding 250 millimetres (Gentilli 1972). However, average figures are misleading for the rainfall is highly variable. The area experiences extended droughts interspersed with relatively high rainfall periods; occasional very high rainfalls may also occur. At Mount Dare Station, the total rainfall for 1976 was 569 millimetres, four times the long-term average, which was preceded by three years of rainfall at two to three times the long-term average (Buckley 1981b).

The Simpson Desert in South Australia lies on the boundary between the northern (monsoonal) summer-rain zone and the southern winter-rain regions, with probably the major part of average rainfall in summer. Oodnadatta, south-west of the park, has approximately 60 per cent of its average rainfall in October to March (Australian Bureau of Statistics 1982), while Alice Springs, to the north-west, has 75 per cent of its average over the same period. Summer falls tend to be heavier than winter falls.

Rainy days are few. Oodnadatta, for example, has averaged only thirty days per annum with rain over all years of records.

Seasonal and diurnal variation in temperature is marked. At Oodnadatta, the mean monthly maxima and minima vary from about 38°C and 22°C respectively in January, to 19°C and 6°C in July. Daily maxima above 38°C are common in summer, while frosts are frequent in winter.

Evaporation rates are very high (3300 millimetres per annum at Oodnadatta (Stace *et al.* 1968)). Rates are, of course, highest in summer, and consequently more rain is needed in summer than in winter to be effective in stimulating plant growth. Overall, Jessup (1960) has estimated that only 33 per cent of average annual rainfall is effective in the southern Simpson Desert.

September and October are the windiest months and the dominant winds are south-easterly, approximately parallel to the desert sandridges (Brookfield 1970). These winds shift sand, and are discussed in later sections because of their role in dune building.

The aridity of the Simpson Desert is not as extreme as in parts of the Sahara for it is unlikely that any part of the Simpson Desert would be completely without rain for more than a year. However, the aridity is comparable with that of other major deserts in the world, such as the Kalahari.

Geology and Geomorphology

THE UNDERLYING SEDIMENTS

The Simpson Desert is a relatively recent land-form, a result of climatic oscillations in the Quaternary (Table I). It is underlain by aeolian, stream and lake deposits of the Tertiary, and the Mesozoic sediments of the Eromanga Basin. Below the Eromanga Basin is the Permian Pedirka Basin, the present focus of petroleum exploration. The geological structure of the Pedirka Basin closely resembles that of the Cooper Basin, from which gas and liquid hydrocarbons are extracted on a commercial basis (Figure 2).

Ancient features and tectonic structures in the pre-Permian basement rocks have largely controlled the pattern of later sedimentation (Wopfner and Twidale 1967; Firman 1974, 1981). The structures have resulted in differential subsidence of various parts of the region along lineaments (extensive and straight zones of faulting). The most recent movements on the basement structures have produced lineaments visible at the surface on LANDSAT imagery. Before the Permian, the various movements gave rise to a series of troughs and valleys at the surface, and it was in these troughs that the Permian sediments were laid.

The region was glaciated in the early Permian (about 270 million years ago), and the lowest sediments in the Pedirka Basin comprise tillite and other glacial deposits (Crown Point Formation). The glaciation was followed by a brief incursion of the sea, in turn followed by a long period, of over 50 million years, during which the Pedirka Basin was largely or entirely a shallow lake. Deposition during this period included masses of organic matter, mud and sand. The deposits are now represented by strata in the Purni Formation comprising siltstones, sandstones and shales interspersed with coal seams up to 20 metres thick.

Some of the organic matter has been converted to gaseous and liquid hydrocarbons rather than to coal, and such petroleum is trapped in the porous sandstones of the formation.

Above the Pedirka Basin is part of the much larger Eromanga Basin. This is one of several sub-basins that together make up the Great Australian Basin (or, less correctly, the Great Artesian Basin). Triassic sediments, particularly sandstones, cap much of the Permian sediment of the Pedirka Basin. The Eromanga Basin was apparently landlocked in this period (200 to 250 million years ago).

Sedimentation in the Eromanga Basin during the Jurassic is represented by strata up to 1 000 metres thick beneath the desert. There are a number of Jurassic formations, indicating a cycle of deposition in a freshwater environment. The Jurassic sequences are bounded by sandstones, and intermediate sediments, include shale and coal.

A major downwarping of the Eromanga Basin occurred during the Cretaceous (about 130 million years ago) and resulted in transgression of the sea into the basin. The lowest Cretaceous sediments show the transition from the landlocked, freshwater depositional environment of the preceding period. Subsequent regression of the sea brought a return to freshwater deposition with sediments including siltstones, shales and sandstones, and carbonaceous plant material and fossil wood being formed. All of the South Australian portion of the basin had become dry land by the end of the Cretaceous (70 million years ago), and a period of weathering of the land surface followed.

First development of the modern Lake Eyre depression started in the early Tertiary, 60 to 70 million years ago. Gentle downwarping over the region produced a shallow but very widespread depression which set the broad outline of the modern land-form (the Lake Eyre Basin of Wopfner and Twidale 1967). The depression resulted in the Eromanga Basin becoming isolated from the sea, and by the Miocene, the drainage of the basin ended in the depression—streams did not reach the sea. As a result, much of the area, including the present Simpson Desert in South Australia, was under shallow lagoons or was broad floodplain over which meandered the streams. The lake and stream sediments from this time to the Pleistocene form a blanket up to 200 metres thick beneath the desert, particularly in the playa lakes region. In these sediments are the Miocene clays, sands and dolomites of the Etadunna Formation containing a rich fossil fauna of both terrestrial and aquatic forms including mammals, fish and crocodiles.

The richness of the fossil fauna point to a wet, warm, temperate or possibly subtropical climate in the Miocene, capable of supporting abundant plant and animal life. In the late Miocene, however, a general cooling and drying of the climate began, interspersed with some wetter periods which continued into the Quaternary. Major climatic oscillations occurred during the early and middle Pleistocene from about 1.5 million years ago to 100 000 years ago. Climates in the region varied from cold and dry, corresponding with glaciation elsewhere in the world; to temperate and wet (Firman 1981). The former periods brought about exposure of the lake and stream deposits, and led to the formation of dunes. Evidence of a former arid dune system in the region 300 000 years ago is given by Bowler (1976). In the more temperate periods, the lake and river systems were again active.

Subsequent events in the Pleistocene are intimately connected with the surface features of the present Simpson Desert, and are accordingly discussed below.

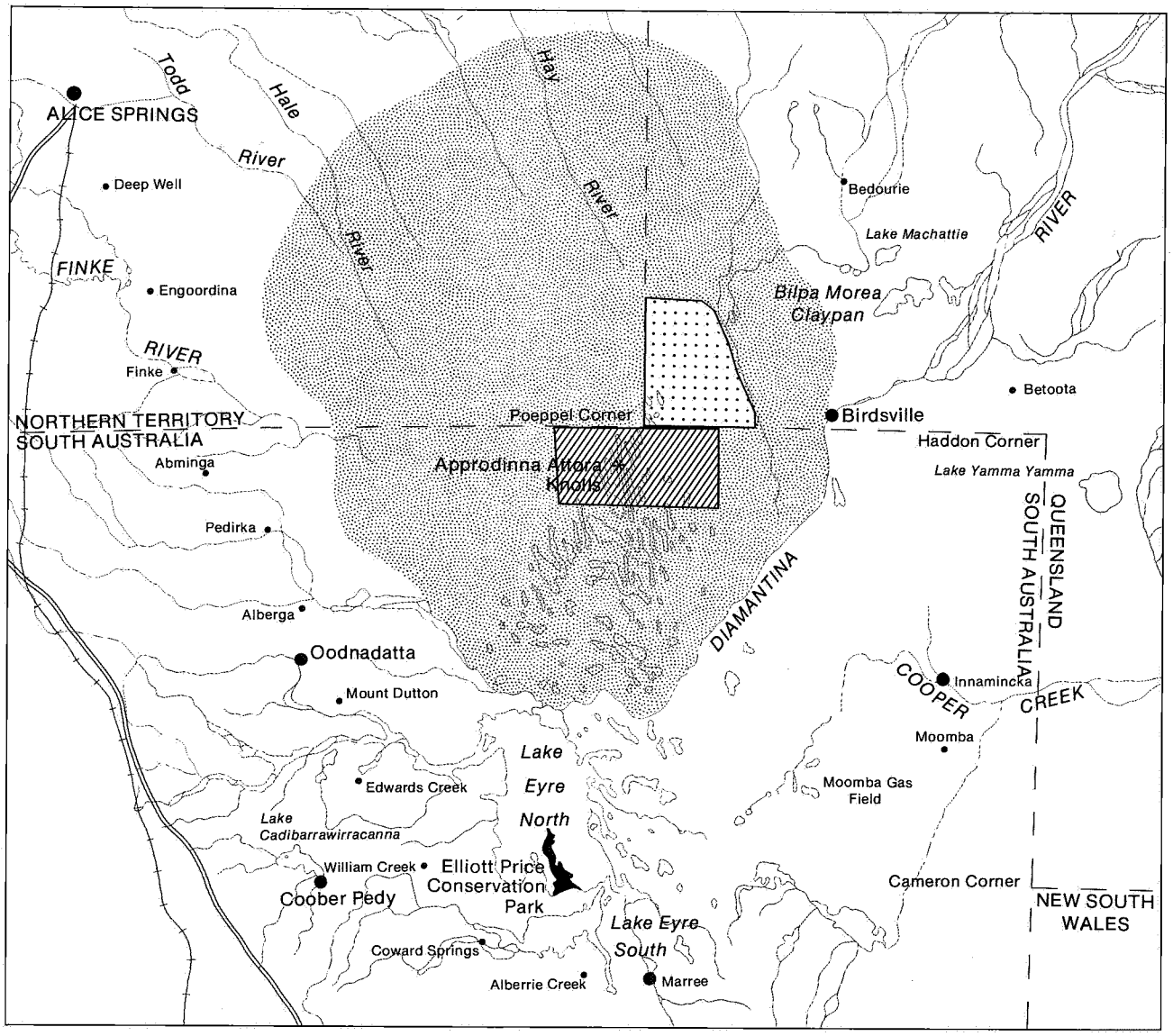
OIL AND THE PERMIAN STRATA

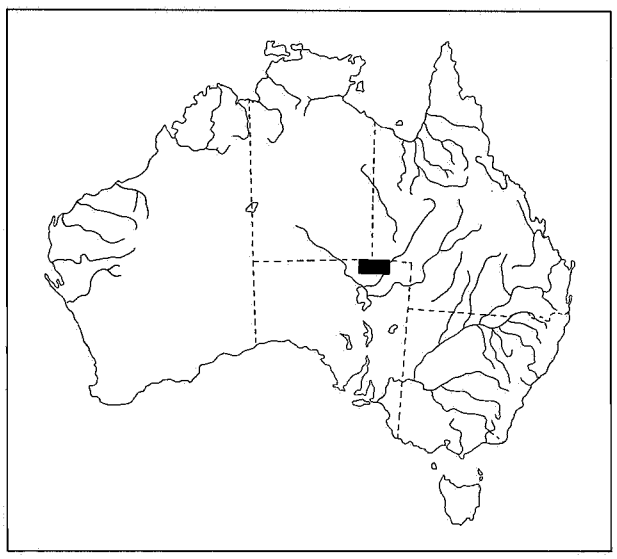
The hydrocarbon-bearing sediments of the Permian Pedirka Basin are the focus for current petroleum exploration of which mention should be made.

Organic matter, if buried with fine-grained sediment, will be incompletely decomposed. The decomposition bacteria leave a mixture of organic compounds which, through various physical and chemical processes, form hydrocarbon compounds, particularly paraffin hydrocarbons. Whether these compounds are light (forming gas) or heavy (forming hydrocarbon liquids or oil) depends partly on the nature of the original material. For a reservoir of gas or liquid to develop, movement of the hydrocarbons to the reservoir must be possible, and the strata bounding the reservoir must be relatively impermeable. In the case of the Pedirka Basin and also the gas-producing Cooper Basin, the potential reservoirs are porous sediments of Permian and possibly Triassic sandstones lying in troughs and hollows in the relatively impermeable pre-Permian

TABLE I : Geological Time Scale

Years before present				
3000	CAINOZOIC	QUATERNARY	HOLOCENE	Arid-humid climate oscillations
8000				Peak aridity
18000			PLEISTOCENE	Regional dunefield formation
				Progressive drying
				Last humid period Lake Eyre full
40000				Humid-arid climate oscillations
				Some dune building
1.8m		TERTIARY	PLIOCENE	Drying and cooling of climate
10m			MIOCENE	Subtropical Land-locked
20m			OLIGOCENE	
40m			EOCENE	
50m			PALEOCENE	Development of Lake Eyre Basin starts
60m				Dry land
70m	MESOZOIC		CRETACEOUS	Marine incursions
100m				
150m			JURASSIC	Fresh-water deposition
200m			TRIASSIC	
250m	PALAEOZOIC		PERMIAN	Hydrocarbon-forming sedimentation
300m			CARBONIFEROUS	
350m			DEVONIAN	





Simpson Desert Conservation Park (S.A.)

Simpson Desert National Park (Qld.)

Extent of Simpson Desert

Primary road

Railway line

Figure 1

Park Location

basement (SANTOS 1981a). The current petroleum exploration in the desert is aimed at identifying and testing potential reservoir formations within the basin. The stratigraphy and geographic extent of the Pedirka Basin is such that the reservoirs with most potential for yielding hydrocarbons in commercial quantities may be under, or close, to the park (Figures 2 and 3).

It should also be mentioned here that the pre-Permian sediments include several formations which may have as much hydrocarbon potential as the Permian strata (Youngs 1975) and exploration of these is a future possibility.

THE DUNEFIELDS

The primary characteristic of the Simpson Desert is its extensive system of long, straight and evenly-spaced parallel dunes. The dunes are aligned approximately NNW-SSE. Individual dunes commonly extend continuously for over 150 kilometres and some are as long as 300 kilometres. The height of ridges and spacing between dunes varies in different parts of the desert. Along the South Australian border, the range is 10 to 15 metres in height, with an average spacing of 200 metres between ridges in the western desert, to over 30 metres in height and spacing wider than 1 kilometre in the east. In general, the wider the spacing, the higher the dune. "Tuning fork" junctions between dunes occur sporadically, with openings upwind.

Over much of the desert, dunes are asymmetric in cross-section, with generally steeper eastern faces (Figure 4). Usually, only the dune summits are mobile, having little vegetative cover. Dune flanks are generally fixed by vegetation. Because of their mobility, dune crests may show a variety of features related to short-term wind patterns such as secondary crests at angles to the main dune line. Often, crests display reverse asymmetry, with the steepest part of the dune becoming the summit of the western face.

The nature of the swales (interdunal corridors) varies with dune spacing. The underlying alluvial deposits may be exposed where dunes are widely spaced, or covered with a mantle of clayey sand between closely-spaced dunes.

The parallel dunes give an impression of uniformity in the desert, but the impression is misleading. As well as the broad variation in dune height and spacing, there are major regional variations in dune shape, age, level of mobility and general regularity. The nature of sediments exposed between dunes also varies. The variations are particularly pronounced in the southern Simpson Desert, including the park area (Graetz *et al.* 1982; Fatchen and Barker 1979a, 1979b; Buckley 1979, 1981c). In many respects, it is unfortunate that the first

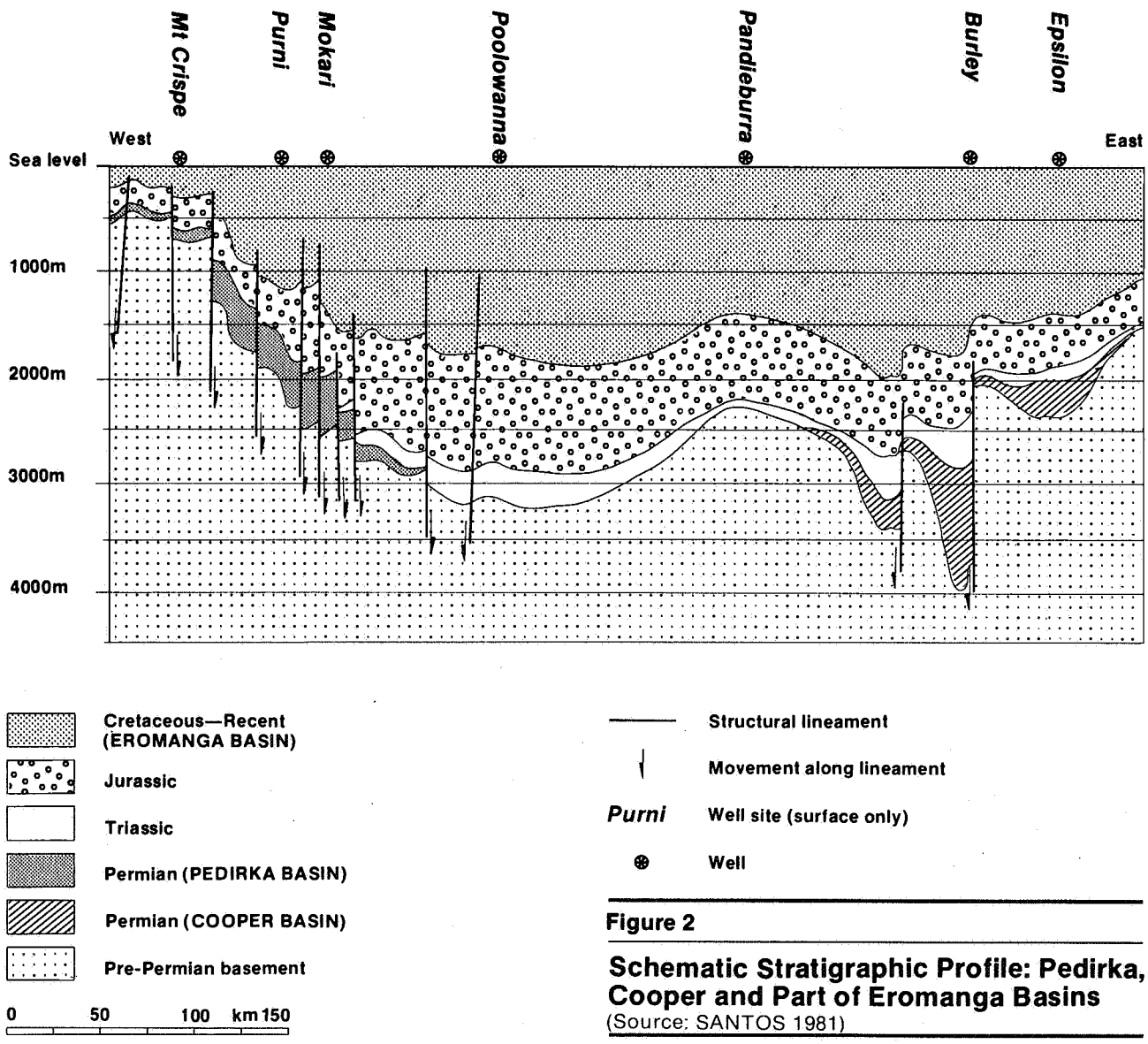


Figure 2

Schematic Stratigraphic Profile: Pedirka, Cooper and Part of Eromanga Basins
(Source: SANTOS 1981)

detailed scientific reports (Madigan 1936, 1945a, 1946b; Crocker 1946) dealt primarily with the northerly portion of the desert where variation is not so pronounced, as the reports strengthened the still commonly-held view of the desert as one large, homogeneous unit. The land-form variations influence the regional ecology and also the likely response of particular landscapes to disturbance, and because of this, they are further discussed in Part 1: Ecological Associations.

The Simpson Desert dunes are Quaternary siliceous sands, part of the Australian Pleistocene dunefields which occupy nearly 20 per cent of arid Australia. Dunes are generally "soft" in the western desert; that is, lacking a harder, consolidated core, but consolidated cores of dunes are found in the playa lakes region.

The precise source of the sand used in the dune-building and the sequence in which the dunefields were constructed is still not certain. Broadly, the main sand source would have been the alluvial material transported into the region by the streams terminating in the Lake Eyre depression. The sand may have been transported north from Lake Eyre, forming the dunes, but there is some evidence indicating that dunes were also built directly from local sources (Buckley 1981a).

Lake Eyre was a permanent lake with a depth of well over 10 metres of water at the close of the last very humid period in the Pleistocene about 40 000 years ago (Twidale, in Foale n.d.). Surrounding it were other lakes and extensive flat floodplains. With the onset of severe aridity and cold and windy conditions, the lakes dried and the alluvial plains lost their vegetation. Winds scoured the alluvial surfaces, transporting fine sediment long distances, but heaping up the heavier sands in mounds in the lee of the lakes and plains, and then forming the longitudinal dunes from these mounds. The actual mechanisms of longitudinal dune formation are of some importance in predicting the consequences of disturbance (for example, by seismic tracks) and, accordingly, are discussed at more length below.

The drying was at first progressive with aridity reaching a peak about 16 000 to 18 000 years ago. At this time, the regional pattern of the desert dunefields was set. Subsequently, the climate has oscillated between wet and dry periods, with dunefields fixed by vegetation, streams and lakes again active, and soil formation occurring in the wetter periods. Opinion is divided on how many such alternations there have been. Firman (1981) indicates two wet periods since the peak aridity at about 11 000 and 7 000 years ago (see also King 1960); Jessup and Norris (1971) suggest more.
The present-day climate, though arid, is not as extreme as some of the major periods of sand deposition and dune shaping, but these processes are continuing in at least part of the desert. The streams continue to bring sediment to the alluvial plains of the channel country and to Lake Eyre which has been partly or wholly filled, and subsequently dried, several times this century. There is, therefore, a continuing supply of "new" sand available for transport northward from Lake Eyre and the plains south-east of the desert (Twidale, in Foale n.d.). Sands of the central and eastern portions of the desert in South Australia (including the park) show evidence of this continuing process by irregularities in shape (Graetz *et al.* 1982), but especially in colour. Newly-transported sands are very pale or white, gradually becoming red with age as clay particles, trapped among the sand grains, weather. Dunes on the northern border of Lake Eyre and for some distance north, are white or pale yellow, becoming progressively redder to the north. Sand actively transported along crests in the eastern desert is itself paler than on the lower, non-mobile dune flanks. In striking contrast are the red dunes of the western and northern parts of the desert, the colour indicating an absence of new supplies of dune-building materials.

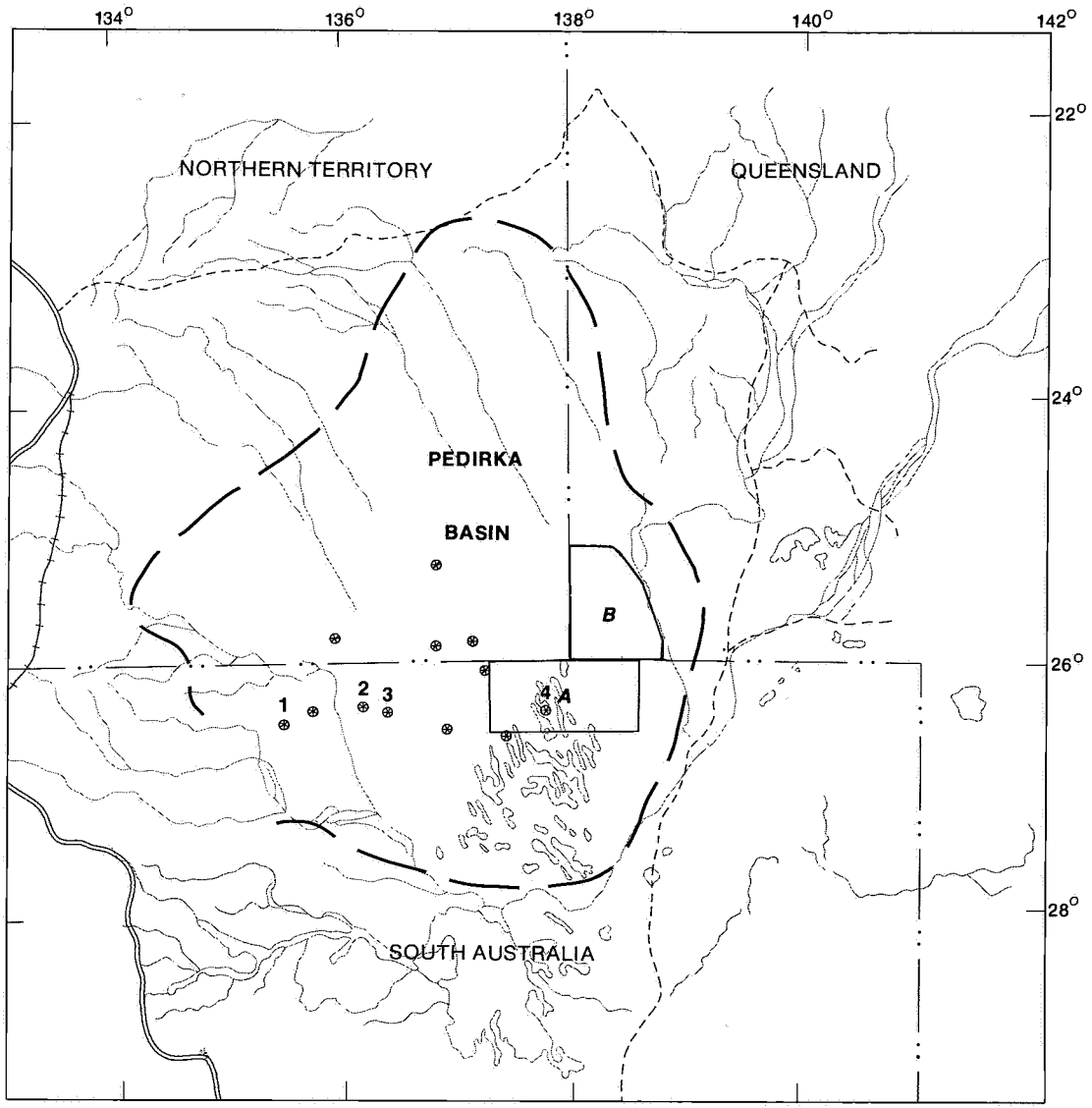
PROCESS OF DUNE FORMATION

The mechanics of longitudinal dune formation are still not certain. That they parallel the dominant wind direction at the time of their formation has been known for over a century (Blanford 1896, cited in Derbyshire *et al.* 1979; Madigan 1936). A formation theory originated by Bagnold (1953) now has wide currency. Briefly, dunes are formed and maintained by a spiral (helicoidal) windflow. The requirements are a level plain of alluvial origin with winds dominant in one direction. Paired wind spirals form as illustrated in Figure 5, and descending local wind currents scour the alluvium, bouncing sand grains along the ground and depositing them in the "dead" area between wind spirals. The net result is the heaping up of a longitudinal dune and a general movement of sand (and extension of the dune) in the direction of the overall windflow.

There are variations of this theory which imply that once dunes are formed, the dunes themselves fix the wind spirals in position, which means that, in turn, the dune will maintain its position, growing larger in time and probably extending downwind but not moving laterally (Derbyshire *et al.* 1979). There is evidence of this from the Strzelecki Desert where depositional sequences in single dunes indicate that the dunes have not changed their position through several periods of dune building and subsequent stabilisation (Callen *et al.* 1982).
Twidale (in Foale n.d.) links together the helicoidal process of dune formation and sand transport from the Lake Eyre region. Sand is first deposited in lee-side mounds on the northern margins of playa lakes or alluvial plains. Wind passing over these mounds becomes turbulent and the spirals develop in their lee. Sand is shifted from the mounds into the "dead" areas between vortices, forming prongs which, with continued sand transport, gradually extend downwind to form the ridges of the dunefield. Similar views have been put by Mabbutt and Sullivan (1968) and are supported by evidence from LANDSAT imagery (Loeffler and Sullivan 1979).

The helicoidal, "one-wind" theory is not entirely satisfactory. It does not completely account for the very regular spacing of the dunes; nor for their asymmetry (although this may result from occasional cross-winds). It does resolve a number of problems, which are not satisfactorily dealt with by alternative theories, but not to the extent that alternatives can be completely discounted. An earlier theory, also put forward by Bagnold (1941), deserves mention as it is still often cited as the primary means of longitudinal dune formation (Roxby Management Services 1982). By this theory, longitudinal dunes are converted from other forms by a bi-directional wind regime, with the line of dune along the resultant of the two winds. Mabbutt (1977) considered the argument between the uni-directional and bi-directional wind theories unresolved, while Derbyshire *et al.* (1979) point out that both result in sand movement patterns and deposition as indicated in Figure 5.

As this management plan is concerned with possible impacts on the dunefield within the park resulting from petroleum exploration or visitor use, several consequences of the pattern of dune formation are significant. First, the processes of construction and the orientation of dunes to the wind are quite different from those in coastal dunefields. Consequences of particular impacts in the desert cannot be predicted on the basis of known consequences of similar impacts in coastal dunefields, and the temptation to do so should be



Exploration and stratigraphic wells	⊛
Wells shown in Figure 2	
Mt Crispe 1	1
Purni 1	2
Mokari 1	3
Poolawanna 1	4
Simpson Desert Conservation Park (S.A.)	*A*
Simpson Desert National Park (Qld)	*B*

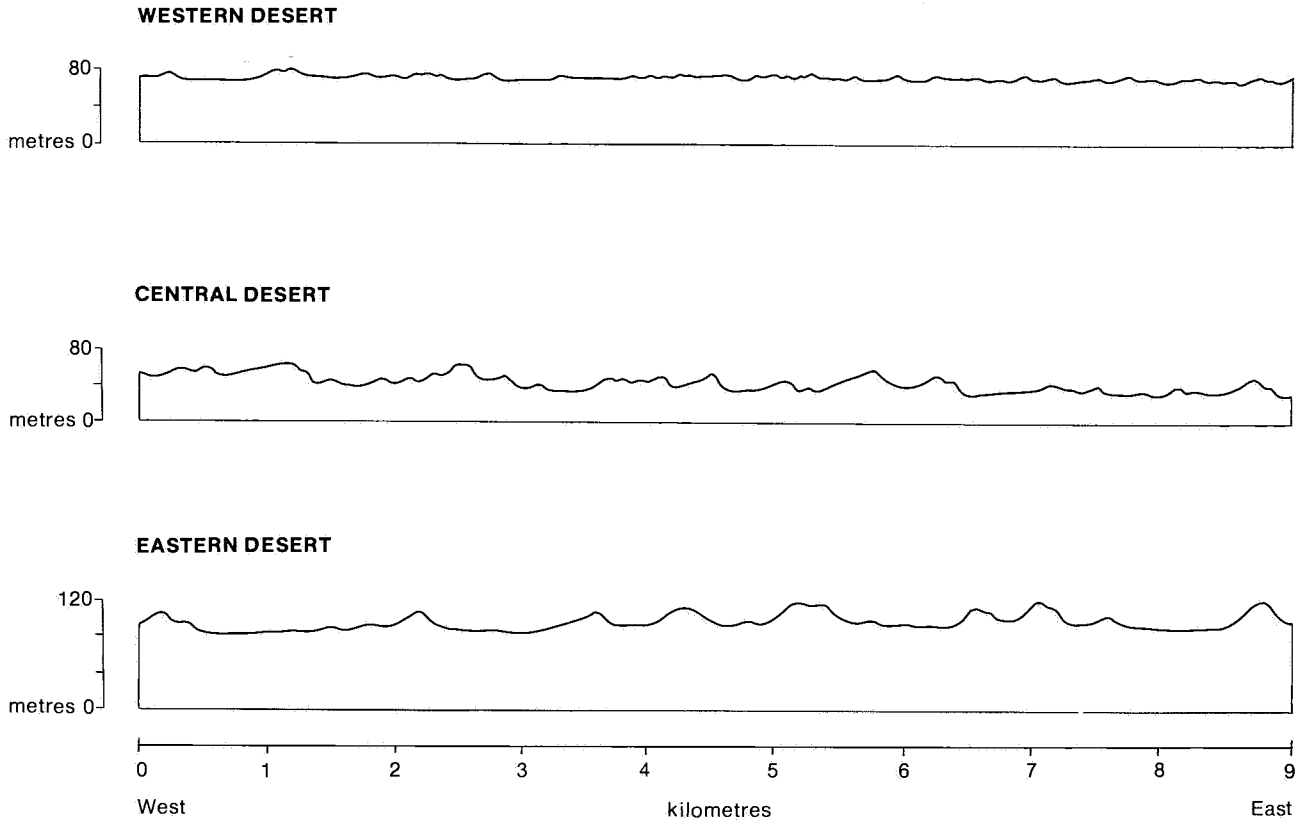
0 100 200 km 300

Figure 3

Extent of Pedirka Basin

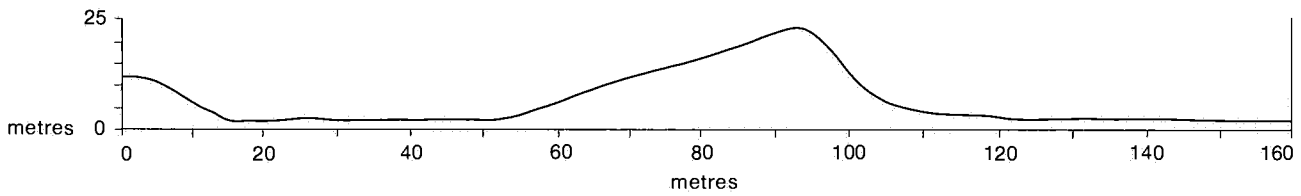
Adapted from Youngs (1976) and Alexander (1981)

DUNE PROFILES (after Wopfner and Twidale 1967)



INDIVIDUAL DUNES (after Buckley 1981c)

Typical dune, asymmetric and regular



Dune in playa lakes area

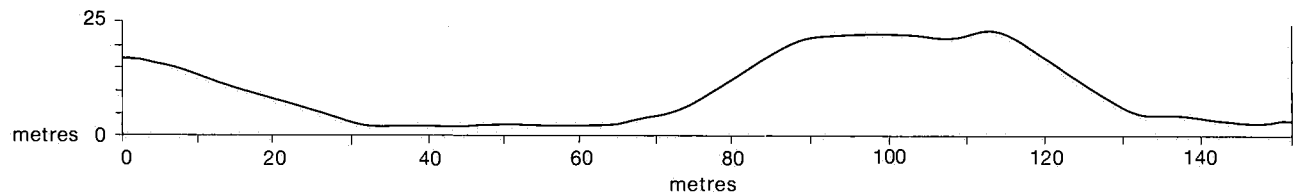
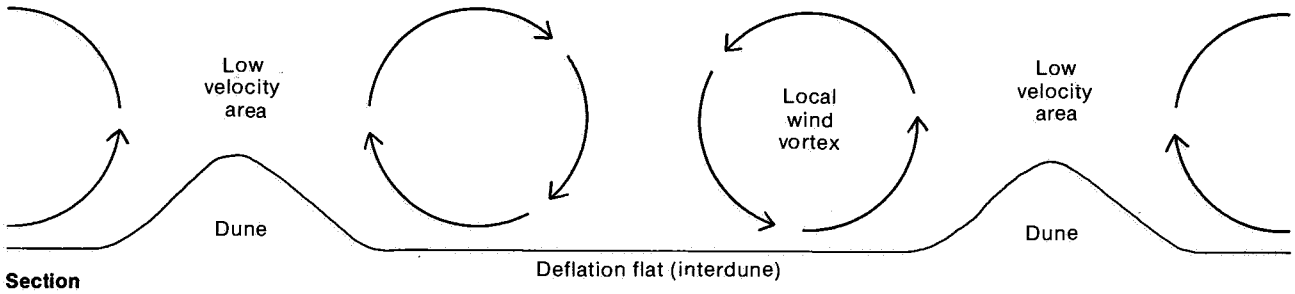


Figure 4

Example of Dune Profiles

WINDS (after Derbyshire *et al.* 1979)



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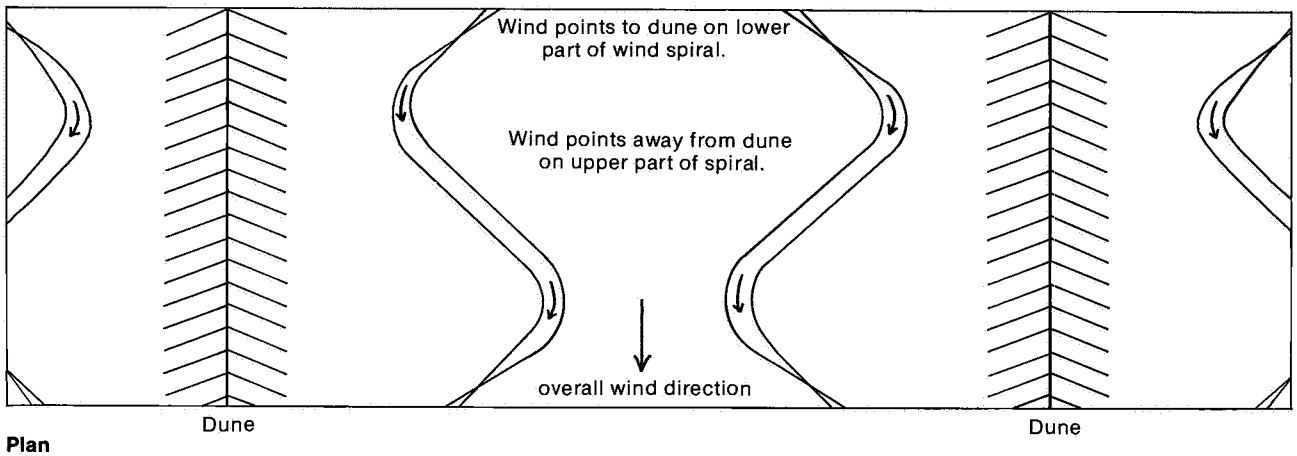
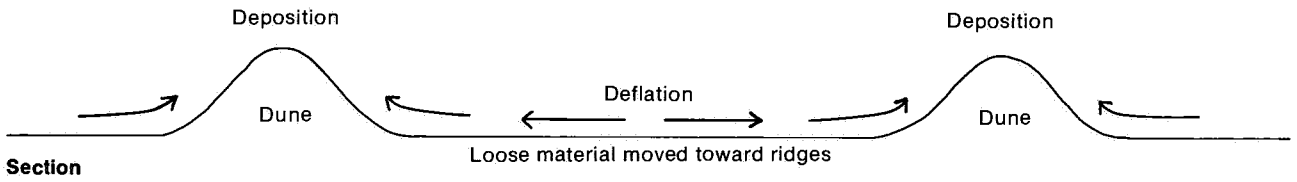


Plan

SAND MOVEMENT



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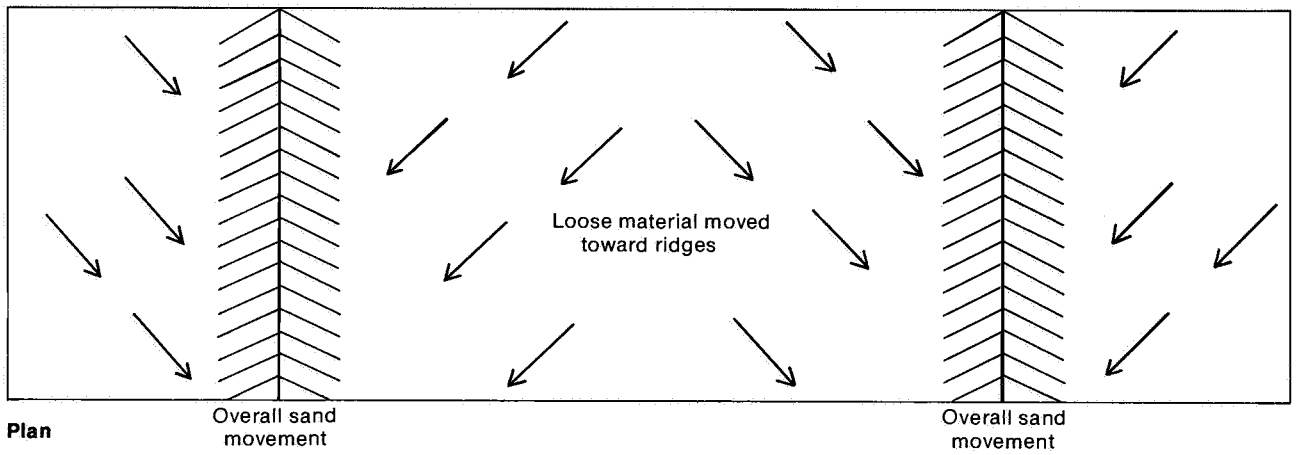


Plan

Mobile sands on ridges will creep in the overall wind direction

Figure 5

Helicoidal Winds in Longitudinal Dune Building

avoided. In particular, there is no mechanism whereby the Simpson Desert dunes could be readily converted into transgressive sand sheets, short of a major change in climate and wind pattern because the dunes still parallel the present dominant wind direction (Brookfield 1970). Even complete removal of vegetation, which occurs at times under stock grazing on desert margins, or through fire, will only result in increased surface mobility. Dunes may slump slightly and their bases spread, but will still remain in place.

The local sand transport, both along the dune end and up the dune flanks to the crest, provides a "self-repair" capability in situations such as cuts through dunes for roads. Once cuts cease to be maintained, the sand movement will result in their eventual infill.

Finally, the local surface wind pattern will tend to scour swale areas with loose material being transported to bordering dunes. This is likely to have a temporary infilling effect over a graded track, for example, but significant removal of stabilising cover may increase the rate at which swale areas are deflated.

Overall, the probable dune formation processes give to the dunefield a pronounced resilience and the ability to recover from disturbance without major land-form changes resulting.

THE PLAYA LAKES

The playa lakes are characteristic of most of the Simpson Desert Conservation Park and of the central portion of the south Simpson Desert (Figure 1). Their characteristics have recently been examined by Krieg and Callen (1980) and the following is based on this 1980 report.

Individual playas are elongate but quite irregular in shape, with very sharp boundaries. Larger playas have a thin, white salt crust up to 5 centimetres thick over a layer of mud which remains damp even in drought. Smaller playas have a smooth and hard clay surface. Playas are frequently edged by a steep slope of sub-dunal sediments, the slope often showing a miniature "badlands" effect due to water erosion.

Along the northern margin of all the major playas are huge sand lunettes, very broad mounds of sand rising up to 50 metres above the playa floor. Despite their size and control of local relief, they are not readily noticeable because of their broadness and the presence of the more eye-catching, though much smaller, longitudinal dunes which cross them.

Within the park, playas tend to be linear, following the line of dunes, but further south their shape parallels that of the present Kallakoopah Creek. Indeed, stream meanders on playa beds are detectable from aerial photographs. Because of this parallelism, and also a lack of recent lake sediment beneath them, the playas are thought to represent the remains of former stream courses rather than the remnants of a larger Lake Eyre.

Playas within the park only receive water through local runoff, but to the south there is connection with the Kallakoopah Creek, resulting in very slight and occasional water flows.

Krieg and Callen (1980) point out that the playa region is of considerable intrinsic interest. It provides numerous opportunities for the study of aeolian sedimentology which so far have not been undertaken but which could contribute greatly to a better understanding of the past climatic regimes.

Other Surface Features

There are variations in relief within the Simpson Desert, and the more significant are discussed in Part 1: Ecological Associations. Overall, the Simpson Desert in South Australia is low-lying with most of it close to sea-level. Much of Lake Eyre is more than 10 metres below sea-level, and the surface of playas as far north as Poeppel Corner may be very close to this level (Krieg and Callen 1980). There are no hills as such in the southern Simpson Desert, but within the park there are two or three areas of small knolls of less relief than the surrounding dunes (one area is the Approdinna Attora Knolls) (Figure 1)).

Floodplains bound the desert to west and east. Those of the Finke, in the west, rarely contain water. Courses of the Mulligan River (Eyre Creek) contain water with much greater frequency. Kallakoopah Creek in the desert south of the park, has very occasional, slight flows. The only permanent surface water in the southern desert comes from Purni Bore (Figure 1), a former stratigraphic well sunk by petroleum exploration crews in 1963 and completed as an artesian well. Its water is potable. The Aboriginal wells formerly in the desert (Part 1: Aboriginal Occupation) were dug into local surface aquifers and no longer function as water supplies.

Summary and Implications

The aridity of the park and surrounds, expressed in high mean temperature and low and erratic rainfall, will limit the variety in flora and fauna species capable either of surviving or of evading periods of extended drought. Limited vegetation cover will be one consequence of the aridity, and will in turn result in a high degree of naturally occurring erosion. Care is therefore needed in any consideration of the erosional consequences of human activity in the area in order to keep the effects in perspective with the natural erosional processes.

The underlying geology of the southern Simpson Desert has been largely controlled by movements of the basement, resulting in the formation in different periods of various sedimentary basins. Of these, the Permian Pedirka Basin is the present focus of petroleum exploration because the conditions under which sedimentation occurred are those associated with hydrocarbon formation, and the formations are similar to those commercially exploited in the related Cooper Basin. Tectonic movements subsequent to the Permian have altered the arrangement of the Pedirka Basin sediments in such a way that the formations most likely to contain hydrocarbons in commercial quantities, lie close to or under, the conservation park.

The surface characteristics of the Simpson Desert reflect the climatic oscillations of the past 40 000 years. The present climate, though arid, is less so than in periods of major dune building in the recent past, and in many respects the Simpson Desert dunefields are relatively stable.

Both the land-form building processes and the variety of land-forms resulting, have a number of implications for conservation purposes and management in the region. The most significant is the actual means of dune-building. The situation is not analogous with coastal dunefields, and management attitudes should not be directly transferred from coastal situations to the desert. Whichever theory of dune formation is accepted, it would appear that the Simpson Desert dunes have a physical self-maintenance capacity which prohibits the development of transgressive movement even in the event of severe damage. Complete removal of vegetation is certainly likely to increase the degree of sand movement, but is unlikely to result in the large-scale dune deflation so often associated with similar damage in coastal environments.

Further, as the supply of sand from the sources south-east of the desert is probably less than in the recent

past, it may be that deflation of the dunes in the drier south-east part of the desert is occurring naturally. This makes it difficult to estimate the level of deflation which might be resulting from human activity in this region.

The variation in dune form, spacing and colour across the desert belies the popular view of uniformity. This has considerable bearing on the adequacy of the conservation park as a representative sample of desert environments. This aspect is examined further in subsequent sections.

HISTORY

Aboriginal Occupation

Several South Australian and Northern Territory tribes included at least part of the Simpson Desert within their tribal boundaries (Figure 6). On the western side of the desert, the Eastern Aranda territory extended down the Hale River to near Andado (Northern Territory), and the Lower Southern Aranda included the Finke River floodflats on the western desert margin. The alternative name for the desert, the "Arunta Desert", was derived from the Aranda name. However, this name may be as out of place as the European name "Simpson Desert" is to some segments of the community as tribes other than the Aranda occupied a much larger proportion of the desert.

On the eastern side of the desert, the Jeljendi tribe extended from east of the Diamantina River, in Queensland, into the desert beyond Poeppel Corner, although the greater part of the tribal area lay in Queensland beyond the desert. Their southern neighbours, the Karanguru, occupied an area from the Diamantina westward to the chain of playa lakes in the southern desert. The Ngameni also extended into the eastern fringes of the southern desert, although primarily occupying the flooding country about the Diamantina and Warburton. The bulk of the Simpson Desert, however, lay within the tribal boundaries of the Wongkamala (largely Northern Territory) and the Wongkanguru (South Australia) (Tindale 1974).

The present Simpson Desert Conservation Park, according to tribal boundaries in Tindale (1974), occupies former lands of the Wongkanguru, the Jeljendi and the Karanguru. Tindale estimated tribal populations to have been of 400 to 600 people in each group.

Doubts have been expressed whether any significant Aboriginal occupation took place in the central desert. Tindale also indicated that the main Aboriginal distribution was about the watercourses on the desert boundaries. A number of other authors, past and present, have pursued this theme. Madigan (1945a, 1946a) reported that Aborigines living on the desert margins were fearful of the desert and had no knowledge of its interior. Boyland and Ogilvie (1966) considered that Aborigines were present in the desert only in good years. Such a view has been supported recently by the ecological evidence in Latz and Griffin (1977) who note that areas such as the Simpson Desert dunefield contain a relatively low component of food species within their flora, and would, therefore, be little utilised by comparison with lands beyond the dunefield.

Against this view can be put the experience of explorers, particularly Lindsay, and the presence of Aboriginal wells within the desert. Linsday was able to cross the desert in 1886 and pass through the present park area only with the aid of Aborigines familiar with the location of Aboriginal wells through the desert. He also reported Aborigines at places well within the desert in a season that was not particularly good.

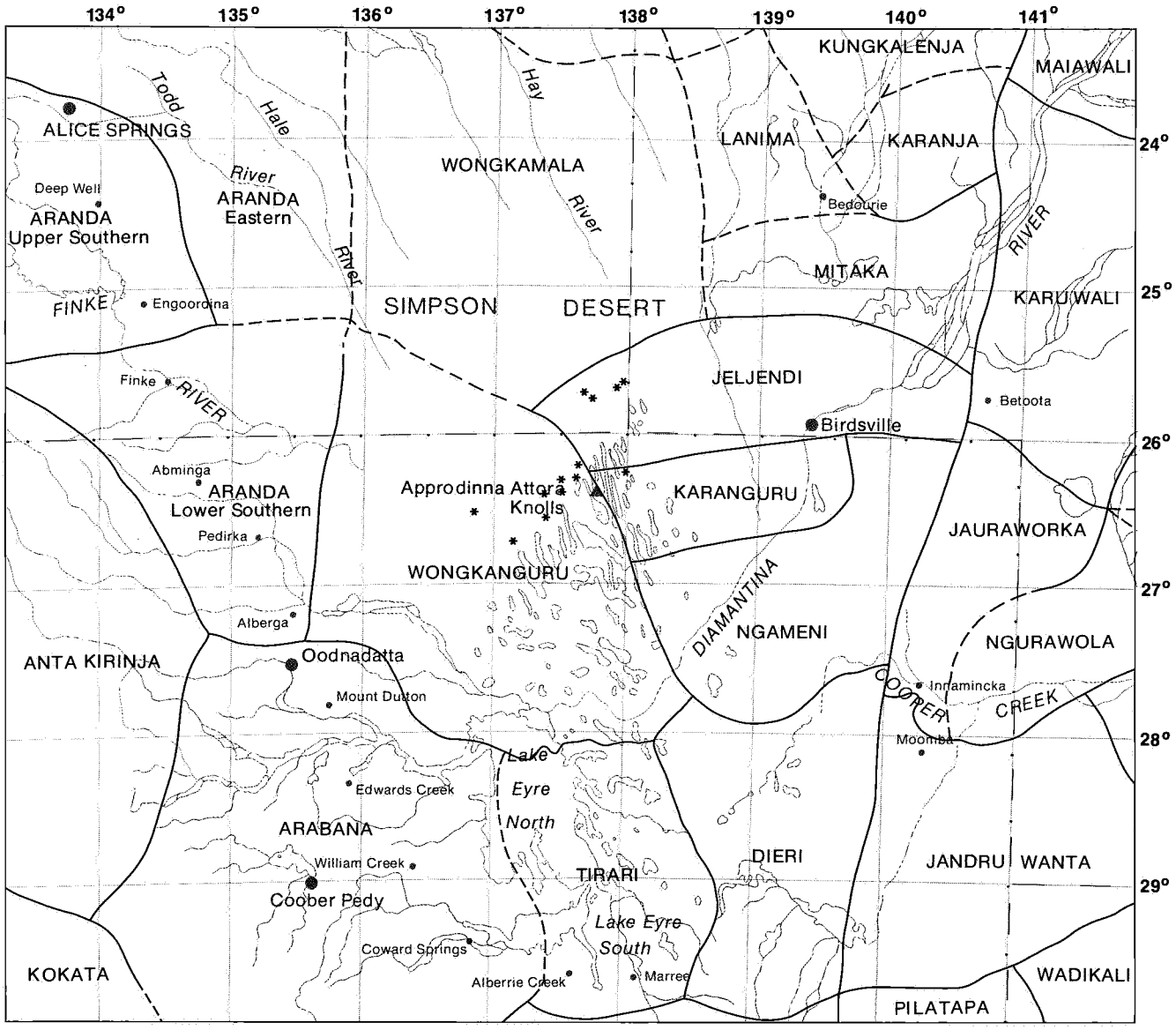
Earlier, in 1845, Sturt had frequent encounters with groups of Aborigines in the eastern desert, and also made use of their wells. Although Sturt did not penetrate into the central part of the desert, he did move far enough away from the marginal streams to be considered as moving within the desert proper. Recently, Alexander (1981) reported that a group partly retracing Madigan's (1946a) exploratory route, had found Aboriginal stone circles in the Northern Territory portion of the desert, indicating more than an occasional foray by Aborigines into the desert's interior. We should also add that Aboriginal place names, such as those reported by Colson (1940) and Lindsay (1886) during their desert crossings, existed for topographic features well within the desert, and are a further indication of considerable Aboriginal usage. Figure 6 shows the approximate location of former Aboriginal wells documented by Madigan (1945a) and the South Australian Department of Lands. The number and location of these documented wells indicates considerable use by Aborigines of a large part of the desert, not just fringe areas. Several wells were present within the park boundaries but to present knowledge, these have now been filled in by drift.

The tribal distributions shown in Figure 6 were determined from the reports of anthropologists during and after the collapse of most tribal living under the impact of European development. They were not necessarily immutable over long periods. Tradition indicates that the Wongkamala, moving into the northern Simpson Desert, displaced the Wongkanguru to the southern desert. The former occupants of this area, the Dieri, were in turn displaced to the south-east into the Strzelecki area (Tindale 1974).

The various Simpson Desert and fringing tribes are recognised to be part of the Central Lakes Cultural Complex (Ellis 1978). More than twenty separate tribal groups formed this complex over a landscape stretching from the Simpson Desert and beyond, to the gulfs and peninsulas of southern South Australia. Tribes within the complex had a common social organisation which distinguished them from others in South Australia. Organisation was based on a moiety system in which two divisions within a tribe functioned as marriage units with a member of one moiety required to marry only with a member of the other moiety. The complex was also distinguished by the practice of circumcision as part of the male initiation.

In other respects, the tribes followed a traditional hunting and gathering economy in common with the tribes of other cultural complexes. All members of the society contributed to the collection of food, water and other material requirements. As little surplus was ever held, maintenance of existence depended on thorough knowledge of land capabilities and harvesting limits and the maintaining of population at more or less constant, ecologically viable levels through cultural practices. The hunting-gathering economy was highly efficient, requiring little effort by comparison with early agricultural practices, but it required a profound appreciation of climate, geography and ecology. The complex mythological systems created by the Aborigines were means for organising and retaining the necessary information for survival.

The Central Lakes Cultural Complex tribes, including those of the Simpson Desert, are also distinguished from those of other cultural traditions by the extensive trade carried out. An account is given in McCarthy (1939). Much of this trade concerned a prized deposit of red ochre in the northern Flinders Ranges. Simpson Desert and even Queensland tribes were among those who regularly undertook extensive journeys along fixed trade routes to obtain the ochre. Trade routes followed



* **Aboriginal well-site (approximate location only)**

——— **Tribal boundaries (after Tindale 1974)**

0 km 100 200 300 400

Figure 6

Aboriginal Wells and Tribal Boundaries
(Source: Alexander 1981 citing Madigan 1945)

mythological tracks, and travellers following the path of their totemic heroes were safe, at least so far as other members and local groups of that totem were concerned. Ellis (1978) quotes an early description of an ochre expedition, and the South Australian National Parks and Wildlife Service (1983) provides a more extended discussion of the ochre trade and some of the myths associated with it.

Also traded were sandstone grinding stones obtained from quarries in the Flinders Ranges. From the north came ground-edge axes (from quarries in Queensland) and also the introduction of Pitcheri (*Duboisia hopwoodii*), a plant treated and chewed for its narcotic properties.

The wells dug by Aborigines of the Simpson Desert deserve particular mention, not only because the Wongkanguru and Wongkamala were reliant on them for water, but also as outstanding examples of water-gathering abilities. Called *migiri* by the Wongkanguru (*mikari* by the Wongkamala), the wells were in some cases tunnels 10 metres long by 1.5 metres diameter and dug at an angle through sand to local surface aquifers. Lindsay describes two of these wells in his journal (1886):

> The well is first 12 feet perpendicular and then 8 feet slope. So small is the entrance that I had to take off my clothes before I was able to go to the water. The well is in a depression 2 chains across—12 feet deep.

Most of the wells are now unrecognisable, or almost so, because of infilling (Alexander 1981; Bartell 1981).

The rapid pastoral expansion on desert margins in 1860-1900 brought with it displacement of tribes, either by directly occupying key tribal lands or by indirectly attracting tribal people to the European settlements. Often, "brutal campaigns of extermination" (Ellis 1978) were mounted by pastoral settlers. The worst impact of European settlement was, however, the result of an influenza epidemic about the time of the first World War. The epidemic decimated tribes and depopulated extensive areas through north and north-eastern South Australia, including the Simpson Desert area.

The last Aboriginal links with the Simpson Desert as a living culture are now extremely tenuous. For example, Hercus (1978) wrote that there were only three or four fluent speakers of Wongkanguru and Dieri remaining in South Australia; only a single speaker each of Ngameni and Tirari; and no fluent speaker of Karanguru. Some of the last remaining speakers have since died (Graetz *et al.* 1982). The traditional lore associated with the desert is in danger of disappearing entirely.

European Exploration

Routes of early European explorers in the region are shown in Figure 7. Penetration of the Simpson Desert began with Sturt's 1845 expedition to the interior of Australia (Sturt 1849). Sturt was searching for the rumoured inland sea suggested by the westward courses and apparently swampy endings of the New South Wales Lachlan and Macquarie rivers. (At this time, the full extent of the Murray-Darling river system was not realised, although Sturt himself had already traced the courses of the Murrumbidgee and lower Murray as well as part of the Darling River.) Sturt proceeded from Adelaide, following the Murray and then the Darling, eventually setting up a base in the Grey Range close to the present junction of South Australia, New South Wales and Queensland. Here his party waited six months for rain. In July 1845, Sturt set out in a north-westerly direction crossing the Stony Desert and channels of the Diamantina, Georgina and Mulligan. The party's exploration extended into the Simpson Desert north-west of Birdsville (Queensland) to the present Northern Territory border (longitude 138° east) at latitude 24°40' south. At this point, all Sturt could see were the sandridges extending northwards—to east and west "they succeeded each other like the waves of the sea". With their horses in poor condition, and themselves suffering from scurvy, the party turned back in August 1845.

There is a possibility that the next exploring party to enter the desert was the ill-fated 1848 expedition of Leichhardt who was attempting to cross the continent from east to west. No certain trace of the expedition has ever been found. Rumours of skeletons near Muckaringa waterhole on the Finke prompted a South Australian Government expedition in 1938. Although there were no skeletons, a number of coins were found. One of these was a 1841 Maundy threepence; one of only 2 904 minted. Leichhardt had been in England at the end of August 1841 and the chances are high that the coin is a relic of his expedition.

The ill-fated Burke and Wills expedition of 1860-61 passed near the eastern boundaries of the desert. A relief expedition out of Adelaide led by McKinley, provided much information on the lands immediately east of the desert. McKinley's reports prompted the occupation by pastoralism of the Cooper Creek and Diamantina "channel country" in South Australia.

A number of Government surveys were carried out in the period 1874-1881 in parallel with pastoral expansion. In 1876, W. O. Hodgkinson, for the Queensland Government, discovered the Mulligan River and completed exploration of the north-eastern margin of the desert. W. Lewis, for the South Australian Government, mapped most of the shores of Lake Eyre and also surveyed the Warburton and Diamantina to beyond Birdsville in 1874-1875. H. Vere Barclay and C. Winnecke explored the northern border of the desert, and discovered Plenty, Marshall, Thring and Arthur rivers between 1878 and 1881. Mapping of desert boundaries on the western margin was still limited to the area about the Overland Telegraph route (Madigan 1946a).

The survey of the South Australian-Queensland border was begun from Haddon Corner on 30 June 1880 by Augustus Poeppel. The 299 kilometres to the intersection of the 138th meridian was completed by the end of 1880. Poeppel used camels to drag a 2.1 metre long, 25 centimetre diameter Coolibah post (Poeppel Peg) 92 kilometres from the Mulligan River across the sandridges to mark the South Australian-Northern Territory-Queensland junction (Poeppel Corner). The post was placed in the middle of a large, dry salt lake (Lake Poeppel). It was adzed on three sides and inscribed with the State and Territory names. The post has now been removed and is preserved in Adelaide. Posts with the mileage from Haddon Corner inscribed on them were also placed along the border, and some of these are known to be still standing. A "solid peg" was also placed every quarter-mile (400 metres).

Poeppel's traverse did not continue any further west than the Corner because of difficulties in obtaining water. On return to Adelaide in 1881, the chain used for surveying was found to have lengthened through wear (2.5 centimetres), and resurvey of part of the traverse was necessary. This was carried out by L. A. Wells (Steel and Steel 1978) from a trigonometric station near the Diamantina River to Poeppel Corner. The corner post was found to be 15 chains 75 links (316.8 metres) too far west and was moved to its present position out of the lakebed.

All these explorative and surveying forays did not have the desert as their main objective and the desert's

EXPLORATION ACTIVITY

Within South Australia, the Simpson Desert and the park were included in Oil Exploration Licences 20 and 21 granted to the Delhi-SANTOS operation. The two licences covered approximately 66 per cent of the State. The area was reduced following legislative changes in 1967, with the Cooper Basin and Simpson Desert segments of the original licences included in the new Petroleum Exploration Licences (PEL) 5 and 6 (Figure 8).

Several groups have explored for oil in the Delhi-SANTOS licence areas under farm-out arrangements. Between 1963 and 1966, operators for the French Petroleum Company undertook seismic surveys near the South Australian-Northern Territory border, from Dalhousie Springs to near Poeppel Corner. The two lasting effects of this survey sequence are the free-flowing Purni Bore in the western desert and the "B" line or French Track into the park. The French Petroleum Company also ran seismic surveys in 1964 in the Kallakoopah area south of the park.

Exploration interest waned for some years, during which the present park was proclaimed. Some activity recommenced in 1972 with the grading of a track north from Mount Gason and through the park into the Northern Territory. This track, put through the park with neither the knowledge nor the permission of the National Parks and Wildlife Service, provided access to an exploration camp (Reef Oil Company) in the Northern Territory, and was not associated with any survey in South Australia.

Major petroleum exploration effort in South Australia recommenced in 1974, partly under farm-out to the Western Mining Corporation, with the Lake Thomas seismic survey which extended over much of the park area. Seismic surveys have since progressed to the point where most of the Simpson Desert in South Australia has been covered.

Stratigraphic wells (Part 1: Petroleum Exploration) were drilled by the French Petroleum Company at Purni and Mokari in 1963 and 1966. No further drilling took place until 1977, when Western Mining sank wells at Poolawanna and Macumba. The Poolawanna Number 1 Well, inside park boundaries, produced hydrocarbon shows; as did the Walkandi and Erabena wells drilled by Delhi Australia in 1981 (see Figure 3). Other wells drilled in South Australia have not intersected hydrocarbons.

The future emphasis in exploration is likely to continue to shift from the preliminaries of seismic survey to more intensive and localised operations, particularly further well drilling. A fuller account of past exploration history and possible prospects is given by Alexander (1981).

Aboriginal and Historic Relics

Relics of Aboriginal occupation still remain in the park and surrounds. Little documented information is available; the following is only a brief and anecdotal account.

Many of the native wells are still evident, although no longer a source of water because of infilling. Bartell (1981) followed Lindsay's 1886 route, finding several of the wells Linsday used still present as shallow depressions. He also noted that the last well used by Lindsay, Kilpatha, had had a track cut to it in during a seismic survey and that the well site itself had been excavated by bulldozer.

Other relics are present. Possible stone arrangements have been reported by visitors in the Northern Territory segment of the desert, while in the South Australian portion, stone implements and workings are present in moderate amounts.

The major relics of European exploration are the marks of explorers and the explorer-surveyors. Two of the most significant items, Poeppel Peg and one of Lindsay's 1886 marked trees, were originally within the park area but have been removed. Poeppel Peg, which was removed prior to park dedication and is preserved in Adelaide, was replaced by a modern corner marker. Lindsay's tree was dead when found by Bartell (1981) during his retracing of the explorer's route. Bartell was given permission to remove it so that it could be protected against possible damage in the desert and be preserved in Adelaide. The site is marked with a plaque. Other items still remaining in and around the park include some of the mileposts placed by Poeppel and probably at least one other tree blazed by Lindsay.

Park Acquisition

The present Simpson Desert Conservation Park was proclaimed during the major expansion of the South Australian reserve system during the decade 1962-1972. During this period, the parks and reserves system grew from nineteen reserves totalling about 234 000 hectares, to ninety-nine reserves covering a total of over 3.5 million hectares (Harris 1974).

Increasing interest in environmental protection and nature conservation was one of the factors contributing to this massive increase in reserved lands. Specht and Cleland (1961, 1963) had published two pioneering papers, one concerning the preservation of vegetation formations in South Australia, and the other the preservation of individual plant species. The two papers provided the first inventory of flora conservation needs for South Australia and highlighted a serious lack of reserves for the protection of arid zone plants and vegetation. The papers contributed greatly to arguments in favour of park dedication in arid areas.

The present Simpson Desert Conservation Park had its origins in a proposal for a truly national park in the centre of the continent, comprising segments of the Simpson Desert in Queensland, South Australia and the Northern Territory. The tri-State park proposal came from the National Parks Association of Queensland (NPA). In 1966, the NPA had proposed to the Queensland Minister for Conservation that desert lands between the Northern Territory-Queensland border (longitude 138° east) and longitude 138°30′ east be incorporated into a national park to preserve an area of 3 625 to 5 700 square kilometres. Simultaneously, the NPA initiated moves to have the then Northern Territory Parks and Reserves Board proclaim an adjoining park in the south-east corner of the Northern Territory.

In South Australia, the NPA asked C. W. Bonython to:

> ... sponsor an application to the appropriate South Australian authority for a National Park covering approximately an area of 78 miles by 35 miles ... The siting of the South Australian section would coincide and join (1) the proposed Queensland National Park (southern boundary on Latitude 26° South...) and (2) the proposed Northern Territory park's southern boundary on Latitude 26° extending from Longitude 137°15′E. westward to 138°E.
>
> (Bonython 1966)

In his report, Bonython quoted the NPA justification for reserving part of the Simpson Desert. As this formed the basic justification for dedication of the present park, the main points are given here:

(a) an area of little or no rainfall.

(b) geological considerations involving the many parallel tightly packed sandridges extending NNW to SSE.

(c) scientific interest in the ephemeral shrubs and some sparse trees.

(d) the small mammals of the area.

(e) Aboriginal relics and history.

(f) future safari-type photographic visits.

Bonython also suggested that if the proposal were to be adopted:

> ... a larger area could be considered with the objects of:
>
> (1) ensuring that if possible the whole of the Simpson Desert sandridge country in South Australia be preserved.
>
> (2) including the north loop of the Kallakoopah Creek, and lakes like Peera Peera Poolanna.
>
> (3) conserving any rare vegetation ...

He also pointed out that such a proposal was not unreasonable as the whole South Australian part of the desert was unoccupied Crown Land subject only to oil exploration licences.

However, objections were raised to this wider proposal by those who considered reservation of such an area as excessive (Bonython 1980, cited in Alexander 1981). Harris (1974) mentioned that this opposition may have been due to pastoral industry intervention, while Alexander (1981) cites a South Australian Pastoral board memorandum advising against reservation of the whole desert area. Among the reasons put forward in this memorandum were that reservation of the area would prevent future pastoral occupation, attract people into a dangerous landscape and so be a threat to public safety, and would possibly hinder the search for oil.

Finally, the recommendation for park acquisition followed the boundaries originally proposed by the National Parks Association of Queensland. In 1967, the Director of Lands informed the newly-constituted National Parks Commission that no objection would be raised against the dedication of the park on those boundaries, provided the Queensland and Northern Territory proposals were also to proceed. At the same time, the Minister of Lands warned that any park dedication in the South Australian part of the desert would necessarily be subject to the *Mining Act* 1930-1962 and the *Mining (Petroleum) Act* 1940-1967, since oil exploration licences were already held over most of the park area. The Queensland Government publicly announced its intention to dedicate 5 050 square kilometres of the Simpson Desert as a National Park in May 1967 (with a slightly larger area and a boundary further to the east than originally proposed by the NPA). The announcement also made public the possibility of South Australia and the Northern Territory following suit. The Northern Territory, however, declined to act on grounds that not only would the relative isolation and inaccessibility of the desert be sufficient protection for the dunes and their flora and fauna, but also that dedication of a park in the Simpson Desert might prejudice the dedication of more significant lands elsewhere. To date, there have been no further moves towards acquisition of a Simpson Desert park in the Northern Territory, and completion of the original tri-State park is now most unlikely. The land originally suggested by the NPA is now subject to an Aboriginal land claim, but even if this pending claim is unsuccessful, a conservation reserve in the Northern Territory sector of the desert is still seen as a low priority and, if dedicated, would be on the desert fringes.

In South Australia, the Simpson Desert National Park was duly proclaimed under the *National Parks Act* 1966 on 14 December 1967 (*South Australian Government Gazette* 14.xxi.1967, p. 2 534). The National Parks Act generally provided that no mining rights would be issued in national parks, but still retained a provision giving the Governor power to declare all or part of a national park subject to either or both the Mining Acts already mentioned. As oil exploration licences were already held in the area, the proclamation establishing the park also invoked this provision to permit retention of the oil exploration licences.

The National Parks Act was replaced by the National Parks and Wildlife Act in 1972. This Act retained the provision for declaring a park subject to the Mining Acts and also reconstituted the Simpson Desert National Park as the Simpson Desert Conservation Park.

A proclamation to permit continuation of oil exploration in the park under the new legislation did not, in fact, appear until 1974. Unlike the 1967 proclamation, the 1972 Act not only declared the park subject to the *Petroleum Act* 1940-1969 but also laid down conditions under which rights in relation to the Petroleum Act could be exercised. As these conditions were the first specific management proposals for the park and the basis for subsequent environmental controls on oil exploration, the proclamation is reproduced in full in the Appendices.

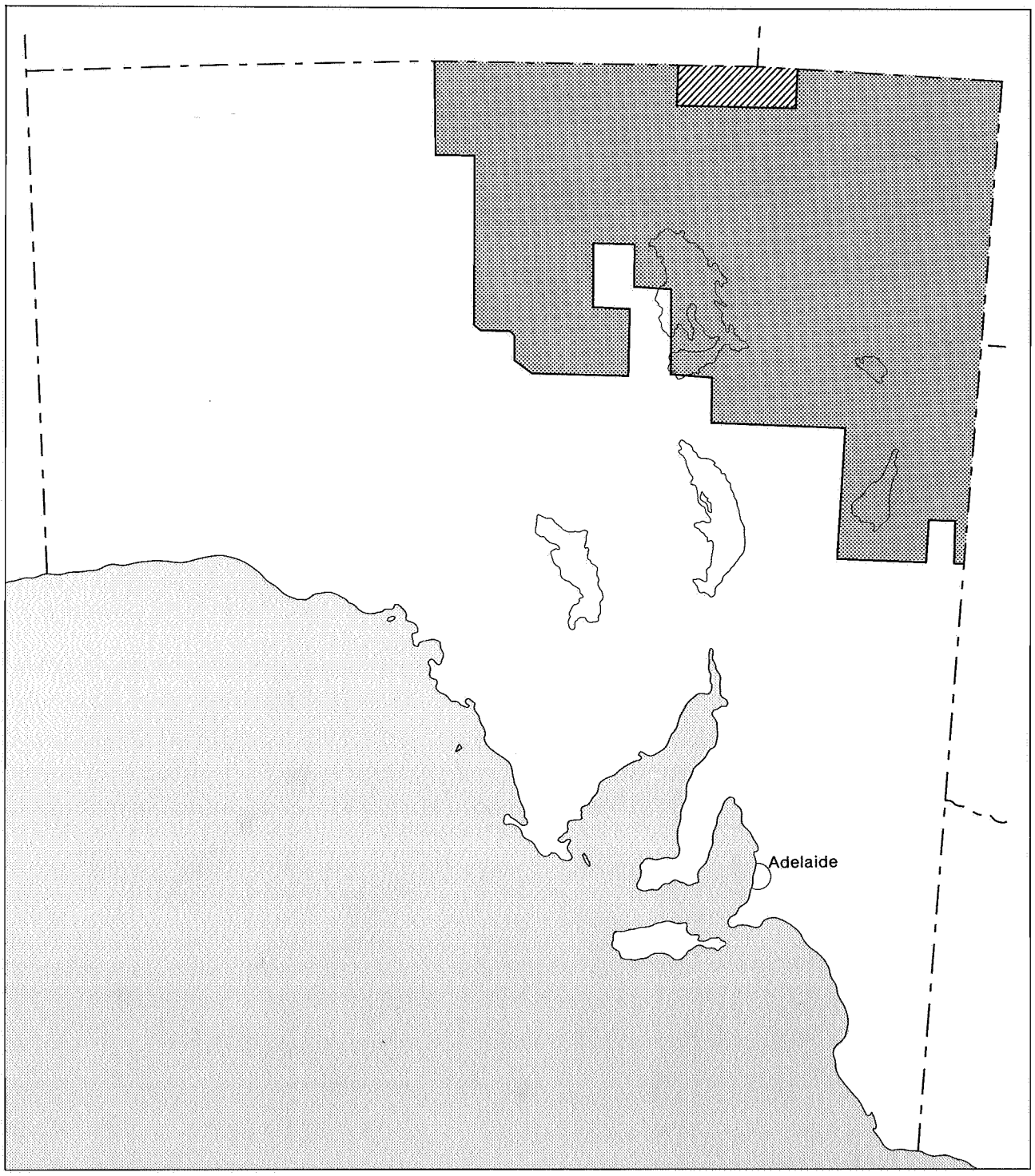
Park Management To Date

No inspection of the park area was carried out prior to its dedication in 1967. Until 1972, the park was under the control of the National Parks Commission. It was regarded as a wilderness area well buffered by the equally wild surrounding desert lands, distant from pastoral influences and largely inaccessible, and because of this it was considered to need little active management input. Over this period only three Field Officers were available to cope with field management over the whole State, and their efforts were necessarily concentrated on parks in the settled areas. In 1968 the only inspection of the Simpson Desert National Park was made by a Field Officer.

The park was reconstituted a Conservation Park (under the control of the National Parks and Wildlife Service) partly in recognition of the wilderness nature of the area. However, there was no field inspection by the Service until 1973. The inspection, prompted by the recommencement of active petroleum exploration, was undertaken to determine appropriate environmental control measures needed to minimise potential impacts of exploration activities within the park. The conditions of the 1974 proclamation were determined largely from the findings of this inspection.

The park has been visited by National Parks and Wildlife Service staff every year since 1975 and by members of the Development Management Division (and its antecedents) of the Department of Environment and Planning. The primary purpose of the inspections has been the examination of petroleum exploration impacts and the effectiveness of environmental controls and conditions in force. Environmental controls and their implementation are discussed at length in Part 1: Petroleum Exploration. Some wildlife inventories, particularly of birds, have been undertaken and a number of photographic monitoring points set up.

The services the National Parks and Wildlife Service have been able to provide for the park have been limited. The responsible Field Officers are stationed in the Far Northern District at Leigh Creek. This district is also responsible for field management of the Gammon Ranges National Park (Flinders Ranges) and the Elliot Price Conservation Park (Lake Eyre). It also has



Petroleum Exploration License 5 and 6

Simpson Desert Conservation Park

Exploration Licence boundary

0 200 400 km 600

Figure 8

Petroleum Exploration Licenses

responsibilities for wildlife off reserves, including the policing of hunting regulations, through the Far North of South Australia.

Summary and Implications

Although a number of writers have considered the Simpson Desert and the park area to have always been essentially unoccupied, Aboriginal occupation is in fact well evidenced, although populations would have been at a relatively low density. As several tribes used the region, the former name "Arunta Desert", appears to have been something of a misnomer.

The Simpson Desert was a barrier to early European exploration and subsequent pastoral occupation because of its terrain and aridity. Although pastoral occupation was limited to the desert margins, European influences nevertheless led to the collapse of the Aboriginal desert tribes.

A number of relics of Aboriginal occupation and European exploration remain. The documentation of the nature and position of these relics is poor. Some relics are in danger from present land-uses, a danger perhaps born more from ignorance than intent, and therefore there is clearly a need to increase the level of knowledge of the area as a first step in increasing the protection of the relics.

The Simpson Desert Conservation Park was originally dedicated as South Australia's contribution to a tri-State national park, but there now appears little chance of a Northern Territory park being dedicated to complement the South Australian and Queensland parks. This has a number of adverse consequences for the effectiveness of land-form and biological conservation in the area because, as already indicated in Part 1: Physical Features, the desert landscapes are not uniform. The significance of regional variation in relation to conservation purposes will become evident in subsequent sections. However, it should be noted that the conservation park was dedicated without a prior inspection and along arbitrary boundaries, largely in the belief that the desert was a homogeneous entity.

The park area was formerly considered to be wilderness, and because of this, only slight management input was provided. However, the park had been declared subject to the various mining and petroleum Acts, and as the level and extent of petroleum exploration has increased, more management input has been required. Exploration can be expected to continue for some years.

One effect of the petroleum exploration has been the creation of defined access in the desert, and this in turn has led to a major increase in public use over the last decade. In some respects, it is ironical that objections to the park's dedication were based in part on the park attracting the public into a dangerous landscape and so increasing public risk. The level of public use and the management problems created by it are a major concern of this management plan. The tracks, their levels of use and continuing exploration mean that the Simpson Desert and the park area cannot be considered the wilderness it was the past. It is essential to determine to what extent the related impacts of visitor use and petroleum exploration are permanent in order to allow assessment of the practicalities of the wilderness management option.

BIOLOGY

Introduction

Crocker (1946), from Madigan's 1939 scientific expedition, mapped the entire Simpson Desert as one "edaphic complex": the cycle of plant communities over the land-form, and soil cycle of dune and swale. The two main plant associations of this cycle were the Sand-hill Cane-grass *(Zygochloa paradoxa)* association of the mobile dune crests, and the Lobed Spinifex *(Triodia basedowii)* association of the stable dune flanks and interdune corridors. Other associations were also described, but considered minor. The *Zygochloa paradoxa-Triodia basedowii* edaphic complex was regarded as the typical vegetation of the desert and was present throughout with remarkable homogeneity. Such a view of ecological homogeneity was retained until quite recently. Specht (1972), for example, shows the southern desert vegetation wholly as a hummock grassland of *Zygochloa* and *Triodia* on the basis of Crocker's report.

Indications that the desert was not ecologically uniform were given by the soil maps of Northcote *et al.* (1968) and the environmental association maps of Laut *et al.* (1977). These showed that the intrusion of the chain of playa lakes into the central part of the desert should bring with it ecological or biogeographical variation on a broader scale than that of the local dune and swale variation.

Boyland (1970) was first to publish a detailed ecological account concerning the Queensland sector of the desert and stemming from inspections prior to the dedication of the Simpson Desert National Park (Queensland) (Boyland and Ogilvie 1966). This study showed a much greater variety within the desert than that implied from the earlier reports, and in particular, drew attention to the extensive Gidgee *(Acacia cambagei)* open woodlands in the eastern desert. Recent examination of specimens from the eastern desert indicate that the species is *Acacia georginae* not *A. cambagei* (R. Purdie, personal communication). Until this is confirmed and published, *A. cambagei* will be used for the name of the species.

Fatchen and Barker (1979a, 1979b) and Buckley (1979) both reported major geographic variations in vegetation and land-form. The former traversed the desert in 1972 along latitude 26° south and passed through the conservation park. Among the variations in species distributions they noted was an apparent complete disappearance of *Triodia.* Although supposedly the "most important plant in the desert" (Crocker 1946), it had disappeared from 33 per cent of the traverse, including the part through the park. They also defined three distinct dune systems, each with differences in vegetation. Their "western dune system" contained the typical Simpson Desert dunes as described by Madigan, Crocker and others: red sand, regular and parallel dunes, unstable or mobile crests, and sandy corridors, with *Zygochloa* and *Triodia* hummock grassland the main cover. The "central dune system", about the playa lakes in the central desert, contained less regular, yellow dunes with few mobile crests. This system was virtually the same unit as the Kallakoopah Environmental Association described by Laut *et al.* (1977). *Zygochloa* grasslands were still present, but the area lacked *Triodia*. East of Poeppel Corner, a further system was reported which was similar in a number of respects to the western desert but with higher, wider spaced dunes (Part 1: Geology and Geomorphology) and flats carrying the Gidgee *(A. cambagei)* woodlands already mentioned.

Buckley (1979a, 1981a, 1981b) also pointed out major variations in land-forms and plant species distributions across the desert which conformed closely with those previously mentioned.

Although most of these investigations were primarily concerned with flora and vegetation, the findings have a wider ecological significance. They belie the popular and previous scientific belief that the desert is a homogeneous ecological entity. Geomorphological

variations have already been established (Part 1: Physical Features). Variation of land-form will produce changes in the fauna present, in the ecological processes in operation (such as frequency of fires), and in response to disturbance.

One consequence of the ecological variation is that there is not yet sufficient information available to map the vegetation of the South Australian and Northern Territory segments of the desert adequately (for example, to the level of mapping available for Queensland (Boyland 1979). Examples from Buckley (1979, 1981a, 1981c), Fatchen and Barker (1979a, 1979b), Wiedemann (1971), Boyland (1970) and Crocker (1946) all provide information on the local vegetation pattern at various points in the desert, but data are lacking between points.

For this reason, the wider but less specific concept of ecological associations which embraces soils, vegetation and land-form has been used for the basic ecological resource mapping rather than vegetation. In the following section, the various ecological associations within and about the conservation park are briefly described. Flora and vegetation are further discussed in subsequent sections.

Ecological Associations

An overview of the ecological associations in the southern Simpson Desert and its margins has recently been compiled by Graetz *et al.* (1982) on the basis of LANDSAT imagery and some ground examination. Graetz *et al.* define nineteen ecological associations, of which three are partly contained within the conservation park (Figure 9). These ecological associations, from west to east, are the Wongkanguru, Karanguru and Jeljendi, and conform respectively to the western, central and eastern dune systems of Fatchen and Barker (1979b). Within the desert proper are a further two, the Kallakoopah Ecological Association and part of the Mulligan Ecological Association. The remainder are beyond the desert boundaries. Ecological associations differ from each other regarding size, shape and spacing of dunes; presence or absence of playa lakes; and the nature of the vegetative cover. Differing combinations of these features are likely to result in different available habitats, growth patterns and responses to disturbance. The ecological associations therefore provide at least a framework for management decisions.

Graetz *et al.* do not report on the desert north of the State border. Comments relating to this part of the desert are drawn from the reports already cited and also Bonython (1980a). Some of the descriptions given below are also at slight variance with the report of Graetz *et al.* on the basis of other reports.

WONGKANGURU ECOLOGICAL ASSOCIATION

This association is an extensive area of red, closely spaced, parallel dunes built over a calcareous clayey alluvium (the "typical" Simpson Desert dunes. See Part 1: Physical Features). The alluvium is thought to be a former floodplain of the streams on the western desert edge. There are no playa lakes present. The ecological association contains the land-form and vegetation usually considered typical of the Simpson Desert. Although it accounts for only 33 per cent of the desert in South Australia, the Wongkanguru Ecological Association extends into the Northern Territory, forming the bulk of the Northern Territory segment and probably the major part of the Simpson Desert.

The landscape and vegetation is that which was originally described at length by Crocker (1946). It was for the protection of this ecological association that the Simpson Desert Conservation Park was originally dedicated although Figure 9 illustrates that only a small proportion of it is contained within the present park boundary. The dunes vary from 10 to 15 metres in height. They are occasionally jumbled on the western margin, but are usually quite regular, evenly and closely spaced. Spacing ranges from four dunes per kilometre in the west, to two or three dunes per kilometre in the east. Dunes are asymmetric, with steep eastern faces and gentler western slopes, and are mobile only on crests. Interdune (swale) areas are normally sandy, a thin mantle over the underlying clays with only occasional areas of sandy clays appearing.

A well-reported sequence in vegetation corresponds to the soil sequences of mobile crest sand, deep stable sand dune flanks, and shallow sand or sandy clay of the swale (Crocker 1946; Wiedemann 1971; Fatchen and Barker 1979a; Buckley 1981a, 1981b). Species distributions correlate with soil mobility but may be determined by other factors such as soil moisture characteristics (Buckley 1982b). Overall, the vegetation is open hummock grassland with the perennial grasses *Zygochloa paradoxa* (Sand-hill Cane-grass) on crests, and *Triodia basedowii* (Lobed Spinifex) on flanks and in swales. The perennial cover is usually low, however, and most cover, other than in severe drought, is provided by a suite of short-lived (ephemeral) species, particularly grasses and herbs such as *Aristida* spp., *Salsola kali, Sida* spp. and *Sclerolaena* spp. Taller shrubs, particularly the Umbrella Bush *(Acacia ligulata),* may be moderately dense on dune flanks, but are less frequent in swale areas except where localised water runoff occurs.

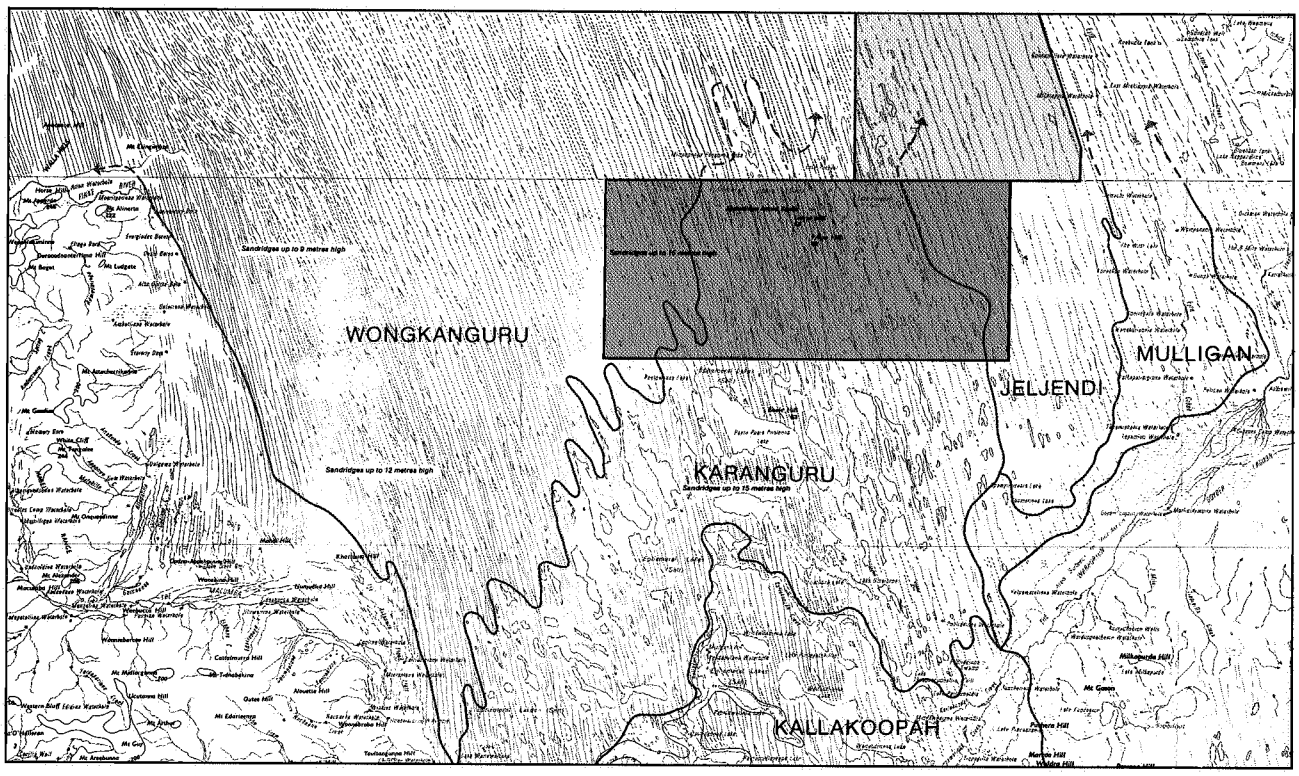
KARANGURU ECOLOGICAL ASSOCIATION

This is the largest ecological association mapped by Graetz *et al.* in the South Australian segment of the desert and the bulk of the conservation park area lies within it (Figure 9). It differs from most of the Simpson Desert in the nature of its dunes and the presence of numerous large and small playa lakes.

The dunes are composed of light-coloured sand which has been blown out of the sand sources about Lake Eyre. Their lighter colour is evidence of their more recent origin compared with the red dunes of the Wongkanguru Ecological Association. Dunes are higher (to 20 metres) than in the western desert, but are comparatively short, less strictly parallel and much more irregularly spaced (Fatchen and Barker 1979b). They are almost symmetrical in cross-section—there is no great difference in slopes of eastern and western faces—and lack the pronounced mobile crest, stable flank and swale soil sequence present elsewhere in the desert.

Fatchen and Barker (1979a) reported that these dunes appeared more stable than in other parts of the desert because of infrequent mobile crests, yet at the same time showed physical evidence of recent deflation and carried vegetation which, on the whole, indicated a high degree of instability. Graetz *et al.* (1982) consider that the system as a whole is being destabilised as sand steadily mobilises and is carried north, thus exposing indurated sand plinths. Buckley (1981a) also has observed major wind-scouring. The destabilisation is believed to be a natural phenomenon.

As well as the obvious longitudinal dune system within the ecological association, there is another less obvious but much larger set of dunes. These are huge sand lunettes forming broad humps on the northern margins of the playas (Krieg and Callen 1980). Although they may reach more than 50 metres above playa floors, they are not immediately obvious because they are very wide and of subdued profile.



JELJENDI **Ecological Association (after Graetz 1982)**

Ecological Association Boundary (mapping in Graetz ceases at Lat. 26° S)

Simpson Desert Conservation Park (S.A.)

Simpson Desert National Park (Qld.)

Dune lines are representational only

0 50 100 km150

Figure 9

Ecological Associations

The lack of a pronounced soil cycle in the dunefield is reflected by an absence of clearly defined vegetation patterns. In the eastern part of the ecological association, the dune vegetation is still predominantly a very sparse hummock grassland of *Zygochloa* on crests and *Triodia* on dune flanks. At the level of the State border, however, *Triodia* is absent across the western half of the association (Fatchen and Barker 1979b) and is also absent from much of the area to the south (Buckley 1981a; Lewis, in Foale n.d.). Interdune areas are commonly only vegetated with ephemeral herbaceous species, although some may contain low open shrublands of Bladder Saltbush *(Atriplex vesicaria)*. In the south, and largely outside park boundaries, there are considerable areas containing sparse stands of Mulga *(Acacia aneura* and others) and Needle-bushes *(Hakea leucoptera, H. eyreana)*.

Low open woodlands of Gidgee *(Acacia cambagei)* appear in isolated swales west of Poeppel Corner, becoming extensive woodlands to the east of the Corner. The woodlands, viewed from dune crests, give an illusion of thickly-forested swales, although the actual density of trees is low.

No vegetation grows on the saline surfaces of the playa lakes, but mounds within the lakes and the lake fringes carry very sparse low shrublands of Samphire *(Sclerostegia* and *Halosarcia* species) with occasional Nitre-bush *(Nitraria billardieri)*. Vegetative cover is usually very low in the south of the ecological association.

JELJENDI ECOLOGICAL ASSOCIATION

Jeljendi is a dunefield lying between the playa lakes region and the active floodplains of the Mulligan River (the "eastern dune system" of Fatchen and Barker 1979b). To the south it contains a few playa lakes. The sands are light yellow, and in this respect are similar to those of the Karanguru Ecological Association. The dunes, however, are much more regular and have the typical asymmetric cross-section. They are long, rarely branched, and in the park area may be very high (to 30 metres). Spacing between dunes may be over 1 kilometre. Further south, nearer to sand sources, dunes are relatively low and more closely spaced.

The dunes overlie a clayey alluvium, readily evident in swales, and believed to be recently buried floodplains of the Mulligan River (Graetz *et al.* 1982).

Dune vegetation depends to some extent on the particular location. Fatchen and Barker (1979a) report that *Triodia* only reappears in the eastern part of the ecological association, an observation supported by earlier comments of Boyland (1970). Graetz *et al.* (1982) indicate that *Triodia* is a characteristic species forming hummock grassland throughout. All authors at least agree that the Sand-hill Cane-grass (*Zygochloa paradoxa*) forms a sparse hummock grassland on mobile dune crests, and that taller shrubs such as *Acacia murrayana* and *A. dictyophleba* may be moderately dense on dune flanks.

More disagreements arise in relation to the vegetation of interdune corridors. Graetz *et al.* record the Gidgee woodlands as being present only in isolated swales, whereas Boyland, and Fatchen and Barker attest to the Gidgee being extensive, if sparse. Understoreys in woodlands are generally grassy. Where swales lack woodlands, there are ephemeral grasslands or, in the eastern parts, very sparse perennial hummock grasslands of *Triodia*.

The two following ecological associations lie entirely outside the present park boundaries. They are briefly described in order to give a clearer view of the park in context with the Simpson Desert in South Australia.

MULLIGAN ECOLOGICAL ASSOCIATION

Past and present floodplains of the Mulligan River (Eyre Creek) system define the Mulligan Ecological Assocation. The floodplains are crossed by dunes of similar structure and vegetation as in the Jeljendi Ecological Association. The flood-out areas between dunes have grey, self-mulching (cracking) clay soils carrying a sparse perennial shrubland of chenopods, particularly the Old Man Saltbush (*Atriplex nummularia*). Large amounts of ephemeral herbage appear after flooding. Flood channels and gutters close to the Mulligan River also have a very sparse cover of Coolibah (*Eucalyptus microtheca*). The banks of the relatively well-watered main streams of the Mulligan River have woodlands of Coolibah, River Red Gum (*Eucalyptus camaldulensis*) and *Lysiphyllum gilvum*.

KALLAKOOPAH ECOLOGICAL ASSOCIATION

This ecological assocation is distinguished from the otherwise very similar Karanguru Ecological Association because its playa and floodplain systems still receive water inflows other than from purely local runoff. The flows, rare and of low volume, are provided by the Kallakoopah Creek. Consequently, the ecological association possesses wetland areas that are unique within the Simpson Desert. The wetlands are actually a drier outlier of those associated with the Warburton (discussions in Foale n.d.).

The clay soils of the flood-out and channel areas become progressively more saline towards Lake Eyre. The only account of the vegetation is from Graetz *et al.* (1982). Vegetation on channels grades with increasing salinity from tall open shrublands of *Atriplex nummularia* to tall shrublands of *Melaleuca* spp., with the most saline areas containing low sparse shrublands of Samphire (*Halosarcia* spp.). Flood-outs show similar vegetation changes with increasing salinity, from chenopod shrubland of Cotton Bush (*Maireana aphylla*) to sparse ephemeral herbfields on more saline soils.

