Koedoe 17: 2 – 37 (1974).

SURVEY TO DETERMINE THE ADEQUACY OF EXISTING CONSERVED AREAS IN RELATION TO VEGETATION TYPES. A PRELIMINARY REPORT.

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Abstract – The report is a broad survey of the conservation status of South African vegetation. Data and maps show the distribution and total areas of conserved lands by the various conservation agencies, the size structure of nature reserves, the areas and percentages of conserved areas in relation to the 70 veld types and seven main vegetation types into which South Africa was divided by Acocks (1953), and important conservation requirements in the Bantu Homelands.
Major conservation deficiencies lie in the Karoo and Karroid Bushveld and Grassland Types of vegetation, where 42 veld types have none or virtually no conservation, and in the Tropical Bush and Savanna Types to which belong nine of the 10 remaining veld types extremely lacking in conservation. Additional reserves are needed to conserve certain important and local ecosystems and species in the remaining 18 veld types, especially the Sclerophyllous Bush (Macchia or Fynbos) and Temperate and Transitional Forest and Scrub Types, and in certain Coastal Tropical Forest and Thornveld Types. Apart from minor deficiencies, the conservation status is outstanding for six of these 18 veld types (up to 47 per cent under conservation), and very good for another six veld types.

Introduction

To assess the conservation status of South African vegetation it has obviously been necessary to conduct surveys to determine which types and kinds of vegetation are represented in what may be considered permanently conserved areas, and from this basis proceed to establish those types and kinds of vegetation that require conservation.

Surveys of conserved areas in the Republic of South Africa were thus started during 1968 by staff of the Botanical Research Institute along the lines indicated by the International Biological Programme (Peterken 1967). Peterken noted that highly refined techniques for analysing field data are not necessary for the purposes of the IBP/CT surveys. However, to provide the necessary basis for comparing and co-ordinating plant community information without prejudicing unduly at the same time the rate at which the surveys could be carried out, it was decided that

vegetation sample plot data representative of the communities recognized, would have to be obtained. Since surveyors would in any event have to obtain a basic floristic knowledge of a reserve, this procedure would not unduly delay the rate at which the surveys could be carried out.

It may be noted that the time needed to acquire even a basic knowledge of the flora of a reserve is often considerable. A small reserve of 30 ha usually has several hundred angiosperm species and may have a range of communities comprising evergreen forest, grassland, scrub and savanna over a 200 m range in altitude. Surveyors have frequently commented upon the fact that even between geographically close areas, such as on the southwestern Cape mountains, they have had to learn virtually a completely new flora. From a conservation point of view, this illustrates also the dangers of assessing conservation status upon a too superficial viewpoint of the vegetation, such as may be provided by considering vegetation only in terms of physiognomic types and of the dominant species. It was anticipated that even though the survey of conserved areas at the community level would take longer than the allowed duration of IBP, it would provide information of more lasting and greater value to conservationists.

The present report presents a broad survey of the conservation status of South African vegetation. It shows major conservation deficiencies and indicates also a number of conservation priorities. Such priorities are determined by land use threatening the existence of a particular kind of vegetation that is either endemic, of very localized occurrence, or occurs only in a very limited amount in South Africa. The approach used has been to list all permanent conserved areas and relate them to the 70 main classes of vegetation into which the country has been classified and mapped by Acocks (1953).

1. *Conservation agencies*

In South Africa, the state Department of Forestry, the National Parks Board, and the four provincial government conservation agencies of the Cape Province (including Divisional Councils), Natal, Orange Free State and Transvaal, are responsible for nearly all conserved areas that may be considered reasonably permanent areas managed specifically for conservation. Minor conservation agencies include municipal authorities, private individuals and organizations, the Department of Bantu Affairs, the Department of Agricultural Technical Services, and the Department of Water Affairs.

The number of private individuals and organizations practising some form of nature conservation is considerable. In the Transvaal alone there are some 438 registered private nature reserves, which, with 20 municipal reserves, cover 1 163 355 ha. Permanent conservation of these reserves as a whole, however, is uncertain, and their actual conservation status depends upon the attitudes of the landowners towards a definite conservation management policy.

Conservation agencies responsible for permanent conservation areas are

thus almost entirely state and provincial governmental organizations. The acquisition, management and future permanency of conserved areas in South Africa thus depends at present almost entirely upon governmental support.

2. *Total area of permanently conserved lands and their distribution*

Official census data* indicate that nature reserves cover 2 959 000 ha, or 2,4 per cent of South Africa's total area of 122 111 000 ha. In addition to these conserved areas administered by national and provincial conservation authorities, the state Department of Forestry has jurisdiction over 1 258 512 ha of non-afforested land amounting to 1,0 per cent of the area of South Africa. These State Forest areas, that are mainly managed for the conservation of vegetation, soil and water resources, contribute one-third of the conservation area of South Africa.