The proportion of the area occupied by the channels and flood-outs is small, however, and most of the ecological association comprises dunefield or playa lakes with characteristics the same as the Karanguru Ecological Association.

Representation of Ecological Associations within the Park

The present Simpson Desert Conservation Park is not fully representative of the three main ecological associations of the desert. Over 60 per cent of the park area is within the Karanguru Ecological Association, representing about 20 per cent of the total (Figure 9). A further 20 per cent of the park area is within the Jeljendi Ecological Association, conserving about 33 per cent of this unit's area in South Australia. A much larger area of the Jeljendi Ecological Association is protected within the Simpson Desert National Park (Queensland).

Only a slight proportion of the Wongkanguru Ecological Association is conserved within the conservation park, even when considering only the South Australian extent of this ecological association. As this ecological association contains the "typical" Simpson Desert land-forms and vegetation and forms the bulk of the Simpson Desert, the conservation park fails to protect a viable and representative sample of the country it was intended to protect. If the tri-State park proposal (Part 1: Park Acquisition) had been fully implemented, the proposed Northern Territory reserve would have completed the representation of the main desert landscapes. However, there now seems little likelihood of a Northern Territory reserve being proclaimed, and as a result, the sample of desert systems protected in the South Australian and Queensland parks will remain inadequate.

Flora and Vegetation

FLORA

The known flora of the Simpson Desert proper is listed in the Appendices. The first list of plants was published by Eardley (1946) from the collections of Madigan's 1939 expedition. A more recent checklist was provided by Symon (1969), who listed 180 species within the desert itself. As a result of further collecting, over 200 species are recorded in the flora list in the Appendices. The desert margins, with a greater variety of habitats and often the presence of floodplains, provide many more species than are found in the desert proper.

The desert flora is limited by the aridity, soils and land-form. A large proportion of the species consists of short-lived, drought-evading plants. Although there is considerable land-form variation across the desert, the lack of marked topographic relief, a general similarity of soil types, and the lack of surface water also limit the floral diversity.

The flora is not consistent across the desert. Individual species, particularly the drought-resisting perennials, have variable distributions. Gaps in the distribution of *Triodia basedowii* and the restriction of *Acacia cambagei* to the eastern desert have already been noted. Figure 10 gives distributions of a number of species along the State border and across the park. Many species, particularly ephemerals, are widespread throughout the desert. Other species are limited to either the western or the eastern desert, with varying degrees of penetration towards the central desert, while still others may be missing from the central desert, but present in both east and west.

These species gradients have been discussed by Fatchen and Barker (1979b) and Buckley (1981a). Fatchen and Barker suggest that they indicate a continuing, natural invasion of the desert by a number of species.

Figure 10 provides a further indication of the biological variety within the desert beyond the conservation park boundaries, and the limited representation of the park.

Alien species are still very uncommon within the desert (see Appendices). The aridity may inhibit the rate of spread of aliens. The percentage of exotic plants in the central Australian flora is only 50 per cent of that for the better-watered parts of the continent (Buckley 1981d). Nevertheless there is considerable potential for invasions by both herbaceous and woody weed species.

Some species may have been introduced into the region by Aborigines. Finger Grass (*Dactyloctenium radulans*), Native Millet (*Panicum decompositum*), *Tragus australianus, Portulaca oleracea, Sida corrugata* and *Solanum ellipticum* are food species which are thought to have been widely spread by Aborigines (Cleland 1966; Buckley 1981d).

Occasional weeds have been noted in association with petroleum activities during field inspections, although these cases do not appear to have persisted. Native species may also be spread by human movement (Fatchen and Barker 1979b).

Only one species recorded within the desert proper, *Calandrinia disperma,* is considered rare (Leigh *et al.* 1981), but it is neither currently endangered nor at risk in the longer term.

VEGETATION PATTERNS

Regional variation in plant species associations has already been discussed and now mention is needed of the characteristic local vegetation patterns. The following discussion is largely drawn from Crocker (1946), Fatchen and Barker (1979a, 1979b), and Buckley (1979, 1981c, 1982a).

The typical soil pattern of desert dunes, best expressed in the Wongkanguru Ecological Association, is of mobile sands on dune crests, stable sands on dune flanks, and stable sands, clayey sands or sandy clays in swales. The change from one soil condition to the next is continuous and comprises a soil catena. Associated with the soil catena is a vegetation catena which was originally described as an alternation of plant associations, but which is now recognised as continuous variation. Mobile sand areas, usually on dune crests but sometimes elsewhere, have a sparse mixture of herbs and grasses. Sand-hill Cane-grass (*Zygochloa paradoxa*) is usually the most obvious but does not necessarily contribute most to the sparse cover. Other common species include the annual grasses *Enneapogon cylindricus, Eragrostis dielsii* and *Plagiosetum refractum;* herbaceous species such as *Trichodesma zeylanicum* and the spiny-fruited, prostrate *Tribulus hystrix;* and a number of taller, perennial shrub species present at very low densities including the Parrot Bush (*Crotalaria cunninghamii*) and *Calotis* spp. In the western desert, some quite large shrubs such as *Grevillea stenobotrya* may also be present. Wildflowers may appear in quantity on loose sands following rain, and can include Stuart's Daisy (*Myriocephalus stuartii*), everlastings (*Helichrysum*) spp. and various species of *Helipterum, Ptilotus* and *Sida*. With increasing stability of substrate, these species are replaced by others.

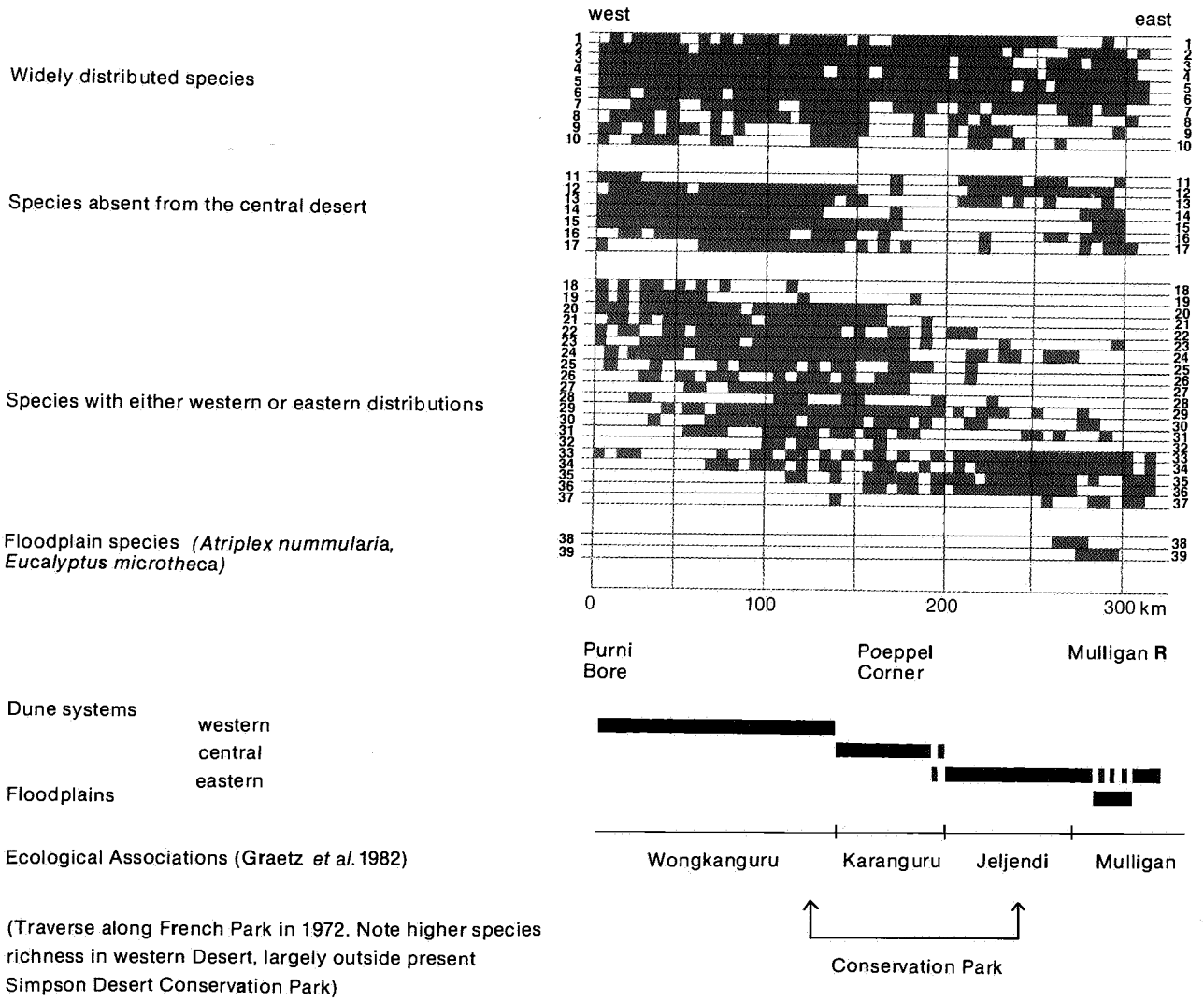
The stable lower dune flanks are generally characterised by Lobed Spinifex (*Triodia basedowii*), accompanied by grasses, numerous shrubs, and tall shrubs, particularly *Acacia* spp. (Over the last decade, the amount of tall shrub cover has greatly increased to the point where much of the desert area usually described as *Triodia* hummock grassland could equally well be classified a tall open shrubland. This increase is discussed further in Part 1: Ecological Dynamics. Common tall shrubs include Umbrella Bush (*Acacia ligulata*), *A. murrayana* and *A. ramulosa* in the west, and *A. dictyophleba* and needle-bushes (*Hakea* spp.) in other areas. The grasses common on mobile sands are less frequent, being largely replaced by *Aristida browniana*. With decreasing sand mobility, other small shrubs are also present and may include *Eremophila* spp. and *Dicrastylis* spp.

Swale areas are generally characterised by *Triodia*, often with individuals seated on hummocks of cemented sand, exposed by wind-scouring through the swale. Between the dune flank and the bottom of swales, the range of species present again changes. Short-lived grasses such as *Aristida contorta, Eriachne aristidea* and *Enneapogon polyphyllus* generally provide most of the groundcover. Swales in the western desert may also have small trees within them, primarily Mulga (*Acacia aneura*).

Although the change from one group of species to another takes place often within very short distances, the change is nevertheless gradual. It is both possible, and at times useful, to discuss the vegetation in terms of "mobile sand" and "stable sand" species, provided the continuous gradation in local distributions is kept in mind.

Patterns in the vegetation within the Jeljendi and Mulligan ecological associations are basically similar. Differences relate to the flora and main swale species already discussed. However, a consistent pattern is not present within much of the central Karanguru Ecological Association (summarised above).

The correlation between the particular species present in a locality, and the level of soil mobility, may not be a cause-and-effect situation. Soil movement itself may exert a direct control, but other factors, such as soil



(Traverse along French Park in 1972. Note higher species richness in western Desert, largely outside present Simpson Desert Conservation Park)

(a) Trees or tall shrubs

1 *Acacia cambagei* Baker
2 *Acacia dictyophleba* F. Muell
3 *Acacia ligulata* Cunn. ex Benth.
4 *Acacia linophylla* Fitz.
5 *Acacia murrayana* F. Muell. ex Benth.
6 *Acacia oswaldii* F. Muell
7 *Cassia nemophila* var. *nemophila* (Cunn. ex Vogel) Symon
8 *Dodonaea attenuata* Cunn.
9 *Eucalyptus microtheca* F. Muell
10 *Grevillea juncifolia* Hook.
11 *Hakea leucoptera* R. Br.

(b) Shrubs

12 *Abutilon otocarpum* F. Muell
13 *Atriplex nummularia* Lindl
14 *Atriplex vesicaria* Heward ex Benth.
15 *Sclerolaena bicornis* Lindl
16 *Sclerolaena wilsonii* (Isling) Scott
17 *Crotalaria novae-hollandiae* DC.
18 *Dicrastylis costelloi* Bailey
19 *Eremophila macdonnellii* F. Muell
20 *Leschenaultia divaricata* F. Muell
21 *Phyllanthus fuernrohrii* F. Muell
22 *Ptilotus atriplicifolius* (Cunn. ex Moq.) Benth.
23 *Ptilotus obovatus* (Gaudich) F. Muell.
24 *Rhagodia spinescens* var. *deltophylla* (F. Muell.) Black
25 *Scaevola depauperata* R. Br.

(c) Herbs

26 *Atriplex limbata* Benth
27 *Goodenia cycloptera* R. Br.
28 *Ptilotus latifolius* R. Br.
29 *Ptilotus polystachyus* (Gaudich) F. Muell.
30 *Salsola kali* L.
31 *Sida corrugata* Lindl
32 *Sida virgata* Hook.
33 *Trichodesma zeylanicum* (Burm.f.) R.Br.

(d) Grasses

34 *Aristida browniana* Henr. (cf. *A. contorta* R. Br.)
35 *Enneapogon avenaceus* (Lindl) C. E. Hubbard.
36 *Eragrostis dielsii* Pilger
37 *Plagiosetum refractum* (F. Muell) Benth.
38 *Triodia basedowii* E. Pritzel
39 *Zygochloa paradoxa* S. T. Blake

Figure 10

Plant Species' Distribution near Latitude 26° South
(after Fatchen and Barker 1979)

TABLE II: DUNE-SWALE PATTERN IN SOIL FACTORS

Factor	Pattern
Sand depth	Increases from swale to crest
Degree of sand sorting	Increases from swale to crest
Percentage of fine material	Decreases from swale to crest
Degree of soil crust formation	Decreases from swale to crest
Penetrability	Increases from swale to crest
Soil mobility	Increases from swale to crest
Infiltration of water	Increases swale to crest
Runoff of water	Greatest on lower dune slopes
Soil moisture content	Decreases from swale to crest
Carbon content	Decreases from swale to crest
Soil Nitrogen	Decreases from swale to crest
Soil P, K and minor nutrients	No pattern, low levels
pH	Generally more or less neutral, high (alkaline) in calcareous swales

(Buckley 1979)

moisture and nutrient levels, are more likely to be the main determinants of local plant distributions (Buckley 1979, 1982a, 1982b). Mobile crest sands in particular have a very low nutrient status (Table II), while swales may have a much higher pH and a greater water-holding capacity.

The above factors are themselves closely related to soil mobility. The correlation of individual species with degrees of soil mobility, and with combinations of the other factors, is easily carried out (Wiedemann 1971; Fatchen and Barker 1979a), although it is very difficult to isolate one factor which is the true control for local plant distributions (Buckley 1982b). Nevertheless, the correlations mean that a number of species can be readily used as indicators of a particular set of soil conditions and especially of changes in soil mobility. Within the desert, Fatchen and Barker (1979a) used indicator species to demonstrate increasing sand mobility at Purni Bore resulting from grazing by domestic cattle.

VEGETATION AS A STABILISING INFLUENCE

There is little doubt that the vegetative cover contributes greatly to reduction of the degree of surface sand movement in the desert. However, the vegetation is unlikely to be the primary mechanism for fixing dunes in place. The discussion on processes of dune formation (Part 1: Geology and Geomorphology) has shown that transgressive sand movement on a large scale is most unlikely even if vegetation is stripped. In such a case the dunes should maintain their general shape and orientation even though transport of sand to and along the dunes would be expected to be increased. Complete or almost complete removal of vegetation must occur at intervals as a result of fire (see Part 1: Ecological Dynamics), but there is no evidence of fires in the recent past being followed by large-scale deflation. Also, the species stabilising dune flanks are largely ephemeral, disappearing in severe drought. Although even dead plants can bind sand effectively, there must be extended drought periods, in which most of the groundcover is missing and the remaining perennial species are too widely spaced, to limit wind erosion. Again, there is no indication that dunes have moved significantly in such periods, beyond surface transport along the ridges (Ratcliffe 1936). Fatchen and Barker (1979a) reported dune movement due to domestic stock removing the vegetative cover of dunes near Birdsville, citing as evidence partial burial of trees in swales. Even so, these cases involved a movement of only 2 or 3 metres (T. Fatchen, personal communication), relatively slight, given a century of domestic grazing, and possibly resulting more from slight slumping of the dunes rather than lateral dune movement.

This view of the role of vegetation in holding dunes should not be read to mean that no significant ecological changes will take place if the vegetation is continuously damaged. Floristic changes in sandhill country under domestic grazing are well documented, both in Australia and overseas. Continued heavy grazing, for example, eventually leads to major changes in plant communities and the fauna dependent on them, despite the physical resiliency of the dunefields on which they may be found. Reduction in groundcover, a decrease in productivity and an increase in surface soil movement, lead to a bare landscape—the process of desertification (Graetz and Tongway 1980; Dixon 1981). The influence of the rabbit in the park, for example, is of concern to management for changes of this kind, rather than for the possibility of rabbit grazing increasing dune movement.

Vertebrate Fauna

Spinifex grasslands such as those of the Simpson Desert do not support a great diversity, or large numbers, of individuals of vertebrate species except after rains, hence local and regional species distributions are usually very dynamic (Frith 1979). A complete picture of the fauna of the desert and the park is therefore only possible through repeated observations over long periods. The remoteness, and until recently, the inaccessibility of the region, have limited the number of faunal studies. As a consequence, the desert fauna is very poorly known by comparison with the more readily observable flora. The South Australian Museum, for example, possesses no native mammal specimen from the conservation park area. In most cases, occurrences of species within the desert and the park must be inferred from records on desert margins, supported by the few records from the desert interior. The lack of contemporary information is illustrated by the fact that reports from Madigan's 1939 expedition still remain the primary data source for this area.

BIRDS

The birds are the best known of the desert fauna, largely as a result of expeditions reported by Wilson (1973) in the Northern Territory, and observations over the last decade by May (in prep.; also May 1977a, 1977b; Parker *et al.* 1978) in the southern Simpson Desert.

May's observations of species observed, their frequency and habitat are summarised in the Appendices. One hundred and thirty-two species are recorded for the southern Simpson Desert, including the park area, and a further twenty-one species are noted from lists of Wilson (1973). Only a few of the records are of true vagrants, that is, species of exceptional occurrence well beyond their normal range and habitat.

Bird species diversity varies considerably within the desert. The marginal floodplains have the richest avifauna and the sandridge desert the least diverse. Reduced bird species diversity within the desert proper is as much a result of lack of surface water as lack of diversity of habitat. For example, Wilson (1973) compared the distributions of Black Kites, which were not found far from water, with the Brown Falcons and Wedge-tailed Eagles, which were found throughout the desert. Wilson also noted that the distributions of larger seed-eating species, such as the Crested Pigeon and Galah, were restricted by lack of water, whereas smaller seed-eaters, such as the Zebra Finch and Budgerigar, were found throughout.

One effect of the free-flowing Purni Bore within the desert has been to greatly increase the local diversity

of birds by permitting the long-term occupation of part of the desert by species with high water requirements.

Seasonal conditions markedly affect distributions and abundances. May's observations cover both drought and very wet periods, particularly 1973-1976. He reports that in August 1976 daily lists of birds totalled forty to sixty species. This compares with daily lists in the range twelve to thirty species under drought conditions in August 1982.

A large number of waterbirds are recorded for the desert. These species are normally found in the marginal floodplain country, but in the wet periods, range through the playa lakes in the central desert and the park area. The Poeppel Corner visitor book (Part 1: Visitor Use) records the surprise of some visitors on seeing large numbers of ducks on the playa lakes.

Birds of particular interest both in the desert and in the present park area are the Australian Bustard (*Ardeotis australis*) and the Eyrean Grasswren (*Amytornis goyderi*). Both are listed as rare species in the Eighth Schedule of the National Parks and Wildlife Act. The Australian Bustard has been greatly reduced in numbers in southern Australia partly as a result of habitat modification due to changes in land-use and also to a large degree through hunting pressure, as, apart from being a large ground-dwelling bird, it also has reasonable eating qualities. The species is extinct or very rare over much of its former range (Frith 1979) because of these pressures, but the desert is able to contain a moderate population.

The Eyrean Grasswren was first collected from near Lake Eyre in 1874-1875. Over the next fifty years, it was reported twice in South Australia and once in the Northern Territory, but in each case the reports were probably based on misidentifications. Another report, supposedly of a different species, may have been of the Eyrean Grasswren. The first certain report subsequent to the original discovery, was in 1961 on the Macumba River not far from the original locality. In 1972 May observed possible Grasswrens east of Poeppel Corner, within the conservation park. Returning in 1976, he took two specimens which allowed positive identification as Eyrean Grasswrens (May 1977b). At this stage the species was still considered very rare, therefore news of the find was followed by public controversy, with newspaper articles being followed by numerous published letters criticising the taking of specimens of such a rare species, particularly from a park (*Advertiser*, Adelaide, August-October 1976). Subsequent examinations have revealed that the Eyrean Grasswren is a relatively common bird encountered widely through the desert (Parker *et al.* 1978). The previous, apparent rarity of the bird was simply because of lack of observation within the remote and difficult landscape it occupies. Given the low level of knowledge of much of the desert fauna, the situation is one which may well be repeated in the future with other species.

The importance of having proper evidence of the occurrence of a species through specimens taken from the wild is one point to have emerged during the ensuing controversy, for the situation could not be clarified until actual specimens were to hand. Hence, although it may seem repugnant to some to purposely take or kill wildlife for any reason within a park, there are occasions when such action will be necessary for a clearer and more certain evaluation of the biological resource.

REPTILES AND AMPHIBIANS

Compared with the birds, there is little known of the reptiles of the park area and the surrounding desert. Once again, observers have not always differentiated between desert margins, including floodplains and streams, and the waterless desert proper. Table III lists twenty-one species which have been reported within the southern Simpson Desert and in the Queensland National Park. Although observers have reported more species than appear in Table III, an attempt has been made to limit inclusion to those species collected or noted well away from the desert margins.

TABLE III: REPTILES AND AMPHIBIANS KNOWN TO OCCUR WITHIN THE SIMPSON DESERT CONSERVATION PARK

AMPHIBIAN	
Neobatrachus centralis (Parker)	Trilling Frog
GECKOES	
Gehyra variegata (Dumeril and Bibron)	Tree Dtella
Heteronotia binoei (Gray)	Bynoe's Gecko
Lucasium damaeum (Lucas and Frost)	Beaded Gecko
Rhynchoedura ornata Gunther	Beaked Gecko
LEGLESS LIZARDS	
Lialis burtonis Gray	Burton's Snake-Lizard
DRAGON LIZARDS	
Amphibolurus barbatus (Cuvier)	Bearded Dragon
Amphibolurus maculatus (Gray)	Spotted Dragon
Amphibolurus pictus Peters	Painted Dragon
Amphibolurus vitticeps Ahl.	Central Bearded Dragon
Tympanocryptis lineata Peters	
Tympanocryptis sp.	
MONITORS	
Varanus giganteus (Gray)	Perentie
Varanus gouldii (Gray)	Gould's Goanna, Sand Monitor
SKINKS	
Ctenotus brooksi (Loveridge)	
Ctenotus pantherinus (Peters)	
Ctenotus regius Storr	
Egernia inornata Rosen	
Morethia boulengeri (Ogilby)	
PYTHON	
Aspidites ramsayi (Macleay)	Woma
ELAPID SNAKE	
Pseudonaja nuchalis (Gunther)	Western Brown Snake

Nomenclature follows Cogger (1979). See also Appendices.

The species listed represent perhaps 25 per cent of the desert herpetofauna. On the basis of their geographic range and habitat preferences, more than sixty other species can be expected to occur within the desert and probably within the park (see Appendices). None of the known or possible species are considered threatened (Jenkins 1979).

NATIVE MAMMALS

There is a dearth of information on the native mammal fauna of the park area in particular and the desert generally. Most information relates to marginal or neighbouring areas (for example, Forrest, in Foale n.d.; Watts and Aslin 1974; Parker 1973; Finlayson 1933, 1939, 1940, 1941, 1961).

Table IV, prepared by the late P. Aitken (formerly Curator of Mammals, South Australian Museum) for Alexander (1981), lists the mammals possibly to be found within the conservation park. Of these, the Kultarr (*Antechinomys laniger*) and the Greater Bilby (*Macrotis lagotis*) are listed as Rare Species in the National Parks and Wildlife Act, while the Marsupial Mole (*Notoryctes typhlops*) is listed as a Threatened Species (this may simply result from the difficulty of finding it (Aitken 1979). Not all the mammals shown are necessarily present.

A number of native species formerly within the desert are now believed to be extinct in the region. For example, the Lesser Bilby (*Macrotis leucura*) was originally found in the desert north of Lake Eyre (Aitken 1979). Very few details are known of its former status or distribution, although the species would appear to

TABLE IV: MAMMALS PRESENT OR PROBABLY PRESENT IN THE SIMPSON DESERT CONSERVATION PARK

NATIVE MAMMALS	
Antechinomys laniger	Kultarr. Rare Species (NPW Act)
Chalinolobus gouldii	Gould's Wattled Bat
Dasycercus cristicauda	Mulgara
Leggadina forresti	Forrest's Mouse
Macropus rufus	Red Kangaroo
Macrotis lagotis	Greater Bilby. Rare Species (NPW Act)
Notomys alexis	Spinifex Hopping-mouse
Notomys fuscus	Dusky Hopping-mouse
Notomys mitchellii	Mitchell's Hopping-mouse[1]
Notoryctes typhlops	Marsupial Mole. Threatened Species (NPW Act)
Nycticeius greyii	Little Broad-nosed Bat
Nyctophilus geoffroyi	Lesser Long-eared Bat
Pseudomys australis	Plain's Mouse
Pseudomys desertor	Desert Mouse
Pseudomys hermannsburgensis	Sandy Inland Mouse
Rattus villosissimus	Long-haired Rat
Sminthopsis crassicaudata	Fat-tailed Dunnart
Sminthopsis macroura	Stripe-faced Dunnart
INTRODUCED MAMMALS	
Camelus dromedarius	Arabian Camel
Canis familiaris	Dingo
Felis cattus	Feral Cat
Mus musculus	House Mouse
Oryctolagus cuniculus	European Rabbit
Vulpes vulpes	Red Fox

Species with verified records from park area
[1] Collections in Simpson Desert National Park (Queensland) by National Museum of Victoria

Prepared by the late P. Aitken, formerly Curator of Mammals, South Australian Museum, for Alexander (1981).

have always been rare. Aitken (1979) considers its apparent extinction was probably due to introduced predators, the Feral Cat and the Fox. The Brush-tailed Bettong (*Bettongia penicillata*), Burrowing Bettong (*Bettongia lesueur*) and the Hairy-footed Dunnart (*Sminthopsis hirtipes*) are other probably extinct species which may have extended through the desert.

Species such as the Greater Bilby and the Kultarr have suffered major and serious contraction from their original range due to habitat change (Aitken 1979; Archer 1979) and are now present only in arid areas free from activities such as domestic grazing. The Simpson Desert is potentially a significant refuge for such species because it has largely escaped the direct effects of European settlement. However, it too has suffered the indirect influences of the rabbit and other alien herbivores and the introduced predators.

Small native mammals would apear to be present at very low densities within the desert. Madigan's 1939 expedition collected only two. R. E. Barwick, crossing the desert further south in 1972, found only the Long-haired Rat (*Rattus villosissimus*). P. B. Copley, crossing along Madigan's route, only noted *Notomys alexis* within the desert proper, although more species were found on desert margins. Trapping by the South Australian National Parks and Wildlife Service during inspection trips in the area have resulted mainly in catches of the introduced House Mouse (*Mus musculus*), probably now the most common small mammal in the park.

The level of information on native mammals of both the park area and its surrounds is clearly deficient. Inventory is limited to possibilities, and in contrast to the reptile inventory, a number of these possibilities are species in rare and endangered categories. There is a need for further investigation of the mammals at least at the level of inventory and preferably to a level allowing at least some statement of distribution and abundance which will permit the development of rational protection strategies.

FERAL MAMMALS

Introduced mammals known to be present in the park are also listed in Table IV. At present, rabbits are the most evident and abundant and are causing considerable concern because of the damage to vegetation and habitat resulting from their very high numbers.

Rabbit populations in the desert fluctuate markedly. Madigan (1946a) and Colson (1940), both crossing the desert in moderate seasons, commented on a general absence of rabbits. Frith (1979) showed the distribution of the rabbit avoiding the desert, with only isolated colonies present within it. Fatchen and Barker (1979a), crossing in drought during 1972, reported only occasional numbers of rabbits. Following the very wet years 1973-1976, however, Buckley (1979) found rabbits throughout the desert, and Alexander (1981) reports the southern Simpson Desert and the park area to be "riddled with burrows". Pech and Graetz (1982) report "devastating" large populations of rabbits throughout the desert and the park, with the greatest concentrations in the playa lake regions (Karanguru Ecological Association). Because of the damage caused by the rabbit, they state that "rabbits pose the most significant present-day threat to the ecological integrity of the Simpson Desert".

The effects of rabbit grazing are obvious everywhere at present with almost complete removal of groundcover in many places and browse lines on shrubs (Pech and Graetz 1982; and other observers).

The rabbits are not amenable to control by normal procedures. Apart from the sheer size of the area they are presently infesting, the residual populations, which will remain even after extended periods of drought, are expected to be relatively mobile, moving to areas of growth following localised rains. Within the park, there appear to be no "core" areas likely to function as drought refuges and, therefore, to attack the populations by destruction of warrens during periods of drought is not a practical means of control. The only reasonable control measure at present is one which will avoid the artificial creation of permanent or semi-permanent water supplies which may aid the rabbits in time of drought. For example, the free-flowing Purni Bore in the western desert can be expected to maintain a permanent rabbit population which will provide the nucleus for reinvasion of surrounding areas after drought.

There remains a possibility that the rabbit population is normally very low in the desert, and that the present high populations are a once-in-a-century result of the once-in-a-century rains of 1973-1976. Madigan's crossing in 1939 took advantage of good seasonal conditions (although not of the remarkable level of 1973-1976), yet apparently no more rabbits were noted by his group than were noted by Fatchen and Barker (1979a) during their 1972 crossing in drought. There is not enough information to test this possibility and so determine the magnitude of the rabbit problem in the long-term.

Nevertheless, the damage already done by the recent and present high rabbit populations is such that the effects, particularly in relation to shrub and tree regeneration, may persist for decades.

Arabian Camels range freely across the desert and are usually present within the park. Judging from comments by visitors, there has also been an increase in the camel population over the last several years. Forty Arabian Camels were sighted during a May 1982 traverse of the desert by the Toyota Landcruiser Club of Australia (S.A.) Inc., most within the park. This is the largest number the club has observed in a decade of

regular desert crossings, and indicates a population within the park of several hundreds. The impact of the Arabian Camel on the desert vegetation is unknown.

Of the other introduced species, the Dingo is also found across the desert, although its frequency within the central desert during drought is probably low. Feral Cats and the Fox are found throughout, but little is known of their abundance. It has already been noted that after the rabbit, the introduced House Mouse is the most frequently found small mammal within the desert. Donkeys and horses are present on desert margins but do not penetrate far into the desert and normally would not reach the park.

Ecological Dynamics

The over-riding influence on the behaviour of the desert ecosystems is the low and erratic rainfall. Rain comes unpredictably, not very often, and in short bursts. Each rainfall event results in increased biological activity, although only effective falls (see Part 1: Climate) actually result in plant growth. A small effective fall may have little effect beyond a brief growth period, with plants rapidly returning to dormancy if perennial, or dying if ephemeral, with the inevitable drying-out.

The usual pattern is for parts of the desert to be "greening", growing vigorously from effective but localised falls, while other parts of the desert are undergoing extended drought with the death of all but the hardiest plants. The LANDSAT mosaic in Graetz *et al.* (1982) shows at least five isolated and discrete patches within the southern Simpson Desert dunefields in which growth responses are evident. In areas with active plant growth, non-mobile fauna populations such as the small native mammals, can be expected to be increasing while more mobile species, particularly birds, are concentrating. In the drought areas, faunal populations will be at very low levels, or possibly locally extinct in some cases. The situation is highly dynamic.

The desert vegetation and fauna are also much more dynamic over longer periods (of the order of decades) than has previously been realised. The dramatic rise of rabbit populations following the 1973-1976 heavy rainfall period has already been noted. This extended "wet" has also resulted in a great increase in the abundance of tall shrubs, particularly *Acacia* species, to the point where much of the desert could properly be regarded as a tall shrubland rather than a hummock grassland of Lobed Spinifex and Sand-hill Cane-grass. Possibly this shrub cover may disappear in subsequent, normal seasons, but it also may well persist now that it is established. In either case, there will have been marked long-term alterations in the desert ecology through purely natural events. Fire effects must also be considered as major long-term influences within the desert. Enormous fire scars are evident on LANDSAT imagery. Pech and Graetz (1982) state that one area, of approximately 6 000 square kilometres, had been "virtually cleared of vegetation". This area is equivalent to the area of the conservation park. The fires followed the wet years of 1973-1974 which resulted in the build-up of herbage sufficient to carry fires. The fires were in no way "unnatural", for the vegetation regenerates quickly from seed. Pech and Graetz estimate that a return to a hummock grassland would be accomplished in eight to ten years, although information in Buckley (1979) would suggest a longer period for complete recovery to pre-fire vegetation and floristic composition. In the meantime, however, the habitat is likely to be unsuitable for much of the wildlife which would normally be present. Recolonisation of burnt areas requires unburnt habitat from which the wildlife can recolonise.

Dramatic changes in the biology of any part of the desert may thus occur from season to season and over much longer periods in the course of natural events. Whole vegetation types may come and go and faunal populations fluctuate between local extinction and sometimes plague proportions. Consideration of impacts from human activity such as petroleum exploration or visitor use must be viewed against this dynamic background. In particular, it must also be viewed in the light of the remarkable capacity for the desert ecosystems to recover from disruption on the scale brought about, for example, by a major wildfire.

The ecological dynamics are such that there is little point in considering stability of ecosystems in the desert in relation to human impacts. The ecosystems are patently not stable. The main concern should be the question of resilience, that is, the ability for natural processes to continue following disruption. The dunefields display remarkable resilience which is a function of both the physical processes maintaining the land-forms, and of the vegetation which is dominated by opportunistic species that have evolved to cope with the natural disruption of the erratic arid climate. For example, an impact resulting in temporary vegetation removal will not have severe consequences in many cases because temporary loss of vegetative cover is a naturally-occurring phenomenon. Even if the damage extends to the removal of perennial species, there are still mechanisms for eventual re-establishment as evidenced by responses to wildfire. It must also be remembered that the perennial cover is frequently very low and in some parts of the desert almost completely absent. Part of the key to the resilience of the vegetation also lies in the nature of the soils. Dune sands are largely unstructured soils. Loss or movement of the surface soil layers does not result in major changes in hydrological characteristics or nutrient status, unlike, for example, the duplex soils of the chenopod shrubland rangelands in southern Australia (Graetz and Howes 1979). The seed-bed has the same general characteristics before and after sand movement. To a lesser extent, swale soils display a similar resilience. Again, the flora is largely ephemeral and temporary loss of vegetative cover does not necessarily mean a major change in swale ecosystems, although some scalding—exposure of hard and impermeable substrates—may occur.

Adequacy of Biological Conservation

There is a recognised need for protecting examples of all major ecosystems in reserves. Such reserves may be given the general title "ecological reserves". Within the South Australian parks system these are mostly conservation parks and some national parks. The generally accepted objectives for ecological reserves have been defined by UNESCO (1974, cited in Pech and Graetz 1982):

> To conserve for present and future use the diversity and integrity of biotic communities of plants and animals within natural ecosystems, and to safeguard the genetic diversity of species on which their continuing evolution depends.

The UNESCO Man and the Biosphere Programme recommended two types of reserves to achieve this objective: the first type to be representative reserves containing the range of habitats to be conserved and species populations sufficiently large to persist; the second type of reserve to be one which would contain a unique or special characteristic (for example, unusual land-forms, rare and localised species). The Simpson Desert Conservation Park is intended to be a representative reserve. Its conservation significance lies in the particular combinations of desert land-form and

biology it possesses rather than in any singular and unique feature.

The range of habitats of the desert proper have been grouped into three broad ecological associations. The park contains at least some of each association, and on this basis could be said to protect the range of broad habitats of the desert. However, there is considerable physical and biological variation within each ecological association which is not represented within the Simpson Desert Conservation Park and consequently the present park cannot be considered to contain a representative range of habitats.

The most poorly represented are the land-forms and vegetation of the Wongkanguru Ecological Association, the landscape usually considered typical of the Simpson Desert. The park contains a small part of the western fringe of this ecological association. In particular, it does not encompass any of the closely-spaced red dunes of the western desert or much of the *Triodia* hummock grasslands. Land-form and vegetation variation within the Karanguru Ecological Association, on the other hand, is well represented. The park does not extend far enough east to contain a complete sample of variation in habitat within the Jeljendi Ecological Association, but if considered in conjunction with the Simpson Desert National Park (Queensland), the overall representation is good.

The large park area dedicated was intended to ensure viability of areally dependent species populations. This however is not the case, and again the problem lies with the relatively small area of the Wongkanguru Ecological Association within the park.

First, reserves in the arid zone, and particularly in a very arid desert, need to be larger than in the wetter regions. This need arises because of the over-riding influence of the erratic rainfall. To maintain populations of species in at least part of the reserve, the reserve must be large enough to encompass the spatial variation in growth brought about by rainfall in different areas at different times. There is simply not a large enough area of the Wonkanguru Ecological Association within present park boundaries to be reasonably sure that at any time some of the area is in growing condition. The Simpson Desert National Park (Queensland) does not improve this situation on a regional basis, because according to the reports of Boyland (1970, 1979), Boyland and Ogilvie (1966), and Crocker (1946), the ecological association does not extend east of the Queensland-Northern Territory border.

Secondly, the Lobed Spinifex vegetation within the Simpson Desert is susceptible to naturally occurring wildfire. To ensure that some of it will remain unburnt and so act as a colonisation source after future fires, it is desirable that an additional area of the Wongkanguru Ecological Association be included in the park.

The combined areas of the Simpson Desert Conservation Park and Simpson Desert National Park (Queensland) thus allow for the protection of a representative sample of the habitats and habitat variations within the Karanguru and Jeljendi ecological associations, with an overall area sufficent to allow for most climatic and other contingencies. However, the main Simpson Desert system, the Wongkanguru Ecological Association, is poorly represented both in terms of the habitats encompassed by the conservation park, and the scale and pattern of growth and fire within the desert. In summary, neither the Simpson Desert Conservation Park nor the Simpson Desert National Park (Queensland) adequately conserves the most noted and extensive features of the Simpson Desert.

Consideration is also directed to conservation of floodplain areas on desert margins. Previous discussion has indicated that areas about the Mulligan River, and to a lesser extent the Kallakoopah Creek and Finke River, are biologically much richer and diverse than the desert proper. The conservation value of such areas as the Diamantina-Goyder Lagoon-Warburton stream systems is very high indeed, particularly in relation to their function as waterfowl areas (Frith 1979) and their possession of a still relatively rich mammal fauna (Watts and Aslin 1974; Forrest, in Foale n.d.). The arguments for conservation of at least part of the stream and floodplain areas are compelling. However, although a number of boundary extensions to the conservation park will be proposed later in this management plan, they intentionally do not include the floodplain country indicated by the Nature Conservation Society. There are several reasons for this decision. First, the primary purpose of the Simpson Desert Conservation Park is seen to be the protection of a representative sample of the land-forms, flora and fauna of the desert proper, whereas the protection of the floodplain country is regarded as a distinct and separate problem. Secondly, the floodplain areas, which could be included within reasonable park extension, about the Mulligan and Kallakoopah are not the areas most deserving of protection (Foale n.d.). Other factors, such as conflicting land-uses and potential management problems, have also contributed to the decision.

The case for reservation of part of the floodplain country deserves serious consideration in its own right and is not to be considered further in this management plan.

Summary and Implications

The biology of the Simpson Desert is still relatively poorly documented. The flora and vegetation are the best known, but still not at a level to allow mapping of vegetation within the conservation park or the surrounding desert.

Neither the park area nor the surrounding desert is a homogeneous entity in an ecological sense, despite popular and previous scientific belief. Ecological variation within the desert has been summarised by the definition of three ecological associations, each having broad differences with the other in land-form, flora and probably fauna. These associations each contain considerable regional variation. Even the dune-swale vegetation patterns, formerly regarded as typical of the desert, are not invariate over the whole desert nor even within the considerably smaller park area.

Discussion of desert fauna is severely hampered by lack of information. The avifauna has the only reasonable level of properly recorded information. The level of information is worst for native mammals because at present, the most that can be said is that a number of species, some of them rare, may be present in the park and surrounds. The potential for presence of rare mammals in particular, points to a need for an investigation to provide a reasonable inventory of species.

There is, however, more than sufficient information pointing to the rabbit as probably the most disruptive and serious biological problem within the desert. There is little chance of effective direct control, but some safeguards against maintaining rabbit populations in drought are possible.

The Simpson Desert Conservation Park, dedicated on arbitrary boundaries without prior inspection, is not considered to contain within it a fully representative sample of the Wonkanguru Environmental

Association—the land-forms, vegetation and probably the fauna of the major part of the Simpson Desert. In view of the ecological dynamics within the desert, the park does not provide sufficient protection to that part of the Wongkanguru Ecological Assocation it does contain. There is a need for at least some extension of the park boundaries in order to increase the representation of the various habitats and also to increase the likelihood of the park always containing some growing and some unburnt portions of each major association. Any park extensions, however, should be aimed at the protection of habitats in the desert proper. Lands marginal to the desert have no representation within the South Australian reserves system at present, despite containing areas of high conservation value. However, their protection should be considered a separate issue to the protection of the Simpson Desert landscapes.

Desert ecosystems are highly dynamic in both the short and long terms. Major changes in the vegetative cover, and the plant and animal species present, will occur naturally over time in any given location through effects of the erratic rainfall and, less frequently, of naturally occurring wildfires. Effects of human impacts must be judged against this dynamic background.

PETROLEUM EXPLORATION

Introduction

A brief history of petroleum exploration in the park and surrounds has been given in Part 1: Petroleum Exploration, and the geological background discussed in Part 1: Geology and Geomorphology. The following considers the methods, impacts, environmental safeguards and significance of petroleum exploration within the southern Simpson Desert generally and the park in particular. In 1981, L. Alexander undertook a major study of conflicts between petroleum exploration and conservation objectives within the park, and much of the following is drawn from her study.

Petroleum exploration has been proceeding in response not only to increasing evidence of possibilities of oil or gas in the Pedirka Basin, but also in response to wider economic and political pressures. Petroleum exploration has been encouraged by all major Australian political parties because of the nation's increasing dependence on oil for energy, transportation and industrial uses, and more recently to maintain Australia's partial self-sufficiency in oil production. The partial self-sufficiency has cushioned the worst of the economic impact of increased costs of imported oil over the last decade, but will be eroded without further commercial oil finds. There is therefore a major national interest in the continuation of petroleum exploration.

Within South Australia, there is also an urgent need to establish further supplies of natural gas. Reserves in the Cooper Basin are committed to supplying Sydney to the year 2006, but to Adelaide only until 1987 (SANTOS 1981). Apart from home consumption for cooking and heating, Adelaide is largely reliant on Cooper Basin gas for power generation.

The pressures for exploration, in both national and State interests, are such that petroleum exploration has received, and will continue to receive, precedence over nature conservation purposes within the Simpson Desert. If a commercially viable oil or gas field is located within the Pedirka Basin, it will eventually be developed whether or not it happens to be under the conservation park. Responsible conservation management must recognise this situation and plan as far as possible for such an eventuality. This does not concede that petroleum development must occur whatever the environmental costs, or that exploration should be free from any environmental protection restrictions. It does mean that compromise will be necessary between nature conservation objectives and management, and petroleum exploration and possible further development, so that as many conservation goals as possible can be achieved without major disruption of the petroleum exploration.

The primary question concerns the significance of the impacts of petroleum exploration: whether the impacts are major or minor in an ecological sense; whether they are transient or permanent; and whether they lead to other significant impacts. Before attempting to answer the question, an understanding must be gained of the requirements and methods of exploration, the known effects on landscape and biology, and the level and effectiveness of environmental controls presently in operation within the Simpson Desert.

Exploration Methods and Impacts

Petroleum exploration is perforce an extensive land-use. Potential reservoirs have to be located and tested individually. This will require surveys of considerable intensity over large areas to find reservoirs which may be limited to quite small surface areas.

Preliminary survey requires geological interpretation of aerial photography (and recently LANDSAT imagery), ground mapping and surface geological survey. The last is of little help in areas such as the Simpson Desert where the Quaternary sands and earlier alluvia completely blanket the underlying strata. Preliminaries are generally followed by a magnetometer survey, measurement of variation in the earth's magnetic field brought about by variation in the distribution of sedimentary strata. Magnetometer surveys define the depth to basement rock and the morphology of the basement as the latter is often reflected in the distribution of overlying strata. Usually, the magnetometer is trailed from an aircraft, and such aeromagnetic surveys were flown across the Simpson Desert shortly after the initial exploration licences were granted.

A gravity survey may follow if the results of magnetometer surveys are promising. Variation in rock density slightly alters the local gravitational field, and small field variations can be used to indicate such features as basin shapes and location of fault lines. Some early gravity surveys in the Simpson Desert were carried out on the ground, but most of the South Australian portion of the desert was surveyed using aircraft.

None of these preliminary survey techniques have a significant direct impact on the ground. They may, however, yield uncertain results and ground-based seismic survey is needed for further clarification. The greatest environmental effects are associated with seismic surveys.

Seismic surveys use reflected shockwaves to determine the structure of the subsurface formations. Explosives or other sources of vibration are set on the surface to create the shockwaves, which in turn penetrate the substrata. Part of the shockwave is reflected back to the surface to detecting and recording devices each time it hits an interface between differing subsurface formations. Given the velocity of the shockwaves, the depth of each such interface can be determined. With multiple points of origin of shockwaves on the surface, a three-dimensional picture can be built up of the subsurface geological structure.

To gain the three-dimensional picture, a seismic survey is usually performed on a grid pattern which may

extend over a large area (Figure 11). The gridding allows a more ready basis for mapping the extent of structures of interest than would, for example, a random arrangement.

Gridlines have generally been bulldozed prior to the actual survey within the Simpson Desert, and it is the network of seismic gridlines which present the most widespread, obvious and potentially significant impact of the early exploration stages.

Seismic tracks are bulldozed for economic reasons. Seismic recording is expensive, but track clearing, at 33 per cent of the cost, is relatively cheap (Alexander 1981). A bulldozed line allows rapid movement of recording vehicles up and down a sweep (recording section), as well as allowing faster access for recording teams into the area. The cost of bulldozing lines is, therefore, more than recovered in cost reductions from reduced recording times as well as reducing other costs such as vehicle breakdown. Such cost reductions are extremely important as exploration is a high risk venture with only a small percentage of total exploration resulting in a commercially viable find. Funds for high risk ventures are not unlimited.

Three types of vibration sources have been used in Simpson Desert seismic surveys. *Shotpoints* are explosive charges placed in narrow holes and produce a single signal when fired. *Vibroseis* (brand name of Continental Oil) is an acoustic source using a continuous vibrating signal. The vibration units (one to three in a seismic team) are massive hydraulic pistons which literally hammer the ground. This operation, combined with the movement of heavy machinery, is more likely to have a greater compactive effect on surface soils than other methods (Alexander 1981). Geoflex (trade mark of Imperial Chemical Industries Ltd) is a rope-like explosive, ploughed into the ground alongside the seismic line before firing. *Geoflex* has been the usual energy source for the more recent seismic surveys in the desert.

Generally, the sinking of wells follows in the later stages of exploration after extensive seismic survey to identify the most promising locations for wells. An exception is the stratigraphic well, drilled in association with a seismic survey in a largely unknown area to document the age of sediments and identify possible reservoir strata rather than in expectation of an oil discovery (Sheriff 1978). Purni Bore was sunk as a stratigraphic well. In other respects, a stratigraphic well is identical to an exploration well which is drilled only in an area with some probability of oil discovery.

Drilling of wells is far more expensive than preliminary survey, and because of this, sites for wells are very carefully chosen on the basis of seismic survey results. Well drilling itself results in very heavy but localised impacts: a camp, local movement of heavy equipment, excavation and use of water, waste, and drilling mud sumps. More extensive impacts result from improvements in access needed to get heavy drilling rigs in and out. Unlike seismic survey machinery, rigs need more than a simple scraped track to move through the desert. Dune crossings and often tracks in swales, have to be capped with clay before rigs can be brought through. The clay, taken from borrow-pits between dunes, forms a hard and largely impermeable surface which is slow to disappear and on which natural regeneration of vegetation cannot proceed easily. Both the clay caps and the borrow-pits are potentially a semi-permanent feature of the landscape.

Clayed tracks and stratigraphic and exploration wells are shown in Figure 12.

As a result of the continuing petroleum exploration, the Simpson Desert and the conservation park contain a network of scraped seismic tracks of varying age, condition and usage, together with a few well sites and a number of clayed access roads. Bulldozed seismic lines in the park alone totalled nearly 1 200 kilometres by the end of 1981, with well over 4 500 kilometres in the southern Simpson Desert. This enormous trackage should, however, be kept in proportion to the areal extent of the desert itself. Despite their linear extent, tracks and other exploration works occupy only a relatively small area. For example, four parallel tracks spaced 1 kilometre apart, running for 100 kilometres with an effective width of 10 metres (wider than the actual track width but allowing for edge effects such as enhanced runoff), involve a total of 400 kilometres of tracks and enclose 300 square kilometres of country, but the actual tracks and surrounds only occupy 4 square kilometres overall, little more than 1 per cent of the total area. However, the tracks can provide a ready means of access, involving lessened physical difficulty, into remote areas long after the cessation of exploration activity, and in this regard create a problem for management of subsequent park usage. The primary questions concerning the tracks are whether they represent a permanent or transient impact under normal construction and one-off use, and how this impact may be altered by subsequent, non-exploration use.

PHYSICAL AND BIOLOGICAL IMPACTS OF SEISMIC TRACKS

Few ecological studies have concerned the impact of seismic exploration. Recently, Graetz and Tongway (1979, 1980) have examined some environmental problems stemming from mineral exploration in the arid zone of South Australia, the 1980 report in particular concerning dunefields with some similarity to the Simpson Desert situation. However, their conclusions are general, based on reconnaissance level observation supported by inferences from related studies. Similarly, environmental impact studies for the Moomba-Stony Point liquids pipeline and the Olympic Dam development (SANTOS 1981b; Roxby Management Services Pty Ltd 1982) also rely heavily on inferences drawn from research concerned with the environmental processes in question and the particular areas involved, but not specifically dealing with the impact of exploration. Alexander (1981) has documented a number of impacts and subsequent events following seismic survey within the Simpson Desert Conservation Park, and the following notes use her review as a primary source. A more general review is also available in Graetz and Pech (1982).

Creation of tracks and paths by recreational users has attracted some ecological research, particularly in coastal areas, but also in semi-arid and arid lands. The resulting studies allow some understanding of the processes likely to be in operation where seismic tracks are made, but may also be highly misleading in several respects. First, recreational use is continuous, whereas most seismic exploration is "one-off" usage. Secondly, much of the literature concerns coastal areas, and major differences have already been noted between the desert and coastal dunefields, particularly in relation to dune construction (see Part 1: Geology and Geomorphology).

Foot and vehicular traffic in recreational usage generally bring about a gradual loss of vegetation (cover, plant density, species diversity) until the point is reached where a bare track is formed. Most reported ecological studies (for example, Goldsmith *et al.* 1970; Liddle and Grieg-Smith 1975) consider the effects after this point, examining continued track usage or complete closure and subsequent regeneration. In contrast, the seismic track involves a much greater initial impact with the complete removal of the

vegetation and topsoil by bulldozing, a brief period of intensive use, and then no further use (or at the most, a light and intermittent use). Recreational track studies can possibly show the processes in action, but cannot provide a basis for direct prediction of the outcome of seismic track construction.

The construction of the seismic track changes the local hydrology as well as initially removing the vegetation and topsoil. With less impedance to water flow, runoff may increase, and infiltration of water into the soil below the track decrease. The result is often an "irrigation" effect along tracksides. The combinations of general soil disturbance and increased local water supply from runoff may specifically favour the establishment of opportunistic plant species, particularly those often regarded as weeds (Dixon *et al.* 1976). The track itself may be compacted, and with longer-term use, the deeper soil layers may also become compacted. In the desert, this may result in a greater water-holding capacity because of the large-grain soil fraction (Liddle and Grieg-Smith 1975; Goldsmith *et al.* 1970), although on finer-grained soils, such as the clays of interdune areas in the eastern desert, compaction may simply result in increased runoff because the surface soil layers have become impermeable. Compaction may also inhibit seedling emergence (Liddle 1975).

Tracks may also intercept and redirect overland water flows away from vegetation dependent on such flows, with consequent death of plants well away from the track. Such situations have arisen about Ayers Rock (Ovington *et al.* 1973) and have affected proposed township designs at Olympic Dam (Roxby Management Services Pty Ltd 1982).

Winds funnelled along tracks may accelerate erosion and extend bare areas by sandblasting plants (Gilbertson 1977), resulting in dune blow-outs.

Vertebrate populations may also be affected. In a much-quoted study of reptiles and off-road vehicle use in the Mojave Desert (USA), Busack and Bury (1974) found lizard populations to be highest in areas free from vehicle use. Barnett *et al.* (1978), in eastern Australia, found that even tracks unused for a long time may act as dispersal barriers to small mammals.

A number of these potential impacts can be discounted in the southern Simpson Desert and the park area. The small mammal barrier, determined from studies in well-vegetated habitats, is unlikely to apply in the generally sparsely vegetated desert where the degree of track clearing in all but major growth conditions will not represent more than a slight local increase in bare ground. Similarly, under present levels of use and coverage of tracks, a reduction of reptiles, as noted for the Mojave Desert, is also unlikely to apply. Dunes cannot "blow out" in the same sense as in coastal regions because of the compensatory effects of the dune-building mechanisms. The remaining potential impacts group loosely into erosional and alien introduction effects.

Potentially the most significant ecological impact is possible accelerated erosion. The desert shows a high degree of natural erosion as part of normal functioning. Accelerated erosion can arise by the partial removal of the existing erosion protection—vegetation, soil crusts, stones—leading to a redistribution of water and nutrients in such a way that further loss of protective cover occurs, perpetuating the cycle and leading to an ultimately bare and eroded landscape. Accelerated erosion has long been of major concern in the Australian arid lands (Ratcliff 1936).

Evidence from the Simpson Desert shows that accelerated erosion is not resulting from the construction and use of the seismic track network in most cases, but that the impact of the tracks is transient. In the early stages of petroleum exploration before the appearance of environmental controls on operations, the teams working for the French Petroleum Company found that drift sand rapidly infilled tracks to the point where east-to-west movement over dunes was impossible within a few days of track construction. Alexander (1981), attempting a field study of track regeneration, was unable to find any of the oldest seismic lines which had not been subject to subsequent use. Field reports of officers of the then South Australian Department for the Environment had noted more recent tracks infilled and overgrown in 1977. In 1980, Alexander was unable to detect the tracks in question. Alexander used light aircraft to search for the "missing" tracks and located one only by virtue of a slight shadow cast by a former trackside windrow. Alexander was able to locate persisting tracks across playa lakes, although the same tracks had become undetectable within the adjoining dunefields.

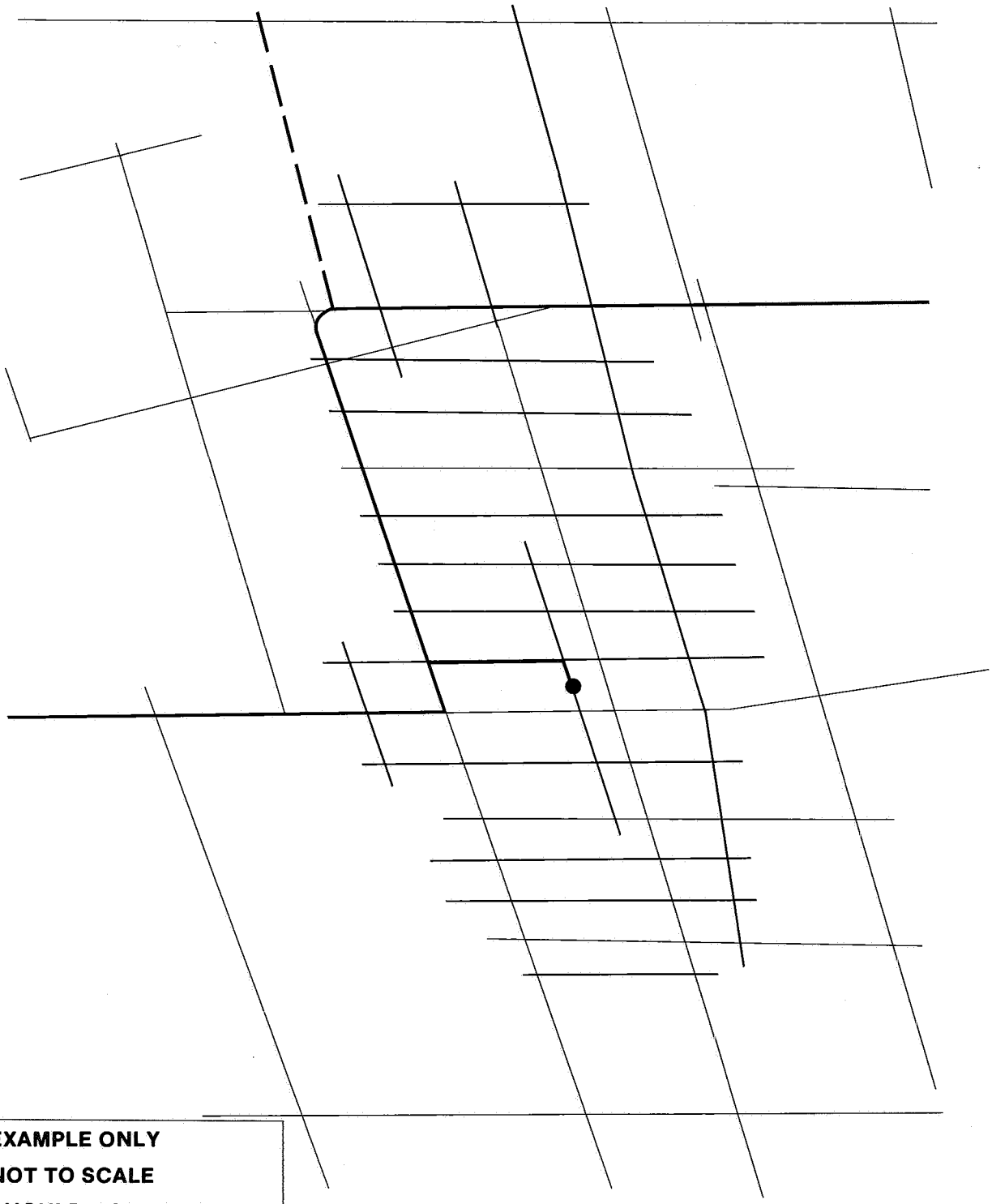
Alexander has suggested some time-scales for track regeneration on the basis of these observations. Little-used lines put in by the French Petroleum Company in 1963-1966 had regenerated thirteen years later with mature herbaceous species present and perennial species in the process of re-establishing. Other cases cited by Alexander suggest a seven-to-ten year regeneration period. Buckley (1980) has pointed out that this relatively rapid regeneration may be a consequence of a series of years with high rainfall. He suggests that, given good rains, annual grasses will establish within a year on the track surface; small perennials will appear within three years; and large perennials within ten years. However, it may take about thirty years for the floristic composition of the track area to return to that of neighbouring vegetation even though the track would have ceased to be visible well before that time. If tracks are constructed in drought they would, of course, remain bare until rain.

In keeping with this view, Alexander (1981) found a number of differences between the vegetation of apparently regenerated tracks and that of surrounding vegetation. Tracks generally had a greater overall plant cover and displayed significant differences in floristic composition than their surrounds. In terms of protection from accelerated erosion, however, the tracks would be regarded as regenerated.

Alexander also found little difference between vegetative cover of very recently made tracks and much older tracks which had been subject to subsequent intermittent use. Clearly, even slight track use after the actual seismic survey, will greatly retard the regeneration of the track surface.

As regards the introduction of exotic species, Alexander observed no alien species on or near tracks, and considers introduction effects to be minor, if present at all.

Graetz *et al.* (1982) and Alexander (1981) report gully erosion commonly occurring on approaches to playa lakes. The natural susceptibility to water erosion of the landscapes immediately about the playa lakes has already been noted (Part 1: Geology and Geomorphology). Scarring of playa lake surfaces was also noted and must be regarded as a long-term, and possibly a very long-term impact. Alexander also noted some instances where cuts through dunes had resulted in wind erosion widening the gap. In view of the longer-term examples of complete infilling of such cuts elsewhere, and in view of the mechanics of the dune formation, such blow-outs are also considered to be transitory.



EXAMPLE ONLY

NOT TO SCALE

SHOULD NOT BE USED FOR NAVIGATION

Three phases of exploration shown, over three years

SEISMIC TRACKS

- Initial survey (year 1)
- More detailed survey (year 2)
- Exploration well (year 3)

SUPPLY ROADS (clayed)

- To well shown
- To other wells

0 5 km 10

Figure 11

Examples of Exploration Grids

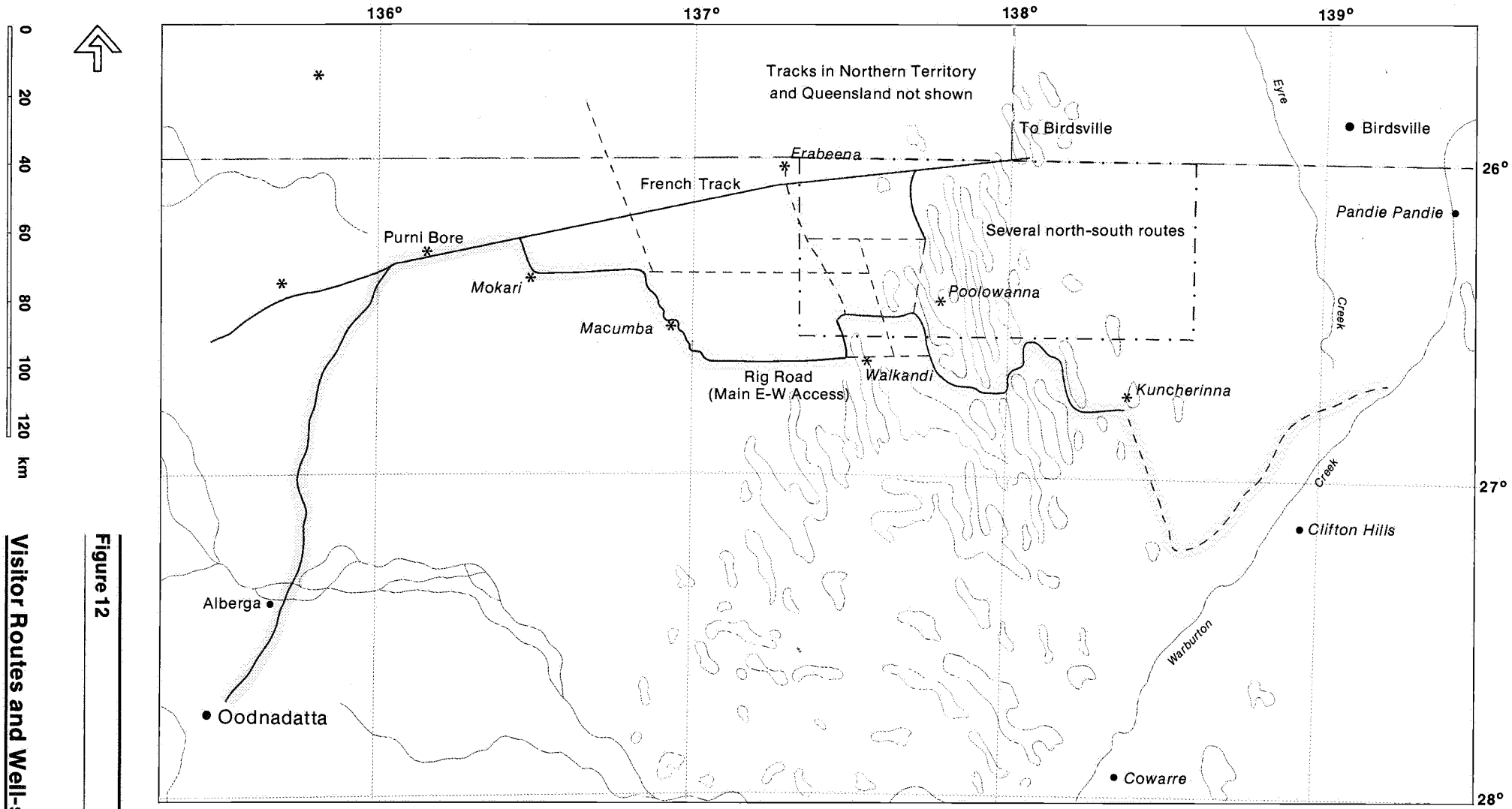


Figure 12

Visitor Routes and Well-sites

The most persistent identifying features of abandoned tracks are the windrows at track edges, created by bulldozing of the track itself and also tyning for placement of vibration sources. Windrows may still be evident for some years after the track itself is obscured by vegetation.

In general, therefore, the system of seismic tracks is unlikely to significantly impair the long-term conservation function of the park, provided the tracks are left unused following the seismic survey. Even the earliest tracks, put in without environmental controls, can naturally regenerate to the point of total disappearance. The impacts generally are transient and short-term, a result largely of the natural resilience of the desert ecosystems and landscape. There are a number of exceptions to the general case. Damage to playa lake surfaces is likely to persist because removal of marks, imprints and gouges depends on very infrequent filling of the lakes with water. Accelerated erosion which is probably irreversible (Graetz and Pech 1982; Graetz *et al.* 1982), has occurred in landscapes associated with playa lakes as a consequence of track-making through erosion-prone soils over slopes.

PROBLEM OF CLAYED ROADS

Clayed access and supply roads differ markedly from the scraped seismic tracks. The clay capping, needed to allow the frequent movement of supply vehicles and also the transport of heavy drilling rigs, is impermeable to water and plants cannot establish on the surface. Consequently, clayed roads cannot regenerate quickly. Alexander (1981) noted water gullying occurring on a number of clayed dune crossings, which in time could be expected to break up the caps, allowing sand vegetation to recolonise. Without aid, however, this process may require a very long period.

In some cases, the clay cap may not break up at all. Visitors following the clayed roads have mentioned that one way to cross dune crests was by digging sand away to expose the intact former clay cap below the present sand surface.

OTHER EFFECTS OF PETROLEUM EXPLORATION

The main secondary effect of petroleum exploration has been the provision of access into a previously inaccessible area. Although most of the direct impacts of exploration are transient, this indirect effect has the potential for permanent impact. Continued use of the track network by visitors will retard their regeneration, and over a long term may result in increased erosion not evident under the present light levels of use. The problem in most cases, therefore, lies in preventing subsequent use of tracks in order to allow regeneration to take place, rather than in preventing or ameliorating the initial impact of track construction and seismic survey. This in turn becomes a visitor management problem which is not only limited to the park area (see Part 1: Visitor Use).

Another indirect effect of the clayed roads may be to assist rabbit populations. Borrow-pits for clay are generally dug in the deepest parts of interdune areas, where any runoff is likely to accumulate. Pech and Graetz (1982) suggest that borrow-pits provide surface water longer than would be the case normally and therefore prolong the survival of rabbit populations in drought periods.

Varied debris, including litter, rubbish and abandoned equipment, has often been left after seismic surveys and drilling, although less frequently in the park area than within the surrounding desert.

Establishment of domestic grazing within the desert has been one indirect result of a drilling programme with the completion of the Purni stratigraphic well as an artesian bore (Part 1: Pastoral and Other Neighbouring Land-uses). The bore's influence on fauna populations has already been discussed (in particular, its probable role in maintaining a continuous rabbit population).

Environmental Controls

The 1974 proclamation (see Appendices) forms the legal basis for environmental controls within the Simpson Desert Conservation Park. The conditions within the proclamation are potentially very stringent, but not in all cases realistic in relation to the needs of petroleum exploration. For example, the use of grid survey patterns allows seismic lines to occasionally go through timber, although regulations require operators not to "cut, break, sever or damage green standing timber". Although stringent, the wording of the proclamation and regulations is such that it appears the only penalty which could be applied in the event of breaches is revocation of the rights of entry and prospecting. Except in the case of the most severe and wilful damage, such a penalty would seem unacceptably harsh. Also, revocation of rights is unlikely to be enforced in view of the national and State significance of petroleum exploration.

There is a possibility, not yet tested, that action could be taken against a company breaching regulations under Section 79 of the *National Parks and Wildlife Act* 1972-1981, which states:

> 79.(1) Any person who causes damage to any portion of a reserve or any building, equipment or facility on a reserve shall be liable to compensate the Minister [of Environment and Planning] for that damage.
>
> (2) The Minister may, by action in any court of competent jurisdiction, recover compensation to which he is entitled under subsection (1) of this section.

The wording of the 1974 proclamation, however, is such that it is debatable whether conditions of the National Parks and Wildlife Act, other than those specified in the proclamation, can be applied to petroleum exploration activities.

The main value of the proclamation has been the requirement for prior consent, in writing, from the Director General of the Department of Environment and Planning before track construction or other use of earthmoving equipment can commence. As a result, companies exploring for oil and gas have submitted annual programmes of work to the Department of Environment and Planning (and its predecessors) for approval. This provides the basis for a reasonable analysis of potential conflicts between exploration and conservation requirements and the setting of specific conditions appropriate to individual programmes in particular parts of the desert. Flexibility in the specific conditions applied is needed because of the variation in landscape within the park.

The intent of the conditions applied has been twofold. First, to limit the extent of initial disturbance, and secondly, to maximise the chances of regeneration of desert ecosystems following exploration. The conditions recognise that the proportional area directly affected by exploration activities is slight and that the impacts of most concern are those likely to trigger irreversible accelerated erosion or other permanent damaging of susceptible landscapes.

Initially, conditions were set without certain knowledge of the desert environment's responses to disturbance. New conditions have evolved in response to increasing knowledge of the practicality and effectiveness of controls and the observed regeneration of former works.

The first set of specific conditions, applied for a survey undertaken in 1974, required that:

1. Surface damage be kept to a minimum.
2. No old seismic lines to be reopened.
3. Grid system of lines to be broken up, by raking over windrows.
4. Heavy vehicle entry to be kept to a minimum.
5. All camp sites to be cleaned up, pits filled in and no equipment abandoned.
6. There should be no claying of roads within the park.

The company concerned reported that all conditions were met (Seismograph Services 1974, surveying on behalf of Western Mining Corporation), but Alexander (1981) comments that track windrows were still very much in evidence in 1980.

By 1976, further conditions had evolved. For the 1976 exploration programme, conditions were:

1. All tracks to be cut to a minimum depth with windrows flattened wherever possible. Fan-shaped cuts on dune slopes to be avoided.
2. Grid system of tracks to be broken up by raking over of windrows for the last half kilometre abutting the main east-west tracks.
3. Heavy vehicles to be kept to a small number of specified lines.
4. If specified airstrips are to be used, traffic to be kept to the new seismic lines; old lines not to be opened.
5. All stores, fuel unloading bays to be cleaned up on completion. The ground restored to its approximate original contours.
6. Tracks and dunes within the park not to be clayed. In surrounding areas, claying to be kept to a minimum and pits restored to approximate original topography.
7. Signs to be erected to direct traffic.

Conditions have since varied in detail but overall have been similar to those for the 1976 programme. Particular additions have included prohibition of track-making across playa lakes in the park to minimise long-lasting damage to their surface. "Argo Buggies", light eight-wheeled vehicles which leave less imprint than a human foot, have been used in seismic survey over lake surfaces. In a number of cases, permission to construct particular tracks has been refused; in one case, on the grounds that the proposed tracks would aggravate visitor traffic problems; in other cases, because the tracks would cross erodible landscapes and would be unlikely to regenerate. Track windrow flattening has sometimes been required to 1 kilometre either side of track junctions, a measure aimed at discouraging subsequent use by visitors (and hence retard regeneration of the track surface). The usual requirement for windrow flattening remains 500 metres each side of junctions (north-south tracks) or to the nearest dune ridges (east-west tracks).

Conditions applied to petroleum exploration within the Simpson Desert National Park (Queensland) are in some respects considerably stricter than those applied in South Australia. Those equivalent to the South Australian conditions include the recent conditions imposed in 1982 (information courtesy of Queensland National Parks and Wildlife Service):

> All operations involving surface clearing are to be conducted in such a way as to minimise the complete removal of forbs and small plant communities. It is recommended that a minimum one blade width (4-5 metres) be used, and extensive use be made of back-blade techniques in bulldozer operations on the level clay flat and swale areas.
>
> ... cutting through dunes must be restricted to the minimum width—one blade—and removed sand to be utilised on the dune track—not pushed in wings to either side.

Other provisions in Queensland cover "good housekeeping" and clean-up provisions also similar to those in South Australia. The main difference lies in the treatment required for track windrows:

> All windrows created either side of the track to be eradicated to allow the regenerative processes ... to occur on the cleared swales and claypans.

Part of the reason for this much more stringent requirement relates to water erosion. Considerable areas of swales within the Simpson Desert National Park (Queensland) are former or present semi-active floodplains, and track channelling effects could well lead to serious erosion if windrows are not flattened. While this is generally not the case in the Simpson Desert Conservation Park (South Australia), gullying of tracks resulting from water flow redirection has already been noted to occur in the playa lakes area.

Compliance with conditions has generally improved over the last five years, particularly on the part of the main operator within the park. Bonython (1980a) gives a case where companies involved disregarded the windrow-flattening requirement, and when later requested to comply, refused to do so on grounds that the bulldozers had left the area, their return would be excessively costly, and that in any case the tracks would regenerate naturally. The last argument is not strictly correct for it assumes that subsequent visitors would not use the abandoned tracks despite the persistent windrows clearly identifying the former track surface before the area completely regenerated (some decades).

In other cases, prospecting companies have omitted, rather than refused, to comply with conditions. In both the 1974 and 1976 programmes for which conditions have been cited, windrows were not flattened as required, nor were borrow-pits rehabilitated.

Companies have at times given insufficient notice of planned operations which has not allowed time for an adequate environmental assessment to be completed and for conditions and approvals to be given before work has commenced. In other cases, the department has been slow in responding to requests for approval, again resulting in works commencing prior to formal approval.

The level of surveillance applied by the National Parks and Wildlife Service and other divisions of the Department of Environment and Planning within the park area, has not been sufficient to allow early detection of breaches of conditions. Some of the unintentional omissions mentioned, such as failure to level windrows, could have been rectified without major additional costs to the companies concerned had the omissions been noted while the works were still in progress rather than after all equipment had been removed. Also, a number of breaches have undoubtedly arisen because of poor communication between the department and the explorer, and mutual misunderstanding of each group's needs and purposes.

The present conditions are considered to be a reasonable compromise between park protection and the financial and practical restrictions on petroleum exploration companies.

Outside park boundaries, there is no legal basis for environmental protection. As a consequence, less care has been taken in survey operations beyond the park. For example, Alexander (1981) notes:

> ... deeper [track] cuts and more pronounced windrows are prevalent, the ramping and claying of access roads are more widespread, and untidy clay pits and scattered debris are present outside the park ... No attempts have been made to reinstate old well sites ...

The level of debris has been sufficient to raise comment by visitors to the desert. Both departmental inspections and comments from private visitors indicate that the more recent exploration activities have left less debris than in the past, but nevertheless there have been few attempts to obscure abandoned tracks. Delhi Petroleum Ltd has complied with recent requests to undertake some rehabilitation of former operations while upgrading the main east-west access.

Monitoring

The recurrence of instances of unnecessary and lasting damage from petroleum exploration activities highlights the need for better surveillance of operations and monitoring of impacts, even though most activities result in apparently transient impacts and are conducted largely in accordance with the conditions specified. Problems in increasing the surveillance and monitoring from the present one or two inspections per year, stem from the remoteness of the area, its sheer size, and other demands on National Parks and Wildlife Service and other departmental staff.

At present, monitoring of operations and impacts in the desert is provided by direct ground inspection and light aircraft inspection tours, and within the park through a small number of photographic monitoring points (South Australian National Parks and Wildlife Service 1982a). Alternatives must be considered because the monitoring is limited both by its subjectivity and its labour and logistic cost.

Any impacts of exploration need to be viewed in the context of the natural dynamics of desert ecosystems. The dramatic (and erratic) growth responses within the desert after effective rains have already been outlined, as have apparent major and long-term changes which apparently have little to do with any human influence. Generally, most petroleum exploration impacts represent only slight perturbations compared with these natural changes. It is often difficult for subjective observation to differentiate between exploration impacts which appear significant but are not given the particular set of weather, growth and land-form conditions at the site, and those which are significant, resulting in more than a transient local perturbation of the ecosystem.

Graetz and Pech (1982) have recently evaluated LANDSAT imagery, large-scale aerial photographs, and ground level photography as possible assessment and monitoring tools. LANDSAT imagery is deficient in a number of respects. In particular, properly constructed seismic tracks have lateral dimensions below the normal limit of resolution of the imagery. Their linear extent is such that many tracks are in fact detectable, but only as an intermittent series of contrast points on images. Detection is more frequent for east-west tracks crossing dunes and less frequent for north-south tracks through swales. The latter do not result in pronounced contrasts and cannot be readily distinguished from the linear dunes they parallel (Graetz and Pech 1982). The tracks do not return a specific "signature", an unambiguous and clearly identifiable response on the imagery.

The great advantage of LANDSAT is the low cost per unit area of coverage and the capacity for repeated observations at relatively short time intervals. Also, the department possesses both the expertise and capital equipment to make use of LANDSAT in the desert. The low cost of remote sensing by LANDSAT allows at least an initial screening for potential problems. For example, properly constructed tracks are close to the threshold of detection. Undue disturbance along tracks or elsewhere, resulting from exploration works, will have dimensions greater than those of a track and are more likely to pass the threshold into the detectable range. Hence, areas in which a problem is developing should be detectable at a relatively early stage by LANDSAT, and subsequent, more detailed observation can be directed to the particular areas of concern. As a secondary function, LANDSAT can also be used to monitor growth and fire in the desert.

LANDSAT cannot replace more detailed observation. For example, as properly constructed tracks are generally below the limits of resolution, regeneration processes cannot be followed.

Formal large-scale aerial photography (at scales in the range 1:2 500 to 1:10 000) has not yet been employed as a monitoring tool in the desert. Graetz and Pech (1982) point out a number of advantages in its use. The detail it provides is both finer and more readily interpretable than LANDSAT imagery although the cost per unit area is very much greater.

Neither LANDSAT nor aerial photography can remove the need for some ground inspection, although the techniques can greatly increase the efficiency of ground inspection by rapidly pin-pointing areas of particular concern.

General biological conservation and visitor management requirements within the park require that some ground patrolling is necessary. Consequently, a number of cost objections to monitoring by ground observations are reduced (in particular, logistic costs) as officers have to visit the area, anyway. Nevertheless, the costs of monitoring on the ground are still high. The most appropriate uses of personnel visiting the area would appear to be general appraisal of the standard of exploration operations including using objective techniques such as photographic monitoring.

Summary and Implications

National and State interests in the search for oil require that petroleum exploration will continue within the park area and surrounds, and that oil-field development must be expected in the event of any discoveries at commercially-viable levels. Hence, biological and landscape considerations are subordinate to the oil search as petroleum exploration has a legal precedence in the park area. Intelligent conservation planning must recognise the national interest involved, and attempt to find a compromise solution which will allow an accommodation between conservation objectives and the requirements of petroleum exploration.

Petroleum exploration is an extensive, though largely transient, land-use because of the difficulties inherent in locating relatively small, potential reservoir structures within extensive sedimentary basins. The main impact associated with exploration in the desert and the park is the network of seismic survey tracks, and the main concern has been that the track making would lead to accelerated erosion culminating in a bare, eroded landscape. In most cases, accelerated erosion has not occurred. Tracks regenerate if they are used for only a short survey period and are then left undisturbed. Cuts through dunes eventually heal, while in swale areas, tracks have regenerated to the point of disappearance within ten years (although complete regeneration to the original floristic composition is estimated to take up to thirty years). Provided tracks subsequently remain

unused, their impact is transient, and despite the visual obviousness of newly-laid seismic lines, the impact is minor both in terms of the proportional area affected and by comparison with the background dynamics of desert ecosystems. There are, however, landscapes in which impacts may be long-lasting and leading to local alterations of vegetation or land-form. Surfaces of playa lakes may retain the marks of petroleum exploration indefinitely. Structured soils bordering playas are prone to water erosion and frequent cases of gullying have been noted. Also, clayed supply and access roads do not regenerate readily and, without treatment, are likely to persist.

The creation of ready access into the Simpson Desert is the main secondary effect of the petroleum exploration. Continued use of tracks by visitors to the area may convert the otherwise transient impact to a permanent one.

Environmental controls on exploration within the park area are based on the 1974 proclamation declaring the Simpson Desert Conservation Park subject to the relevant mining Acts. Over the last five years, administrative procedures, specific environmental control procedures, and operators' compliance with conditions, have evolved to the stage where both conditions and compliance are generally considered satisfactory. Conditions vary in detail, depending on the particular exploration programme and location within the park, and some retention of flexibility is necessary because of the variety of landscapes and responses to disturbance within the park.

Unfortunately, cases still recur of non-compliance, resulting in lasting damage to land-forms within the park. Some of the cases have been in direct conflict to conditions set, and there is therefore clearly a continuing need for effective surveillance of activities.

Surveillance and monitoring are inadequate at present, largely because of dependence on subjective inspection on the ground. Remote sensing techniques offer a means of increasing the efficiency of inspection.

VISITOR USE

Introduction

There is no complete or accurate record of visitor use of the Simpson Desert Conservation Park, the Simpson Desert National Park (Queensland) or the southern Simpson Desert as a whole, and accordingly, usage rates are difficult to determine. Arid zone tourism in Australia generally has increased greatly over the past decade. The South Australian National Parks and Wildlife Service (1983) reports an overall increase of some 54 per cent in total numbers visiting the Flinders Ranges National Park between 1971-1972 and 1980-1981. Pech and Graetz (1982) report a three-fold increase in tourists visiting the Far Western Region of New South Wales and a near-doubling of visitors to the Ayers Rock-Mount Olga National Park (Uluru) in the Northern Territory over the five years to 1974-1975. While increased transportation costs have undoubtedly had their effect, there is also no doubt that visitor use of the Simpson Desert and the conservation park has also increased greatly over the last decade.

The appearance of the network of petroleum exploration tracks has been largely responsible for this increase although the area's tourist potential differs from the examples quoted above in a number of important respects. The desert is sufficiently remote from population centres to require at least several days to be set aside for a visit, a time-span more in keeping with annual holidays than with weekend forays. Oodnadatta and Birdsville, the main starting points for a desert crossing, are two days of moderate driving from Adelaide, and a desert crossing itself generally requires at least two to three days. Both Oodnadatta and Birdsville are small, distant from the desert, and offer only very basic services. Access to the desert is rough and the actual crossing requires vehicles with off-road capability. The arid environment, with its general absence of surface water and high summer temperatures, constrains usage largely to the cool winter months. Navigation within the desert is not simple. Large areas have no identifying features of use in navigation; not all existing tracks are shown on published maps; and many that are shown are no longer evident on the ground.

Visitor use is thus largely limited to well-equipped and self-sustaining groups possessing suitable vehicles and competent leaders.

Levels of Use

In the absence of any formal survey of visitor levels, information is presented here from the three following sources: police and user estimates, a survey of club users, and from the visitors' book kept at Poeppel Corner. Information previously gained from the first two sources grossly underestimates the number of visitors. The data are nevertheless presented here to show how inaccurate estimates can be when not gained by direct observation, and to provide an indication of relative levels for years not covered by the information from the visitors' book.

Alexander (1981) made the first attempt to gather visitor information data, but warned of the probable inadequacy of the information available to her. She sought estimates of vehicles per annum (other than those associated with petroleum exploration) crossing the desert from police and others at regional centres, and from four-wheel-drive clubs (Table V). Regional ranger staff considered that the estimates given to Alexander represented as little as 20 per cent of the actual number, particularly as many parties failed to notify police or others at the regional centres of their entry to the desert.

Alexander also contacted four-wheel-drive clubs and tour operators throughout Australia while seeking information on movements. It was believed that such groups made up the majority of visitors. Her findings are summarised in Table VI. Although the information gained does demonstrate the highly seasonal nature of visits (the cooler months, May to September) and also the considerable increase of visitor use since 1972, it cannot give a realistic guide to visitor numbers. Not every group contacted replied to enquiries, and information on private (non-club) parties was not usually available. Estimated from this data, the average number of visitors per annum for the three-year period 1978-1981 was 128, and average number of vehicles per annum was forty-three; a considerably higher number than the estimates of police and others in Table V. Alexander considered that the true vehicle figure would be in the range thirty to sixty vehicles per

TABLE V: ESTIMATES OF ANNUAL NUMBERS OF VEHICLES CROSSING THE DESERT THROUGH THE PARK

Estimate Obtained From	Estimated Number of Vehicles Per Annum
Birdsville Police	20-30
Oodnadatta Store	25
Oodnadatta Police	20
Land Rover Club of Australia	20-30
Victorian Association of Four-wheel-drive Clubs	30

(Alexander 1981)

TABLE VI: VISITOR USE SEPTEMBER 1972-JULY 1981 (Estimated by Alexander 1981)

Type of Organisation	Date	Number of Vehicles	Number of Persons	Origin	Total for Year Vehicles (from mid-season)	Persons
Club	Sept. 72	2	4	S.A.		
Tour	Sept. 72	3	16	S.A.	5	20
Club	July 73	4	8	S.A.	4	8
	1974 no information					
Tour	Sept. 75	1	6	S.A.	1	6
?	June 76	6	18*	?		
Club	July 76	6	15	S.A.		
Tour	Sept. 76	2	12	S.A.	14	45
?	May 77	4	12*	S.A.		
Tour	Sept. 77	1	6	S.A.		
Club	Sept. 77	22	66*	N.S.W.	27	84
Club	July 78	8	18	S.A.		
Tour	July 78	5	15	Qld		
Club	Aug. 78	13	43	N.S.W.		
Tour	Aug. 78	1	6	S.A.		
Club	Sept. 78	6	18*	N.S.W.	33	100
Club	May 79	5	12	S.A.		
Club	Aug. 79	2	7	S.A.		
Tour	Aug. 79	1	6	S.A.		
Club	Aug. 79	17	51*	Vic.		
Club	Aug. 79	23	69*	W.A.		
Club	Aug. 79	13	39*	N.T.		
Private	Aug. 79	2	6*	S.A.		
Private	Aug. 79	5	15*	S.A.		
Club	Aug. 79	6	18*	Vic.		
Tour	Sept. 79	1	6*	S.A.	75	229
Club	May 80	5	13	S.A.		
Tour	June 80	1	5	S.A.		
Club	Aug. 80	9	25	N.S.W.		
Club	Sept. 80	5	8	N.S.W.		
Tour	Sept. 80	1	5	S.A.	21	56
Club	May 81	?	?	N.S.W.		
Club	May 81	10	23	S.A.	(to mid-season)	
Club	July 81	4	8	S.A.	14+	31+

* Estimate not given by Alexander. Estimated from average vehicle occupancy on excursions for which both number of vehicles and number of persons are known.

annum. With an average occupancy of three per vehicle, this would mean an upper limit of about 180 visitors per annum.

A visitors' book has been maintained at Poeppel Corner by the Tamworth Four Wheel Drive Club since September 1978. Information in the book was not available at the time Alexander was compiling her data. Table VII provides a breakdown of signatures and other information in the book for the period 3 September 1978 to 4 September 1981, with a fuller listing given in the Appendices. Within this period, ninety parties are recorded with at least 281 vehicles and at least 831 people. These figures exclude petroleum exploration teams listed. Averages are 30 parties per annum, 94 vehicles per annum and 277 or more persons per annum, but yearly rates are variable. In 1979, well over 330 visitors came to the Corner in 111 vehicles (in striking contrast to previous estimates of 20 or so vehicles per annum).

Commercial tours are regular but few. The bulk of visitors are more or less evenly divided into four-wheel-drive clubs and private parties.

Only one school group has been recorded. Visitors have come by four-wheel-drive and conventional cars, motor cycles, helicopters, and in one case by camel. The largest recorded group to visit was a Western Australian club in 1979 with thirty-five vehicles and at least sixty and possibly up to one hundred people. With the visitors have come a number of dogs and one Siamese cat. Two groups mentioned they were carrying firearms, but most groups are likely to have some firearm with them. Seasonality is very clearly defined, with visits commencing in May and ending in early October.

Results of the breakdown of visitor numbers by State of origin (Table VIII) are quite unexpected. By far the

TABLE VII: SUMMARY OF SIGNATURES IN POEPPEL CORNER VISITORS' BOOK SEPTEMBER 1978-SEPTEMBER 1981

Nature of Party	Cars No.	Cars Per Cent	Motor Cycles No.	Persons No.	Persons Per Cent	Individual Parties No.	Individual Parties Per Cent
1978							
Record commences 3 Sept. 78							
Last visitors: October							
Clubs	13	(46)	-	43	(54)	1	(14)
Private	15	(54)	-	36+	(46+)	6	(86)
Total	28	(100)	-	79+	(100)	7	(100)
1979							
First visitors: May							
Last visitors: November							
Tours	2	(2)	-	12	(4)	2	(6)
Clubs	75	(68)	1	185+	(56+)	8	(24)
Private	34	(30)	3	109+	(33+)	20	(61)
Army	Airborne		-	24	(7)	3	(9)
Total	111	(100)	4	330+	(100)	33	(100)
1980							
First visitors: May							
Last visitors: October							
Tours	3	(5)	-	10	(6)	2	(10)
Clubs	18	(31)	-	34	(20)	2	(10)
Private	37	(64)	20	126	(74)	16	(80)
Total	58	(100)	20	170	(100)	20	(100)
1981							
First visitors: May							
Record ends 4 Sept. 81							
Tours	3	(4)	-	14	(6)	2	(7)
Clubs	41+	(49)	-	113	(45)	6	(20)
Private	37	(44)	2	97	(38)	20	(67)
School	3	(3)	-	23	(9)	1	(3)
Army	Airborne		-	5	(2)	1	(3)
Total	84	(100)	2	252	(100)	30	(100)

TABLE VIII: STATE OF ORIGIN OF VISITORS: POEPPEL CORNER, SEPTEMBER 1978-SEPTEMBER 1981

	Vic	NSW	SA	Qld	WA	NT	?	Total
No. of visitors recorded	269+	164+	151+	86	68*	38	55	831
Per cent	(32)	(20)	(18)	(10)	(8)	(5)	(7)	(100)

*Possibly above 100 persons. Mainly in one party with 34 vehicles. Estimated 60 persons in this figure, but if at mean vehicle occupancy for other parties, then 100 or more in this one party alone.

largest proportion of visitors recorded over the three-year period came from Victoria (33 per cent of the total). New South Wales and South Australia each contributed about 20 per cent of the total, with other mainland States represented at smaller proportions. The attraction of the area on a national scale is perhaps best demonstrated by the fact that at least 40 per cent of all visitors are recorded to be from Victoria and Western Australia, States remote from the area.

Not enough visitors have given details of routes taken or time spent for a cohesive picture to emerge. It appears that a majority had been travelling west to east along the French Track, with most of the remainder coming west from Birdsville (sometimes on single day-trips), but some travelling from the south along exploration supply tracks or from the north (from Alice Springs). These patterns may have since altered with changes in exploration road layouts.

It is emphasised that the Poeppel Corner visitors' book is not a complete record of visits. While most parties visit the corner, not all do and not all necessarily provide information in the book.

Nature of Use

Recreation in the desert and the park, although vehicle-based, is not necessarily vehicle-oriented. The primary purpose of most parties' visits to the desert is to visit the desert rather than indulge in off-road vehicle use as an end in itself. Most club users appear to be motivated by a desire to see the desert at first hand and to experience a sense of wilderness and isolation in natural surroundings, probably with a sense of adventure and exploration included (Alexander 1981). Entries in the visitors' book would indicate this is also true of most private parties. The remoteness and natural hazards of the desert, and the resulting level of preparation and time needed for a crossing, must inhibit to a large extent casual vehicle-oriented activities. Vehicles with off-road capability are used because they provide relatively safe access. While part of the enjoyment of visits probably stems from pitting a vehicle against difficult terrain, visitors keep largely to tracks put in by petroleum exploration. Off-road motoring is not the primary object of most visits as it is with dunefields near population centres (Walsh 1975) where vehicle-oriented recreation often causes significant environmental damage.

The following example of club-user attitude is given by the Toyota Landcruiser Club of Australia (S.A.) Inc., one of the more frequent club users of both the desert and the park. Its aims include:

> To encourage and promote family oriented recreational activities, in particular in areas inaccessible to other than four-wheel drive vehicles, and to organise Club trips including such activities as camping, bushwalking, photography, birdwatching, fossicking, fishing and the study of flora, fauna, history ...

Comments in the club's submission included:

> Although we take some pride in the vehicles which we use, our activities are not vehicle-oriented. Vehicles provide a safe, practical and reliable means of transportation for our families through the harsh conditions common to Australia to places where we enjoy our varied outdoor pursuits.

Similar views and objectives are expressed by other club users.

Commercial operators have been running safari-type tours through the desert since the early 1970s. Usually, these have involved one or two vehicles at a time with five to twelve people. Occasionally, light aircraft have been used, utilising the petroleum exploration airstrips within the desert, and at least one camel train excursion has been attempted. Most tour parties originate from Adelaide. These tours are expensive, and again the motivation for tour party members lies in experiencing the desert. Attitudes are illustrated in the advertising of one of the major tour operators:

> There can be few places left in the world where true expeditions can be operated into unspoilt country—the Simpson Desert is one such place.
>
> (Desert Trek Safaris 1980)

With the common motivation of a remote-area experience and interest in the desert itself, such forms of visitor use, although involving off-road vehicles, are of a different nature to the use of off-road vehicles for their own sake.

Few scientific visits have been made to the park for purposes other than those linked directly with petroleum exploration or examination of impacts of exploration. In 1971, Arkaroola Pty Ltd (Adelaide) established a research facility within the park at Surprise Lagoon. The facility had a dual intent: to provide a base camp for aerial and tourist safaris into the central desert, and to provide an opportunity for those wishing to undertake scientific research within the desert. In the latter case, the only cost involved for the user was petrol and food—transport and the use of facilties was to be provided by Arkaroola Pty Ltd (in effect, the tourist operation would subsidise research). The facility was short-lived, however, being removed by the order of the then National Parks Commission before any scientific use of it could be made.

None of the foregoing park uses are incompatible with the purposes of a conservation park. The *National Parks and Wildlife Act* 1972-1981 provides generally for "... the encouragement of public use and enjoyment of reserves and education in, and a proper understanding of, their purpose and significance". Recreational use, private or commercial, in which the primary motivation is to see and experience the desert, is in keeping with the intent of the Act, provided it does not conflict with the flora, fauna, landscape and heritage protection provisions.

There have, however, been some instances of other recreational uses of the park area and the desert in which the desert experience itself is secondary. These we have classified under the general heading of "events". The most recent example (1982) was a crossing through the park of a BMX party from Sydney which was widely reported in the media. While in many respects praiseworthy as a physical endeavour and unlikely to result in significant environmental damage, such an activity has itself as the main object, not the experiencing of the desert environment or the sense of wilderness. Of a similar nature, but with far more

potential for environmental damage, have been cross-desert dune buggy and trail bike rides (often to establish such "firsts" as the first east-to-west crossing by vehicles) in which the recreation has definitely been centred on the vehicle rather than on the desert. The area has also been used as a proving ground for new off-road vehicle models, not necessarily at the instigation of the manufacturers. There have also been isolated incidents of demonstrations of trail-blazing skills for promotional purposes. Such recreational uses are not in keeping with the intent of the National Parks and Wildlife Act and frequently contravene a number of its provisions. While there is as yet no evidence that the relatively slight level of these forms of use has resulted in lasting environmental damage, the potential for such damage is well-known (Wilshire and Nakata 1976).

The desert has not suffered some of the recreational impacts which are causing major concern in North America, probably because of its remoteness. For example, there have been no trans-desert motor cycle enduro races or major car rallies.

Apart from the potential for damage, vehicle-oriented recreational uses are likely to conflict with the remote-area or wilderness experiences being sought by the majority of visitors.

As a final note, some recreation in the desert, although not environmentally damaging, has been unnecessarily foolhardy: in particular, an attempt to walk the desert without preparation, and a crossing by conventional drive vehicles in 1980.

Movement Patterns

The Poeppel Corner visitors' book data are not sufficient on their own to outline movement patterns within the desert. The following account has been compiled with reference to the data in the book, information from club users, and observations of departmental and petroleum exploration staff in the desert.

Almost all visitors travel along present or former main access tracks constructed during petroleum exploration. Information from four-wheel-drive clubs and direct observations, indicate that the one-off seismic tracks are rarely used. Patterns of visitor access have varied depending on the state of repair and use of supply roads.

Visitors undertaking a desert crossing have tended to travel along the former Central Australian Railway to Oodnadatta, then to Dalhousie Springs and Purni Bore, and then via the French Track (see Part 1: Petroleum Exploration) to Poeppel Corner. For much of this crossing, because of the steep eastern faces of the dunes, movement is practical and relatively safe only in an easterly direction. Also the route has a number of difficulties and hazards. The road from the Central Australian Railway to Dalhousie Springs is rough, and Spring Creek between Dalhousie and the desert is prone to flooding. The French Track has clayed dune crossings only as far as Mokari airstrip and most of the dune crossings along it are uncapped with consequent hazards of vehicle bogging, damage and possible rollovers. Difficulties are often encountered in the east in crossing the Mulligan River (particularly on the State border) and in penetrating the high dunes west of Birdsville. A number of bad boggings in the playa lakes along the track are noted in the visitors' book.

The French Track is believed to continue to attract considerable use because it is the crossing most frequently shown on maps. However, its hazards, discomforts, and navigation difficulties are such that increasing use is being made of alternative crossings provided for petroleum exploration, particularly in the last two years. Such crossings have generally been on or about the southerly west-east access route, a short distance outside the present park boundary (Figure 12). Dune cappings allow movement along this route in both easterly and westerly directions. A new access from Oodnadatta to the western fringe of the desert via Macumba Station has recently been built to service petroleum exploration. This route avoids some of the problems associated with the route via Dalhousie but the degree to which visitors use it is unknown.

Poeppel Corner is a geographic focus for visitors simply by virtue of it being a three-State corner, for the site itself has no special distinguishing landscape features. Most visitors go to the corner. Apart from the direct access by the French Track from the west, the corner can also be reached directly from Birdsville and from the southerly east-west access by tracks through dune corridors.

Movement away from the main routes is minimal. Visitors sometimes explore new exploration roads as these appear, and there has been some penetration of the seismic track network despite the measures taken, at least within the park, to disguise the entries to tracks. In these cases, vehicles move off supply roads and search up swales to find the unflattened windrows of the former tracks and then use the levelled former track surface for further travel.

Impacts of Visitor Use

The potential ecological effects of vehicle use have already been discussed in relation to the effects of seismic tracks (Part 1: Petroleum Exploration). The present light and intermittent vehicle traffic associated with visitors is unlikely to slow down regeneration of seismic tracks except over the main through routes. The French Track provides one long-term example of a track maintained by intermittent use.

However, the aridity of the area and the fragility of some of the landscapes have led to discernible impacts in areas favoured by visitors. At Poeppel Corner, effects of usage are evident in reduced vegetative cover and increased drift. Elsewhere, impacts are generally minor and not readily separable from the impacts of track construction. An exception is the crossing of playa lakes where damage caused by vehicle movement over playa surfaces may be permanent. Vehicle tyre-marks on playa floors will not be removed by natural processes until the playa contains some water. As all the playas in the park (and most of those in the southern desert) rely on local runoff for filling, the natural removal of vehicle marks may take several decades, and severe scarring may never be completely removed. Also, areas immediately bordering playas may be particularly prone to damage (Part 1: Geology and Geomorphology). Unnecessary movements may trigger erosion which, unlike that on sandy areas, is not reversible.

There is no information available on damage to timber or disturbance of wildlife. Some reduction in dead timber must occur along main desert thoroughfares and about exploration camps through firewood gathering, although the contribution of visitors to this reduction may be slight compared with that of survey teams. However, rates of growth of woody species in the desert are slow and there is a possibility that visitors will use the wood faster than it can be naturally replenished.

Some wildlife species still present within the desert are highly susceptible to shooting. The Australian Bustard, for example, is a species which is known to have been

reduced by hunting in South Australia. Its relative commonness in the western desert (I. May, personal communication) is a consequence of low hunting pressure. There is, therefore, a possibility that significant reductions in the populations of this and similar species will result from increasing public use, if this brings with it increased use of firearms.

In general, the present impacts of visitor use both in the park and in the surrounding desert are considered to be slight and of little if any ecological significance (Pech and Graetz 1982; Alexander 1981). Nevertheless, there remains potential for greater impacts with continued and increasing visitor use. On present indications, this potential would only be realised with much higher levels of general use or with an increase in more damaging forms of use than presently exist. Such levels are unlikely to be reached for some years if present trends continue, but planning should provide against this possibility.

Safety Problems

Only one death through misadventure is recorded in association with the southern Simpson Desert. In 1975, French adventurer Bernard Faton set out from Oodnadatta, against all advice, to cross the desert on foot without support. He was ill-equipped for such a venture and in particular was carrying inadequate water supplies. There is some doubt whether he even reached the desert for his body has not been found. Other foolhardy approaches to the desert are known, although no deaths have resulted.

The likelihood of serious misadventure among park and desert visitors is small but growing. Most parties appear to be well prepared with fuel, water, adequate communication, navigational equipment and multiple vehicles. Even so, not all users are necessarily properly prepared or can navigate effectively. The increasing complexity of seismic track networks, largely unsignposted, have led to groups mistakenly following the wrong tracks. In a recent incident, an exploration team reported to department staff that a group appeared at a well-drilling site under the impression that they had been heading to Poeppel Corner (on a parallel track more than 30 kilometres to the east). Their remaining fuel, while sufficient to leave the desert had they been where they intended, was not enough to allow them to do the same from the well site without assistance from the exploration team. In other cases, exploration teams have reported cases of single, ill-prepared vehicles in the central desert areas.

Discussions with user groups in South Australia and New South Wales during preparation of this plan have highlighted the need for increasing the level of public safety in and about the park, increasing the level of information on the area, and defining routes in the desert.

One further point of safety needs mention. Playa lake crossings can result in almost irretrievable bogging. While no party is yet known to have been seriously in danger in such cases, the possibility is there.

Information for Visitors

The lack of information on the area in general and the park in particular has already been noted in regard to public safety. The importance of providing information to intending visitors has been particularly emphasised by Pech and Graetz (1982) and is reinforced by enquiries from user groups. Apart from increasing public safety, the education of users into the existence of the park, its purposes, and how to treat it, is potentially the most effective management tool for the area.

Problems of public safety have already been outlined. There is a general absence of adequate informative material to assist the intending visitor and particularly those with no previous experience. The 1:250 000 series maps covering the area are not suitable for the rapidly-changing seismic track network. Tracks which have vanished are indicated, while new tracks are not shown. Accurate information on which tracks are usable is largely by word-of-mouth within and between clubs. Occasional articles in magazines aimed at four-wheel-drive users may be accompanied by maps (Bartell 1980) which are not necessarily accurate. A recent magazine article by Bartell (1982) is the only known guide which gives some public indication of routes to take, the type of vehicle suitable for a desert crossing, the time to allow, and safety and behaviour standards. Even with this article, typesetting and printing processes have resulted in inaccuracies in the maps.

The provision of information is potentially the most effective management tool available for the conservation park. The levels of use of the park cannot justify frequent ranger patrols, let alone permanent staffing. Accordingly, protection of the park must rely on the co-operation and understanding of users, most of whom are unaware of the existence or the purpose of the conservation park and the bordering national park. Popular magazine and newspaper articles mention the existence of the park only briefly, if at all (Bartell and Richardson 1980; Bartell 1982). Clearly, a primary need is to make the existence of the park and its purposes better known.

Summary and Implications

The number of visitors to the park is far greater than has been previously realised. Considering that visitor use only started in the early 1970s, the increase has been dramatic.

Most visitors to the park and surrounding desert are seeking either a wilderness experience or a sense of isolation and remoteness (remote-area experience). The use of four-wheel-drive vehicles and the somewhat anti-social connotations associated with off-road vehicles should not obscure the fact that visitor activities are generally desert-oriented not vehicle-oriented. This type of visitor use is in keeping with the intent of the National Parks and Wildlife Act and, properly guided, should not significantly affect biological and landscape conservation purposes. A minority of visitors do indulge in activities which are incompatible with conservation objectives, and the prevention or at least limiting of such activities should be a goal of management.

Visitor access and movements are relatively well-defined, despite deficiencies in the data. Often the routes used are not the best for the visitors' purposes. The use of the French Track as a main access is probably due to ignorance as better alternatives exist, both from the point of view of visitors and from conservation objectives. There is a dearth of information on the existence of the park, its purposes, and survival in the desert as a whole, and because of this there is a major problem of public safety. The network of exploration tracks which make it possible to move relatively easily through the desert is also capable of snaring the unwary or ill-prepared.

For these safety reasons, there is clearly a need to inform intending users of the needs and requirements of a desert crossing, and to provide some direction. Direction and information is also needed to assist conservation. Damage resulting from visitors' activities is slight, but if the park is to have large areas revert to wilderness there will need to be a defining of visitor

access areas in order to reduce the extent of possible problems. There will also need to be an education of visitors, first into the existence of the park and then into a sympathetic understanding of its purposes and values.

PASTORAL AND OTHER NEIGHBOURING LAND-USES

The Simpson Desert Conservation Park is isolated from pastoral leases by surrounding vacant Crown Land in South Australia and the Northern Territory, in which the only present land-uses are petroleum exploration and limited tourism, and by the Simpson Desert National Park (Queensland). The nearest pastoral leases to the east are those associated with the Mulligan River (Eyre Creek) and its floodplains. In South Australia, there are the Alton Downs-Andrewilla leases and to the south-east the Goyder Lagoon lease (Figure 13). The eastern boundary of the Queensland park runs along the rabbit fencing marking the western edge of the Queensland pastoral leases.

To the west, the Dalhousie and Purni pastoral leases (run as part of Mount Dare Station) encompass the Finke floodplains and extend into the desert around Purni Bore.

Domestic grazing, both east and west of the park, has always been based on cattle, although during the early years of pastoral occupation, the former Dalhousie Station bred army remount horses.

Both in and beyond the pastoral leases, one of the secondary effects of settlement has been the establishment of feral populations of camels, donkeys and horses, the latter two restricted to desert margins and not penetrating as far as the park because of lack of surface water.

In the Far North of the State, pastoralism is a very extensive land-use with cattle run at very low densities (two per square kilometre or less). Capital and labour inputs are very low per unit area. Until recently, most leases were largely open-range without significant fencing. Pech and Graetz (1982) describe the resulting standard of pastoral management as "synonymous with a 'cattle hunting' operation", albeit periodically very profitable.

Recent regulations for the compulsory eradication of the diseases brucellosis and bovine tuberculosis have resulted in at least boundary fencing of properties. As new fencing represents a high capital expense, the tendency has been to fence out the desert dunefield, this being the least productive and most difficult landscape for stock management. Pech and Graetz (1982) indicate that the real boundaries of leases (that is the boundary to areas intentionally stocked) have now contracted from the desert margins and now do not conform to the lease boundaries shown in Figure 13. They also state that with this contraction of pastoral use, the Simpson Desert itself will be isolated from exotic herbivores other than the camel and the rabbit.

The only other potential change in land-use is in the Northern Territory. The unoccupied land of the Northern Territory segment of the desert is currently under Aboriginal land claim. It is not known how such a claim, if successful, will affect the Simpson Desert Conservation Park.

THE SIMPSON DESERT CONSERVATION PARK AS WILDERNESS

The term "wilderness" has been used in the preceding text. The original dedication of the conservation park envisaged the area as wilderness, as did subsequent management. Popular conception of the Simpson Desert remains that of an inhospitable wilderness, a term which means different things to different people. The precise definition of "wilderness" in relation to the Simpson Desert, has been left intentionally until last so that the various definitions of "wilderness" can be examined considering the changes in the Simpson Desert over the last few years.

Helman *et al.* (1976) have reviewed the various definitions of "wilderness" in Australia. From this review, Pech and Graetz (1982) quote a general definition of wilderness as "a large area of land perceived to be natural, where genetic diversity and natural cycles remain essentially unaltered".

How large a "large area" needs to be, depends partly on human perception and partly on ecological processes. In the case of human perception the area needs to be large enough for users to feel that they are in a wilderness, remote from civilisation. It would appear that a sense of wilderness is gained by most visitors to the Simpson Desert and conservation park despite their own use of vehicles, the petroleum exploration track network, and the presence of seismic and drilling teams.

From an ecological viewpoint, the area needs to be large enough to maintain its natural systems (including processes of change in operation such as fire). On this basis the park and surrounding desert retain much of a wilderness character despite the petroleum exploration and visitor use because the actual areas affected are very small in proportion to the extent of remaining, unaffected landscapes, even though the degree of penetration and the linear extent of tracks is very great. Also, present evidence indicates that in most cases the local perturbations to natural systems resulting from the land-uses, are transient and will vanish if the use is ended without leaving significant traces.

The definition of "wilderness" published by the Australian Conservation Foundation (n.d., 1978), differs slightly. The foundation considers that to be wilderness, the land must also be "primitive", that is, substantially free of human works. Wilderness may also be defined in a negative fashion by characteristics it must not have or by activities which are not permissible (for example, no tracks, no earthmoving equipment, no artificial structures and no motorised transport (Pech and Graetz 1982)). Overall, such wilderness definitions are not met at present (neither within the desert generally nor in the park), although they have been in the past. Petroleum exploration with its attendant roadmaking and motorised recreation are the main activities in the area. For this reason, no part of the park or surrounds is regarded as wilderness in this management plan, although it is accepted that visitors to the area may experience a very real sense of wilderness or, at the least, gain a remote-area experience. There is, however, a strong future option for at least part of the area to return to a wilderness state which meets all the above definitions. The option requires that petroleum exploration leaves no long-term traces either as man-made structures (including tracks) or as permanent changes in the natural systems (such as accelerated erosion, or the further introduction of alien flora and fauna). It also requires that motorised recreation be directed in such a way as to leave relatively large areas free of continuous use. It is also dependent in many respects on the eventual fate of the petroleum exploration. The presence, or absence, of a commercial oil or gas field will obviously determine the extent of possible wilderness.

Whatever the eventual outcome of the oil and gas search, there is justification for a return of at least part of the area to wilderness (Australian Conservation Foundation 1978) as the Simpson Desert is one of the

few remaining major wilderness or potential wilderness areas in Australia.

One note of warning is needed in relation to exclusion of motorised transport from any areas which may be selected for a return to wilderness. First, it is impossible to enforce any prohibition of vehicles by reason of the remoteness of the desert and the park and the sheer size. Secondly, even if all motorised transport could be excluded, the value of such an area for either wilderness recreation or scientific purposes would be very low. The Simpson Desert is not a suitable area for walking expeditions despite the fact that a number of persons have walked or attempted to walk the desert in the last twenty years. It would be unwise to apply the same criteria in relation to vehicles as is applied in less arid environments.

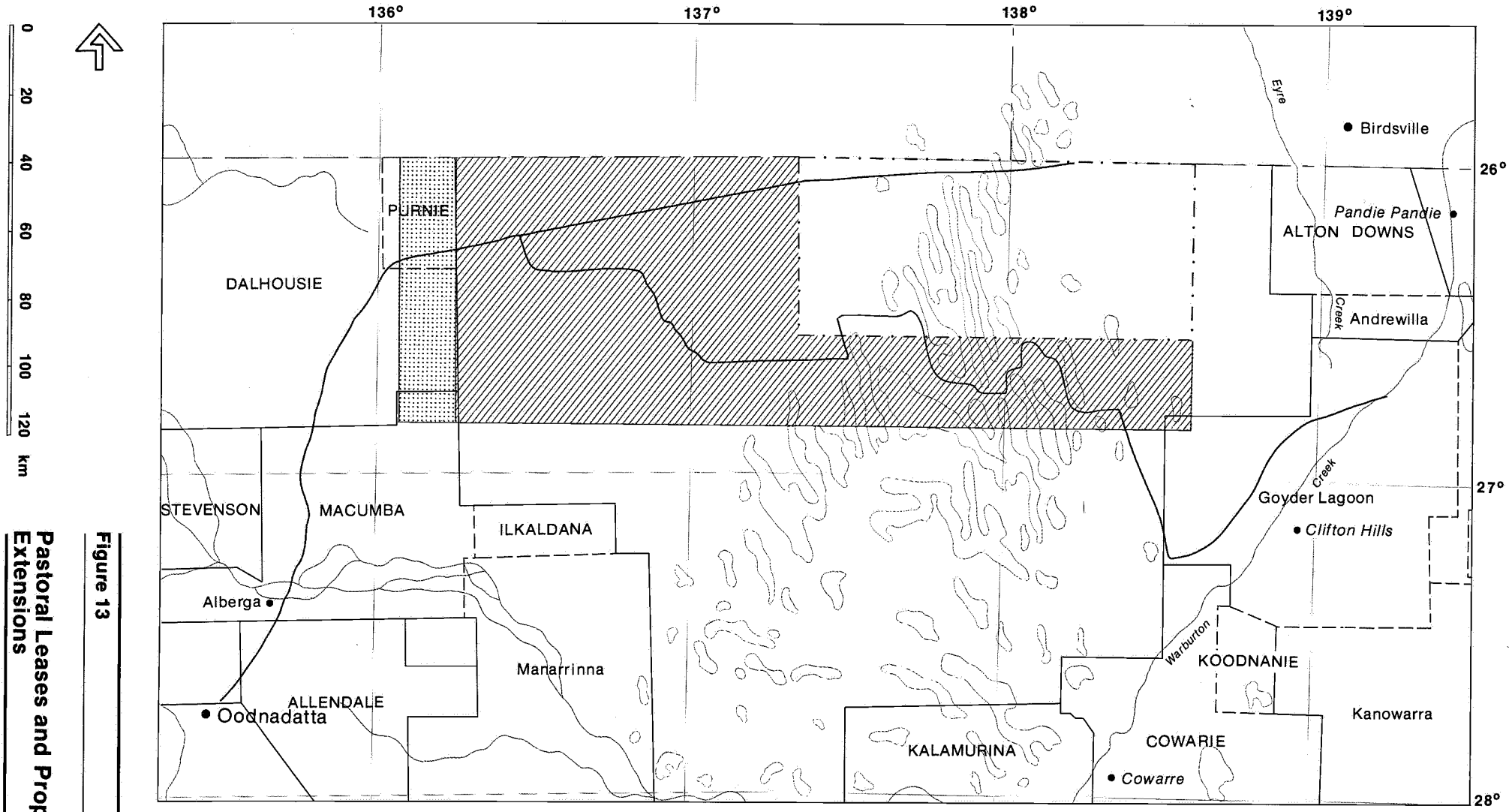


Figure 13

Pastoral Leases and Proposed Park Extensions

NATIONAL PARKS AND WILDLIFE ACT, 1972: RIGHTS OF PROSPECTING AND MINING— SIMPSON DESERT CONSERVATION PARK

SOUTH AUSTRALIA, *to wit*: *Proclamation by His Excellency the Governor of the State of South Australia*

(L.S.) M. L. OLIPHANT

BY virtue of the provisions of the National Parks and Wildlife Act, 1972, and all other enabling powers, I, the said Governor, with the advice and consent of the Executive Council do hereby declare that subject to the conditions specified in the first schedule hereto the rights pursuant to the Petroleum Act, 1940-1969, of entry, prospecting, exploration and mining vested by that Act in any persons immediately before the commencement of the National Parks and Wildlife Act, 1972, may be exercised by those persons and no other person in respect of the reserve specified in the second schedule.

THE FIRST SCHEDULE

The persons exercising rights pursuant to the Petroleum Act, 1940-1969, in respect of the reserve specified in the second schedule hereto shall:—

(1) Not make, cut or grade access roads or tracks in the reserve without the prior consent in writing of the Director of Environment and Conservation and when required by the Director of Environment and Conservation shall re-instate the land over which such access roads or tracks have been made cut or graded in accordance with the Director's requirements.

(2) Not use earthmoving equipment in the reserve without the prior consent in writing of the Director of Environment and Conservation.

(3) Backfill in a proper and workmanlike manner to the satisfaction of the Director of Environment and Conservation all excavations made by them for prospecting purposes.

(4) Not cut, break, sever or damage green standing timber.

(5) Use their best endeavours to ensure that in the exercise of their rights the natural vegetation is not disturbed.

(6) Maintain all camp sites made or used for the exercise of their rights in a clean and tidy condition.

(7) In the event of the exercise of mining rights other than rights of prospecting or exploration, the method of mining, disposal of waste and restoration of the area shall be subject to the prior written approval of the Director of Environment and Conservation and shall be carried out in accordance with that approval.

(8) The rights of entry, prospecting, exploration and mining hereby granted shall in all respects be subject to the Mining Act, 1971-1973 and the Petroleum Act, 1940-1969.

THE SECOND SCHEDULE

Simpson Desert Conservation Park: North out of hundreds, section 48.

Given under my hand and the public seal of South Australia, at Adelaide, this 30th day of May, 1974.

By command,

A. F. KNEEBONE, for Acting Premier

N.P. & W.S., 3/1972

GOD SAVE THE QUEEN!

Plant Species Recorded in the Simpson Desert

The list is drawn largely from Symon (1969), with additions from subsequent verified collections of Buckley (1981c), A. Johnson (unpublished) and P. Copley (unpublished). Species collected only from desert margins (including floodplains) and from Kallakoopah Creek have been excluded.

AIZOACEAE
Aizoon quadrifidum (F. Muell.) F. Muell.
Trianthema pilosa F. Muell.

AMARANTHACEAE
Amaranthus grandiflorus (J. M. Black) J. M. Black
Ptilotus atriplicifolius (A. Cunn. ex Moq.) Benl
Ptilotus latifolius R. Br.
Ptilotus obovatus (Gaudich.) F. Muell.
Ptilotus polystachyus (Gaudich.) F. Muell.

BORAGINACEAE
Heliotropium pleiopterum F. Muell.
Trichodesma zeylanicum (Burm. f.) R. Br.

BRUNONIACEAE
Brunonia australis Sm.

CAMPANULACEAE
Lobelia heterophylla Labill.

CHENOPODIACEAE
Atriplex angulata Benth.
Atriplex limbata Benth.
Atriplex nummularia Lindl.
Atriplex spongiosa F. Muell.
Atriplex velutinella F. Muell.
Atriplex vesicaria Heward ex Benth.
Babbagia acroptera F. Muell. et Tate
Babbagia dipterocarpa F. Muell.
Chenopodium auricomum Lindl.
Chenopodium plantaginellum (F. Muell.) Aellen
Dissocarpus paradoxa (R. Br.) F. Muell. ex Ulbrich
Dysphania simulans F. Muell. & Tate ex Tate
Enchylaena tomentosa R. Br.
Halosarcia halocnemoides (Nees) Wilson
Halosarcia indica (Willd.) Wilson
Halosarcia sp.
Maireana aphylla (R. Br.) Wilson
Maireana appressa (Benth.) Wilson
Maireana lanosa (Lindl.) Wilson
Maireana pyramidata (Benth.) Wilson
Rhagodia spinescens var *deltophylla* (F. Muell.) Black
Salsola kali L.
Salsola kali var *strobilifera* Benth.
Sclerolaena bicornis (Lindl.) Anderson
Sclerolaena birchii (F. Muell.)
Sclerolaena convexula (Anderson) Scott
Sclerolaena diacantha (Nees) Benth.
Sclerolaena divaricata (R. Br.) Domin
Sclerolaena intricata (Anderson) Scott
Sclerolaena johnsonii (Ising) Scott
Sclerolaena lanicuspis (F. Muell.) Benth.
Sclerolaena muricata (Moq.)
Sclerolaena spinosa (Ewart & Davies) Scott
Sclerostegia tenuis (Benth.) Wilson

CHLOANTHACEAE
Dicrastylis costelloi Bailey
Dicrastylis doranii F. Muell.
Newcastlia spodiotricha F. Muell.

COMPOSITAE
Angianthus pusillus (Benth.) Benth.
Brachycome ciliaris (Labill.) Less.
Brachycome iberidifolia Benth.
Calotis erinacea Steetz
Calotis hispidula (F. Muell.) F. Muell.
Calotis latiuscula F. Muell. & Tate
Calotis multicaulis (Turez.) Druce
Craspedia chrysantha (Schldl.) Benth.
Gnephosis eriocarpa (F. Muell.) Benth.
Gnephosis skirrophora (Sond. & F. Muell. ex Sond.) Benth.
Helichrysum ambiguum var *paucisetum* J. M. Black
Helichrysum davenportii F. Muell.
Helipterum floribundum DC.
Hellpterum moschatum (A. Cunn. ex DC.) Benth.
Helipterum pterochaetum (F. Muell.) Benth.
Helipterum tietkensii F. Muell.
Minuria denticulata (DC.) Benth.
Myriocephalus stuartii (F. Muell. & Sond. ex Sond.) Benth.
Podocoma nana Ewart & White
Podolepis canescens A. Cunn. ex DC.
Senecio gregorii F. Muell.
Senecio lautus Forst.f. ex Willd.
Waitzia citrina (Benth.) Steetz

CONVOLVULACEAE
Convolvulus erubescens Sims
Evolvulus alsinoides L.
Ipomoea heterophylla R. Br.
Ipomoea muelleri Benth.

CRUCIFERAE
Arabidella eremigena (F. Muell.) E. A. Shaw.
Blennodia canescens R. Br.
Blennodia pterosperma (J. M. Black) J. M. Black
Harmsiodoxa blennodioides. (F. Muell.) Schulz
Lepidium rotundum DC.
Stenopetalum lineare var *canescens* Benth.

CUCURBITACEAE
Citrullus colocynthis (L.) Schrad.
Melothria maderaspatana (L.) Cogn.

CYPERACEAE
Cyperus gymnocaulos Steud.
Cyperus laevigatus L.

EUPHORBIACEAE
Adriana hookeri (F. Muell.) Mueller-Arg.
Euphorbia drummondii Boiss.
Euphorbia eremophila A. Cunn. ex Hook.
Euphorbia wheeleri Bail.
Glochidion rhytidospermum (Mueller-Arg.) Eichler
Glochidion trachyspermum (F. Muell.) Eichler
Phyllanthus fuernrohrii F. Muell.
Phyllanthus lacunarius F. Muell.

FRANKENIACEAE
Frankenia foliosa J. M. Black
Frankenia gracilis Summerh.

GENTIANACEAE
Centaurium spicatum (L.) Fritsch.

GERANIACEAE
Erodium cygnorum ssp..*glandulosum* Carolin

GOODENIACEAE
Calogyne berardiana (Gaudich.) F. Muell.
Goodenia cycloptera R. Br.
Goodenia heterochila F. Muell.
Goodenia lunata J. M. Black
Goodenia mitchellii Benth.
Goodenia subintegra F. Muell. ex Tate
Goodenia unilobata J. M. Black
Lechenaultia divaricata F. Muell.
Scaevola aemula R. Br.
Scaevola collaris F. Muell.
Scaevola depauperata R. Br.
Scaevola ovalifolia R. Br.
Scaevola spinescens R. Br.
Velleia connata F. Muell.

GRAMINAEAE
Aristida browniana Henr.
Aristida contrta F. Muell.
Dactyloctenium radulans (R. Br.) Beauv.
Dichanthium affine (R. Br.) A. Camus
Enneapogon avenaceus (Lindl.) C. E. Hubbard
Enneapogon cylindricus N. T. Burb.
Enneapogon polyphyllus (Domin.) N. T. Burb.
Eragrostis dielsii Pilger
Eragrostis eriopoda Benth.
Eragrostis laniflora Benth.
Eragrostis setifolia Nees
Eragrostis xerophila Domin
Eriachne aristidea F. Muell.
Iseilema membranaceum (Lindl.) Domin
Monachather paradoxa Steudel
Panicum australiense Domin
Plagiosetum refractum (F. Muell.) Benth.
Setaria surgens Stapf
Tragus australianus Blake.
Triodia basedowii E. Pritzel
Triraphis mollis R. Br.
Zygochloa paradoxa (R. Br.) Blake

GYROSTEMONACEAE
Gyrostemon ramulosus Desf.

HALORAGACEAE
Haloragis gossei F. Muell.
Haloragis heterophylla Brongn.

LEGUMINOSAE
Acacia aneura F. Muell. ex Benth.
Acacia brachybotrya Benth.
Acacia brachystachya Benth.
Acacia cambagei Baker (Note: desert specimens may be *A. georginae)*
Acacia dictyophleba F. Muell.
Acacia ligulata A. Cunn. ex Benth.
Acacia maitlandii F. Muell.
Acacia murrayana F. Muell. ex Benth.

Acacia oswaldii F. Muell.
Acacia ramulosa Fitzg.
Acacia tetragonophylla F. Muell.
Acacia victoriae Benth.
Cassia nemophila Cunn. ex Vogel.
Cassia nemophila var *zygophylla* (Benth.) Symon
Cassia pleurocarpa F. Muell.
Crotalaria cunninghamii R. Br.
Crotalaria dissitiflora Benth.
Crotalaria eremaea strehlowii (Pritzel) Lee.
Crotalaria novae-hollandiae DC.
Crotalaria smithiana A. Lee
Indigofera brevidens var *uncinata* Benth.
Indigofera colutea (Burman f.) Merr.
Isotropis wheeleri F. Muell. ex Benth.
Lotus cruentus Court
Lysiphyllum gilvum F.M. Bail.
Psoralea eriantha Benth.
Psoralea patens Lindl.
Swainsona microphylla ssp. *affinis*. Lee
Swainsona microphylla ssp. *pallescens*. A. Gray
Swainsona procumbens (F. Muell). F. Muell.
Swainsona phacoides Benth.
Swainsona rigida (Benth.) J. M. Black
Tephrosia purpurea (L.) Pers.
Tephrosia sphaerospora F. Muell.

LILIACEAE
Bulbine semibarbata (R. Br.) Haw.
Caesia lateriflora R. Br.
Wurmbea dioica dioica (R. Br.) F. Muell.

LORANTHACEAE
Amyema preisii (Miq.) Tiegh.

MALVACEAE
Abutilon otocarpum F. Muell.
Hibiscus krichauffianus F. Muell.
Lavatera plebeia Sims
Sida corrugata Lindl.
Sida cunninghamii C. T. White
Sida fibulifera Lindl.
Sida platycalyx f. Muell. ex Benth.
Sida virgata Hook.

MARSILEACEAE
Marsilea sp.

MYOPORACEAE
Eremophila latrobei F. Muell.
Eremophila longifolia (R. Br.) F. Muell.
Eremophila macdonnellii F. Muell.
Eremophila obovata L.S. Smith
Eremophila willsii F. Muell.

MYRTACEAE
Eucalyptus microtheca F. Muell.
Eucalyptus terminalis F. Muell.
Thryptomene maisonneuvii F. Muell.

NYCTAGINACEAE
Boerhavia diffusa L.

PLANTAGINACEAE
Plantago drummondii Decne.
Plantago varia R. Br.

POLYGONACEAE
Muehlenbeckia cunninghamii (Meisn.) F. Muell.

PORTULACACEAE
Calandrinia balonensis Lindl.
Calandrinia disperma J. M. Black
Calandrinia polyandra Benth.
Calandrinia remota J. M. Black
Portulaca intraterranea J. M. Black

PROTEACEAE
Grevillea juncifolia Hook.
Grevillea stenobotrya F. Muell.
Grevillea striata R. Br.
Hakea divaricata Johnson
Hakea eyreana (S. Moore) D. McGillivray
Hakea leucoptera R. Br.

RUBIACEAE
Hedyotis pterospora (F. Muell.) F. Muell.
Pomax umbellata (Sol. ex Gaertn.) Miq.

SANTALACEAE
Santalum lanceolatum R. Br.

SAPINDACEAE
Dodonaea attenuata A. Cunn.
Dodonaea viscosa Jacq.

SCROPHULARIACEAE
Morgania floribunda Benth.
Morgania glabra R. Br.

SOLANACEAE
Nicotiana velutina Wheeler
Solanum centrale J. M. Black
Solanum chenopodinum F. Muell
Solanum coactiliferum J. M. Black
Solanum ellipticum R. Br.
Solanum esuriale Lindl.

THYMELAEACEAE
Pimelea pencillilaris F. Muell.
Pimelea trichostachya Lindl.

TILIACEAE
Triumfetta winneckeana F. Muell.

UMBELLIFERAE
Trachymene glaucifolia (F. Muell.) Benth.

ZYGOPHYLLACEAE
Nitraria billardieri DC.
Tribulus hystrix R. Br.
Zygophyllum ammophilum F. Muell.
Zygophyllum howittii F. Muell.
Zygophyllum sp. nov.

Birds Observed in the South Australian Portion of the Simpson Desert by I. May, 1971-1982

Habitats

Dunefields
(a) Grasslands of dunes and swales
1. Sand-hill Cane-grass (*Zygochloa paradoxa*) grassland and shrubland.
2. Lobed Spinifex (*Triodia basedowii*) hummock grassland.
3. Ephemeral grassland of swales.

(b) Tall shrublands and woodlands
4. *Hakea* tall open shrublands.
5. Gidgee (*Acacia cambagei*) open woodlands.
6. Mixed *Acacia* shrublands.

Playa Lakes and Surrounds
7. Samphire shrublands.
8. Open salt lake and claypan surfaces.
9. Saltbush shrublands.

Floodplains, Bore Drains and Soaks (Habitats Marginal to the Desert)
10. Coolibah (*Eucalyptus microtheca*) woodland floodplain.
11. Lignum (*Muehlenbeckia cunninghamii*) shrubland floodplain.
12. Semi-saline swamps (including bore drains).

Sighting Frequencies

Sighting frequency is caculated by A/B x 100 = per cent frequency is caculated by /B
frequency where A is the number of days a species was recorded from a particular habitat and B is the total number of days spent in survey of that habitat.
Categories:

FR Frequent (Frequency greater than 60 per cent.)
IN Infrequent (Frequency between 20 per cent and 60 per cent.)
OC Occasional (Frequency between 1 per cent and 10 per cent.)
VA Vagrant (Exceptional occurrence. Beyond normal limits of range.)

Residency:

R Resident species
S Seasonally present species
N Nomadic species

Species	Noted in Park	Habitats												Residency		
		1	2	3	4	5	6	7	8	9	10	11	12	R	S	N
Acanthagenys rufogularis. Spiny-cheeked Honeyeater	+	IN	—	OC	FR	FR	FR	—	FR	IN	IN	—	OC	+	—	+
Acanthiza uropygialis. Chestnut-rumped Thornbill	+	IN	IN	—	—	FR	FR	IN	OC	IN	IN	—	IN	+	—	—
Aegotheles cristatus. Australian Owlet-nightjar	+	—	—	—	OC	FR	—	—	—	—	FR	—	IN	+	—	—
Amytornis barbatus. Grey Grasswren	—	—	—	—	—	—	—	—	—	—	—	—	IN	—	—	—
Amytornis goyderi. Eyrean Grasswren	+	FR	FR	—	—	—	—	—	—	—	—	—	—	+	—	—
Anas gibberifrons. Grey Teal	—	—	—	—	—	—	—	—	FR	—	FR	—	FR	+	—	+
Anas superciliosa. Pacific Black Duck	—	—	—	—	—	—	—	—	FR	—	FR	—	FR	+	—	+
Anhinga melanogaster. Darter	—	—	—	—	—	—	—	—	—	—	IN	—	—	—	—	+
Anthus novaeseelandiae. Richard's Pipit	+	IN	OC	FR	IN	FR	—	FR	FR	FR	IN	OC	IN	+	—	—
Aphelocephala leucopsis. Southern Whiteface	—	—	—	—	—	OC	—	—	—	—	IN	—	IN	+	—	—
Aphelocephala nigricincta. Banded Whiteface	+	FR	FR	—	FR	IN	IN	—	—	OC	—	—	—	+	—	+
Aquila audax. Wedge-tailed Eagle	+	FR	FR	FR	FR	FR	FR	IN	FR	IN	IN	FR	IN	+	—	+
Ardea novaehollandiae. White-faced Heron	—	—	—	—	—	—	—	OC	FR	—	FR	—	—	+	—	+
Ardea pacifica. Pacific Heron	—	—	—	—	—	—	—	—	IN	—	FR	—	—	—	—	+
Ardeotis australis. Australian Bustard	+	OC	OC	IN	—	—	—	—	OC	OC	IN	—	IN	+	—	—
Artamus cinereus. Black-faced Woodswallow	+	FR	FR	FR	FR	FR	OC	OC	FR	FR	FR	—	FR	+	—	—
Artamus leucorhynchus. White-breasted Woodswallow	—	—	—	—	—	—	—	—	—	—	FR	—	FR	+	—	+
Artamus personatus. Masked Woodswallow	+	IN	OC	OC	OC	FR	IN	—	IN	OC	FR	—	IN	—	+	—
Artamus superciliosus. White-browed Woodswallow	+	IN	OC	OC	FR	FR	IN	—	IN	IN	FR	—	FR	—	+	—
Ashbyia lovensis. Gibberbird	—	—	—	OC	—	—	—	—	—	—	—	—	—	—	—	—
Aythya australis. Hardhead	—	—	—	—	—	—	—	—	OC	—	OC	—	FR	—	—	+
Cacatua roseicapilla. Galah	+	FR	—	FR	IN	IN	—	—	FR	OC	FR	—	FR	+	—	—
Cacatua sanguinea. Little Corella	+	FR	—	FR	OC	IN	OC	—	FR	OC	FR	—	FR	+	+	+
Calidris acuminata. Sharp-tailed Sandpiper	—	—	—	—	—	—	—	IN	FR	—	OC	—	IN	—	+	—
Calidris ferruginea. Curlew Sandpiper	—	—	—	—	—	—	—	IN	IN	—	—	—	OC	—	+	—
Calidris ruficollis. Red-necked Stint	—	—	—	—	—	—	—	IN	IN	—	—	—	IN	—	+	—
Caprimulgus guttatus. Spotted Nightjar	—	—	OC	—	—	OC	OC	—	—	—	—	—	—	+	—	+
Cecropis ariel. Fairy Martin	—	—	—	—	—	IN	OC	OC	FR	—	FR	—	FR	—	+	—
Cecropis nigricans. Tree Martin	+	IN	IN	IN	FR	FR	OC	IN	FR	OC	FR	OC	FR	+	—	+
Certhionyx variegatus. Pied Honeyeater	—	—	—	—	—	—	—	—	IN	—	FR	—	—	—	—	+
Charadrius melanops. Black-fronted Plover	—	—	—	—	—	—	—	—	FR	—	FR	—	IN	+	—	+
Charadrius mongolus. Mongolian Plover	—	—	—	—	—	—	—	—	VA	—	—	—	—	—	—	—
Charadrius ruficapillus. Red-capped Plover	—	—	—	—	—	—	—	IN	FR	—	—	FR	—	+	—	—
Chenonetta jubata. Maned Duck	—	—	—	—	—	—	—	—	IN	—	FR	—	FR	—	—	+
Cheramoeca leucosternum. White-backed Swallow	+	FR	FR	IN	IN	FR	IN	IN	FR	IN	OC	IN	OC	+	—	—
Chlidonias hybrida. Whiskered Tern	—	—	—	—	—	—	—	OC	FR	—	IN	—	FR	—	—	+
Chrysococcyx basalis. Horsfield's Bronze-Cuckoo	+	—	—	—	—	OC	OC	OC	—	—	OC	—	—	—	—	—
Chrysococcyx osculans. Black-eared Cuckoo	+	—	—	—	OC	IN	OC	—	—	—	IN	—	—	—	—	—
Cinclorhamphus cruralis. Brown Songlark	+	IN	—	FR	OC	OC	—	IN	IN	OC	—	—	OC	+	+	—
Cinclorhamphus mathewsi. Rufous Songlark	—	—	—	—	—	OC	—	—	OC	—	IN	—	OC	—	—	+
Cinclosoma cinnamomeum. Cinnamon Quail-thrush	+	IN	OC	OC	OC	IN	IN	OC	—	OC	—	—	OC	+	—	—
Circus assimilis. Spotted Harrier	+	IN	IN	IN	IN	IN	FR	OC	FR	OC	—	—	—	+	—	+
Colluricincla harmonica. Grey Shrike-thrush	—	—	—	—	—	—	—	—	—	—	FR	—	IN	+	—	—
Coracina novaehollandiae. Black-faced Cuckoo-shrike	+	—	—	—	—	IN	OC	—	OC	—	FR	—	IN	+	—	—
Corvus bennetti Little Crow	+	FR	FR	FR	FR	FR	FR	IN	FR	FR	FR	OC	IN	+	—	—
Corvus coronoides Australian Raven	+	FR	IN	IN	IN	OC	OC	IN	OC	FR	—	FR	+	—	—	
Cracticus torquatus Grey Butcherbird	+	—	—	—	OC	OC	—	—	IN	—	IN	—	OC	+	—	—
Cuculus pallidus Pallid Cuckoo	—	—	—	—	OC	IN	OC	—	—	—	IN	—	—	—	+	—
Cygnus atratus Black Swan	—	—	—	—	—	—	—	—	OC	—	IN	—	—	—	—	+
Dicaeum hirundinaceum Mistletoebird	+	—	—	—	—	IN	OC	—	IN	—	IN	—	—	—	—	+
Dromaius novaehollandiae Emu	+	OC	OC	IN	—	OC	—	—	IN	OC	IN	—	OC	+	—	+
Egretta alba Great Egret	—	—	—	—	—	—	—	—	IN	—	IN	—	—	—	—	+
Elanus scriptus Letter-winged Kite	+	IN	—	IN	IN	—	—	—	—	OC	—	—	—	—	—	+
Ephthianura aurifrons Orange Chat	+	FR	IN	FR	OC	OC	—	FR	FR	FR	—	IN	IN	—	—	+
Ephthianura tricolor Crimson Chat	+	IN	OC	OC	IN	OC	OC	—	IN	IN	FR	—	IN	—	—	+
Erythogonys cinctus Red-kneed Dotterel	+	—	—	OC	—	—	—	—	FR	—	IN	—	FR	+	—	+
Falco berigora Brown Falcon	+	FR	FR	FR	FR	FR	FR	FR	FR	FR	IN	OC	UN	+	—	+
Falco cenchroides Australian Kestrel	+	IN	FR	FR	FR	FR	IN	IN	FR	IN	IN	IN	OC	+	—	+
Falco hypoleucos Grey Falcon	—	—	—	—	—	—	—	—	VA	—	—	—	—	—	—	+
Falco subniger Black Falcon	+	IN	IN	IN	IN	IN	—	IN	FR	OC	IN	OC	OC	+	—	+
Fulica atra Eurasian Coot	—	—	—	—	—	—	—	—	FR	—	FR	—	FR	+	—	+
Gallinula tenebrosa Dusky Moorhen	+	—	—	—	—	—	—	—	FR	—	—	—	—	+	—	—
Gallinula ventralis Black-tailed Native-hen	—	—	—	—	—	—	—	—	OC	FR	—	FR	OC	FR	+	—	+
Gelochlidon nilotica Gull-billed Tern	—	—	—	OC	—	—	—	—	OC	OC	—	OC	OC	IN	—	—	+
Geopelia cuneata Diamond Dove	—	—	—	—	OC	IN	—	—	IN	—	FR	—	IN	+	—	—
Geopelia placida Peaceful Dove	+	OC	—	—	IN	FR	—	—	FR	OC	FR	—	IN	+	—	—
Gerygone fusca Western Gerygone	—	—	—	—	—	—	—	—	FR	—	—	—	—	—	+	—
Grallina cyanoleuca Australian Magpie-lark	+	—	—	FR	OC	FR	—	IN	FR	—	FR	OC	FR	+	—	—
Grus rubicundus Brolga	—	—	—	OC	—	—	—	—	OC	—	IN	—	IN	—	—	+
Gymnorhina tibicen Australian Magpie	+	OC	OC	FR	FR	FR	OC	IN	FR	OC	FR	OC	IN	+	—	—
Halcyon pyrrhopygia Red-backed Kingfisher	+	OC	—	IN	IN	IN	—	—	in	oc	FR	—	in	—	+	—
Haliastur sphenurus Whistling Kite	+	—	—	OC	OC	IN	—	OC	IN	OC	FR	OC	IN	+	—	+
Hamirostra melanosternon Black-breasted Buzzard	—	—	—	—	—	—	—	—	OC	—	IN	—	OC	+	—	+
Hieraaetus morphnoides Little Eagle	+	OC	—	—	OC	OC	—	—	OC	—	IN	—	OC	+	—	—
Himantopus himantopus Black-winged Stilt	—	—	—	—	—	—	—	IN	FR	—	IN	—	FR	+	—	+
Hirundo neoxena Welcome Swallow	+	IN	IN	IN	OC	FR	OC	IN	FR	IN	FR	OC	FR	+	+	—
Hydroprogne caspia Caspian Tern	—	—	—	—	—	—	—	OC	OC	—	OC	—	OC	—	—	+
Lalage sueurii White-winged Triller	+	—	—	—	FR	IN	—	—	—	—	FR	—	IN	—	+	—
Larus novaehollandiae Silver Gull	—	—	—	—	—	—	—	OC	IN	—	IN	OC	—	—	—	+
Lichenostomus penicillatus White-plumed Honeyeater	—	—	—	—	—	—	—	—	—	—	—	—	FR	+	—	—
Malacorhynchus membranaceus Pink-eared Duck	+	—	—	—	—	OC	—	FR	—	FR	—	FR	+	—	—	
Malurus lamberti Variegated Fairy-wren	+	FR	IN	—	IN	FR	FR	—	FR	OC	IN	—	IN	+	—	—
Malurus leucopterus White-winged Fairy-wren	+	FR	FR	FR	FR	IN	OC	FR	IN	FR	OC	—	FR	+	—	—
Manorina flavigula Yellow-throated Miner	+	—	—	—	IN	FR	OC	—	—	OC	FR	—	FR	+	—	—
Megalurus gramineus Little Grassbird	—	—	—	—	—	—	—	—	FR	—	—	—	IN	+	—	+
Melanodryas cucullata Hooded Robin	+	—	—	—	IN	IN	OC	—	IN	—	IN	—	—	+	—	—
Melopsittacus undulatus Budgerigar	—	—	IN	OC	FR	IN	—	—	IN	—	IN	—	IN	—	—	+
Merops ornatus Rainbow Bee-eater	—	OC	OC	OC	IN	IN	—	—	IN	—	IN	—	OC	—	—	—

Species	Noted in Park	Habitats												Residency		
		1	2	3	4	5	6	7	8	9	10	11	12	R	S	N
Milvus migrans. Black Kite	+	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	IN	+	–	+
Neophema chrysostoma. Blue-winged Parrot	–	OC	–	OC	–	–	–	–	OC	–	–	–	–	–	+	–
Ninox novaeseelandiae. Southern Boobook	–	–	–	–	–	–	–	–	–	–	FR	–	OC	+	–	–
Northiella haematogaster. Blue Bonnet	–	–	–	–	–	OC	–	–	–	OC	FR	–	OC	+	–	–
Nycticorax caledonicus. Rufous Night heron	–	–	–	–	–	–	–	–	OC	–	IN	–	–	–	–	+
Nymphicus hollandicus. Cockatiel	–	–	–	–	OC	IN	–	–	OC	–	IN	–	OC	–	–	+
Ocyphaps lophotes. Crested Pigeon	+	FR	IN	IN	FR	FR	FR	IN	FR	FR	FR	OC	FR	+	–	–
Oreoica gutturalis. Crested Bellbird	+	–	IN	–	IN	FR	FR	–	IN	–	IN	–	OC	+	–	–
*Pardalotus rubricatus.*Red-browed Pardalote	–	–	–	–	–	–	–	–	–	–	FR	–	OC	+	–	–
Pelecanus conspicillatus Australian Pelican	–	–	–	–	–	–	–	–	OC	–	FR	–	–	–	–	+
Peltohyas australis. Inland Dotterel	+	–	–	OC	–	–	–	–	–	–	–	OC	–	–	–	+
Petroica goodenovii. Red-capped Robin	+	–	–	–	OC	FR	IN	–	FR	OC	IN	–	OC	+	–	–
Phalacrocorax carbo. Great Cormorant	–	–	–	–	–	–	–	–	OC	–	FR	–	–	–	–	+
Phalacrocorax melanoleucos. Little Pied Cormorant	–	–	–	–	–	–	–	–	IN	–	FR	–	–	–	–	+
Phalacrocorax sulcirostrist. Little Black Cormorant	–	–	–	–	–	–	–	–	IN	–	FR	–	–	–	–	+
Phylidonyris albifrons. White-fronted Honeyeater	+	–	–	–	OC	OC	OC	–	OC	–	–	–	–	–	+	
Platalea flavipes. Yellow-billed Spoonbill	–	–	–	–	–	–	–	–	FR	–	FR	–	IN	+	–	+
Platalea regia. Royal Spoonbill	–	–	–	–	–	–	–	–	–	–	OC	–	IN	–	–	+
Plegadis falcinellus. Glossy Ibis	–	–	–	–	–	–	–	OC	–	–	OC	–	IN	–	–	+
Podargus strigoides. Tawny Frogmouth	+	–	–	OC	OC	IN	–	–	–	–	FR	–	OC	+	–	–
Peophila guttata. Zebra Finch	+	FR	FR	IN	FR	FR	FR	OC	FR	FR	FR	–	FR	+	–	–
Poliocephalus poliocephalus. Hoary-headed Grebe	–	–	–	–	–	–	–	–	FR	–	IN	–	–	–	–	+
Pomatostomus superciliosus. White-browed Babbler	–	–	–	–	–	–	–	–	FR	–	IN	–	–	+	–	+
Porphyrio porphyrio. Purple Swamphen	–	–	–	–	–	–	–	–	FR	–	–	–	–	+	–	–
Porzana fluminea. Australian Crake	–	–	–	–	–	–	–	–	FR	–	OC	–	FR	+	–	+
Porzana tabuensis. Spotless Crake	–	–	–	–	–	–	–	–	IN	–	–	–	–	+	–	–
Psophodes cristatus. Chirruping Wedgebill	+	IN	–	–	OC	FR	OC	–	OC	FR	–	–	FR	+	–	–
Recurvirostra novaehollandiae. Red-necked Avocet	–	–	–	–	–	–	–	IN	FR	–	FR	OC	FR	+	–	+
Rhipidura leucophrys. Willie Wagtail	+	IN	IN	IN	FR	FR	IN	FR	FR	FR	OC	FR	+	–	–	
Sericornis brunneus. Redthroat	+	FR	IN	–	–	–	IN	–	–	–	–	–	–	+	–	+
Stictonetta naevosa. Freckled Duck	–	–	–	–	–	–	–	–	OC	–	IN	–	IN	–	–	+
Stiltia isabella. Australian Pratincole	+	–	–	FR	–	–	–	IN	FR	–	FR	IN	IN	–	+	–
Stipiturus ruficeps. Rufous-crowned Emu-wren	+	IN	FR	–	–	–	–	–	–	–	–	–	–	+	–	–
Tachybaptus novaehollandiae. Australasian Grebe	–	–	–	–	–	–	–	OC	–	OC	–	–	–	+		
Threskiornis aethiopisus. Sacred Ibis	–	–	–	–	–	–	–	–	IN	–	IN	–	–	–	–	+
Threskiornis spinicollis. Straw-necked Ibis	–	–	–	OC	–	–	–	OC	OC	–	IN	–	IN	–	–	+
Tringa glareola. Wood Sandpiper	–	–	–	–	–	–	–	–	IN	–	–	–	–	–	+	–
Tringa nebularia. Greenshank	–	–	–	–	–	–	–	OC	FR	–	OC	–	OC	–	+	–
Turnix velox. Little Button-quail	+	–	–	IN	–	OC	–	–	–	IN	–	–	–	–	–	+
Tyto alba. Barn Owl	+	OC	OC	OC	OC	IN	–	–	–	–	FR	–	OC	+	–	+
Tyto longimembris. Eastern Grass Owl	–	–	–	–	–	–	–	–	–	–	–	–	OC	–	–	+
Vanellus miles. Masked Lapwing	+	OC	–	IN	–	–	–	IN	FR	–	FR	IN		+	–	–
Vanellus tricolor. Banded lapwing	+	–	–	FR	–	–	–	–	IN	–	OC	OC	–	+	–	+

Other Birds Noted in the Simpson Desert

The following list is from Wilson (1974), observations of the National Museum of Victoria, and also with reference to Badman (1979).

Amytornis striatus	Striated Grasswren
Anas castanea	Chestnut Teal
Barnardius zonarius	Port Lincoln Ringneck
Calyptorhynchus magnificus	Red-tailed Black-Cockatoo
Cracticus nigrogularis	Pied Butcherbird
Daphoenositta chrysoptera	Varied Sittella
Dendrocygna eytoni	Plumed Whistling-Duck
Falco peregrinus	Peregrine Falcon
Lichenostomus plumulus	Grey-fronted Honeyeater
Microeca leucophaea	Jacky Winter
Neophema bourkii	Bourke's Parrot
Oxyura australis	Blue-billed Duck
Pachycephala rufiventris	Rufous Whistler
Pardalotus striatus	Striated Pardalote
Petrophassa plumifera	Spinifex Pigeon
Phaps histrionica	Flock Bronzewing
Psephotus varius	Mulga Parrot
Psophodes occidentalis	Chiming Wedgebill
Rhipidura fuliginosa	Grey Fantail
Smicrornis brevirostris	Weebill
Tadorna tadornoides	Australian Shelduck

Reptiles and Amphibians Possibly in or near the Park

Eighty-two species may occur within or near the Simpson Desert Conservation Park. Twenty-one of these have been reported in or very close to the park. The following is a list of the species and indicates the likelihood of occurrence on a high-medium-low scale, using distributional and habitat data primarily from Cogger (1979). Cogger has summarised most previous distributional studies, but some original authors have also been consulted (Kinghorn 1945; Houston 1978).

Species reported are from the observations of the National Museum of Victoria, P. B. Copley, R. E. Barwick, and files of the South Australian National Parks and Wildlife Service with records of species in or near the park.

Species	Common Name	Likelihood of Occurrence
LEPTODACTYLID FROGS		
Cyclorana cultripes Parker		High
Cyclorana platycephalus (Gunther)	Water-holding Frog	High
Litoria rubella (Gray)	Desert Tree Frog	Low
Neobatrachus centralis (Parker)	Trilling Frog	High, seen
Notaden nichollsi Parker	Desert Spadefoot Toad	High
Platyplectron spenceri Peters		Low
GECKOES		
Crenadactylus ocellatus (Gray)	Clawless Gecko	Medium
Diplodactylus byrnei Lucas and Frost		High
Diplodactylus ciliaris Boulenger	Spiny-Tailed Gecko	Medium
Diplodactylus conspicillatus Lucas and Frost	Fat-Tailed Diplodactylus	High
Diplodactylus elderi Stirling & Zietz	Jewelled Gecko	High
Diplodactylus intermedius Ogilby	Eastern Spiny-Tailed Gecko	High
Diplodactylus stenodactylus Boulenger		High
Diplodactylus tessellatus (Gunther)	Tessellated Gecko	High
Gehyra variegata (Dumeril and Bibron)	Tree Dtella	High, seen
Heteronotia binoei (Gray)	Bynoe's Gecko	High, seen
Lucasium damaeum (Lucas and Frost)	Beaded Gecko	High, seen
Nephrurus laevissimus Merteus		Low
Nephrurus levis De Vis		Low
Rhynchoedura ornata Gunther	Beaked Gecko	High, seen
SNAKE-LIZARDS		
Delma australis Kluge		High
Delma nasuta Kluge		High
Delma tincta De Vis		Medium
Lialis burtonis Gray	Burton's Snake-Lizard	High, seen
Ophidiocephalus taeniatus Lucas & Frost		Low
Pygopus nigriceps (Fischer)	Hooded Scaly-Foot	Medium
DRAGON LIZARDS		
Amphibolurus barbatus (Cuvier)	Bearded Dragon	High, seen
Amphibolurus clayi Storr		Medium
Amphibolurus isolepis (Fischer)	Military Dragon	High
Amphibolurus maculatus (Gray)	Spotted Dragon	High, seen
Amphibolurus maculosus (Mitchell)	Lake Eyre Dragon	Medium
Amphibolurus nuchalis (De Vis)	Central Netted Dragon	Medium
Amphibolurus pictus Peters	Painted Dragon	High, seen
Amphibolurus vitticeps Ahl.	Central Bearded Dragon	High, seen
Diporiphora winneckei Lucas & Frost		High
Moloch horridus Gray	Thorny Devil	High
Tympanocryptis intima Mitchell		High
Tympanocryptis lineata Peters		High, seen
Tympanocryptis tetraporophora Lucas & Frost		Medium
MONITORS		
Varanus brevicauda Boulenger		High
Varanus eremius Lucas and Frost		High
Varanus giganteus (Gray)	Perentie	High, seen
Varanus gilleni Lucas and Frost	Pigmy Mulga Monitor	Medium
Varanus gouldii (Gray)	Gould's Goanna	High, seen
SKINKS		
Cryptoblepharus boutonii (Desjardin)		Medium
Ctenotus brooksi (Loveridge)		High, seen
Ctenotus helenae Storr		Medium
Ctenotus leae (Boulenger)		High
Ctenotus leonhardii (Sternfield)		High
Ctenotus pantherinus (Peters)		High, seen
Ctenotus regius Storr		Medium, seen
Ctenotus schomburgkii (Peters)		Low
Egernia inornata Rosen		High, seen
Egernia striolata (Peters)	Tree Skink	Medium
Lerista frosti (Zietz)		Low
Lerista labialis Storr		Low
Lerista muelleri (Fischer)		Low
Menetia greyi Gray		Low
Morethia adelaidensis Peters		Low
Morethia boulengeri (Ogilby)		Low, seen (at Dickerie Waterhole)
Sphenomorphus fasciolatus (Gunther)	Narrow-Banded Sand Swimmer	Medium
Sphenomorphus richardsonii (Gray)	Broad-Banded Sand Swimmer	Medium
Tiliqua branchialis (Gunther)		High
Tiliqua multifasciata Sternfield	Centralian Blue-Tongued Lizard	High
Tiliqua occipitalis (Peters)	Western Blue-Tongued Lizard	Medium
BLIND SNAKES		
Typhilina australis (Gray)		Medium
Typhilina bituberculata (Peters)		Medium
Typhlina endotera (Waite)		High
PYTHONS		
Aspidites ramsayi (Macleay)	Woma	High, seen
Liasis childreni (Gray)	Children's Python	High
Morelia spilotes (Lacepede)	Carpet Python	High
ELAPID SNAKES		
Acanthophis pyrrhus Boulenger	Desert Death Adder	High
Demansia psammophis (Schlegel)	Yellow-Faced Whip Snake	Medium
Furina diadema (Schlegel)	Red-Naped Snake	Medium
Rademansia microlepidota (McCoy)	Fierce Snake	Medium
Pseudechis australis (Gray)	Mulga or King Brown Snake	High

Species	Common Name	Likelihood of Occurrence
Pseudonaja modesta (Gunther)	Ringed Brown Snake	Medium
Pseudonaja nuchalis (Gunther)	Western Brown Snake	High, seen
Simoselaps bertholdi Jan	Desert Banded Snake	Medium
Simoselaps fasciolatus (Gunther)	Narrow-Banded Snake	High
Suta suta (Peters)	Myall or Curl Snake	Medium
Vermicella annulata (Gray)	Bandy-Bandy	High

Summary of Entries in Poeppel Corner Visitors' Book 1978-1981

The visitors' book was placed by the Tamworth Four Wheel Drive Club on 3 September 1978. The first volume, from which these figures are taken, was removed by the club on 4 September 1981 and replaced by a new book. The original is now in the National Library, Canberra. Signatures of exploration teams have not been used in compilation of the following table.

A number of comments in the visitors' book are highly critical of the removal of plaques from the Corner by the South Australian National Parks and Wildlife Service. Since the late 1960s, plaques had been placed by various groups travelling to the Corner. The plaques were not removed by the National Parks and Wildlife Service.

Year	Month	Nature of Group	No. of Vehicles	No. of Persons	State of Origin	Comments
1978	Sept.	Club	13	43	N.S.W.	Desert was flowering
1978	Sept.	Private	4	11	N.S.W.	
1978	Sept.	Private	3	6	Vic.	Rain across desert
1978	Sept.	Private	1	1	Vic.	Carrying firearms
1978	Sept.	Private	2	7	N.S.W./Vic.	
1978	Sept.	Private	4	7	N.S.W.	
1978	Oct.	Private	1	4	Vic.	Came from Birdsville on day trip
1979	May	Club	5	16	S.A.	Travelling east to west
1979	May	Club	3	6	Vic.	Subaru 4WD
1979	June	Army	-	8	Qld	4 helicopters—navigation exercise
1979	July	Private	2	5	N.S.W.	With dog
1979	July	Club	2	4	Vic.	
1979	July	Private	1	2	Qld	From Birdsville. Local residents
1979	Aug.	Private	1	2	?	Researching Sturt's journey
1979	Aug.	Private	1	6	Qld	Came from Birdsville
1979	Aug.	Tour	1	6	Mixed	
1979	Aug.	Club	4	15	Qld	Drove in from Birdsville
1979	Aug.	Private	4	14	Qld?	Drove in from Birdsville with dog
1979	Aug.	Private	3	10	Qld	Birdsville residents
1979	Aug.	Club	2	4	Qld	
1979	Aug.	Private	2	9	S.A.	
1979	Aug.	Private	-	3	N.T.	3 motor cycles
1979	Aug.	Private	2	4	S.A.	
1979	Aug.	Club	7	26	Vic.	
1979	Aug.	Army	-	2	Qld	1 helicopter—navigation exercise
1979	Aug.	Private	3	3+	S.A.	Oodnadatta residents
1979	Sept.	Club	34	35-60+	W.A.	Plus 1 motor cycle. May have been 100 or more in this group
1979	Sept.	Private	3	7	Vic.	
1979	Sept.	Private	2	7	N.S.W.	
1979	Sept.	Club	18	53	Vic.	1 Siamese cat
1979	Sept.	Private	2	8	S.A.	
1979	Sept.	Private	1	4	?	1 dog
1979	Sept.	Private	1	5	Vic.	1 dog
1979	Sept.	Private	1	4	Vic.	1 dog
1979	Sept.	Private	1	2	Vic.	1 dog
1979	Sept.	Tour	1	6	S.A.	Members: 3 S.A.; 1 Vic.; 2 N.S.W.
1979	Sept.	Private	3	11	N.S.W.	
1979	Oct.	Private	1	2	N.T.	
1979	Oct.	Private	-	1	?	Used 4 camels. With dog
1979	Nov.	Army	-	14	Qld	3-5 helicopters. Exercises
1980	May	Tour	2	6	Vic.	L. Poeppel damp
1980	May	Private	2	4	?	
1980	May	Private	7	36	S.A.	Light rain
1980	May	Private	1	2	S.A.	Retraced Lindsay's route
1980	June	Private	2	4	Vic.	30 camels seen
1980	June	Private	-	4	Vic.	4 motor cycles
1980	July	Private	1	2	Vic.	
1980	July	Private	1	6	Vic.	
1980	July	Private	1?	5	?	Runner with vehicle support
1980	July	Private	2	3	N.S.W.	Conventional vehicles, not 4WD
1980	Aug.	Private	3	20	N.T.	13 motor cycles as well as 3 cars
1980	Aug.	Private	2	4	W.A.	
1980	Aug.	Private	1	1	Vic.	
1980	Aug.	Club	13	26	Vic.	
1980	Aug.	Private	2	4	Vic.	Drove in from Birdsville
1980	Aug.	Private	6	16	N.S.W.	East to west crossing
1980	Aug.	Private	-	3	S.A.	3 motor cycles
1980	Sept.	Club	5	8	N.S.W.	
1980	Sept.	Tour	1	4	?	
1980	Oct.	Private	6	12	Vic.	

Year	Month	Nature of Group	No. of Vehicles	No. of Persons	State of Origin	Comments
1981	May	Private	3?	23	Vic.	
1981	May	Private	4	9	N.S.W.	East to west crossing
1981	May	Tour	2	9	Qld	
1981	May	Club	5	16	S.A.	
1981	May	Club	10	23	S.A./Vic.	
1981	May	Private	2	7	Qld	Attempt on cross-desert running record (see 1980)
1981	May	Club	4?	9	S.A.	
1981	May	Club	10	23	S.A./Vic.	Return journey
1981	June	Club	5	9	S.A.	
1981	June	Army	-	5	Qld	2 helicopters. Exercises
1981	June	Private	2	4	W.A.	
1981	June	Private	1	1?	S.A.	Removed one of the trees blazed by D. Lindsay
1981	July	Private	2	4	?	East to west crossing
1981	July	Private	2	6	N.T.	1 dog. Badly bogged in L. Poeppel
1981	Aug.	Private	-	2	N.S.W.	2 motor cycles and sidecars. Rain
1981	Aug.	Tour	1	5	Vic./N.S.W.	
1981	Aug.	Private	1	2	S.A.	
1981	Aug.	Private	1?	1?	N.T.	
1981	Aug.	Private	3	9	?	
1981	Aug.	Private	1	2	Vic.	
1981	Aug.	Private	4	7	Vic.	Complaint of "too many people . . . have to find a place with less traffic"
1981	Aug.	Private	4?	16	Vic.	
1981	Aug.	Private	2	6	Vic.	1 dog
1981	Aug.	Private	1	2	Vic.	1 dog
1981	Sept.	Private	1	4	?	
1981	Sept.	Private	1	4	N.T.	
1981	Sept.	Private	1	2	N.T.	
1981	Sept.	Private	3	3	?	
1981	Sept.	Private	1?	6	S.A.	
1981	Sept.	Club	7?	33	N.S.W.	Tamworth 4WD Club replacing visitors' book

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Part 2:

Management Objectives

MANAGEMENT PHILOSOPHY

Conservation Purposes

The primary purpose of park management should be the conservation, in perpetuity, of the landscapes, the native flora and the native fauna of the Simpson Desert. Allied to this purpose should be the eventual return, wherever possible, of much of the park to a wilderness state.

The Simpson Desert is of world-wide scientific interest for its sandridge formations, while its biological conservation values stem from its location in the most arid area of the continent and its present relative freedom from ecologically significant land-uses, particularly animal husbandry.

The South Australian and Queensland parks together form a reserve of national significance by providing an opportunity for the permanent protection of a large part of the Simpson Desert. Given the lack of any present or foreseeable conservation reserve within the Northern Territory sector of the desert, the significance of the Simpson Desert Conservation Park is increased for it is the only reserve which can offer protection of the central and western desert landscapes.

Other conservation functions which the park should fulfil are the protection and preservation of relics of Aboriginal occupation and European exploration.

Recreation Purposes

Recreational use of the park is considered a valid secondary purpose for park management. Petroleum exploration has made most of the park accessible to suitably-equipped visitors seeking a remote-area or wilderness experience. The bulk of visitors, however, appear to have restricted their movements to a few relatively well-defined routes and points of interest. Provision for visitor use of this nature in a conservation area is consistent with the objectives of the National Parks and Wildlife Act, and there is room within the park to provide for continuation of existing patterns of use without prejudicing the park's primary purpose.

Part of the significance of the park, within the South Australian reserve system, lies in the opportunity it provides for remote-area recreation within a true desert environment.

Conflicts with Petroleum Exploration and Development

Conflicts arise between the conservation purpose and the pressures of petroleum exploration and development. Petroleum exploration has legislative precedence over conservation purposes and park management. Although the relevant legislation and proclamations provide for a degree of control over the manner in which exploration is carried out, the controls are aimed at minimising and ameliorating impacts which may occur. The actual course and general location of exploration activities cannot be directed under the National Parks and Wildlife Act.

Neither can the course of future petroleum exploration or development be predicted. In the longer term, a commercial oil field might be developed within park boundaries. Oil field development would bring with it upgraded access, and operating and housing requirements. Even if such a development does not eventuate, continuing exploratory survey can be expected. In particular, further exploratory wells are likely to be sunk which will require access superior to that needed for seismic survey, and not necessarily over existing main access routes.

The legislative precedence of petroleum exploration and the uncertainties of future oil development combine to make management planning extremely difficult. The complexion of the park's geography, particularly the location of man-made access, is likely to change significantly within a few years. The changes are unpredictable in detail and largely beyond the control of park managers. This does not prevent the determination of objectives for management, but strongly influences the means by which the objectives might be achieved.

Management Strategy

Normal park planning and implementation procedures are inappropriate in view of petroleum activities. For example, other large parks in South Australia can be zoned to separate areas for appropriate, but conflicting, purposes, and the zoning can reasonably be expected to provide the framework for park management and development for at least several years without requiring radical alteration. In particular, areas for intensive development can be defined and separated, in subsequent management treatments, from areas for biological conservation purposes. This is not the case in the Simpson Desert Conservation Park. The location of the most potentially significant future developments cannot be predicted. There is, therefore, little point in following a conventional zoning plan in which, for example, a "wilderness zone" is declared, with attendant stringent restrictions on management, access and activities, only to have an oil field development appear within it at a later stage. A more flexible planning approach is needed.

The philosophy of this plan has been to provide a framework which allows necessary management actions to take place without closing future land-use options, and without future petroleum developments later rendering the management actions futile. Uncertainty over the course of petroleum exploration and possible end-uses for parts of the park should not be a reason for deferring all management action; nor should it be permitted to lead to undirected, unco-ordinated and purely reflexive park development.

The approach which has been applied has used two main zoning categories. Unlike the normal park zones, they are intended to be temporary and eventually altered in extent or location or replaced by other categories on completion of petroleum exploration in the area. An outline of their intended operation is given here because of their central role in park management. Further discussion is provided in Part 3: Zoning.

Most of the park will be zoned as "Natural Area", recognising the possibility of two extreme end-uses (wilderness or oil field) without attempting to predict which outcome might apply in any given area. No active park development is proposed within the Natural Area Zone and the use of recreational vehicles will be discouraged (though not prohibited). Most petroleum exploration will continue to take place within the zone, but rehabilitation measures will be required of exploration groups to ensure that the zone retains the option of an eventual return to wilderness.

Access corridors have been designated for visitor use (zoned "Visitor Access"). The corridors utilise in part the clayed roads resulting from petroleum exploration. Park visitors will be directed to them, and most of the physical development planned for the park will be within the Visitor Access Zone. Some new access may appear within the Natural Area Zone in the course of petroleum exploration. In some cases, this access may better suit park management purposes than the access designated in this plan. However, a proliferation of major access corridors is not consistent with the eventual return of much of the park to wilderness.

Recognising this, the management actions proposed for the Visitor Access Zone are all readily reversible and do not permanently commit the land to use as access. In the event of new access appearing where it better serves park purposes than that already defined within the Visitor Access Zone, the present access corridors can be abandoned in favour of the newer access, and incorporated into the Natural Area Zone with a view to eventual return to wilderness.

OBJECTIVES

The following specific objectives for the management of the Simpson Desert Conservation Park are intended to serve as a rigorous guide to the uses and developments permitted within the park and under the control of the *National Parks and Wildlife Act* 1972-1981. All park management should be constrained under these objectives.

Objectives relating to petroleum exploration are limited by the terms of the proclamation relating to rights of entry to the park under the *Petroleum Act* 1940-1969.

Boundaries

1. To achieve, through the addition of adjoining Crown Land, the protection within the park of a representative sample of the southern Simpson Desert landscapes, flora and fauna.

2. To extend park boundaries to include the main tourist access routes within the desert and so enable park development which will make these routes safer for the public.

Zoning

To zone the park for potentially conflicting uses of the various habitats and localities with due regard to the possible outcomes of current petroleum exploration; to ensure the conservation in perpetuity of the landscapes, flora and fauna; and to ensure the protection of relics of Aboriginal occupation and European exploration.

Native Flora and Fauna

1. To minimise human interference with natural processes influencing the desert flora and fauna within the park, and to protect that flora and fauna wherever possible from the impacts of visitor use and petroleum exploration.

2. To identify any areas of particular ecological significance within the park and provide for their special protection.

3. To encourage further examination of the distributions, dynamics and ecological relationships of plant and animal species within the park in order to increase the current level of knowledge and assist future management decisions and actions.

4. To monitor changes in the vegetation, faunal habitats and species populations in response to wildfire, climatic variation and the influences of feral animals.

Aboriginal and Historic Relics

1. To locate, identify and document all areas of special heritage value within the park.

2. To preserve relics of Aboriginal occupation and European exploration and in particular to protect sites of significance from damage through visitor use.

Petroleum Exploration and Future Development

1. To minimise and ameliorate impacts of petroleum exploration on park landscapes, flora and fauna by the means provided in existing proclamations, and particularly, to encourage the return of lands affected by past petroleum exploration to an undisturbed state.

2. To monitor the impacts of continuing petroleum exploration and the effectiveness of environmental controls in regard to park landscape, flora and fauna.

3. To co-ordinate, where possible, future park development and management with continuing exploration activities and possible future commercial oil-field development.

Visitor Use

1. To provide for visitor usage of the park in keeping with the intent of the National Parks and Wildlife Act and the primary conservation objectives.

2. To increase public safety within the park by a combination of education, capital works and provision of emergency facilities.

3. To provide interpretive material to park users and petroleum exploration groups so that awareness can be increased of the park's existence, purposes and special values.

4. To upgrade the means available for monitoring visitor usage, for purposes both of public safety and visitor use management.

Plant and Vertebrate Pests, Feral Species

1. To prevent the establishment of any works which may aid the maintenance of feral and pest animal populations.

2. To monitor levels of feral and pest animals within the park.

3. To encourage research within the region aimed at eventual control of the rabbit.

4. Where feasible, to prevent the importation and establishment of plant species alien to the region.

Fire

1. To accept the occasional presence of naturally occurring wildfire as an integral part of ecological processes in operation in the park and to permit wildfire to burn unimpeded.

2. To reduce through public education the possibility of outbreak of wildfire as a result of visitor use or petroleum exploration within and about the park.

Part 3:

Management Considerations

BOUNDARIES

Origin of Existing Boundaries

The existing park boundaries are highly artificial, bearing no real relationship to the geography or biology of the Simpson Desert. The park does not at present contain an adequate or representative sample of all the main environmental associations within the desert. In particular, the Wongkanguru Environmental Association is represented only within the extreme western portion of the park, despite occupying half the Simpson Desert in South Australia and being the main environmental association of the Simpson Desert as a whole.

That the Simpson Desert Conservation Park fails to conserve the landscapes usually considered typical of the Simpson Desert is an accident of history. At the time of the original tri-State park proposal, the broad geographic variations in land-form, vegetation, habitat and species within the desert were not well known, and popular conception of the desert was of a homogeneous sea of identical sandridges.

There was, therefore, insufficient reason for selecting any particular set of boundaries over another. The tri-State park proposal recognised that some geographical variation existed, although details were not known, and part of the rationale for the very large total area proposed was to encompass this variation. In fact, had the proposal succeeded and a Northern Territory park been dedicated, the resulting reserve would have provided statutory protection to a representative sample of all the Simpson Desert landscapes. Much of the Northern Territory segment would have comprised the Wongkanguru Environmental Association in particular. The much-acclaimed system of closely ranked, evenly spaced and parallel red sandridges which epitomise the Simpson Desert would thus have had adequate representation.

Reasons for Park Extension

Given that dedication of a park within the Northern Territory sector of the desert is now most unlikely, there is a strong case for extension of the Simpson Desert Conservation Park to include a representative and sizeable portion of the Wongkanguru Environmental Association. This would, at the least, provide consistent statutory protection to the "core" landscapes, flora and fauna of the Simpson Desert; otherwise, Australia will lack adequate representation within a national park or conservation reserve system of the typical Simpson Desert landscape.

A second reason for proposing park extension is to give new public access, partly to increase the likelihood of achieving conservation objectives, but mainly to increase the level of public safety in the area. The major east-west access along the oil exploration clayed roads, is close to, but outside, existing park boundaries for most of its length. The less-used northerly traverse lies largely within the park, but its western starting point is well beyond present park boundaries. The boundaries result in a number of separate park entries utilised by visitors, with the main east-west access crossing and recrossing the southern boundary. Inclusion of the main access route and key junctions within new park boundaries is desirable as it would allow management actions aimed at increasing public safety to be applied by the National Parks and Wildlife Service over most of its length. Administrative and legal problems arise if such developments are attempted by the Service on land legally beyond its control. Also, extension of the park, to include the main access and key route junctions, would mean that visitors would then always be within a park, with a consistent required standard of behaviour and activity over most of their traverse.

The possibility of eventual oil-field development provides a further reason for alteration of park boundaries. Eventual realisation of, at least, part of the park as wilderness will require a large area uninterrupted by man-made features. A commercial oil-field development within the park may prevent such a criterion being fulfilled over a large proportion of the present park area, even though the development itself may not significantly affect biological conservation objectives.

For example, the Cooper Basin developments at present directly occupy less than 90 square kilometres, and at full projected development are unlikely to occupy any more than three times this area. The development has no significant regional impact on pastoral productivity, and if biological conservation were the primary land-use, rather than pastoral production, a similar outcome could be expected. However, the eventual installations (well-heads, roads, and so on) in the Cooper Basin will be dispersed over about 12 000 or more square kilometres in such a manner that only a small proportion of this very large area will lie more than 20 kilometres away from an installation of one sort or another. A comparable development within existing park boundaries would not negate biological conservation purposes; nor would it necessarily prevent visitors experiencing a sense of wilderness. It could, however, prevent the establishment of true wilderness areas since the park area is insufficient to absorb such development and still have large areas of remnant undeveloped land.

Nature of Park Extensions

The proposed park extensions are shown in Figure 13. The western boundary should be relocated along longitude 136° East and the southern boundary moved further south to latitude 26° 45′ South. The northern boundary, being the State border, should remain unchanged. The eastern boundary should be maintained along its present longitude.

The westward extension has as its primary purpose, the inclusion of a significant portion of the Wongkanguru Environmental Association. The proposed boundary would generally coincide with the western boundary of the desert. It would require resumption of part of the Purni and Dalhousie pastoral leases where these leases extend into the dunefields of the desert. As an interim measure, pending resumption of the areas, a temporary western boundary should be declared at the perimeter of the leases. Both the interim and the final western boundary would include the western junction of the two main east-west access routes within the park, and would mean that the northerly east-west access would lie entirely within the park. This should permit public safety improvements to be applied particularly at the key junction.

The southern extension is intended to incorporate the main east-west access into the park area, primarily to allow management actions aimed at increasing public safety.

The substantial additional park area resulting from the proposed extensions should also increase the chance of large, undeveloped areas remaining in the park in the event of major oil-field development.

No change is proposed in the eastern boundary at this stage. Continuity with the eastern boundary of the Simpson Desert National Park (Queensland) may be desirable as a long-term objective, but is not seen as a management necessity, and is not justifiable on ecological grounds because the landscapes concerned

are already adequately conserved. A case exists for protection in reserves of the floodplains and watercourses of the desert environs, particularly the channel country of the Diamantina and including the Mulligan River (Eyre Creek) system east of the existing reserve. Such environments have particularly high conservation values in a highly arid region, yet are unrepresented within the South Australian reserve system. However, conservation purposes would be better served by selection and dedication of areas specifically for the floodplain and stream systems, rather than adding a relatively small, and not necessarily highly significant, floodplain component to a park primarily intended for the protection of desert ecosystems. Eastern extension of the park may, however, be a future option, particularly if similar extension of the Simpson Desert National Park (Queensland) is contemplated.

The proposed new boundaries of Figure 13 are still artificial because they do not follow any geographical, ecological or cultural boundary other than part of the western desert edge. Recommendations for the dedication of the whole of the South Australian segment of the Simpson Desert are made from time to time. These recommendations are usually on the grounds that the land is largely vacant and that dedication of the whole desert will create a clearer definition of the protected area by natural boundaries and the practical limits of pastoralism. Some form of environmental protection may be needed for the desert as a whole, but dedication of the entire area as a reserve under the National Parks and Wildlife Act is difficult to justify on either ecological or public use grounds.

ZONING

The approach used in deriving the zoning provisions has already been outlined in Part 2: Management Philosophy. The location and extent of the two main zones, Natural Area and Visitor Access, are shown in Figure 14. A third, localised zoning of Heritage Site is also proposed for the specific protection of areas which have particular Aboriginal or historical significance or contain relics of former occupation or exploration. No area has been zoned in this category in this plan, although such areas are known, or likely, to exist in the park (for example, sites of Aboriginal wells), but exact locations are either unknown or not available to the planner at present. The zoning plan should be updated as more information becomes available.

Natural Area Zone

The intent of the Natural Area zoning is to maintain the option of eventual return to wilderness of at least part of the park. The park is not at present wilderness (under most definitions) because of the continuing petroleum exploration activity and the network of seismic tracks associated with it.

Most of the ecological effects of the seismic network are considered to be transient, at least on present knowledge, and do not prohibit the return of the land to an undisturbed state. The impacts of tracks have been cause for concern, not because of the direct damage to land-form and vegetation—tracks occupy only a very small area despite their linear extent—but rather for their potential to trigger erosion which would affect a far larger area than the tracks themselves. Available evidence indicates that trackage has not had this effect. For example, dune cuttings have infilled following track abandonment, rather than leading to blow-outs and increasing dune mobility. Environmental controls on the construction and abandonment of tracks have assisted natural regeneration (although there is room for improvement in this regard. Upgrading of environmental controls is discussed further in Part 3: Petroleum Exploration). In addition, the alterations of landscape and biology, resulting from exploration activity, are minor indeed when compared with the changes following naturally-occurring wildfire and climatic variation.

Continued use of tracks by visitors, however, will inhibit their regeneration, and accordingly, visitor use of the zone should be minimised. In particular, no development for visitor use should be initiated within the zone, and park information (signs and interpretive materials) provided for visitors should direct their use away from the zone. Another step which should assist is the obliteration of clayed exploration roads. This would not entirely prevent some visitor use of the zone, but would be expected to result in most park visitors staying within the defined visitor access corridors. Total prohibition of visitor movement within the Natural Area Zone is considered unnecessary, as well as unenforceable, as the residual use of the zone is unlikely to have more than a very slight effect.

Visitor Access Zone

Access corridors have been zoned Visitor Access. The defined corridors (Figure 14) are intended to provide two east-west traverses and one north-south route through the park. The southerly traverse, along clayed exploration roads, follows a route of only moderate difficulty and is expected to be used by most parties intent on crossing the desert. Its eventual outlets are at Purni Bore in the east and the Birdsville Track in the west. The northerly traverse, close to the State border, should provide a very much rougher route for the more adventurous. This is the route of the first seismic survey team (the French Track) and is only passable from west to east, and terminates at Poeppel Corner. A single north-south corridor links the two east-west corridors and allows easier access to Poeppel Corner than is possible via the French Track.

The Queensland National Parks and Wildlife Service is willing to define a similar access route from Birdsville into the Simpson Desert National Park (Queensland), also terminating at Poeppel Corner. In practice, this and the proposed north-south route in the Simpson Desert Conservation Park (South Australia), would form a single route through Poeppel Corner, terminating outside Birdsville in the north, and at the main east-west access in the south. This would remove the need for an eastern route out of the park along the border and so reduce the problems often encountered in crossing the Mulligan River at this latitude.

The fate of access into the Northern Territory will depend in part on the outcome of the present Aboriginal land claim.

Most park developments should be directed to the Visitor Access Zone. In keeping with the conservation functions of the park and the desire of most visitors for a remote-area or wilderness experience, development should be minimal, aimed primarily at increasing public safety, with visitor education and park interpretation as secondary purposes. Development should be limited to route marking, placement of advisory signs, and some provision of emergency facilities, primarily water.

All installations within the zone should be low-key and relatively informal. Installations should have the capacity for complete removal in the event of oil-field development or other changes in park use necessitating a reorganisation of access. There should be no attempt by park management to maintain the tracks themselves within the zone. Not only is the cost of maintenance unjustifiable in terms of the degree of

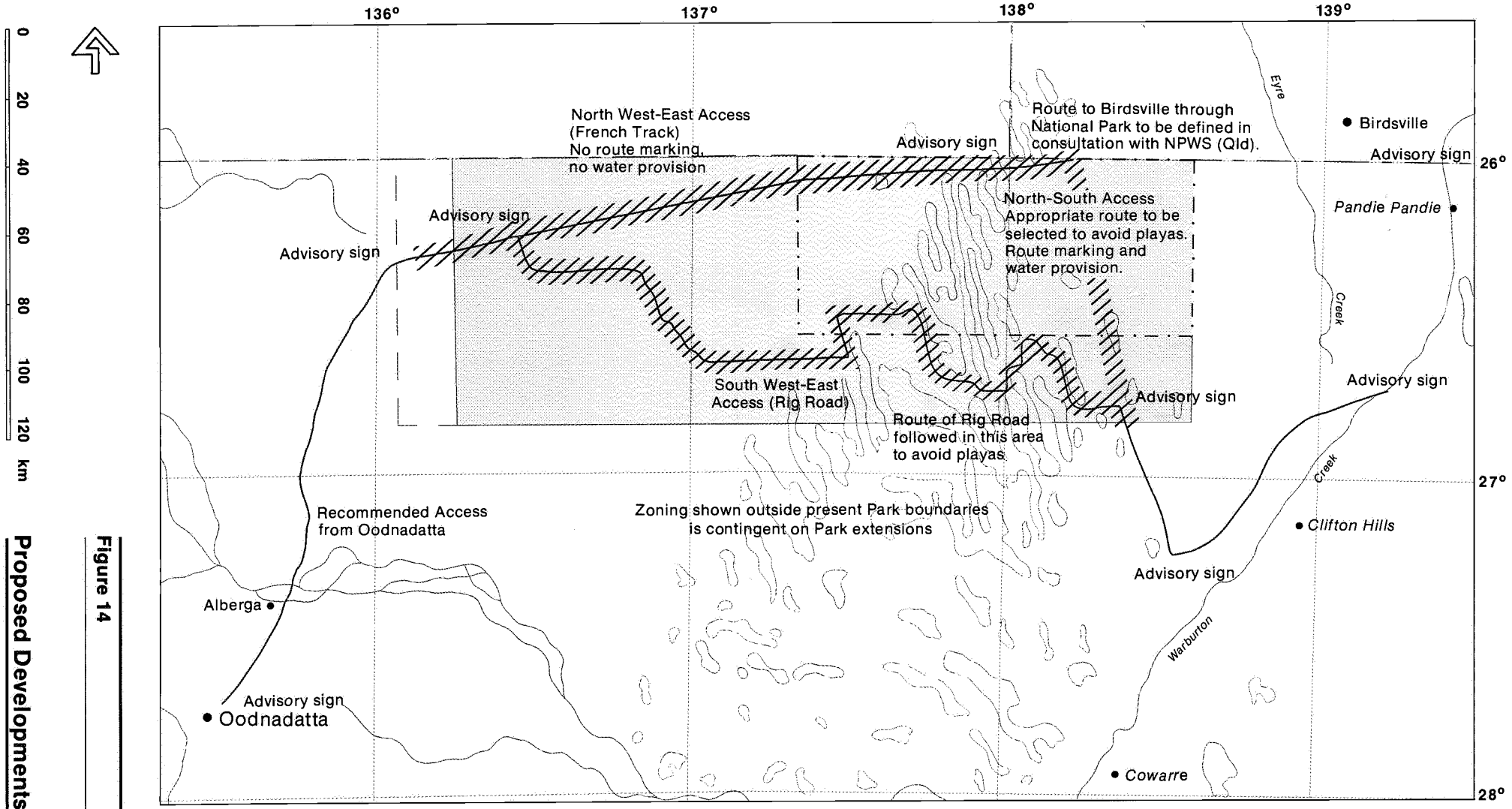


Figure 14

Proposed Developments

visitor use, but also their maintenance would mitigate against abandonment in favour of more appropriate routes which might be developed during future petroleum exploration. The intention is to define routes through the park, not to build or maintain roads, even though the routes proposed at present take cognizance and advantage of tracks originally put in for petroleum exploration purposes.

Other Zones

The Heritage Site category is introduced in this plan to establish guide-lines for future use, although no areas within the category are yet proposed. Heritage sites are expected to be of two kinds; the first sites to be of a purely geographical nature (for example, former Aboriginal wells) which can be made known to park users without prejudicing their existence; the second to contain artefacts or portable relics where public knowledge of their existence may result in damage or loss of the relics. Given the intent and behaviour of most present park visitors, the risk of intentional damage or illicit removal of relics is small. Unintentional damage, however, may occur through ignorance. The size and remoteness of the park makes it physically impossible to actively police sites, and so the best means for their protection would seem to be education of park users. This could be achieved by indicating the approximate locations, explaining the significance and importance of the sites, and requesting that appropriate care be taken if intending to pass through the area. As an added precaution, defined access routes should not be directed near sites of particular significance.

There are no known areas within the park for which zoning is required to provide a higher degree of protection than that afforded by the Natural Area category. Cases equivalent to the distribution of *Acacia peuce* (Northern Territory) may be found in the future, and the option of special zoning for their protection should be maintained.

PETROLEUM EXPLORATION

General Considerations

Any consideration of environmental controls on petroleum exploration in the park must take into account the following points.

First, Australia's partial self-sufficiency in oil will diminish without further oil-field development, with severe national economic and strategic consequences. There is, therefore, significant national interest involved in continuing petroleum exploration and development of any commercially viable fields.

Secondly, even a small oil/gas find in the Pedirka Basin may be commercially viable because of the Basin's proximity to the Moomba pipeline terminals, especially with the current development of a liquids pipeline to Stony Point (S.A.). Viability may be further enhanced because of the possible linking by pipeline with the Mereenie and Palm Springs (N.T.) gas field.

Thirdly, petroleum exploration commenced well before proclamation of the Simpson Desert Conservation (formerly National) Park. In recognition of this, and of the importance to Australia and South Australia of oil search, the park was originally proclaimed under, and subject to, the *Mining Act* 1930-1962 and the *Mining (Petroleum) Act* 1940-1967; with those Acts therefore taking precedence over the then *National Parks Act* 1966. With the introduction of the present National Parks and Wildlife Act, a special proclamation confirmed continuation of previous exploration rights, subject to regulations intended to minimise exploration impact.

The regulations, under the National Parks and Wildlife Act, provide the basis for environmental controls and are potentially quite stringent. Their legal and practicable enforceability is questionable, however, for there is no explicit penalty for breaches of the regulations. The wording of the proclamation and regulations indicates that the only penalty which could be applied in the event of breaches is the extreme one of loss of rights of entry and prospecting. Such a penalty is most unlikely to ever be invoked. First, cessation of petroleum exploration would not be in the national interest. Secondly, such a penalty would be out of proportion to all but the grossest and most wilful breaches of the regulations. Accordingly, adherence to, and fulfilment of, conditions requires a willingness on the part of all parties to co-operate and compromise where necessary. An antagonistic approach will serve neither the purposes of the park nor the needs of petroleum exploration.

Finally, the direct ecological effects of petroleum exploration are relatively slight and transient in most cases (at least, on present evidence) because of the resilience of most desert landscapes. Impacts which have the potential to bring about permanent changes are largely aesthetic, for example, in the case of tracks cut through and marring the surfaces of playa lakes, or arising as a consequence of subsequent, non-exploration use of facilities such as tracks or bores.

These considerations should not be taken to imply that the conservation function of the park must always be subordinated to development interest, or that planning should provide for oil exploration at the expense of other issues. Rather, the conflicts arising between conservation and exploration need compromise solutions which, as with all compromises, may not be totally satisfactory for either of the main interests involved.

Nature and Efficacy of Environmental Controls within the Park

The 1974 proclamation lays down conditions governing rights of entry and prospecting which, though potentially stringent, are generalised. More detailed directions and conditions are applied in the granting of approval for exploration companies' annual programmes of works. The specific environmental control directives vary from programme to programme (see Part 1: Petroleum Exploration), but the primary conditions generally have been minimum-depth track-cutting; windrow flattening within 500 metres of the main access routes; general clean-up provisions; directives to minimise the proliferation of the longer-lasting clayed roads; ways in which dunes are to be crossed; and avoidance of playa lake crossings and ground recontouring where needed (for example at well sites).

Conditions for petroleum exploration in the Simpson Desert National Park (Queensland) are similar but in some regards more stringent, particularly in a requirement for windrows to be flattened and tracks to be disguised over their whole length. However, the Queensland conditions have not been fully tested in practice as exploration efforts within the National Park have been slight, compared with those in South Australia. Nevertheless, the Queensland National Parks and Wildlife Service has agreed to co-operate with the South Australian Service in tightening up the conditions attached to petroleum exploration, by providing for obliteration of seismic lines and tracks where these cut across designated routes, and by ensuring closer attention to rehabilitation, elimination of windrows, control of additional clayed dune crossings and clear signposting of major roads.

The aims of the conditions have been to facilitate natural regeneration of exploration areas by minimising disturbance during construction and immediate use, and limiting the chance of subsequent use by park visitors; and to retain as far as possible the option of eventual return of the park area to wilderness (by the general clean-up provisions as well as more rapid regeneration).

There has been a steady increase in operators' compliance with the conditions over the last five years, particularly on the part of the major operator (Delhi Petroleum Pty Ltd). There have also been numerous examples of non-compliance, especially in the case of operators in the Northern Territory segment of the desert seeking access through the park. The most recent major example (1981) resulted, among other things, in unnecessary and undue scarring of the surfaces of salt lakes, the effects of which may be permanent unless active rehabilitation treatment is applied.

Among other possibilities, non-compliance may result from specific conditions being imposed which cannot be met in practice; from misunderstanding of the conditions or the reasons behind the conditions; lack of, or slow, communication between petroleum explorer and government authority; intentional disregard of the conditions; or plain negligence. The first three possibilities are best avoided by good communication and co-ordination between petroleum explorer and the department, as has increasingly been the case with the main operator in the area. To demonstrate that this is more than wishful thinking, it should be noted that the possibility of returning much of the present park area to wilderness has been retained largely by such communication and co-ordination. The main east-west access lies largely outside the present park boundaries, not because it was the optimum route for purposes of petroleum exploration, but because it was seen by both exploration groups and conservation authorities to be a reasonable compromise by providing an access without bisecting the park area. Another example of compromise is given by the introduction of a light vehicle for seismic recording on lake-beds, thus avoiding the need for track construction in a situation where damage may be long-lasting.

The present conditions, guide-lines and administrative procedures for environmental protection, involving both continuous communication and some compromise with the main operators, have resulted in petroleum exploration impacts within the park being minimised and have increased the likelihood of a return to wilderness conditions at the cessation of exploration. Their effect is perhaps best demonstrated by comparing areas in the park with areas of the desert outside the park. Outside the park, there has been no basis for environmental protection beyond relatively loose conditions under the various mining and petroleum Acts, and conditions have been more in the line of advisory guide-lines rather than mandatory requirements. The result has been a much higher degree of direct damage and general untidiness which is readily apparent even to casual visitors to the area.

Negligence or intentional disregard of conditions are more difficult to deal with than other causes of non-compliance because of the apparent lack of penalty (short of complete loss of rights) either for breach of regulation or failure to reinstate damaged areas when requested to do so. Part of the answer may lie in increasing the level of monitoring and patrolling (discussed below) so that intentional or negligent breaches can be detected and stopped in order to minimise significant damage.

Alterations to Environmental Controls

The evolving environmental safeguards, administrative and exploration procedures are proving satisfactory on the whole; more so in recent years with increased understanding between exploration groups and conservation authorities. Because the safeguards are evolving, however, changes must be expected from time to time. Also, the conditions applied need to be allowed some flexibility in order to deal appropriately with the special requirements of individual exploration surveys. Accordingly, this management plan should not attempt to lay down particular and specific requirements. Rather, the general conditions which have been applied should be more flexible in future operations.

First, the environmental protection conditions applied to petroleum exploration within the present park should be extended to apply throughout any new park area resulting from the proposed extensions, but cannot reasonably be made retrospective. Conditions should also aim to ensure that landscapes likely to bear evidence of exploration well into the future are more stringently avoided than they have been in the past. This is in keeping with retention of the wilderness option, and means avoiding almost entirely the salt lakes in the area. Points of particular biological, Aboriginal or past exploration significance may be identified in the future and where found, or are currently known to exist, petroleum exploration operations should be directed away from them.

In view of the provisions for public use elsewhere in this plan, rehabilitation of exploration works should aim to avoid increasing the degree of public penetration of areas not zoned for visitor use, and also to avoid lowering the level of public safety in visitor use areas. This has particular relevance to the treatment of seismic tracks and supply roads. We do not propose, for example, to increase the stringency of windrow flattening requirements to the level required in Queensland, at least not on ecological grounds, for these are insufficient to warrant the very much increased expenditure entailed. However, some increase in the requirement is necessary for public safety. The intent of the present requirement (500 metres flattening each side of junctions with main access on north-south seismic lines and flattening to the nearest dunes on east-west lines) has been to reduce the possibility of visitors using the track windrows as a guide to access. Current evidence suggests that this purpose is being at least partly defeated by visitors who search up swales until they find the unflattened windrows and then proceed along the abandoned track. Flattening windrows for a greater distance than is presently required should make such a search less profitable, and so reduce the use of abandoned tracks thus assisting both the natural regeneration and the public safety within the area. The ideal would certainly be the Queensland complete-removal requirement. Failing this, an extension of the length over which windrows are to be flattened should be included in conditions of future seismic survey.

Similarly, clayed rig roads, other than those indicated as visitor access routes, should be obliterated along their length to reduce the penetration of the Natural Area Zones by visitors. Otherwise, these roads would be the most permanent relic of petroleum exploration both by their persistence in the landscape and their possible public use. Again, communication between exploration groups and the department has advantages for park management, particularly if some compromise is allowed. The present planning does provide for this. The interests of both parties may be better served by abandoning the older, in favour of newer access where

the newer, access routes are planned in consultation with both exploration groups and the department.

Repeated surveys over the same area should not occur within the park unless there has been a clear and demonstrable increase in the available technology. The present exploration programmes are expected to continue for some years, and it may be found that there are no oil, gas or hydrocarbon traces. In such a case, exploration would be expected to cease, and park areas allowed to return to wilderness as laid down in this plan. It would negate the main purpose of much of this plan if the cycle was then repeated with a new exploration effort, using the same technology as that presently in use over ground which has been proven barren. Such situations have risen elsewhere in Australia in the past, particularly in the course of mining investment booms.

Oil-Field Development

Although recognising and providing for the possibility of a future commercial oil-field development within the park, this plan can do no more than establish the general park management purposes which should be considered in such an event. These are outlined in Part 2: Management Objectives.

Any oil-field development will inevitably necessitate a complete revision of park management, and the detail of changes should be the subject of a new management plan.

Debris and Damage outside the Park

The lack of formal or effective environmental controls on areas outside present park boundaries has led to lower environmental standards being applied to areas now within the proposed park extensions. For example, track windrows are often pronounced and track cuts deep, untidy borrow-pits and assorted debris remain, and old well sites are often obvious.

Both departmental inspections and comments from private visitors agree that in most cases, the more recent exploration activities have had a higher degree of cleanliness than in the past with less rubbish being left, but that other aspects are still not satisfactory. For example, little has been done to obscure abandoned tracks, with adverse consequences both for public safety and for public movement.

The National Parks and Wildlife Service does not have the resources to clean up the proposed park extensions, except perhaps as a very long-term objective. Further, exploration groups cannot reasonably be expected to re-enter an abandoned survey area purely for clean-up purposes when the state in which the area was left was acceptable at the time of abandonment. The most that can reasonably be required is that renewed activity in a former survey area (for example, the maintenance or upgrading of rig access or the sinking of an exploratory well) should have rehabilitation of former works as an additional environmental control.

Debris from past seismic surveys and well drilling outside the present park but within proposed park extensions, is thus expected to remain except where further exploration activities will permit its economic removal. As the presence of the debris would otherwise reflect badly and undeservedly on park management, the reasons for its presence should be outlined in park interpretive material.

Monitoring Effects of Petroleum Exploration

LANDSAT imagery has the most potential for rapidly and economically detecting impacts of exploration on a regional scale. This use of LANDSAT imagery has been regarded with some doubt in the past because the degree of resolution is insufficient to always show track developments. Properly-constructed seismic tracks, for example, are not a sufficiently wide landscape feature to return a definite "signature" (unambiguous identifiable response) in the imagery. That is, the tracks are just below the threshold of detection. However, this is a positive advantage in the handling of monitoring data. With regard to biological conservation purposes within the park, the main concern with tracks are that they be constructed with minimum disturbance, and that they do not trigger more extensive erosional processes. In cases where a track is not constructed with "good housekeeping" in mind, or where erosion commences as a result of the track, the area of disturbed ground will be greater than that of a properly constructed track and will cross the threshold into the detection capabilities of LANDSAT imagery. More use should be made of the LANDSAT facility for such detection purposes than has been the case in the past.

Formal aerial photography involving an aircraft-mounted large-frame camera and flight-path/altitude control, has not been used as a monitoring tool to date, although informal aerial photographs have occasionally been used in supporting field inspection reports. Aerial photography has the advantage of returning finer and more immediately interpretable detail than is possible with LANDSAT, although the expense involved is far greater. Three possible applications should be considered:

1. A routine sampling (spot check) of areas of petroleum exploration activity.

2. Monitoring the success of regeneration of track and other disturbance.

3. Confirming excessive damage or accelerated erosion problems detected by LANDSAT.

Neither the use of LANDSAT nor of aerial photography removes the need for ground inspection, although the remote-sensing techniques should increase the efficiency and effectiveness of ground inspection which, however, cannot hope to provide a completely objective or sufficiently representative means of impact monitoring because of the area involved and economic limitations. Rather, it should provide a confirmatory appraisal of the success or otherwise of the environmental controls.

Standard National Parks and Wildlife Service photographic monitoring points should also be employed with discretion because of their dependence on ground inspection. Their best use would be in the provision of illustrative samples of developing, or regenerating, exploration works as a support to the remote-sensing techniques. They could also be used in a temporary but detailed watch on major development such as exploratory wells or survey camp areas.

Monitoring exploration impacts and policing environmental controls are not matters for the National Parks and Wildlife Service alone, as similar monitoring or policing is needed outside park areas as well. The development and implementation of monitoring and control programmes should continue to be a matter for the department in general, and not restricted to a specific division within it.

Park Development and Petroleum Exploration

Given the nexus between the park management objectives, park visitor usage and petroleum exploration, co-ordination between park development and petroleum exploration activities is essential. This is particularly so in preventing the proliferation of major park access routes. For example, this plan provides for alteration of main access routes in the event of

construction of additional clayed roads. Such a development has the potential to proceed to the benefit of all parties, provided each group communicates its needs before the development starts. In the past, the absence of a formal park management plan has meant that park purposes have been largely undefined, and problems have only become apparent after the development has occurred.

Other Petroleum Exploration Inputs to Park Management

Petroleum exploration has the potential to enhance our biological and cultural knowledge of the desert because of the area covered intensively in a seismic survey. There is particular potential for the identification of unusual landscape or biological features and possible heritage sites. Such a source of information should not be ignored, but the information can be forthcoming only if some indication is given to exploration groups regarding what should be watched for; why it should be watched for; how it can be recognised; and how it should be documented.

Sporadic recommendations have been made from time to time towards co-operation, with this aim in view, but have rarely been actively pursued. The National Parks and Wildlife Service and other arms of the department should derive a programme in consultation with the main operators to aid biological and heritage inventory within the park area. As a minimum effort, exploration groups should be provided with interpretive material outlining the level of inventories to date and the gaps in present knowledge.

NATIVE FLORA AND FAUNA

Considerable gaps exist in our knowledge of the fauna, and to a lesser extent, the flora of the park. The remoteness and the apparent large-scale homogeneity of the environmental associations within the desert have both contributed to this problem. In particular, the apparent absence of sites of particular biological significance may stem from our ignorance of the desert flora and fauna.

Research and management priorities elsewhere within the South Australian reserve system are such that only moderate efforts towards increasing our knowledge of the area can be justified within the National Parks and Wildlife Service.

Ranger patrols and occasional technical staff visits to the park should provide opportunities for increasing the completeness of plant and animal species inventories. More detailed information should come from the proposed monitoring (see below). Efforts on the part of bodies other than the National Parks and Wildlife Service should be actively encouraged and materially aided when possible. The existing information has come from a range of observers, professional and amateur, acting individually, or as part of an institutional research effort; as part of recreation or professional work; or even in search of profit. No potential source of information should be ignored.

Two needs require special mention; because there is little information on the mammals within the park, a mammal survey should be conducted as a matter of priority and any programmes for flora and fauna surveys should have as a subsidiary aim, the detection and documentation of any areas of special biological significance.

ECOLOGICAL MONITORING

Monitoring of ecosystem behaviour and response is desirable at several levels. The impacts of exploration activities are presently under scrutiny as part of the environmental controls applied by the Department of Environment and Planning. Three methods are now in operation: use of LANDSAT imagery; detailed observation by ground-level photography (National Parks and Wildlife Service photopoints); and by inspection tours. This scrutiny should continue, but particular attention should be paid to the examination of regeneration following abandonment of seismic tracks. The present level of monitoring has not been sufficiently rigorous to be quite certain that the desert ecosystems will, in fact, completely recover from the present disturbance, although the available evidence most strongly indicates this to be the case.

A watch should also be kept on the background dynamics of the desert flora and fauna. There appear to have been marked changes over the last decade, particularly the great increase in shrub density, following major wildfires, but there is no real documentation of the extent or significance of these changes. Application of LANDSAT imagery, supported by limited ground observation from time to time, would be the most economic means of maintaining a watch on major changes, particularly those relating to wildfires. We would emphasise that little is known of the way desert ecosystems function.

Monitoring the faunal populations, including feral animals, should be carried out in conjunction with routine ranger patrols. A number of species deserve particular attention: the level of the Australian Bustard population because of the species' vulnerability to shooters; and the two ferals, the rabbit and the camel.

PLANT AND VERTEBRATE PESTS, ALIEN SPECIES

Some redistribution of plant species within the region, and the introduction of alien and pest plant species are inevitable with vehicle movement in the desert, particularly with the use of tracked vehicles. Only a few of the aliens introduced are likely to establish, however, because of the aridity of the area, and those that do, will tend to establish along tracks (and during the more favourable runs of seasons).

Manpower constraints will not permit a weed-control programme. However, rates of establishment of woody weeds along tracks may be sufficiently slow enough to allow a degree of control, at least on main access routes, by occasional direct removal during ranger patrols. In particular, a watch should be kept to forestall establishment of species such as mesquite.

Intentional importation of alien plants should be strictly prohibited. Park visitors are unlikely to be carrying potted plants with them, but in the event of an oil-field or other development requiring a semi-permanent construction camp, pressures favouring the introduction of alien species will appear.

Rabbits are recognised at present to be a major management problem within the park. A solution to this problem is beyond the capabilities of the National Parks and Wildlife Service, given the extent of the park, its remoteness and priorities for management, and expenditure in more critical areas of the State's reserve system. Indeed, it would seem that a solution to the rabbit problem in most of arid Australia is beyond the capabilities of any one organisation or authority. Until a rabbit control method is devised which can be applied cheaply and effectively over large areas, attempts at control within the park will simply be a waste of public money. Research into effective control methods should, therefore, be encouraged.

Care should be taken to avoid any development or activity which might aid the maintenance of rabbit populations during drought periods. For example, artificial open waters should not be established in the

park. No further wells should be finished as flowing bores. Potential water sources include the borrow-pits associated with clayed road construction, although such sources are temporary.

The impact of the camel is not known. Both camel and rabbit numbers should be regularly monitored, at least at the level of recording sightings along the main east-west access during patrols (relative density estimate).

The distribution and behaviour of the cat in the Simpson Desert is also poorly known. If it is demonstrated that this species is a major threat to small mammal populations, additional research should be undertaken to determine possible control techniques.

ABORIGINAL AND HISTORIC RELICS

Almost nothing is currently recorded with certainty of Aboriginal relics and sites of Aboriginal significance within the park although they must exist. An inventory of sites and relics is needed, particularly to avoid park development and use resulting in destruction or damage to heritage items through ignorance of their existence.

Relics of European exploration are better documented, and the sites of most relics within the park and the proposed park extensions are known. However, there are exceptions; for example, the explorer Lindsay marked more than one tree during his desert explorations, but only the site of one has been found. There is, therefore, also a need for some further search and inventory of exploration relics.

Survey of heritage items should be on a continuing basis, incorporated, where possible, with other management activities. Routine ranger patrols, inspection of petroleum exploration works as part of environmental controls, seismic surveys, and interested park visitors all provide opportunities for the detection and recording of sites. There is, of course, a danger of inconsistencies in recording any finds or observations. Therefore, a standard method of site description and reporting should first be devised.

Direct surveys with the specific purpose of finding and recording sites are beyond the resources of the National Parks and Wildlife Service, but strong support and encouragement should be given to organisations or individuals with the appropriate expertise who wish to undertake heritage studies in the park area.

Preservation of Relics

Relics, whether of Aboriginal occupation or European exploration, should be preserved *in situ*. Australian guide-lines of the International Council on Monuments and Sites state that the moving of all, or part, of a heritage item is unacceptable unless this is the sole means of ensuring its survivial.

Two of the most significant items of European exploration have been removed from what is now the park area. These were Poeppel's Peg, from Poeppel Corner, and one of Lindsay's blazed trees. The first was removed and replaced by a modern survey marker well before the park was declared. The second was removed, with permission, in 1981 and replaced with a plaque. Both items have been preserved in Adelaide.

The two removals had as their main intent the permanent preservation of a significant heritage item. In the case of Poeppel's Peg, removal was probably the sole means of preserving it because Poeppel Corner is the main focus for park visitors, and the present corner marker bears testimony to thwarted attempts at removal. Lindsay's marked tree, however, was away from the usually travelled routes, and even if its location had been publicised it would have been unlikely to attract similar attention.

Much of the significance of such relics lies in their location. On site, they are not important so much in themselves, but rather because they are where they were put (or marked) by the people who put them there. Removed from the site, the significance of their location is lost, and the items themselves become museum pieces rather than active reminders of the past.

Some examples may illustrate this principle, which underlies the guide-lines of the International Council on Monuments and Sites. The historic significance of the Old Gum Tree, Glenelg (S.A.) rests largely in the trees remaining at the site at which the Province of South Australia was proclaimed. Away from that site, the tree would simply be a curiosity of concrete and decaying wood. An older, but equally significant exploration relic, the Explorer's Tree on the Great Western Highway, out of Sydney, would be little more than an uninspiring stump except that it remains on the original site where it was blazed during the first crossing of the Blue Mountains.

There is, therefore, an inherent contradiction in the well-intentioned removal of a significant heritage item to prevent its removal by those less well-intentioned, when with the very act of removal, the item loses most of its significance.

Accordingly, every attempt should be made to keep relics in their original position. In some instances, for example, Lindsay's other marked trees or Poeppel's mile pegs along the State border, treatment on site may be needed to reduce deterioration.

The protection of relics from disturbance, damage or removal by visitors will be best achieved by public education.

APPROPRIATE RECREATION WITHIN THE PARK

The National Parks and Wildlife Act provides generally for:

> . . . the encouragement of public use and enjoyment of reserves and education in, and a proper understanding of, their purpose and significance . . .

As interpreted in management plans published to date, public use of a conservation park is an acceptable and often desirable secondary objective, provided the use is of a nature compatible with the conservation purposes. The validity of most recreational use of the Simpson Desert Conservation Park has already been stated in Part 2: Management Philosophy.

A distinction needs to be drawn between the recreational use of the park in which the desert experience itself is the main object, and use of the park for an "event" which has little or nothing to do with the natural values of the area. We would place in the latter category activities such as cross-desert car rallies and motor cycle enduro races (of the sort now frequent in North America), or the less environmentally damaging, but related, use of the desert as a proving ground for new vehicle models or for demonstrations of trail blazing skills or even monster BMX rallies. Such recreational or promotional usages should be prohibited. Not only do they tend to be environmentally damaging and out of keeping with the primary purposes of the park, but they will also conflict with the desires of the majority of park users who are trying to escape, for a time, the very values such activities most strongly represent:

We believe that everyone should be given the opportunity to escape from the pressures of the highly commercialised, technologically based society

in which most of us live and work, by retreating to the natural areas ... where the pressures are minimal.
(Toyota Landcruiser Club of Australia (S.A.) Inc)

Vehicles will remain necessary for most recreation within the park, and a large, if somewhat uncomfortable, part of the enjoyment of a desert crossing may be the struggle between the vehicle and terrain. Within the park, however, the primary recreation should be desert-oriented not vehicle-oriented, and this criterion should be used in future assessment of acceptable recreation.

PUBLIC SAFETY

It is in the public interest to increase public safety within the park, particularly so because the National Parks and Wildlife Service incurs additional responsibility by directing visitors to particular parts of the park through the zoning provisions and related management actions. The Simpson Desert in general will remain a dangerous place for the unwary and unprepared because of its remoteness, its terrain and its aridity. No conceivable action on the part of park authorities can be expected to prevent future loss of life through foolhardiness, but measures can, and should, be taken to reduce risks born of simple misfortune or uninformed inexperience.

The primary mechanism for increasing public safety should be the education of intending and present park users into the dangers and safety precautions needed in the desert. This education should commence well before users actually enter the desert or the park.

Public Education Prior to Park Entry

Informative material should be readily available in response to preliminary enquiries made of the National Parks and Wildlife Service by intending private users. Tour operators should be provided, on an individual basis if possible, with more detailed information emphasising not only general safety aspects but also giving a code of acceptable behaviour for large groups within the park. Emphasis should be directed to tour operators, particularly in New South Wales and Queensland, who are likely to enter the desert and the park on only an occasional basis, rather than to those operating regular tours in the area. On the record to date, safety problems are unlikely to arise with the established and experienced tour operators (largely South Australian). Indeed, their experience should be drawn on in preparing advisory information for other tour operators and the public.

Information should be circulated to four-wheel-drive clubs and user groups in all mainland States. The bulk of park-users in this category appears to be from Victoria, New South Wales and South Australia, with a lesser contribution from Queensland, but groups from all mainland States have been recorded. As with tour operators, those groups which use the area regularly for recreation can assist in preparing guide-lines for the less experienced.

Intending users not associated with a tour group or a formal club can be reached to some extent via the magazines aimed at the recreational four-wheel-drive user. Some formal response can be given to articles which may mislead future users if, for example, incorrect access is shown in the area, or activities are promoted which are incompatible with the purposes of the park. A totally negative approach is not desirable, however, and the more positive goal of directly providing information to the magazines should be pursued.

These methods will not, however, mean that this information will reach all intending users. Advisory signs should, therefore, be erected at Marree, Oodnadatta and Birdsville (Qld), the three main centres around the park through which almost all visitors have to pass. Placement at these centres is proposed so that intending park visitors, if necessary, will still have the opportunity of increasing the adequacy of their preparation without facing the possibility of abandoning their visit or entering the desert inadequately prepared. Because of their past experience with people moving through the area the, co-operation of the police at Birdsville should be sought in developing public information materials and procedures.

Safety within the Park

The main safety provisions within the park should be advisory signs, route markings and some provision of emergency water.

Advisory signs are needed at park entries and significant junctions. A supply of leaflets duplicating the information on the signs should be kept at the signs. At a minimum this information must include:

1. The locations of park access routes and exits.
2. The manner in which access routes are marked.
3. The location of emergency water supplies.
4. What to do in an emergency.

Route markers should be used to set bearings for vehicles on straight sections of park traverses, and to guide visitors through route direction changes and intersections with temporary petroleum exploration tracks. Route markers should not be elaborate. Apart from the expense and difficulty in undertaking elaborate works over the very large area involved, this would be out of keeping with the character of the area and the expectations and desires of visitors. For example, star posts, suitably distinguished from seismic pegs by painting or numbering, would serve adequately as route markers without detracting too greatly from the park's wilderness attributes sought by visitors.

Emergency water supplies should be established at intervals within the Visitor Access Zone. Sealed, clearly identified, simple containers such as "44-gallon drums" would be appropriate. Alternatives, such as rainsheds and tanks, are more prone to damage and evaporative water loss, as well as being more capital and labour intensive to set up, maintain, and shift (when necessary). While the water in the supplies should, of course, be drinkable, it should be of lower quality than rainwater, and this quality should be stated, to guard against use of the water in other than genuine emergency situations.

Notification of Park Entry

Permit systems for entry to the park are proposed from time to time to improve public safety. Two major problems arise, however. First, a formal permitting system would not be enforceable without undue expenditure on staff. Secondly, permitting would carry with it a suggestion, not necessarily warranted, of attempting to discourage visitor use of the park.

Nevertheless, some form of entry and intended travel record would aid in not only recording visitor usage patterns, but also materially assist future search and rescue operations. Points for lodgement of such "safety notes" and subsequent reporting could be the three main regional centres of Oodnadatta, Marree and Birdsville, the main starting and finishing points for visitors. As many intending park users, particularly those from interstate, may be unaware of the existence of the park, there would be no point in requiring lodgement of a safety note through the Adelaide or regional offices. Possible arrangements for notifications would be made with police, post offices or publicans at the three centres.

The Queensland National Parks and Wildlife Service also favours some form of recording entries and movements and as well, such a system provides an excellent opportunity for a questionnaire-type survey and consequent accumulation of resource and management information relating to the park.

Search and Rescue

A contingency plan for search-and-rescue operations should be devised in consultation with the South Australian, Queensland and Northern Territory police forces. Existing airstrips within the park should be specifically excluded from the rehabilitation measures required of petroleum exploration because of their potential use in the event of a search-and-rescue operation.

LOCATION AND STANDARDS OF PARK DEVELOPMENTS

Developments proposed are summarised in Figure 14. The location of signs at park entries and main access junctions are shown. Two additional signs are suggested outside the park and its proposed extensions; one on the junction of the Birdsville Track and the main east-west access, and one to guide visitors through the intersection south of the Kuncherinna well site. The three signs of most importance for public safety lie outside the present park boundaries. In the event of the park extension objectives not being met, these signs should still be placed.

Metal is preferred for the signs because of its ease of transport and installation and for the amount of information that can be provided on a relatively small sign. Plain, metal signs are also considered less out of place, as well as far easier to handle, than the standard routed wood signs used elsewhere in the park system.

Route markers should be installed along the main southernmost east-west access and along the north-south route to Poeppel Corner. Field staff should select the most appropriate of the several alternative routes to the corner within the Visitor Access Zone, and should determine the parts of the main east-west access most in need of marking.

Installation of route markers, and to a lesser extent their maintenance, will require considerable effort on the part of the National Parks and Wildlife Service. If park extension objectives are not achieved, route marking should, therefore, be applied only within the existing park boundary.

The northerly west-east route (the French Track) has been benchmarked by the South Australian Lands Department. Development of this route, in keeping with its purpose as a "rough" access, should be limited to advisory signs at its endpoints (north of Mokari airstrip and well site, and near Poeppel Corner) which clearly warn of the route's difficulty and inherent dangers.

Local details of route markings and the placement of emergency water supplies within the Visitor Access Zone should be determined by field staff. Routes should be diverted where necessary to avoid crossing salt lakes, but otherwise route selection criteria should be similar to that for petroleum exploration tracks.

PARK INTERPRETATION

Within the South Australian reserve system, priority in the preparation of interpretive material must necessarily be given to the parks with much higher levels of use than the Simpson Desert Conservation Park. Accordingly, no formal interpretive programme is proposed for the park at this stage. Nevertheless, its protection from visitor damage can be provided effectively only through increased public education and awareness of the park's purposes and its particular attributes.

Many of the measures proposed to enhance public safety lend themselves equally to park interpretation. Interpretive material should be included with the safety information, even if it is limited to a brief statement of the park's purposes and major values.

LEVELS OF VISITOR USE

Information on park usage in Part 1 of this plan has been assembled from a number of sources of varying reliability. Deficiencies in the information are apparent. The actual level of usage is not known, and estimates of the total visitor numbers range from twice, to five times, the number actually recorded.

A better accounting of visitor usage is needed; at least in order to judge the efficacy of management actions associated with visitor use. The accounting need not be by conventional user surveys used in parks with higher rates of use. The expense and effort involved is neither justifiable nor necessary at present. Possible means for gathering the information include the "safety notes" proposed or the formalisation of the Poeppel Corner visitor book.

Visitor levels are, of course, low by comparison with many less remote parks, and there is little doubt that the park could absorb a much higher rate of usage without seriously prejudicing its conservation functions. There is, of course, a limit to usage beyond which the remote-area experience sought by visitors cannot be achieved because there are too many other visitors, and beyond which degradation of park landscapes may occur through overuse. However, the physical difficulties of movement within the park, together with the remoteness of the park from major population centres, should prevent this limit being reached in the near future, and accordingly, no restriction should be applied to visitor numbers.

FIRE

Naturally occurring wildfires are apparently uncommon within the Simpson Desert, but are nevertheless an integral factor in determining the dynamics and distribution of desert species. As a natural process, wildfire should be unhindered within the park. Such a course of action is unlikely to endanger either human life or property because of the "fire-break" influence of the individual sandridges and that the park will be largely surrounded by vacant land.

It is not desirable to have an increased frequency of wildfires resulting from visitor use or exploration activities. As with many other problems relating to human activity within the park, the remoteness and extent of the area make direct actions impractical in guarding against accidental fires. Again, the most productive means of protection is through public education.

STAFFING

The levels of visitor use and the potential for damage to the park by visitors are not sufficient enough to justify more than occasional ranger patrols within the park. Also, the developments proposed for the park are low-key and capable of installation and maintenance with only small manpower expenditure.

Patrols should, however, be more frequent than has been the case. The purpose of patrols should be to maintain safety installations and to undertake the continuing survey and monitoring functions already outlined.

Occasional patrolling may not prove sufficient to dissuade acts of intentional vandalism. The possibility of wilful damage would, however, seem slight. The very considerable effort needed to get into the park and the particular desire for remote-area, or wilderness experience which largely stimulates the effort, are not usually associated with a desire for wilful damage.

There is still a chance of vandalism, however, which may be reduced if policing of the area can be increased in some way other than a direct increase in the level of staffing. The possibility should, therefore, be considered of appointing additional wardens under the National Parks and Wildlife Act on an honorary basis. Such wardens need not possess all powers of wardens as currently specified in the Act, and those powers they have should only be exercisable in the park. A number of administrative and legal problems are associated with such a proposal, particularly in defining areas of responsibility and accountability. At present, there is no objective evidence that such appointments would increase the level of park protection; nevertheless, this possibility should not be discounted out of hand.

Part 4:

Management Actions

INTRODUCTION

The following account provides a summary and ranking of the specific management actions which result from the park planning objectives and the management considerations given in the preceding two parts of this management plan. In a number of cases, park management objectives cannot be met by a specific management action. For example, the encouragement of research within the region requires, first of all, groups or individuals interested in performing the research. Specific management actions in response will depend largely on the particular research topic and the capabilities of the individual or group which will perform the research. Accordingly, there is a great variety of possible management actions in keeping with the intent of the objective, and it would be pointless to attempt to define a management action for each possible situation. The actions indicated are largely those for which concrete measures are required rather than establishment of a policy to guide future actions.

The following table provides page references to the major discussion sections of the plan for each of the proposed management actions.

ACTION	PRIORITY	PAGE
BOUNDARIES		
Move the western park boundary to coincide with the present eastern boundaries of the Dalhousie and Purni pastoral leases, and move the southern park boundary to latitude 26° 45′ South.	High, immediate	77
Resume those portions of the Dalhousie and Purni pastoral leases East of longitude 136° East and north of latitude 26° 45′ South, and add the area to the park.	Low	77
ZONING		
Establish special purpose zones for protection of heritage sites or sites of particular biological signficance as information justifying establishment comes to hand.	Low continuing	78
Modify zoning for visitor access within the guide-lines of the management plan in the event of major changes in petroleum exploration patterns.	Low, continuing	78
PETROLEUM EXPLORATION CONTROLS		
Upgrade environmental protection conditions relating to the avoidance of sensitive landscapes and the rehabilitation of former access.	Moderate	81
Maintain existing administrative approaches to environmental controls on petroleum exploration but increase the level of surveillance applied, particularly by increased use of remote-sensing facilities.	Moderate	83
ECOLOGICAL SURVEY		
Undertake an initial mammal survey within the park.	Moderate	84
Survey for areas of particular ecological significance within the park.	Low, continuing	84
Complete and maintain plant and animal species inventories for the park.	Low, continuing	84
Provide for the possible assistance of petroleum exploration groups in contributing to the maintenance of inventories and the detection of areas of particular ecological significance or value within the park.	Moderate continuing	84
ECOLOGICAL MONITORING		
Develop and apply methodologies for rigorous and objective monitoring of petroleum exploration impacts and rehabilitation.	Moderate, continuing	84
Design and install ecological monitoring points for purposes of increasing the information on desert ecosystem dynamics and checking the impacts of park management particularly in relation to visitor use.	Moderate, continuing	84
Increase the use of remotesensing facilities for following regional changes in vegetation due to fire.	Low, continuing	84
Monitor rabbit, cat and camel populations within the park.	Low, continuing	84
Maintain a watch in the course of routine patrols for alien plant invasions, particularly of woody weeds.	Low, continuing	84

ACTION	PRIORITY	PAGE
CULTURAL HERITAGE		
Devise a standard system for the documentation of sites or objects of heritage significance (Aboriginal, European exploration).	Moderate	85
Survey for sites of heritage significance within the park and increase co-operation with exploration groups with a view to assisting heritage inventory.	Moderate, ongoing	85
Establish appropriate site or relic conservation and preservation procedures.	Moderate	85
VISITOR USE, PUBLIC SAFETY AND PARK INTERPRETATION		
Erect informative and advisory signs at desert entries, key access track junctions, and at the regional centres, Marree, Oodnadatta and Birdsville.	High	86
Produce advisory leaflets clearly showing park and associated desert access routes, the means by which these are identified and the location of any emergency facilities. Explain clearly and concisely the problems, dangers and requirements of a desert crossing.	High	86
Provide means or facilities for getting the leaflet to intending users at each park entry and at Birdsville, Marree and Oodnadatta.	High	86
Install route markings and signpost the southern east-west access.	High	87
Select and mark the most suitable route through the north-south access corridor to Poeppel Corner.	High	87
In consultation with the Queensland National Parks and Wildlife Service, arrange for identification of access from Poeppel Corner to Birdsville.	High	87
Disseminate park information aimed at upgrading public safety to potential users, particularly tour operators and four-wheel-drive clubs, by direct contact and by media release.	Moderate, continuing	87
Establish a system of entry and intended travel notifications, with facilities for lodgement at Marree, Oodnadatta and Birdsville.	Moderate	87
Develop policies and contingency plans for search-and-rescue operations.	Moderate	87
Develop interpretive leaflets outlining the purpose of the park and its particular values, acceptable behaviour within the park, and generally describing points of significance.	Moderate	87
Obliterate the entire length of clayed roads no longer in use for petroleum exploration within the park other than those selected for visitor access, in order to reduce the dangers of inexperienced travellers becoming disoriented and to reduce vehicle penetration of the Natural Area Zone.	Moderate	83
Provide and maintain emergency water supplies at intervals along the main east-west and north-south accesses.	Low, continuing	87
Formalise existing means for monitoring visitor use.	Low	86
STAFFING		
Institute regular ranger patrols of the park which are planned to incorporate the maintenance of safety developments, inventory and monitoring requirements, as well as increasing the level of visible presence.	High	87

PRESENTATION TO

SOUTH AUSTRALIAN

DEPARTMENT OF MINES & ENERGY

5th February 1981

COOPER BASIN ENVIRONMENTAL MANAGEMENT PROGRAMME

WP 1574A

COOPER BASIN ENVIRONMENTAL MANAGEMENT PROGRAMME

This programme is carried out by the Environmental Affairs Section, SANTOS Ltd., and is aimed at providing the company and interested Government authorities with environmental data which enables the company and the authorities to evaluate the nature and extent of impact of the oil and gas related activities in the Cooper Basin lease areas.

ECOLOGICAL OVERVIEW

The purpose of this section is to place in perspective the imposition and impact of the project on its desert host environment. The theme is that, while the project has a series of individual environmental effects, to be described and investigated, the stress that it imparts overall is very small when compared with the violent natural fluctuations of a desert climate, and the devastation of European settlement. To recognise these unassailable facts is not to dismiss the environmental effects of the project as insignificant; but it is a realistic basis for understanding and hence managing in a responsible manner the localised impacts of the development.

Physical Components

The landscape and biota of the Cooper Basin have evolved over a long period of sustained aridity, and share similar features with other Australian deserts.

The Cooper Basin project area lies within the lowest, most variable and drought-prone rainfall regime in inland Australia. Rainfall is temporally and spatially extremely variable. The landforms themselves are principally erosional and water has played the major role in structuring the topography and soils of the region (Jessup and Norris, 1979).

A combination of low surface gradients and low rainfall has produced poorly defined drainage systems. Almost all surface drainage is by sheet flow when the soil is saturated or when rainfall is very heavy (Goodspeed and Winkworth, 1978). Runoff/runon systems exist at all scales ranging from microtopographic (scalds and depressions) to regional (Lake Eyre drainage basin and salina) (Perry, 1973). These are a significant feature of the sandy and stony deserts and contrast with the narrow riverine corridor of Strzelecki Creek and of Cooper Creek, which provides the only naturally occurring permanent and semi-permanent surface water.

Living Components

Before European settlement, there existed a diverse flora and fauna comprised of both endemic and widespread forms, grouped in distinct communities. There is a distinctive Eremaean (central arid zone) assemblage which is interrupted along the creeks by a more widely distributed group of riverine species with northern and southern affinities. In addition to the residents are nomadic and migratory animals, particularly birds.

The numerous species of the desert habitats show adaptations to the environmental stresses of low nutrient and/or saline soils; aridity and periodic flooding. In plants these adaptations include facultative loss of leaves in adverse conditions, excellent regenerative capacity, specially shaped or coated leaves, the production of copious volumes of seed, and seeds with coats impervious to all but extreme trauma, such as flooding, abrasion or fire. Similarly, some animals have methods of survival in dry and unpredictable environments, such as physiological and behavioural mechanisms for avoiding heat stress and water loss, opportunistic breeding and periodic population irruptions.

Numerous examples exist among individual plants and animals to illustrate their various strategies for survival, and their ability to regenerate as individuals and populations. But perhaps the most graphic and general manifestation lies in a simple comparison of the desert landscape around the Moomba plant. Plate 1.1 shows the effects of a prolonged sequence of dry years, and Plate 1.2 the results of the drought-breaking floods of 1974 .

At first glance, the ability of the diverse range of plants and animals to withstand their harsh conditions and extreme water cycles makes them appear almost invulnerable to outside effects.

But, in evolving to desert life, species became highly specialised, and highly interdependent, an inevitable adaptation in relatively unproductive country. It is that specialisation which places desert ecosystems in the fragile balance for which they are well known; and in the biogeographically isolated continent of Australia, this balance is particularly vulnerable to the addition of new elements.

European Settlement and present Environmental Status

The arrival of Euorpean settlers in the last century, with their agricultural industries and introduced plants and animals, began a period of severe change in the Australian environment, which continues to this day. Inevitably, it has been the specialised and vulnerable plants and animals of the desert that have suffered, and in the project area, pastoral land use and the ravages of feral species have left an apparently irreversible effect. The formerly rich diversity and cyclical abundance of native species has been greatly reduced, and many surviving populations, especially of animals, are local remnants of formerly widespread distributions. Other native species have not been sighted in the area for many years and their status is unknown.

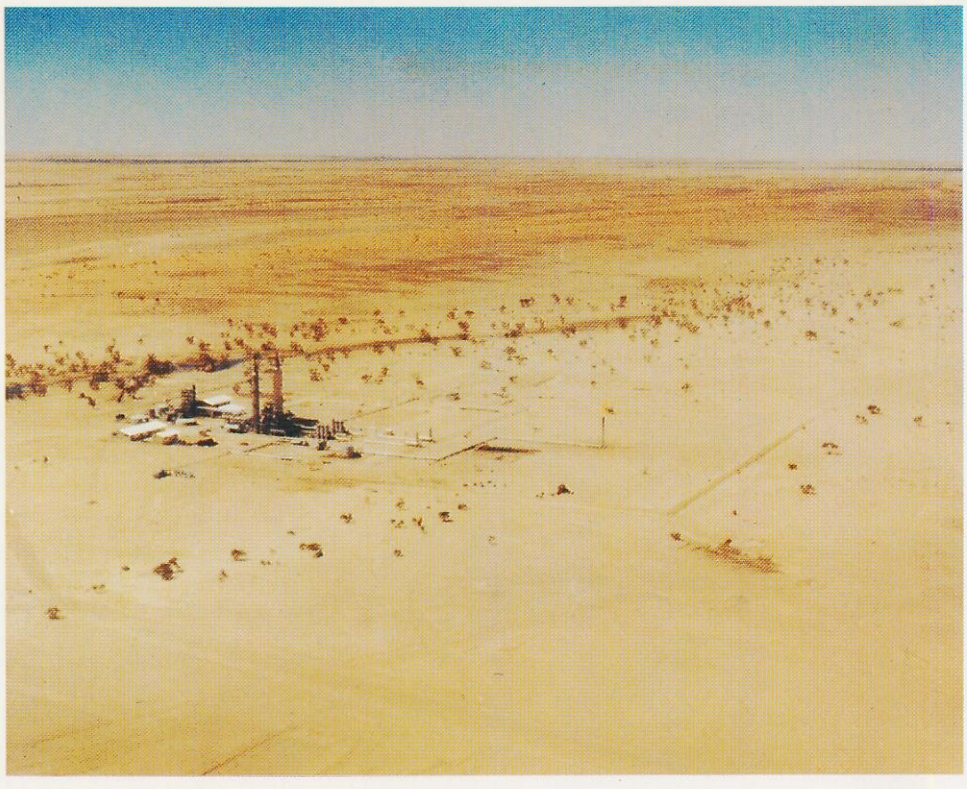


PLATE 1·1

Moomba environs (August 1970)

PLATE 1·2

Moomba environs (January 1980)

PLATE 13

Satellite Photograph of Cooper Basin Area. (6 February 1974).

PLATE 14

Aerial Photograph of Della Field and
Satellite Station (April 1980)

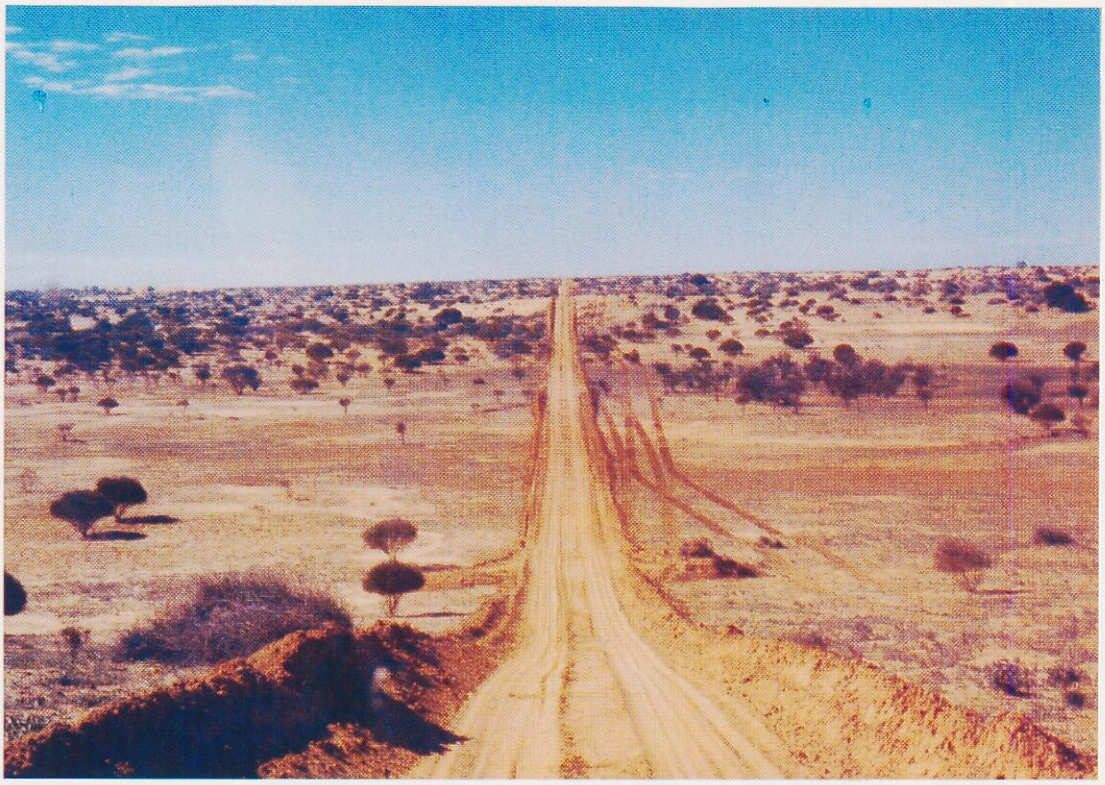


PLATE 1·5

Seismic line in the Gidgealpa field
(graded and photographed, May 1980)

PLATE 1·6

Revegetated seismic line in the Gidgealpa field
(graded, 1969: photographed May 1980)

The effects of disturbance are also evident among land forms, with accelerated erosion due to loss of vegetation and scalding, and the silting of drainage channels.

While the most dramatic changes to the environment were manifest about forty to fifty years ago, recent monitoring of the abundance and status of plant species suggests that deterioration is continuing but at a slower rate. The long-term implications of such modifications on the ecological integrity and stability of the region may take many years to become apparent.

Ecological Perspective

The effects of the project need to be seen against the violent natural fluctuations in the desert water cycle, to which the indigenous biota were adapted, and against the historical ravages of rabbits, mice, goats, pigs, donkeys, cats, camels, brumbies and foxes, to which they were not.

In this context, the localised and short term disturbances to small areas of land in a vast landscape does not assume regional or fundamental ecological significance. Or, to put it another way, the effects of the project are slight perturbations in a vast area dominated by long term climatic factors, pastoral land use and the effects of feral species.

This judgement has been made, because the project will still have effects which are not merely the subject of predictions in this report, but also of a continuing programme of monitoring and management. An appreciation of the current status of the envitonment is considered to be the only realistic basis for assessing, monitoring and managing the consequences of the development.

MONITORING AND MANAGEMENT

The effects of the various components of the project have been predicted on the basis of theoretical calculations, circumstantial factors and case study experience. From the engineering viewpoint, adherence to standard industry codes of practice for design, operation and contingency planning is seen to be a satisfactory basis for maintaining beneficial environmental features and functions overall, with disturbances restricted to those of a localised or termporary nature. Similarly the environmental management principles are expected to prove satisfactory in practice.

Continuity in this regard is ensured by an environmental section within the operating company, with a permanent, professional environmental co-ordinator. Subsequent stages in the environmental planning process are outlined below:

Design, Construction and Operation Guidelines

The APEA Code of Environmental Practice covers in general terms appropriate procedures for activities associated with the petroleum industry. Particular attention is to be given to the following areas:

- A study to produce guidelines for the recognition and conservation of sites of archaeological or historical significance.

- A study of accommodation redevelopment options at Moomba, in the light of environmental and operating factors, and public health, in particular the investigation of ground level concentrations of process waste gases.

- Contractual obligations for environmental control applicable to exploration crews and construction workers.

- Development of company policy at Moomba on: domestic pets; firearms and trapping; motorised recreation; visitors; plant security.

Monitoring

During the operation of the project, it will be necessary to monitor its effects. At this stage, the following aspects appear to warrant attention:

- Continuation of generalised environmental monitoring in the Cooper Basin, already initiated and developed through informal consultation with the State Department of Agriculture and Fisheries (Arid Zones) and with the aid of a geologist working in association with SANTOS on the National Academy of Sciences Schools Geology Project.

- Photo-monitoring points associated with seismic survey, access tracks, pipelines, drilling rigs, satellite stations and the Moomba camp are being established to furnish evidence of landform and vegetation disturbance, the rates of natural ecological trends within the project area's identifiable biogeographic sub-divisions. This information will provide the base of long-term rehabilitation measures and rationalisation of land use in the Cooper Basin project area, particularly the present informal and extensive network of roads.

- Fixed transects over major habitat types will include undisturbed control areas; quadrats will be set up to monitor vegetation regrowth rates; and special rabbit, mouse and insect proof areas will indicate the role of these animals in constraining regrowth.

- The results of the various components of the monitoring programme will either confirm that the project is operating in an environmentally acceptable manner, or not. If the latter, then the area in question must be more fully investigated and if necessary more appropriate operating standards adopted.

Abandonment

It is probable that most of the facilities to be constructed for this project will be in operation for several decades, but ultimate abandonment is inevitable.

At that time, the objective will be to restore the land surface and vegetation to a form compatible with undisturbed areas and current land use. Hardware can be either removed for salvage or buried after purging.

Disused wells are filled with concrete to prevent any movement of hydrocarbons or groundwater in accordance with the S.A. Department of Mines regulations.

The Environmental Affairs Section will, during 1981, prepare an updated review publication which will set out in detail the nature of the operations in the Cooper Basin and the Environmental Management Programme which will monitor its effects and devise ways and means of minimising adverse effects on the environment.

AS:bc
30.1.81

R.T. 30-6-81

087

AN OUTLINE OF THE SIMPSON DESERT PROJECT

Edition 1 - 26.6.81

I. PROJECT PROPOSAL:

1. Staff of the Rangelands Research Program, CSIRO Division of Land Resources Management will complete and publish a comprehensive study of the southern part of the Simpson Desert and its margins.

2. The study as a whole will be comprised of the following separate parts:

   a) A synoptic description of the lands within the desert and its margins.

   b) A classification and mapping of the lands into basic ecological regions at a scale of 1:100,000

   c) A comparison of the nature of the impacts of mining exploration with the other uses (i.e. recreational and fringe pastoral), to include both the direct short-term and immediate ones (i.e. construction and use of access tracks, airstrips, camps etc.) and the indirect, long term ones of invasion, introduction and establishment of feral animals and weeds into an otherwise relatively pristine wilderness area.

   d) A comparison of the nature and scale (i.e. area and longevity) of the above man-made impacts with natural phenomena characteristic of this arid region, e.g. wildfire and flooding.

e) Devise and prescribe the most efficient frameworks and methods for the long-term monitoring of all of the above impacts on these arid lands, and

f) consider all of the issues involved in the future multiple-use of the lands (tourism, conservation, preservation and oil and gas exploration and exploitation) and consider all feasible management options and the ecological trade-offs involved.

g) A comprehensive review of the relevant literature.

II. PROJECT AREA:

1. The project area is the southern Simpson Desert and its margins and is taken to be that contained within the 1:250,000 map sheets OODNADATTA, NOOLYEANA, GASON, PANDIE PANDIE, POOLAWANNA and DALHOUSIE or within the Landsat scenes 105-078, 105-079, 106-078, 106-079, 107-078, 107-079. It is approximately 100,000 km^2 in total area.

2. For reasons to be outlined later, only the southern part of the Simpson Desert will be studied. However extension into the northern Simpson Desert areas of N.T. (at present under Aboriginal Claim) and Queensland (containing a Conservation Park) would be a simple matter at a later date.

3. A map of the project area is attached.

III. PROJECT STAFF:

1. The project will be manned by

R.D. Graetz

R.P. Pech

D.J. Tongway

N.L. Hindley

from the Deniliquin Laboratory of the Rangelands Research program.

2. Support in the development of the required specialized computer enhancement techniques for Landsat images will be provided co-operatively by Dr. J. O'Callaghan, CSIRO Division of Computing Research, Canberra.

IV. PROJECT ORIGIN:

1. We were initially consulted by the Assessment Section of the S.A. Department for the Environment on the utility of Landsat for locating, assessing and monitoring the various impacts of mining exploration in the Simpson Desert.

2. At about the same time, but independently, we were approached by Mr. Allan Sann of SANTOS seeking advice on the use of Landsat in environmental management programs associated with the Cooper Basin developments.

3. Both requests contained common problems and, in our opinion, had common solutions.

4. From a detached national viewpoint we see the present and future land issues of the southern Simpson Desert as being:

a) The area is a large arid land wilderness in relatively 'pristine' condition.

b) There are at least four major ecosystem types represented in this area that are worthy of consideration for conservation and the present Conservation Park seems ill-sited.

c) There is appreciable mining exploration activity in the area with a high probability of a commercially viable find which will generate the exploitative activity of mining, pipelines and population centres.

d) This area is now one of the most accessible 'wilderness' areas in the arid zone and is thus regarded as a prime recreational resource by steadily-increasing numbers of off-road vehicle enthusiasts and the more adventuresome 'red-centre' tourists using either private or charter operations.

5. Obviously the task is the planning and management of the above multiple-uses of the area of the southern Simpson Desert.

6. The problem we see is the dearth of available ecological information that can support planning and management decision-making.

7. Experience has shown that a lack of understanding usually manifests itself in a piecemeal, incremental approach to decisions. This approach is inefficient and frustrating in the short term and is potentially harmful to the well-being of the lands and the users in the long term.

V. PROJECT OBJECTIVES:

Following from the considerations set out above the objectives of the project are:

To provide comprehensive summary of the land resources and the impact of the present uses to support the multiple-use management of these lands in the future (e.g. recreation, mining, conservation and preservation).

VI. PROJECT OUTPUT:

1. The study would result in the publication of a CSIRO Division of Land Resources Management Technical Report(s). These reports will be subject to the usual peer-group criticism and review required by CSIRO to maintain standard of scientific work.

2. All custom-enhanced imagery and maps would be made freely available to all interested parties as soon as they are produced. Whilst we are interested in conducting and reporting the study such that it is generally and widely applicable, we would maintain close contact with all collaborators throughout the project to ensure the provision of the required information and outputs.

3. We believe that there already exists a large and diverse market for the information to be provided in these reports.

VII. PROJECT DETAILS

1. The study will be based on the use of digitally processed, custom-enhanced Landsat imagery supported by laboratory and field work.

2. Considering the separate parts of the project (as listed I.2a-e) the details are as follows:

   a) The synoptic description of the lands will be derived from interpretations of especially enhanced Landsat imagery and verified by field traverse. Six contemporary Landsat images (acquired 11.4.81) will be digitally mosaiced together and registered to the Australian National grid to provide a multispectral image map. These images can then be digitally enhanced for whatever features are of interest, e.g. the structure of the dunefields, the vegetation cover or the soil types. Prints will be made available for each of the six 1:250,000 map sheets (see II.1).

As far as we are aware this type of product has not been generated in Australia before. This section will be a co-operative interactive effort with Dr. John O'Callaghan of CSIRO Division of Computing Research.

b) The classification of the area into its basic ecological regions will be done using the above Landsat imagery integrated with other data from topological and geological maps. Such a classification or grouping requires considerable interpretation and the incorporation of such factors as 'texture' of the land and implied functioning (e.g. floodouts etc.). The mapping will be done at a scale of 1:100,000 in the laboratory, checked in the field and compiled and published at 1:250,000 scale.

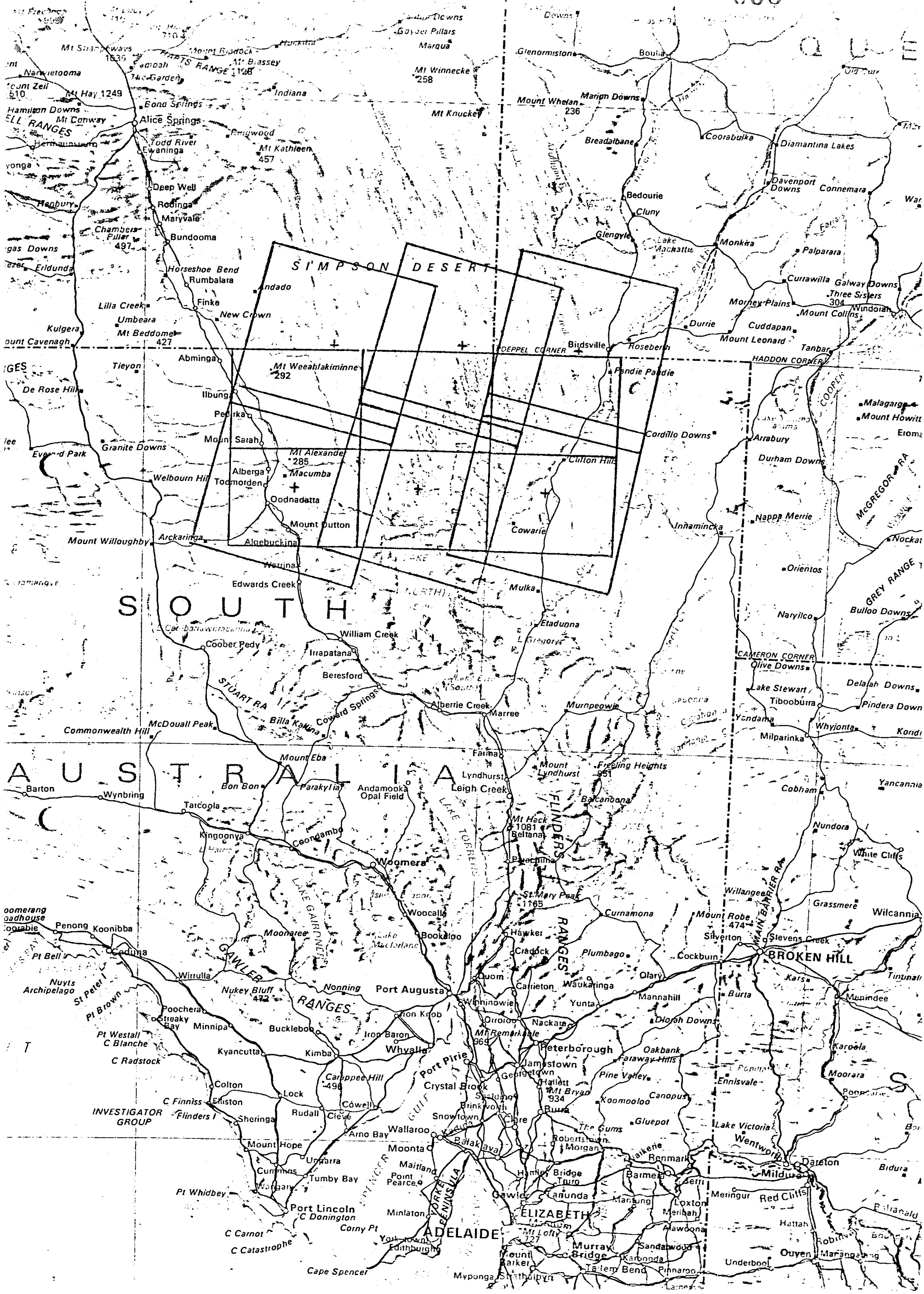
c) On-ground measurement and low-level aerial photography will be used to describe and compare the impacts of exploration, tourism and grazing by feral cattle and camels on the vegetation and soils of all of the components of the landscape, i.e. dunes, clay pans, floodouts etc. This will be the major task of the field work.

d) On ground measurements and low level aerial photography will be used to describe and compare the above man-made impacts with those of wildfire and flooding. The successional revegetation sequence of fire scar and track will be determined from field sampling. A comparison of the areas associated with each impact will be determined by generating a 'change-detection' image of the Simpson Desert Conservation Park area between 1972 and 1981.

e) The methods used in the study will range from ground traverse, low level aerial photography and radiometry to digital analysis of Landsat data. The capabilities of each of these methods will be matched with the scale and frequency of the information requirements for impact assessment and management (from parts c & d) to describe the most efficacious environmental monitoring system for these remote lands.

VIII. PROJECT TIMETABLE:

As of 25.6.81 the Landsat tapes have been ordered and field work is planned for October 1981. First draft of the publication should be available in January 1982.


SIMPSON DESERT
SOUTH AUSTRALIA
Mt Strangways 1636
Mt Zeil 1510
Mt Hay 1249
Hamilton Downs
Mt Conway
Alice Springs
Bond Springs
Indiana
Marqua
Mt Winnecke 258
Mt Knuckey
Glenormiston
Boulia
Mount Whelan 236
Marion Downs
Breadalbane
Coorabulka
Diamantina Lakes
Todd River
Ewaninga
Mt Kathleen 457
Deep Well
Rodinga
Maryvale
Hanbury
Chambers Pillar 497
Bundooma
Erldunda
Horseshoe Bend
Rumbalara
Andado
Finke
Lilla Creek
Umbeara
Mt Beddome 427
New Crown
Kulgera
Bedourie
Cluny
Davenport Downs
Connemara
Glengyle
Lake Machattie
Monkira
Palparara
Currawilla
Galway Downs
Three Sisters 304
Windorah
Mount Collins
Morney Plains
Durrie
Cuddapan
Mount Leonard
Tanbar
Birdsville
Roseberth
POEPPEL CORNER
HADDON CORNER
Abminga
Tieyon
Mt Weeahlakiminne 292
Pandie Pandie
De Rose Hill
Ilbunga
Malagarga
Mount Howitt
Pedirka
Mount Sarah
Cordillo Downs
Arrabury
Eromanga
Everard Park
Granite Downs
Mt Alexander 285
Macumba
Alberga
Todmorden
Clifton Hills
Durham Downs
McGREGOR RA
Welbourn Hill
Oodnadatta
Mount Dutton
Cowarie
Nappa Merrie
Innamincka
Mount Willoughby
Arckaringa
Algebuckina
Nockatunga
Warrina
Orientos
Edwards Creek
Mulka
GREY RANGE
Etadunna
Naryilco
Bulloo Downs
William Creek
Coober Pedy
Irrapatana
L Gregory
Beresford
CAMERON CORNER
Olive Downs
STUART RA
Lake Stewart
Tibooburra
Delalah Downs
Pindera Downs
Coward Springs
Billa Kalina
Alberrie Creek
Marree
Murnpeowie
Yandama
Whyjonta
Milparinka
Commonwealth Hill
McDouall Peak
Mount Eba
Farina
Mount Lyndhurst
Freeling Heights 951
Lyndhurst
Leigh Creek
Barton
Wynbring
Bon Bon
Parakylia
Andamooka Opal Field
Balcanoona
Cobham
Yancannia
Tarcoola
LAKE TORRENS
FLINDERS
Mt Hack 1081
Beltana
Kingoonya
Coondambo
Woomera
Parachilna
Nundora
White Cliffs
LAKE GAIRDNER
St Mary Peak 1165
Willangee
MAIN BARRIER RA
Grassmere
Wilcannia
Woocalla
Curnamona
Mount Robe 474
Penong
Koonibba
Moonaree
Bookaloo
Lake Macfarlane
Hawker
Silverton
Stevens Creek
RANGES
Ceduna
Cradock
Plumbago
Cockburn
BROKEN HILL
GAWLER
Nuyts Archipelago
Wirrulla
Nonning
Port Augusta
Quorn
Carrieton
Waukaringa
Olary
St Peter I
Pt Bell
Pt Brown
Nukey Bluff 472
Poochera
Streaky Bay
Minnipa
Iron Knob
Wilmington
Orroroo
Yunta
Mannahill
Nackara
Burta
Menindee
Pt Westall
C Blanche
Buckleboo
Iron Baron
Mt Remarkable 969
Dlorah Downs
Kyancutta
Kimba
Whyalla
Peterborough
Oakbank
C Radstock
Port Pirie
Jamestown
Karoola
Carappee Hill 496
Crystal Brook
Georgetown
Hallett
Pine Valley
Ennisvale
Moorara
Colton
Mt Bryan 934
Koomooloo
Canopus
Lock
C Finniss
Elliston
Cowell
Brinkworth
Burra
Gluepot
INVESTIGATOR GROUP
Flinders I
Sheringa
Rudall
Cleve
Snowtown
Clare
The Gums
Lake Victoria
Arno Bay
Wallaroo
Robertstown
Wentworth
Mount Hope
Moonta
Morgan
Renmark
Dareton
Ungarra
Kadina
Balaklava
Maitland
Barmera
Mildura
Cummins
Tumby Bay
Point Pearce
Hamley Bridge
Truro
Loxton
Meringur
Red Cliffs
Pt Whidbey
YORKE PENINSULA
Gawler
Tanunda
Mannum
Port Lincoln
C Donington
Minlaton
ELIZABETH
C Carnot
Corny Pt
ADELAIDE
Mt Lofty 727
C Catastrophe
Yorketown
Edithburgh
Murray Bridge
Karoonda
Sandalwood
Underbool
Ouyen
Hattah
Cape Spencer
Mount Barker
Tailem Bend
Pinnaroo
Mypong

MINUTES forming ENCLOSURE to

DE 4138/86
DL 4831/84

TO THE DIRECTOR-GENERAL, DEPARTMENT OF MINES AND ENERGY

RE: EXTENSION TO SIMPSON DESERT CONSERVATION PARK

You will be aware that an election platform of the current Government is to establish a large and significant number of arid land National and Conservation Parks.

This file contains minutes drafted to our Minister and the Minister of Lands seeking addition of the Crown Lands adjacent to the Simpson Desert Conservation Park to that Park. A map contained within defines the proposed addition.

As part of the process of consultation with relevant agencies, I would be grateful if you could refer this proposal to officers of your Department and advise if you have any objections to the proposal before Ministerial approval is sought. I would envisage that the joint proclamation arrangements allowing for continuation of existing use rights for mineral and hydro-carbon exploration will apply over this area as is the case with the Witjira National Park and the Simpson Desert Conservation Park.

You will note that the South Australian Branch of the Royal Geographical Society is planning a crossing of the Simpson Desert in late September to commemorate the centenary of crossing this Desert by Lindsay and Coleman. It would be appropriate for the addition to the Park to be proclaimed at the time of the Society's crossing.

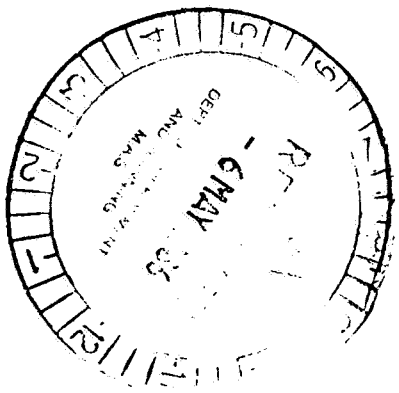
I propose to seek Ministerial approval early August 1986. I would therefore be grateful if you advise of any difficulties with my proposed course of action by the 1st of August, 1986.

Original signed

I. McPhail
DIRECTOR-GENERAL
DEPARTMENT OF ENVIRONMENT AND PLANNING

16/7/86

MINUTES forming ENCLOSURE to DL 4831 / 84.



To.

RICK GIBKI
DEPT ENVIRONMENT & PLANNING

6/5/86.

LRO-LDB

MINUTES forming ENCLOSURE to D.L. / ~~D.L.~~ No. 4831 / 1786 / 1666 19 84 / 83 / 85

original in

TO THE MANAGER, URBAN PROJECTS BRANCH

DIRECTOR, OUTBACK MANAGEMENT DIVISION

Re: Lake Eyre & Tirari Desert Crown Lands

On 7/9/83 (D.L. 1786/83) the Minister of Lands approved in principle, the gradual dedication, as desert reserves, of large areas of Crown Land in the Far North, subject to a certain procedure being followed. An initial recommendation was that Lakes Eyre North and South and the Tirari Desert be used as a test case to evaluate the procedure.

The procedure involved:

- preparation of a brief environmental report
- notification to Department of Mines and Energy , Department of Environment and Planning and Highways Department allowing four weeks to reply
- approval of Minister of Lands

A brief report of the Lake Eyre and Tirari Desert area was prepared and is contained herein. The Departments nominated above were notified on 16/4/85. No objections were received from the Department of Mines and Energy or the Highways Department. However the Department of Environment and Planning stated that Lake Eyre and Tirari Desert areas have been identified for future park status and a submission to Cabinet was made proposing dedication as a Conservation Park. The proposal of the Department of Environment and Planning is currently subject to negotiation with the Department of Mines and Energy concerning oil and gas exploration rights. However, there was no indication of whether the submission was approved, whether the area for proposed Conservation Park is the same as that proposed for dedication under the Crown Lands Act or when it is likely that a proclamation under the National Parks and Wildlife Act will occur. The Department of Environment and Planning did offer though, that there may be no need to dedicate the lands under the Crown Lands Act, even as an interim measure.

To clarify the points omitted from the response by the Department of Environment and Planning, further discussions with that Department should follow and in particular a copy of the Cabinet submission be sought. Such information would be necessary to include in a report to the Minister of Lands which would either recommend dedication of the lands under provisions of the Crown Lands Act or seek approval not to proceed with the dedication because of an imminent proclamation under the National Parks and Wildlife Act.

MINUTES forming ENCLOSURE to ..... *No.* 19

RECOMMENDATION:

The Department of Environment and Planning be requested to supply a copy of the Cabinet Submission formally proposing the Lake Eyre and Tirari Desert Crown lands as Conservation Park. Furthermore the Department be requested to indicate when it is likely that such proclamation will take place.

JMcD.

John McDonald
LAND RESOURCE OFFICER
URBAN PROJECTS

16/8/85

Letter requesting copy of information sent 28/8/85
Still awaiting reply
JMcD. 15/11/85.

GS2808-1

To: Director Land Operations

I fully support the above recommendation.
Draft minute for Director's attention attached
~~and~~

M.L.D
15.11.85

MINUTES forming ENCLOSURE to ..... *No.* *19*

MANAGER, URBAN PROJECTS BRANCH

DIRECTOR, OUTBACK MANAGEMENT DIVISION

RE: CROWN LANDS IN SIMPSON DESERT

On 7/9/83 the Minister of Lands approved a procedure which would lead to gradual dedication as desert reserve under the Crown Lands Act, of all the large areas of Crown land in the state's Far North.

The procedure involved:

- preparation of a brief environmental report
- notification to Department of Mines & Energy, Dept. of Environment and Planning and Highways Department, allowing four weeks to reply
- seeking approval of Minister of Lands.

To evaluate the procedure, it was also recommended and approved to begin the process with the Crown Lands in the Lake Eyre & Tirari Desert Region. To date this area has not been dedicated; the Department of Environment and Planning have expressed interest in proclaiming all or part of this area as Conservation Park under the National Parks and Wildlife Act. The matter is being negotiated with the Department of Environment and Planning.

So far, no report has yet been preparedfor the Simpson Desert lands, but as there was considered a degree of urgency for dedication of these lands (related to pre-empting use of and claims for the land) letters were sent to the abovementioned Departments on 7/5/85. No objections were received from the Department of Mines and Energy though they did request consultation in drafting the proclamation. Highways Dept. also raised no objection. The Department of Environment and Planning in an initial response of 23/5/85 (herein) stated that our proposal to dedicate was in conflict with their desire to extend the Simpson Desert Conservation Park. However, in a later response of 17/7/85 (herein) the Director-General of the Department of Environment and Planning stated that dedication of the lands as desert reserve would be a worthwhile interim measure pending dedication of portion of the lands as Conservation Park.

A draft Management Plan for the Simpson Desert Conservation Park contains most of the information necessary for a brief environmental report of the Simpson Desert Crown Lands. Any extra information is included in Environments of South Australia - Northern Arid Province. Photocopies of relevant portions are attached.

Plan and Detail, dated 10.4.85 is contained herein.

RECOMMENDATIONS

1. The Simpson Desert Crown Lands, being Blocks 536 - 570, 572, 573, 575 - 578, 580 - 582, 589 and 591 be dedicated as desert reserve under provisions in the Crown Lands Act.

2. Dedication is to proceed prior to that of the Lake Eyre & Tirari Desert Crown lands and without necessity for compilation of a brief report as originally approved on 7/9/83 by the Minister of Lands.

3. When approved by the Minister of Lands, a copy of the approval to dedicate be referred to the Department of Mines and Energy.

J. MCDONALD
Land Resource Officer
URBAN PROJECTS BRANCH

16/8/85

CS2808-6

MINUTES forming ENCLOSURE to ..... DEP (DMD) No. 2157/85 19

DL 1667/85
DL 1666/85

TO THE DIRECTOR-GENERAL, DEPARTMENT OF LANDS

Re: Unallotted Desert Land

I am writing in response to your minutes of 16/4/85 and 7/5/85 concerning the dedication of Lakes Eyre North and South and portions of the Tirari and Simpson Deserts as Desert Reserves.

The Simpson Desert land was the subject of a reply from me in May in which I noted that portion of that land was earmarked for eventual dedication as Conservation Park. This Department sees the dedication of the land as Desert Reserve as being a very worthwhile interim measure to protect the land from tenure claims until it can be dedicated as park. Accordingly, we would be pleased to offer assistance with the provision of information if a resource inventory and land use study is undertaken before the land is dedicated as a park.

I understand that your Department will be advancing similar proposals concerning other areas of unallotted Crown land in the outback, and the Department of Environment and Planning would give them all support as at least interim measures and also provide assistance with information gathering and area assessment.

The Tirari Desert and Lake Eyre are also areas which this Department sees as having conservation significance. These areas however have not only been earmarked for eventual park status, but are the subject of a firm proposal to Cabinet that they be dedicated as Conservation Parks. The proposal was discussed by Cabinet some time ago. It is currently subject to negotiation with the Department of Mines and Energy concerning exploration rights. Once this issue is resolved it is expected that the declaration of Park status will automatically follow. It may therefore be unnecessary for these lands to be declared Desert Reserve even as an interim measure.

I trust that these comments are of assistance to you. If you have any further queries please contact either Mr. N. Newland, Acting Director, National Parks and Wildlife Service, or Mr. P. Simpson, Northern Sector Manager.

E.J. Phipps
DIRECTOR-GENERAL
DEPARTMENT OF ENVIRONMENT AND PLANNING

( ) /7/85

Original in → D.L. 1786 83

MINUTES forming ENCLOSURE to ..... D.L. ..... No. 4831 ..... 19 84

ASSISTANT DIRECTOR OF LANDS

RE: Unallotted Crown Lands in the Far North.

There has been some overlap with approvals given by the Minister of Lands and the Minister of Environment & Planning to evaluate options of future status of large areas of unallotted Crown land in the far north.

The Minister of Lands (7/9/83 - DL 1786/83) approved a recommendation to proceed with reservation, under the Crown Lands Act, of Lake Eyre and portion of adjoining Tirari Desert. Pending proclamation of the reservation, the remaining large areas of unallotted Crown Land would be treated in similar manner.

The Minister of Environment & Planning (19/7/84 - DL 4831/84 & DL 8155/82) approved the creation of an interdepartmental Working Party to evaluate options for future status and use of the large areas of unallotted Crown land. In their report of 18/1/85, the Working Party recommended an interim reservation of the lands, under the control of the Pastoral Board, pending a complete assessment and inventory of the lands. The exception was the Lake Eyre and Tirari Desert desert lands which was recommended for immediate proclamation as Conservation Park under National Parks and Wildlife Act.

To implement recommendations of the Working party and to make complementary the courses of action stemming from separate Ministerial approvals, the following course of action is recommended:

1. Dedication under the Crown Lands Act of the large areas of unallotted Crown land in the Far North, as an interim measure pending completion of proposed resource inventory, range condition and land use study.

2. Immediately proceed with the dedication, under the Crown Lands Act, of Lake Eyre and portion of adjoining Tirari Desert (sections 1466, 1467, 1468 N.O.O.H.) and Crown lands in the Simpson Desert. These areas are to be dedicated as Desert Reserves, with care control and management lying with the Crown.

3. Identify, using land parcel description, the remaining unallotted Crown lands and allocate priorities for dedication.

4. For the areas mentioned in recommendations 2. & 3., no application for use or allotment, irrespective of proposed use, is to be considered without consultation with the Pastoral Board.

F J Vickery
DIRECTOR, OUTBACK MANAGEMENT
CHAIRMAN, PASTORAL BOARD

and

C J Kaufmann
MANAGER, URBAN PROJECTS BRANCH

GS1704-5

12/4/84

Noted

DIRECTOR OF LANDS

23/4/85

MINUTES forming ENCLOSURE to DL No. 4831 19 84

Approval of 5.3.85 by M.L. in respect to Report of 18.1.85, noted.

Assistant Director of Lands for information & noting

5.3.85.

Noted

5/3/85

Note for the Minister

A note to let you know that I have arranged for the Working Party which has been set up to examine unallotted Crown Lands in the State's Outback, to meet with you on Tuesday, 5 March at 10.00 a.m. in the E&P Office.

K.
15/2

OK.

MINUTES forming ENCLOSURE to DL No. 4831 1984

To Director, Conservation Programmes
Dept. of Environment & Planning

To secure signature of Mr N.P. Newland.

Thence to :-

Director-General Dept. Environment & Planning
and Minister of Lands, & of Environment & Planning
(Copy of within Report provided to Asst. Director of Lands)

J-DUM
17.1.85

TO THE MINISTER FOR ENVIRONMENT AND PLANNING

THROUGH: DIRECTOR-GENERAL 21/1

Please note completed report on unallotted Crown Lands in the Arid Zone prepared by a Working Party of Officers from the Department of Environment and Planning and the Department of Lands.

N.P. Newland.

Nicholas Newland
MANAGER - OPERATIONS
NATIONAL PARKS AND WILDLIFE SERVICE

SEEN

MINISTER FOR ENVIRONMENT AND PLANNING

Happy to note. N.B.
p. 5

TO THE MINISTER OF LANDS AND OF ENVIRONMENT AND PLANNING:

1. INTRODUCTION AND BACKGROUND:

On 19 July 1984 you approved the establishment of the within Working Party to consider and recommend to you appropriate action relative to the future use and status of unallotted Crown lands in the State's Outback.

At the time of that approval you requested a report by 31 October 1984, and we wish to apologise for failure of the Working Party to meet that target date. The delay has resulted from various absences on Recreation and/or Long Service Leave by all members of the Working Party during the period 1 August to 31 October 1984.

2. AN ESSENTIAL PRE-REQUISITE:

The issue has now been considered by the Working Party who are unanimously agreed that long term, or permanent, decisions and determinations on the future use and status of unallotted outback lands should only be made on the basis of information provided by a wide ranging, objective, scientifically based inventory of outback land resources and systems, an assessment of current range condition and trend, and a re-assessment of future outback land use needs.

You will recall that such a study was recommended as an essential pre-requisite to implementation of subsequent outback land management, and tenure administration proposals in the "Vickery Report" of 1981.

The Working Party are furthermore of the view that such a study should be statutorily prescribed to ensure its pursuit and completion regardless of potentially oscillating political attitudes prevailing in the short to medium term future.

Such statutory provision is seen by the Working Party to be analogous to the statutory requirement for management plans in the National Parks and Wildlife Act.

In arriving at this determination the Working Party have also been mindful of the Government's pre-election platform to "... undertake the five year study of arid land ecology recommended in the 'Vickery Report'."

The Working Party is of course also aware of the task being pursued by your Arid Lands Review Steering Committee, and would hope and expect that that Committee will also recognise and support the essential need for compilation of such an inventory and renewable resource data base.

.../2

3. ESSENTIAL RESOURCES AND INTER-DEPARTMENTAL CO-ORDINATION:

Having expressed the above view on the fundamental importance of a wide ranging resource inventory, range condition, and land use assessment study to precede future permanent decisions in respect to outback resources use, allocation, status, tenure, and management, the Working Party feels bound to invite attention to the fact that such a programme will clearly need to be undertaken jointly by officers in your Departments of Lands and Environment and Planning, together with some input from the Department of Agriculture.

Having regard to that fact it follows that in order to complete such a programme within an acceptable time interval, and avoid criticism resulting from delayed decisions, it will be essential that:

(1) adequate resources and professionally qualified and experienced staff are provided; and

(2) the roles and functions of the two operating Departments are effectively co-ordinated by the establishment of an appropriate organisation, secondments, delegations, or a Steering Committee.

4. A JUSTIFIABLE EXCEPTION:

However, notwithstanding the Working Party's view on the foregoing pre-requisite study, its members have carefully considered the proposal in DE 1013/71TC1 that the existing Elliott Price Conservation Park be extended to include the bed of Lake Eyre North and the adjacent Tirari Desert dunefield.

Since the flood events of 1949-50 this salina and dunefield have been the subject of extensive scientific study embracing hydrology, hydraulics, geology, palaeontology, climatology, zoology and botany, by eminent scholars, scientists and researchers from the Universities of Adelaide, Flinders, Sydney and California, and the Royal Society and Royal Geographical Society.

Whilst much of the data resulting from these studies is somewhat widely distributed, the Working Party is appreciative of the current efforts of the Lake Eyre Committee of the Royal Geographical Society to collate and publish a significant quantity thereof in a report on the impact and after effects of the 1974 flooding in the Lake Eyre Basin.

Having regard to the nature and extent of this scientific knowledge and data, the Working Party considers that Lake Eyre and its immediate environs represents:

* a terminal salina and playa lake of undoubted national and international significance;

* a justifiable exception to the pre-requisite study proposed above; and

* a region and structure which should be the subject of urgent preservation, protection, and appropriate management as an element of the State's National Parks system.

However, in expressing this view the Working Party recognises the need to preserve and appropriately manage exploration and production tenements under the Mining and Petroleum Acts.

In reaching the above determinations in respect of the Lake Eyre area the Working Party has also been mindful of:

* the fact that no purchase or acquisition funds or issues are involved; and

* the appended report (DE 1013/77TC1) from the Director, National Parks and Wildlife Service, which identifies and evaluates potential management issues, a modest recurring initial annual expenditure of approximately $5,000 and also a capital cost of fencing on a shared basis.

5. INTERIM INITIATIVES AND PROTECTION:

The Working Party considers it important that immediate initiatives be taken to provide interim protection for the State's fragile unallotted desert lands pending completion of the above proposed inventory and study.

Additionally, the Working Party believes that all extensive outback lands should be managed as a public resource by an appropriately qualified and constituted statutory authority, under your general direction and control, assisted by an advisory committee comprised of vested land use interest, and service group representatives.

The Working Party is also concerned that the existing Pastoral Act lacks authority to reserve outback lands such that their management is a Pastoral Board responsibility and function. The present provision whereby lands can only be reserved under the Crown Lands Act statutorily removes outback lands so reserved from management by a broadly based Pastoral Board, or a succeeding appropriate outback land management authority.

It is therefore the view of the Working Party that appropriate amendment to the Pastoral Act to provide for the reservation of lands under the control and management of the Pastoral Board (or its broadly based successor) in terms of that Act, should be urgently considered.

Such action would then enable the interim reservation of outback desert lands under appropriate management and surveillance pending completion of the proposed resource inventory, range condition and land use assessment process.

In respect to the Tallaringa lands which have been subject to Annual Licence 9741 the Working Party notes that minimal drought relief use of these lands has occurred over the 25 year duration of that Licence, and therefore considers that little further risk of change is likely by preserving the status quo, pending completion of the proposed pre-requisite inventory/study programme.

.../4

6. SUMMARY AND RECOMMENDATIONS:

Having regard to the foregoing facts and discussion the Working Party now UNANIMOUSLY RECOMMENDS that:

(1) You seek Government approval for the reservation of the bed of Lake Eyre North and the adjacent unoccupied lands of the Tirari Desert, as an extension of the Elliott Price Conservation Park under the National Parks and Wildlife Act;

(2) You seek Government approval to introduce urgent amendments to the Pastoral Act and/or future outback land management legislation which will provide for:-

(a) statutory pursuit and completion of an outback renewable resources inventory, range condition, and land use assessment study as a pre-requisite to all future permanent or long term determinations affecting the use, status and tenure of the State's outback lands; and

(b) the reservation of outback lands for any purpose, and their appropriate resumption by the Minister, on the recommendation of the existing Pastoral Board, or a broadly based successor;

(3) Long term or permanent determinations of future use, status, and tenure of outback desert lands be made only on the basis of, and following completion of the renewable resources inventory, range condition and land use assessment programme proposed in (2) above;

(4) In order to support pursuit and enactment of recommendation (2) (a) above you approve:

(a) the principle of continued departmental priority and provision of appropriate essential resources; and

(b) the establishment of a Steering Committee comprising appropriate representation from:

(i) The Department of Lands;

(ii) The Department of Environment and Planning; and

(iii) The Department of Agriculture

to review, and co-ordinate interdepartmental input to the proposed outback resources inventory, condition and land use study.

(5) The status quo of Annual Licence tenure be permitted to continue in respect to the southern section of Tallaringa Lands on an interim basis pending final determinations pursuant to recommendations (2) and (3) above;

.../5

(6) Subject to:

* enactment of statutory amendments proposed in (2) above; and

* preservation of existing rights under Mining and Petroleum Act tenements;

remaining unallotted, outback desert lands be afforded interim protection by proclamation as Desert Reserves pending completion of the proposed pre-requisite resource inventory, range condition, and land use study;

(7) Having regard to the complexity and inter-dependent nature of these recommendations and other essentially related issues, you agree to, and signify an appropriate time and place for, the Working Party to discuss and further explain them, and its other concerns to you; and

(8) Subject to your approval of the foregoing and the satisfactory outcome of the meeting and discussion sought in (7) above, this report be referred to:

* The Honourable the Minister of Mines and Energy;

* The Director of Lands; and

* The Director-General, Department of Environment and Planning

for information, and/or comment, and direction to appropriate Departmental areas for implementation and co-ordination of approved initiatives and on-going action.

James Vickery
F.J. VICKERY

C.R. HARRIS

G.N. Drewien
G.N. DREWIEN

S Barker
DR. S. BARKER

N.P. Newland.
N.P. NEWLAND

(7), (8) approved.

18/1/85

(1) → (6) agreed for Cabinet 8/2.

LAKE EYRE BASIN STUDIES

A meeting was recently held at the University of Adelaide, South Australia to examine the possibilities of forming a Lake Eyre Basin Studies Group. This meeting was attended by interested academics from both the University of Adelaide and Flinders University, and represented many concerns ranging from the physical sciences through to cultural geography. A map of the region of interest (Map 5 in Review of Australia's Water Resources, Department of Minerals and Energy, 1975) is included overleaf.

Major points raised in discussions included :

1. The need to liaise and involve other interested parties - from other academics to Government bodies and private individuals.

2. As a first priority, the compilation of a bibliography and archival record (including motion and still film) of all research done in the Lake Eyre Basin.

3. The need to examine all funding options for both multidisciplinary group/affiliations and individual research in the region.

4. Thoughts on the possibility of promoting research and discussion aimed at evaluating the concept of a World Heritage Listing for some of this basin.

5. The formation of a seminar-workshop program to promote interdisciplinary interest and as a forum for general discussions.

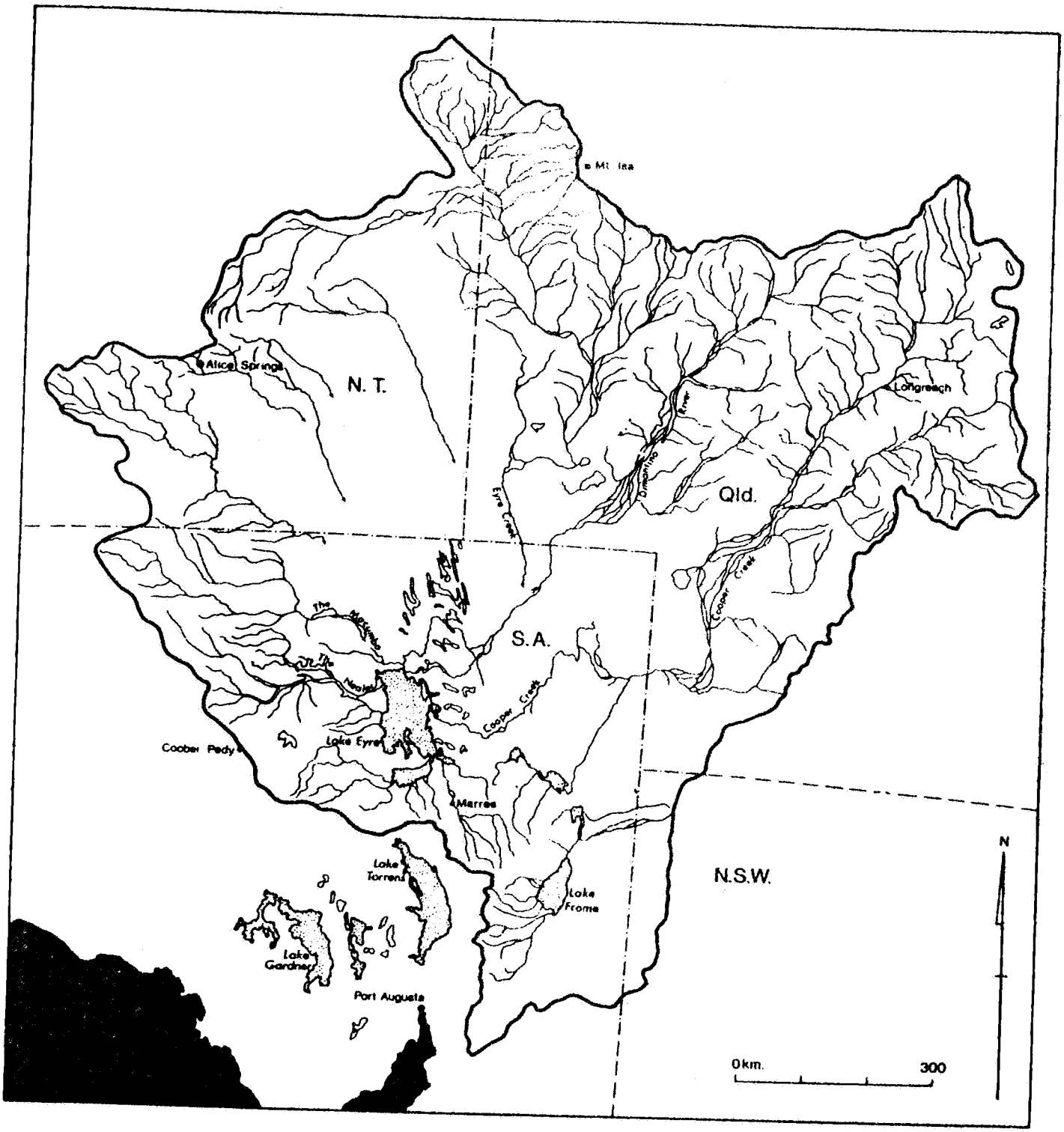
As a group, we feel that there are important advantages in co-operative research and discussion, therefore we would welcome any interest and advice. We have not attempted to constitute a formal committee as we feel that the first step must be an attempt to engender the widest Australian response and support.

If you have an interest in any of these matters we would be pleased to hear from you.

The current study group comprises : Flinders University :- Dr John Bye (Earth Sciences), Dr Les Heathcote (Geography), Prof John Holmes (Earth Sciences), Dr Rod Wells (Biological Sciences), Dr Molly Whalen (Biological Sciences); University of Adelaide :- Mr Max Foale (Geography), Prof Fay Gale (Geography), Dr Sandy Taylor (Geography), Dr Rowl Twidale (Geography) and Prof W D Williams (Zoology).

Next meeting is to be held on Wednesday 12th September in the Department of Geography, University of Adelaide, Staff Seminar Room 815 at 5.00 pm.

Dr Rob Allan
Executive Officer
I can be contacted or messages left for me at either; Department of Geography, University of Adelaide (08) 2285654 or 2285643 or School of Earth Sciences, Flinders University of South Australia (08) 2752212 or 2752198.


Mt Isa
Alice Springs
N.T.
Longreach
Qld.
Eyre Creek
Cooper Creek
S.A.
The Narrows
Lake Eyre
Coober Pedy
Marree
Lake Torrens
Lake Gardner
Port Augusta
Lake Frome
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300

LAKE EYRE BASIN STUDIES SEMINAR AND MEETING

VENUE : School of Earth Sciences, Flinders University, Room 304.

TIME : 5.30 pm.

DATE : Wednesday, 12th December.

SPEAKER: Mr Colin Harris, South Australian Department of Environment and Planning.

TOPIC : Mound Springs of the Lake Eyre Basin : An introduction to their occurrence, nature and conservation significance.

The meeting will follow this seminar and it is hoped that there will be sufficent attendance and interest from the seminar to permit a full discussion of the study group's objectives in terms of the bibliography, funding, structure, personnel and longer term aims. Thus there will not be a separate agenda for this meeting.

Dr Rob Allan,

Executive Officer.

PS. The map of the Flinders campus on the back of this circular shows the location of the building housing the School of Earth Sciences as 13. The closest car parks to this are those marked Car Park 9 and Car Park 10. The easiest entrance to make access to Room 304 is that on the eastern face of the building marked 13 just around the corner from Car Park 10 (on same level as Car Park 10).

MOUND SPRINGS OF THE LAKE EYRE BASIN

An introduction to their occurrence, nature and conservation significance

Colin Harris

South Australian Department of Environment and Planning

SUMMARY

Mound springs are natural outlets for waters of the Great Artesian Basin. They occur in a great arc around the margin of the Basin where impervious basement rocks abut the sedimentary Jurassic and Cretaceous aquifers of the Basin. Emergence is often associated with fractures or faults, but can also result from pressure water breaking through thin confining beds on the margin of the Basin. Approximately 600 spring locations have been recorded in south western Queensland, north western New South Wales and northern South Australia.

As suggested by the name, many springs have built up conical mounds, the composition of which varies from sands to clays to gypseous silts to limestone. The build up of material forming the mounds is a result of mechanical deposition of particles derived from the underlying aquifers and by chemical precipitation of dissolved solids present in the artesian groundwater. There is considerable variation in the size and activity of springs. Some springs emerge at ground level and have no discernible mound, whilst others have well-developed mounds with a local relief of up to 15m. Current rates of flow are also very variable, ranging from mere seepages to a maximum of 7.3 ML/d for one of the springs at Dalhousie in northern South Australia. The estimated discharge for all mound springs in Australia is 129 ML/d.

The waters are relatively high in dissolved solids, with sulphates, bicarbonates, chlorides and sodium prominent in many samples. In South Australia, average TDS values range from below 2000 mg/L at Dalhousie to around 5-8000 mg/L for many of the springs to the south and west of Lake Eyre.

Mound springs in South Australia occur in three main areas.

1. In the vicinty of Lakes Frome, Callabonna and Blanche - relatively minor springs with small flows.

2. The Marree-Peake country - Coward Springs, Elizabeth Springs, Strangways Springs, Freeling Springs etc. Some of the springs are still large and significant, but many others are extinct or have had their flows reduced greatly since European settlement.

3. Dalhousie Springs - 160 km north east of Oodnadatta. An impressive complex of over 60 active springs: the most significant group of springs in Australia.

/

As a source of permanent water in an otherwise arid environment, the springs were of obvious importance to Aboriginal man and many are surrounded by old campsites littered with occupational debris. It is known that many of the springs were important primary mythological sites. The first discovery of the springs by Europeans was in October, 1858 when Babbage and Warburton were exploring in the vicinity of Lake Eyre South. Further springs, extending northwards almost as far as present-day Oodnadatta, were discovered by Stuart in 1859. The springs provided strategic "stepping stones" to the interior and were the key to the exploration of Central Australia and the eventual crossing of the Continent. Stuart's line of exploration subsequently became the route of the Overland Telegraph and the Strangways and Peake Repeater Stations were strategically located on mound springs. Pastoralism followed hard on the heels of exploration. Stuart was in the pay of pastoral interests and before his explorations were even complete much of the mound spring country was occupied.

Recent biological research has added to the acknowledged geological, archaeological and historical significance of the springs. A variety of endemic invertebrates occur; at least two species of fish are endemic; and amongst the plants special mention needs to be made of the rare Eriocaulon carsoni, a species restricted to two spring groups in northern South Australia.

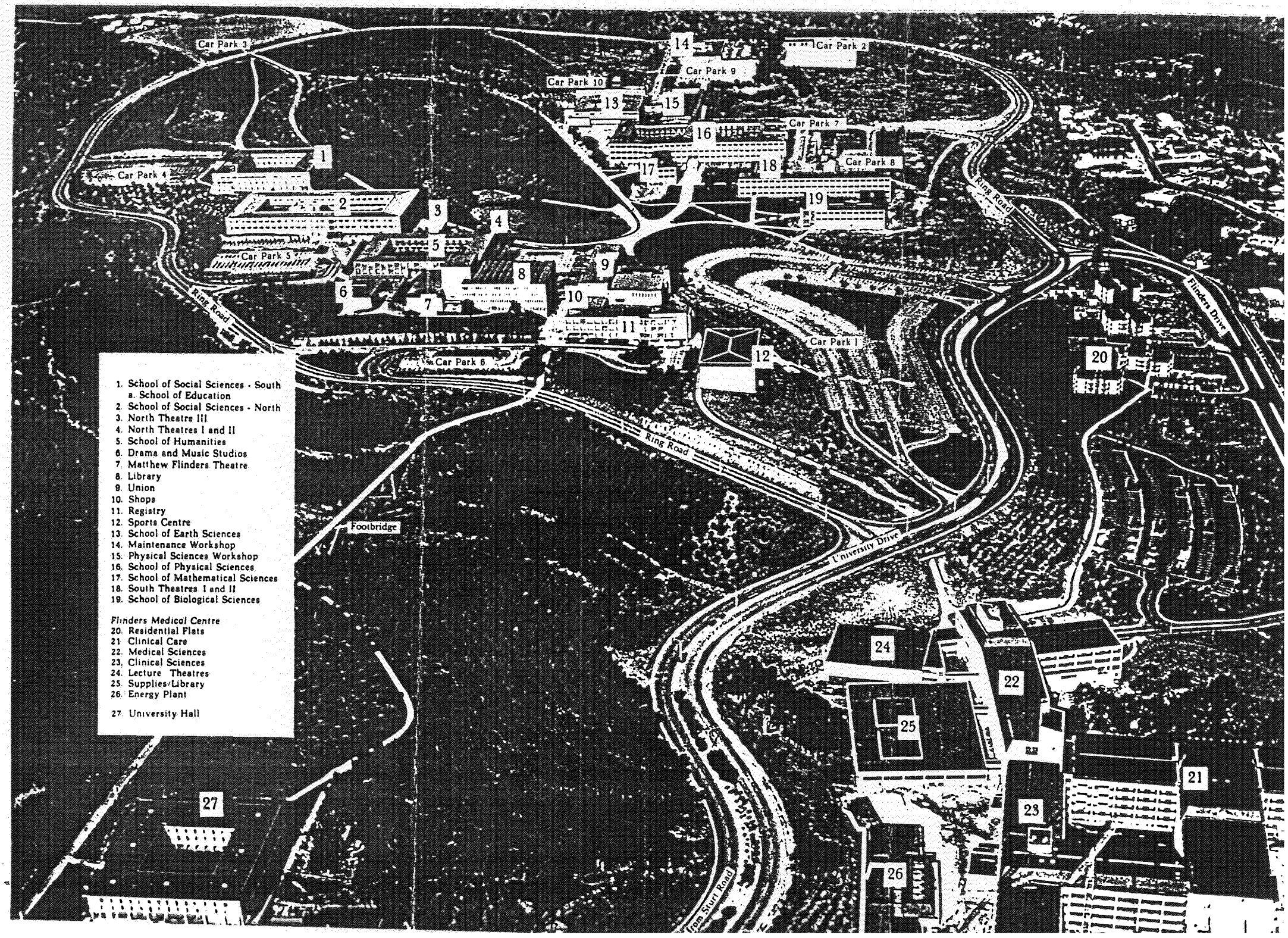
The mound springs are, in short, of considerable conservation significance. However, they are very susceptible to damage and currently face a variety of development threats and pressures.

1. Exploitation of the Great Artesian Basin aquifers has reduced dramatically the flow rate of many springs - in some cases to the point of extinction - and further extraction for industrial purposes at Olympic Dam will accelerate the decline in some areas.

2. Largely uncontrolled access of stock (domestic and feral) to the springs is resulting in the destruction of fringing vegetation, the trampling of drainage lines and the siltation and pollution of the pools and overflow channels.

3. The low rainfall and saline/gypseous soils adjacent to the springs combine to make the pedestrian and vehicular impact from an increasing number of visitors severe and long-lasting.

The South Australian Department of Environment and Planning places a high priority on conservation of the mound springs. In the past twelve months it has expended around $90,000 on studies to document the biological, Aboriginal and European heritage values of the springs; acquired Dalhousie Station at a cost of $750,000 to protect the Dalhousie Springs group; and in co-operation with World Wildlife Australia committed $42,000 to a trial programme of protective fencing for springs near Lake Eyre South. These efforts notwithstanding, the future of many important springs is far from assured and a continuing programme of research and protective works is planned.


Car Park 3
Car Park 2
Car Park 10
Car Park 9
Car Park 7
Car Park 8
Car Park 4
Car Park 5
Car Park 6
Car Park 1
Ring Road
Flinders Drive
University Drive
Footbridge
from Sturt Road
1. School of Social Sciences - South a. School of Education
2. School of Social Sciences - North
3. North Theatre III
4. North Theatres I and II
5. School of Humanities
6. Drama and Music Studios
7. Matthew Flinders Theatre
8. Library
9. Union
10. Shops
11. Registry
12. Sports Centre
13. School of Earth Sciences
14. Maintenance Workshop
15. Physical Sciences Workshop
16. School of Physical Sciences
17. School of Mathematical Sciences
18. South Theatres I and II
19. School of Biological Sciences
Flinders Medical Centre
20. Residential Flats
21. Clinical Care
22. Medical Sciences
23. Clinical Sciences
24. Lecture Theatres
25. Supplies/Library
26. Energy Plant
27. University Hall

extra finance via the Minister from Treasury to cover this extra responsibility.

R.I. Nichols.

R.I. Nichols
DIRECTOR
NATIONAL PARKS AND WILDLIFE SERVICE

TO THE DIRECTOR - OUTBACK MANAGEMENT DIVISION, DEPARTMENT OF LANDS

RE: IMPLICATIONS OF RECOMMENDING LAKE EYRE AND TIRARI DESERT AS A CONSERVATION PARK

Due to the relative scarcity of information on this area we are not able to give a detailed accout of likely future management implications. The two major areas of concern are as follows:-

1. Fencing between the Tirari Desert and the Pastoral Holdings to the east and north. We believe there has been incursions by lessees into the Tirari Desert which will require agreement between the Pastoral Board and the National Parks and Wildlife Service as to the appropriate northern and eastern boundary for the proposed reserve. It is likely that the B.T.B. programme has provided means for fencing works to be undertaken. However, there could be further implications for fencing under the Service's fencing subsidy programme.

2. It is likely that the declaration of this area as a reserve will cause an initial and periodic influx of tourists. It is difficult at this stage to predict the effect of tourism pressure but it is possible that some problems could be created for us in search and rescue. Also I believe it important that before the area is established as a reserve we define clearly the points of access and egress.

3. I believe it important that discussions take place with the lessees of Muloorina.

4. There will be a need for staff from the far north district to visit the proposed area a number of times a year to establish the extent of visitor pressure and problems which may manifest themselves due to public visitation. Such inspections and work that is likely to occur from visitor activity would impose additional cost for the far north district of approximately $5,000.00 per year. We would be seeking

Cont/2...

TO THE ASSISTANT DIRECTOR OF LANDS:

Re: Availability of Unallotted Crown Lands for self-help enterprises and use by unemployed persons

Appended correspondence from Mr. D. Hawcroft addressed to the Hon. the Minister of Health has been noted, and the following comments and information are now submitted in response:-

1. Mr. Hawcroft states, "Leases are given to Aboriginals or to mining companies by the thousands of acres".

   In considering this sweeping statement it is essential to understand that:

   (a) Lands vested in Aboriginal interests are in fact vested in, or held by, respresentative Aboriginal corporate entities, who hold title to, where appropriate sub-lease, and are publicly responsible and accountable for the use and management of, the subject lands. e.g. Aboriginal Lands Trust, Pitjantjatjara Land Council, Maralinga Tjarutja, Aboriginal Development Commission etc.

   I am not aware of the existence of any such comparable corporate respresentative entities in respect to the interests of unemployed persons. It must also be borne in mind that Aboriginal interests must be seen as having permanent racial status, and that the situation of unemployed persons is a dynamic one of (hopefully) transient and temporary status.

   (b) Tenements held by Mining Companies are:

   * held under the statutory provisions, and confer the specific and limited land use rights, of the Mining Act;

   * superimposed over the State's entire land tenure system, which includes estates of Freehold and permanent and expiring tenures held from the Crown.

Having regard to these facts it is clear that lands held by Aboriginal interests, and as Mining Act Tenements, are held by financed, corporate, representative, entities who are publicly accountable, and/or who's use and management of the subject lands is statutorily limited, regulated, and monitored.

2. Unallotted lands under control ofthe Pastoral Board and/or the Outback Management Group are situated in the far Northern arid zone of this State and are:

   * bio-physically sensitive and fragile;

* of extremely low economic productive potential, the development of which requires vast financial and water resources and inevitably reveals a negative cost/benefit ratio;

* subject to rigorous climatic extremes;

* remote from transport systems and other socio-economic infrastructure;

* are generally hostile to modern ill-equipped non-Aboroginal man; and

* are currently subject to a review of status, and potentially protection from use and occupation, by reservation.

Having regard to the above facts, it is suggested that the initiation of self-help land based programmes for unemployed persons should be based on the following pre-requisite criteria:

* Appropriate financial/funding resources;

* Organised corporate entity or entities having long term life or statutory perpetual succession, and appropriate accountability; and

* Practical, economically viable, land use, production and management proposals in the temperate settled agricultural/urban lands of Southern and Eastern Australia, or the tropical and sub-tropical lands of the Northern Territory and Queensland.

DIRECTOR, OUTBACK MANAGEMENT,
CHAIRMAN, S.A. PASTORAL BOARD

/9/84

B47

MINUTES forming ENCLOSURE to D.L. *No.* 1786 *19* 83

TO THE DIRECTOR, DIVISION OF OUTBACK MANAGEMENT

Re: Progress of Proposed Desert Reserve System

Please find attached, a report on the progress of proposed Desert Reserves, prepared for the Minister of Lands. Progress in this matter has been slowed by loss of two L.R.O.'s from Urban Projects which has increased the workload of the L.R.O. working on the project.

John McDonald

C.J. Kaufmann,
Manager,
URBAN PROJECTS

18/5/84

D.O.M.
Please return docket when finished.
GHB. 18/5/84.

C4

MINUTES forming ENCLOSURE to DL *No.* 1786 *19* 83.

TO THE DIRECTOR OF LANDS

ATTENTION: Mr. J. Vickery

The Minister has asked for a report on the progress which has been made on developing proposals and legislative concepts for the suggested Desert Reserve system.

He also suggests that the working group considering this matter invite representatives of the Minister of Mines and Energy to attend the next meeting to discuss the proposal.

Di Gayler.

(Di Gayler)
RESEARCH OFFICER TO THE
MINISTER OF LANDS

15/5/84

RECEIVED
16 MAY 1984
MINISTER OF LANDS
OFFICE

Manager Urban Projects —
Can you provide a report?

N.B. Di Gayler requests further that any future discussions should involve David Cox (Cocks?) – Research Officer to the Minister of Mines.

G. Doom
16.5.84.

PROGRESS REPORT ON PROPSED DESERT RESERVE SYSTEM

Background

The Minister of Lands approved a test procedure to reserve vast areas of S.A. arid lands, on 7/9/83. An area comprising Lake Eyre (North and South) and the Tirari Desert is being used as a test case to evaluate the proposal of reservation and the procedures.

Stages Completed

1. Plan and Detail

   Drafting Branch has completed a plan illustrating the current tenures and confirming the area concerned is Crown land. Section numbers have been allocated to permit reservation under the Crown Lands Act.

2. Description

   A brief description of the landscape including topography, vegetation and geomorphology has been prepared.

Stages Being Completed

1. Mining

   Lists and plans of mining tenements are being prepared. This includes mineral exploration licences and leases and petroleum exploration licences and leases.

2. Description

   Brief descriptions, particularly relating to Aboriginal and European heritage, are being prepared. In addition, bibliographies referencing the physical and biological environments and heritage value of the region are also being prepared.

Interdepartmental Involvement

The test procedure approved by the Minister specifies that upon completion of the brief report, the Departments of Mines and Energy, Environment and Planning and Highways will be notified. It is envisaged that a single meeting of representatives from these Departments and the Department of Lands will be convened so the interests of each Department can be accommodated in the reservation status.

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SANTOS LTD
(Incorporated in South Australia)
SANTOS HOUSE, 39 GRENFELL STREET, ADELAIDE, SOUTH AUSTRALIA 5000
Postal Address:
G.P.O. BOX 2319, ADELAIDE, SOUTH AUSTRALIA 5001
Telephone: (08) 218 5111 Facsimile: (08) 212 5476 Telex: AA 82716

17 September, 1984

RM/84/6.1
OM:mm

Mr J. Vickery,
S.A. Department of Lands,
GPO Box 1047,
ADELAIDE, S.A. 5001

Dear Jim,

Re: Discussion of Simpson Desert Conservation Park Draft Management Plan

I regret to inform you that the meeting scheduled for 3.00 p.m. on Tuesday, 25 September, to have been held on the 2nd Floor of SANTOS House, has now been cancelled.

Please accept my sincere apologies for any inconvenience that this cancellation may cause.

Should it become possible to reconvene this meeting at a later date I shall ensure that ample forewarning is given.

Yours sincerely,

Oleg

OLEG MOROZOW
GOVT. LIAISON & ENVIRONMENT OFFICER

Offices at:
WHYALLA: 7a Forsyth Street, Whyalla, South Australia 5600
P.O. Box 344, Whyalla, S.A. 5600 Telephone: (086) 45 2266
BRISBANE: 12th Floor, Societe General House, 40 Creek Street, Brisbane, Queensland 4000
P.O. Box 1026 Brisbane, Qld. 4001
Telephone: (07) 229 7766 Facsimile: (07) 229 0165 Telex AA 43978 SANQLD
SYDNEY: Suite 6102, Level 61,MLC Centre, 19 Martin Place, Sydney, New South Wales 2000
Telephone: (02) 235 0899 Telex: AA 75424

DEPARTMENT OF LANDS

144 King William Street, Adelaide, South Australia
Box 1047, G.P.O., Adelaide, S.A. 5001

Telephone Enquiries
(08) 227-3233 Mr. Vickery
When replying please quote

D.L. 4831/84

7 September 1984

The General Manager,
Santos Ltd.
G.P.O. Box 2319
ADELAIDE 5001

Attention: Government Liaison and Environment Officer - Mr. Oleg Morozow

Dear Oleg,

Many thanks for your kind invitation to attend the meeting and discussion scheduled for 25 September on the National Parks and Wildlife Service proposed Management Plan for the Simpson Desert National Park.

Your invitation is gratefully accepted and I look forward intensely to an interesting discussion which will undoubtedly be of value in further consolidating the already excellent relations and co-ordination between Santos and Government agencies.

Kind regards,

Yours sincerely,

DIRECTOR, OUTBACK MANAGEMENT

CHAIRMAN, S.A. PASTORAL BOARD

DEPARTMENT OF LANDS

144 King William Street, Adelaide, South Australia
Box 1047, G.P.O., Adelaide, S.A. 5001

Telephone Enquiries
(08) 227-3233 Mr. Vickery
When replying please quote
D.L. 4831/84

7 September 1984

The General Manager,
Santos Ltd.
G.P.O. Box 2319
ADELAIDE 5001

Attention: Government Liaison and Environment Officer - Mr. Oleg Morozow

Dear Oleg,

Many thanks for your kind invitation to attend the meeting and discussion scheduled for 25 September on the National Parks and Wildlife Service proposed Management Plan for the Simpson Desert National Park.

Your invitation is gratefully accepted and I look forward intensely to an interesting discussion which will undoubtedly be of value in further consolidating the already excellent relations and co-ordination between Santos and Government agencies.

Kind regards,

Yours sincerely,

DIRECTOR, OUTBACK MANAGEMENT

CHAIRMAN, S.A. PASTORAL BOARD

SANTOS LTD
(Incorporated in South Australia)
SANTOS HOUSE, 39 GRENFELL STREET, ADELAIDE, SOUTH AUSTRALIA 5000
Postal Address:
G.P.O. BOX 2319, ADELAIDE, SOUTH AUSTRALIA 5001
Telephone: (08) 218 5111 Facsimile (08) 218 5255 Telex: AA 82716

4831/84

3 September, 1984

RM/84/6.1
OM:mm

Mr J. Vickery,
S.A. Department of Lands,
GPO Box 1047,
ADELAIDE, S.A. 5001

Dear Jim,

The National Parks and Wildlife Service has recently published a Draft Management Plan for the Simpson Desert Conservation Park.

Dr Sue Barker, Manager Programmes for the Service, has kindly agreed to attend a meeting of interested parties in terms of both continued use and ongoing management of the park. She will be accompanied by the two officers who did much of the ground work for the plan, Messrs Greg Rowbery and Rob Leslie.

Exploration and Drilling personnel from SANTOS, Delhi and SAOG have been invited as well as relevant officers from S.A. Department of Lands and the Department of Mines & Energy.

It is intended that the N.P.W.S. officers will briefly outline the major intentions of the plan and will then participate in a question and answer session that may clarify matters relating not only to the future of the Simpson Desert but also other areas such as Lake Eyre, Innamincka and the Coongie Lakes.

The meeting is scheduled for 3.00 p.m. on Tuesday, 25 September in the 2nd Floor Conference Room of SANTOS House.

I would be pleased if you could attend in the company of any relevant officers from your group.

Kind regards,

Oleg Morozow.

OLEG MOROZOW
GOVERNMENT LIAISON & ENVIRONMENT OFFICER

Offices at:
WHYALLA 7a Forsyth Street, Whyalla, South Australia 5600
Postal Address: P.O. Box 344, Whyalla, S.A. 5600
Telephone: (086) 45 2266
BRISBANE City Mutual Building, 13th Floor, 307 Queen Street, Brisbane, Queensland 4000
Postal Address: P.O. Box 1026, Brisbane, Qld. 4001
Telephone: (07) 229 7766
Telex: AA 43978 SANQLD

13

SOUTH AUSTRALIA

DEPARTMENT OF LANDS

ADELAIDE

(WHEN REPLYING PLEASE QUOTE

1. Continue A.L. over Rankin Tallaringa Block.

2. ~~Determine for~~ Convert remaining unallotted Crown Lands to Desert Reserve Lands on interim basis.

3 Fully review appropriate future use condition & status as part of arid Lands land use & condition assessment study

4 If action needed dedicate bed of Lake Eyre & Tirari Desert as extension of Elliott Price Conservation Park

(paper re cost & mgmt needs coming from Nick.)

17

Canberra

G. F. BLACKWOOD A.A.S.A. CPA
Public Accountant

30 Mudies Road
St Ives
NSW 2075

TEL: 44-4071

July 31, 1984

Lands Department
144 King William Street
Adelaide
S.A. 5000

Dear Sirs

A client has requested information regarding acquiring Crown Land in your state that would otherwise be classified as waste land, i.e. arid or desert lands.

The purpose of the purchase is in connection with an overseas promotion scheme in which the land or insignificant portions would be gifted or sold for nominal values.

I understand from my clients that similar acquisitions of valueless land have been made in other states for similar purposes.

I would appreciate your advice as to the following:-

i) Name & address, (Telephone & Telex numbers) of the Department concerned and preferably the name of an officer of that Department who could provide further detailed information.

ii) Are such waste lands available for sale and how may my client identify such land.

iii) What form of application should be made for purchase of such land.

iv) Are there any particular requirements e.g. minimum lots, hindrance to title etc..

Any further information which would be relevant would be appreciated.

Yours faithfully

4807/83

Rudy's Odd Tour
PO Box 522
COOBER PEDY SA 5723

13 March 1984

The Director of Outback Management
Department of Lands
PO box 1047 GPO
ADELAIDE SA 5001

Dear Sir,

I am writing to you to asking your advice and help. Recently I spoke to Mr Neil Conrick (Dept of Lands) and he suggested I write to you.

For the past two years I have conducted a tour business called the "Camel Mine Tours" in and around Coober Pedy. I would like to further develop this tourist business by setting up a Camel Farm to be run in conjunction with the tours.

To do so, I would need an area where I can build a yard and an area to graze the camels. I have selected a suitable site close to the new Stuart Highway. It is a gully about 13 miles south of Coober Pedy. The area is at present serviced by a sub-artesion bore. This salt water is used in the construction of the new highway however once this section is completed the bore will be of no further use. I would like to continue to use this bore to water my camels. The salty water can be drunk by camels.

I seek permission to commence this project. I realize a licence of some kind would have to be issued and I am prepared to abide by your decisions on this matter.

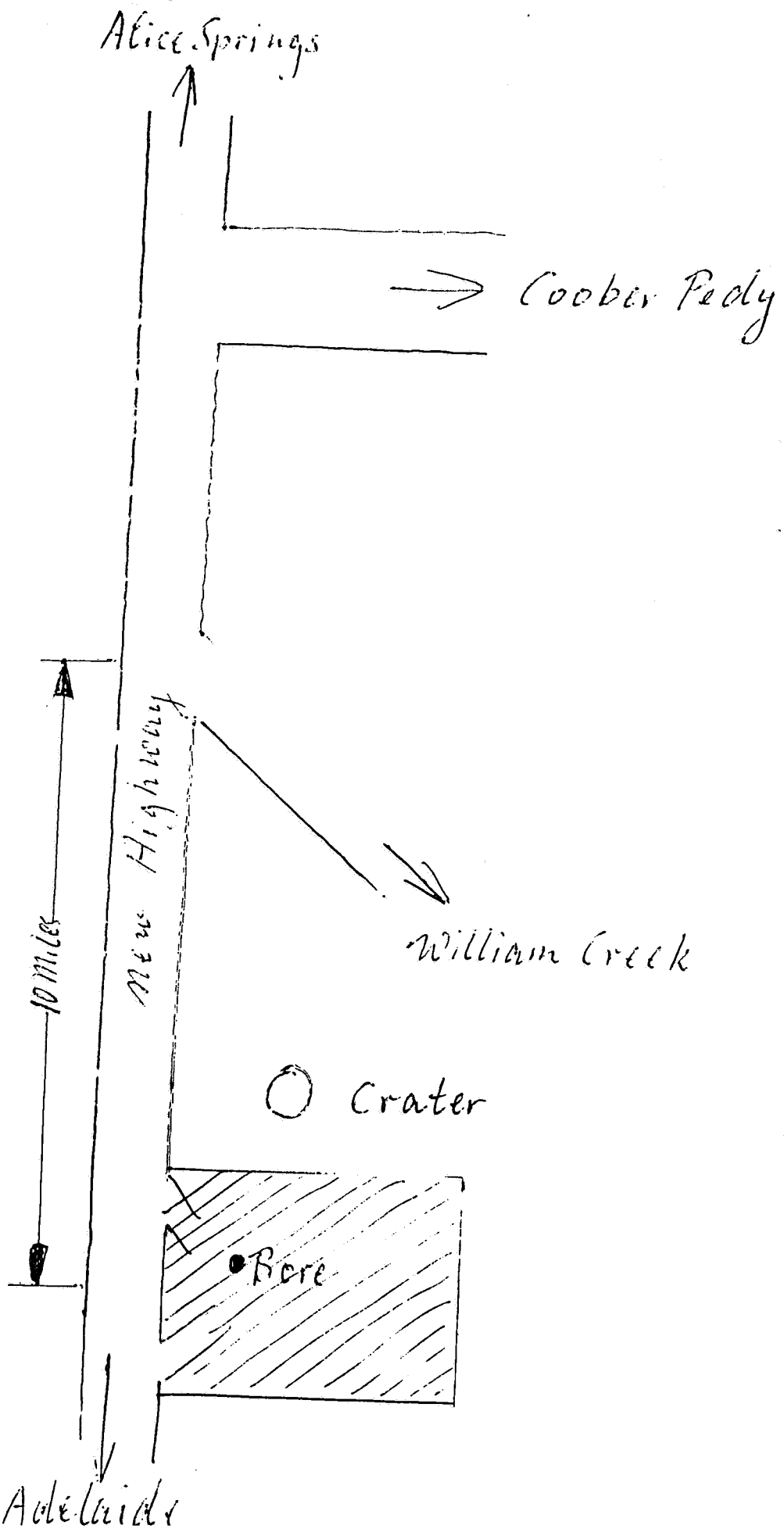
I trust you will view this application in all earnestness and I look forward to hearing from you.

Yours faithfully,

RUEDIGER YANZEN

PS: Please find enclosed a map and location of the proposed site.

4807/84


Alice Springs
Coober Pedy
10 miles
Mens Highway
William Creek
Crater
Bore
Adelaide

MINUTES forming ENCLOSURE to D.L. *No.* 4807 *19* 84

TO THE DIRECTOR, OUTBACK MANAGEMENT:

In letter dated 13 March 1984, Mr. Reudiger YANZEN, P.O. Box 522, COOBER PEDY, makes application to lease land in the Coober Pedy area to set up a Camel Farm to be run in conjunction with a tour business he currently runs in and around Coober Pedy.

His letter details a site he has selected adjacent to the new Stuart Highway approximately 20 Km south from Coober Pedy. He wishes this particular site as it contains a subartesian bore presently used by Contractors for road making. It is expected the bore will become available for use when that section of the Highway is completed later this year.

The site sought by Mr. Yanzen is presently unoccupied Crown Lands, which was formerly part of the Mount Clarence pastoral lease. It is on the escarpment of the Stuart Range which drops away to the East, and is bounded by the Dog Fence. He proposes to instal a set of yards at a site near the bore, to hold the camels, and to allow them to graze the existing vegetation, supplemented by some hand feeding.

He presently owns two camels which are kept in yards adjacent to his dugout near Dead Mans Gully, and are allowed to roam freely to graze near the town.

Following the application by Yanzen, a letter was sent to the Coober Pedy Miners and Progress Association seeking their views on the project. The Association has replied and supports the proposal.

Mr. Yanzen apparently got the idea for his project from viewing a similar one conducted by Noel Fullarton in Alice Springs.

There are factors which are quite relevant to the application, and which must be considered prior to a decision being taken.

1. The land which Yanzen wishes to obtain is Unoccupied Crown Lands and as such is available.

2. The site however does present a problem for the following reasons:

   2.1 It is in close proximity to the new Stuart Highway, and it is problematical whether the Highways Department would agree to such an establishment so close to a high speed road. Two camels grazing near the highway, let alone the 40-45 envisaged, could create a dangerous situation if at any time they got loose at night. This could very easily happen given the actions of vandals in sparsely inhabited areas.

...../2

2. Contd.

2.2 The bore which Yanzen hopes to take over following the completion of road works, is adjacent to the new Highway (designated Bore 63 on attached plan). Details of the bore are -

Depth 122 metres

Casing Depth 122 metres

Static water level 102.5 metres

Recommended pump depth 121 metres

Yield: 3 litres per second

Salinity 32 000 Mg/litre (5oz/gallon)

As can be seen the water is extremely saline, and I would consider totally unsuitable for stock watering.

2.3 The proposed method of grazing the camels would create environmental problems. The vegetation in the Coober Pedy area is sparse. The tableland contains a mix of Saltbush and Bluebush, while drainage lines provides almost the only relief with regard to taller timber. It is a fact that camels are middle and upper storey browsers, and the prospect of 40 or 50 camels grazing the vegetation in the vicinity of Coober Pedy, which is not noted for vegetative extravangance, cannot be lightly dismissed.

To summarise the proposals put forward by Mr. Yanzen I consider -

1. The proposed site for the Camel farm is unsuitable for the purpose.

2. The water supply (which he does not own) is unsuitable for stock watering purposes.

3. The numbers of camels it is envisaged will be kept, are too high for the fragile environment of the area.

4. The applicant has not demonstrated any capacity to be able to provide the finance for such a venture, other than rather vague statements that he had enough money.

28/6/84

CHIEF ADMINISTRATIVE OFFICER,
OUTBACK MANAGEMENT.

MINUTES forming ENCLOSURE to DL *No.* 8155/82 19

TO THE DIRECTOR OF LANDS

Attention: Director, Outback Management

You will note that the Minister of Environment and Planning has approved the accompanying proposal to have a small interdepartmental working party evaluate the options for the future status and use of unallotted crown lands in the arid zone of South Australia, with special reference to the Tallaringa Lands.

You will also note that the Minister has approved the suggestion that the Director of Outback Management and Chairman of the Pastoral Board be Chairman of the Working Party, and I now refer the matter to you for further action.

E.J. Phipps
DIRECTOR-GENERAL

O *MINUTES forming ENCLOSURE to* DL *No.* 8155/82 *19*

TO: Minister for Environment and Planning

FROM: Director, Conservation Programmes

SUBJECT: Tallaringa Block - request from Mabel Creek Pty. Ltd. for pastoral lease tenure

DATE: 4th July, 1984

THROUGH: Deputy Director-General

The principal lessee of Mabel Creek Pty. Ltd. has applied for the issue of pastoral lease tenure over the 5696 km² Tallaringa Block, currently held under Annual Licence 9741, and in his accompanying minute of 16 January 1984, the Director of Outback Management has sought a policy direction from you on the matter.

You may recall discussing this matter with me informally soon after you received the minute referred to above. At the time you concluded that a Government decision was needed on the status and future use of all unallotted crown lands in the arid zone of the State, rather than a policy decision in isolation on Tallaringa: Tallaringa could then be placed in a broader, overall perspective. You indicated that you would discuss this approach with the Director, Outback Management.

I do not know whether the opportunity subsequently arose for such a discussion, but my own view is that the approach you initially decided upon is still the best. The fact that it has been used for pastoral purposes for the past 24 years notwithstanding, there would be some sensitivity attached to conversion of the Tallaringa Block to pastoral lease tenure, and a broader context for a decision is needed. You have currently a working group under the chairmanship of Mr. Gerry Woodroffe reviewing the status and future of unallotted crown lands in the agricultural regions of the State and a similar exercise for the arid zone would be timely.

I have discussed such an exercise with the Director, Outback Management and it has his support. At the same time, we think it should be a relatively informal, preliminary evaluation of the options for you, rather than the more ambitious quasi-public enquiry of the kind being undertaken by Mr. Woodroffe's group. Specifically, we suggest a working group drawn from your Lands and Environment and Planning portfolios. With only one change - the replacement of Mr. B. Lay (Department of Agriculture) by Mr. G. Drewien (Department of Lands) - the group that has been steering the moves to acquire Dalhousie would be quite appropriate, viz.

Mr. Jim Vickery	(Lands)
Mr. Nicholas Newland	(Environment and Planning)
Mr. Gary Drewien	(Lands)
Mr. Colin Harris	(Environment and Planning)
Dr. Sue Barker	(Environment and Planning)

I have been chairing the Dalhousie working party, but in view of his statutory and administrative responsibilities it would be more appropriate for Mr. Vickery to chair this proposed new group. In summary, I suggest the following.

Terms of Reference

To provide for the Minister of Lands and Minister of Environment and Planning a preliminary evaluation of options for the future status and use of unallotted crown lands in the arid zone of South Australia, with special reference to the Tallaringa Lands.

Composition of Working Group

As listed above.

Timetable

To report to the Minister by 31 October, 1984.

Colin Harris

I concur

M.E.P.

TO THE DIRECTOR-~~GENERAL~~
DEPT OF ENVIRONMENT AND PLANNING

for

MINISTER FOR ENVIRONMENT AND PLANNING

19/7/84

MINUTES forming ENCLOSURE to DL....8155/82.....*No.* *19*

Lands Mgt. Dir.

TO THE DIRECTOR-~~GENERAL~~, DEPARTMENT OF ENVIRONMENT AND PLANNING

The Minister has asked for comment please on the attached minute from the Director, Outback Management in the Department of Lands concerning the annual licence known as Tallaringa Block.

SECRETARY TO THE
MINISTER FOR ENVIRONMENT AND PLANNING

28/6/84

TO THE HON. THE MINISTER OF LANDS:-

Inviting attention to the within letter of 26 September, 1983 from the Lessee principal of Mabel Creek Limited seeking Pastoral Lease tenure over the land comprised in Annual Licence 974I known as the "Tallaringa Block".

The subject land is hatchured in green on the appended Land Utilizaation Plan of South Australia, is located outside the Dog Fence west from Coober Pedy, and adjoins the proposed Maralinga Lands to the West.

Whilst the within correspondence refers only to the 5696 Km2 comprised in the above-mentioned Annual Licence, an approximately equal area of unoccupied lands adjoins to the North, thus bringing the total area of "Tallaringa Lands" to almost I2,000 Km2.

Annual Licence 974I has been held continuously since I September, 1959 by Mabel Creek Limited, as reserve grazing, outside the Dog Fence. During this period of 24 years the land has been used for limited ad hoc grazing relief during drought. The subject lands are watered by Tallaringa (Native)Well, three water bores, and two water points provided from water sources inside the Dog Fence via pipeline, and are unfenced to the North and West. This lack of fencing has undoubtedly limited the use of the lands by the Lessees in times of drought.

The subject lands comprise the Eastern limits of the Western Desert Plateau sand-plain, characterised by minor dune formation and supporting a low woodland of Mulga , (Acacia Aneura), with perennial shrub understorey and perennial grasses and seasonal herbage ground cover.

Affirmative response to the within application would normally involve the following procedure:

(I) Bio-physical assessment of the present condition of the subject lands and assessment of the potential impact and permissible levels of future pastoral use;

(2) Subject to:-

(a) Current Government Policy; and

(b) An appropriate Pastoral Board recommendation;

your approval to Gazette the lands open for general application for Pastoral Lease tenure for a term of 2I years with the statutory right of a further lease for 42 years to follow, under the provisions of Part III of the Pastoral Act.

..2.

Having regard to current public attitudes and concern for environmental and resources use issues, the Pastoral Board is extremely conscious of the fundamental significance of current Government policy in the above procedural chain; and considers that a policy direction should precede the potential expenditure of funds and other resources on an extensive bio-physical assessment of the subject lands.

The matter is thus referred to you seeking a direction on the basis of current Government policy in respect to future use, and to the grant of new Pastoral tenure(s) over the subject lands.

In considering this question; and possibly discussion with your Cabinet colleagues, it is suggested that the following summarised factors are relevant:

I. The "Tallaringa Lands" totalling approximately I2,000 Km2. constitute an infrequently used and partly occupied area of land between the proposed Maralinga Lands and the western limit of traditional pastoral occupation.

2. The "Tallaringa Lands" comprise:

(a) Annual Licence 974I of 5696 Km2 which:-

* Has been subject to that tenure for almost 25 years:

* is watered by Tallaringa (Native) Well, three sub-artesian bores, and two water points piped from water sources within the Dog Fence on Mabel Creek Run , and

* has been subject to intermittent pastoral use over the above 25 year period of Annual Licence tenure:

and

(b) Hitherto unallotted Crown Lands adjoining Annual Licence 974I to the North, and also approximating 6000 Km2 in area.

3. Having regard to the above facts and past history the "Tallaringa Lands" are in all probability suitable for pastoral occupation, either as continued relief grazing, and/or by a new entrant to the pastoral industry.

4. Proper condition, and potential pastoral impact, assessment would if undertaken establish a data base for appropriate future monitoring and management of such potential future use; and

5. Application of pastoral use and tenure to the subject lands would result in a dramatic increase in rental revenue therefrom, from the present $220 per annum, to a figure potentially in excess of $I2,000 per annum.

A policy decision and further direction is awaited with interest.

James Tuckey

DIRECTOR, OUTBACK MANAGEMENT
CHAIRMAN, S.A. PASTORAL BOARD

16/I/84.

EXTRACT FROM PASTORAL BOARD MINUTES 12.12.83

The Board notes that portions of the Commonage Reserve are currently held under Miscellaneous Lease by the Iron Knob Pony Club and/or used for grazing purposes by Mr. E.J. Marshall under Annual Licence conditions.

The Board is concerned that the alienation of portions of the Reserve may not be seen by the local community as the most appropriate use of the resource. An alternative would be to authorise Commonage grazing Licences rather than allow the fencing of specific areas.

The Board RESOLVED to request the Pastoral Inspector to report with relation to the current use of the Commonage Reserve by the Iron Knob Pony Club and Mr. E.J. Marshall respectively. In the meantime Mrs. Harvey will be advised that her request is being investigated.

* 6.5. DL 8155/82 Pastoral Lease 2191 Mabel Creek

The Board received a report from the Senior Administrative Officer, Outback Management concerning an application from Mr. I. Rankin, for Mabel Creek Pty. Ltd. for amalgamation of the Tallaringa Well Block into the adjoining Mabel Creek Run. Tallaringa Well Block (area 2000 square miles approximately) is held by Mabel Creek Pty. Ltd. under Annual Licence conditions.

The Board records that the Tallaringa Well Block is in excess of the area which may be allotted to an adjoining Pastoral Lessee under Section 42c(7) of the Pastoral Act 1936-1980 and must be gazetted open to general application if the proposal is to proceed. Footnoting to the Mabel Creek Pastoral Company Pty. Ltd. would not be permitted unless it could be shown that the Mabel Creek Pastoral run was deemed to be a sub-standard holding.

The Board is agreed that the lessee's application should be deferred pending a full assessment of the Tallaringa Well Block by the Outback Management Rangelands Technicians. The lessee will be advised.

6.6. DL 8326/82 Pastoral Lease 2465 Wiawera

The Board received a report from the Senior Rangelands Officer, Outback Management with relation to seasonal conditions and management of the Wiawera Pastoral run. At this stage the Lease is carrying 1110 sheep evenly distributed throughout the property. The lessee proposes a double lambing programme to increase stock numbers without exceeding the agreed limit of 2500.

Mr. K.H. Treloar is hopeful of being able to purchase the interest of his Co-Lessees in the near future and will run Wiawera in conjunction with his Yarramba Lease. The Board is agreed that Wiawera can only be considered as a build-up proposition.

A full report will be submitted shortly.

DEPARTMENT OF LANDS

144 King William Street, Adelaide, S.A.
Box 1047, G.P.O., Adelaide, S.A. 5001
Telephone No. (08) 227 2076
Office of the Director

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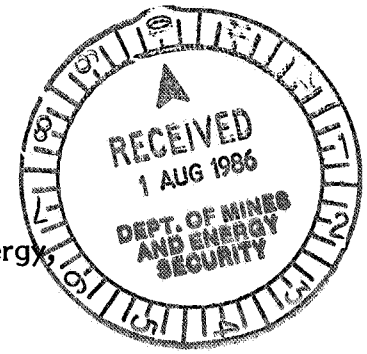


31st July 1986

Mr. R.K. Johns,
Director-General,
Department of Mines and Energy,
191 Greenhill Road,
PARKSIDE. 5063

Dear Mr. Johns,

Enclosed are copies of papers relating to a proposal from the Chairman of the Environmental Protection Council for the establishment of a Land Use Management Committee under a Land Use Management Act.

The Deputy Premier and Chairman of the Resources and Physical Development Committee has now formally requested our Land Resource Management Committee to prepare comments on this proposal.

To assist the Committee I also enclose copies of the Cabinet submissions on the new Crown Land Conservation and Management Act (approved), the Pastoral Lands Conservation and Management Act (deferred), and more details of the Council and Regional Committees.

The background to these submissions is contained in the report, "Government Land Resource Management in South Australia - A Perspective" which the Committee considered and accepted last year as a basis for moving towards improving land resource management and preparing legislation.

The above Acts deal with Crown Land but the proposed Advisory Council can have the same powers as our Committee to deal with all land resource management issues by administrative approval of Cabinet (when considered appropriate).

The concept of trying to separate out the land resource management functions in my Department for transfer to Environment and Planning fills me with horror; apart ;from the staff reactions.

It would destroy the regional network of the Department and the essential close relationship of land resource management with the Survey and Valuation functions and lease administration. The land resource inventory is also an essential part of the Land Information System being developed by the Department which made rapid strides when the Titles Office was transferred into this Department. Transferring out land resource management would have a contrary effect.

However, leaving this aside as what might be perceived as vested interest on my part, my strong view is that we must keep firm control of the situation through our Committee and gradually, by working together, rationalise our activities through joint studies such as

the North Flinders and explore quietly legislative and organisation change if and as necessary. I consider the changes envisaged by the Environmental Protection Council would raise too much unnecessary trauma and costly organisational investigations probably by consultants - things could well get out of hand. This is particularly the case in terms of the budget restraints with which we are trying to cope.

The Environmental Protection Council in my view is not performing its correct role. The operating Departments should be given overall Governmental environmental policies and targets to achieve and get on with developing practical land management policies and targets within the overall framework that this body, assisted by Environment and Planning, should be providing after Government endorsement. There is then no conflict of interest by planners and operators doing their own thing.

Would you please consider the issues raised for initial discussion at our next meeting. We need not necessarily finalise our recommendations but it may well be desirable to do so. We should at least make a clear response to the proposal by early September.

Basically we are faced with either a costly investigation (estimated at $2m based on my experience of these studies) with a major upheaval and certainly strong opposition or with quietly working together to co-ordinate and rationalise our resources and programs through the Land Resource Management Committee.

Yours sincerely

Chairman
LAND RESOURCE MANAGEMENT COMMITTEE

Environmental Protection Council

55 Grenfell Street,
Adelaide, South Australia 5000
Telephone (08) 216 7777

G.P.O. Box 667,
Adelaide,
South Australia 5001

Reference

Contact Officer

26 June 1986

Mr D. Alexander,
Chairman,
Land Resource Management Committee,
Department of Lands,
GPO Box 1047,
ADELAIDE 5001

Dear Mr Alexander,

Thank you for giving me the opportunity to discuss with you your proposal for a South Australian Land Resource Management Council and the Environmental Protection Council's submission to the Minister for Environment and Planning, suggesting the establishment of a Land Use Management Committee under a Land Use Management Act.

The EPC has now examined this matter further and makes the following comments:

- the model suggested by EPC is intended to cover both private and public land as it is considered that this would achieve the maximum benefit, it could if necessary be restricted initially to government land;

- the structure proposed by EPC would, in its opinion, provide a more effective integrated management and policy formulation mechanism, which could also provide advice to Cabinet through the Chairman of the Cabinet Committee on Physical Resources and Development;

- Council considers that the Chairman of the Committee should be independent of existing government departments and be available for two to three days per week;

- it is thought that the government membership of the Central Committee should comprise senior departmental experts who are available for a reasonable amount of time for work associated with the functions of the committee.

- it is considered to be essential that the use of departmental resources be rationalised; the functions of the Surveyor General, Valuer General and Registrar General being retained by the Lands Department, other functions being transferred to the Department of Environment and Planning which already has a multi-purpose role. This Department would then be responsible for the Land Use Management Act and other legislation at present administered by the Lands Department. Resources at present employed in the Department of Agriculture for pest and weed control should also be transferred.

/2.

It is considered that these measures would then ensure more effective land use planning and management than is presently achieved by any of these departments;

- the Land Use Management Committee should be serviced by its own secretariat, the range of expertise allocated to this would necessarily depend on the commitment of the government committee members.

Finally Council reiterates its previous recommendation that a small working party be convened by the Department of Environment and Planning, with representatives from the Department of Lands and the Department of Agriculture, to prepare a more detailed report on the structure of the proposed organisation and the proposed legislation.

It is considered that the investigation could not be achieved in less than three months, but should not in any circumstances take longer than six, and should include an examination of the Victorian and West Australian legislation.

Yours sincerely,

Hon. G.R. Broomhill
CHAIRMAN

c.c. Minister for Environment and Planning
Mr L. Yelland, Department of Lands

AGENDA ITEM 5

MINUTES forming ENCLOSURE to MEP 635/86

THE CHAIRMAN - LAND RESOURCE MANAGEMENT COMMITTEE

The Chairman of the Environmental Protection Council has raised with me as Minister for Environment and Planning the issue of future land-use management and in particular sought the views of the Land Resource Management Committee.

I referred their submission to the Minister of Lands who has indicated herein that he approves of your holding discussions with the Chairman of the Environmental Protection Committee and establishing a line of communication.

In the circumstances I would be pleased if you would formally include the issues raised by the Council on your agenda.

(Don Hopgood)
CHAIRMAN OF THE RESOURCES AND
PHYSICAL DEVELOPMENT COMMITTEE

RECEIVED
- 1 JUL 1986
REGISTRY OFFICE

Land development — No

MA pp SL

DIRECTOR of LANDS

MINUTES forming ENCLOSURE to

TO THE DEPUTY PREMIER

The Director of Lands and Chairman of the Land Resource Management Committee has prepared interim comments on the matter you referred from the Environment Protection Council Chairman. The issue requires very careful consideration as does all land legislation and I am confident that the Land Resource Management Committee is the best forum for dealing with these matters. Indeed, it has already accomplished a great deal in establishing a base for sound progress.

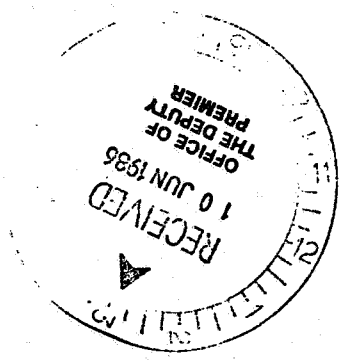
I approve of the Chairman and Director of Lands holding discussions with the Chairman of the Environment Protection Council and establishing a line of communication.

I suggest that you, as Chairman of the Resources and Physical Development Committee, request the Land Resource Management Committee, to formally include the issues raised by the Environment Protection Council on its agenda.

RkA

MINISTER OF LANDS

5/6/86.



EQ2707-1

MINUTES forming ENCLOSURE to

TO THE MINISTER OF LANDS

The Land Resource Management Committee at its meeting on Thursday, 22nd May considered the report from the Environment Protection Council.

This report proposed the preparation of a Land Use Management Act "to enhance private and public land management in South Australia". The Act would be administered by staff currently involved in land resource managment but policies could be formulated and approved by a multi-disciplinary Central Land Use Managment Committee having representatives from public agencies and private organisations.

In referring the report to the L.R.M. Committee the Deputy Premier points out that the proposal parallels some of the work done by myself and presented to the Resources and Physical Development Committee. He felt the issues raised fell within the ambit of the L.R.M. Standing Committee.

Justice could not be done to the report due to its late arrival and the heavy agenda.

However, the Committee requested that I, as Chairman, prepare interim comments. These are:-

1. The Land Resource Management Committee was recalled by the Minister of Lands last year and began meeting to consider formalising its establishment and terms of reference.

2. The main matter considered was the report, "Government Land Resource Management in South Australia - A Perspective", by the Director of Lands.

   Other land resource matters raised by the members were dealt with as well.

3. With the support of the Committee, the above report was submitted to the Resources and Physical Development Committee of Cabinet as a basis for developing new Crown Land legislation and formally establishing the Land Resource Management Committee.

4. The Cabinet Committee on 10/3/86 approved the Land Resource Management Committee membership and terms of reference, and also the preparation of a full Cabinet submission on a new Act, the Crown Land Conservation and Management Act. Details are attached.

5. On 12/5/86 Cabinet approved the preparation of the Act for presentation to Parliament later this year.

6. The main feature of this Act germane to this discussion, is the proposal to establish a S.A. Land Resource Management Council, details of which are attached.

7. The Land Resource Management Committee is the precursor to this Council. Whilst the Council is established under the new Act dealing with Crown Land (80% of the State), its functions can be extended to those of the Land Resource Management Committee with administrative approval by Cabinet.

8. The Council and its regional and specialist advisory committees could then be able to co-ordinate and advise Ministers on the full range of land resource management activities with both departmental and community inputs. The Land Resource Management Committee will be considering these aspects.

9. Following establishment and a period of practical experience, the Government may well ask the Council to advise on the preparation of a Land Use Management Act. It will have a ready made forum for consultation and advice for this purpose.

Any proposal for such an Act will have to be very sensitively handled and certainly not rushed.

10. In the meantime, the Land Resource Management Committee is the appropriate body to advise the Government on the above and on practical land resource management matters and provide the necessary co-ordination as per its terms of reference. No doubt working parties will be established to report to the Committee on specific tasks.

11. The Land Resource Management Committee consider that the matters raised by the Environment Protection Council are within its ambit and charter from the Government but that communications should be established with the Environment Protection Council so that mutual understanding is developed and also, perhaps, some broad overall environmental policies, guidelines and performance indicators can be developed for the practical land managers to work within and achieve.

12. A key factor in co-ordinating and managing the use of Government land resources will be the State Land Information System being development by the Land Information Management Committee. This Committee will be transferred under the guidance of the Land Resource Management Committee in the near future. The Department of Lands is providing the staff support, co-ordination and technical backup to the State Land Information System.

MINUTES forming ENCLOSURE to

Finally, the Land Resource Management Committee has a heavy workload for its future agendas and will be meeting monthly dealing with a wide range of issues related to land resource management and particularly in reviewing legislation and those issues raised in the report from the Environment Protection Council.

D J Ment

CHAIRMAN, LAND RESOURCE MANAGEMENT COMMITTEE
and
DIRECTOR OF LANDS

30/5/86

EQ2707-1

Government Land Resource Management

Results of Cabinet Submission (10/3/86).

The Resources and Physical Development Committee of Cabinet approved the following recommendations:-

1. That the Department of Lands report "Government Land Resource Management in South Australia - A Perspective" by the Director of Lands be accepted as a basis for a consultative process to develop policy and management procedures for Government land resource management but subject to the standard disclaimer in regard to approved Government policy.

2. That, arising out of this report, the Government adopt a user and community involvement advisory network approach similar to the S.A. Water Resource Council and its Advisory Committees for land resource management rather than the traditional powerful statutory board approach.

3. That a new Act - the Crown Land Conservation and Management Act to cover the whole State - and amendments to the Pastoral Act as a specialist Act for the pastoral industry, be drafted and then be subject to consultation with outside parties.

4. That Cabinet formally approve the recall of the Land Resource Management Committee as an interim consultative and co-ordinating mechanism between land related Departments with a membership of:

   Chairman: Director of Lands

   Members: Director-General and Engineer-in-Chief
   Director-General of Environment and Planning
   Director-General of Mines and Energy
   Director-General of Agriculture
   Director of Woods and Forests

   The right to co-opt other agencies (e.g., Tourism, Treasury, Highways Department) as deemed necessary by the Chairman of the Land Resource Management Committee.

   Executive Officer: Chief Project Officer (Policy)
   Department of Lands.

The original recommendation 3. was varied slightly to provide for the drafting of the new Act and the amendments to the Pastoral Act prior to consultation with outside parties. Recommendation 4. was endorsed with the proviso of the right to co-opt other agencies as indicated.

During discussion, the Chairman of the Resources and Physical Development Committee mentioned that he had been approached by the Environment Protection Council with a proposal for land management committees to deal with pest plants, vermin, etc. He had suggested that the Council address the Resources and Physical Development Committee on this. However, he has sought the views of the Director of Lands on the best way of handling this and the Director's involvement in the matter.

LAND RESOURCE MANAGEMENT STANDING COMMITTEE

1. Membership

Chairman:	Director of Lands
Members:	Director-General and Engineer-in-Chief Director-General of Environment and Planning Director-General of Mines and Energy Director-General of Agriculture Director of Woods and Forests

The right to co-opt other agencies (e.g. Treasury, Highways Department) as deemed necessary by the Chairman of the Land Resource Management Committee.

Executive Officer:	Chief Project Officer (Policy) Department of Lands.

2. Terms of Reference

1. Co-ordinate and monitor inter-departmental management of the State's land resource.
2. Identify emerging land management issues that will require inter-agency action.
3. Over-view the preparation of land resource legislation.
4. Over-view the preparation of the Government Property File (already approved) and monitor the Land Information System.
5. Identify policy formulation needs that will impact on Departments involved in land resource management.
6. Report to the Cabinet Sub-Committee on Resources and Physical Development.

MINUTES forming ENCLOSURE to

To the Members of the Land Resource Management Standing Committee

Could you please peruse the attached response to the Deputy Premier arising out of Item 10 of the meeting on Thursday May 22nd - proposal on Land Resource Management by the Environmental Protection Council.

Would you let me have any comments by Friday May 30th please - telephone 227 0728.

Leith Yelland
CHIEF PROJECT OFFICER, POLICY

27 /5/86

EQ2707-1

MINUTES forming ENCLOSURE to MEP 635/86

TO THE MINISTER OF LANDS

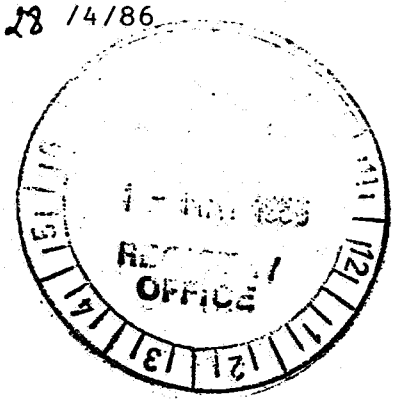
The Environmental Protection Council has raised with me the issue of land use management. They have prepared a paper, attached, which parallels some of the work recently undertaken by the Director of Lands and presented to the Resources and Physical Development Committee.

I believe the issues raised fall into an ambit of the Land Resource Management Standing Committee.

I would appreciate you forwarding it to that Committee for consideration at their next meeting. I believe the Standing Committee will be considering related matters at this meeting and therefore I think it is particularly appropriate that this paper is also discussed.

DEPUTY PREMIER
MINISTER FOR ENVIRONMENT AND PLANNING

28/4/86



minister of lands
MA pres c

Environmental Protection Council

55 Grenfell Street,
Adelaide, South Australia 5000
Telephone (08) 216 7777

G.P.O. Box 667,
Adelaide,
South Australia 5001

Reference

Contact Officer

JS:GVK

4 April, 1986

Hon. D. Hopgood,
Deputy Premier & Minister for Environment & Planning
55 Grenfell Street,
ADELAIDE, S.A., 5000.

Dear Dr. Hopgood,

Please find enclosed Council's submission on the issue of future land-use management, as discussed recently with you and as mentioned in your letter dated 19 March, 1986.

Council will be interested to learn of any further developments in this regard and particularly the views of the Land Resource Management Standing Committee.

Yours sincerely,

G.R. Broomhill,
CHAIRMAN.

Enclosure.

LAND USE MANAGEMENT ACT

1. Introduction

When commenting on the Lewis Committee's Report on "Bushfire Prevention and Electricity Distribution the Environmental Protection Council suggested that the Government, rather than setting up yet another network of specialist committees, should consider establishing more generalised Land Use Management Committees under the control of a Central Committee.

At the request of the Minister for Environment & Planning Council has progressively elaborated on this proposal for the introduction of Land Use Management Committees and has now prepared this submission, to the Land Resource Management Committee.

2. Proposal

It is proposed that a Land Use Management Act be drawn up to enhance private and public land management in South Australia with the aim of implementing the National Conservation Strategy by:

(1) protecting ecological processes & life support systems;

(2) preserving genetic diversity;

(3) ensuring the sustainable use of non-renewable resources;

(4) maintaining and enhancing environmental qualities.

Thus the Act will encompass the work of existing more specialised committees dealing with weed and pest control, soil erosion, bushfire protection measures and the management of indigenous vegetation and other land use matters.

The Act would be administered by staff currently involved in land resource management but policies could be formulated and approved by a multi-disciplinary Central Land Use Management Committee having representatives from the relevant public agencies and private organisations.

The composition of the Central Committee could comprise for example of representatives from Environment and Planning (National Parks and Wildlife Service and Conservation Programmes), Lands Department, Engineering and Water Supply Department, Country Fire Services, Department of Agriculture, Woods and Forests Department, Local Government, United Farmers and Stockowners and the Conservation Council. The Central Committee and its sub-committee would be able to call on additional expertise as required to deal with specific problems. The Chairman of the Central Committee should be appointed by the Minister.

It is essential that members of the Central Committee should be persons having a broad perspective of land use management problems and that this Committee be assisted by a number of 'expert' sub-committees composed of at least two representatives of the Central Committee and several representatives from the appropriate area of expertise covered by the sub-committee, for example pest plants or bushfire management. These sub-committees would work on general or specific problems originated by the sub-committee or the Central Committee but the Central Committee would be responsible for the development and adoption of programmes and policies. All communication to the Regional Committees would be through the Central Committee unless specifically authorised by the Central Committee, thus ensuring proper co-ordination of activities and consistency of policy.

Regional Committees would also have representatives of government agencies responsible for land management in the region and an appropriate range of regional expertise drawn from other organisations having land management responsibilities in the area. Again there should be provision for co-opting individuals with special expertise to deal with specific problems.

The responsibilities of the Land Use Committees would cover the work of the existing more specialised committees and in addition the Committees would comment on land management plans, reports prepared by government and semi-government agencies.

It is suggested that the resources at present employed in servicing the present committees be brought together within the Department of Environment and Planning and used to service the new committees.

The Chairman of the Central Committee should be apppointed by and report to the Chairman of the Cabinet Committee on Physical Resources and Developments. The structure of the proposed organisation is shown in the attached diagram.

3. Rationale

1. Currently land management problems such as weeds, pests, soil erosion and bushfire hazards are handled by independent authorities acting under separate items of legislation which are sometimes in conflict, each authority having its own staff and responsibilities.

2. The problems mentioned are widespread and many have proved somewhat intractable, and occasionally contentious, under the present legislation.

3. At present, in trying to solve one problem, others may be created or exacerbated. For example, the control burning of vegetation under one piece of legislation can, in some situations, lead to weed infestation, soil erosion and to the displacement of indigenous species protected under other legislation. Often a worse fire hazard may be created than originally existed unless a much higher land management input is available than was previously necessary.

4. There are relatively few individuals who are sufficiently competent and available to serve on government committees, and prepared to work for the good of the general community, hence those available should be used to the best advantage.

5. A Land Use Management Act would allocate land management responsibility to one authority which would be required to take account of a range of problems and would thus not be able to deal with a problem in isolation. It would enable resources to be used more efficiently and hence land owners would be served more effectively as problems would be considered in a more coherent manner and the number of site visits should be reduced. In addition, the subsequent amendment of legislation should be relatively easy.

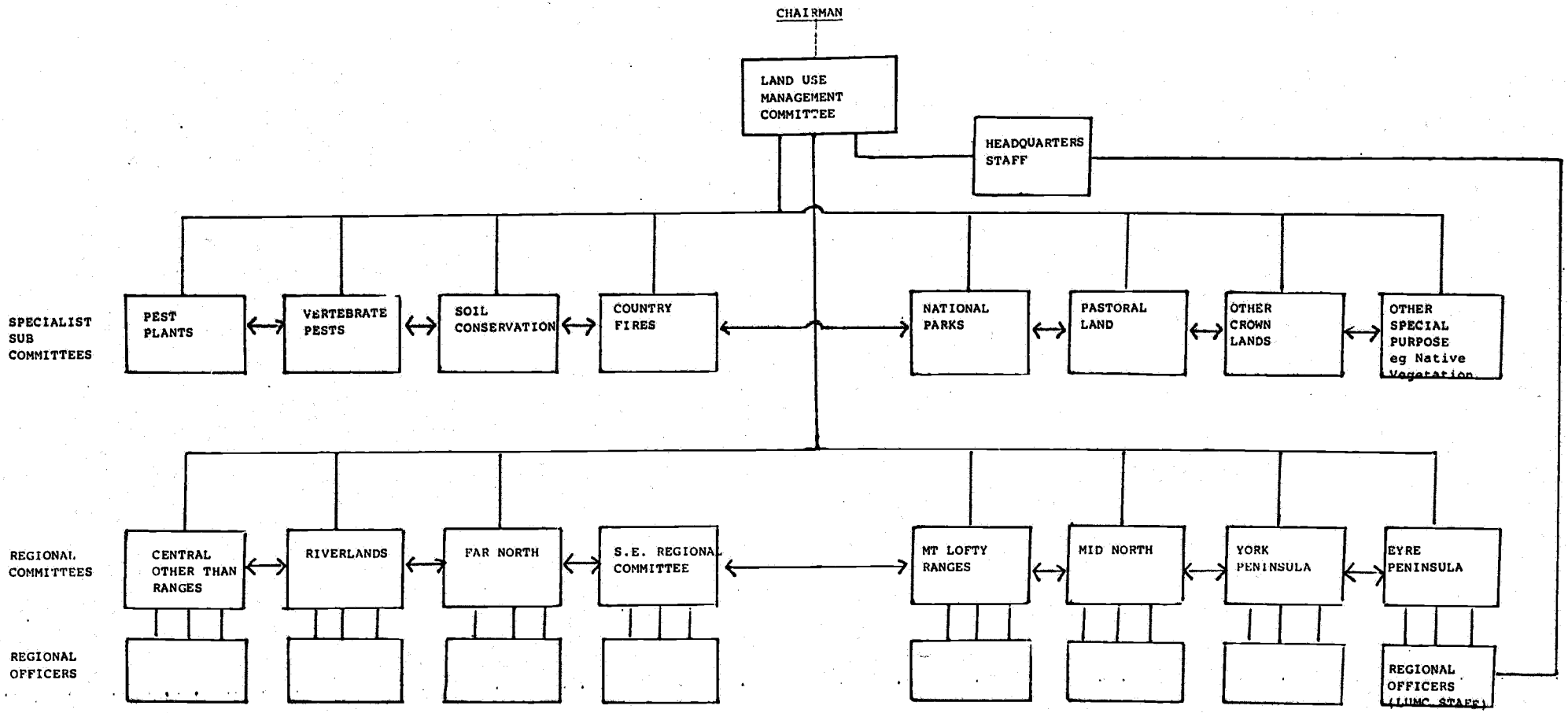
6. There is an existing Land Resource Management Committee but this has no statutory responsibility and, to date, would not appear to have played a significant role in solving the problems mentioned.

The establishment of a Land Use Management Committee with statutory responsibilities and served by specialist sub-committees to assist in the development and implementation of policies would in itself encourage the development of more effective policies and integrated thinking, and hopefully assist in the land management process on government lands as well as elsewhere.

4. Recommendation

It is recommended that a small working party be established under the chairmanship of Mr. C. Harris, Director, Conservation Programmes Division of the Department of Environment & Planning, with representatives from the Department of Lands and the Department of Agriculture, to prepare a more detailed report on the structure of the proposed organisation and the proposed legislation.

It is considered that investigation could not be achieved in less than three months, but should not in any circumstance take longer than six.


CHAIRMAN
LAND USE MANAGEMENT COMMITTEE
HEADQUARTERS STAFF
SPECIALIST SUB COMMITTEES
PEST PLANTS
VERTEBRATE PESTS
SOIL CONSERVATION
COUNTRY FIRES
NATIONAL PARKS
PASTORAL LAND
OTHER CROWN LANDS
OTHER SPECIAL PURPOSE eg Native Vegetation
REGIONAL COMMITTEES
CENTRAL OTHER THAN RANGES
RIVERLANDS
FAR NORTH
S.E. REGIONAL COMMITTEE
MT LOFTY RANGES
MID NORTH
YORK PENINSULA
EYRE PENINSULA
REGIONAL OFFICERS
REGIONAL OFFICERS (LUMC STAFF)

TO THE PREMIER: FOR CABINET:

1. PROPOSAL

That approval be given for the preparation of a draft Bill (other than in relation to the Pastoral Act) which will consolidate and rationalise existing Crown land tenure Acts and in the process repeal related anachronistic legislation.

2. BACKGROUND

2.1 On 7.3.83 Cabinet approved the preparation of a detailed submission for the drafting of legislation to consolidate all existing Crown land tenure Acts, abolish the Land and Pastoral Boards and rationalise the administration and management of Crown lands, dedicated lands and other lands of the Crown.

3. DISCUSSION

3.1 In the 3 years since that time considerable debate and consideration has been given to -

- the whole question of Government land resource management throughout the State and the role the Department of Lands should play in this field;
- the need for a disciplined and co-ordinated process of scientific land assessment, planning, management and administration with respect to lands of the Crown;
- the need for public participation in the management of such lands through an appropriate consultative process;
- the need for co-ordinated inter-action with other Government Departments; and
- the need to enact modern land legislation which reflects the Department of Lands' change in role to that of the Government's conserver and manager of the lands of the Crown.

3.2 In this connection I submitted to the Resources and Physical Development Committee on 10.3.86 a paper which -

- outlined the history of the legislative review that has taken place since 7.3.83;
- presented the Department of Lands report "Government Land Resource Management in South Australia - A Perspective" which details the perceptions for the future role and approach of the Department in terms

3.2 cont.

of the land resource management function and refers to its ability to make a major contribution in multi-agency co-ordination and long term goal setting with respect to the Government-wide function through the proposed L.R.M. Council;

- foreshadowed the preferred future management structure in terms of the land resource management function;

- sought approval for the recall of the Land Resource Management Committee as a forerunner to the proposed Council and Advisory Committee structure; and

- recommended that a submission be prepared seeking Cabinet approval for the drafting of a new Act (the Crown Land Conservation and Management Act) to cover the whole State and to amend the Pastoral Act as a specialist Act for the pastoral industry incorporating a management structure which conforms with that proposed in the new Act.

3.3 The Resources and Physical Development Committee endorsed all the recommendations of my paper and further, agreed that the new legislation should be drafted prior to further consultation with outside parties.

3.4 In this regard your attention is invited to the following appendices -

Appendix 1 - an outline of the new Crown Lands Conservation and Management Act focusing on the major concepts proposed;

Appendix 2 - a brief statement in relation to amendments envisaged for the Pastoral Act;

Appendix 3 - a listing and explanation of the statutes proposed to be repealed; and

Appendix 4 - copy of the submission to the Resources and Physical Development Committee (a copy of the "Perspective" is also attached).

3.5 Notwithstanding the above, at this stage, I am only seeking approval for the drafting of the Bill in respect to the new Crown Lands Conservation and Management Act and the repeal of associated statutes.

The Pastoral Act proposals will be the subject of a separate submission in the future when the precise requirements and future direction of administration and management have been settled upon.

3.6 In relation to the new Act, if, as a result of further consultations and negotiations, variations of a significant nature to the principles, etc. contained in Appendix 1 are agreed upon, they shall be specifically referred to in any further submission to Cabinet seeking approval for the Bills introduction to Parliament.

3.7 It must be emphasised that this Act represents a new direction in land resource management and administration. As foreshadowed in the "Perspective", it is moving towards an advisory network which will enable a much broader input from the community and interest groups as distinct from narrowly based powerful statutory Boards.

The Minister and the Government will be able to implement new land resource management policies more readily but will still be constrained by the prescriptive clauses in the Act and the input from the Land Resource Management Council. This direction is consistent with modern land regulatory profiles and more community involvement in decision making.

3.8 Cost

No variations to budget allocations are anticipated.

3.9 Staffing

The appropriate staff skills required to successfully pursue the Department's change in direction include land resource scientists and technical officers. All staff appointments during the last few years have been made with this requirement in mind. It is not envisaged that additional resources will be necessary in this regard.

4. RECOMMENDATION

4.1 It is recommended that approval be given for the drafting of a Bill to -

- repeal all of the present Acts relating to the administration of Crown lands with the exception of the Pastoral Act; and
- enact a new Crown Lands Conservation and Management Act which

(i) preserves existing tenural rights under the Acts to be repealed;

(ii) provides for the on-going administration of those tenures (subject to an appeals system) and of all unalienated Crown lands in appropriate divisions of the Act;

(iii) abolishes the Land Board and establishes an appropriately representative Land Resource Management Council and Advisory Committee network; and

(iv) clearly places responsibility for the administration of the Act with the Minister of Lands;

MINISTER OF LANDS

6/15/86.

EQ2807-1

Appendix I

CROWN LANDS CONSERVATION AND MANAGEMENT ACT

PART I PRELIMINARY

General: This part should include

- the usual introductory clauses
- a statement of intent comprising of a summary of the Act's objectives
- an index of the Act
- transitional provisions to protect lessees' and registered interests in the current tenures issued under the Acts proposed to be repealed by the new Act (see Appendix 4), and
- appropriate definitions of terms.

PART II ADMINISTRATION

General: This part provides for the preferred management structure in terms of the administration of the new Act.

New Initiatives: This part will establish the South Australian Land Resource Management Council which is to comprise of 12 members as follows -

Chairman	Director of Lands
Government Members	Permanent Heads of the Departments of Environment and Planning, E. & W.S., Agriculture, Mines and Energy, Woods and Forests
Other Members	Representatives of the Local Government Association, Conservation interests, Primary Production (2), Land Development Industry, Tourist Industry

Chg min APGA

Repl. from Mines & Petroleum Industries?

The Council's functions will be -

(a) to advise the Minister in relation to any matter referred to it by the Minister or his delegate arising out of or concerned with the administration of the new Act or other Acts committed to the Minister dealing with lands of the Crown;

(b) to consider any matters of significance raised by any member of the Council pertinent to the administration of the new Act or other Acts committed to the Minister dealing with lands of the Crown;

(c) to co-ordinate and oversee the preparation of a status inventory and report in respect to Crown land resources under the control of the Minister at such periods as the Minister may determine on the advice of the Council;

(d) to co-ordinate and oversee the activities of Advisory Committees established pursuant to the new Act; and

(e) to perform any other function, as directed by the Minister, relevant to the administration of the new Act or others Acts committed to the Minister dealing with lands of the Crown.

This part will also provide for the Minister to establish a network of Advisory Committees under the auspices of the Council which will consider and report on a wide range of land management/administration issues. they will comprise predominantly of outside representatives and, together with the Council, provide significant opportunity for public participation and input to the management of the Crown's estate.

The other major feature of this Part will be the establishment of an appeals mechanism similar to that provided for under The Water Resources Act.

This part will, in effect, abolish the Land Board.

PART III DIVISION OF LAND

General: This part carries forward the Minister's powers and procedures under the Acts to be repealed in respect to -

- Counties, Hundreds and Towns
- Acquisition of Town Lands Prior to Closure of Town
- Irrigation Areas
- Lands Set Apart for Discharged Soldiers
- Lyrup Village Settlement

PART IV MANAGEMENT AND CONTROL OF LANDS OF THE CROWN

General: This part will clearly provide that the Minister must actively manage the lands under his control in terms of sound land conservation and management practices having regard to environmental, economic and social needs.

New Initiatives: This part will provide for and formalise a land management plan process involving wide public consultation.
It will also clearly state what are offences on land belonging to or vested in the Crown and provide for appropriate penalties.

PART V DEDICATED LANDS

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to -

- creation of dedications
- Trust Grants
- management of dedicated lands, and
- resumption of dedicated lands and removal of Trusts.

New Initiatives: In order to provide a wider range of land management options, this part will authorise the Minister to appoint a Board of Trustees (which will be a body corporate) to manage a parcel of land in accordance with a plan of management.

PART VI GRANTS OF CROWN LANDS AND DISPOSAL OF LANDS OF THE CROWN

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to -

- Alienation in Fee Simple
- Sale of Land
- Sale of Land to Owner of Other Lands
- Conversion of Existing Tenures
- Conditions of Grants
- Mortgages and Agreements for Sale and Purchase
- Disposal of Lands of the Crown

New Initiatives: The spirit of this part will dictate that the Minister may sell the fee simple of land in accordance with criteria laid down by the Council.

It will also provide for -

(a) conditions to be included in new Land Grants;

(b) the Minister to lend to a person portion of the purchase money of land to be secured by a mortgage registered over the land in favour of the Minister; and

(c) the Minister to dispose of surplus Government properties after having been certified as no longer required by the relevant Crown Minister of instrumentality, (such certification not required under present Act).

PART VII EASEMENTS

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to the grant of easements.

PART VIII MISCELLANEOUS LEASES

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to the granting of Miscellaneous Leases.

PART IX LICENCES

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to the granting of licences.

New Initiative: This part will provide for licences to be issued for any term not exceeding 10 years in lieu of current limitation of one year.

PART X PERPETUAL LEASES

General: This part carries forward only those ministerial powers, etc. under the Acts to be repealed in respect to perpetual leases deemed necessary having regard to the new initiative discussed below.

New Initiatives: In line with the direction during the last few years of not issuing new perpetual leases because of their uneconomic nature and difficulty of management, this part will not provide for new perpetual leases to be issued. It will only provide for such leases to be reissued over lands currently held under perpetual lease following surrender or for Crown land to be added to existing perpetual leases.

PART XI PROVISIONS APPLICABLE TO LEASES AND AGREEMENTS

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to -

- Conditions in Leases and Agreements
- Financial Matters
- Surrenders
- Transfers and Mortgages
- Divisions, Amalgamations and Other Dealings
- Resumptions, Cancellation and Penalties for Covenant
- Breach
- Miscellaneous tenural matters

New Initiatives: This part will -

(i) extend current provisions in respect to minimum rents to all tenure irrespective of date of issue; and

(ii) remove the requirement for ministerial consent to transfer, assign, sublet, encumber or mortgage Crown tenures except where the Minister holds a mortgage (consent to transfer, assign or sublet a Miscellaneous Lease will still be required).

PART XII POWER OF ACQUISITION

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to acquisition of lands.

PART XIII MISCELLANEOUS

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to the general mechanics of Crown tenure administration.

PART XIV REGULATIONS

General: This part carries forward the Governor's powers, etc. under the Acts to be repealed in respect to the making of regulations for the purposes of the new Act.

New Initiative: This part will also provide for regulations to be made in respect to -

(a) the conduct of persons whilst on Crown lands, dedicated lands and lands belonging to or vested in the Crown; and

(b) penalities for non-compliance with or breach of any regulation.

PART XV LEGAL AND PROCEDURAL PROVISIONS

General: This part carries forward the Minister's powers, etc. under the Acts to be repealed in respect to general legal and procedural matters.

New Initiative: This part will provide for expiation fines for offences in terms of Part IV.

EQ2807-2

Appendix 2

PASTORAL ACT AMENDMENTS

Briefly, the Pastoral Act requires amendment as follows:-

- Statutory Land Management policies requiring the establishment and maintenance of a program of scientific range monitoring and assessment.

- Covenant review of tenure based on the above program with 14 year reviews of a 'rolling' type 42 year lease with an appeal mechanism.

- Rights of public access to the outback.

- Place the Act under the general direction and control of the Minister of Lands.

- Provide for an appropriate management structure.

- Enable the Minister to grant leases, accept surrender, terminate leases and to transfer land to the control of the Crown Land Conservation and Management Act for purposes such as towns, camping sites, reserves, etc.

- Repeal archaic and bureaucratic procedures.

Appendix 3

STATUTES TO BE REPEALED

1. Crown Lands Act 1929

As previously stated, the general thrust of the Crown Lands Act is in conflict with the Department of Lands' role and responsibilities of today and in the forseeable future.

That thrust basically relates to bringing the lands of the State into production whereas today's requirement of the Department is that it be the conserver and manager of the Crown's estate.

2. Irrigation Act 1930

The Irrigation Act was enacted to control, manage and supervise Government Irrigation Areas and reflected the nexus seen at that time between tenure and irrigation/water management. This is underlined by the fact that the amalgamation of the then Irrigation and Drainage Commision with the Lands and Survey Department resulted in the enactment of this statute.

Not surprisingly therefore, the Irrigation Act contains not only many land management and Crown tenural provisions but also a significant number of provisions relating to water supply, drainage and associated matters.

For some years now, responsibility for water resource management has rested with the Minister of Water Resources (formerly Minister of Works) and the Minister of Lands quite properly has withdrawn from such activities. This is reflected by the fact that all sections within the Irrigation Act which deal with water related matters have been delegated to the Minister of Water Resources since 1978.

It is proposed that the Irrigation Act be repealed with the land management provisions being incorporated into the Crown Lands Conservation and Management Act. Discussions with the E. & W.S. Department are continuing in regard to the water related provisions, however, at this stage it seems preferable to incorporate those provisions into the Water Resources Act. This will be the subject of a separate submission.

3. Discharged Soldiers Settlement Act 1934

This statute was enacted to consolidate all previous Discharged Soldiers Settlement Acts which sought to establish landholdings onto which those returned servicemen from World War I who wished to pursue primary production as their livelihood, could be placed on favourable terms.

Even in 1934, it was reported in Parliament that the initial work of soldier settlement had been practically completed and that the consolidated statute was required only to administer tenure and generally control discharged soldiers holding land under previous statutes.

Some 50 years later (it being now 70 years since World War I) the need to retain this statute no longer exists and it should therefore be repealed.

4. Marginal lands Act

The Marginal Lands Act was enacted in 1940 to implement the Commonwealth Government's policy for the stabilisation of the wheat industry which was formulated at joint Ministerial conferences in 1938. It was accepted that the desired level of stabilisation could not be achieved until the problems associated with marginal lands had been satisfactorily resolved.

These problems emanated from decisions around the turn of the century to progressively open up lands for wheat growing in areas which subsequently proved to be unsuitable solely for that land use because of inadequate rainfall, poor soil types and other factors. The effect of adverse weather conditions combined with farming methods of that era and the depression of the early 1930's was disastrous, particularly on small properties which were used principally for wheat production.

The Commonwealth's suggestions for the resolution of the problems associated with marginal lands included -

1. Evacuating some farmers by purchasing their land for subsequent allotment to owners of other inadequate holdings.

2. Provision of appropriate improvements.

3. Prevention of future subdivision.

4. Limiting the area which could be annually cropped with wheat.

Subject to acceptance of the Commonwealth's policy by the four major wheat producing States and the enactment of enabling legislation, the Commonwealth agreed to finance the scheme from the proceeds of flour tax legislation without any obligation on the States for repayment. In order to expedite the implementation of the scheme by giving the then Commissioner of Crown Lands the right to purchase land and other property as well as the power to sell, lease or otherwise dispose of any property so purchased without resorting to the cumbersome provisions of the Crown Lands Act, special legislation was necessary.

The Marginal Lands Act, 1940 was the result. This very short Act provides that for the purpose of promoting the more profitable and successfull working and development of marginal land, the Minister may purchase any real or personal property and sell, lease or otherwise dispose of that property. All funds required for the purposes of the Act shall be paid out of money granted by the Commonwealth for such purposes. No funds have been granted by the Commonwealth for this purpose since about 1950. The last property acquired under this scheme was in 1946.

As part and parcel of the scheme Marginal Lands Perpetual Leases (M.L.P.L.'s) were issued subject to a condition which tied them to other lands held by the lessees. Such other land usually comprised of freehold land and land held under ordinary perpetual lease. The tying conditions could not practically be enforced in relation to freehold land which has tended to negate the intent of the proposal.

M.L.P.L.'s were also subject to wheat cropping limitations. No action has been taken to police the cropping conditions for well over 20 years. There is no limitation on the area which can be sown with barley or other crops.

Very little in the Marginal Lands Act is not, in effect, a duplication of the powers

contained in the Crown Lands Act. No regulations have ever been made under the Act. It is not a land management statute.

At best, the Marginal Lands Act is anachronistic. Its usefulness can be measured by the fact that land held under M.L.P.L. comprises only 15% of the area of the State considered to be marginal for cereal production.

During the last few years, the repeal of the Act has been suggested on numerous occasions. On the last occasion it was decided that the repeal of the Act should await amendments to the Soil Conservation Act. This aspect will be pursued as a part of the consultation phase still to be undertaken, however, it appears now that there is no real advantage in this course of action. It should also be pointed out that the Act's non-repeal in terms of the proposed legislative package will mean that many bureaucratic, humdrum procedures proposed to be repealed will have to be retained in the new Crown Lands Conservation and Management Act for no real gain. This situation should be avoided if at all possible.

5. War Service Land Settlement Agreement Act 1945

The War Service Land Settlement Agreement Act gave effect to an agreement between the Commonwealth and the State regarding the repatriation of returned soldiers and revolved around a land settlement scheme. In this context, it was the World War II version of the Discharged Soldiers Settlement Act.

It has fulfilled its purpose and the war service land settlement scheme has, in effect, been defunct for some years. It should now be repealed.

APPENDIX 4

MINUTES forming ENCLOSURE to DL *No.* 13/86 *19*

TO THE CHAIRMAN, CABINET RESOURCES AND PHYSICAL DEVELOPMENT COMMITTEE

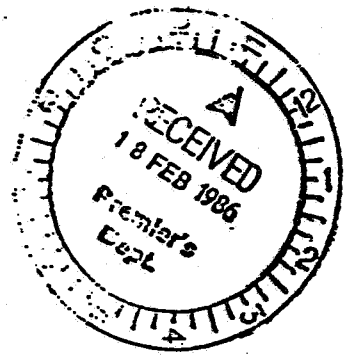
I suggest that this matter be included for discussion at the next Cabinet Committee prior to going to Cabinet.

RKH

MINISTER OF LANDS

13 / 2 /1986

Encs.: 12 copies of submission



TO THE PREMIER FOR CABINET

1. PROPOSAL

That Cabinet accept the concept of Government Land Resource Management as a disciplined process of scientific land assessment, planning, management and administration directed towards maintaining and improving the total sustainable social, economic and environmental goals for the purposes of developing Government land management policy and appropriate legislation involving consultative processes and wide inter-Departmental and community interests inherent in the management structure.

2. BACKGROUND

On 7/3/1983, Cabinet (DL 2/83) approved the preparation of a detailed submission proposing the drafting of legislation to:-

1. Repeal all of the present Acts relating to the administration of Crown Lands including the Crown Lands Act, the Pastoral Act and the Irrigation Act;

2. Enact a statute preserving the existing tenure rights under those various Acts and provide for on-going administration of those tenures and of all unalienated Crown Lands in appropriate divisions of the Act;

3. Establish an appropriately representative Crown Lands Council, having only advisory functions to the Minister, and to abolish the Pastoral and Land Boards;

4. Invest the Minister with the exclusive statutory responsibility for the administration of all Crown Lands and tenures thereof with powers comparable to those vested in other Ministers and statutory authorities owning substantial land holdings.

To facilitate consultation a 'Crown Lands Legislation Advisory Committee' was formed under the Chairmanship of the Assistant Director of Lands and representation from the United Farmers and Stock Owners, Conservation Council, Department of Agriculture, Department of Environment and Planning, and Department of Lands.

The Committee divided on two major fundamental issues on whether there should be a separate Act relating to the Arid Zone of the State and the administrative structure, i.e., the question of statutory boards, advisory councils and their functions and responsibilities.

Shortly after the establishment of this Committee, another Committee was set up called the Arid Lands Review Committee also under the Chairmanship of the Assistant Director of Lands with a membership of two officers, one from the Department of Environment and Planning and one from the Department of Lands.

The issues became involved and confused, particularly with the Conservation Council making a separate approach outside the Committees. The Chairman put the main Committee into recess in November 1984 until the situation was clarified.

Following various meetings and an address to the Rangelands Society, it was submitted to Cabinet on 1/8/1984:-

1. that the need for a separate Act dealing solely with the administration and management of pastoral lands be affirmed;

2. that the Cabinet approval of 7th March 1983 be varied by the deletion of any references to the Pastoral Act in the context of consolidation of legislation relating to the administration of Crown Lands within the State;

and

3. that the terms of reference of the review of Crown Land legilsation be modified, as set out in Attachment 1, to exclude all reference to the Pastoral Act and Board.

Finally Cabinet approved a further submission on 12/3/1985, viz.:

a) ENDORSE the principles and concepts of future outback land policy, management, tenure, and multiple use outlined above; and

b) APPROVE the preparation of a draft Bill to amend the Pastoral Act, expressing these policies, and concepts, as the basis for final discussion and agreement with outback land use interests.

In effect, this was an approval for the preparation of a separate Act for the North of the State "the Outback Management Act" that incorporated statutory requirements for all decisions on lease renewal or take up of the new "rolling" tenure of 14 yearly covenant reviews to be based on a prior resource inventory and land use assessment report; and the establishment of a Statutory Outback Management Authority.

However, this approach was also construed as giving this proposed Statutory Outback Management Authority more power than the Minister with the potential to become a "Parliament of the North" and to dominate the day-to-day affairs and economic developments in this region. This is unacceptable, particularly in view of the enormous importance of the North of the State in terms of economic development.

The new Director of Lands who took up duty on 4/2/1985 was faced with considerable concern expressed by the experienced land administrators in the Department, from the Pastoralist groups and the United Farmers and Stock Owners Association.

The Director advised me on a number of occasions of these emerging problems with the legislation. Also several delegations have been received from the U.F. & S. and the Conservation Council, expressing a variety of views.

There is not general agreement about the proposals.

3. DISCUSSION

The expressed views of the above groups are briefly:-

3.1 The U.F. & S., representing the pastoralists, are concerned at the practical application of the covenants and their 14 yearly review in the rolling tenure proposal.

3.2 The pastoralists themselves are confused and do not want change.

3.3 The U.F. & S. agrees with a State-wide Crown Land Council along the lines of the Water Resources Council but wish to retain the present Pastoral Board which has little real workload.

3.4 The Conservation Council representatives on the Legislation Committee will accept one State-wide Council providing there are two Acts, but require a powerful statutory management body free of Ministerial control.

3.5 The experienced land administrators in the Department favour one Act with a Council as in the original Cabinet decision. It must be a strong Act with prescriptive clauses specifying Government Objectives and containing the necessary powers for the Minister to implement the policies of the Government of the day within these Objectives.

The Director has attended pastoralists' group meetings at Port Augusta and Mannahill and has called on a number of lessees to assess the situation as well as observing the mining and tourist impacts in the Innamincka, Mintabie and Coober Pedy areas.

In view of the foregoing, I have concluded that the whole question of Government land resource management throughout the State should be placed in perspective and not dealt with piecemeal particularly with regard to the serious land degradation problems Australia is suffering. The Director of Lands, accordingly, has written the report, "Government Land Resource Management in South Australia - A Perspective". A summary of this report relevant to this submission is attached and concerns primarily a significant opportunity to implement a most effective, integrated and non-bureaucratic approach to Government land resource management by adopting a similar structure to that of water resources management.

The two resources are fragile, basic and finite which are inert, except for natural events, until utilised. Utilisation can cause irreversible deterioration of both resources either on each separately or by interaction between the two. Both require strong legislation with explicit Government Objectives stated.

Clearly similar management techniques as to water resources are most appropriate for land resources, viz., to manage land as a finite resource within a disciplined process of land assessment, planning, management and administration directed towards maintaining and, where applicable, increasing the sustainable social, economic and environmental goals for Government land resource management policy.

The legislative structure proposed is a new Act, the Crown Land Conservation and Management Act, (approved in concept by the Minister of Lands on 3/6/1985 in D.L.49/85), to cover the whole State and incorporate the above management precepts with the Pastoral Act amended as approved (except for the establishment of it as an Outback Management Act) to apply to pastoral leases only as a specialist Act under the umbrella of the main Act, together with a management structure similar to that of the Water Resources Council and Advisory Committees. Other such specialist Acts may also be required.

I have approved the recall of the Land Resource Management Committee under the Chairmanship of the Director of Lands, with membership of the Director-General and Engineer-in-Chief, E & WS Department, the Director-General of Environment and Planning, Director-General of Mines and Energy, Director-General of Agriculture and the Director of Woods and Forests.

This Committee has been meeting on an informal basis discussing and co-ordinating general land resource management issues including the proposed legislation and management framework.

The Committee is in general agreement with the report proposed by the Director of Lands. No consultation has taken place at this stage with non-Government sources but, given acceptance of this submission, this will be carried out.

The management/advisory concept, which is detailed in the attachment, envisages the formation of a S.A. Government Land Resource Management Council with relevant Departmental Head representation and representation from appropriate land related non-Government organisations such as the U.F. & S., Conservation Council, etc. A regional and specialist Advisory Committee network would report to the Council which would then advise the Minister on Government land resource management issues and wider overall land resource management issues eventually, e.g., a Pastoral Advisory Committee could advise on the management of the Pastoral lands under the aegis of the Council and the Minister of Lands. An Outback Regional Advisory Committee could similarly advise on all issues in the North of the State. A number of these Advisory Committees would have similar membership to the Water Resources Advisory Committees so a significant opportunity exists for closer co-operation in managing these two basic inter-acting resources.

The Regional Advisory Committee approach will facilitate communication and rationalisation of general land resource management between land related Departments at the Regional level and also involve the local community through appropriate membership.

A watershed exists whereby land resource management can continue with the Statutory Board approach or progress to a more modern, community and user advisory mechanism with strong legislation and full Ministerial and Departmental accountability.

The important aspect of the latter is that it facilitates modern participative management and open Government policies and is in accord with the principles of the National Conservation Strategy for Australia. These proposals will also provide the focus for practical Government Land Resource Management input into the Government's policy of upgrading all aspects of the South Australian environment including the proposed biennial environment audit.

Cost and Staffing

No significant costs are involved or increases in staff as the majority of the qualified Land Scientists and other staff are already employed. This may need review as the final mechanism takes shape, depending on whether fees or expenses are paid to the Council and Advisory Committee members.

4. RECOMMENDATIONS

4.1 That the Department of Lands report "Government Land Resource Management in South Australia - A Perspective" by the Director of Lands be accepted as a basis for a consultative process to develop policy and management procedures for Government land resource management but subject to the standard disclaimer in regard to approved Government policy (summary attached).

4.2 That, arising out of this report, the Government adopt a user and community involvement advisory network approach similar to the S.A. Water Resource Council and its Advisory Committees for land resource management rather than the traditional powerful statutory board approach. (Details in attachment pages 6 and 7.)

4.3 That a Cabinet submission be prepared to formally approve the preparation of a new Act, the Crown Land Conservation and Management Act to cover the whole State and to amend the Pastoral Act as a specialist Act for the Pastoral Industry as approved except for the management structure recommended in 4.2 following a consultative process.

4.4 That Cabinet formally approve the recall of the Land Resource Management Committee as an interim consultative and co-ordinating mechanism between land related Departments with a membership of:

Chairman : Director of Lands

Members : Director-General and Engineer-in-Chief
Director-General of Environment and Planning
Director-General of Mines and Energy
Director-General of Agriculture
Director of Woods and Forests

Executive Officer : Chief Project Officer (Policy), Department of Lands.

Terms of Reference

- Co-ordinate and monitor inter-departmental management of the State's land resource.
- Identify emerging land management issues that will require inter-agency action.
- Over-view the preparation of land resource legislation.
- Over-view the preparation of the Government Property File (already approved) and monitor the Land Information System.
- Identify policy formulation needs that will impact on Departments involved in land resource management.
- Report to the Cabinet Sub-Committee on Resources and Physical Development.

MINISTER OF LANDS
13/12/1986

RESOURCES & PHYSICAL DEVELOPMENT COMMITTEE
10/3/86

GOVERNMENT LAND RESOURCE MANAGEMENT IN SOUTH AUSTRALIA

This paper is based on the Department of Lands' report "Government Land Resource Management in South Australia - A Perspective" by the Director of Lands, and discusses two basic approaches to managing fragile, basic and finite resources such as water and land.

Traditionally, land resources have been administered rather than managed with the objective, based on the Wakefield theory of colonisation, of developing the State by bringing land into primary production.

This process importantly depended on an equitable administrative system removed from direct political control by the use of Statutory Boards with varying bureaucratic powers.

The Land Board and Pastoral Board are two examples of this process. The former was primarily concerned with tenure administration and freeholding whilst the latter was primarily concerned with lease administration and also limiting stock numbers to control degradation of land and vegetation.

These Boards consisted of public servants with few if any efforts made to involve the stakeholder and/or the community in the process, or, except latterly, to conserve and manage land by the use of management plans based on scientific methodology.

However, it has been gradually accepted that these traditional processes of land administration need to be supplemented by management plans which recognise the necessity to manage land as a finite resource within a disciplined process of land assessment, planning, management and administration directed towards maintaining and, where applicable, increasing the total sustainable social, economic and environmental goals for Government land resource policy.

It must be stressed that whilst regions of the State may have special problems such as the marginal and arid lands, nevertheless the same disciplined process described above is applicable in preparing management plans and managing the resource.

The present system of Statutory Boards has inhibited the proper development of land resource management policies so that the above goals can be defined and enable a consistent approach to land conservation and management throughout the State.

This contrasts sharply with the developments in water resource management over the last decade in South Australia (and elsewhere in Australia and Overseas). In South Australia, a Water Resources Council is the peak advisory mechanism to the Minister of Water Resources backed up by regional and specialist advisory committees. These have wide representation from appropriate Departmental Heads and officers, community interest groups and stakeholders.

Water and land resources are inert, except for the impact of natural events, until put to use by the community. Use can cause irreversible deterioration of both resources, either on each separately or by the interaction of land on water and vice-versa. On the other

land, properly managed uses can be economically sound. The managers of these resources have a vital responsibility to ensure that existing uses do not cause further deterioration and that proposed uses are approved in the context of management plans addressing the goals mentioned previously. In point of fact, most of the uses of these two resources are dependent on one another.

Clearly the management of land and water resources are closely allied and that similar management techniques are appropriate particularly if these enable a close working relationship between the management of both basic resources.

A highly desirable opportunity exists to achieve this in terms of the proposed new Crown Land Conservation and Management Act and the Amendments to the Pastoral Act.

A State-wide Land Resource Management Council with departmental, community and stakeholder representation can be established with appropriate regional and specialist advisory committees to parallel the water resources network where applicable. In fact, the committees at regional level would have very similar membership and an opportunity therefore exists to co-ordinate and rationalise a number of land and water management related issues. Similarly, the Land Resource Management Advisory Committees can be used to co-ordinate and rationalise at the local level a number of land related issues such as soil conservation, coastal management, pest control, vegetation, and land degradation generally. Major problems exist in land resource management in South Australia.

Discussions of the Land Resource Management Committee support this approach which also has the support of the Department of Lands Re-Organisation Steering Committee and experienced land administrators in the Department.

Modern government administration is moving towards less regulation, open Government with responsible community participation in decision making with strong legislation that includes statutory management objectives to be achieved by, where appropriate, 'peer' group pressure advisory groups, managed and monitored closely by a Department.

There is, therefore, clearly a watershed in Government land resource management with two distinct directions to go, viz., continue and strengthen powerful Statutory Boards that cut across normal Ministerial and Permanent Head responsibility and tend to be inflexible in policy development, to be 'Parliaments' in themselves or to implement a Land Resource Management structure along the lines of the Water Resource Advisory networks which, through the Water Resources Council, advise the Minister who then implements decisions through the Departmental Head. This has the added opportunity to facilitate close interaction between the management of the two fragile, finite and basic resources, land and water.

A unique opportunity therefore exists to implement a most effective, integrated and modern approach to land resource management in this State, initially land of the Crown, by adopting the advisory approach as distinct from the Statutory Board approach. This involves the creation of a South Australian Land Resource Management Council with a network of advisory committees.

Attached are two diagrams illustrating this advisory mechanism which can be incorporated into the Crown Land Conservation and Management Act and the Amendments to the Pastoral Act.

The intention is for the former Act to cover the whole State with the revised Pastoral Act to cover specialist land use for pastoral purposes. Other such Acts may be necessary for specialist purposes in other sensitive areas of the State under the umbrella of the main Act.

Incorporated in these proposals are the Objectives for land conservation and management expressed in the National Conservation Strategy for Australia.

As an example, a Pastoral Advisory Committee to manage the pastoral leases within the Council framework and the regional structure of the Department of Lands, together with a Regional Advisory Committee, Outback, would also be established to report to the Council with wide representation of Outback interests including pastoralism, tourism, outback development, mining, etc. which would operate under the new Crown Land Conservation and Management Act.

The Land Resource Management Committee has devolved from a Cabinet Committee established by the then Deputy Premier (J.D. Corcoran) on 23/1/1978. Departmental Heads represented the Ministers on this Committee. The Committee was established with Departmental Head representation under the Chairmanship of the Director of Lands on 30/5/1980 by Cabinet.

The Committee was terminated on 24/8/1982 by Cabinet but with the Director of Lands having the discretion to convene meetings of appropriate land related Departmental Heads as required by Cabinet, a Minister or any Departmental Head.

With the approval of the Minister of Lands, one meeting was held mid-1985 and, with the agreement of the Minister and the Committee, a cycle of regular meetings is being held to informally co-ordinate a number of current land resource management issues, including legislation.

Details of the Committee are attached, with suggested membership together with suggested terms of reference. The Committee would disband if a Council is established.

Attached also is a copy of the approval of the previous Minister of Lands for the concept of the Crown Land Conservation and Management Act as outlined herein.

D J Slee

DIRECTOR OF LANDS
24/ 1/1986

LAND RESOURCE MANAGEMENT COMMITTEE

MEMBERSHIP

Chairman: Director of Lands

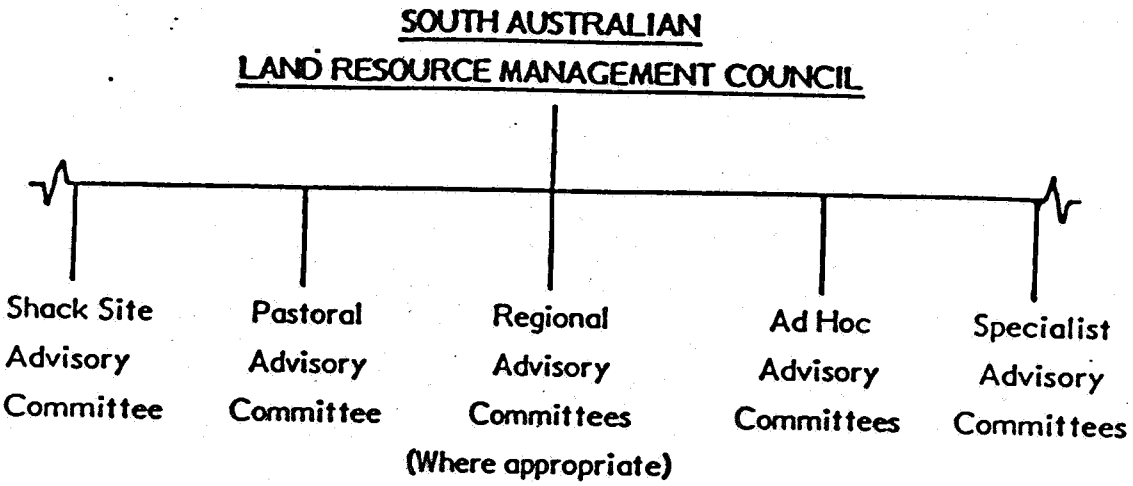
Members; Director-General and Engineer-in-Chief
Director-General, Environment and Planning
Director-General of Agriculture
Director of Forests
Director-General, Mines and Energy

Executive Officer: E. Yelland, Acting Chief Project Officer (Policy), Department of Lands

TERMS OF REFERENCE

- Co-ordinate and monitor inter-departmental management of the State's land resource.
- Identify emerging land management issues that will require inter-agency action.
- Over-view the preparation of land resource legislation.
- Over-view the preparation of the Government Property File and monitor the Land Information System.
- Identify policy formulation needs that will impact on Departments involved in land resource management.
- Report to the Cabinet Sub-Committee on Resources and Physical Development.

CHART 3



Typical Committee Structure

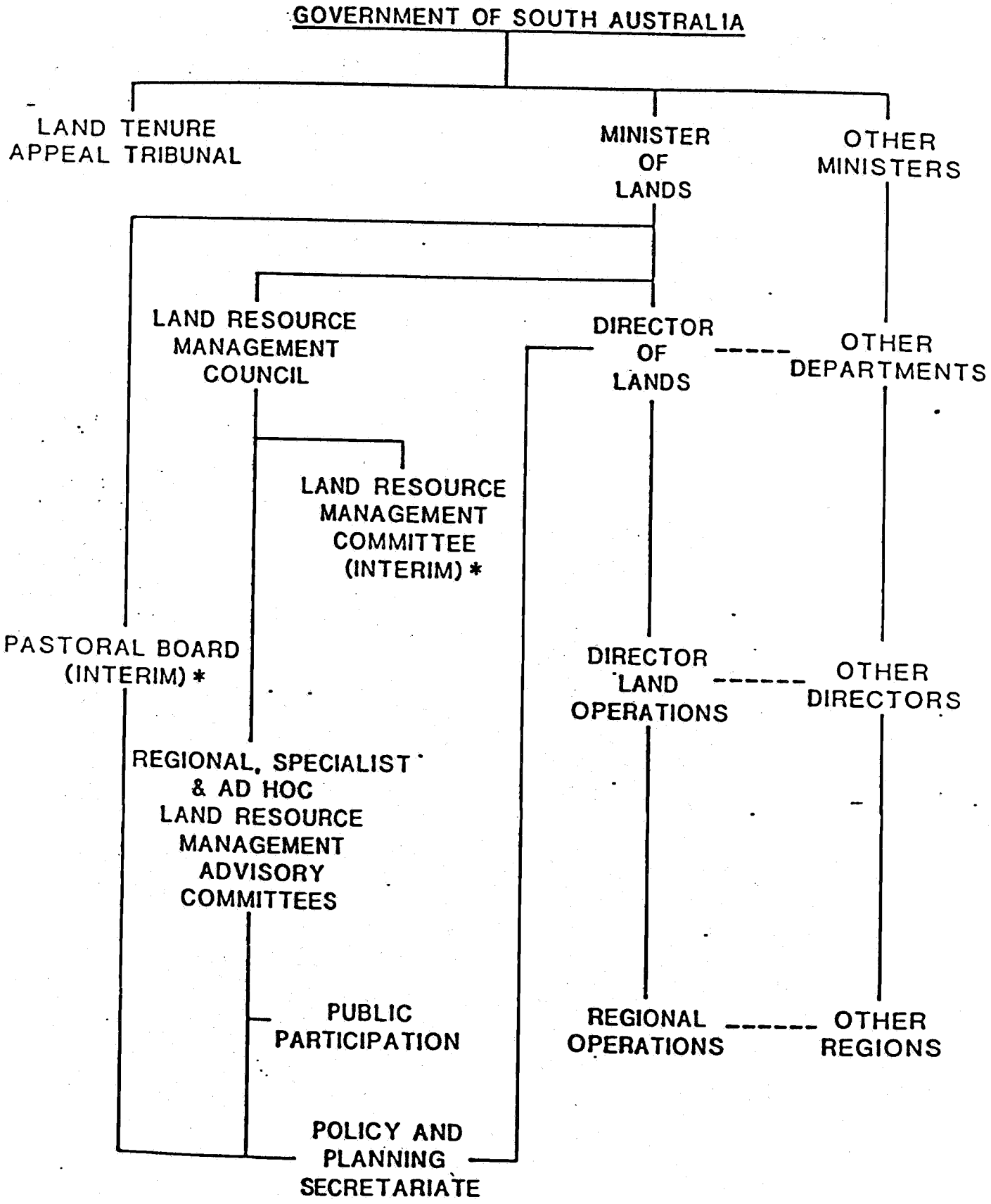
Council of 12, chaired by the Director of Lands, with the following suggested membership:

Departmental Head Representation	Other Representations
Environment and Planning	Local Gov. Administration
E & WS	Conservation interest
Agriculture	Primary Production (2)
Mines and Energy	Land Development Industry
Woods and Forests	Tourist Industry
	Chamber of Mines + Energy?

Staff Support from the Policy and Planning Secretariate of the Department of Lands.

DEPARTMENT OF LANDS

ADVISORY NETWORK



Both these phase out as the Council and Advisory Committees are established.

MINUTES forming ENCLOSURE to

TO THE PREMIER FOR CABINET

1. PROPOSAL

That approval be given for

(i) the preparation of a draft Bill to repeal the existing Pastoral Act, and enact a Pastoral Lands Conservation and Management Act which incorporates new concepts of tenure, advisory assistance, scientific assessment and monitoring of range condition and lease covenants;

(ii) the Land Resource Management Committee investigating and reporting on management arrangements, environmental goals and performance indicators; and

(iii) appropriate consultation taking place after the Act is prepared and in conjunction with the Crown Lands Conservation and Management Act.

2. Background

2.1 The Pastoral Act 1936 was established with the allotment of leases and the obligation to improve them of major importance. This developmental bias has served its purpose and substantial amendment is required to reflect the changed administrative and management needs of the state's outback rangelands.

2.2 In this regard, for some time, consideration has been given to the legislative backing necessary to facilitate the application of sound conservation and management principles in this area of the State, having regard to the fragile and unique nature of these lands.

2.3 On 18.3.85, Cabinet

- endorsed principles and concepts for future Outback policy, management and tenures; and

- approved the preparation of a draft Bill to amend the Pastoral Act, which would incorporate the new policies and concepts and for the draft Bill to be used as the basis for further discussions and consultation with Outback land interests.

2.4 This submission implements the principles approved by the Resources and Physical Development Committee on 10.3.86 in regard to the report "Government Land Resource Management in South Australia - A Perspective" and by Cabinet on 12.5.86 in regard to the new Crown Lands Conservation and Management Act.

3. DISCUSSION

3.1 Since the approval of 18.3.85, proposals in relation to the new Crown Lands Conservation and Management Act have been finalised and Cabinet approval given on 12.5.86 for the drafting of a Bill. Further consideration has also been given to the Pastoral Act proposals in the light of the new C.L.C. & M. Act outline and it is now considered that the amount of amendment required to the Pastoral Act justifies its repeal and the enactment of a new Pastoral Lands Conservation and Management Act in its stead.

3.2 The new Act should recognize and incorporate many new concepts in, and approaches to, land resource management. It will enable on one hand, a consistency of attitudes and procedures to the management of all Crown lands and on the other hand a recognition of the special land management approach necessary in pastoral areas.

3.3 In this regard, your attention is invited to Appendix I which is an outline of the new Pastoral Lands Conservation and Management Act focusing on the major concepts and principles envisaged. Set out hereunder is a summary of those major proposals.

3.3.1 Administration of the new Act

Unlike the Pastoral Act, the new Act should quite clearly be under the specific direction and control of the Minister of Lands.

3.3.2 Management Structure

Under the aegis of the Land Resource Management Council to be established under the Crown lands Conservation and Management Act, there should be two bodies created viz.

(i) A Pastoral Lands Advisory Board (to replace the existing Pastoral Board) which is to be chaired by the Director of Lands or his nominee as approved by the Minister and will, subject to final consultation, comprise from the related Government Departments, one environmental scientist, an agricultural scientist and a land scientist and three (3) pastoralists. The Regional Manager, Outback, will be the executive officer of the Board. This Board will provide advice on and monitor the management of lands held under Pastoral Leases.

(ii) An Outback Regional Advisory Committee which will advise the Council on all multiple use issues relating to arid lands. In order to ensure continuity of approach and adequate consultation, two members of the Pastoral Lands Advisory Board will also be members of the Advisory Committee.

The Committee will comprise of representatives from all relevant Government Departments and interest groups.

The application of the Council and Advisory Committee concept to the State's pastoral lands, inter alia, will provide the forum for public involvement in their management and promote more effective self-management of the pastoral industry.

(iii) It should be noted that I propose to seek approval from Cabinet at the appropriate time to extend the duties of the Council to those of the Land Resource Management Committee by administrative action. This will enable the Council to respond to all land resource management issues, not just those relating to Crown lands.

3.3.3 Land Management and Tenure Administration

Land management policies are to be given statutory backing with the establishment and maintenance of a program of scientific range monitoring and assessment at 3-5 year intervals. This program will be reflected in the proposed 14 year covenant review of the new "rolling" type 42 year lease (see Appendix 2). Aggrieved Pastoral lessees will have access to the appeals mechanism to be provided under the Crown Lands Conservation and Management Act.

Existing tenural rights will be preserved under the new Act along with relevant tenural provisions. All archaic and unnecessary bureaucratic procedures will be abandoned. Many of the proposed "housekeeping" amendments were contained in the 1985 Cabinet approval for the amendments to the Act.

3.3.4 Rights of Public Access to the Outback

The rights of the public to travel in the outback areas will be clarified by the establishment of "access corridors" and specific provisions regulating the use of motor vehicles. The question of occupiers' liability will be dealt with in a specific and separate statutory enactment being considered by the Attorney-General.

3.4 Subject to Government direction, a task for the current Land Resource Management Standing Committee (the pre-cursor of the Land Resource Management Council), following enactment and broad acceptance of the new Bill, will be to consider overall Government management arrangements for the arid areas within this framework. If the full Council is established by then (1987/88 financial year as planned) it can be used as an advisory and consultative mechanism for this process.

3.5 An important part of this process will be the development of overall environmental goals for the management of land resources in South Australia and particularly arid lands. These can be developed in line with Government Policy and the National Conservation Strategy and could be subject to tri-annual audit.

3.6 This will allow the practical land resource management decisions to be made under an "umbrella" of environmental goals. Importantly this will mean the land resource management performance can be monitored against goals and objectives set by the Government based on considerations in 3.5 above and overseen by, say, the Environmental Protection Council. This can be achieved by the establishment of appropriate performance indicators.

3.7 Guarded preliminary contacts with United Farmers and Stockowners Association and conservation groups indicate general support for the thrust of the new initiatives. However, in line with the approach suggested by the Resources and Physical Development Committee in respect to the Crown land management legislative package, I seek approval for the drafting of a Pastoral Lands Conservation and Management Bill prior to further consultation with interested parties including other Government Departments.

3.8 Costs

Because of the time remaining for existing Pastoral leases to run, contingency resource implications relating to the issue of leases under the new Act are impossible to quantify at this stage - refer Appendix 2.

3.9 Staffing

Satisfactory.
The Land Assessment Branch in the Department is staffed by 12 Land Scientists including a wide range of skills appropriate to the requirements of this Act and the Crown Lands Conservation and Management Act. A wide variety of ancillary skills are also available from Land Resource Officers, Property Service Officers, Valuers and Surveyors.

4. RECOMMENDATIONS

4.1 It is recommended that approval be given to the drafting of a Bill to :-

- Repeal the existing Pastoral Act
- Enact a new Pastoral Lands Conservation and Management Act which -

  (i) preserves existing tenurial rights under the repealed Act

  (ii) provides for a rolling 42 year lease tenure for Pastoral leases

  (iii) provides for scientific land management plan and monitoring processes

  (iv) provides statutory right of access to Pastoral areas of the State

  (v) streamlines the administrative system and provides for appeals from Ministerial decisions

(vi) clearly places responsibility for administration of the Act with the Minister of Lands.

4.2 It is also recommended that the Land Resource Management Committee investigate and report to the Resources and Physical Development Committee on:-

(i) appropriate Government management arrangements for the Outback following a settling down period for the new legislation;

(ii) appropriate environmental goals and performance indicators for land resource management in the Outback and elsewhere in the State; and

(iii) consultations with the Environment Protection Council in regard to the relationship between the two Councils in terms of establishing, reporting and monitoring overall land resource environmental goals and performance indicators.

4.3 Finally, it is recommended that the consultation phase take place following preparation of the Act as approved for the Crown Lands Conservation and Management Act.

MINISTER OF LANDS

/ /86

APPENDIX I

THE PASTORAL LANDS CONSERVATION AND MANAGEMENT ACT

Part I - Preliminary

General: This part should include

- the usual introductory clauses
- a statement of intent comprising a summary of the Act's objectives
- an index of the Act
- transitional provisions to protect lessees' and registered interests in current tenures issued under the Pastoral Act to be repealed by the new Act.
- appropriate definitions of terms.

Part II - Administration

General: This part will provide for the preferred management structure in terms of administration of the new Act.

New Initiatives: This part will provide for two bodies viz:

(i) The Pastoral Lands Advisory Board

Composition: Chairman: Director of Lands or his nominee
Members: Lands (1)
Environment and Planning (1)
Agriculture (1)
Pastoralists (3)

Function: To provide advice on and monitor the management of lands held under Pastoral Leases.

(ii) The Outback Regional Advisory Committee

Composition: Chairman: Lands
Members: E. & W.S. (1)
Agriculture (1)
Environment & Planning (1)
Outback Community Development (1)
(in lieu of local government)
Pastoralists/Farmers (2)
Conservationists (1)
Tourist/Recreation (1)
Mining (1)
Aborigines (1)

Function: To provide advice on multiple use issues relating to arid lands.

Part III - Land Management

New Initiatives:

This part will clearly provide that the Minister must actively manage the lands under his control in terms of sound land conservation and management practices having regard to environmental, economic and social needs.

In this respect, scientific land assessment will be carried out, management plans will be established through the tenure system and the on-going condition of the rangelands will be monitored in a way which will ensure the optimum in both conservation and production.

In particular, such management should have regard to the need for multiple concurrent use of outback lands.

Part IV - Leases of Land

General:

This part carries forward existing provisions which have been simplified and placed under the direct control of the Minister.

New Initiatives:

This part will empower the Minister -

- to obtain a scientific land assessment before the issue, extension or renewal of any new lease;
- to require all leases to contain covenants consistent with a land management plan;
- to introduce the new "rolling lease" tenure concept which, with the other matters as set out above, will give lessees incentive to comply with management plans to enable them to allow the 14 year extension to be added to the balance 28 years unexpired term;
- to give power to the Minister to enforce covenants with a wider range of penalties for breach of covenants, e.g. to rectify the fault at the cost of the lessee;
- to give the Minister general power to make orders for the conservation and protection of the land;
- to extend the Minister's power to aggregrate adjoining land into Pastoral Leases;
- to give statutory rights to owners of travelling stock to cross land in pastoral leases, under certain conditions, and to enable the Minister to declare that any particular stock route shall be regarded as a "public road" for the purposes of the Planning Act relating to subdivision of lands;
- to give to the Minister general power to accept surrender of lands and to resume lands as may be needed upon payment of appropriate compensation;
- to give the Minister power to order water to be supplied from one leased area to another leased area;

Part V - Rent and Re-valuations

General: This part carries forward relevant provisions relating to rent, re-valuation, appeals and improvements. In cases of appeal, the matter is to be referred to a Tribunal to be set up under the Crown Lands Conservation and Management Act.

Part VI - Access

New Initiatives: To enable the Minister to declare certain areas of Pastoral Leases "Access Areas" over which the public may travel (in addition to Public Roads which are at present maintained by the Highways Dept.). The lessees obligations in relation to Access Routes will be set out.

The question of the liability of Pastoral Lease holders (as "Occupiers") to members of the public is to be specifically set out in a revision of the laws relating to "Occupiers Liability" generally for the whole of South Australia being handled by the Attorney-General.

Part VII - Regulations

General: This part carries forward the Governor's powers to make regulations in respect of

a) any matter under the Repealed Act;
b) the conduct of persons on Pastoral land, "Access Corridors" etc; and
c) penalties for any breach of or non-compliance with any regulation.

Part VIII - Legal and Procedural Provision

General: This part carries forward the Minister's powers etc. under the old Pastoral Act.

New Initiatives: To widen the power of the Minister to penalize lessees for breaches of covenant etc. by methods other than forfeiture.

- To provide for any procedure to be used in instituting Appeals against Ministerial decisions.

APPENDIX 2

Issue of new Leases under the Pastoral Lands Conservation and Management Act

The process involved in issuing new continuous leases under the new legislation is seen as follows:-

1. Rangeland Assessment

   This study of the lease or run in its present state is a first step and will be carried out by Scientific Officers of the Land Assessment Branch.

2. Agreed land management plan

   This will develop out of the rangeland assessment and will be prepared by the Scientific Officers, the lessee himself, the Regional Manager, Outback and any other agency deemed to be affected by the proposed tenure if activities other than pastoralism are occuring or seen as likely to occur. This can be a short document setting out agreed goals and objectives for the lease and allocating responsibilities. Agreed objectives and responsibilities between the lessee and the Minister of Lands will be given force by lease covenant. Other activities such as tourism, conservation, mining etc. can be covered by lease covenant, where appropriate, or by administrative agreement.

3. Lease Covenants

   These covenants emerge from objectives of the management plan and will be formally set, on behalf of the Minister by the Pastoral Lands Advisory Board on the recommendations of the Regional Manager, Outback. The Manager will consult also with the Regional Advisory Committee on broad principals but not individual cases where confidentiality will be respected.

   These covenants will include reference to optimum stocking rates to maintain desired range condition.

4. Regular Monitoring

   This will be carried out both by the Pastoral Inspectors and the Scientific Officers at a frequency that will be dictated by the condition of the lease etc. but so that all leases are monitored at least every 5 years. The ideal will be to have carried out 3 monitorings before the covenant review at 14 years.

5. Fourteen (14) year covenant review

   This will involve a formal comprehensive review of the performance of the lessee (and other agencies if appropriate) in implementing and adhering to both the covenants and any agreements emerging from the original land management plan. It will involve the lessee, the Regional Manager Outback, the Manager Land Assessment Branch, the Pastoral inspectors and any other involved agency.

A new land management agreement may be prepared for the next 14 years or the existing agreement modified. The lease will be 'altered' to show:-

a) A further extension of 14 years to the remaining 28 years if performance is satisfactory i.e. returned to 42 years;
and
b) Any new covenant emerging from the new or revised management agreement.

The processes described will then repeat for the next 14 years in relation to monitoring leading up to covenant review. Continuous non-compliance with the covenants or any agreement entered into following the management plan will result in the lease being terminated. This is most unlikely to happen as frequent monitoring will give early warning of difficulties. Frequent monitoring will also mean that there will be no "hidden agendas" and sudden shocks at the 14 year covenant review.

Unresolved disagreements at both covenant setting and review can be referred to the Land Resource Appeal Tribunal to be established under the new Crown Lands Conservation and Management Act. This Tribunal will also be available in the event of proposed termination.

Unsatisfactory performance at the 14 year covenant review may lead to no extension beyond the remaining 28 years or no commitment by the Minister to extend until the next 14 year review is carried out.

Resource Implications

It is almost impossible to predict the likely workload in carrying out this procedure. There are currently 240 "runs" involving some 360 leases. The opportunity will be taken as existing leases are surrendered to consolidate these leases and ideally we will be dealing eventually with not more than 240 "leases". The figure should be less than this as there are an estimated 30-40 leases over which a new continuous pastoral lease will not be offered because of size, location and condition.

From the passing of the new legislation, lessees will be able to apply to surrender their existing leases for a new lease that will include the process discussed in this paper. There will be no compulsion to do so and in most cases it is anticipated that lessees will not take up a new lease until compelled to do so by the expiration of their existing lease.

In about 90% of the leases this will occur from 2005 onward for a period of 7 years.

SANTOS LTD.

(Incorporated in South Australia)

SANTOS HOUSE, 39 GRENFELL STREET ADELAIDE, SOUTH AUSTRALIA 5000

Postal Address:
G.P.O. BOX 2319, ADELAIDE, SOUTH AUSTRALIA 5001

Telephone: (08) 218 5111 Facsimile: (08) 212 5476 Telex: AA 82716

13th August 1986.
CRA.138/86:cib.

The Director-General
Department of Mines and Energy
P.O. Box 151
Eastwood SA 5063.

Dear Sir,

Multiple Land Use.

Thank you for your letter of 29th July in relation to our proposal to the Deputy Premier on multiple land use in the general area of Innamincka.

The draft terms of reference for the expanded Joint Operations Management Group appear to us reasonably appropriate for dealing with the day to day administration and liaison between the Department and Licencees on environmental, petroleum exploration and development, and occupational health and safety matters affecting the Licencees in their day to day operations. We have some reservations about the degree of specialised knowledge on occupational health and safety matters immediately available to the suggested committee representatives but this could be overcome by supplementing the committee when occupational health and safety issues are included in the agenda.

However, we remain concerned about the suggested extension of this committee to a quarterly "Petroleum Operations Committee" to deal with multi-department issues impacting on land use within the Licence area. Without detracting in any way from your Department's responsibility to control the day to day activities of the Licencees, we believe there is a need for a broader advisory group which could meet say, quarterly, and review some of the strategic issues which are increasingly affecting operations in the region. It was this need which we sought to address in our proposal to the Deputy Premier. Without such a group the problem remains that some departments (other than Mines and Energy) may overlook the impact which new developments in the region may have on the operations of the Licencees. For example, the development of additional tourist facilities, road improvements and long term decisions in relation to pastoral leases can have a significant impact on the Licencees and their operations.

Offices at: **PORT BONYTHON:** P.O. Box 344, Whyalla, S.A. 5600
Telephone: (086) 40 3100 Facsimile: (086) 45 1799 Telex: AA80903

BRISBANE: 20th Floor, Santos House, 215 Adelaide Street, Brisbane, Qld. 4000
P.O. Box 1026, Brisbane, Qld. 4001
Telephone: (07) 228 6666 Facsimile: (07) 229 0165 Telex: AA43978

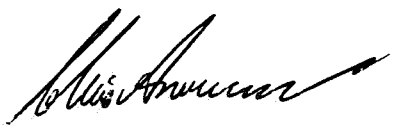
SYDNEY: Suite 6102, Level 61, MLC Centre, 19 Martin Place, Sydney, New South Wales 2000
Telephone: (02) 235 0899 Telex: AA75424

Neither the existing arrangements nor your proposed Petroleum Operating Committee permit the Licencees, or other land users, the opportunity of directly contributing to the fomulation of decisions in areas where adverse effects on the licencees could be avoided by such contribution.

With respect to its own operations, it is our understanding that the Government has recognised the benefit of minimising the adverse impact of such decisions by setting up an interdepartmental Land Use Committee. However, this committee does not provide for direct representation from substantial land users such as Delhi or SANTOS or the main pastoral companies.

From our viewpoint the JOMG/Petroleum Operations committee would have neither the breadth of Departmental representation nor the seniority of licencee representation to undertake the required task. Accordingly we remain convinced that this aspect could be best addressed through an advisory group comprising both Government and land users as was suggested in our letter to the Deputy Premier.

Yours faithfully,



C.R. Armour,
General Manager Corporate Services.

cc Delhi Petroleum Pty Ltd.

MINUTES forming ENCLOSURE to ..... No. 19

TO THE DIRECTOR-GENERAL, DEPARTMENT OF ENVIRONMENT AND PLANNING

Proposal to enlarge Simpson Desert National Park

I need to register the strongest concerns over your recently submitted plan to create a huge new National Park covering over 38 000 square kilometres in the Simpson Desert area at short notice.

Your request that we respond within eight days is at variance with the well established assessment procedures that have been in place between our two departments for some time. It particularly conflicts with the requirement for full assessment, discussion and consultation before any decisions are taken on alienation of land as recommended by the Cabinet Resources and Physical Development Committee chaired by your Minister (attached).

The implication of this proposal to vastly increase the National Parks system needs to be assessed very carefully in terms of its potential for suppressing economic development and inviting Comonwealth control. Alternatives such as the creation of a Desert Reserve under the Crown Lands Act Section 5f may, for example, offer more all round benefits to the State than the creation of a National Park.

Although a joint proclamation that allows continuing and future access for the resource industry is a welcome improvement it was never envisaged that this would be appropriate or used as an excuse for alienating further huge areas of the State. Regardless of this, certain sections of the community would regard any activity in a Park as unacceptable and therefore your proposal risks being socially divisive.

The proposal may well be consistent with one of the Government's election pledges, however, it is undoubtably contrary to other election pledges such as the need to expedite the exploration and development of South Australia's energy resources etc.

I strongly suggest that a more realistic time frame for consideration of the matter be established that is not constrained by any tour date of the Royal Geographical Society. The ramifications of your proposal need to be explored fully before any recommendations are made.

23 July 1986
TRW:CMO

DIRECTOR-GENERAL
DEPARTMENT OF MINES AND ENERGY

original sent DEP in file L1138

N.B. Copy of Lands Dept. Docket contents 4831 1984 and 1617 85 COPIED TO ENV 5617 DME 225/84 23/7/86

ACCESS TO LAND FOR PETROLEUM AND MINERAL EXPLORATION IN SA

Recommendations approved by
the Cabinet Resources and Physical Development Committee

1. As a general policy, no Government decisions should be made to deny or limit access for exploration or production over any area without careful review and consideration of any existing subsurface rights, as well as the mineral potential of the area. This is to be ascertained via consultation with DME.

2. Government to consider the principle of multiple land use to reconcile aa and where appropriate any conflicting aims between conservation, Aboriginal land rights and agricultural interests, and subsurface reaource exploration and development.

3. Any Cabinet Submission which containa a proposal involving limitations on accesa to land for petroleum or mineral resource exploration or development to include a discussion of the alternative surface and subsurface land use options.

4. Any Cabinet Submisaion recommending proclamation of a reserve under the National Parks and Wildlife Act or a State Heritage Area under the SA Heritage Act to include an assurance by SADME that consultation has occurred with any licensees under the Petroleum and Mining Acts who would be affected.

5. That the rights arising out of the existence of a production tenement be recognised in compensation in the event of a proclamation under the National Parks and Wildlife Act or SA Heritage Act which prevents further production from that tenement.

6. Section 41 of the National Parks and Wildlife Act be amended so that The Minister of Mines and Energy is to be consulted regarding any proposal to create or alter the boundaries of a reserve. (Currently before Cabinet.)

7. Unless in the opinion of the Minister for Environment and Planning overriding conservation considerations dictate otherwise, that for any future proclamations of parks over large areas or over small areas with recognised mineral potential, a simultaneous proclamation under Section 43 of the National Parks and Wildlife Act be made to provide that access be permitted for exploration and development under controls which enaure specific features or ecoaystems of particular and important significance are not disturbed. In these circumstances, a percentage of the royalties determined should be allocated to the management of national parks.

8. That careful consideration be given to the principlea endorsed by these recommendations before the State supports the entering of future parks on the Register of the National Estate.

9. That South Auatralia recommend to the Commonwealth that the Australian Heritage Act be amended such that Government conaultation ia required at both Commonwealth and State level before any item or area is listed on the National Eatate.

TO THE DEPUTY DIRECTOR-GENERAL

RE: SUMMARY OF LAND RESOURCE MANAGEMENT COMMITTEE

Agenda as shown was reorganised.

Alexander wanted to use the meeting to summarize some of the work of the LRM Committee to emphasise that it was a suitable precursor of the proposed LRM Council.

In attendance:

Alaxander, Yelland	-	Lands
Lewis	-	E&WS
McPhail	-	DEP

Also reps. from Woods & Forests & Agriculture.

Items in order of discussion:

Item 7 Land Information Management Committee

Background notes supplied / 10 min. video show.

Item 6 Government Property File and major transactions

Notes supplied by Maurice Toohey - Chief Properties Officer (Lands).

Advising progress in Property Register and Tenure Processing

Item 5 Future Waterworks Reserve (Hd. of Sleaford)

I contacted Bill Boucaut to see if any of this was of concern to him, but he felt it was all of E&WS's concern.

- Waterworks Reserve comprises half of Jursieu Peninsula south of Port Lincoln.
- Other half is Lincoln National Park.
- Reserve is sought by NPWS for addition to Lincoln National Park, the reason given being that a common management plan could then be implemented.
- Keith Lewis said this was unacceptable to E&WS, as the word 'Park' had emotive overtones and E&WS might be prevented from laying pipelines in the future - he cited the Coffin Bay water supply as an example.

- McPhail said that all this could be resolved by invoking multiple land use concepts within the proclamation. States that one of the advantages of declaring it a Park was that is would then be a requirement to have a plan of management. Lewis said he had no problems with leaving things as they were and having NPWS manage the whole area - in fact, E&WS would pay them to manage the Water Reserve.

- McPahil adamant that Hopgood wanted it all to be a National Park. Both McPhail and Lewis then agreed to discuss it further with Hopgood, although Lewis clearly disgruntled.

Items 2 and 3 Business Arising & Innamincka Study Report

'SANTOS' Committee vs. JOMG proposal

I indicated your written objections to the minutes of the previous meeting.

Alexander tabled a letter from Hopgood to Armor giving support to the 'SANTOS' Committee and remarked that this now seemed to be the accepted approach. Rick Barratt (Lands Assessment Branch?) has been told to contact Armor. Dept. of Tourism keen to be involved. A brief has been given to Barratt to get a suggested committee structure for the October meeting of LRM Committee. We should approach Alexander on the subject of who should chair this committee.

Alexander asked if, in the light of this decision, we still wished SADME's objections to stand in the minutes. I indicated that we did.

McPhail then raised the issue of the Innamincka Pastoral Lease and mentioned his proposal to the pastoral lessees (Kidman Holding's Pty Ltd). He advised that he had sent letters to Dept of Mines and Energy and Lands asking for comments. He stated that Hopgood was determined that the Park proposal should go ahead.

I suggested that this attitude was contrary to the Recommendations approved by the Cabinet Resources and Physical Development Committee on Access to Land for Petroleum and Mineral Exploration.

He stated that he had begun the consultative process by asking DME and Lands for comments.

Lewis and Alexander then both said that it seemed nevertheless a fait accompli and that further work on the Innamincka Study Report would seem to be a waste of time. McPhail said that of course it would form the basis of a Draft Management Plan and therefore it was desirable to go ahead with it.

I reiterated Keith Lewis' previous comments about the emotional connotations of the words 'Park' or 'Heritage Area', but McPhail said that everything would be OK with a multiple land use concept, to which I begged to differ.

The discussion then went on to the Simpson Desert proposal, with McPahil taking the view that by declaring it a Park it was then

mandatory to produce a management plan. An aside from Lewis to the effect that DEP was in enough trouble managing what it already had. Alexander and I argued that the management plan could also be adopted for a Desert Reserve without the connotations of Park status.

McPhail tried to take the heat off by a counter attack - that he understood that DME was preparing a Cabinet submission on the Simpson Desert and that it was a terrible thing that this might go to Cabinet before passing before the LRM Committee. In retrospect, I think this might have been a deliberate ploy, because it put Alexander off the offensive by making him defend his LRM baby, and it put me on the defensive, because all I could say was that I was unaware of any such submission but that I would mention it to you so that you could discuss it with Alexander as Chairman. I have the feeling that McPhail may not be too sure of how strongly he could defend his cause on this issue and that he will use divisive tactics like this.

Item 8 Pastoral Lands Conservation and Management Act

A discussion paper was tabled for review and discussion at the next meeting. I skimmed through it and suggested that, as an initial comment, it would be appropriate to include 'and organisations representing mining and petroleum interests' to Sec. 2.5 (P.3).

McPhail said this was one issue which he'd gladly support.

Item 10 Other business

There was some discussion over an issue raised by E&WS about roadworks at Happy Valley and whether or not it was too small a scale for discussion by the LRM Committee.

The meeting broke up following this.

16th September 1986
RGN:DG

R.G. NELSON
CHIEF GEOPHYSICIST

TO THE DEPUTY DIRECTOR-GENERAL

RE: SUMMARY OF LAND RESOURCE MANAGEMENT COMMITTEE

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16th September 1986
RGN:DG

R.G. NELSON
CHIEF GEOPHYSICIST

MINUTES forming ENCLOSURE to D.E. 4138/86

TO THE DIRECTOR-GENERAL, DEPARTMENT OF MINES AND ENERGY

Re: Extension to Simpson Desert Conservation Park

I refer to your minute of 23rd July, 1986 and make the following points by way of response:

1. *Your minute refers to the plan being the creation of a new National Park. My minute of 16th July was titled the proposal to extend the Simpson Desert Conservation Park. You would be aware of the different status of national parks and conservation parks under Part III of the National Parks and Wildlife Act. It is therefore suggested your response is unduly reactive as the conservation status seeks protection for the purpose of conserving wildlife and natural features (Conservation Park) not a declaration of lands being considered as containing features of national significance (National Park).*

2. *I note your use of the word "huge new National Park" which is assumed to convey a suggestion of ill-intent. My minute pointed out the Government's policy which is, to quote :*

   > *"work towards creating the world's largest network of arid lands national parks"*

   Whilst the proposal is to expand a conservation park, it is suggested that, in spirit, the Premier's policy statement is being significantly addressed.

3. *I further note the attached recommendations approved by the Cabinet Resources and Physical Development Committee. The proposal, to the extent that it is possible, is in accord with the key elements of the recommendations. I will be recommending that simultaneous proclamation under Section 43 of the National Parks and Wildlife Act will apply to the dedication. Under these circumstances, I believe your Department's concerns are fully accommodated and would be grateful for advice as to why you regard this as not being satisfactory.*

4. *I do not accept the proposal as being socially divisive and find the comment unusual. The proposal is consistent with Government policy and accommodates mining concerns in a way that has been demonstrably successful in the Witjira National Park. If you regard the Witjira negotiations and agreements reached with industry and your Department as being unacceptable, then I am not aware of any problems. I am led to believe that the industry found the liaison to have been most satisfactory. I would appreciate your advice if you believe this not to be the case.*

.../2

5. *I am not aware of any benefits that Desert Reserve status would have over a joint proclamation conservation park dedication. In view of the proximity to Witjira National Park, Lake Eyre National Park and Simpson Desert Conservation Park, I am surprised that a different tenure could be regarded as offering more all-round benefits to the State. You may not be aware that the area was declared a Desert Reserve on 24th October, 1985 however the proposal was only agreed to by my Department as an interim measure prior to the extension of the Simpson Desert Conservation Park.*

6. *You have alluded to an invitation to Commonwealth control. You provide no basis for this view however, I assume you refer to declaration under the (Commonwealth) National Parks and Wildlife Act 1975. If this is the case, you should note that acquisition cannot be undertaken without consent of the State (Section 6(2)). My Department would not recommend such a course of action for the Simpson Desert Conservation Park extensions.*

7. *In summary*

   (i) the area is proposed as a conservation park not a national park

   (ii) the proposal is in accord with Government policy

   (iii) the proposal is in accord with the thrust of the Cabinet Committee approvals

   (iv) the joint declaration process has shown very satisfactory practical implementation and accommodation of D.M.E. and industry interests

   (v) the Desert Reserve status exists and is regarded as interim leading to Conservation Park declaration

   (vi) there is no opportunity for Commonwealth control.

8. *I would appreciate your further comment on the matters I have raised. Please note my main basis for believing your concerns can be accommodated in the joint proclamation arrangements. I believe you should demonstrate where this is showing to be an unsatisfactory arrangement.*

(I.R. McPhail)
DIRECTOR-GENERAL
DEPARTMENT OF ENVIRONMENT AND PLANNING

30 / 7 /86

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA
191 Greenhill Road, Parkside

1836 SOUTH AUSTRALIA 1986

TELEPHONE: (08) 274 7500
TELEGRAMS: Domex
TELEX: AA88692
FACSIMILE No. 272 7597
PLEASE ADDRESS ALL CORRESPONDENCE TO:
The Director-General
PO Box 151
Eastwood, S.A., 5063
In reply, please quote

DME225/84 RL:ZV

31st July, 1986.

Mr. R. Adler,
Managing Director,
Santos Limited,
G.P.O. Box 2319,
ADELAIDE. S.A. 5001.

Mr. F. Ainsworth,
Managing Director,
Delhi Petroleum Pty. Ltd.,
G.P.O. 2364,
ADELAIDE. S.A. 5001.

Dear Sirs,

Re: Proposed Simpson Desert Conservation Park Extension

I have been advised that the Department of Environment & Planning will shortly be proposing to their Minister an extension to the Simpson Desert Conservation Park as set out on the attached map. This will increase the area of the current park from 6927 sq.km to 36569 sq.km. On 24/10/85 the status of the area of the proposed park extension was changed from Unallocated Crown land to Desert Reserve under S.5f the Crown Lands Act.

You are no doubt aware of this Department's position with regard to the alienation of land from mineral and petroleum exploration, and your continued rights of access into the recently created Witjira and Lake Eyre National Parks. It is therefore anticipated that any proclamation extending the Simpson Desert Conservation Park will permit your continued access for exploration, preserve your rights with regard to the issue of production licences and preserve industry's rights of access when your current licence expires.

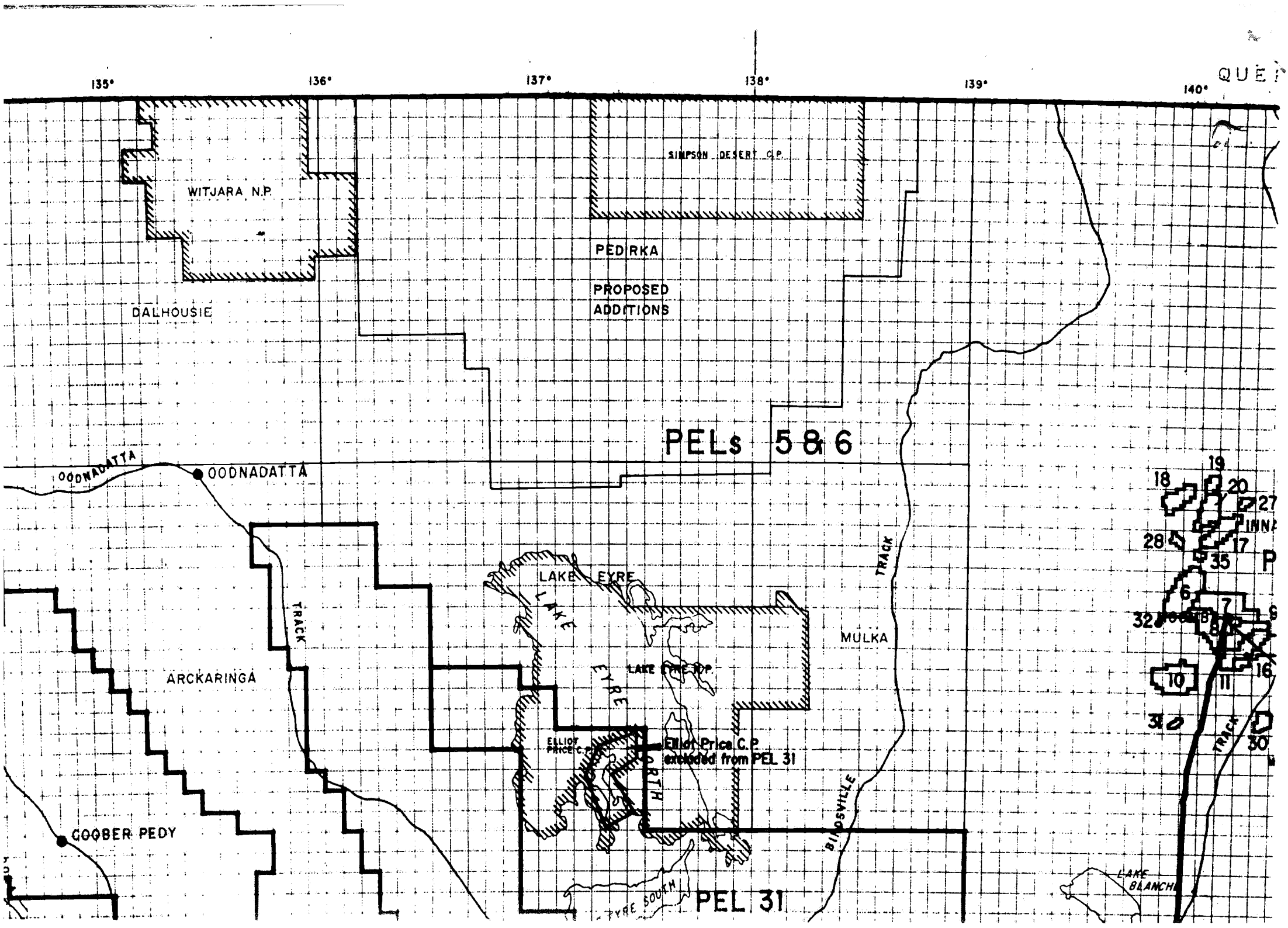
Would you please advise any comments and concerns you may have in relation to the proposed park dedication as soon as possible.

Yours faithfully,

R.K. JOHNS
DIRECTOR-GENERAL

Encl.

G2206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SANTOS Ltd
SANTOS House
39 Grenfell Street
Adelaide SA 5000.

Delhi Petroleum Pty Ltd
CSR House
101 Grenfell Street
Adelaide SA 5000.

13th August 1986
CRA.140/86:cib.

The Director-General
Department of Mines and Energy
PO Box 151
Eastwood SA 5063.

Dear Sir,

Simpson Desert Conservation Park - Proposed Extension.

Thank you for your letter relating to the impending proposal for an extension to the Simpson Desert Conservation Park.

As you will be aware, Delhi and SANTOS have particular concern about the increasing alienation of land from mineral and petroleum exploration.

As the proposed extension covers a significant portion of our Licence area, we would appreciate your advice as to the reasoning behind such a large extension of the Conservation Park. We would be interested, in particular, in what studies have been undertaken in the area to support the proposal for a conservation park extension, whether a management plan has been, or has yet to be prepared for the area and, if so, the manner in which users such as Delhi and SANTOS will be consulted as part of the process of its preparation.

It is also our view that prior to the proclamation of any proposal to extend such Conservation Parks that an assessment of the socio-economic factors of such a change, as well as biological factors, should be undertaken. In this respect we believe the procedures governing changes in land use ought to mirror the E.I.S. requirements with which Development Companies are obliged to comply before proceeding with a development.

The region is underlain by rocks of the Eromanga Basin which contains the oil fields in the Moomba area and by Permian and Triassic rocks which are equivalent to the Cooper Basin gas fields. There are about 50 prospects and leads which could contain oil and gas in the area and the joint venture exploration companies working in this area will be seeking to address these prospects in the future. The companies propose to conduct seismic work in the region in 1987 and further drilling is planned during 1988.

The Companies support the recent moves to implement multiple land use principles for areas in the far north. We are concerned, therefore, that the recent proposal to extend the Simpson Desert Conservation Park could prejudge the outcome of the work to assess the feasibility of continuing multiple land use for such areas.

In moving to designate the land as a Conservation Park it appears that the Park extension proposal has sought to determine a primary conservation land use for the area. Delhi and SANTOS see the current Desert Reserve status as more suited to the concept of multiple land use and to have adequate scope for Ministerial control to ensure the activities of all users can be appropriately managed. Indeed, we understand that Desert Reserve status for the area would be consistent with the Guidelines for Reservation and Management of Wilderness Areas in Australia set down by the Council of Nature Conservation Ministers in June of this year. The Council concluded that where exploration and mining were to proceed such areas should be designated under a reserve classification other than Wilderness Area or National Park.

There is a very vocal proportion of the general public who are opposed to exploration in any area which has been given the title of "Park". This proposed extension may result in increasing the degree of user conflict rather than reducing the conflict while still allowing the resources to be identified and developed.

Given the current public debate on stopping exploration activities on parts of the Innamincka Pastoral lease (an area which has no park status), the Companies are concerned about the prospect of a five-fold increase in the size of one of the existing Conservation Parks within its lease areas; particularly within such a potentially important oil and gas province as the Pedirka.

Throughout PELs 5 and 6, the Companies have a primary responsibility under the Petroleum Act 1940 to the Department of Mines and Energy and believe this point of reference should be maintained throughout Desert Reserves by ensuring:-

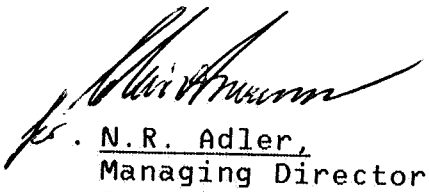
(a) the appropriate administrative arrangements are agreed between the Minister of Mines and Energy and the Minister of Lands; and

(b) suitable environmental guidelines and operational conditions are adopted, allowing both the continuation of the Companies' existing Exploration and Production activities and other rights, and the effective management of activities to minimise their potential effects on the environment.

The Companies have given thought to conditions and operational guidelines that may achieve the above and would be pleased to discuss these with officers of your department.

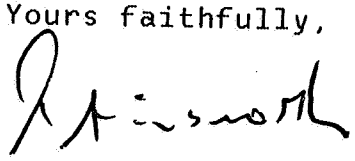
Your advice in relation to the above matters would be appreciated in due course.

Yours faithfully,

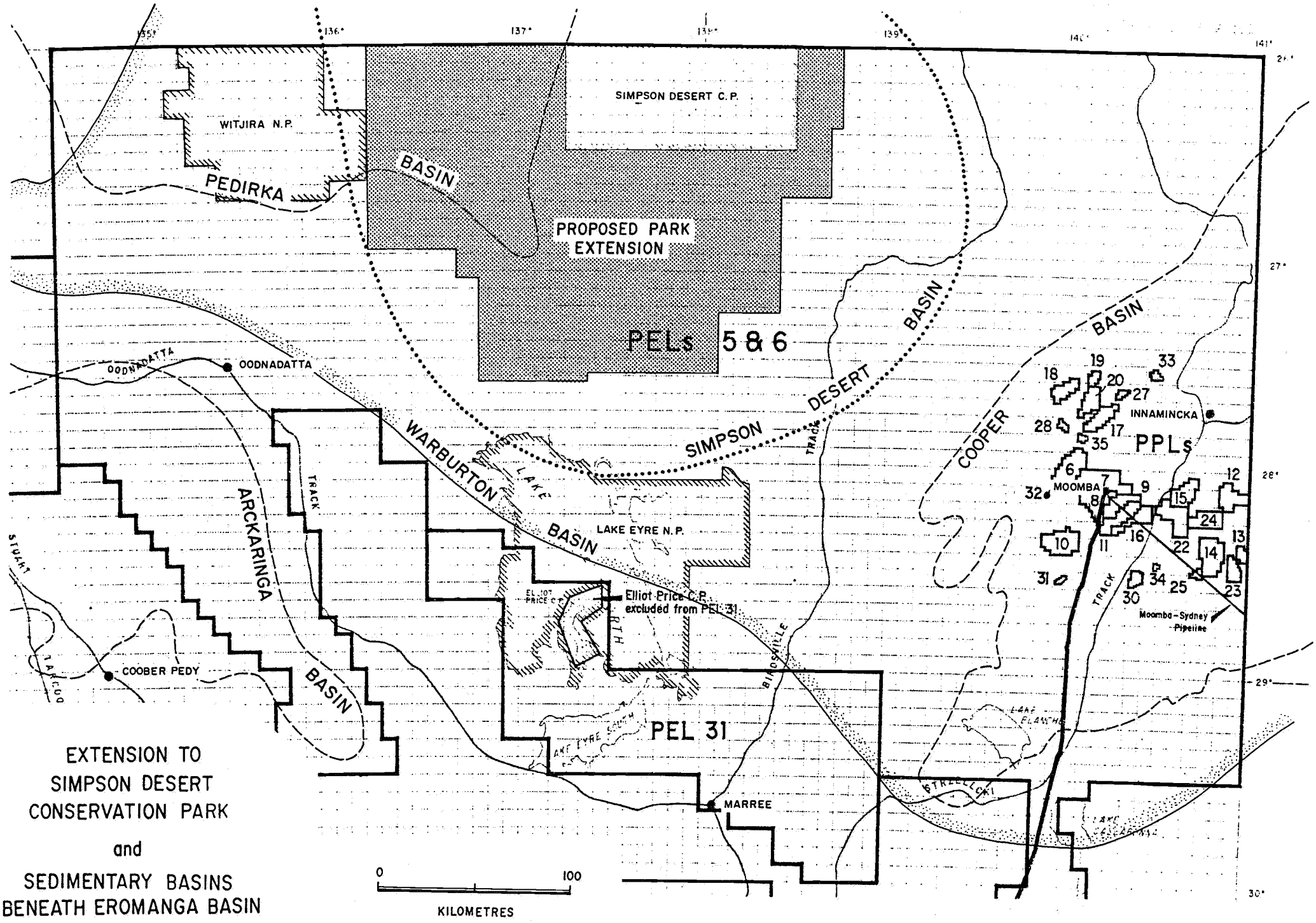


N.R. Adler,
Managing Director
SANTOS Limited.

Yours faithfully,



E.F. Ainsworth,
Managing Director
Delhi Petroleum Pty Ltd.



EXTENSION TO SIMPSON DESERT CONSERVATION PARK

and

SEDIMENTARY BASINS BENEATH EROMANGA BASIN

MINUTES forming ENCLOSURE to

To

RICK GIBKI
DEPT OF ENVIRONMENT & PLANNING.

6/5/66.

JMB.
LRO - LDB.

MINUTES forming ENCLOSURE to ..... No. 1667 1985

Manager, Urban Projects

MANAGER, LAND DEVELOPMENT BRANCH

re Simpson Desert Reserve

While rereading this docket, I have noticed that Recommendation 2 of Ministerial approval of 2nd September 1985 (herein) ~~is~~ nominates the Minister of Lands as the ~~Minister~~ Minister to whom care, control and Management has been charged. However, the dedication in gazette 24/10/85 placed the care control and management in the name of the Crown c/- the Minister of Lands and therefore will need to be rectified.

Also, as recently it has been proposed to term all the large areas of Crown land in the north as Arid Lands reserves, it may be worth changing the dedication from desert reserve to Arid Lands reserve. This will require resubmission for Ministerial approval.

3/4/86

I agree

11.L.D

4.4.86

John McDonald

LRO - LDB

MINUTES forming ENCLOSURE to DL. *No.* 1667 *1985*

NOTICE gazetted 24 / 10 /1985.

Copy enclosed.

7 / 11 /1985

pro ~~REGISTRAR LAND OFFICE~~
M./L.T.A.

SURVEY DATA BRANCH:

Public Map and ~~Original~~ Amended

Land Tenure Map Amended

7 / 11 /1985

W. Labay
Senior Drafting Officer
Plans Group

SERVICES BRANCH:

1. Survey - Council Records

Sean Jost
8/11/85

2. Detail - L.O.T.S. files created (copies enclosed).

SDO / DIG 11/11/85

3. Definitions - To note.

Noted in proclamation records

CROWN LANDS ACT, 1929: SECTION 5

TAKE notice that pursuant to the Crown Lands Act, 1929, I, Roy Kitto Abbott, Minister of Lands and the Minister of the Crown to whom the administration of the Crown Lands Act, 1929 is committed do hereby dedicate the Crown Lands defined in The Schedule as a Desert Reserve.

THE SCHEDULE

(1) Blocks 563, 564 and 565, Out of Hundreds (Dalhousie and Poolowanna).

(2) Blocks 566, 567 and 572, Out of Hundreds (Poolowanna).

(3) Blocks 568 and 573, Out of Hundreds (Noolyeana and Poolowanna).

(4) Block 577, Out of Hundreds (Gason, Noolyeana, Pandie Pandie and Poolowanna).

(5) Blocks 569 and 570, Out of Hundreds (Noolyeana).

(6) Blocks 575 and 576, Out of Hundreds (Pandie Pandie and Poolowanna).

(7) Block 578, Out of Hundreds (Gason and Noolyeana).

(8) Block 582, Out of Hundreds (Gason and Pandie Pandie).

(9) Blocks 580, 581, 589 and 591, Out of Hundreds (Pandie Pandie).

Dated 26 September 1985.

ROY KITTO ABBOTT, Minister of Lands

D.L., 1667/1985

CROWN LANDS ACT, 1929: SECTION 5

TAKE notice that pursuant to the Crown Lands Act, 1929, I, Roy Kitto Abbott, Minister of Lands and the Minister of the Crown to whom the administraton of the Crown Lands Act, 1929 is committed do hereby resume the lands defined in The Schedule.

THE SCHEDULE

Water Reserve No. 8 adjoining section 1937, Hundred of Kanmantoo, which was set aside as a reserve and placed under the care, control and management of the District Council of Nairne (now District Council of Mount Barker) in *Government Gazette* of 14 December 1865, at pages 1156, 1157, 1158 and 1159, eighth appearing.

Dated 14 October 1985.

ROY KITTO ABBOTT, Minister of Lands

D.L., 4245/1981

CROWN LANDS ACT, 1929: SECTION 5

TAKE notice that pursuant to the Crown Lands Act, 1929, I, Roy Kitto Abbott, Minister of Lands and the Minister of the Crown to whom the administration of the Crown Lands Act, 1929 is committed do hereby resume the lands defined in The Schedule.

THE SCHEDULE

Water Reserve No. 7, adjoining section 1932, Hundred of Kanmantoo, which was set aside as a reserve and placed under the care, control and management of the District Council of Nairne (now District Council of Mount Barker) in *Government Gazette* of 14 December 1865, at pages 1156, 1157, 1158 and 1159, seventh appearing.

Dated 14 October 1985.

ROY KITTO ABBOTT, Minister of Lands

D.L., 4244/1981

CROWN LANDS ACT, 1929: SECTION 5

TAKE notice that pursuant to the Crown Lands Act, 1929, I, Roy Kitto Abbott, Minister of Lands and the Minister of the Crown to whom the administration of the Crown Lands Act, 1929 is committed do hereby resume the lands defined in The Schedule.

THE SCHEDULE

Water Reserve No. 10, adjoining section 1806, Hundred of Kanmantoo, which was set aside as a reserve and placed under the care, control and management of the District Council of Nairne (now District Council of Mount Barker) in *Government Gazette* of 14 December 1865, at pages 1156, 1157, 1158 and 1159, tenth appearing.

Dated 14 October 1985.

ROY KITTO ABBOTT, Minister of Lands

D.L., 4242/1981

CROWN LANDS ACT, 1929: SECT

TAKE notice that pursuant to the Crown Lands
Kitto Abbott, Minister of Lands and the Mini
to whom the administration of the Crown L
committed do hereby dedicate the Crown lan
Schedule as a Conservation Reserve and decla
shall be under the care, control and manageme
of Lands.

THE SCHEDULE

Section 103, Hundred of Cunyarie, County o
of all necessary roads.

Dated 14 October 1985.

ROY KITTO ABBOTT, M

D.L., 1286/1984

CROWN LANDS ACT, 1929: SE

TAKE notice that pursuant to the Crown Lan
Kitto Abbott, Minister of Lands and the M
to whom the administration of the Crown
committed do hereby resume the lands defin

THE SCHEDULE

Water Reserve No. 6, adjoining section 47.
which was set aside as a reserve and placed u
and management of the District Council of
Gazette of 2 August 1877 at pages 313 and

Dated 21 October 1985.

ROY KITTO ABBOTT.

D.L., 3100/1983

CROWN LANDS ACT, 1929: S

TAKE notice that pursuant to the Crown L
Kitto Abbott, Minister of Lands and the
to whom the administration of the Crow
committed do hereby resume the lands de

THE SCHEDULE

Water Reserve No. 29, adjoining sec
Nangkita, which was set aside as a reserv
care, control and management of The D
Elliott and Goolwa in *Government Gazett*
at pages 1208, 1209, 1210 and 1211, twe

Dated 21 October 1985.

ROY KITTO ABBO

D.L., 4006/1984

CROWN LANDS ACT, 1929

TAKE notice that pursuant to the Crow
Kitto Abbott, Minister of Lands and th
to whom the administration of the Cr
committed do hereby resume the lands

THE SCHEDULE

Water Conservation Reserve, adjoini
Wandana, the proclamation of whic
Government Gazette on 10 February 1

Dated 21 October 1985.

ROY KITTO ABI

E.W.S., 1926/1943

CROWN LANDS ACT, 19

TAKE notice that pursuant to the Cro
Kitto Abbott, Minister of Lands and
to whom the administration of the
committed do hereby:

1. Resume the lands defined in Th

2. Dedicate the Crown Lands defin
as a Recreation Reserve and declar
under the care, control and manageme
Progress Association.

Serial 6032/1

(7) Ownership

Name	Address	P. Cde	Owners' No.	Moieties
THE CROWN	POST BOX 1047		900006521	
c/- THE MINISTER OF LANDS	G.P.O. ADELAIDE	5001		

(1) Serials

Tenure D024 10 1385
Valuation Dep.
Co. ords Zone
East
North
Title Reference 8305000563
Date of Comc. – Lease

(8) Location

2 Closed Road
3 Strata Unit
4 Section
6 Allotment
7 Block

(1) County. Hundred	(2) Township	(3) Imp. Area (Div.)		
OH(DALHOUSIE)			1	830500
			7	5632
OH(POOLOWANNA)			7	5651
			1	830600
			7	5632
			7	5681
"SIMPSON DESERT"			7	572
			7	573
			7	5752
OH(PANDIE PANDIE)			7	5771
			1	830700
			7	5752
			7	5771
			7	580

8 Run : 9 Mineral Section : 0 Site

(2) Area and Rent

Area HK Approx. 29642K
Purchase Money $
Rent Inter Mths Amt $
Conc Rent Yrs Amt $
Date of Comc.
Review Duration Yrs
Rent Due

(3) Agreement / Improvements

Date
Deposit $
No. of Inst./Prd. Mths
Rates (Nor | Late)
Princ Imp./Land $
Princ Int $
Instalment $

(9) Constraints Conditions

LIMIT(0932)

(4) Crown Loan or Mortgage

Due Date
No. of Inst./Prd Mths
Rate %
Loan Amount $
Instalment $
Supported by
Insurance $

(0) Encumbrances

Agency	Type	Agency No	Reg

L.O.T.S. Advice No	Date
M 7857	9.9.85
N2652, G0148	29/10/85

(5) Diagram Book Page Nos

Authentication

Compiled by
Approved by
Punched by
Verified by
Filed by

Dates —
Compiled 10 9 85
Filed
Punched

(A) Lands Department File Reference

Docket	Subject
166785	TO BE DEDICATED AS A DESERT RESERVE – MIN. APPD. 2.9.85 – UNDER THE CONTROL OF THE MINISTER OF LANDS.
166785	AUTHD RE DEDICATED AS A DESERT RESERVE – VIDE GAZ. 24/10/1985.

MINUTES forming ENCLOSURE to D.L. *No.* 1667 *19* 85

SURVEYOR-GENERAL:

Definition herewith. No definition fee is required.

20.9 .1985

SENIOR DRAFTING OFFICER
Definitions Unit

NOTICE to be published in the gazette Certified correct.

TO THE MINISTER OF LANDS:

NOTICE to be published in the gazette to dedicate:-

(1) Blocks 563, 564 and 565, Out of Hundreds (Dalhousie and Poolowanna).

(2) Blocks 566, 567 and 572, Out of Hundreds (Poolowanna).

(3) Blocks 568 and 573, Out of Hundreds (Noolyeana and Poolowanna).

(4) Block 577, Out of Hundreds (Gason, Noolyeana, Pandie Pandie and (Poolowanna).

(5) Blocks 569 and 570, Out of Hundreds (Noolyeana).

(6) Blocks 575 and 576, Out of Hundreds (Pandie Pandie and Poolowanna).

(7) Block 578, Out of Hundreds (Gason and Noolyeana).

(8) Block 582, Out of Hundreds (Gason and Pandie Pandie).

(9) Blocks 580, 581, 589 and 591, Out of Hundreds (Pandie Pandie) as a Desert Reserve herewith for signature.

Total area to be dedicated is 29642km².

20.9 .1985

A/ Supervising Drafting Officer,
for SURVEYOR-GENERAL

BK:alf

LAND TENURE ADMINISTRATION
16 OCT 1985
pro DOCUMENTARY OFFICER

CROWN LANDS ACTS, 1929: SECTION 5

TAKE NOTICE that pursuant to the Crown Lands Act, 1929, I ROY KITTO ABBOTT Minister of Lands and the Minister of the Crown to whom the administration of the Crown Lands Act, 1929 is committed DO HEREBY dedicate the Crown Lands defined in The Schedule as a Desert Reserve.

The Schedule

(1) Blocks 563, 564 and 565, Out of Hundreds (Dalhousie and Poolowanna).

(2) Blocks 566, 567 and 572, Out of Hundreds (Poolowanna).

(3) Blocks 568 and 573, Out of Hundreds (Noolyeana and Poolowanna).

(4) Block 577, Out of Hundreds (Gason, Noolyeana, Pandie Pandie and Poolowanna).

(5) Blocks 569 and 570, Out of Hundreds (Noolyeana).

(6) Blocks 575 and 576, Out of Hundreds (Pandie Pandie and Poolowanna).

(7) Block 578, Out of Hundreds (Gason and Noolyeana).

(8) Block 582, Out of Hundreds (Gason and Pandie Pandie).

(9) Blocks 580, 581, 589 and 591, Out of Hundreds (Pandie Pandie).

Dated 1985.

ROY KITTO ABBOTT
Minister of Lands

D.L. 1667/1985

MINUTES forming ENCLOSURE to DL No. 1667 1985

CHIEF DRAFTING OFFICER

For action in terms of Ministerial approval to recommendations 1. & 2.&4. in minute of 26/8/85.

3/9/85

J.M. Gould.
L.R.O. - Urb. Projects Branch.

LDB1 Record created & LOTS file created

Senior Drafting Officer,
D.I.G. - Detail
10/9/85

Definitions

12/9 Urgent see minute dated 20.8.85 herein

10 SEP 1985 Serial 68327

(7) Ownership

Name	Address	P. Cde	Owners' No.	Moieties
THE CROWN	POST BOX 1047		90000652	
c/- THE MINISTER OF LANDS	G.P.O. ADELAIDE	5001		

(1) Serials

Tenure
Valuation Dep.
Co. ords Zone
East
North
Title Reference 8305000563
Date of Comc. – Lease

(8) Location

(1) County Hundred	(2) Township	(3) Irrig Area (Div.)
OH(DALHOUSIE)		
OH(POOLOWANNA)		
"SIMPSON DESERT"		
OH(PANDIE PANDIE)		

7 Closed Road
3 Strata Unit
4 Section
5 Town Acre
6 Allotment
7 Block

1	830500	1
7	563	2
7	565	1
1	830600	4
7	563	2
7	568	1
7	572	7
7	573	8
7	575	2
7	577	1
1	830700	1
7	575	2
7	577	1
7	580	4

8 Run 9 Mineral Section 0 Site

(2) Area and Rent

Area H.K Approx. 29642 K
Purchase Money $
Rent Inter Mths Amt $
Conc Rent Yrs Amt $
Date of Comc
Review Duration Yrs
Rent Due

(3) Agreement / Improvements

Date
Deposit $
No. of Inst./Prd. Mths
Rates (Nor | Late)
Princ Imp./Land $
Princ Int $
Instalment $

(9) Constraints Conditions

LIMIT(CL)

(4) Crown Loan or Mortgage

Due Date
No. of Inst./Prd Mths
Rate %
Loan Amount $
Instalment $
Supported by
Insurance $

(0) Encumbrances

Agency	Type	Agency No	Reg.

LOTS Advice No: M 7857 Date: 9.9.85

(5) Diagram Book Page Nos

Authentication

Compiled by
Approved by
Punched by
Verified by
Filed by

Dates —
Compiled 10 9 85
Filed
Punched

(A) Lands Department File Reference

Docket	Subject
I 166785	TO BE DEDICATED AS A DESERT RESERVE – MIN. APPD. 2.9.85 – UNDER THE CONTROL OF THE MINISTER OF LANDS.

INTRA-OFFICE MEMORANDUM

DEPARTMENT OF LANDS

(Under no circumstances is this memorandum to leave this department)

To DIRECTOR OF LANDS.

Don,

you should be aware of this before it goes to Minister. I can see no problems with its implementation as mining interests are being protected, as is the land.

✓

Signed Rod Gilmour

22/8/1985

CL 164

TO THE DIRECTOR LAND OPERATIONS:

Re Crown Lands in Simpson Desert

BACKGROUND:

1. On 7/9/83 the Minster of Lands approved a course of action which would gradually lead to dedication as desert reserve under the Crown Lands Act, of all the large areas of Crown land in the state's Far North. The procedure was to begin with dedication of Crown lands in the Lake Eyre - Tirari Desert region.

2. The procedure involved compilation of a brief environmental report, notification to three other Government Departments and the seeking of ministerial approval for dedication.

3. The intention of dedication is to preclude development and use of lands considered not suitable to bring into development and use, apart from mining and petroleum exploration.

CONSIDERATIONS:

1. Lake Eyre - Tirari Desert Crown lands have not yet been dedicated because there is a proposal to proclaim all or portion of the lands as Conservation Park under the National Parks and Wildlife Act.

2. A brief Environmental report has not been considered necessary as the relevant information is included in the DRAFT MANAGEMENT PLAN - Simpson Desert Conservation Park. Copies of the draft are attached.

3. The Department of Mines and Energy and Highways Department have raised no objection to the proposal, though Department of Mines and Energy desired consultation on the proclamation. The Department of Environment and Planning have expressed support for the proposal as an interim measure prior to extension of the Simpson Desert Conservation Park. The proposed extension includes portion of the Simpson Desert Crown lands.

MINUTES forming ENCLOSURE to D.L. *No.* 1667 *19* 85

RECOMMENDATIONS:

1. The Simpson Desert Crown lands, being Blocks 563 to 570 inclusive, 572, 573, 575 to 578 inclusive, 580 to 582 inclusive, 589 and 591 be dedicated as desert reserve under provisions of Section 5 of the Crown Lands Act.

2. The Minister of Lands be responsible for the care, control and management of the reserve.

3. Dedication of the Simpson Desert Crown lands is to proceed prior to that of the Lake Eyre and Tirari Desert Crown lands.

4. A copy of the ministerial approval to dedicate is to be referred to the Department of Mines and Energy.

C.J. Kaufmann
Manager
URBAN PROJECTS BRANCH

JM:FM
26/8/85

TO THE MINISTER OF LANDS:

I support the above recommendations and RECOMMEND their approval.

for D.J. Alexander
DIRECTOR OF LANDS

27/8/85

AL2310-2

APPROVED I hereby authorise the affixing of the Common Seal of The Minister [illegible] to all documents necessary to implement [illegible] approval.

.....
THE MINISTER OF LANDS
2.9.85

MINUTES forming ENCLOSURE to DL No. 1667 1985

To DIRECTOR, OUTBACK MANAGEMENT

For noting, thence return to Urban Projects Br. for Action.

J McDonald.
LRO - Urb. Proj.
16/8/85.

Seen & noted.
Manager, Urban Projects.

Please proceed with these reservations as a matter of urgency. I was under the impression that this matter was much further advanced — in fact virtually completed.

[signature]
20.8.85.

MINUTES forming ENCLOSURE to D.L. 1667 *No.* 19 85
D.L. 1786 83

MANAGER, URBAN PROJECTS BRANCH

DIRECTOR, OUTBACK MANAGEMENT DIVISION

RE: CROWN LANDS IN SIMPSON DESERT

On 7/9/83 the Minister of Lands approved a procedure which would lead to gradual dedication as desert reserve under the Crown Lands Act, of all the large areas of Crown land in the state's Far North.

The procedure involved:

- preparation of a brief environmental report
- notification to Department of Mines & Energy, Dept. of Environment and Planning and Highways Department, allowing four weeks to reply
- seeking approval of Minister of Lands.

To evaluate the procedure, it was also recommended and approved to begin the process with the Crown Lands in the Lake Eyre & Tirari Desert Region. To date this area has not been dedicated; the Department of Environment and Planning have expressed interest in proclaiming all or part of this area as Conservation Park under the National Parks and Wildlife Act. The matter is being negotiated with the Department of Environment and Planning.

So far, no report has yet been preparedfor the Simpson Desert lands, but as there was considered a degree of urgency for dedication of these lands (related to pre-empting use of and claims for the land) letters were sent to the abovementioned Departments on 7/5/85. No objections were received from the Department of Mines and Energy though they did request consultation in drafting the proclamation. Highways Dept. also raised no objection. The Department of Environment and Planning in an initial response of 23/5/85 (herein) stated that our proposal to dedicate was in conflict with their desire to extend the Simpson Desert Conservation Park. However, in a later response of 17/7/85 (herein) the Director-General of the Department of Environment and Planning stated that dedication of the lands as desert reserve would be a worthwhile interim measure pending dedication of portion of the lands as Conservation Park.

A draft Management Plan for the Simpson Desert Conservation Park contains most of the information necessary for a brief environmental report of the Simpson Desert Crown Lands. Any extra information is included in Environments of South Australia - Northern Arid Province. Photocopies of relevant portions are attached.

Plan and Detail, dated 10.4.85 is contained herein.

RECOMMENDATIONS

JMc 16/8/85.

1. The Simpson Desert Crown Lands, being Blocks ~~536~~ 563 - 570, 572, 573, 575 - 578, 580 - 582, 589 and 591 be dedicated as desert reserve under provisions in the Crown Lands Act.

2. Dedication is to proceed prior to that of the Lake Eyre & Tirari Desert Crown lands and without necessity for compilation of a brief report as originally approved on 7/9/83 by the Minister of Lands.

3. When approved by the Minister of Lands, a copy of the approval to dedicate be referred to the Department of Mines and Energy.

John McDonald

J. MCDONALD
Land Resource Officer
URBAN PROJECTS BRANCH

16/8/85

CS2808-6

Sir: for your information
Please return this & we will proceed
with further work
MVP 16.8.85

DESCRIPTION OF THE AREA

LOCATION

The Simpson Desert Conservation Park lies in the southern Simpson Desert in the extreme far north of South Australia (Figure 1). It is the second largest reserve in the South Australian park system and covers 692 680 hectares. Its northern boundary is the State border, latitude 26° South. About 60 per cent of this boundary, west from the South Australian-Queensland-Northern Territory junction at Poeppel Corner, abuts vacant Crown Land in the Northern Territory. East of Poeppel Corner, the northern boundary abuts Queensland's Simpson Desert National Park which covers an area of some 505 000 hectares.

The southern boundary lies along latitude 26°30' south, and the western and eastern boundaries respectively on longitudes 137°15' east and 138°30' east. The eastern boundary of the Simpson Desert National Park (Queensland) intersects the Queensland-South Australian border some 20 kilometres further east, at latitude 138°42' east, than the eastern boundary of the South Australian park.

The Simpson Desert is a sandridge desert of some 150 000 square kilometres, with segments in South Australia, Queensland and the Northern Territory. It is roughly triangular in shape, with its apex at Lake Eyre. The desert is bounded to the east by the floodplains of the Mulligan and the Warburton creeks, and to the west by the floodplains of the Finke and Macumba rivers. The Simpson Desert Conservation Park (South Australia) and the Simpson Desert National Park (Queensland) together provide statutory protection to slightly under 8 per cent of the Simpson Desert.

The Simpson Desert Conservation Park was originally gazetted a National Park under the then *National Parks Act* 1966 as Section 48 North Out of Hundreds. It was reconstituted a Conservation Park under the present *National Parks and Wildlife Act* 1972-1981.

The only other park in the region is the Elliot Price Conservation Park on the shores of Lake Eyre (Figure 1).

PHYSICAL FEATURES

Climate

There are no substantial data on the climate of the Simpson Desert in general or the park in particular, although some records of limited periods do exist. Most climatic information is an extrapolation from records of meteorological stations bordering the desert.

The Simpson Desert is within the most arid core of the continent. Almost all of the desert lies within the 130 millimetre annual rainfall isohyet (Buckley 1981c). This low average rainfall decreases to the south. The area about Lake Eyre is the driest part of the continent with average annual rainfall between 100 and 150 millimetres, and the twelve-month aggregate rainfall rarely exceeding 250 millimetres (Gentilli 1972). However, average figures are misleading for the rainfall is highly variable. The area experiences extended droughts interspersed with relatively high rainfall periods; occasional very high rainfalls may also occur. At Mount Dare Station, the total rainfall for 1976 was 569 millimetres, four times the long-term average, which was preceded by three years of rainfall at two to three times the long-term average (Buckley 1981b).

The Simpson Desert in South Australia lies on the boundary between the northern (monsoonal) summer-rain zone and the southern winter-rain regions, with probably the major part of average rainfall in summer. Oodnadatta, south-west of the park, has approximately 60 per cent of its average rainfall in October to March (Australian Bureau of Statistics 1982), while Alice Springs, to the north-west, has 75 per cent of its average over the same period. Summer falls tend to be heavier than winter falls.

Rainy days are few. Oodnadatta, for example, has averaged only thirty days per annum with rain over all years of records.

Seasonal and diurnal variation in temperature is marked. At Oodnadatta, the mean monthly maxima and minima vary from about 38°C and 22°C respectively in January, to 19°C and 6°C in July. Daily maxima above 38°C are common in summer, while frosts are frequent in winter.

Evaporation rates are very high (3300 millimetres per annum at Oodnadatta (Stace *et al.* 1968)). Rates are, of course, highest in summer, and consequently more rain is needed in summer than in winter to be effective in stimulating plant growth. Overall, Jessup (1960) has estimated that only 33 per cent of average annual rainfall is effective in the southern Simpson Desert.

September and October are the windiest months and the dominant winds are south-easterly, approximately parallel to the desert sandridges (Brookfield 1970). These winds shift sand, and are discussed in later sections because of their role in dune building.

The aridity of the Simpson Desert is not as extreme as in parts of the Sahara for it is unlikely that any part of the Simpson Desert would be completely without rain for more than a year. However, the aridity is comparable with that of other major deserts in the world, such as the Kalahari.

Geology and Geomorphology

THE UNDERLYING SEDIMENTS

The Simpson Desert is a relatively recent land-form, a result of climatic oscillations in the Quaternary (Table I). It is underlain by aeolian, stream and lake deposits of the Tertiary, and the Mesozoic sediments of the Eromanga Basin. Below the Eromanga Basin is the Permian Pedirka Basin, the present focus of petroleum exploration. The geological structure of the Pedirka Basin closely resembles that of the Cooper Basin, from which gas and liquid hydrocarbons are extracted on a commercial basis (Figure 2).

Ancient features and tectonic structures in the pre-Permian basement rocks have largely controlled the pattern of later sedimentation (Wopfner and Twidale 1967; Firman 1974, 1981). The structures have resulted in differential subsidence of various parts of the region along lineaments (extensive and straight zones of faulting). The most recent movements on the basement structures have produced lineaments visible at the surface on LANDSAT imagery. Before the Permian, the various movements gave rise to a series of troughs and valleys at the surface, and it was in these troughs that the Permian sediments were laid.

The region was glaciated in the early Permian (about 270 million years ago), and the lowest sediments in the Pedirka Basin comprise tillite and other glacial deposits (Crown Point Formation). The glaciation was followed by a brief incursion of the sea, in turn followed by a long period, of over 50 million years, during which the Pedirka Basin was largely or entirely a shallow lake. Deposition during this period included masses of organic matter, mud and sand. The deposits are now represented by strata in the Purni Formation comprising siltstones, sandstones and shales interspersed with coal seams up to 20 metres thick.

Some of the organic matter has been converted to gaseous and liquid hydrocarbons rather than to coal, and such petroleum is trapped in the porous sandstones of the formation.

Above the Pedirka Basin is part of the much larger Eromanga Basin. This is one of several sub-basins that together make up the Great Australian Basin (or, less correctly, the Great Artesian Basin). Triassic sediments, particularly sandstones, cap much of the Permian sediment of the Pedirka Basin. The Eromanga Basin was apparently landlocked in this period (200 to 250 million years ago).

Sedimentation in the Eromanga Basin during the Jurassic is represented by strata up to 1 000 metres thick beneath the desert. There are a number of Jurassic formations, indicating a cycle of deposition in a freshwater environment. The Jurassic sequences are bounded by sandstones, and intermediate sediments, include shale and coal.

A major downwarping of the Eromanga Basin occurred during the Cretaceous (about 130 million years ago) and resulted in transgression of the sea into the basin. The lowest Cretaceous sediments show the transition from the landlocked, freshwater depositional environment of the preceding period. Subsequent regression of the sea brought a return to freshwater deposition with sediments including siltstones, shales and sandstones, and carbonaceous plant material and fossil wood being formed. All of the South Australian portion of the basin had become dry land by the end of the Cretaceous (70 million years ago), and a period of weathering of the land surface followed.

First development of the modern Lake Eyre depression started in the early Tertiary, 60 to 70 million years ago. Gentle downwarping over the region produced a shallow but very widespread depression which set the broad outline of the modern land-form (the Lake Eyre Basin of Wopfner and Twidale 1967). The depression resulted in the Eromanga Basin becoming isolated from the sea, and by the Miocene, the drainage of the basin ended in the depression—streams did not reach the sea. As a result, much of the area, including the present Simpson Desert in South Australia, was under shallow lagoons or was broad floodplain over which meandered the streams. The lake and stream sediments from this time to the Pleistocene form a blanket up to 200 metres thick beneath the desert, particularly in the playa lakes region. In these sediments are the Miocene clays, sands and dolomites of the Etadunna Formation containing a rich fossil fauna of both terrestrial and aquatic forms including mammals, fish and crocodiles.

The richness of the fossil fauna point to a wet, warm, temperate or possibly subtropical climate in the Miocene, capable of supporting abundant plant and animal life. In the late Miocene, however, a general cooling and drying of the climate began, interspersed with some wetter periods which continued into the Quaternary. Major climatic oscillations occurred during the early and middle Pleistocene from about 1.5 million years ago to 100 000 years ago. Climates in the region varied from cold and dry, corresponding with glaciation elsewhere in the world; to temperate and wet (Firman 1981). The former periods brought about exposure of the lake and stream deposits, and led to the formation of dunes. Evidence of a former arid dune system in the region 300 000 years ago is given by Bowler (1976). In the more temperate periods, the lake and river systems were again active.

Subsequent events in the Pleistocene are intimately connected with the surface features of the present Simpson Desert, and are accordingly discussed below.

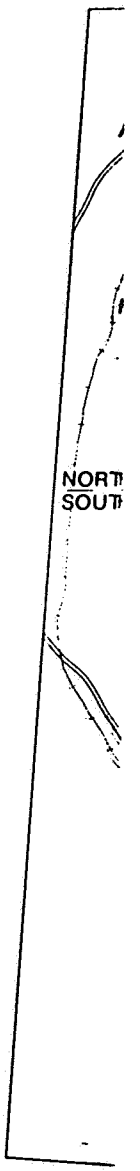
OIL AND THE PERMIAN STRATA

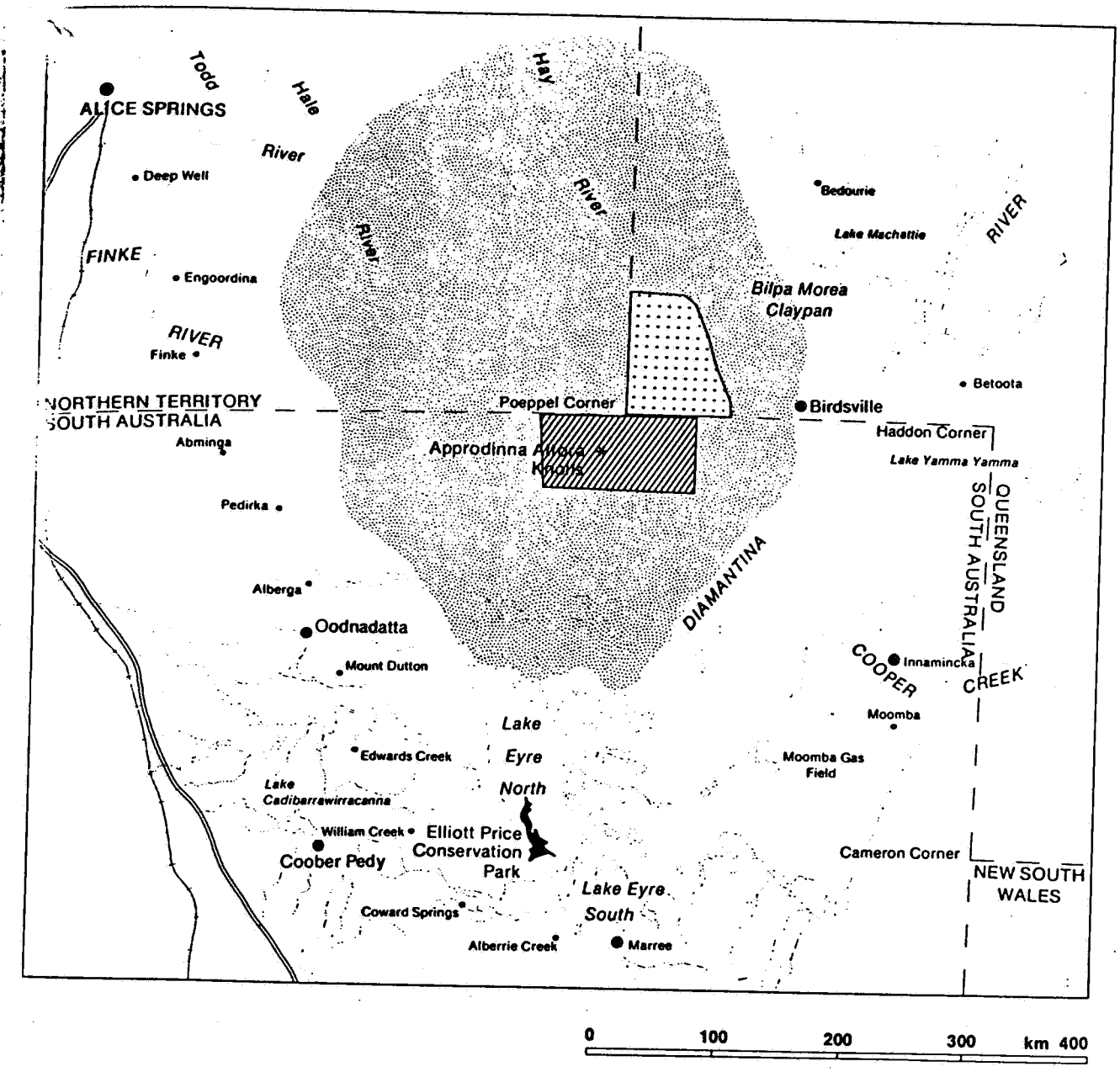
The hydrocarbon-bearing sediments of the Permian Pedirka Basin are the focus for current petroleum exploration of which mention should be made.

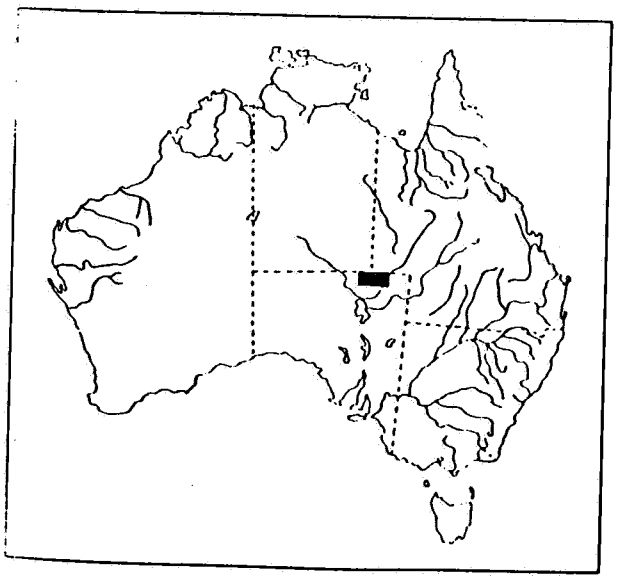
Organic matter, if buried with fine-grained sediment, will be incompletely decomposed. The decomposition bacteria leave a mixture of organic compounds which, through various physical and chemical processes, form hydrocarbon compounds, particularly paraffin hydrocarbons. Whether these compounds are light (forming gas) or heavy (forming hydrocarbon liquids or oil) depends partly on the nature of the original material. For a reservoir of gas or liquid to develop, movement of the hydrocarbons to the reservoir must be possible, and the strata bounding the reservoir must be relatively impermeable. In the case of the Pedirka Basin and also the gas-producing Cooper Basin, the potential reservoirs are porous sediments of Permian and possibly Triassic sandstones lying in troughs and hollows in the relatively impermeable pre-Permian

TABLE I: Geological Time Scale

Years before present				
3000	CAINOZOIC	QUATERNARY	HOLOCENE	
8000				Arid-humid climate oscillations
18000			PLEISTOCENE	Peak aridity Regional dunefield formation Progressive drying
40000				Last humid period Lake Eyre full Humid-arid climate oscillations
1.8m		TERTIARY	PLIOCENE	Some dune building Drying and cooling of climate
10m				
20m			MIOCENE	Subtropical Land-locked
			OLIGOCENE	
40m			EOCENE	
50m				
60m			PALEOCENE	
70m				Development of Lake Eyre Basin starts Dry land
100m	MESOZOIC		CRETACEOUS	
150m			JURASSIC	Marine incursions
200m			TRIASSIC	Fresh-water deposition
250m	PALAEOZOIC		PERMIAN	Hydrocarbon-forming sedimentation
300m			CARBONIFEROUS	
350m			DEVONIAN	







Simpson Desert Conservation Park (S.A.)

Simpson Desert National Park (Qld.)

Extent of Simpson Desert

Primary road

Railway line

Figure 1

Park Location

basement (SANTOS 1981a). The current petroleum exploration in the desert is aimed at identifying and testing potential reservoir formations within the basin. The stratigraphy and geographic extent of the Pedirka Basin is such that the reservoirs with most potential for yielding hydrocarbons in commercial quantities may be under, or close, to the park (Figures 2 and 3).

It should also be mentioned here that the pre-Permian sediments include several formations which may have as much hydrocarbon potential as the Permian strata (Youngs 1975) and exploration of these is a future possibility.

THE DUNEFIELDS

The primary characteristic of the Simpson Desert is its extensive system of long, straight and evenly-spaced parallel dunes. The dunes are aligned approximately NNW-SSE. Individual dunes commonly extend continuously for over 150 kilometres and some are as long as 300 kilometres. The height of ridges and spacing between dunes varies in different parts of the desert. Along the South Australian border, the range is 10 to 15 metres in height, with an average spacing of 200 metres between ridges in the western desert, to over 30 metres in height and spacing wider than 1 kilometre in the east. In general, the wider the spacing, the higher the dune. "Tuning fork" junctions between dunes occur sporadically, with openings upwind.

Over much of the desert, dunes are asymmetric in cross-section, with generally steeper eastern faces (Figure 4). Usually, only the dune summits are mobile, having little vegetative cover. Dune flanks are generally fixed by vegetation. Because of their mobility, dune crests may show a variety of features related to short-term wind patterns such as secondary crests at angles to the main dune line. Often, crests display reverse asymmetry, with the steepest part of the dune becoming the summit of the western face.

The nature of the swales (interdunal corridors) varies with dune spacing. The underlying alluvial deposits may be exposed where dunes are widely spaced, or covered with a mantle of clayey sand between closely-spaced dunes.

The parallel dunes give an impression of uniformity in the desert, but the impression is misleading. As well as the broad variation in dune height and spacing, there are major regional variations in dune shape, age, level of mobility and general regularity. The nature of sediments exposed between dunes also varies. The variations are particularly pronounced in the southern Simpson Desert, including the park area (Graetz *et al.* 1982; Fatchen and Barker 1979a, 1979b; Buckley 1979, 1981c). In many respects, it is unfortunate that the first

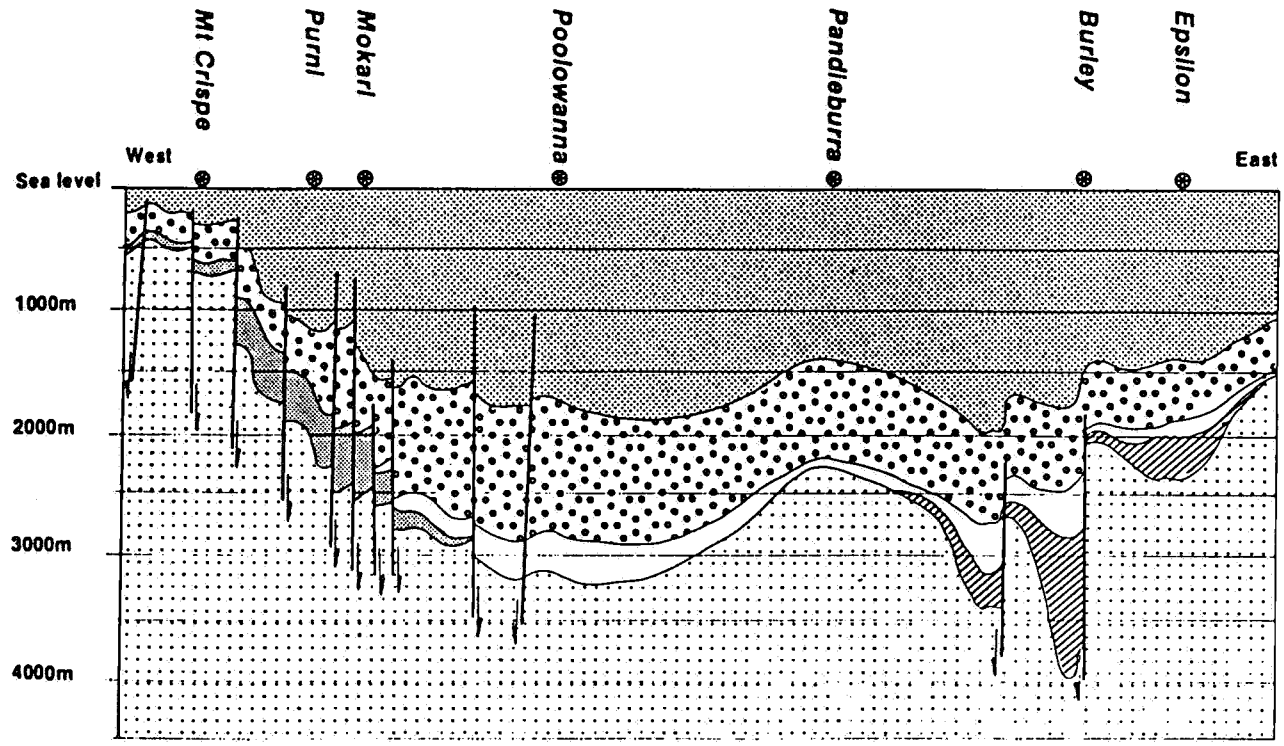


Figure 2

Schematic Stratigraphic Profile: Pedirka, Cooper and Part of Eromanga Basins
(Source: SANTOS 1981)

detailed scientific reports (Madigan 1936, 1945a, 1946b; Crocker 1946) dealt primarily with the northerly portion of the desert where variation is not so pronounced, as the reports strengthened the still commonly-held view of the desert as one large, homogeneous unit. The land-form variations influence the regional ecology and also the likely response of particular landscapes to disturbance, and because of this, they are further discussed in Part 1: Ecological Associations.

The Simpson Desert dunes are Quaternary siliceous sands, part of the Australian Pleistocene dunefields which occupy nearly 20 per cent of arid Australia. Dunes are generally "soft" in the western desert; that is, lacking a harder, consolidated core, but consolidated cores of dunes are found in the playa lakes region.

The precise source of the sand used in the dune-building and the sequence in which the dunefields were constructed is still not certain. Broadly, the main sand source would have been the alluvial material transported into the region by the streams terminating in the Lake Eyre depression. The sand may have been transported north from Lake Eyre, forming the dunes, but there is some evidence indicating that dunes were also built directly from local sources (Buckley 1981a).

Lake Eyre was a permanent lake with a depth of well over 10 metres of water at the close of the last very humid period in the Pleistocene about 40 000 years ago (Twidale, in Foale n.d.). Surrounding it were other lakes and extensive flat floodplains. With the onset of severe aridity and cold and windy conditions, the lakes dried and the alluvial plains lost their vegetation. Winds scoured the alluvial surfaces, transporting fine sediment long distances, but heaping up the heavier sands in mounds in the lee of the lakes and plains, and then forming the longitudinal dunes from these mounds. The actual mechanisms of longitudinal dune formation are of some importance in predicting the consequences of disturbance (for example, by seismic tracks) and, accordingly, are discussed at more length below.

The drying was at first progressive with aridity reaching a peak about 16 000 to 18 000 years ago. At this time, the regional pattern of the desert dunefields was set. Subsequently, the climate has oscillated between wet and dry periods, with dunefields fixed by vegetation, streams and lakes again active, and soil formation occurring in the wetter periods. Opinion is divided on how many such alternations there have been. Firman (1981) indicates two wet periods since the peak aridity at about 11 000 and 7 000 years ago (see also King 1960); Jessup and Norris (1971) suggest more.

The present-day climate, though arid, is not as extreme as some of the major periods of sand deposition and dune shaping, but these processes are continuing in at least part of the desert. The streams continue to bring sediment to the alluvial plains of the channel country and to Lake Eyre which has been partly or wholly filled, and subsequently dried, several times this century. There is, therefore, a continuing supply of "new" sand available for transport northward from Lake Eyre and the plains south-east of the desert (Twidale, in Foale n.d.). Sands of the central and eastern portions of the desert in South Australia (including the park) show evidence of this continuing process by irregularities in shape (Graetz *et al.* 1982), but especially in colour. Newly-transported sands are very pale or white, gradually becoming red with age as clay particles, trapped among the sand grains, weather. Dunes on the northern border of Lake Eyre and for some distance north, are white or pale yellow, becoming progressively redder to the north. Sand actively transported along crests in the eastern desert is itself paler than on the lower, non-mobile dune flanks. In striking contrast are the red dunes of the western and northern parts of the desert, the colour indicating an absence of new supplies of dune-building materials.

PROCESS OF DUNE FORMATION

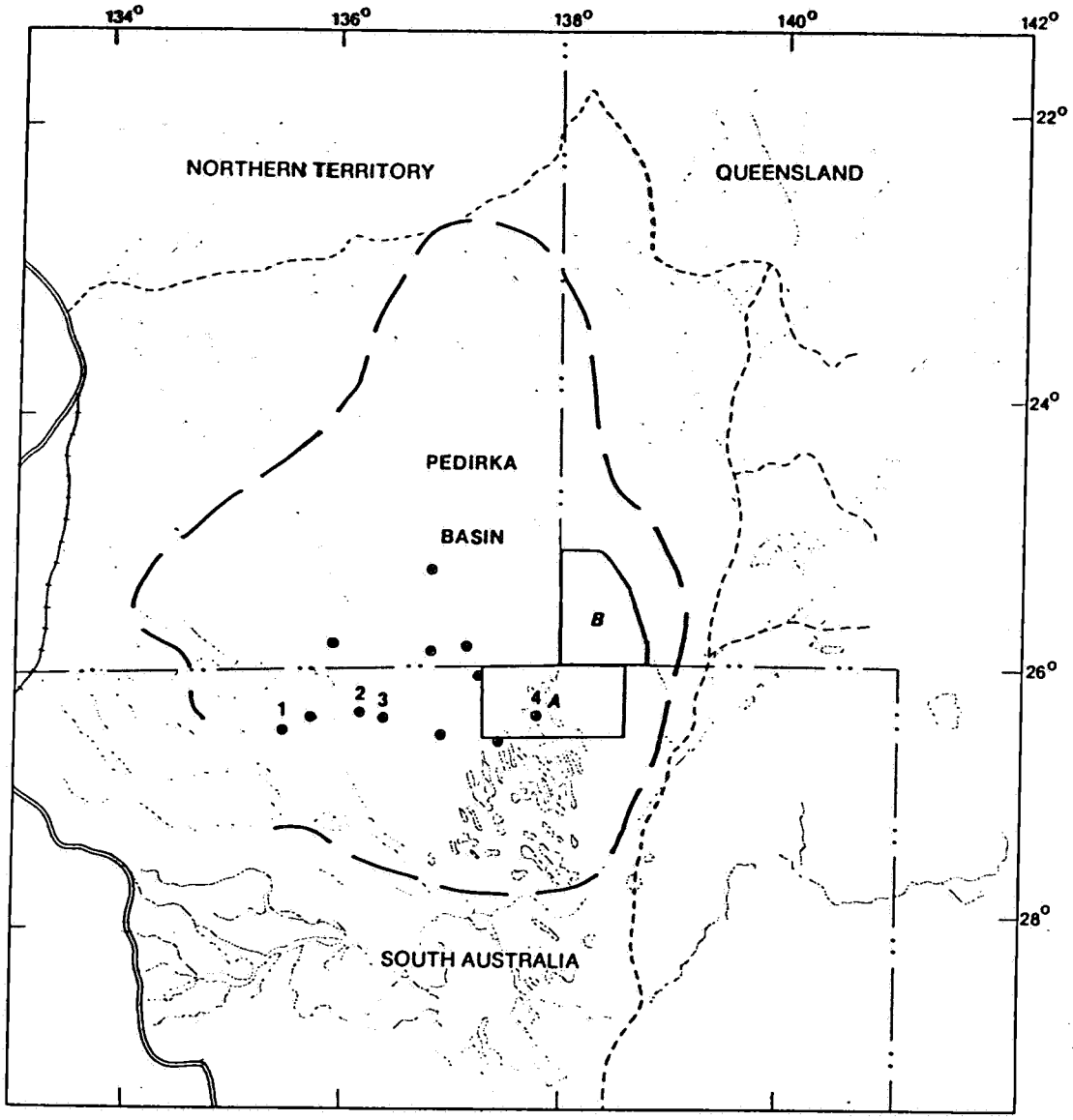
The mechanics of longitudinal dune formation are still not certain. That they parallel the dominant wind direction at the time of their formation has been known for over a century (Blanford 1896, cited in Derbyshire *et al.* 1979; Madigan 1936). A formation theory originated by Bagnold (1953) now has wide currency. Briefly, dunes are formed and maintained by a spiral (helicoidal) windflow. The requirements are a level plain of alluvial origin with winds dominant in one direction. Paired wind spirals form as illustrated in Figure 5, and descending local wind currents scour the alluvium, bouncing sand grains along the ground and depositing them in the "dead" area between wind spirals. The net result is the heaping up of a longitudinal dune and a general movement of sand (and extension of the dune) in the direction of the overall windflow.

There are variations of this theory which imply that once dunes are formed, the dunes themselves fix the wind spirals in position, which means that, in turn, the dune will maintain its position, growing larger in time and probably extending downwind but not moving laterally (Derbyshire *et al.* 1979). There is evidence of this from the Strzelecki Desert where depositional sequences in single dunes indicate that the dunes have not changed their position through several periods of dune building and subsequent stabilisation (Callen *et al.* 1982).

Twidale (in Foale n.d.) links together the helicoidal process of dune formation and sand transport from the Lake Eyre region. Sand is first deposited in lee-side mounds on the northern margins of playa lakes or alluvial plains. Wind passing over these mounds becomes turbulent and the spirals develop in their lee. Sand is shifted from the mounds into the "dead" areas between vortices, forming prongs which, with continued sand transport, gradually extend downwind to form the ridges of the dunefield. Similar views have been put by Mabbutt and Sullivan (1968) and are supported by evidence from LANDSAT imagery (Loeffler and Sullivan 1979).

The helicoidal, "one-wind" theory is not entirely satisfactory. It does not completely account for the very regular spacing of the dunes; nor for their asymmetry (although this may result from occasional cross-winds). It does resolve a number of problems, which are not satisfactorily dealt with by alternative theories, but not to the extent that alternatives can be completely discounted. An earlier theory, also put forward by Bagnold (1941), deserves mention as it is still often cited as the primary means of longitudinal dune formation (Roxby Management Services 1982). By this theory, longitudinal dunes are converted from other forms by a bi-directional wind regime, with the line of dune along the resultant of the two winds. Mabbutt (1977) considered the argument between the uni-directional and bi-directional wind theories unresolved, while Derbyshire *et al.* (1979) point out that both result in sand movement patterns and deposition as indicated in Figure 5.

As this management plan is concerned with possible impacts on the dunefield within the park resulting from petroleum exploration or visitor use, several consequences of the pattern of dune formation are significant. First, the processes of construction and the orientation of dunes to the wind are quite different from those in coastal dunefields. Consequences of particular impacts in the desert cannot be predicted on the basis of known consequences of similar impacts in coastal dunefields, and the temptation to do so should be



Exploration and stratigraphic wells	•
Wells shown in Figure 2	
Crispe 1	1
Burni 1	2
Mokari 1	3
Poolawanna 1	4
Simpson Desert Conservation Park (S.A.)	*A*
Simpson Desert National Park (Qld)	*B*

100 200 km 300

Figure 3

Extent of Pedirka Basin
Adapted from Youngs (1976) and Alexander (1981)

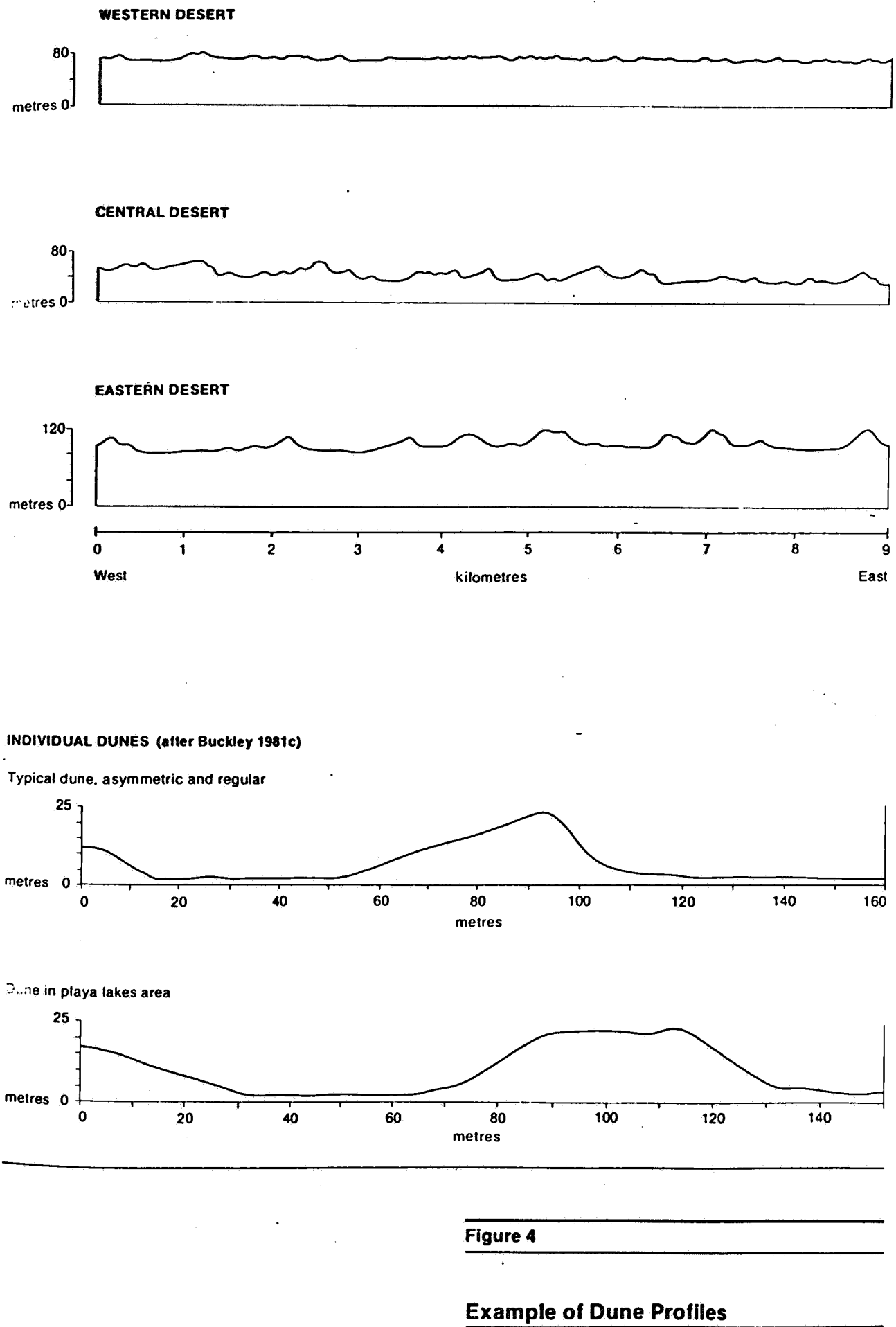
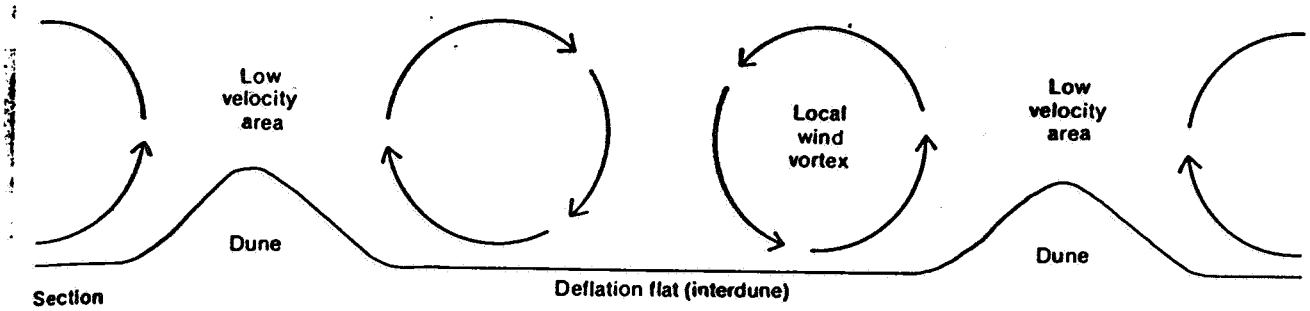
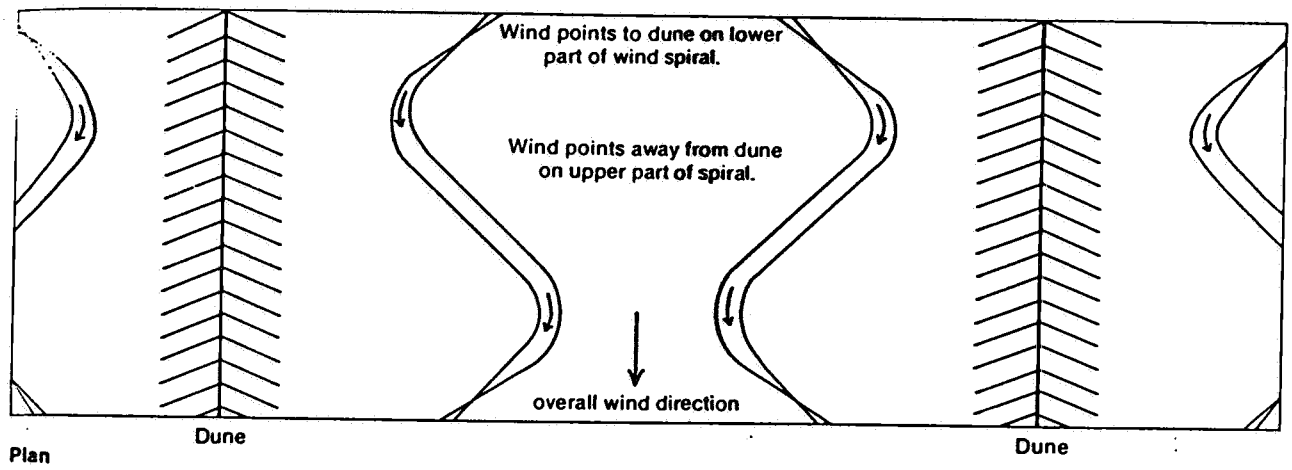


Figure 4

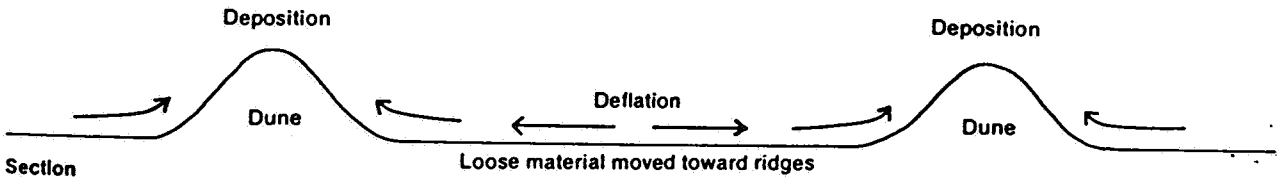
Example of Dune Profiles

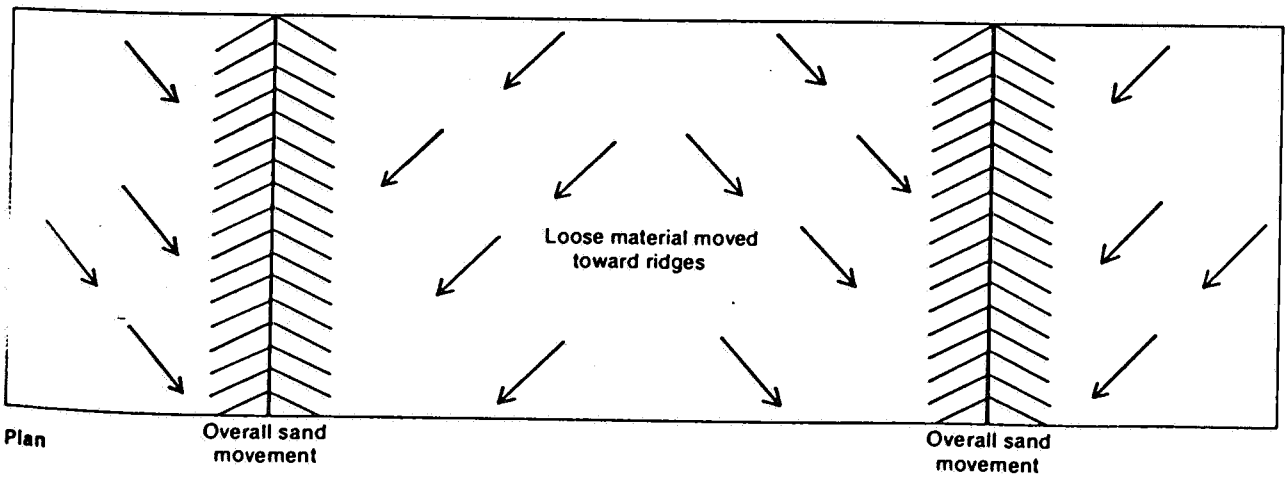
WINDS (after Derbyshire *et al.* 1979)





SAND MOVEMENT





Mobile sands on ridges will creep in the overall wind direction

Figure 5

Helicoidal Winds in Longitudinal Dune Building

avoided. In particular, there is no mechanism whereby the Simpson Desert dunes could be readily converted into transgressive sand sheets, short of a major change in climate and wind pattern because the dunes still parallel the present dominant wind direction (Brookfield 1970). Even complete removal of vegetation, which occurs at times under stock grazing on desert margins, or through fire, will only result in increased surface mobility. Dunes may slump slightly and their bases spread, but will still remain in place.

The local sand transport, both along the dune end and up the dune flanks to the crest, provides a "self-repair" capability in situations such as cuts through dunes for roads. Once cuts cease to be maintained, the sand movement will result in their eventual infill.

Finally, the local surface wind pattern will tend to scour swale areas with loose material being transported to bordering dunes. This is likely to have a temporary infilling effect over a graded track, for example, but significant removal of stabilising cover may increase the rate at which swale areas are deflated.

Overall, the probable dune formation processes give to the dunefield a pronounced resilience and the ability to recover from disturbance without major land-form changes resulting.

THE PLAYA LAKES

The playa lakes are characteristic of most of the Simpson Desert Conservation Park and of the central portion of the south Simpson Desert (Figure 1). Their characteristics have recently been examined by Krieg and Callen (1980) and the following is based on this 1980 report.

Individual playas are elongate but quite irregular in shape, with very sharp boundaries. Larger playas have a thin, white salt crust up to 5 centimetres thick over a layer of mud which remains damp even in drought. Smaller playas have a smooth and hard clay surface. Playas are frequently edged by a steep slope of sub-dunal sediments, the slope often showing a miniature "badlands" effect due to water erosion.

Along the northern margin of all the major playas are huge sand lunettes, very broad mounds of sand rising up to 50 metres above the playa floor. Despite their size and control of local relief, they are not readily noticeable because of their broadness and the presence of the more eye-catching, though much smaller, longitudinal dunes which cross them.

Within the park, playas tend to be linear, following the line of dunes, but further south their shape parallels that of the present Kallakoopah Creek. Indeed, stream meanders on playa beds are detectable from aerial photographs. Because of this parallelism, and also a lack of recent lake sediment beneath them, the playas are thought to represent the remains of former stream courses rather than the remnants of a larger Lake Eyre.

Playas within the park only receive water through local runoff, but to the south there is connection with the Kallakoopah Creek, resulting in very slight and occasional water flows.

Krieg and Callen (1980) point out that the playa region is of considerable intrinsic interest. It provides numerous opportunities for the study of aeolian sedimentology which so far have not been undertaken but which could contribute greatly to a better understanding of the past climatic regimes.

Other Surface Features

There are variations in relief within the Simpson Desert, and the more significant are discussed in Part 1: Ecological Associations. Overall, the Simpson Desert in South Australia is low-lying with most of it close to sea-level. Much of Lake Eyre is more than 10 metres below sea-level, and the surface of playas as far north as Poeppel Corner may be very close to this level (Krieg and Callen 1980). There are no hills as such in the southern Simpson Desert, but within the park there are two or three areas of small knolls of less relief than the surrounding dunes (one area is the Approdinna Attora Knolls) (Figure 1)).

Floodplains bound the desert to west and east. Those of the Finke, in the west, rarely contain water. Courses of the Mulligan River (Eyre Creek) contain water with much greater frequency. Kallakoopah Creek in the desert south of the park, has very occasional, slight flows. The only permanent surface water in the southern desert comes from Purni Bore (Figure 1), a former stratigraphic well sunk by petroleum exploration crews in 1963 and completed as an artesian well. Its water is potable. The Aboriginal wells formerly in the desert (Part 1: Aboriginal Occupation) were dug into local surface aquifers and no longer function as water supplies.

Summary and Implications

The aridity of the park and surrounds, expressed in high mean temperature and low and erratic rainfall, will limit the variety in flora and fauna species capable either of surviving or of evading periods of extended drought. Limited vegetation cover will be one consequence of the aridity, and will in turn result in a high degree of naturally occurring erosion. Care is therefore needed in any consideration of the erosional consequences of human activity in the area in order to keep the effects in perspective with the natural erosional processes.

The underlying geology of the southern Simpson Desert has been largely controlled by movements of the basement, resulting in the formation in different periods of various sedimentary basins. Of these, the Permian Pedirka Basin is the present focus of petroleum exploration because the conditions under which sedimentation occurred are those associated with hydrocarbon formation, and the formations are similar to those commercially exploited in the related Cooper Basin. Tectonic movements subsequent to the Permian have altered the arrangement of the Pedirka Basin sediments in such a way that the formations most likely to contain hydrocarbons in commercial quantities, lie close to or under, the conservation park.

The surface characteristics of the Simpson Desert reflect the climatic oscillations of the past 40 000 years. The present climate, though arid, is less so than in periods of major dune building in the recent past, and in many respects the Simpson Desert dunefields are relatively stable.

Both the land-form building processes and the variety of land-forms resulting, have a number of implications for conservation purposes and management in the region. The most significant is the actual means of dune-building. The situation is not analogous with coastal dunefields, and management attitudes should not be directly transferred from coastal situations to the desert. Whichever theory of dune formation is accepted, it would appear that the Simpson Desert dunes have a physical self-maintenance capacity which prohibits the development of transgressive movement even in the event of severe damage. Complete removal of vegetation is certainly likely to increase the degree of sand movement, but is unlikely to result in the large-scale dune deflation so often associated with similar damage in coastal environments.

Further, as the supply of sand from the sources south-east of the desert is probably less than in the recent

past, it may be that deflation of the dunes in the drier south-east part of the desert is occurring naturally. This makes it difficult to estimate the level of deflation which might be resulting from human activity in this region.

The variation in dune form, spacing and colour across the desert belies the popular view of uniformity. This has considerable bearing on the adequacy of the conservation park as a representative sample of desert environments. This aspect is examined further in subsequent sections.

HISTORY

Aboriginal Occupation

Several South Australian and Northern Territory tribes included at least part of the Simpson Desert within their tribal boundaries (Figure 6). On the western side of the desert, the Eastern Aranda territory extended down the Hale River to near Andado (Northern Territory), and the Lower Southern Aranda included the Finke River floodflats on the western desert margin. The alternative name for the desert, the "Arunta Desert", was derived from the Aranda name. However, this name may be as out of place as the European name "Simpson Desert" is to some segments of the community as tribes other than the Aranda occupied a much larger proportion of the desert.

On the eastern side of the desert, the Jeljendi tribe extended from east of the Diamantina River, in Queensland, into the desert beyond Poeppel Corner, although the greater part of the tribal area lay in Queensland beyond the desert. Their southern neighbours, the Karanguru, occupied an area from the Diamantina westward to the chain of playa lakes in the southern desert. The Ngameni also extended into the eastern fringes of the southern desert, although primarily occupying the flooding country about the Diamantina and Warburton. The bulk of the Simpson Desert, however, lay within the tribal boundaries of the Wongkamala (largely Northern Territory) and the Wongkanguru (South Australia) (Tindale 1974).

The present Simpson Desert Conservation Park, according to tribal boundaries in Tindale (1974), occupies former lands of the Wongkanguru, the Jeljendi and the Karanguru. Tindale estimated tribal populations to have been of 400 to 600 people in each group.

Doubts have been expressed whether any significant Aboriginal occupation took place in the central desert. Tindale also indicated that the main Aboriginal distribution was about the watercourses on the desert boundaries. A number of other authors, past and present, have pursued this theme. Madigan (1945a, 1946a) reported that Aborigines living on the desert margins were fearful of the desert and had no knowledge of its interior. Boyland and Ogilvie (1966) considered that Aborigines were present in the desert only in good years. Such a view has been supported recently by the ecological evidence in Latz and Griffin (1977) who note that areas such as the Simpson Desert dunefield contain a relatively low component of food species within their flora, and would, therefore, be little utilised by comparison with lands beyond the dunefield.

Against this view can be put the experience of explorers, particularly Lindsay, and the presence of Aboriginal wells within the desert. Linsday was able to cross the desert in 1886 and pass through the present park area only with the aid of Aborigines familiar with the location of Aboriginal wells through the desert. He also reported Aborigines at places well within the desert in a season that was not particularly good.

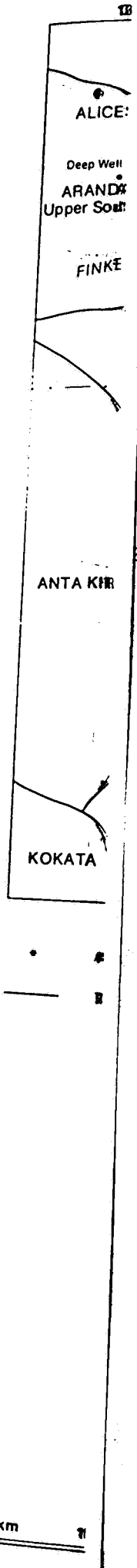
Earlier, in 1845, Sturt had frequent encounters with groups of Aborigines in the eastern desert, and also made use of their wells. Although Sturt did not penetrate into the central part of the desert, he did move far enough away from the marginal streams to be considered as moving within the desert proper. Recently, Alexander (1981) reported that a group partly retracing Madigan's (1946a) exploratory route, had found Aboriginal stone circles in the Northern Territory portion of the desert, indicating more than an occasional foray by Aborigines into the desert's interior. We should also add that Aboriginal place names, such as those reported by Colson (1940) and Lindsay (1886) during their desert crossings, existed for topographic features well within the desert, and are a further indication of considerable Aboriginal usage. Figure 6 shows the approximate location of former Aboriginal wells documented by Madigan (1945a) and the South Australian Department of Lands. The number and location of these documented wells indicates considerable use by Aborigines of a large part of the desert, not just fringe areas. Several wells were present within the park boundaries but to present knowledge, these have now been filled in by drift.

The tribal distributions shown in Figure 6 were determined from the reports of anthropologists during and after the collapse of most tribal living under the impact of European development. They were not necessarily immutable over long periods. Tradition indicates that the Wongkamala, moving into the northern Simpson Desert, displaced the Wongkanguru to the southern desert. The former occupants of this area, the Dieri, were in turn displaced to the south-east into the Strzelecki area (Tindale 1974).

The various Simpson Desert and fringing tribes are recognised to be part of the Central Lakes Cultural Complex (Ellis 1978). More than twenty separate tribal groups formed this complex over a landscape stretching from the Simpson Desert and beyond, to the gulfs and peninsulas of southern South Australia. Tribes within the complex had a common social organisation which distinguished them from others in South Australia. Organisation was based on a moiety system in which two divisions within a tribe functioned as marriage units with a member of one moiety required to marry only with a member of the other moiety. The complex was also distinguished by the practice of circumcision as part of the male initiation.

In other respects, the tribes followed a traditional hunting and gathering economy in common with the tribes of other cultural complexes. All members of the society contributed to the collection of food, water and other material requirements. As little surplus was ever held, maintenance of existence depended on thorough knowledge of land capabilities and harvesting limits and the maintaining of population at more or less constant, ecologically viable levels through cultural practices. The hunting-gathering economy was highly efficient, requiring little effort by comparison with early agricultural practices, but it required a profound appreciation of climate, geography and ecology. The complex mythological systems created by the Aborigines were means for organising and retaining the necessary information for survival.

The Central Lakes Cultural Complex tribes, including those of the Simpson Desert, are also distinguished from those of other cultural traditions by the extensive trade carried out. An account is given in McCarthy (1939). Much of this trade concerned a prized deposit of red ochre in the northern Flinders Ranges. Simpson Desert and even Queensland tribes were among those who regularly undertook extensive journeys along fixed trade routes to obtain the ochre. Trade routes followed



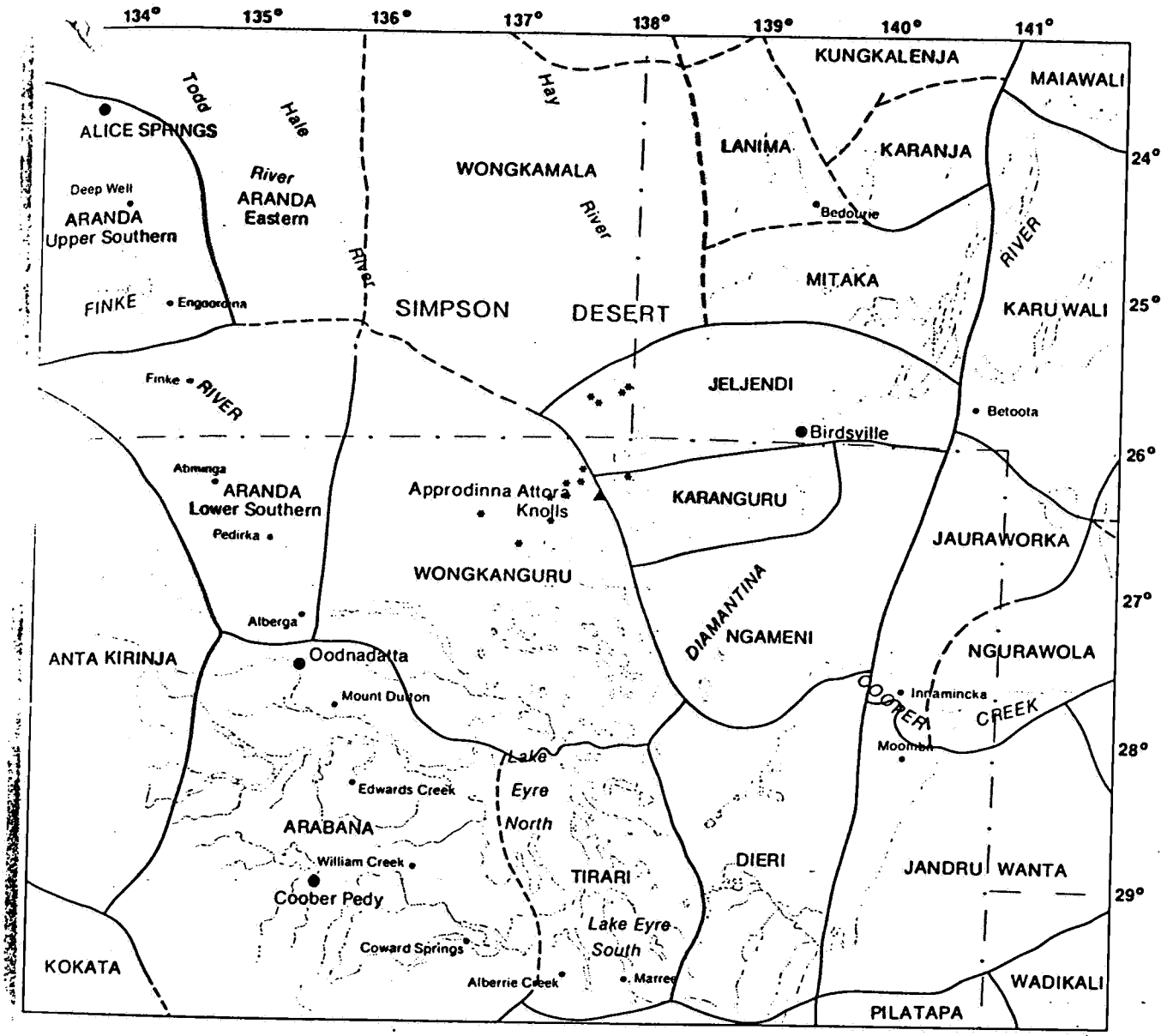


Figure 6

Aboriginal Wells and Tribal Boundaries
(Source: Alexander 1981 citing Madigan 1945)

mythological tracks, and travellers following the path of their totemic heroes were safe, at least so far as other members and local groups of that totem were concerned. Ellis (1978) quotes an early description of an ochre expedition, and the South Australian National Parks and Wildlife Service (1983) provides a more extended discussion of the ochre trade and some of the myths associated with it.

Also traded were sandstone grinding stones obtained from quarries in the Flinders Ranges. From the north came ground-edge axes (from quarries in Queensland) and also the introduction of Pitcheri (*Duboisia hopwoodii*), a plant treated and chewed for its narcotic properties.

The wells dug by Aborigines of the Simpson Desert deserve particular mention, not only because the Wongkanguru and Wongkamala were reliant on them for water, but also as outstanding examples of water-gathering abilities. Called *migiri* by the Wongkanguru (*mikari* by the Wongkamala), the wells were in some cases tunnels 10 metres long by 1.5 metres diameter and dug at an angle through sand to local surface aquifers. Lindsay describes two of these wells in his journal (1886):

> The well is first 12 feet perpendicular and then 8 feet slope. So small is the entrance that I had to take off my clothes before I was able to go to the water. The well is in a depression 2 chains across—12 feet deep.

Most of the wells are now unrecognisable, or almost so, because of infilling (Alexander 1981; Bartell 1981).

The rapid pastoral expansion on desert margins in 1860-1900 brought with it displacement of tribes, either by directly occupying key tribal lands or by indirectly attracting tribal people to the European settlements. Often, "brutal campaigns of extermination" (Ellis 1978) were mounted by pastoral settlers. The worst impact of European settlement was, however, the result of an influenza epidemic about the time of the first World War. The epidemic decimated tribes and depopulated extensive areas through north and north-eastern South Australia, including the Simpson Desert area.

The last Aboriginal links with the Simpson Desert as a living culture are now extremely tenuous. For example, Hercus (1978) wrote that there were only three or four fluent speakers of Wongkanguru and Dieri remaining in South Australia; only a single speaker each of Ngameni and Tirari; and no fluent speaker of Karanguru. Some of the last remaining speakers have since died (Graetz *et al.* 1982). The traditional lore associated with the desert is in danger of disappearing entirely.

European Exploration

Routes of early European explorers in the region are shown in Figure 7. Penetration of the Simpson Desert began with Sturt's 1845 expedition to the interior of Australia (Sturt 1849). Sturt was searching for the rumoured inland sea suggested by the westward courses and apparently swampy endings of the New South Wales Lachlan and Macquarie rivers. (At this time, the full extent of the Murray-Darling river system was not realised, although Sturt himself had already traced the courses of the Murrumbidgee and lower Murray as well as part of the Darling River.) Sturt proceeded from Adelaide, following the Murray and then the Darling, eventually setting up a base in the Grey Range close to the present junction of South Australia, New South Wales and Queensland. Here his party waited six months for rain. In July 1845, Sturt set out in a north-westerly direction crossing the Stony Desert and channels of the Diamantina, Georgina and Mulligan. The party's exploration extended into the Simpson Desert north-west of Birdsville (Queensland) to the present Northern Territory border (longitude 138° east) at latitude 24°40' south. At this point, all Sturt could see were the sandridges extending northwards—to east and west "they succeeded each other like the waves of the sea". With their horses in poor condition, and themselves suffering from scurvy, the party turned back in August 1845.

There is a possibility that the next exploring party to enter the desert was the ill-fated 1848 expedition of Leichhardt who was attempting to cross the continent from east to west. No certain trace of the expedition has ever been found. Rumours of skeletons near Muckaringa waterhole on the Finke prompted a South Australian Government expedition in 1938. Although there were no skeletons, a number of coins were found. One of these was a 1841 Maundy threepence; one of only 2 904 minted. Leichhardt had been in England at the end of August 1841 and the chances are high that the coin is a relic of his expedition.

The ill-fated Burke and Wills expedition of 1860-61 passed near the eastern boundaries of the desert. A relief expedition out of Adelaide led by McKinley, provided much information on the lands immediately east of the desert. McKinley's reports prompted the occupation by pastoralism of the Cooper Creek and Diamantina "channel country" in South Australia.

A number of Government surveys were carried out in the period 1874-1881 in parallel with pastoral expansion. In 1876, W. O. Hodgkinson, for the Queensland Government, discovered the Mulligan River and completed exploration of the north-eastern margin of the desert. W. Lewis, for the South Australian Government, mapped most of the shores of Lake Eyre and also surveyed the Warburton and Diamantina to beyond Birdsville in 1874-1875. H. Vere Barclay and C. Winnecke explored the northern border of the desert, and discovered Plenty, Marshall, Thring and Arthur rivers between 1878 and 1881. Mapping of desert boundaries on the western margin was still limited to the area about the Overland Telegraph route (Madigan 1946a).

The survey of the South Australian-Queensland border was begun from Haddon Corner on 30 June 1880 by Augustus Poeppel. The 299 kilometres to the intersection of the 138th meridian was completed by the end of 1880. Poeppel used camels to drag a 2.1 metre long, 25 centimetre diameter Coolibah post (Poeppel Peg) 92 kilometres from the Mulligan River across the sandridges to mark the South Australian-Northern Territory-Queensland junction (Poeppel Corner). The post was placed in the middle of a large, dry salt lake (Lake Poeppel). It was adzed on three sides and inscribed with the State and Territory names. The post has now been removed and is preserved in Adelaide. Posts with the mileage from Haddon Corner inscribed on them were also placed along the border, and some of these are known to be still standing. A "solid peg" was also placed every quarter-mile (400 metres).

Poeppel's traverse did not continue any further west than the Corner because of difficulties in obtaining water. On return to Adelaide in 1881, the chain used for surveying was found to have lengthened through wear (2.5 centimetres), and resurvey of part of the traverse was necessary. This was carried out by L. A. Wells (Steel and Steel 1978) from a trigonometric station near the Diamantina River to Poeppel Corner. The corner post was found to be 15 chains 75 links (316.8 metres) too far west and was moved to its present position out of the lakebed.

All these explorative and surveying forays did not have the desert as their main objective and the desert's

interior remained unexplored as well as unpromising. The first definite attempt to examine the desert itself, rather than the lands about the margins, was that of Winnecke in 1883. Using camels, Winnecke entered the desert from Queensland, exploring along the Hay floodcourse into the desert, with excursions both east and west of the course.

At the beginning of 1886, David Lindsay, accompanied by Charles Bagot and a Murraburt native "Paddy", left Dalhousie Springs near the western margin of the desert, to follow a series of native wells eastward across the desert (Lindsay 1886, 1890). He mentioned in his journal that he marked two trees in the course of this crossing. The first was "a prickly cork tree" near a well which has since been found and removed. Having penetrated to beyond Poeppel Corner, Lindsay returned across the desert to Dalhousie. Although Lindsay did not quite reach the eastern boundary of the desert, this was well within range of his endpoint, and credit for the first European crossing of the desert should be his rather than the later parties to whom the credit is usually assigned. In February of 1886, Lindsay attempted to cross the northern desert starting from a point near the present Anacoora Bore. However, this attempt was abandoned because of intense heat and the poor condition of his camels (Madigan 1946a) (Figure 7).

Summaries of the nineteenth century explorations are given in Reed (1910). For the next forty years, interest in the desert was slight. The limits to pastoral enterprise had been set before the turn of the century, and the desert was known to be a hot, waterless and inhospitable area of no conceivable use, even though it had not been fully explored. Until aerial surveys in 1929, the only reported visit of any consequence was the journey of T. E. Day, from Charlotte Waters to the Todd and Hale floodout areas through the western desert margins.

C. T. Madigan overflew the desert as a reconnaissance in 1929 prior to an attempt to cross the desert with a scientific expedition. Madigan's aerial crossings inspired E. A. Colson, a local pastoralist, to attempt a ground crossing (Colson 1940), possibly in an attempt to beat the scientists. In May of the good season of 1936, Colson, accompanied only by a Musgrave Ranges Aboriginal, left Blood Creek to the west of the desert and, taking nineteen days, crossed along the twenty-sixth parallel to Birdsville. During the crossing, he narrowly missed Poeppel Corner because Wells' correction of the post's position was never recorded or corrected on his maps. On the return journey, Colson followed Lindsay's route and then tried to cross the northern part of the desert, along the route later followed by Madigan, but abandoned the attempt.

Following the aerial reconnaissances of the desert, Madigan renamed it the Simpson Desert (until then generally, but informally, called the Arunta Desert) in honour of A. A. Simpson, then President of the Royal Geographical Society of Australia.

Madigan's crossing of the desert in 1939 with a scientific party, is of particular importance because it provided the first significant scientific information on the desert. The expedition reports are still used as the core information for the desert (Madigan 1945a, 1946b; Crocker 1946; Eardley 1946, 1948; Condon 1946; Kinghorn 1945; Carroll 1944). The expedition was largely financed by A. A. Simpson, and attracted Australia-wide interest. The crossing was made with camels.

There was little penetration of the desert between the time of Madigan's crossing and the late 1950s, when petroleum exploration commenced in the region. In 1962, the first motorised crossing of the desert was made by R. C. Sprigg and members of Geosurveys of Australia Pty Ltd from Mount Dare to Birdsville, close to Colson's 1936 route. Sprigg, accompanied by his family, also made the first south-north crossing of the desert by vehicle in 1964.

The French Petroleum Company, as part of a seismic and stratigraphic survey, constructed the so-called "French Track" from Dalhousie Springs to east of Poeppel Corner in 1964, creating the first defined access across the desert. Subsequent petroleum exploration has increased the ease of access into the southern and central desert, including the park area. Since 1964, there have been numerous and increasing numbers of desert crossings by survey teams and private groups visiting the area. Many of the latter have attempted "firsts" of one sort or another (first motor cycle crossing, first east-to-west vehicular crossing, and so on). The one outstanding crossing, however, is that of C. Warren Bonython (one of the main proponents for the park's dedication) and Charles McCubbin. In 1973 they crossed the desert on foot, pulling an aluminium wagon, from north to south.

Pastoral Occupation

Pastoral occupation in the late nineteenth century never proceeded further than the desert margins. The pattern of pastoral settlement was set by the turn of the century with eastern leases extending only to the floodplains of the Mulligan River (Eyre Creek), and western leases only to the Finke and Macumba floodplains.

It is only recently that there has been an exception to this pattern, and this has been associated with the free-flowing Purni Bore in the western desert which has allowed the depasturing of cattle in the desert proper. This stratigraphic well was sunk in late 1963 and finished as an artesian bore in 1964.

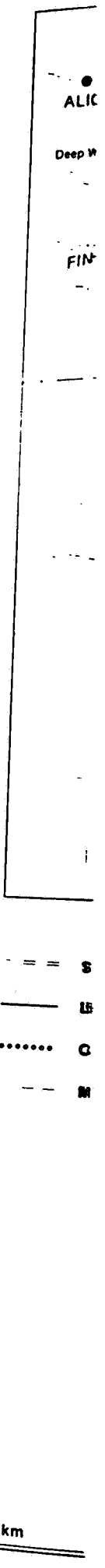
Petroleum Exploration

The potential of the Simpson Desert area as a possible source of petroleum was first emphasised by Sprigg (1958), who pointed out that the early Cretaceous sediments of the Great Australian Basin were laid under conditions favouring the formation of oil (Part 1: Geology and Geomorphology). Sprigg (1963) also pointed out the petroleum-bearing potential of Permian and pre-Permian sediments under the desert.

Petroleum exploration commenced in South Australia in 1959 with the granting of exploration licences to Delhi Australia Ltd and SANTOS Ltd. In 1958, Geosurveys of Australia Pty Ltd had taken out the first Simpson Desert licences in the Northern Territory.

Petroleum exploration has been somewhat sporadic, with the main efforts being in the last six years. In part, delays have resulted because of emphasis which has been placed on exploration and development of the Cooper Basin where commercial gas fields were discovered in the 1960s. Following the Cooper Basin discoveries, most exploration in the Simpson Desert has been aimed at the geologically similar Pedirka Basin. Devine (1975) reported that the Pedirka is potentially able to produce as much petroleum as the Cooper Basin.

Exploration is still in a relatively early phase. Seismic surveys have now been carried out through most of the desert, but only a few exploratory wells have been sunk (fourteen to the end of 1981 for the whole Simpson Desert (Alexander 1981). Because hydrocarbon traces have been found, and prospects remain encouraging, a continuation and possible increase in drilling activity is expected.



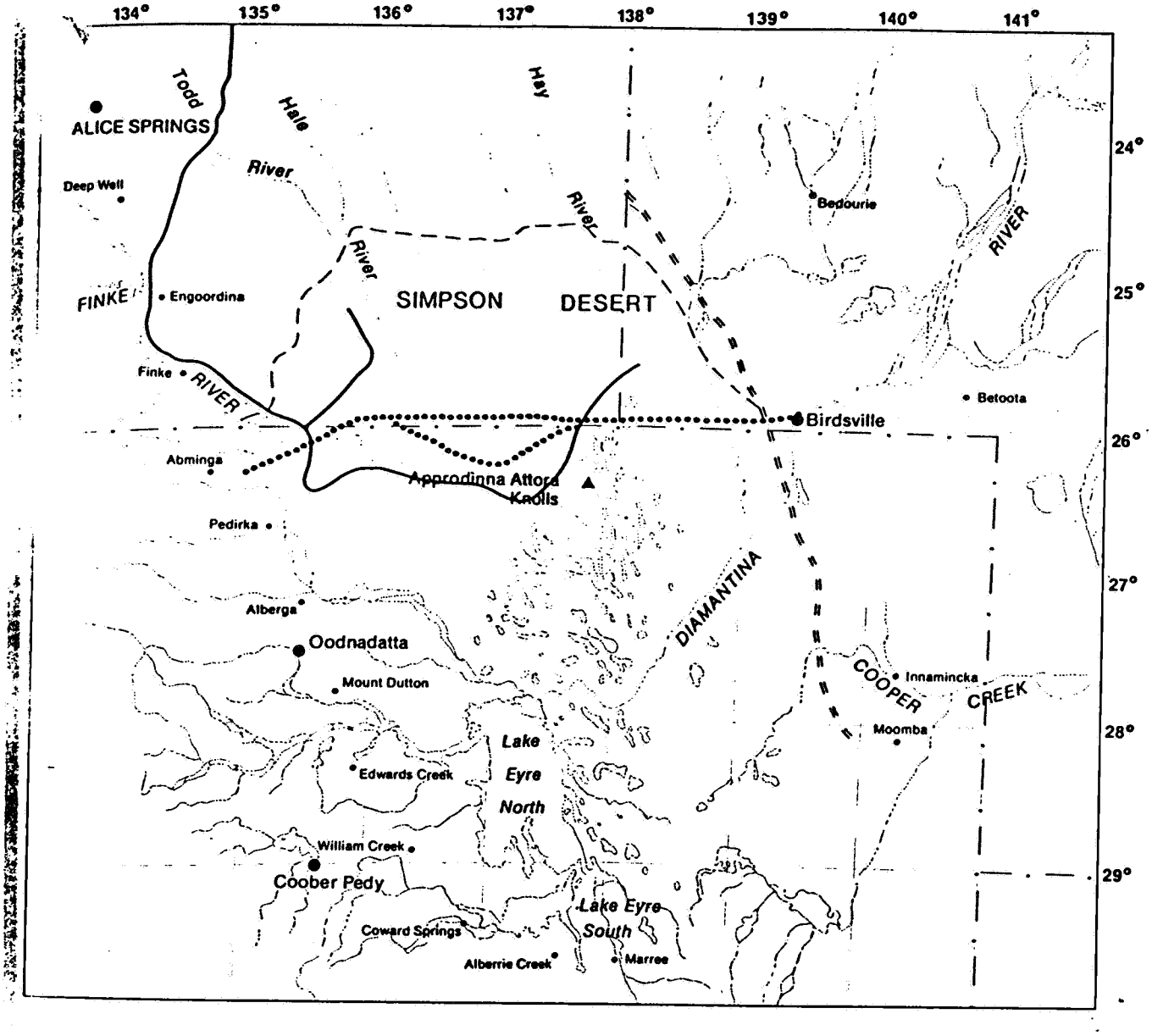


Figure 7

Explorers Routes

EXPLORATION ACTIVITY

Within South Australia, the Simpson Desert and the park were included in Oil Exploration Licences 20 and 21 granted to the Delhi-SANTOS operation. The two licences covered approximately 66 per cent of the State. The area was reduced following legislative changes in 1967, with the Cooper Basin and Simpson Desert segments of the original licences included in the new Petroleum Exploration Licences (PEL) 5 and 6 (Figure 8).

Several groups have explored for oil in the Delhi-SANTOS licence areas under farm-out arrangements. Between 1963 and 1966, operators for the French Petroleum Company undertook seismic surveys near the South Australian-Northern Territory border, from Dalhousie Springs to near Poeppel Corner. The two lasting effects of this survey sequence are the free-flowing Purni Bore in the western desert and the "B" line or French Track into the park. The French Petroleum Company also ran seismic surveys in 1964 in the Kallakoopah area south of the park.

Exploration interest waned for some years, during which the present park was proclaimed. Some activity recommenced in 1972 with the grading of a track north from Mount Gason and through the park into the Northern Territory. This track, put through the park with neither the knowledge nor the permission of the National Parks and Wildlife Service, provided access to an exploration camp (Reef Oil Company) in the Northern Territory, and was not associated with any survey in South Australia.

Major petroleum exploration effort in South Australia recommenced in 1974, partly under farm-out to the Western Mining Corporation, with the Lake Thomas seismic survey which extended over much of the park area. Seismic surveys have since progressed to the point where most of the Simpson Desert in South Australia has been covered.

Stratigraphic wells (Part 1: Petroleum Exploration) were drilled by the French Petroleum Company at Purni and Mokari in 1963 and 1966. No further drilling took place until 1977, when Western Mining sank wells at Poolawanna and Macumba. The Poolawanna Number 1 Well, inside park boundaries, produced hydrocarbon shows; as did the Walkandi and Erabena wells drilled by Delhi Australia in 1981 (see Figure 3). Other wells drilled in South Australia have not intersected hydrocarbons.

The future emphasis in exploration is likely to continue to shift from the preliminaries of seismic survey to more intensive and localised operations, particularly further well drilling. A fuller account of past exploration history and possible prospects is given by Alexander (1981).

Aboriginal and Historic Relics

Relics of Aboriginal occupation still remain in the park and surrounds. Little documented information is available; the following is only a brief and anecdotal account.

Many of the native wells are still evident, although no longer a source of water because of infilling. Bartell (1981) followed Lindsay's 1886 route, finding several of the wells Linsday used still present as shallow depressions. He also noted that the last well used by Lindsay, Kilpatha, had had a track cut to it in during a seismic survey and that the well site itself had been excavated by bulldozer.

Other relics are present. Possible stone arrangements have been reported by visitors in the Northern Territory segment of the desert, while in the South Australian portion, stone implements and workings are present in moderate amounts.

The major relics of European exploration are the marks of explorers and the explorer-surveyors. Two of the most significant items, Poeppel Peg and one of Lindsay's 1886 marked trees, were originally within the park area but have been removed. Poeppel Peg, which was removed prior to park dedication and is preserved in Adelaide, was replaced by a modern corner marker. Lindsay's tree was dead when found by Bartell (1981) during his retracing of the explorer's route. Bartell was given permission to remove it so that it could be protected against possible damage in the desert and be preserved in Adelaide. The site is marked with a plaque. Other items still remaining in and around the park include some of the mileposts placed by Poeppel and probably at least one other tree blazed by Lindsay.

Park Acquisition

The present Simpson Desert Conservation Park was proclaimed during the major expansion of the South Australian reserve system during the decade 1962-1972. During this period, the parks and reserves system grew from nineteen reserves totalling about 234 000 hectares, to ninety-nine reserves covering a total of over 3.5 million hectares (Harris 1974).

Increasing interest in environmental protection and nature conservation was one of the factors contributing to this massive increase in reserved lands. Specht and Cleland (1961, 1963) had published two pioneering papers, one concerning the preservation of vegetation formations in South Australia, and the other the preservation of individual plant species. The two papers provided the first inventory of flora conservation needs for South Australia and highlighted a serious lack of reserves for the protection of arid zone plants and vegetation. The papers contributed greatly to arguments in favour of park dedication in arid areas.

The present Simpson Desert Conservation Park had its origins in a proposal for a truly national park in the centre of the continent, comprising segments of the Simpson Desert in Queensland, South Australia and the Northern Territory. The tri-State park proposal came from the National Parks Association of Queensland (NPA). In 1966, the NPA had proposed to the Queensland Minister for Conservation that desert lands between the Northern Territory-Queensland border (longitude 138° east) and longitude 138°30′ east be incorporated into a national park to preserve an area of 3 625 to 5 700 square kilometres. Simultaneously, the NPA initiated moves to have the then Northern Territory Parks and Reserves Board proclaim an adjoining park in the south-east corner of the Northern Territory.

In South Australia, the NPA asked C. W. Bonython to:

> ... sponsor an application to the appropriate South Australian authority for a National Park covering approximately an area of 78 miles by 35 miles ... The siting of the South Australian section would coincide and join (1) the proposed Queensland National Park (southern boundary on Latitude 26° South...) and (2) the proposed Northern Territory park's southern boundary on Latitude 26° extending from Longitude 137°15′E. westward to 138°E.
>
> (Bonython 1966)

In his report, Bonython quoted the NPA justification for reserving part of the Simpson Desert. As this formed the basic justification for dedication of the present park, the main points are given here:

(a) an area of little or no rainfall.

(b) geological considerations involving the many parallel tightly packed sandridges extending NNW to SSE.

(c) scientific interest in the ephemeral shrubs and some sparse trees.

(d) the small mammals of the area.

(e) Aboriginal relics and history.

(f) future safari-type photographic visits.

Bonython also suggested that if the proposal were to be adopted:

> ... a larger area could be considered with the objects of:
>
> (1) ensuring that if possible the whole of the Simpson Desert sandridge country in South Australia be preserved.
>
> (2) including the north loop of the Kallakoopah Creek, and lakes like Peera Peera Poolanna.
>
> (3) conserving any rare vegetation ...

He also pointed out that such a proposal was not unreasonable as the whole South Australian part of the desert was unoccupied Crown Land subject only to oil exploration licences.

However, objections were raised to this wider proposal by those who considered reservation of such an area as excessive (Bonython 1980, cited in Alexander 1981). Harris (1974) mentioned that this opposition may have been due to pastoral industry intervention, while Alexander (1981) cites a South Australian Pastoral board memorandum advising against reservation of the whole desert area. Among the reasons put forward in this memorandum were that reservation of the area would prevent future pastoral occupation, attract people into a dangerous landscape and so be a threat to public safety, and would possibly hinder the search for oil.

Finally, the recommendation for park acquisition followed the boundaries originally proposed by the National Parks Association of Queensland. In 1967, the Director of Lands informed the newly-constituted National Parks Commission that no objection would be raised against the dedication of the park on those boundaries, provided the Queensland and Northern Territory proposals were also to proceed. At the same time, the Minister of Lands warned that any park dedication in the South Australian part of the desert would necessarily be subject to the *Mining Act* 1930-1962 and the *Mining (Petroleum) Act* 1940-1967, since oil exploration licences were already held over most of the park area. The Queensland Government publicly announced its intention to dedicate 5 050 square kilometres of the Simpson Desert as a National Park in May 1967 (with a slightly larger area and a boundary further to the east than originally proposed by the NPA). The announcement also made public the possibility of South Australia and the Northern Territory following suit. The Northern Territory, however, declined to act on grounds that not only would the relative isolation and inaccessibility of the desert be sufficient protection for the dunes and their flora and fauna, but also that dedication of a park in the Simpson Desert might prejudice the dedication of more significant lands elsewhere. To date, there have been no further moves towards acquisition of a Simpson Desert park in the Northern Territory, and completion of the original tri-State park is now most unlikely. The land originally suggested by the NPA is now subject to an Aboriginal land claim, but even if this pending claim is unsuccessful, a conservation reserve in the Northern Territory sector of the desert is still seen as a low priority and, if dedicated, would be on the desert fringes.

In South Australia, the Simpson Desert National Park was duly proclaimed under the *National Parks Act* 1966 on 14 December 1967 (*South Australian Government Gazette* 14.xxi.1967, p. 2 534). The National Parks Act generally provided that no mining rights would be issued in national parks, but still retained a provision giving the Governor power to declare all or part of a national park subject to either or both the Mining Acts already mentioned. As oil exploration licences were already held in the area, the proclamation establishing the park also invoked this provision to permit retention of the oil exploration licences.

The National Parks Act was replaced by the National Parks and Wildlife Act in 1972. This Act retained the provision for declaring a park subject to the Mining Acts and also reconstituted the Simpson Desert National Park as the Simpson Desert Conservation Park.

A proclamation to permit continuation of oil exploration in the park under the new legislation did not, in fact, appear until 1974. Unlike the 1967 proclamation, the 1972 Act not only declared the park subject to the *Petroleum Act* 1940-1969 but also laid down conditions under which rights in relation to the Petroleum Act could be exercised. As these conditions were the first specific management proposals for the park and the basis for subsequent environmental controls on oil exploration, the proclamation is reproduced in full in the Appendices.

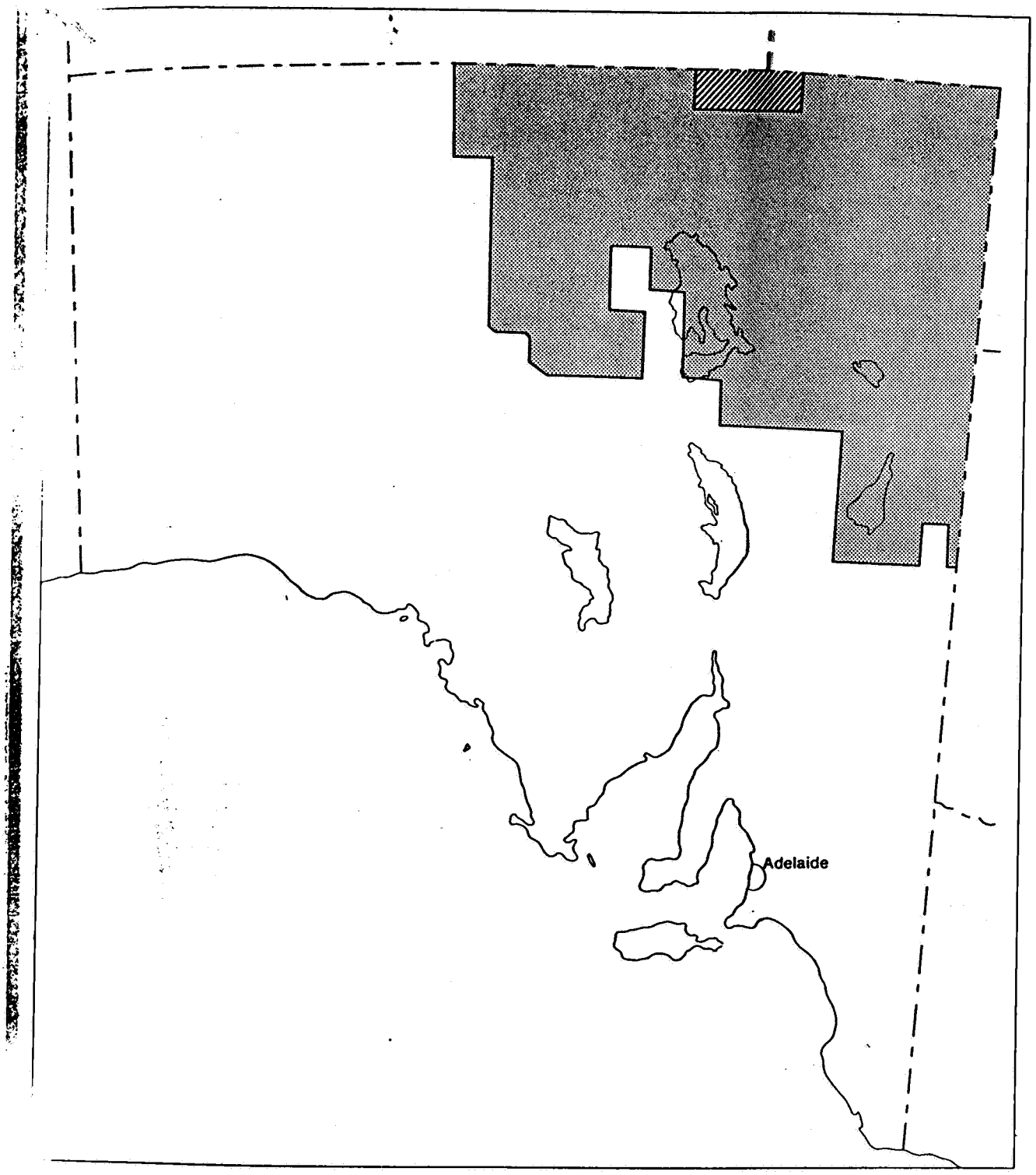
Park Management To Date

No inspection of the park area was carried out prior to its dedication in 1967. Until 1972, the park was under the control of the National Parks Commission. It was regarded as a wilderness area well buffered by the equally wild surrounding desert lands, distant from pastoral influences and largely inaccessible, and because of this it was considered to need little active management input. Over this period only three Field Officers were available to cope with field management over the whole State, and their efforts were necessarily concentrated on parks in the settled areas. In 1968 the only inspection of the Simpson Desert National Park was made by a Field Officer.

The park was reconstituted a Conservation Park (under the control of the National Parks and Wildlife Service) partly in recognition of the wilderness nature of the area. However, there was no field inspection by the Service until 1973. The inspection, prompted by the recommencement of active petroleum exploration, was undertaken to determine appropriate environmental control measures needed to minimise potential impacts of exploration activities within the park. The conditions of the 1974 proclamation were determined largely from the findings of this inspection.

The park has been visited by National Parks and Wildlife Service staff every year since 1975 and by members of the Development Management Division (and its antecedents) of the Department of Environment and Planning. The primary purpose of the inspections has been the examination of petroleum exploration impacts and the effectiveness of environmental controls and conditions in force. Environmental controls and their implementation are discussed at length in Part 1: Petroleum Exploration. Some wildlife inventories, particularly of birds, have been undertaken and a number of photographic monitoring points set up.

The services the National Parks and Wildlife Service have been able to provide for the park have been limited. The responsible Field Officers are stationed in the Far Northern District at Leigh Creek. This district is also responsible for field management of the Gammon Ranges National Park (Flinders Ranges) and the Elliot Price Conservation Park (Lake Eyre). It also has



Petroleum Exploration License 5 and 6

Simpson Desert Conservation Park

Exploration Licence boundary

0 200 400 km 600

Figure 8

Petroleum Exploration Licenses

responsibilities for wildlife off reserves, including the policing of hunting regulations, through the Far North of South Australia.

Summary and Implications

Although a number of writers have considered the Simpson Desert and the park area to have always been essentially unoccupied, Aboriginal occupation is in fact well evidenced, although populations would have been at a relatively low density. As several tribes used the region, the former name "Arunta Desert", appears to have been something of a misnomer.

The Simpson Desert was a barrier to early European exploration and subsequent pastoral occupation because of its terrain and aridity. Although pastoral occupation was limited to the desert margins, European influences nevertheless led to the collapse of the Aboriginal desert tribes.

A number of relics of Aboriginal occupation and European exploration remain. The documentation of the nature and position of these relics is poor. Some relics are in danger from present land-uses, a danger perhaps born more from ignorance than intent, and therefore there is clearly a need to increase the level of knowledge of the area as a first step in increasing the protection of the relics.

The Simpson Desert Conservation Park was originally dedicated as South Australia's contribution to a tri-State national park, but there now appears little chance of a Northern Territory park being dedicated to complement the South Australian and Queensland parks. This has a number of adverse consequences for the effectiveness of land-form and biological conservation in the area because, as already indicated in Part 1: Physical Features, the desert landscapes are not uniform. The significance of regional variation in relation to conservation purposes will become evident in subsequent sections. However, it should be noted that the conservation park was dedicated without a prior inspection and along arbitrary boundaries, largely in the belief that the desert was a homogeneous entity.

The park area was formerly considered to be wilderness, and because of this, only slight management input was provided. However, the park had been declared subject to the various mining and petroleum Acts, and as the level and extent of petroleum exploration has increased, more management input has been required. Exploration can be expected to continue for some years.

One effect of the petroleum exploration has been the creation of defined access in the desert, and this in turn has led to a major increase in public use over the last decade. In some respects, it is ironical that objections to the park's dedication were based in part on the park attracting the public into a dangerous landscape and so increasing public risk. The level of public use and the management problems created by it are a major concern of this management plan. The tracks, their levels of use and continuing exploration mean that the Simpson Desert and the park area cannot be considered the wilderness it was the past. It is essential to determine to what extent the related impacts of visitor use and petroleum exploration are permanent in order to allow assessment of the practicalities of the wilderness management option.

BIOLOGY

Introduction

Crocker (1946), from Madigan's 1939 scientific expedition, mapped the entire Simpson Desert as one "edaphic complex": the cycle of plant communities over the land-form, and soil cycle of dune and swale.

The two main plant associations of this cycle were the Sand-hill Cane-grass *(Zygochloa paradoxa)* association of the mobile dune crests, and the Lobed Spinifex *(Triodia basedowii)* association of the stable dune flanks and interdune corridors. Other associations were also described, but considered minor. The *Zygochloa paradoxa-Triodia basedowii* edaphic complex was regarded as the typical vegetation of the desert and was present throughout with remarkable homogeneity. Such a view of ecological homogeneity was retained until quite recently. Specht (1972), for example, shows the southern desert vegetation wholly as a hummock grassland of *Zygochloa* and *Triodia* on the basis of Crocker's report.

Indications that the desert was not ecologically uniform were given by the soil maps of Northcote *et al.* (1968) and the environmental association maps of Laut *et al.* (1977). These showed that the intrusion of the chain of playa lakes into the central part of the desert should bring with it ecological or biogeographical variation on a broader scale than that of the local dune and swale variation.

Boyland (1970) was first to publish a detailed ecological account concerning the Queensland sector of the desert and stemming from inspections prior to the dedication of the Simpson Desert National Park (Queensland) (Boyland and Ogilvie 1966). This study showed a much greater variety within the desert than that implied from the earlier reports, and in particular, drew attention to the extensive Gidgee *(Acacia cambagei)* open woodlands in the eastern desert. Recent examination of specimens from the eastern desert indicate that the species is *Acacia georginae* not *A. cambagei* (R. Purdie, personal communication). Until this is confirmed and published, *A. cambagei* will be used for the name of the species.

Fatchen and Barker (1979a, 1979b) and Buckley (1979) both reported major geographic variations in vegetation and land-form. The former traversed the desert in 1972 along latitude 26° south and passed through the conservation park. Among the variations in species distributions they noted was an apparent complete disappearance of *Triodia*. Although supposedly the "most important plant in the desert" (Crocker 1946), it had disappeared from 33 per cent of the traverse, including the part through the park. They also defined three distinct dune systems, each with differences in vegetation. Their "western dune system" contained the typical Simpson Desert dunes as described by Madigan, Crocker and others: red sand, regular and parallel dunes, unstable or mobile crests, and sandy corridors, with *Zygochloa* and *Triodia* hummock grassland the main cover. The "central dune system", about the playa lakes in the central desert, contained less regular, yellow dunes with few mobile crests. This system was virtually the same unit as the Kallakoopah Environmental Association described by Laut *et al.* (1977). *Zygochloa* grasslands were still present, but the area lacked *Triodia*. East of Poeppel Corner, a further system was reported which was similar in a number of respects to the western desert but with higher, wider spaced dunes (Part 1: Geology and Geomorphology) and flats carrying the Gidgee *(A. cambagei)* woodlands already mentioned.

Buckley (1979a, 1981a, 1981b) also pointed out major variations in land-forms and plant species distributions across the desert which conformed closely with those previously mentioned.

Although most of these investigations were primarily concerned with flora and vegetation, the findings have a wider ecological significance. They belie the popular and previous scientific belief that the desert is a homogeneous ecological entity. Geomorphological

variations have already been established (Part 1: Physical Features). Variation of land-form will produce changes in the fauna present, in the ecological processes in operation (such as frequency of fires), and in response to disturbance.

One consequence of the ecological variation is that there is not yet sufficient information available to map the vegetation of the South Australian and Northern Territory segments of the desert adequately (for example, to the level of mapping available for Queensland (Boyland 1979). Examples from Buckley (1979, 1981a, 1981c), Fatchen and Barker (1979a, 1979b), Wiedemann (1971), Boyland (1970) and Crocker (1946) all provide information on the local vegetation pattern at various points in the desert, but data are lacking between points.

For this reason, the wider but less specific concept of ecological associations which embraces soils, vegetation and land-form has been used for the basic ecological resource mapping rather than vegetation. In the following section, the various ecological associations within and about the conservation park are briefly described. Flora and vegetation are further discussed in subsequent sections.

Ecological Associations

An overview of the ecological associations in the southern Simpson Desert and its margins has recently been compiled by Graetz *et al.* (1982) on the basis of LANDSAT imagery and some ground examination. Graetz *et al.* define nineteen ecological associations, of which three are partly contained within the conservation park (Figure 9). These ecological associations, from west to east, are the Wongkanguru, Karanguru and Jeljendi, and conform respectively to the western, central and eastern dune systems of Fatchen and Barker (1979b). Within the desert proper are a further two, the Kallakoopah Ecological Association and part of the Mulligan Ecological Association. The remainder are beyond the desert boundaries. Ecological associations differ from each other regarding size, shape and spacing of dunes; presence or absence of playa lakes; and the nature of the vegetative cover. Differing combinations of these features are likely to result in different available habitats, growth patterns and responses to disturbance. The ecological associations therefore provide at least a framework for management decisions.

Graetz *et al.* do not report on the desert north of the State border. Comments relating to this part of the desert are drawn from the reports already cited and also Bonython (1980a). Some of the descriptions given below are also at slight variance with the report of Graetz *et al.* on the basis of other reports.

WONGKANGURU ECOLOGICAL ASSOCIATION

This association is an extensive area of red, closely spaced, parallel dunes built over a calcareous clayey alluvium (the "typical" Simpson Desert dunes. See Part 1: Physical Features). The alluvium is thought to be a former floodplain of the streams on the western desert edge. There are no playa lakes present. The ecological association contains the land-form and vegetation usually considered typical of the Simpson Desert. Although it accounts for only 33 per cent of the desert in South Australia, the Wongkanguru Ecological Association extends into the Northern Territory, forming the bulk of the Northern Territory segment and probably the major part of the Simpson Desert.

The landscape and vegetation is that which was originally described at length by Crocker (1946). It was for the protection of this ecological association that the Simpson Desert Conservation Park was originally dedicated although Figure 9 illustrates that only a small proportion of it is contained within the present park boundary. The dunes vary from 10 to 15 metres in height. They are occasionally jumbled on the western margin, but are usually quite regular, evenly and closely spaced. Spacing ranges from four dunes per kilometre in the west, to two or three dunes per kilometre in the east. Dunes are asymmetric, with steep eastern faces and gentler western slopes, and are mobile only on crests. Interdune (swale) areas are normally sandy, a thin mantle over the underlying clays with only occasional areas of sandy clays appearing.

A well-reported sequence in vegetation corresponds to the soil sequences of mobile crest sand, deep stable sand dune flanks, and shallow sand or sandy clay of the swale (Crocker 1946; Wiedemann 1971; Fatchen and Barker 1979a; Buckley 1981a, 1981b). Species distributions correlate with soil mobility but may be determined by other factors such as soil moisture characteristics (Buckley 1982b). Overall, the vegetation is open hummock grassland with the perennial grasses *Zygochloa paradoxa* (Sand-hill Cane-grass) on crests, and *Triodia basedowii* (Lobed Spinifex) on flanks and in swales. The perennial cover is usually low, however, and most cover, other than in severe drought, is provided by a suite of short-lived (ephemeral) species, particularly grasses and herbs such as *Aristida* spp., *Salsola kali*, *Sida* spp. and *Sclerolaena* spp. Taller shrubs, particularly the Umbrella Bush *(Acacia ligulata)*, may be moderately dense on dune flanks, but are less frequent in swale areas except where localised water runoff occurs.

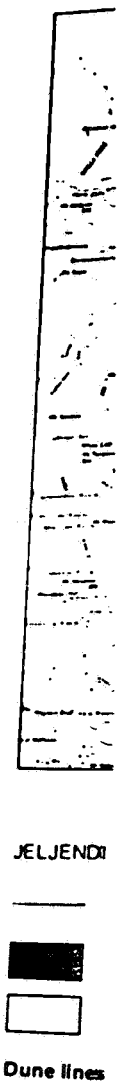
KARANGURU ECOLOGICAL ASSOCIATION

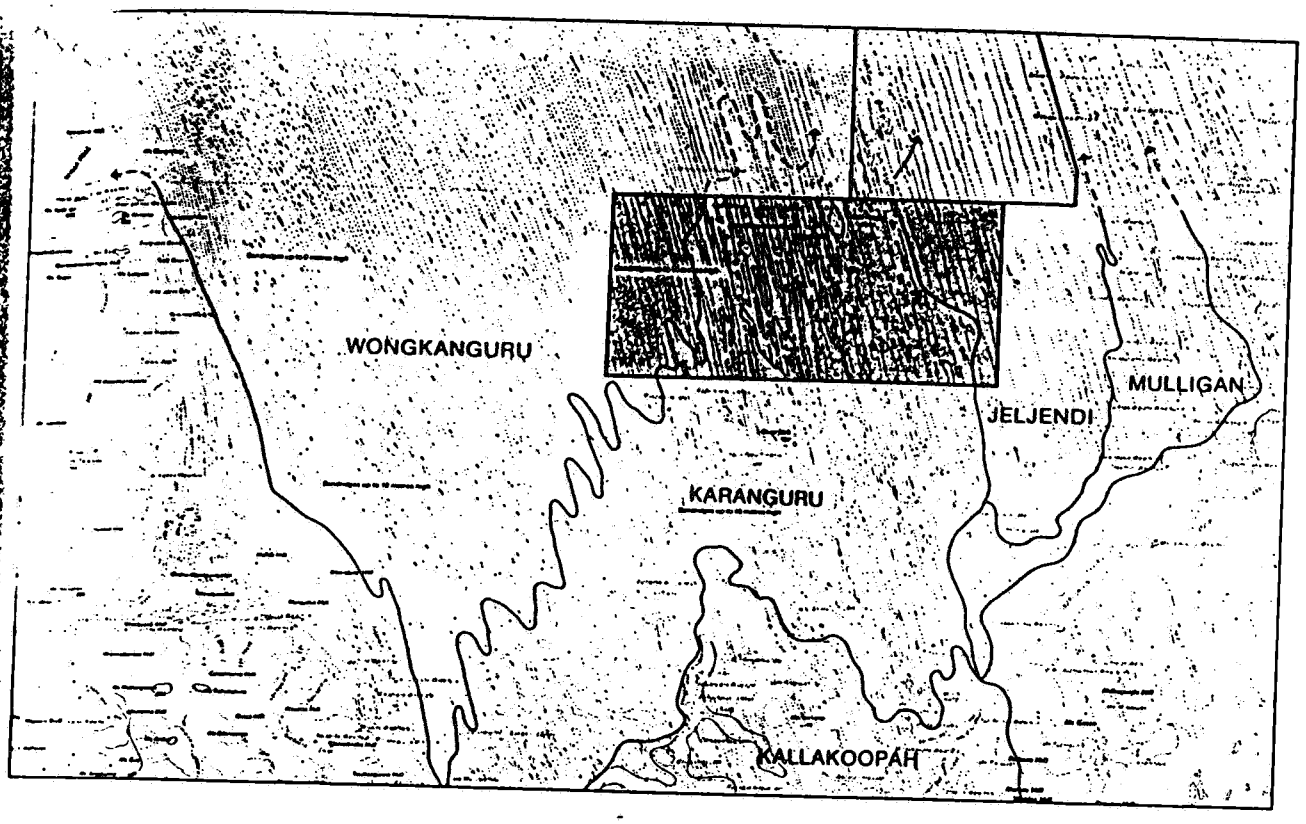
This is the largest ecological association mapped by Graetz *et al.* in the South Australian segment of the desert and the bulk of the conservation park area lies within it (Figure 9). It differs from most of the Simpson Desert in the nature of its dunes and the presence of numerous large and small playa lakes.

The dunes are composed of light-coloured sand which has been blown out of the sand sources about Lake Eyre. Their lighter colour is evidence of their more recent origin compared with the red dunes of the Wongkanguru Ecological Association. Dunes are higher (to 20 metres) than in the western desert, but are comparatively short, less strictly parallel and much more irregularly spaced (Fatchen and Barker 1979b). They are almost symmetrical in cross-section—there is no great difference in slopes of eastern and western faces—and lack the pronounced mobile crest, stable flank and swale soil sequence present elsewhere in the desert.

Fatchen and Barker (1979a) reported that these dunes appeared more stable than in other parts of the desert because of infrequent mobile crests, yet at the same time showed physical evidence of recent deflation and carried vegetation which, on the whole, indicated a high degree of instability. Graetz *et al.* (1982) consider that the system as a whole is being destabilised as sand steadily mobilises and is carried north, thus exposing indurated sand plinths. Buckley (1981a) also has observed major wind-scouring. The destabilisation is believed to be a natural phenomenon.

As well as the obvious longitudinal dune system within the ecological association, there is another less obvious but much larger set of dunes. These are huge sand lunettes forming broad humps on the northern margins of the playas (Krieg and Callen 1980). Although they may reach more than 50 metres above playa floors, they are not immediately obvious because they are very wide and of subdued profile.





JELJENDI **Ecological Association (after Graetz 1982)**

Ecological Association Boundary (mapping in Graetz ceases at Lat. 26° S)

Simpson Desert Conservation Park (S.A.)

Simpson Desert National Park (Qld.)

Dune lines are representational only

0 50 100 km150

Figure 9

Ecological Associations

The lack of a pronounced soil cycle in the dunefield is reflected by an absence of clearly defined vegetation patterns. In the eastern part of the ecological association, the dune vegetation is still predominantly a very sparse hummock grassland of *Zygochloa* on crests and *Triodia* on dune flanks. At the level of the State border, however, *Triodia* is absent across the western half of the association (Fatchen and Barker 1979b) and is also absent from much of the area to the south (Buckley 1981a; Lewis, in Foale n.d.). Interdune areas are commonly only vegetated with ephemeral herbaceous species, although some may contain low open shrublands of Bladder Saltbush *(Atriplex vesicaria)*. In the south, and largely outside park boundaries, there are considerable areas containing sparse stands of Mulga *(Acacia aneura* and others) and Needle-bushes *(Hakea leucoptera, H. eyreana)*.

Low open woodlands of Gidgee *(Acacia cambagei)* appear in isolated swales west of Poeppel Corner, becoming extensive woodlands to the east of the Corner. The woodlands, viewed from dune crests, give an illusion of thickly-forested swales, although the actual density of trees is low.

No vegetation grows on the saline surfaces of the playa lakes, but mounds within the lakes and the lake fringes carry very sparse low shrublands of Samphire *(Sclerostegia* and *Halosarcia* species) with occasional Nitre-bush *(Nitraria billardieri)*. Vegetative cover is usually very low in the south of the ecological association.

JELJENDI ECOLOGICAL ASSOCIATION

Jeljendi is a dunefield lying between the playa lakes region and the active floodplains of the Mulligan River (the "eastern dune system" of Fatchen and Barker 1979b). To the south it contains a few playa lakes. The sands are light yellow, and in this respect are similar to those of the Karanguru Ecological Association. The dunes, however, are much more regular and have the typical asymmetric cross-section. They are long, rarely branched, and in the park area may be very high (to 30 metres). Spacing between dunes may be over 1 kilometre. Further south, nearer to sand sources, dunes are relatively low and more closely spaced.

The dunes overlie a clayey alluvium, readily evident in swales, and believed to be recently buried floodplains of the Mulligan River (Graetz *et al.* 1982).

Dune vegetation depends to some extent on the particular location. Fatchen and Barker (1979a) report that *Triodia* only reappears in the eastern part of the ecological association, an observation supported by earlier comments of Boyland (1970). Graetz *et al.* (1982) indicate that *Triodia* is a characteristic species forming hummock grassland throughout. All authors at least agree that the Sand-hill Cane-grass (*Zygochloa paradoxa*) forms a sparse hummock grassland on mobile dune crests, and that taller shrubs such as *Acacia murrayana* and *A. dictyophleba* may be moderately dense on dune flanks.

More disagreements arise in relation to the vegetation of interdune corridors. Graetz *et al.* record the Gidgee woodlands as being present only in isolated swales, whereas Boyland, and Fatchen and Barker attest to the Gidgee being extensive, if sparse. Understoreys in woodlands are generally grassy. Where swales lack woodlands, there are ephemeral grasslands or, in the eastern parts, very sparse perennial hummock grasslands of *Triodia*.

The two following ecological associations lie entirely outside the present park boundaries. They are briefly described in order to give a clearer view of the park in context with the Simpson Desert in South Australia.

MULLIGAN ECOLOGICAL ASSOCIATION

Past and present floodplains of the Mulligan River (Eyre Creek) system define the Mulligan Ecological Assocation. The floodplains are crossed by dunes of similar structure and vegetation as in the Jeljendi Ecological Association. The flood-out areas between dunes have grey, self-mulching (cracking) clay soils carrying a sparse perennial shrubland of chenopods, particularly the Old Man Saltbush (*Atriplex nummularia*). Large amounts of ephemeral herbage appear after flooding. Flood channels and gutters close to the Mulligan River also have a very sparse cover of Coolibah (*Eucalyptus microtheca*). The banks of the relatively well-watered main streams of the Mulligan River have woodlands of Coolibah, River Red Gum (*Eucalyptus camaldulensis*) and *Lysiphyllum gilvum*.

KALLAKOOPAH ECOLOGICAL ASSOCIATION

This ecological assocation is distinguished from the otherwise very similar Karanguru Ecological Association because its playa and floodplain systems still receive water inflows other than from purely local runoff. The flows, rare and of low volume, are provided by the Kallakoopah Creek. Consequently, the ecological association possesses wetland areas that are unique within the Simpson Desert. The wetlands are actually a drier outlier of those associated with the Warburton (discussions in Foale n.d.).

The clay soils of the flood-out and channel areas become progressively more saline towards Lake Eyre. The only account of the vegetation is from Graetz *et al.* (1982). Vegetation on channels grades with increasing salinity from tall open shrublands of *Atriplex nummularia* to tall shrublands of *Melaleuca* spp., with the most saline areas containing low sparse shrublands of Samphire (*Halosarcia* spp.). Flood-outs show similar vegetation changes with increasing salinity, from chenopod shrubland of Cotton Bush (*Maireana aphylla*) to sparse ephemeral herbfields on more saline soils.

The proportion of the area occupied by the channels and flood-outs is small, however, and most of the ecological association comprises dunefield or playa lakes with characteristics the same as the Karanguru Ecological Association.

Representation of Ecological Associations within the Park

The present Simpson Desert Conservation Park is not fully representative of the three main ecological associations of the desert. Over 60 per cent of the park area is within the Karanguru Ecological Association, representing about 20 per cent of the total (Figure 9). A further 20 per cent of the park area is within the Jeljendi Ecological Association, conserving about 33 per cent of this unit's area in South Australia. A much larger area of the Jeljendi Ecological Association is protected within the Simpson Desert National Park (Queensland).

Only a slight proportion of the Wongkanguru Ecological Association is conserved within the conservation park, even when considering only the South Australian extent of this ecological association. As this ecological association contains the "typical" Simpson Desert land-forms and vegetation and forms the bulk of the Simpson Desert, the conservation park fails to protect a viable and representative sample of the country it was intended to protect. If the tri-State park proposal (Part 1: Park Acquisition) had been fully implemented, the proposed Northern Territory reserve would have completed the representation of the main desert landscapes. However, there now seems little likelihood of a Northern Territory reserve being proclaimed, and as a result, the sample of desert systems protected in the South Australian and Queensland parks will remain inadequate.

MINUTES forming ENCLOSURE to ..... DEP (DMD) No. 2157/85 19

DL 1667/85
DL 1666/85

TO THE DIRECTOR-GENERAL, DEPARTMENT OF LANDS

Re: Unallotted Desert Land

I am writing in response to your minutes of 16/4/85 and 7/5/85 concerning the dedication of Lakes Eyre North and South and portions of the Tirari and Simpson Deserts as Desert Reserves.

The Simpson Desert land was the subject of a reply from me in May in which I noted that portion of that land was earmarked for eventual dedication as Conservation Park. This Department sees the dedication of the land as Desert Reserve as being a very worthwhile interim measure to protect the land from tenure claims until it can be dedicated as park. Accordingly, we would be pleased to offer assistance with the provision of information if a resource inventory and land use study is undertaken before the land is dedicated as a park.

I understand that your Department will be advancing similar proposals concerning other areas of unallotted Crown land in the outback, and the Department of Environment and Planning would give them all support as at least interim measures and also provide assistance with information gathering and area assessment.

The Tirari Desert and Lake Eyre are also areas which this Department sees as having conservation significance. These areas however have not only been earmarked for eventual park status, but are the subject of a firm proposal to Cabinet that they be dedicated as Conservation Parks. The proposal was discussed by Cabinet some time ago. It is currently subject to negotiation with the Department of Mines and Energy concerning exploration rights. Once this issue is resolved it is expected that the declaration of Park status will automatically follow. It may therefore be unnecessary for these lands to be declared Desert Reserve even as an interim measure.

I trust that these comments are of assistance to you. If you have any further queries please contact either Mr. N. Newland, Acting Director, National Parks and Wildlife Service, or Mr. P. Simpson, Northern Sector Manager.

E.J. Phipps
DIRECTOR-GENERAL
DEPARTMENT OF ENVIRONMENT AND PLANNING

17/7/85

HIGHWAYS DEPARTMENT

33-37 WARWICK STREET
WALKERVILLE, SOUTH AUSTRALIA 5081

TELEPHONE—269 8911
TELEGRAMS—"HIGHWAYS, ADELAIDE"
TELEX—88027
DX—171

3481N

In reply please quote
RAD:rr
No. 1354/85

and address to The Commissioner, Box 1 , P.O. Walkerville, S.A. 5081

REFER ENQUIRIES TO Mr. King

TELEPHONE No. 2698 291

13 June, 1985

Mr. R.F. Elleway,
Assistant Director of Lands,
Department of Lands,
Box 1047, G.P.O.,
ADELAIDE. 5001

Dear Sir,

RE: UNALLOTTED CROWN LANDS IN THE SIMPSON DESERT

I refer to your letter (ref. DL 1667/85) of 7 May, 1985 concerning the dedication of unallotted Crown Lands in the Simpson Desert as Desert Reserves and advise that the proposal has been noted.

This Department has no land requirement for road purposes in the area proposed to be dedicated as Desert Reserve. Therefore, this Department has no comment to make on the proposal.

Yours faithfully,

M. J. Knight

COMMISSIONER OF HIGHWAYS

MINUTES forming ENCLOSURE to DL No. 1786 1983

TO THE MINISTER OF LANDS:

Via Asst. Director-General of Lands.

SUBJECT: Status Conversion of Crown Land in Areas North Out of Hundreds.

PROPOSAL:

To Reserve, under Section 5 of Crown Lands Act, the large areas of Crown Land in the areas North Out of Hundreds as Desert or Lake Bed reserves under Minister of Lands care and control.

BACKGROUND:

I. There are many large areas of Crown Land which include areas such as Lake Eyre North and South and the land adjacent (Tirari Desert).

2. These areas are in general not suited for either pastoralism or other uses. Some of these areas are under mining exploration for oil, gas and other resources.

3. The nature of our legislation and administration is such that Crown Land is available for application to use and the State must then undertake all investigations to refuse. This can cost several thousands of dollars per year.

4. The land involved may have environmental or heritage significance and may be the site of future road proposals.

DISCUSSION:

I. It appears that Reservation will achieve the objective of indicating that the State does not have any desire to bring this land into use. We can then demand that any applicant for the land must prepare the environmental justification for tenure, occupation, and/or use of the land.

2. Our interpretation of the Mining Act and Regulations is that Reservation will not preclude either exploration or mining but may increase the environmental investigations required of miners.

3. It is apparent to us that the Department of Mines & Energy, Department of Environment & Planning, and Highways Department may be interested in any given areas.

TENTATIVE PROCEDURE:

I. Having regard to the existance of an inter-Departmental Committee Review of Crown Lands potentially suitable for dedication or reservation for National Parks/ Conservation uses, a direction is sought as to whether this matter should be dealt with as a separate project, or embraced by the above Committee programme.

..2.

2. Subject to a direction, (in response to I above) that the matter of Desert/Lakebed Reserves is to proceed as an individual specific project the following procedure is envisaged:-

(I) Prepare a brief report on the area of land or lake to be reserved, covering

- environment
- heritage - European and Aboriginal
- current use - mining tenures and other

(2) Notify the following:

- Department of Mines & Energy
- Department of Environment & Planning
- Highways Department

allowing 4 weeks to raise any objections.

(3) Seek approval of Minister of Lands and Gazette.

RECOMMENDATION:

That Lake Eyre North & South and the Tirari Desert be used as test cases to evaluate the proposal and the procedures set out above .

TO

F.J. VICKERY
DIRECTOR, OUTBACK MANAGEMENT

C.J. KAUFMANN
MANAGER, URBAN PROJECTS

29/8/83

Noted 6/9/83

7/9 83 IEI

To DCL, As to tentative procedure:

to implement. Noted

1. Matter should be dealt with as a separate project

2. Mechanism as recommended approved

7/9

MINUTES forming ENCLOSURE to DE 4097/81 No. DL 4667/85 19

TO: ASSISTANT DIRECTOR OF LANDS

FROM: DIRECTOR GENERAL DEPARTMENT OF ENVIRONMENT AND PLANNING

SUBJECT: UNALLOTTED CROWN LANDS IN THE SIMPSON DESERT

DATE: 23rd MAY 1985

Your letter of 7th May 1985 seeks comment on a Department of Lands proposal to dedicate all unallotted Crown lands in the Simpson Desert as Desert Reserve under the Crown Lands Act.

This proposal is in conflict with the intentions of the National Parks and Wildlife Service, as published in 1984 in the draft management plan for the Simpson Desert Conservation Park, to extend park boundaries to include a substantial area of unallotted Crown land to the south and west of the present park (see extracts attached).

It should also be noted that the Service has some interest in the remainder of the unallotted Crown land in the Desert for possible inclusion in the National Parks and Wildlife Service reserve system.

E PHIPPS
DIRECTOR GENERAL
DEPARTMENT OF ENVIRONMENT AND PLANNING

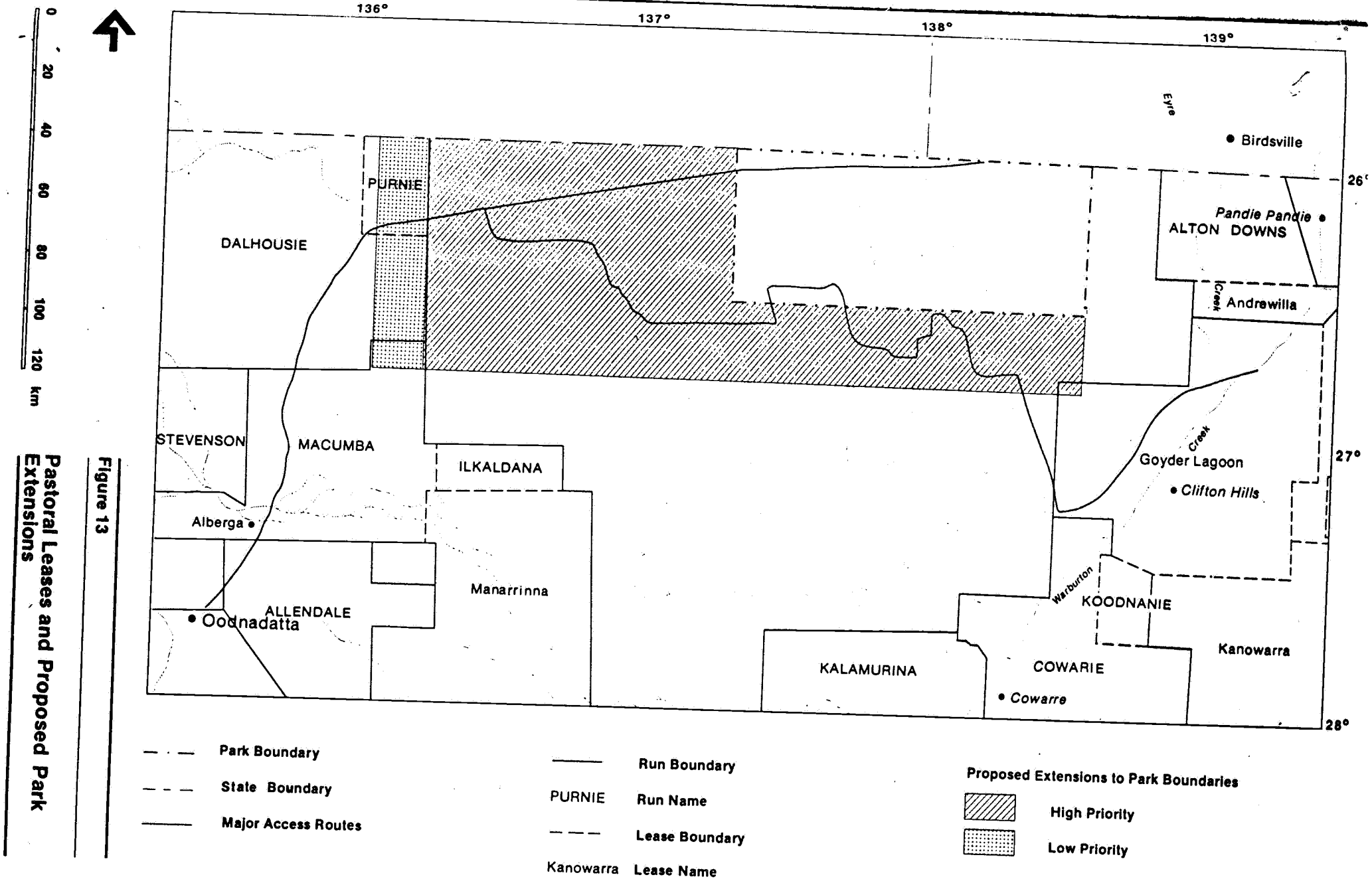


Figure 13

Pastoral Leases and Proposed Park Extensions

BOUNDARIES

Origin of Existing Boundaries

The existing park boundaries are highly artificial, bearing no real relationship to the geography or biology of the Simpson Desert. The park does not at present contain an adequate or representative sample of all the main environmental associations within the desert. In particular, the Wongkanguru Environmental Association is represented only within the extreme western portion of the park, despite occupying half the Simpson Desert in South Australia and being the main environmental association of the Simpson Desert as a whole.

That the Simpson Desert Conservation Park fails to conserve the landscapes usually considered typical of the Simpson Desert is an accident of history. At the time of the original tri-State park proposal, the broad geographic variations in land-form, vegetation, habitat and species within the desert were not well known, and popular conception of the desert was of a homogeneous sea of identical sandridges.

There was, therefore, insufficient reason for selecting any particular set of boundaries over another. The tri-State park proposal recognised that some geographical variation existed, although details were not known, and part of the rationale for the very large total area proposed was to encompass this variation. In fact, had the proposal succeeded and a Northern Territory park been dedicated, the resulting reserve would have provided statutory protection to a representative sample of all the Simpson Desert landscapes. Much of the Northern Territory segment would have comprised the Wongkanguru Environmental Association in particular. The much-acclaimed system of closely ranked, evenly spaced and parallel red sandridges which epitomise the Simpson Desert would thus have had adequate representation.

Reasons for Park Extension

Given that dedication of a park within the Northern Territory sector of the desert is now most unlikely, there is a strong case for extension of the Simpson Desert Conservation Park to include a representative and sizeable portion of the Wongkanguru Environmental Association. This would, at the least, provide consistent statutory protection to the "core" landscapes, flora and fauna of the Simpson Desert; otherwise, Australia will lack adequate representation within a national park or conservation reserve system of the typical Simpson Desert landscape.

A second reason for proposing park extension is to give new public access, partly to increase the likelihood of achieving conservation objectives, but mainly to increase the level of public safety in the area. The major east-west access along the oil exploration clayed roads, is close to, but outside, existing park boundaries for most of its length. The less-used northerly traverse lies largely within the park, but its western starting point is well beyond present park boundaries. The boundaries result in a number of separate park entries utilised by visitors, with the main east-west access crossing and recrossing the southern boundary. Inclusion of the main access route and key junctions within new park boundaries is desirable as it would allow management actions aimed at increasing public safety to be applied by the National Parks and Wildlife Service over most of its length. Administrative and legal problems arise if such developments are attempted by the Service on land legally beyond its control. Also, extension of the park, to include the main access and key route junctions, would mean that visitors would then always be within a park, with a consistent required standard of behaviour and activity over most of their traverse.

The possibility of eventual oil-field development provides a further reason for alteration of park boundaries. Eventual realisation of, at least, part of the park as wilderness will require a large area uninterrupted by man-made features. A commercial oil-field development within the park may prevent such a criterion being fulfilled over a large proportion of the present park area, even though the development itself may not significantly affect biological conservation objectives.

For example, the Cooper Basin developments at present directly occupy less than 90 square kilometres, and at full projected development are unlikely to occupy any more than three times this area. The development has no significant regional impact on pastoral productivity, and if biological conservation were the primary land-use, rather than pastoral production, a similar outcome could be expected. However, the eventual installations (well-heads, roads, and so on) in the Cooper Basin will be dispersed over about 12 000 or more square kilometres in such a manner that only a small proportion of this very large area will lie more than 20 kilometres away from an installation of one sort or another. A comparable development within existing park boundaries would not negate biological conservation purposes; nor would it necessarily prevent visitors experiencing a sense of wilderness. It could, however, prevent the establishment of true wilderness areas since the park area is insufficient to absorb such development and still have large areas of remnant undeveloped land.

Nature of Park Extensions

The proposed park extensions are shown in Figure 13. The western boundary should be relocated along longitude 136° East and the southern boundary moved further south to latitude 26° 45′ South. The northern boundary, being the State border, should remain unchanged. The eastern boundary should be maintained along its present longitude.

The westward extension has as its primary purpose, the inclusion of a significant portion of the Wongkanguru Environmental Association. The proposed boundary would generally coincide with the western boundary of the desert. It would require resumption of part of the Purni and Dalhousie pastoral leases where these leases extend into the dunefields of the desert. As an interim measure, pending resumption of the areas, a temporary western boundary should be declared at the perimeter of the leases. Both the interim and the final western boundary would include the western junction of the two main east-west access routes within the park, and would mean that the northerly east-west access would lie entirely within the park. This should permit public safety improvements to be applied particularly at the key junction.

The southern extension is intended to incorporate the main east-west access into the park area, primarily to allow management actions aimed at increasing public safety.

The substantial additional park area resulting from the proposed extensions should also increase the chance of large, undeveloped areas remaining in the park in the event of major oil-field development.

No change is proposed in the eastern boundary at this stage. Continuity with the eastern boundary of the Simpson Desert National Park (Queensland) may be desirable as a long-term objective, but is not seen as a management necessity, and is not justifiable on ecological grounds because the landscapes concerned

are already adequately conserved. A case exists for protection in reserves of the floodplains and watercourses of the desert environs, particularly the channel country of the Diamantina and including the Mulligan River (Eyre Creek) system east of the existing reserve. Such environments have particularly high conservation values in a highly arid region, yet are unrepresented within the South Australian reserve system. However, conservation purposes would be better served by selection and dedication of areas specifically for the floodplain and stream systems, rather than adding a relatively small, and not necessarily highly significant, floodplain component to a park primarily intended for the protection of desert ecosystems. Eastern extension of the park may, however, be a future option, particularly if similar extension of the Simpson Desert National Park (Queensland) is contemplated.

The proposed new boundaries of Figure 13 are still artificial because they do not follow any geographical, ecological or cultural boundary other than part of the western desert edge. Recommendations for the dedication of the whole of the South Australian segment of the Simpson Desert are made from time to time. These recommendations are usually on the grounds that the land is largely vacant and that dedication of the whole desert will create a clearer definition of the protected area by natural boundaries and the practical limits of pastoralism. Some form of environmental protection may be needed for the desert as a whole, but dedication of the entire area as a reserve under the National Parks and Wildlife Act is difficult to justify on either ecological or public use grounds.

ZONING

The approach used in deriving the zoning provisions has already been outlined in Part 2: Management Philosophy. The location and extent of the two main zones, Natural Area and Visitor Access, are shown in Figure 14. A third, localised zoning of Heritage Site is also proposed for the specific protection of areas which have particular Aboriginal or historical significance or contain relics of former occupation or exploration. No area has been zoned in this category in this plan, although such areas are known, or likely, to exist in the park (for example, sites of Aboriginal wells), but exact locations are either unknown or not available to the planner at present. The zoning plan should be updated as more information becomes available.

Natural Area Zone

The intent of the Natural Area zoning is to maintain the option of eventual return to wilderness of at least part of the park. The park is not at present wilderness (under most definitions) because of the continuing petroleum exploration activity and the network of seismic tracks associated with it.

Most of the ecological effects of the seismic network are considered to be transient, at least on present knowledge, and do not prohibit the return of the land to an undisturbed state. The impacts of tracks have been cause for concern, not because of the direct damage to land-form and vegetation—tracks occupy only a very small area despite their linear extent—but rather for their potential to trigger erosion which would affect a far larger area than the tracks themselves. Available evidence indicates that trackage has not had this effect. For example, dune cuttings have infilled following track abandonment, rather than leading to blow-outs and increasing dune mobility. Environmental controls on the construction and abandonment of tracks have assisted natural regeneration (although there is room for improvement in this regard. Upgrading of environmental controls is discussed further in Part 3: Petroleum Exploration). In addition, the alterations of landscape and biology, resulting from exploration activity, are minor indeed when compared with the changes following naturally-occurring wildfire and climatic variation.

Continued use of tracks by visitors, however, will inhibit their regeneration, and accordingly, visitor use of the zone should be minimised. In particular, no development for visitor use should be initiated within the zone, and park information (signs and interpretive materials) provided for visitors should direct their use away from the zone. Another step which should assist is the obliteration of clayed exploration roads. This would not entirely prevent some visitor use of the zone, but would be expected to result in most park visitors staying within the defined visitor access corridors. Total prohibition of visitor movement within the Natural Area Zone is considered unnecessary, as well as unenforceable, as the residual use of the zone is unlikely to have more than a very slight effect.

Visitor Access Zone

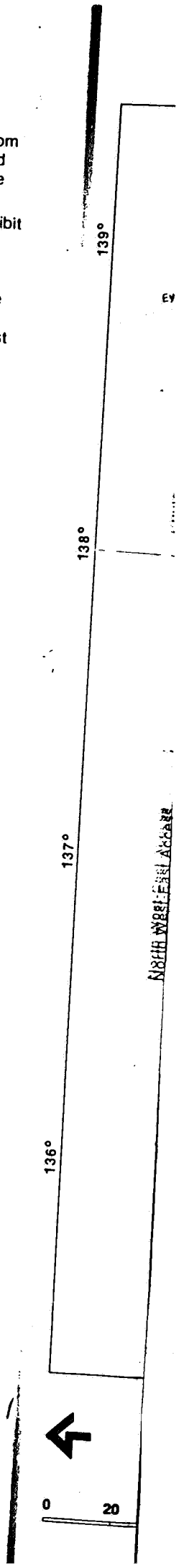
Access corridors have been zoned Visitor Access. The defined corridors (Figure 14) are intended to provide two east-west traverses and one north-south route through the park. The southerly traverse, along clayed exploration roads, follows a route of only moderate difficulty and is expected to be used by most parties intent on crossing the desert. Its eventual outlets are at Purni Bore in the east and the Birdsville Track in the west. The northerly traverse, close to the State border, should provide a very much rougher route for the more adventurous. This is the route of the first seismic survey team (the French Track) and is only passable from west to east, and terminates at Poeppel Corner. A single north-south corridor links the two east-west corridors and allows easier access to Poeppel Corner than is possible via the French Track.

The Queensland National Parks and Wildlife Service is willing to define a similar access route from Birdsville into the Simpson Desert National Park (Queensland), also terminating at Poeppel Corner. In practice, this and the proposed north-south route in the Simpson Desert Conservation Park (South Australia), would form a single route through Poeppel Corner, terminating outside Birdsville in the north, and at the main east-west access in the south. This would remove the need for an eastern route out of the park along the border and so reduce the problems often encountered in crossing the Mulligan River at this latitude.

The fate of access into the Northern Territory will depend in part on the outcome of the present Aboriginal land claim.

Most park developments should be directed to the Visitor Access Zone. In keeping with the conservation functions of the park and the desire of most visitors for a remote-area or wilderness experience, development should be minimal, aimed primarily at increasing public safety, with visitor education and park interpretation as secondary purposes. Development should be limited to route marking, placement of advisory signs, and some provision of emergency facilities, primarily water.

All installations within the zone should be low-key and relatively informal. Installations should have the capacity for complete removal in the event of oil-field development or other changes in park use necessitating a reorganisation of access. There should be no attempt by park management to maintain the tracks themselves within the zone. Not only is the cost of maintenance unjustifiable in terms of the degree of



MINUTES forming ENCLOSURE to D.L. No. 1667 19 85
~~D.E.~~ ~~4020~~ ~~84~~ TE2

RECEIVED
REGISTRY OFFICE
24 MAY 1985
DEPT. LANDS

LRM, (AD.)
WD/ars

TO THE DIRECTOR OF LANDS

Attention: Rod Elleway

Re: Unallotted Crown Lands in the Simpson Desert

I refer to your letter dated 7th May in which you advise the proposal to dedicate unallotted Crown lands in the Simpson Desert under the Crown Lands Act as desert reserve. Your letter indicates that a plan is available.

The Minister for Environment and Planning has discussed with Service Officers, the possibility of establishing a major arid lands National Park on the northern border of the state comprising the existing Simpson Desert Conservation Park, the Dalhousie and Purni pastoral leases (to be dedicated in the future under the National Parks and Wildlife Act) and the Crown lands between these two land parcels. The National Parks and Wildlife Service would have no objection to your proposal, subject to the Crown lands between the two land parcels described above, being available at the appropriate time for dedication under the National Parks and Wildlife Act.

N.P. Newland

(N.P. Newland)
ACTING DIRECTOR,
NATIONAL PARKS AND WILDLIFE SERVICE
DEPARTMENT OF ENVIRONMENT AND PLANNING

21/5/85

11/7/85.

Manager, Urban Projects.

15/7/85.

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

191 Greenhill Road, Parkside

TELEPHONE: (08) 274 7500
TELEGRAMS: Domex
TELEX: AA88692
FACSIMILE No. 272 7597
PLEASE ADDRESS ALL CORRESPONDENCE TO:
The Director-General
PO Box 151
Eastwood, S.A., 5063

In reply, please quote
DME 225/84
RL:AF

29th May, 1985

The Director,
Dept. of Lands,
Box 1047, G.P.O.,
ADELAIDE, S.A., 5001

Your Ref: DL 1667/85

Dear Sir,

Re: Unallotted Crown Land in the Simpson Desert

I refer to your Assistant Director's letter of 23rd July concerning Unallotted Crown Lands in the Simpson Desert. The land described on the map attached to your letter falls entirely with Petroleum Exploration Licence Nos. 5 and 6 and much of the area is considered to have significant potential for oil and gas.

It is necessary that any proclamation of the area as a "desert reserve" preserves full rights of access under the Petroleum & Mining Acts. In order to avoid unnecessary duplication of applications, monitoring of seismic & drilling activities etc., there should be no necessity for the licensees being required to apply to carry out their activities other than to DME.

Could you please keep me advised as to the progress of this matter, especially with regard to any proposed draft proclamation. The contact officer in my Department is Mr Robert Laws, Director of the Oil, Gas & Coal Division.

Yours faithfully,

for R.K. JOHNS
DIRECTOR-GENERAL

MINUTES forming ENCLOSURE to D.L. No. 1667 1985.

DIRECTOR, OUTBACK MANAGEMENT

re Unallotted Crown Land - Simpson Desert - Proposed Reservation

Please note

1) P&D ever Unalletted Crown Lands obtained
2) As in course, approved by Min Lands (7/9/83), letters to Highways Dept, Dept Mines & Energy & Dept Env. & Pl sent. Comments sought by 14/6/85 - we should should start reserve proceedings then.

14/5/85.

John McDonald.
L.R.O. - Urb Proj.

Seen & noted

This matter & a copy of within plan should be placed on next Pastoral Board agenda for information & noting.

J. Doom
16.5.85.

Action taken & submission to Pastoral Board

Director
Outback Management.

Manager, Urban Projects.

DEPARTMENT OF LANDS

144 King William Street, Adelaide, South Australia
Box 1047, G.P.O., Adelaide, S.A. 5001

AS2105-1b

Telephone Enquiries
227.2628 J. McDonald
When replying please quote
D.L. 1667/85

7th May, 1985

Director-General,
Department of Mines & Energy,
P.O. Box 151,
EASTWOOD 5063

Dear Sir,

re Unallotted Crown Lands in the Simpson Desert

A large portion of the Simpson Desert in South Australia is unallotted Crown land. As an interim measure pending completion of a land use assessment study, it is proposed to dedicate these lands under the Crown Lands Act as Desert Reserves. The lands concerned are shown on an attached plan. Comments on the proposal are invited and should be sent to the Department of Lands by 14th June 1985.

Yours faithfully,

R.F. Elleway,
ASSISTANT DIRECTOR OF LANDS

DEPARTMENT OF LANDS

144 King William Street, Adelaide, South Australia
Box 1047, G.P.O., Adelaide, S.A. 5001

AS2105-1a

Telephone Enquiries
227.2628 J. McDonald
When replying please quote
D.L. 1667/85

7th May, 1985

Director-General,
Department of Environment
& Planning,
P.O. Box 667,
ADELAIDE 5001

Dear Sir,

re Unallotted Crown Lands in the Simpson Desert

A large portion of the Simpson Desert in South Australia is unallotted Crown land. As an interim measure pending completion of a land use assessment study, it is proposed to dedicate these lands under the Crown Lands Act as Desert Reserves. The lands concerned are shown on an attached plan. Comments on the proposal are invited and should be sent to the Department of Lands by 14th June 1985.

Yours faithfully,

R.F. Elleway,
ASSISTANT DIRECTOR OF LANDS

DEPARTMENT OF LANDS

144 King William Street, Adelaide, South Australia
Box 1047, G.P.O., Adelaide, S.A. 5001

AS2105-1

Telephone Enquiries
227.2628 J. McDonald
When replying please quote
D.L. 1667/85

7th May, 1985

Commissioner of Highways,
P.O. Box 1,
WALKERVILLE 5081

Dear Sir,

re Unallotted Crown Lands in the Simpson Desert

A large portion of the Simpson Desert in South Australia is unallotted Crown land. As an interim measure pending completion of a land use assessment study, it is proposed to dedicate these lands under the Crown Lands Act as Desert Reserves. The lands concerned are shown on an attached plan. Comments on the proposal are invited and should be sent to the Department of Lands by 14th June 1985.

Yours faithfully,

R.F. Elleway,
ASSISTANT DIRECTOR OF LANDS

MINUTES forming ENCLOSURE to DL *No.* 1667 *1985*

MANAGER, URBAN PROJECTS

re Dedication ptn of Simpson Desert as Desert Reserve.
I understand there is some urgency to dedication of the parcels identified in attached P&D of 10/4/85.

On 7/9/83 (DL 1786/83 - copy herein) approved, in principle, dedication of large areas of unalotted Crown land. The approval specifically referred to a procedure to follow in using Lake Eyre and portion of surrounding Tirari Desert as a test case for dedication. The procedure was to notify various govt depts of reservation proposal, allowing time to reply & compilation of a brief report on the area.
As dedication of Lake Eyre and adjoining area has not proceeded, immediate reservation of the Simpson Desert Lands would be contrary to Ministerial approval.

However, to immediately proceed with dedication, the recommendation to dedicate when submitted to Min. of Lands should include an initial recommendation to dispense with the approved procedure in this case.

As P&D is now obtained, dedication of the Simpson Desert Lands can proceed. Lands to be dedicated are bordered pink on attached plan. marked A

16/4/85

John McDonald
LAND RESOURCE OFFICER
URBAN PROJECTS BRANCH.

John — we will proceed with paperwork
please i) prepare letters similar
Lake Eyre
ii) to A.D.L. for Ministerial
recommendation

17/4/85

ORIGINAL IN

MINUTES forming ENCLOSURE to DL No 1786 1983
DL 1667 85

TO THE MINISTER OF LANDS:

Via Asst. Director-General of Lands.

SUBJECT: Status Conversion of Crown Land in Areas North Out of Hundreds.

PROPOSAL:

To Reserve, under Section 5 of Crown Lands Act, the large areas of Crown Land in the areas North Out of Hundreds as Desert or Lake Bed reserves under Minister of Lands care and control.

BACKGROUND:

I. There are many large areas of Crown Land which include areas such as Lake Eyre North and South and the land adjacent (Tirari Desert).

2. These areas are in general not suited for either pastoralism or other uses. Some of these areas are under mining exploration for oil, gas and other resources.

3. The nature of our legislation and administration is such that Crown Land is available for application to use and the State must then undertake all investigations to refuse. This can cost several thousands of dollars per year.

4. The land involved may have environmental or heritage significance and may be the site of future road proposals.

DISCUSSION:

I. It appears that Reservation will achieve the objective of indicating that the State does not have any desire to bring this land into use. We can then demand that any applicant for the land must prepare the environmental justification for tenure, occupation, and/or use of the land.

2. Our interpretation of the Mining Act and Regulations is that Reservation will not preclude either exploration or mining but may increase the environmental investigations required of miners.

3. It is apparent to us that the Department of Mines & Energy, Department of Environment & Planning, and Highways Department may be interested in any given areas.

TENTATIVE PROCEDURE:

I. Having regard to the existance of an inter-Departmental Committee Review of Crown Lands potentially suitable for dedication or reservation for National Parks/ Conservation uses, a direction is sought as to whether this matter should be dealt with as a separate project, or embraced by the above Committee programme.

..2.

2. Subject to a direction, (in response to I above) that the matter of Desert/Lakebed Reserves is to proceed as an individual specific project the following procedure is envisaged:-

(I) Prepare a brief report on the area of land or lake to be reserved, covering

- environment
- heritage - European and Aboriginal
- current use - mining tenures and other

(2) Notify the following:

- Department of Mines & Energy
- Department of Environment & Planning
- Highways Department

allowing 4 weeks to raise any objections.

(3) Seek approval of Minister of Lands and Gazette.

RECOMMENDATION:

That Lake Eyre North & South and the Tirari Desert be used as test cases to evaluate the proposal and the procedures set out above .

TO

James Vickery

F.J. VICKERY
DIRECTOR, OUTBACK MANAGEMENT

29/8/83

C.J. KAUFMANN
MANAGER, URBAN PROJECTS

Noted 6/9/83

7 9 83 IEI

To DCL, As to tentative procedure.
to implement.
Noted
project
1. Matter should be dealt with as a separate
2. Mechanism as recommended approved

MINUTES forming ENCLOSURE to ORIGINAL IN → D.L. No. 1786 83
D.L. 4831 19 84
DL 1667 85

ASSISTANT DIRECTOR OF LANDS

RE: Unallotted Crown Lands in the Far North.

There has been some overlap with approvals given by the Minister of Lands and the Minister of Environment & Planning to evaluate options of future status of large areas of unallotted Crown land in the far north.

The Minister of Lands (7/9/83 - DL 1786/83) approved a recommendation to proceed with reservation, under the Crown Lands Act, of Lake Eyre and portion of adjoining Tirari Desert. Pending proclamation of the reservation, the remaining large areas of unallotted Crown Land would be treated in similar manner.

The Minister of Environment & Planning (19/7/84 - DL 4831/84 & DL 8155/82) approved the creation of an interdepartmental Working Party to evaluate options for future status and use of the large areas of unallotted Crown land. In their report of 18/1/85, the Working Party recommended an interim reservation of the lands, under the control of the Pastoral Board, pending a complete assessment and inventory of the lands. The exception was the Lake Eyre and Tirari Desert desert lands which was recommended for immediate proclamation as Conservation Park under National Parks and Wildlife Act.

To implement recommendations of the Working party and to make complementary the courses of action stemming from separate Ministerial approvals, the following course of action is recommended:

1. Dedication under the Crown Lands Act of the large areas of unallotted Crown land in the Far North, as an interim measure pending completion of proposed resource inventory, range condition and land use study.

2. Immediately proceed with the dedication, under the Crown Lands Act, of Lake Eyre and portion of adjoining Tirari Desert (sections 1466, 1467, 1468 N.O.O.H.) and Crown lands in the Simpson Desert. These areas are to be dedicated as Desert Reserves, with care control and management lying with the Crown.

3. Identify, using land parcel description, the remaining unallotted Crown lands and allocate priorities for dedication.

4. For the areas mentioned in recommendations 2. & 3., no application for use or allotment, irrespective of proposed use, is to be considered without consultation with the Pastoral Board.

F J Vickery
DIRECTOR, OUTBACK MANAGEMENT
CHAIRMAN, PASTORAL BOARD

and

C J Kaufmann
MANAGER, URBAN PROJECTS BRANCH

GS1704-5

12/4/84.

MINUTES forming ENCLOSURE to D.L. *No.* 1667 *19*85

L.R.M.D. - URBAN PROJECTS

Plan enclosed showing the various Crown lands and Reserve north of Lake Eyre North which are to be included in the proposed reservation of the Simpson Desert arid zone.

Details of these lands are:-

Section 48, area 6926 km^2, is the "Simpson Desert Conservation Park" which was declared by Act of Parliament No. 56 of 1972 and placed under the control of the Minister of Environment (now Environment and Planning).

Blocks 563-570,572,573,575-578,580-582,582A,589,591,591A; total area 30,152 km^2 are currently unallotted Crown Lands which were declared open to application under the provisions of the Pastoral Act to the 28th May, 1912, and again to the 4th December, 1931, with the exception of Block 565 which was declared open to application to the 11th March, 1932.

The conditions applicable to the offered parcels are contained in Government Gazette's 4.4.1912, 22.10.1931 and 21.1.1932 respectively (copies enclosed).

Block 582A is currently subject to Annual Licence No. 5944 held by C.H.B. Oldfield for grazing purposes. The licence commenced on 1st June, 1944.

Block 591A is currently subject to Annual Licence No. 15304 held by R.P. Gaffney for grazing purposes. The licence commenced on 1st August, 1977.

10/4/85

SUPERVISING DRAFTING OFFICER
Drafting Information Group - Detail

MINUTES forming ENCLOSURE to DL No. 1667 1985

DRAFTING INFORMATION GROUP

Please provide plan & detail for Crown Lands and Reserves within area shown on attached plan (Exclude the portion of Lake Eyre).

Also, please allocate section numbers for Crown lands, if necessary, for eventual proclamation as reserve.

John McDonald.
LAND RESOURCE OFFICER
URBAN PROJECTS BRANCH

28/3/85

LAND TENURE MASTER RECORD

Serial 53840

(7) Ownership

Name	Address	P. Cde.	Owners' No.	Moieties
MINISTER OF ENVIRONMENT & PLANNING	G.R.E. BLDG., 50 GRENFELL STR., ADELAIDE.	5000	~~01761100~~ 90000767	

(1) Serials

Tenure: AR00561972
Valuation Dep:
Co. ords Zone:
East:
North:
Title Reference: 8306000048
Date of Comc. – Lease:

(8) Location

(1) County, Hundred	(2) Township	(3) Irrig. Area (Div.)
OUT OF HUNDREDS; POOLAWANNA OUT OF HUNDREDS; PANDIE PANDIE "SIMPSON DESERT CONSERVATION PARK"		

2 Closed Road
3 Strata Unit
4 Section
5 Town Acre
6 Allotment
7 Block

1	8306001
4	48
1	8307001
4	48

8 Run : 9 Mineral Section : 0 Site

(2) Area and Rent

Area H.K: 692680H
Purchase Money $
Rent Inter Mths Amt $
Conc Rent Yrs Amt $
Date of Comc
Review Duration Yrs
Rent Due

(3) Agreement / Improvements

Date
Deposit $
No. of Inst./Prd. Mths
Rates (Nor | Late)
Princ. Imp. Land $
Princ. Int $
Instalment $

(9) Constraints Conditions

LIMIT (0402)

(4) Crown Loan or Mortgage

Due Date
No. of Inst./Prd. Mths
Rate %
Loan Amount $
Instalment $
Supported by
Insurance $

(0) Encumbrances

Agency	Type	Agency No.	Reg.

(5) Irrig. Drainage

Ratable 1070 ha
1220 ha
1470 ha
Drainage ha
Special Rate $
Cap Imp $
Date of Imp

(6) Fees Charges

Dog Fence (H.K)
Wild Dog (H.K)
Vermin (H.K)
Val Gen U.I.V $
Val Gen A.A.V $
Reported Use

Authentication

Compiled by
Approved by
Punched by
Verified by
Filed by

Dates—
Compiled 27 09 1978
Filed
Punched

(A) Lands Department Files Reference

Docket	Subject

(B) Diagram Book Page Nos

8306U00294

PROHIBITION OF THE INTRODUCTION OF STOCK FROM QUEENSLAND AND FROM THE NORTHERN TERRITORY.

Stock Office, Adelaide August 6th, 1905.

NOTICE.—All cattle, camels, horses, and sheep are prohibited from being introduced into South Australia from Queensland and the Northern Territory unless free from "infectious or contagious disease," including "Tick Fever."

All persons intending to introduce healthy cattle, camels, horses, or sheep shall forward written notice, if from Queensland, to the inspector at Quorn, and when *via* Oontoo, to the inspector at Innamincka, also stating number and description of stock, brands, where from, owner, drover, route, destination, consignee, and crossing-place previous to entering South Australia; and the drover shall carry a declaration of health of the stock made by the owner or manager and certified by an inspector of stock, and shall produce the same to an inspector on demand.

For stock from the Northern Territory, notice shall be given to the inspector at Charlotte Waters, and a permit obtained for the introduction of such stock into South Australia.

All cattle or horse hides are prohibited unless salted or dressed.

Penalty for a breach of the proclamation, not less than £5 nor more than £100, with liability to imprisonment for twelve months.

R. J. NEEDHAM, Chief Inspector of Stock.

INTRODUCTION OF STOCK INTO SOUTH AUSTRALIA.

Stock and Brands Office, Adelaide, August 28th, 1905.

POINTS of entry for the introduction of stock overland, and addresses of inspectors:—

Crossing-places between South Australia and Victoria.

No. 1, Ardno Crossing-place; No. 2, Lindsay Crossing-place No. 3, Penola and Casterton Crossing-place; No. 4, Naracoorte and Apsley Crossing-place; No. 6, Lockhart Crossing-place; No. 15, Penola and Dregholm Crossing-place; No. 16, Frances Crossing-place (comprising all that portion of the main road, hundred of Binnum, between the north boundary of section 395 and the south boundary of section 394, and their production to the east boundary of the hundred). Address of inspector of Stock—Mount Gambier.

For No. 5, Wolseley and Serviceton Railway Crossing-place-Address of Inspector of Stock—Serviceton, by rail only.

For No. 7, Murtho and Ned's Corner Crossing-place. Address of Inspector of Stock—Renmark.

Crossing-places between South Australia and New South Wales.

No. 8, Littra Crossing-place. Address of Inspector of Stock—Renmark.

For No. 9, Cockburn Crossing-place. Address of Inspector of Stock—Cockburn, by rail and road.

Crossing-places between South Australia and Queensland.

For No. 10, Innamincka and Oonta Crossing-place; No. 11, Haddon and Brown's Creek Crossing-place; No. 12, Cadelga Waterhole Crossing-place; No. 13, Pandie Pandie and Birdsville Crossing-place; No. 14, Herbert River or Mulligan Crossing-place. Address of Inspector of Stock—Innamincka and Quorn.

Crossing-place between South Australia and West Australia.

No. 17, Eucla Crossing-place. Address of Inspector of Stock—Fowler's Bay.

R. J. NEEDHAM, Chief Inspector of Stock.

PASTORAL LEASES TO BE ALLOTTED BY THE PASTORAL BOARD.

UNDER THE PROVISIONS OF THE PASTORAL ACT, No. 850 OF 1904. P.B., 56/1912.

Crown Lands Office, Adelaide, March 27th, 1912.

THE undermentioned pastoral blocks are now declared open to application under the provisions of the Pastoral Act, No. 850 of 1904. All applications received on or before Tuesday, the 28th May, 1912, will be submitted to the Pastoral Board, for consideration and allotment, on Tuesday, the 28th May, 1912.

Portion of a block can be applied for, and may be allotted if there are two or more applicants for the land, and a proportion of rent and purchase-money for improvements will then be amended accordingly.

Application must be made in writing to the Surveyor-General, and must be accompanied by a deposit of 25 per cent. on the first year's rent, and 5 per cent. in the price to be paid for improvements, as specified in schedule hereto. After the allotments have been made and approved by the Commissioner, the successful applicants shall, within one month after publication in the *Gazette* of notice of such allotment, pay the balance of rent and the purchase-money for the improvements on the land, or any instalment of the value of such improvements, that may be agreed to by the Commissioner in terms of clause 42 of the Act, together with a fee of 25s. for the preparation and registration of the lease.

All leases will commence from day of allotment, but the first payment must include rent at rate gazetted for the time between allotment and the next ensuing quarter-day in addition to the annual rental, which is payable annually from the latter date. The quarter-days are January 1st, April 1st, July 1st, and October 1st.

Applicants may apply for one or more blocks.

In no case will any reduction be made in the purchase-money for improvements after allotment.

Plans and forms of application may be obtained by applying to the Surveyor-General.

CONDITIONS UNDER WHICH PASTORAL LANDS ARE TO BE LEASED.

Covenants by the lessee:—

(*a*) To pay the rent and instalments on improvements annually in advance:

(*b*) To stock the land leased with sheep in the proportion of at least five head or with cattle in the proportion of at least one head for every square mile leased, and to keep the same so stocked, and before the end of the seventh year to increase the stocking to at least twenty head of sheep or four head of cattle per square mile, and to keep the same so stocked during the remainder of the term, and so that the stocking with sheep and cattle combined shall be sufficient if the requisite number are kept, one head of cattle being computed as equal to five head of sheep; and in all cases, upon being required thereunto, to furnish the Commissioner and the Pastoral Board with true particulars of the number of sheep and cattle with which the leased land is stocked:

(*c*) That the lessee will not at any time during the last three years of the term of the lease, overstock the land or any part thereof, or keep thereon any excessive number of sheep, cattle, horses, or other stock, which, in the opinion of the Commissioner or the Pastoral Board, would have the effect of depreciating the ordinary capacity of the land for depasturing stock:

(*d*) To forthwith commence to destroy and use reasonable means to keep the land free of vermin, to the satisfaction of the Commissioner or the Pastoral Board, during the currency of the lease:

(*e*) Not to assign or sublet without the written consent of the Commissioner, but so that such consent shall not be capriciously withheld:

(*f*) Not to erect or suffer brush fences on the land leased:

(*g*) Not to cut timber, except for improvements, or firewood, without the licence of the Commissioner:

(*h*) Not to obstruct or interfere with any public roads, paths, or ways, or the use thereof by any person:

(*i*) To make and furnish all such statements and returns as may be required by any rule or law for the time being in force:

(*j*) To observe and comply with the regulations for the time being in force under the Acts relating to pastoral lands:

(*k*) An exception or reservation in favor of the Crown, and all persons authorised, of all minerals, metals, gems, precious stones, coal, and mineral oils, together with all necessary rights of access, search, procuration, and removal, and all incidental rights and powers:

(*l*) An unrestricted right for the Crown and all persons authorised to enter and view the demised premises, and view the state and condition thereof, and to serve notice on the lessee of any wants of reparation, &c.:

(*m*) An unrestricted right for the Pastoral Board, land boards, and the members, agents, and officers thereof respectively, to enter upon and examine the demised land and premises:

(*n*) A condition that, if rent be not paid on due date, then a penalty of 10 per cent. per annum on the amount of the rent unpaid may, if the Commissioner think fit, be added :

(*o*) A proviso that if rent shall be in arrear for more than three months after due date, or if there has been a breach or non-performance of any of the lessee's covenants or conditions, the Commissioner may cancel the lease subject to the provisions of the Act :

(*p*) Provisions for the re-valuation or resumption of the demised land or premises, or any part thereof, for increasing the rent upon re-valuation and for compensation of the lessee on resumption, in accordance with the Acts and regulations for the time being on that behalf :

(*q*) Such leases shall also contain all such exceptions and reservations in favor of the Crown, the Commissioner, the Pastoral Boards land boards, road boards, and other authorities, the aborigine, of the State, and other persons necessary or proper for giving effect to any Act or regulation for the time being in force or not inconsistent therewith, as may be prescribed, or as the Commissioner may require :

(*r*) To expend in improvements on the land such sum, not exceeding 10*s.* per mile per annum, as shall be recommended by the Pastoral Board, approved by the Commissioner, and fixed by the lease : Provided that such covenant shall cease so soon as there shall be at least £3 per mile value in improvements on the land.

(*s*) The lessee will not be entitled to possession of the land until he shall have paid the first year's rent and fees and purchase-money for improvements or instalment of purchase-money for such improvements, as may be agreed to by the Commissioner.

FRED. W. YOUNG, Commissioner of Crown Lands.

No. of Block.	Locality.	Area in Square Miles.	Annual Rental per Square Mile.	Amount to be Paid to the Crown for Improvements.	Amounts Payable Annually.		Amount to be Forwarded with Application.	Amount to be Expended per Mile Annually in Improvements.	Term of Lease.	Remarks.
					Rent.	Instalment of Purchase-money for Improvements				
			s. d.	£ *s. d.*	£ *s. d.*	£ *s. d.*	£ *s. d.*	*s. d.*	Yrs.	
312	Emu Bluff (Lake Everard).—West of Lake Gairdner, about 110 miles N.E. from Streaky Bay; formerly P.L. 1317 (7)	380	2 0	537 0 0	38 0 0	25 11 11	36 7 0	1 0	42	Buildings, wells, and appliances, tanks, dams, fencing, &c.
425	Kallakoopah West.—N. of and adjoining Lake Eyre, east of the Peake Run : about 90 miles E. from Algebuckina railway siding (16)	615	1 6	—	46 2 6	—	11 10 8	1 0	42	
491	Ammaroodinna.—About 130 miles W. of Oodnadatta. (18)	360	1 6	—	27 0 0	—	6 15 0	1 0	42	
492	Wintinna West.—About 110 miles W. of Oodnadatta. (18)	360	1 6	—	27 0 0	—	6 15 0	1 0	42	
493	Ecavinna Hill.—About 90 miles W. of Oodnadatta. (18)	390	2 0	—	39 0 0	—	9 15 0	1 0	42	
494	Mount Gillen West.—About 90 miles S.W. of Oodnadatta. (18)	392	1 6	—	29 8 0	—	7 7 0	1 0	42	
495	Mount Gillen South-West.—About 100 miles S.W. of Oodnadatta. (18)	340	1 6	—	25 10 0	—	6 7 6	1 0	42	
496	Mount Gillen South.—About 90 miles S.W. of Oodnadatta. (18)	277	1 6	—	20 15 6	—	5 3 11	1 0	42	
497	Giddi-Giddinna West.—About 100 miles S.W. of Oodnadatta. (14)	378	1 6	—	28 7 0	—	7 1 9	1 0	42	
498	Giddi-Giddina.—About 75 miles southerly from Oodnadatta. (14)	780	1 0	—	39 0 0	—	9 15 0	1 0	42	
499	Oolgeiima West.—About 100 miles westerly from William Creek railway siding. (14)	450	1 6	—	33 15 0	—	8 8 9	1 0	42	
500	Oolgeiima.—About 70 miles westerly from William Creek railway siding. (14)	613	1 6	—	45 19 6	—	11 9 10	1 0	42	
501	Mount Clarence.—About 100 miles westerly from William Creek railway siding. (14)	442	2 0	—	44 4 0	—	11 1 0	1 0	42	
502	Mount Brady.—About 70 miles westerly from William Creek railway siding. (14)	604	2 0	—	60 8 0	—	15 2 0	1 0	42	
503	Mount Penrhyn.—About 75 miles S.W. from William Creek railway siding (14)	525	2 0	—	52 10 0	—	13 2 6	1 0	42	
504	Adjoining Innamincka and Kanowna Runs.—About 160 miles N.E. of Hergott. (15)	294	1 0	—	14 14 0	—	3 13 6	0 9	42	

Pastoral Lands—continued.

No. of Block.	Locality.	Area in Square Miles.	Annual Rental per Square Mile.	Amount to be Paid to the Crown for Improvements.	Amounts Payable Annually.		Amount to be Forwarded with Application.	Amount to be Expended per Mile Annually in Improvements.	Term of Lease.	Remarks.
					Rent.	Instalment of Purchase-money for Improvements				
			s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	Yrs.	
561	Tidnabakinna — About 40 miles easterly from Oodnadatta; formerly permit Nos 35 and part 46 (17)	123	2 6	—	15 7 6	—	3 16 10	1 0	42	
562	Coomparana.—About 50 miles east of Oodnadatta: formerly permit Nos. 36 and part 46 (17)	180	2 6	—	22 10 0	—	5 12 6	1 0	42	
563	Northerly from Lake Eyre, about 100 miles N.E. of Oodnadatta (17)	690	1 0	—	34 10 0	—	8 12 6	0 9	42	
564	Northerly from Lake Eyre, about 80 miles N.E. of Oodnadatta (17)	750	1 0	—	37 10 0	—	9 7 6	0 9	42	
565	Northerly from Lake Eyre, about 70 miles N.E. of Oodnadatta; formerly permit Nos. 41, 45, 57, and Crown lands (17)	743	1 0	—	37 3 0	—	9 5 9	0 9	42	
566	North of Lake Eyre, about 120 miles N.E. from Oodnadatta (17)	780	1 0	—	39 0 0	—	9 15 0	0 9	42	
567	North of Lake Eyre, about 100 miles N.E. from Oodnadatta (17)	840	1 0	—	42 0 0	—	10 10 0	0 9	42	
568	North of Lake Eyre, about 90 miles easterly of Oodnadatta (17)	850	1 0	—	42 10 0	—	10 12 6	0 9	42	
569	Mudloo Hill—North of Lake Eyre, about 90 miles east from Oodnadatta (17)	647	1 0	—	32 7 0	—	8 1 9	0 9	42	
570	Pondon Hill.—North of Lake Eyre, about 150 miles northerly of Hergott (16)	646	1 0	—	32 6 0	—	8 1 6	0 9	42	
571	Peelicanna.—North of Lake Eyre, about 220 miles northerly of Hergott (16)	695	1 0	—	34 15 0	—	8 13 9	0 9	42	
572	Poolarranna Lake.—North of Lake Eyre, about 200 miles northerly of Hergott (16)	748	1 0	—	37 8 0	—	9 7 0	0 9	42	
573	Poo'awanna South.—North of Lake Eyre, and about 180 miles northerly from Hergott (16)	635	1 0	—	31 15 0	—	7 18 9	0 9	42	
574	Callalumbunna.—North of Lake Eyre, about 220 miles northerly from Hergott (16)	660	1 0	—	33 0 0	—	8 5 0	0 9	42	
575	Narrow Neck.—North of Lake Eyre, and about 210 miles northerly from Hergott (16)	708	1 0	—	35 8 0	—	8 17 0	0 9	42	
576	Hollands Hill.—North of Lake Eyre, and about 190 miles northerly from Hergott (16)	480	1 0	—	24 0 0	—	6 0 0	0 9	42	
577	Umaroona.—North of Lake Eyre, and about 180 miles northerly of Hergott; formerly part block 418 (16)	720	1 0	—	36 0 0	—	9 0 0	0 9	42	
578	Kanabulana.—North of Lake Eyre, and about 165 miles northerly of Hergott; formerly part block 418 (16)	850	1 0	—	42 10 0	—	10 12 6	0 9	42	
579	Patapara West.—Adjoining Queensland border, about 240 miles northerly of Hergott (16)	605	1 0	—	30 5 0	—	7 11 3	0 9	42	
580	Womma Hill.—About 220 miles N.E. of Hergott (16)	647	1 0	—	32 7 0	—	8 1 9	0 9	42	

Pastoral Lands—continued.

No. of Block.	Locality.	Area in Square Miles.	Annual Rental per Square Mile.	Amount to be Paid to the Crown for Improvements.	Amounts Payable Annually. Rent.	Amounts Payable Annually. Instalment of Purchase-money for Improvements.	Amount to be Forwarded with Application.	Amount to be Expended per Mile Annually in Improvements.	Term of Lease.	Remarks.
			s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	s. d.	Yrs.	
581	Koomarrina.—About 210 miles N.E. of Hergott; formerly block 417 and Crown lands (16)	700	1 0	—	35 0 0	—	8 15 0	0 9	42	
582	Pooliadinna.—About 190 miles N.E. of Hergott; formerly part blocks 415 and 416 (16)	585	1 0	—	29 5 0		7 6 3	0 9	42	
583	Murdamaroo. — About 180 miles north of Hergott; formerly permit No. 95 (16)	140	1 6	—	10 10 0	—	2 12 6	1 0	42	
584	Tumpawarinna. — About 160 miles north of Hergott; formerly permit Nos. 52, 61, and 85 (16)	504	2 0	—	50 8 0	—	12 12 0	1 0	42	Hut and fencing.
585	Koodnanie.—About 160 miles N.E. of Hergott; formerly permit No. 54 (16)	270	2 6	—	33 15 0	—	8 8 9	1 0	42	
586	Mount Gason. — About 175 miles N.E. of Hergott; formerly permit Nos. 18, 25, 27, and 43. (16)	398	2 6	—	49 15 0	—	12 8 9	1 0	42	
587	Poothapootha. — About 190 miles N.E. of Hergott; formerly permit No. 26 (16)	149	2 6	—	18 12 6	—	4 13 1	1 0	42	
588	Talleranie.—About 180 miles N.E. of Hergott; formerly permit No. 97 (15)	491	1 6	27 10 0	36 16 6	1 6 3	10 11 7	1 0	42	Well and fencing.
589	Patapara.—About 240 miles northerly of Hergott; formerly block 321B (16)	400	1 6	22 10 0	30 0 0	1 1 5	8 12 6	1 0	42	Patapara Well.
590	Alton Downs. — About 250 miles northerly of Hergott: formerly block 321A and P.L. 2876 (16)	410	2 6	233 13 6	51 5 0	11 2 9	24 9 11	1 0	42	Wells, buildings, yards, fencing, &c.
a591	Patapara South.—About 225 miles northerly of Hergott; formerly block 322 (16)	556	1 6	—	41 14 0	—	10 8 6	1 0	42	
592	Jookapirie.—About 264 miles northerly of Hergott; formerly permit No. 91 (15)	101	2 0	—	10 2 0	—	2 10 6	1 0	42	
593	Miranda.—About 270 miles northerly of Hergott; formerly permit Nos. 59 and 96 (15)	354	2 6	67 15 0	44 5 0	3 4 7	14 9 0	1 0	42	Hut, well, and fencing.
*594	About four miles S.E. from Blackfellow's Creek railway siding; formerly part P.L. 80A (6)	3	5 0	—	0 15 0	—	0 3 9	2 0	42	Fencing.
a595	Mount Samuel.—About eight miles N.E. from Parachilna; formerly part P.L. 80A (6)	6	2 6	—	0 15 0	—	0 3 9	1 6	42	Fencing.

* Blocks within Vermin Districts.—Lessees will be liable for payment of vermin rates from date of allotment.
a Incoming lessee will be liable in terms of sections 115 and 116 of the Vermin Acts, 1905 to 1911.

E. M. SMITH, Surveyor-General, Chairman of Pastoral Board.

PASTORAL LEASES OF "UNOCCUPIED LANDS" TO BE ALLOTTED BY THE PASTORAL BOARD.

UNDER THE PROVISIONS OF THE PASTORAL ACTS, 1904 TO 1929.

APPLICATION must be made in writing to the Director of Lands, and must be accompanied by a deposit of 5 per cent. of the price to be paid for improvements, the property of the Crown, as specified in schedule hereto.

After the allotments have been made and approved by the Commissioner, the successful applicants shall, within one month after publication in the *Gazette* of notice of such allotment, pay the balance of the first instalment payable on account of such improvements, together with a fee of 35s. for the preparation and registration of the lease.

Portion of a block may be applied for, and may be allotted, and the purchase-money for improvements adjusted accordingly.

All leases to be for a term of twenty-one years, will commence from day of allotment, and rent shall be payable annually (if demanded) on January 1st, April 1st, July 1st, or October 1st, whichever shall happen nearest the date of allotment.

All leases are liable to stamp duty.

Applicants may apply for one or more blocks.

Plans may be seen at the Department of Lands, Adelaide, and obtained on payment of the postal charges.

COVENANTS AND CONDITIONS, ETC., UNDER WHICH "UNOCCUPIED" PASTORAL LANDS ARE LEASED.

Covenants by the lessee:—

(*a*) To pay the rent, one peppercorn, annually in advance (if demanded):

(*b*) That the lessee will not at any time during the term of the lease overstock the land or any part thereof, or keep thereon any excessive number of sheep, cattle, horses, or other stock, which, in the opinion of the Commissioner or the Pastoral Board, would have the effect of depreciating the ordinary capacity of the land for depasturing stock:

(*c*) To commence forthwith to destroy and keep the land free of vermin, to the satisfaction of the Commissioner or the Pastoral Board during the currency of the lease:

(*d*) Not to assign or sublet the whole or any part of the leased land without the consent of the Commissioner: Provided that—

(1) the Commissioner shall not consent to an assignment or subletting of the whole of the leased land during the first five years of the term unless it is proved to his satisfaction that a refusal of consent would cause severe hardship:

(2) the Commissioner shall not, during the first ten years of the term, consent to any assignment or subletting, giving effect to a subdivision of the leased land into two or more parts unless it is proved to his satisfaction that a refusal of consent would cause severe hardship:

(3) the Commissioner shall not at any time consent to any assignment or subletting, giving effect to a subdivision of the leased land into two or more parts unless plans of the proposed subdivision have first been submitted to and approved by him, and he is satisfied that the subdivision is such as would enable the best use to be made of all the improvements, waters, and grazing areas:

(4) subject to the preceding paragraphs of this proviso the Commissioner shall not capriciously withhold his consent to any assignment or subletting:

(*e*) Not to erect or suffer brush fences on the land leased:

(*f*) Not to cut timber, except for erections, fencing, or firewood, without the licence of the Commissioner:

(*g*) Not to obstruct or interfere with any public roads, paths, or ways, or the use thereof, by any person:

(*h*) To make and furnish all such statements and returns as may be required by any rule or law for the time being in force:

(*i*) To observe and comply with the regulations for the time being in force under the Acts relating to pastoral lands:

(*j*) Not to construct or commence to construct any artesian bore without licence from the Commissioner:

(*k*) Not to deepen or enlarge any artesian bore on the land unless with the written permission of the Commissioner given on the recommendation of the Pastoral Board, nor otherwise than in accordance with any requirements imposed by the Commissioner on the recommendation of the Pastoral Board as a condition of giving his permission:

(*l*) Not to use any land comprised in the lease for agriculture unless the consent of the Commissioner has been first obtained:

(*m*) To pay at the times and in the manner specified in the lease the purchase-money for Crown improvements, together with interest at the fixed rate per annum on the balance for the time being unpaid, by equal annual instalments spread over the term of the lease:

(*n*) To maintain improvements, the property of the Crown, in proper repair, to the satisfaction of the Commissioner, reasonable wear and tear excepted, while any instalments remain owing:

(*o*) To spend money on improvements on the land so that by the end of the fifth year of the term thereof not less than ten pounds per square mile will have been spent, and by the end of the thirteenth year not less than fifteen pounds per square mile, and by the end of the twenty-first year not less than twenty pounds per square mile: Provided that such amount spent on improvements shall not include any money advanced by the Commissioner or by any other body or person on behalf of the Crown to the lessee for vermin-proof or dog-proof fencing, and spent by the lessee for that purpose:

(*p*) To supply water for stock travelling through the land at the rates fixed by the Commissioner: Provided that the lessee shall have the right to determine from what water supply the travelling stock are to take water.

(q) To supply water from any artesian bore constructed after the passing of the Pastoral Act Amendment Act, 1929, to other lessees (if so ordered by the Commissioner pursuant to section 97 (j) of the Pastoral Act, 1904, as enacted by the Pastoral Act Amendment Act, 1929):

And in addition to such covenants—

(1) An exception or reservation in favor of the Crown, and all persons authorised, of all minerals, metals, gems, precious stones, coal, and mineral oils, together with all necessary rights of access, search, procuration, and removal, and all incidental rights and powers:

(2) An unrestricted right for the Crown and all persons authorised to enter and view the demised premises, and view the state and condition thereof, and to serve notice on the lessee of any wants of reparation, &c.:

(3) An unrestricted right for the Pastoral Board, Land Board, and the members, agents, and officers thereof respectively, to enter upon and examine the demised land and premises:

(4) A condition that if any instalments payable on account of Crown improvements remain unpaid for three months after the same are due the whole of the purchase-money and interest then remaining unpaid shall at the option of the Commissioner become instantly due, payable, and recoverable:

(5) A proviso that if there has been a breach or non-performance of any of the lessee's covenants or conditions, the Commissioner may cancel the lease subject to the provisions of the Act:

(6) Where a lessee, or his predecessors in title, have held land for 21 years, under the provisions of Part XII. of the Pastoral Act, 1904, as enacted by section 10 of the Pastoral Act Amendment Act, 1937 of 1929, and all the terms and conditions of such lease have been complied with to the satisfaction of the Pastoral Board, he shall be entitled to a lease of the same land under the provisions of the Pastoral Acts, 1904 to 1929, for a term of 42 years. The rental for the first term (21 years) of such lease shall not exceed 2s. 6d. per square mile per annum:

(7) Provisions for the revaluation or resumption of the demised land or premises, or any part thereof, for increasing the rent upon re-valuation and for compensation of the lessee on resumption, in accordance with the Acts and regulations for the time being on that behalf:

(8) Such leases shall also contain all such exceptions and reservations in favor of the Crown, the Commissioner, the Pastoral Board, Land Board, and other authorities, the aborigines of the State, and other persons necessary or proper for giving effect to any Act or regulation for the time being in force or not inconsistent therewith, as may be prescribed, or as the Commissioner may require:

(9) The lessee will not be entitled to possession of the land until he shall have paid the fees and the first instalment of purchase-money for improvements (if any):

(10) The lessee will be liable for any amounts due on account of wire netting, fencing materials, water piping, vermin rates, or wild dog rates.

R. S. RICHARDS, Commissioner of Crown Lands.

"UNOCCUPIED" PASTORAL LANDS.

Department of Lands, Adelaide, October 21st, 1931.

THE undermentioned pastoral blocks are now declared open to application, and all applications received at the office of the Director of Lands before 3 o'clock p.m. on Friday, December 4th, 1931, will be submitted to the Pastoral Board for consideration and allotment.

R. S. RICHARDS, Commissioner of Crown Lands.

Block.	Locality.	Area in Square Miles.	Amount to be Paid to the Crown for Improvements.	Amount Payable Annually.		Amount to be Forwarded with Application.	Term of Lease.	Remarks.
				Rent.	Instalment of Purchase-money for Improvements.			
			£ s. d.		£ s. d.	£ s. d.	Years.	
c 76	No. 5 Bore Block.—On Nullarbor Plain, about 110 miles north-westerly from Yalata (Fowler's Bay), formerly pastoral lease 757 (10)	287	—	One Peppercorn	—	—	21	—
116	Tankamarinna.—About 50 miles north-north-easterly from Marree; formerly part of pastoral lease 1028 (12)	78	—	One Peppercorn	—	—	21	—
e 174	Dulkaninna.—About 40 miles north-easterly from Marree; formerly pastoral lease 1006 (12)	254	—	One Peppercorn	—	—	21	Flowing bore

e The successful applicant will be required to pay the sum of £70 per annum for the use of water from Dulkaninna and Sinclair bores. (These bores and equipment remain the property of the Crown.)

UNOCCUPIED PASTORAL LANDS—*continued.*

Block.	Locality.	Area in Square Miles.	Amount to be Paid to the Crown for Improvements.	Amount Payable Annually.		Amount to be Forwarded with Application.	Term of Lease.	Remarks.
				Rent.	Instalment of Purchase-money for Improvements.			
			£ s. d.		£ s. d.	£ s. d.	Years.	
j 527	Agnes Creek (or De Rose Hill).—About 120 miles westerly from Pedirka Railway Siding and 145 miles north-westerly from Oodnadatta; formerly Crown lands (18)	445	—	One Peppercorn	—	—	21	Well
a 530	Rowland Hill.—About 100 miles westerly from Pedirka Railway Siding and 130 miles north-westerly from Oodnadatta; formerly Crown lands (18)	273	—	One Peppercorn	—	—	21	—
a 531	Ungalootanna.—About 80 miles westerly from Pedirka Railway Siding and 110 miles north-westerly from Oodnadatta; formerly pastoral lease 1485 (18)	272	—	One Peppercorn	—	—	21	—
532	Curralulla.—About 60 miles westerly from Pedirka Railway Siding and 95 miles north-westerly from Oodnadatta; formerly pastoral lease 1486 (18)	289	—	One Peppercorn	—	—	21	—
a 537	Lambinna North.—About 75 miles westerly from Pedirka Railway Siding and 100 miles north-westerly from Oodnadatta; formerly Crown lands (18)	180	—	One Peppercorn	—	—	21	—
a 543	Pundalarrinna.—About 130 miles westerly from Oodnadatta; formerly part pastoral lease 1417 (18)	293	—	One Peppercorn	—	—	21	—
a 562	Coomparana.—About 50 miles easterly from Oodnadatta; formerly pastoral lease 1374 (17)	202	—	One Peppercorn	—	—	21	—
a 563	Northerly from Lake Eyre and about 80 miles north-easterly from Pedirka Railway Siding and 110 miles north-easterly from Oodnadatta; formerly Crown lands (17)	690	—	One Peppercorn	—	—	21	—
a 564	Northerly from Lake Eyre.—About 75 miles easterly from Pedirka Railway Siding and 90 miles north-easterly from Oodnadatta; formerly Crown lands (17)	750	—	One Peppercorn	—	—	21	—
a 566	North of Lake Eyre.—About 110 miles east-north-easterly from Pedirka Railway Siding and 130 miles north-easterly from Oodnadatta; formerly Crown lands (16, 17)	785	—	One Peppercorn	—	—	21	—
a 567	North of Lake Eyre.—About 110 miles north-easterly from Oodnadatta; formerly Crown lands (16, 17)	840	—	One Peppercorn	—	—	21	—
a 568	North of Lake Eyre.—About 95 miles north-easterly from Oodnadatta; formerly Crown lands (16, 17)	854	—	One Peppercorn	—	—	21	—
a 569	Mudloo Hill.—North of Lake Eyre, about 95 miles easterly from Oodnadatta; formerly Crown lands (16, 17)	647	—	One Peppercorn	—	—	21	—
a 570	Pondon Hill.—North of Lake Eyre, about 110 miles easterly from Oodnadatta; formerly Crown lands (16)	649	—	One Peppercorn	—	—	21	—
a 571	Peelicanna.—North of Lake Eyre, about 145 miles north-easterly from Oodnadatta; formerly Crown lands (16)	695	—	One Peppercorn	—	—	21	—
a 572	Poolarranna Lake.—North of Lake Eyre, about 135 miles north-easterly from Oodnadatta; formerly Crown lands (16)	750	—	One Peppercorn	—	—	21	—
573	Poolowanna South.—North of Lake Eyre, about 120 miles east-north-easterly from Oodnadatta; formerly Crown lands (16)	635	—	One Peppercorn	—	—	21	—

j An application from Mr. T. G. O'Donoghue, who, under permit, obtained the water supply on this block, would receive favorable consideration from the Pastoral Board.

UNOCCUPIED PASTORAL LANDS—*continued.*

Block.	Locality.	Area in Square Miles.	Amount to be Paid to the Crown for Improvements.	Amount Payable Annually.		Amount to be Forwarded with Application.	Term of Lease.	Remarks.
				Rent.	Instalment of Purchase-money for Improvements.			
			£ s. d.		£ s. d.	£ s. d.	Years.	
a 574	Callalumbunna.—North of Lake Eyre and about 170 miles north-easterly from Oodnadatta; formerly Crown lands (16)	660	—	One Peppercorn	—	—	21	
a 575	Narrow Neck.—North of Lake Eyre and about 160 miles north-easterly from Oodnadatta; formerly Crown lands (16)	708	—	One Peppercorn	—	—	21	
a 576	Holland's Hill.—North of Lake Eyre and about 155 miles east-north-easterly from Oodnadatta; formerly Crown lands (16)	480	—	One Peppercorn	—	—	21	
a 577	Umaroona.—North of Lake Eyre and about 145 miles east-north-easterly from Oodnadatta; formerly Crown lands (16)	725	—	One Peppercorn	—	—	21	
a 578	Kandabulana.—North of Lake Eyre and about 140 miles easterly from Oodnadatta; formerly Crown lands (16)	855	—	One Peppercorn	—	—	21	
a 579	Patapara West.—Adjoining the Queensland Border and about 195 miles north-easterly from Oodnadatta; formerly Crown lands (16)	609	—	One Peppercorn	—	—	21	
a 580	Womma Hill.—About 180 miles east-north-easterly from Oodnadatta; formerly Crown lands (16)	651	—	One Peppercorn	—	—	21	
a 581	Koomarinna.—About 180 miles east-north-easterly from Oodnadatta; formerly Crown lands (16)	350	—	One Peppercorn	—	—	21	
a 582	Pooliadinna.—About 175 miles east-north-easterly from Oodnadatta; formerly Crown lands (16)	385	—	One Peppercorn	—	—	21	
a 582A	Part Pooliadinna.—About 170 miles easterly from Oodnadatta; formerly pastoral lease 1452 (16)	200	—	One Peppercorn	—	—	21	
a 589	Patapara.—About 215 miles north-easterly from Oodnadatta; formerly pastoral lease 1436 (16)	400	—	One Peppercorn	—	—	21	
a 591	Patapara South.—About 205 miles east-north-easterly from Oodnadatta; formerly Crown lands (16)	278	—	One Peppercorn	—	—	21	
a 673	Lake Eyre North.—From 30 to 60 miles north-easterly from Coward Railway Station; formerly pastoral lease 499 (12)	240	—	One Peppercorn	—	—	21	
ac 697	North of hundreds of Lucy and Trunch.—About 42 miles north-north-westerly from Yalata (Fowler's Bay); formerly Crown lands (9)	128	—	One Peppercorn	—	—	21	
ac 698	North of hundred of Trunch.—About 40 miles north-north-westerly from Yalata (Fowler's Bay); formerly Crown lands (9)	128	—	One Peppercorn	—	—	21	
ac 699	North of hundred of Trunch.—About 40 miles northerly from Yalata (Fowler's Bay); formerly Crown lands (9)	128	—	One Peppercorn	—	—	21	

a Liable for wild dog rates.

b Liable for vermin rates.

c The incoming tenant will be liable in terms of section 114 of the Vermin Acts, 1914 to 1930, and the State Bank Acts, 1925 to 1930, and section 115 of the Vermin Acts, 1914 to 1930.

d The incoming tenant will be liable in terms of section 115 of the Vermin Acts, 1914 to 1930.

Special attention is drawn to clause (*o*) of the conditions of lease regarding amounts to be expended in improvements during the currency of the lease.

Intending applicants are advised to personally inspect the country applied for before lodging their applications.

THEO. E. DAY, Chairman of Pastoral Board.

PASTORAL LEASES TO BE ALLOTTED BY THE PASTORAL BOARD UNDER THE PROVISIONS OF THE PASTORAL ACTS, 1904 TO 1929.

APPLICATION must be made in writing to the Director of Lands, and must be accompanied by a deposit of 25 per cent. on the first year's rent and 5 per cent. of the price to be paid for improvements, the property of the Crown, and (unless the applicant is the outgoing lessee) 10 per cent. of the price to be paid for improvements when the improvements are not the property of the Crown, as specified in schedule hereto. After the allotments have been made and approved by the Commissioner, the successful applicant shall, within one month after publication in the *Gazette* of notice of such allotment, pay the balance of rent and the purchase-money for the improvements on the land, or any instalment of the value of such improvements, that may be agreed to by the Commissioner in terms of clause 42 of the Pastoral Act of 1904, together with a fee of 25s. for the preparation and registration of the lease.

Portion of a block can be applied for, and may be allotted if there are two or more applicants for the land, and a proportion of rent and purchase-money for improvements will then be amended accordingly.

All leases will commence from day of allotment, but the first payment must include rent at rate gazetted for the time between allotment and the next ensuing quarter-day in addition to the annual rental, which is payable annually from the latter date. The quarter-days are January 1st, April 1st, July 1st, and October 1st.

All leases are liable to stamp duty.

Applicants may apply for one or more blocks.

In no case will any reduction be made in the purchase-money for improvements after allotment.

Plans may be seen at the Department of Lands, Adelaide, and obtained on payment of the postal charges.

COVENANTS AND CONDITIONS, ETC., UNDER WHICH PASTORAL LANDS ARE LEASED.

Covenants by the lessee:—

(*a*) To pay the rent annually in advance:

(*b*) To stock the land leased with sheep in the proportion of at least five head or with cattle in the proportion of at least one head for every square mile leased, and to keep the same so stocked during the remainder of the term, and so that the stocking with sheep and cattle combined shall be sufficient if the requisite number are kept, one head of cattle being computed as equal to five head of sheep; and in all cases, upon being required thereunto, to furnish the Commissioner and the Pastoral Board with true particulars of the number of sheep and cattle with which the leased land is stocked:

(*c*) That the lessee will not, at any time during the term of the lease, overstock the land or any part thereof, or keep thereon any excessive number of sheep, cattle, horses, or other stock which, in the opinion of the Commissioner or the Pastoral Board, would have the effect of depreciating the ordinary capacity of the land for depasturing stock:

(*d*) Forthwith to commence to destroy vermin on the leased land to the satisfaction of the Commissioner or the Pastoral Board, and at all times during the term of the lease to use reasonable means to keep the land free of vermin to the satisfaction of the Commissioner or the Pastoral Board.

(*e*) Not to assign or sublet the whole or any part of the leased land without the consent of the Commissioner: Provided that—

(1) the Commissioner shall not consent to an assignment or subletting of the whole of the leased land during the first five years of the term unless it is proved to his satisfaction that a refusal of consent would cause severe hardship;

(2) the Commissioner shall not, during the first 10 years of the term, consent to any assignment or subletting, giving effect to a subdivision of the leased land into two or more parts unless it is proved to his satisfaction that a refusal of consent would cause severe hardship;

(3) the Commissioner shall not at any time consent to any assignment or subletting, giving effect to a subdivision of the leased land into two or more parts unless plans of the proposed subdivision have first been submitted to and approved by him, and he is satisfied that the subdivision is such as would enable the best use to be made of all the improvements, waters, and grazing areas;

(4) if the consent of the Commissioner to any surrender, transfer, assignment, or subletting of the whole or any part of the land is applied for at any time within the first 10 years of the term of the lease and the lease is one in which the rent is fixed on a sliding scale or any variations of the rent is fixed for the first period of 21 years of the term, then the Commissioner may, if he thinks fit, withhold his consent unless and until the lessee has paid to the lessor a sum equal to the difference between the amount payable under such sliding scale or variation for the period between the commencement of the lease and the date of the application for such consent and the total amount that would have been payable as rent for such period if the rent payable during such period had been fixed at the highest rate payable under the lease at any time during such period;

(5) subject to the preceding paragraphs of this proviso the Commissioner shall not capriciously withhold his consent to any assignment or subletting:

(*f*) Not to erect or suffer brush fences on the land leased;

(*g*) Not to cut timber, except for erections, fencing, or firewood, without the licence of the Commissioner:

(*h*) Not to obstruct or interfere with any public roads, paths, or ways, or the use thereof, by any person:

(*i*) To make and furnish all such statements and returns as may be required by any rule or law for the time being in force:

(*j*) To observe and comply with the regulations for the time being in force under the Acts relating to pastoral lands:

(*k*) Not to construct or commence to construct any artesian bore without licence from the Commissioner:

(*l*) Not to deepen or enlarge any artesian bore on the land unless with the written permission of the Commissioner given on the recommendation of the Pastoral Board, nor otherwise than in accordance with any requirements imposed by the Commissioner on the recommendation of the Pastoral Board as a condition of giving his permission:

(*m*) Not to use any land comprised in the lease for agriculture unless the consent of the Commissioner has been first obtained:

(*n*) To pay at the times and in the manner specified in the lease the purchase-money for Crown improvements, together with interest at the fixed rate per annum on the balance for the time being unpaid, by equal annual instalments spread over the term of the lease:

(*o*) So long as any money shall remain owing in respect of the purchase-money of any improvements on the land, to maintain such improvements, the property

of the Crown, in proper repair, to the satisfaction of the Commissioner, reasonable wear and tear excepted; and not to pull down or remove from the land or knowingly suffer to be pulled down or removed or wilfully or knowingly destroy, damage, or injure or suffer to be destroyed, damaged, or injured any such improvements without the consent of the Commissioner in writing first had and obtained:

(*p*) To expend in improvements on the land such amount (if any) as is necessary to ensure that the value of the improvements on the said land will be not less than £10 per square mile by the end of the fifth year; not less than £15 per square mile by the end of the thirteenth year; and not less than £20 per square mile by the end of the twenty-first year of the term of the lease:

(*q*) To supply water for stock travelling through the land at the rates fixed by the Commissioner: Provided that the lessee shall have the right to determine from what water supply the travelling stock are to take water:

(*r*) To supply water from any artesian bore constructed after the passing of the Pastoral Act Amendment Act, 1929, to other lessees (if so ordered by the Commissioner pursuant to section 97 (*j*) of the Pastoral Act, 1904, as enacted by the Pastoral Act Amendment Act, 1929):

(*s*) So long as any money shall remain owing by the lessee in respect of any improvements belonging to the Crown and liable to be destroyed or damaged by fire, to insure and during the term of the lease to keep insured, in some insurance office in Adelaide to be approved by the Commissioner, against loss or damage by fire, all such improvements, other than fencing, in an amount equal to two-thirds of the amount for the time being owing to the Crown in respect thereof, such insurance to be in the joint names of the lessee and the Commissioner; and to lodge the policy of every such insurance in the office of the Commissioner within one calendar month after the date thereof; and to forward to the Commissioner the receipts for the premium payable in respect of every such policy within seven days after the same shall become due: Provided that if the foregoing covenant shall not be duly observed, then the Commissioner shall be at liberty to insure the said improvements in manner aforesaid, and all moneys expended by the Commissioner in or about such insurance with interest thereon at the rate of five pounds per centum per annum, computed from the time of expending the same, shall be repaid to him on demand, and may be recovered in like manner as rent is recoverable: Also provided that all sums of money received by the lessee or the Commissioner under any such insurance shall be laid out in re-instating (*pro tanto*) the premises in respect of which the same shall have been received: Provided also that if the Commissioner and the lessee shall so agree, the moneys so received or such part thereof as may be agreed upon shall, in lieu of being laid out as aforesaid, be applied in reduction of the amount for the time being owing by the lessee to the Crown in respect of such improvements.

And in addition to such covenants—

(1) An exception or reservation in favor of the Crown, and all persons authorised, of all gold, silver, copper, tin, and other metals, all ores and other substances containing metals, all minerals and all gems and precious stones, coal, and mineral oils, together with all necessary rights of access, search, procuration, and removal, and all incidental rights and powers.

(2) An unrestricted right for the Commissioner and all persons authorised by him at all times to enter on the land and view and examine the state and condition thereof and of the improvements belonging to the Crown thereon and of all defects, decays, and wants of reparation contrary to the provisions of the lease as shall be then and there found, to give notice to the lessee or leave on the land notice in writing requiring the lessee to repair and amend the same within six calendar months then next following, within which time the lessee will repair and amend the same accordingly.

(3) An unrestricted right for the Pastoral Board, Land Board, and the members, agents, and officers thereof respectively, to enter upon and examine the demised land and premises.

(4) An unrestricted right for the Governor for the time being of the State and all persons authorised by him or other lawful authority, at any time or from time to time as may be deemed requisite, with horses, carts, and carriages, or without, into, upon, through, and over the land to come and go for the purpose of laying out and making fit for and devoting to the public use any new and additional roads, ways, and paths.

(5) A condition that if the rent be not paid on due date, then a penalty of 10 per cent. per annum on the amount of the rent unpaid may, if the Commissioner thinks fit, be added.

(6) A proviso that if rent shall be in arrear for more than three months after due date, or if there has been a breach or non-performance of any of the lessee's covenants or conditions, the Commissioner may cancel the lease subject to the provisions of the Act.

(7) A condition that if any instalments payable on account of Crown improvements remain unpaid for three months after the same are due, the whole of the purchase-money and interest then remaining unpaid shall at the option of the Commissioner become instantly due, payable, and recoverable.

(8) Provisions for the revaluation or resumption of the demised land or premises, or any part thereof, for increasing the rent upon revaluation and for compensation of the lessee on resumption in accordance with the Acts and regulations for the time being on that behalf: Provided also that during the first six months of the twenty-first year of the term of any lease for 42 years the Pastoral Board shall make a revaluation of the run and determine, subject to the approval of the Commissioner, the rent to be paid by the lessee during the last 21 years of the lease. Such revaluation shall be completed not less than six months before the expiration of such twenty-first year, and the Commissioner shall forthwith serve upon the lessee notice in writing of the rent to be paid during such last 21 years: Provided that the annual rent to be paid on revaluation shall not be more than 50 per centum above or below the rent payable during the twenty-first year of the said term.

(9) Such leases shall also contain all such exceptions and reservations in favor of the Crown, the Commissioner, the Pastoral Board, Land Board, and other authorities, the aborigines of the State, and other persons necessary or proper for giving effect to any Act or regulation for the time being in force or not inconsistent therewith, as may be prescribed or as the Commissioner may require.

(10) The lessee will not be entitled to possession of the land until he shall have paid the first year's rent and fees and purchase-money for improvements or instalment of purchase-money for such improvements as may be agreed to by the Commissioner.

(11) The lessee will be liable for any amounts due on account of wire netting, fencing materials, water piping, vermin rates, or wild dog rates.

R. S. RICHARDS, Commissioner of Crown Lands.

PASTORAL LANDS.

Department of Lands, Adelaide, January 20th, 1932.

THE undermentioned pastoral blocks are now declared open to application, and all applications received at the office of the Director of Lands before 3 o'clock p.m. on Friday, March 11th, 1932, will be submitted to the Pastoral Board for consideration and allotment.

R. S. RICHARDS, Commissioner of Crown Lands.

Block.	Locality.	Area in Square Miles.	Amount to be Paid to the Crown for Improvements.	Rent for the First Year.	Annual Instalment of Purchase-money for Improvements.	Amount to be Forwarded with Application.	Term of Lease.	Remarks.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	Yrs.	
a 412	Mungeranie—About 115 miles north-north-easterly from Marree; formerly pastoral lease 1267. (16)	510	—	12 15 0	—	3 3 9	42	—
b 413A	Part Berlino—About 140 miles north-north-easterly from Marree; formerly pastoral lease 1005. (16)	150	—	3 15 0	—	0 18 9	42	—
c 420	Kalamurina—About 125 miles northerly from Marree; formerly pastoral lease 1282 (16)	821	—	20 10 6	—	5 2 8	42	—
423A	Part Barcoo East—About 80 miles northerly from Marree; formerly pastoral lease 1292. (16)	150	—	One Peppercorn	—	—	42	—
e 487	Lakeside—On east shore of Lake Frome; about 95 miles northerly from Olary Railway Station; formerly pastoral lease 1308. (5, 11)	530	—	13 5 0	—	3 6 3	42	—
f 515	Part Bollard's Lagoon—About 150 miles east-north-easterly from Marree, and about 150 miles north-easterly from Farina; formerly part pastoral lease 1584. (11)	407	—	10 3 6	—	2 10 11	42	—
g 516	Part Bollard's Lagoon—Adjoining the New South Wales and Queensland borders, about 170 miles east-north-easterly from Marree, and about 170 miles north-easterly from Farina; formerly part pastoral lease 1584. (11)	410	—	10 5 0	—	2 11 3	42	—

a Rent for the first 21 years will be payable as follows:—For the first two years, £12 15s. (6d. per square mile) per annum; for the next three years, £25 10s. (1s. per square mile) per annum; and for the next 16 years, £38 5s. (1s. 6d. per square mile) per annum.

b Rent for the first 21 years will be payable as follows:—For the first two years, £3 15s. (6d. per square mile) per annum; for the next three years, £7 10s. (1s. per square mile) per annum; and for the next 16 years, £18 15s. (2s. 6d. per square mile) per annum.

c Rent for the first 21 years will be payable as follows:—For the first two years, £20 10s. 6d. (6d. per square mile) per annum; for the next three years, £41 1s. (1s. per square mile) per annum; and for the next 16 years, £61 11s. 6d. (1s. 6d. per square mile) per annum.

d Rent for the first 21 years will be payable as follows:—For the first 10 years one peppercorn (if demanded) per annum, and for the next 11 years, £1. 5s. (1s. 6d. per square mile) per annum.

e Rent for the first 21 years will be payable as follows:—For the first two years, £13 5s. (6d. per square mile) per annum; for the next three years, £26 10s. (1s. per square mile) per annum; and for the next 16 years, £39 15s. (1s. 6d. per square mile) per annum.

f Rent for the first 21 years will be payable as follows:—For the first 10 years, £10 3s. 6d. (6d. per square mile) per annum; and for the next 11 years, £30 10s. 6d. (1s. 6d. per square mile) per annum.

g Rent for the first 21 years will be payable as follows:—For the first 10 years, £10 5s. (6d. per square mile) per annum; and for the next 11 years, £30 15s. (1s. 6d. per square mile) per annum.

PASTORAL LANDS—*continued.*

Block.	Locality.	Area in Square Miles.	Amount to be Paid to the Crown for Improvements.	Rent for the First Year.	Annual Instalment of Purchase-money for Improvements.	Amount to be Forwarded with Application.	Term of Lease.	Remarks.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.		
hs 517	Carraweena East—About 140 miles east-north-easterly from Marree, and about 140 miles east-north-easterly from Farina; formerly part of pastoral lease 1568. (11)	480	—	12 0 0	—	3 0 0	42	—

h Rent for the first 21 years will be payable as follows:—For the first 10 years, £12 (6d. per square mile) per annum; and for the next 11 years (1s. 6d. per square mile) per annum.

is 518	Tilcha North—About 170 miles east-north-easterly from Marree, and about 165 miles east-north-easterly from Farina; formerly part of pastoral lease 1568. (11)	393	—	9 16 6	—	2 9 2	42	—

i Rent for the first 21 years will be payable as follows:—For the first 10 years, £9 16s. 6d. (6d. per square mile) per annum; and for the next 11 years £29 9s. 6d. (1s. 6d. per square mile) per annum.

js 561	Tidnabakina—About 40 miles east-north-easterly from Oodnadatta; formerly pastoral lease 1516. (17)	123	—	3 1 6	—	0 15 5	42	—

j Rent for the first 21 years will be payable as follows:—For the first 10 years, £3 1s. 6d. (6d. per square mile) per annum; and for the next years £9 4s. 6d. (1s. 6d. per square mile) per annum.

ks 565	Northerly from Lake Eyre, about 70 miles north-easterly from Oodnadatta and about 60 miles east-north-easterly from Alberga Railway Siding; formerly pastoral lease 1397. (17)	743	—	18 11 6	—	4 12 11	42	—

k Rent for the first twenty-one years will be payable as follows:—For the first five years £18 11s. 6d. (6d. per square mile) per annum; and for next sixteen years £55 14s. 6d. (1s. 6d. per square mile) per annum.

ls 584	Tumpawarinna—About 155 miles northerly from Marree; formerly pastoral lease 1353. (16)	504	—	12 12 0	—	3 3 0	42	—

l Rent for the first twenty-one years will be payable as follows:—For the first two years £12 12s. (6d. per square mile) per annum; for the three years £25 4s. (1s. per square mile) per annum; and for the next sixteen years £37 16s. (1s. 6d. per square mile) per annum.

ms 585	Koodnanie—About 155 miles north-north-easterly from Marree; formerly pastoral lease 1354. (16)	266	—	6 13 0	—	1 13 3	42	—

m Rent for the first twenty-one years will be payable as follows:—For the first two years £6 13s. (6d. per square mile) per annum; for the three years £13 6s. (1s. per square mile) per annum; and for the next sixteen years £19 19s. (1s. 6s. per square mile) per annum.

ns 590	Alton Downs—About 240 miles north-easterly from Oodnadatta and 250 miles north-north-easterly from Marree; formerly pastoral lease 1357. (15, 16)	410	—	10 5 0	—	2 11 3	42	—

n Rent for the first twenty-one years will be payable as follows:—For the first two years £10 5s. 0d. (6d. per square mile) per annum; for the three years £20 10s. (1s. per square mile) per annum; and for the next sixteen years £30 15s. 0d. (1s. 6d. per square mile) per annum.

5, 6, 7
13, 14, 15

SIMPSON DESERT

SIMPSON DESERT

QUEE

Plan & Detail of Crown lands & reserves in this area, is requested.

MINUTES forming ENCLOSURE to.....No.....19

A

BK. 556
PURNIE
Macumba Pastoral Co. Pty Ltd

BK. 563

BK. 566

48
SIMPSON DESERT
CONSERVATION PARK

BK. 589

DESERT

BK. 564

BK. 567

BK. 572

BK. 575
BEAL HILL

BK. 580

PL 1530

BK. 591

BK. 59

BK. 565
SIMPSON DESERT

BK. 573

BK. 576

BK. 581

BK
Goyde

BK. 568

BK. 789
CUMBA

WILDANA
BK. 1216
Macumba Pastoral Co. Pty Ltd

MUNJUELLA HILL

BK. 577

BK. 582

GREAT AUSTRALIAN ARTESIAN BASIN

WANNIEBANGO HILL

ATTALMURRA HILL

Eldoravale Ck

Campdana Ck

Alkaowra Flood Flats

BK. 569

BK. 570

BK. 578

PL 5044
BK. 582A.

PL 2434
BK. 1200
Manarrinna
Macumba Pastoral Co. Pty Ltd.

YOULTANGUNNA HILL

Woodmurra Ck

PL 24[illegible]

PL 24[illegible]
MT GASON
BK. 1170
KOODNAMIE

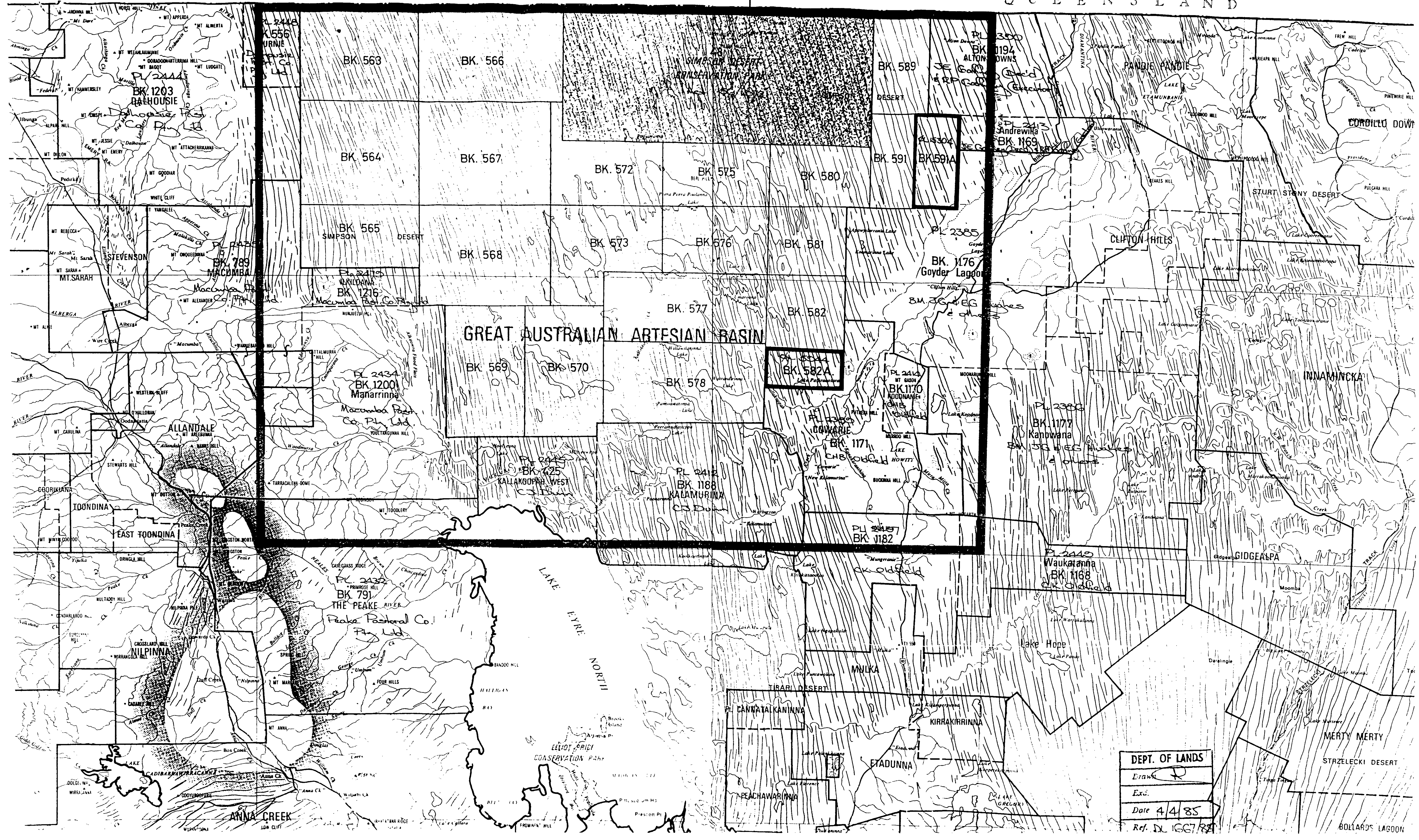
PUTHERA HILL

PL 2360
COWARIE
BK. 1171
CHB Oldfield

MARROO HILL

LAKE HOWITT

16/4/85.


QUEENSLAND
GREAT AUSTRALIAN ARTESIAN BASIN
BK. 563
BK. 566
BK. 564
BK. 567
BK. 565
SIMPSON DESERT
BK. 568
SIMPSON DESERT CONSERVATION PARK
BK. 572
BK. 573
BK. 575
BK. 576
BK. 577
BK. 578
BK. 580
BK. 581
BK. 582
BK. 582A
BK. 589
BK. 591
BK. 591A
BK. 569
BK. 570
PL 2300
BK. 0194
ALTON DOWNS
Andrewilla
BK. 1169
PL 2385
BK. 1176
Goyder Lagoon
PL 2434
BK. 1200
Manarrinna
Macumba Past. Co. Pty. Ltd.
BK. 1216
BK. 789
MACUMBA
PL 2441
BK. 1203
DALHOUSIE
BK. 556
BK. 425
KALLAKOOPAH WEST
C J Dunn
PL 2412
BK. 1188
KALAMURINA
C J Dunn
BK. 1171
COWARIE
CHB Oldfield
BK. 1170
KOODNANIE
BK. 1182
PL 2380
BK. 1177
Kanowana
PL 2440
Waukatanna
BK. 1168
CK Oldfield
PL 2432
BK. 791
THE PEAKE
Peake Pastoral Co. Pty. Ltd.
PANDIE PANDIE
CORDILLO DOWNS
STURT STONY DESERT
CLIFTON HILLS
INNAMINCKA
GIDGEALPA
Moomba
Lake Hope
MULKA
TIRARI DESERT
CANNATALKANINNA
KIRRAKIRRINNA
ETADUNNA
PEACHAWARINNA
MERTY MERTY
STRZELECKI DESERT
BOLLARDS LAGOON
ALLANDALE
TOONDINA
EAST TOONDINA
NILPINNA
ANNA CREEK
STEVENSON
MT.SARAH
LAKE EYRE NORTH
ELLIOT PRICE CONSERVATION PARK
DEPT. OF LANDS
Drawn
Exd.
Date 4/4/85
Ref. DL 1667/82

Date 11/11/1985 S.A. Land Information System 11 NOV 1985 Form 3
Enqy)TTI(Title Ref.)83()0500/0563(

Cost $2.50

TITLE REFERENCE: 83 0500/0563
STATUS: CURRENT
ESTATE: RESERVE
SALE DETAILS: DATE OF LAST SALE: 24/10/85 DOCUMENT NO.:
SALE PRICE: $0 SALE TYPE CODE: 6
AREA: CALC CODE: FRONTAGE:
EASEMENT STATUS/TYPE: NO EASEMENTS
VALUATION NO.: UNIT ENTITLEMENT:
LAND DESCRIPT: PLAN H 830500 HD OH(DALHOUSIE)
PARCEL: BLK 563 (OTHERS)
REGD PROPS: (1) THE CROWN

OWNER NO.: 9000065 2
ADDRESS: VICTORIA SQ ADELAIDE 5000
CONSTRAINTS:
UNRES.DOCS(INCOMPLETE): NONE
ENCUMBS(COMPLETE): NONE STOPPERS(COMPLETE): NONE
NOTES(COMPLETE): NONE
CONDITIONS: AUTHORITY DOCKET D.L. 1667/85
##DATA SHOWN HEREON IS NOT GUARANTEED BY THE SOUTH AUSTRALIAN GOVERNMENT## # END
TTE 83 0500/0563 (MORE CONSTRAINT DETAILS - PRESS 'F11' THEN 'XMIT')

Date 11/11/1985 S.A. Land Information System Form 3
Enqy)TTI(Title Ref.)83()0500/0563(

Cost $.00

TITLE REF: 83 0500/0563 STATUS: CURRENT

INCUMBRANCES(COMPLETE): NONE
STOPPERS (COMPLETE): NONE
NOTES (COMPLETE): NONE
CONDITIONS: AUTHORITY DOCKET D.L. 1667/85
LIMIT (SEE VALN. LAND USE CODE) 0932
RESERVE DEDICATED-GAZ 24/10/1985

##DATA SHOWN HEREON IS NOT GUARANTEED BY THE SOUTH AUSTRALIAN GOVERNMENT## # END
TTE 83 0500/0563 (MORE PLAN/ALLOTMENT DETAILS - PRESS 'F11' THEN 'XMIT')

Date 11/11/1985 S.A. Land Information System Form 3
Enqy)TTI(Title Ref.)83()0500/0563(

Cost $.00

TITLE REF: 83 0500/0563 STATUS: CURRENT
LAND DESCRIPTION - PLAN: H 830500 HUNDRED: OH(DALHOUSIE)

PARCELS: BLK 563
BLK 564
BLK 565

##DATA SHOWN HEREON IS NOT GUARANTEED BY THE SOUTH AUSTRALIAN GOVERNMENT## #CONT
TTE 83 0500/0563 004 (MORE PLAN/ALLOTMENT DETAILS - PRESS 'F11' THEN 'XMIT')

Date 11/11/1985 S.A. Land Information System Form 3
Enqy)TTI(Title Ref.)83()0500/0563(

Cost $.00

TITLE REF: 83 0500/0563 STATUS: CURRENT
LAND DESCRIPTION - PLAN: H 830600 HUNDRED: OH(POOLOWANNA)

PARCELS: BLK 563
BLK 564
BLK 565
BLK 566
BLK 567
BLK 568
BLK 572
BLK 573
BLK 575
BLK 576
BLK 577

##DATA SHOWN HEREON IS NOT GUARANTEED BY THE SOUTH AUSTRALIAN GOVERNMENT## #CONT
TTE 83 0500/0563 015 (MORE PLAN/ALLOTMENT DETAILS - PRESS 'F11' THEN 'XMIT')

Date 11/11/1985 S.A. Land Information System Form 3
Enqy)TTI(Title Ref.)83()0500/0563(

Cost $.00

TITLE REF: 83 0500/0563 STATUS: CURRENT
LAND DESCRIPTION - PLAN: H 830700 HUNDRED: OH(PANDIE PANDIE)

PARCELS: BLK 575
BLK 576
BLK 577
BLK 580
BLK 581
BLK 582
BLK 589
BLK 591

##DATA SHOWN HEREON IS NOT GUARANTEED BY THE SOUTH AUSTRALIAN GOVERNMENT## #CONT
TTE 83 0500/0563 023 (MORE PLAN/ALLOTMENT DETAILS - PRESS 'F11' THEN 'XMIT')

Date 11/11/1985 S.A. Land Information System Form 3
Enqy)TTI(Title Ref.)83()0500/0563(

Cost $.00

TITLE REF: 83 0500/0563 STATUS: CURRENT
LAND DESCRIPTION - PLAN: H 831400 HUNDRED: OH(NOOLYEANA)

PARCELS: BLK 568
BLK 569
BLK 570
BLK 573
BLK 577
BLK 578

##DATA SHOWN HEREON IS NOT GUARANTEED BY THE SOUTH AUSTRALIAN GOVERNMENT## #CONT
TTE 83 0500/0563 029 (MORE PLAN/ALLOTMENT DETAILS - PRESS 'F11' THEN 'XMIT')

Date 11/11/1985 S.A. Land Information System Form 3
Enqy)TTI(Title Ref.)83()0500/0563(

Cost $.00

TITLE REF: 83 0500/0563 STATUS: CURRENT
LAND DESCRIPTION - PLAN: H 831500 HUNDRED: OH(GASON)

PARCELS: BLK 577
BLK 578
BLK 582

##DATA SHOWN HEREON IS NOT GUARANTEED BY THE SOUTH AUSTRALIAN GOVERNMENT## # END

Department of Lands

SOUTH AUSTRALIA

SHOWING

LAND UTILIZATION

REFERENCE

- Pastoral : Cattle
- : Sheep
- Marginal
- Agriculture
- Horticulture
- Grazing/Pasture
- Intense Culture
- Forest
- National Park, Conservation Park etc.
- Isohyets in Millimetres (400)
- Goyder's Line
- Homestead
- Highway (81)
- Main Road
- Secondary Road
- Railway
- River or Creek
- Flood Plain
- Swamp
- Town or Locality
- Dog Fence
- Extent of Councils

Additional information : Cartography by Drafting Branch, Survey Division, Department of Lands, Adelaide

Simple Conic Projection

Standard Parallels 18°S and 28°S

May 1983

SCALE 1:2 000 000

KILOMETRES 20 0 20 40 60 80 100 120 140 160 180 KILOMETRES

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Base Map supplied by the Department of Mines and Energy, Adelaide

The Government of South Australia

J.H.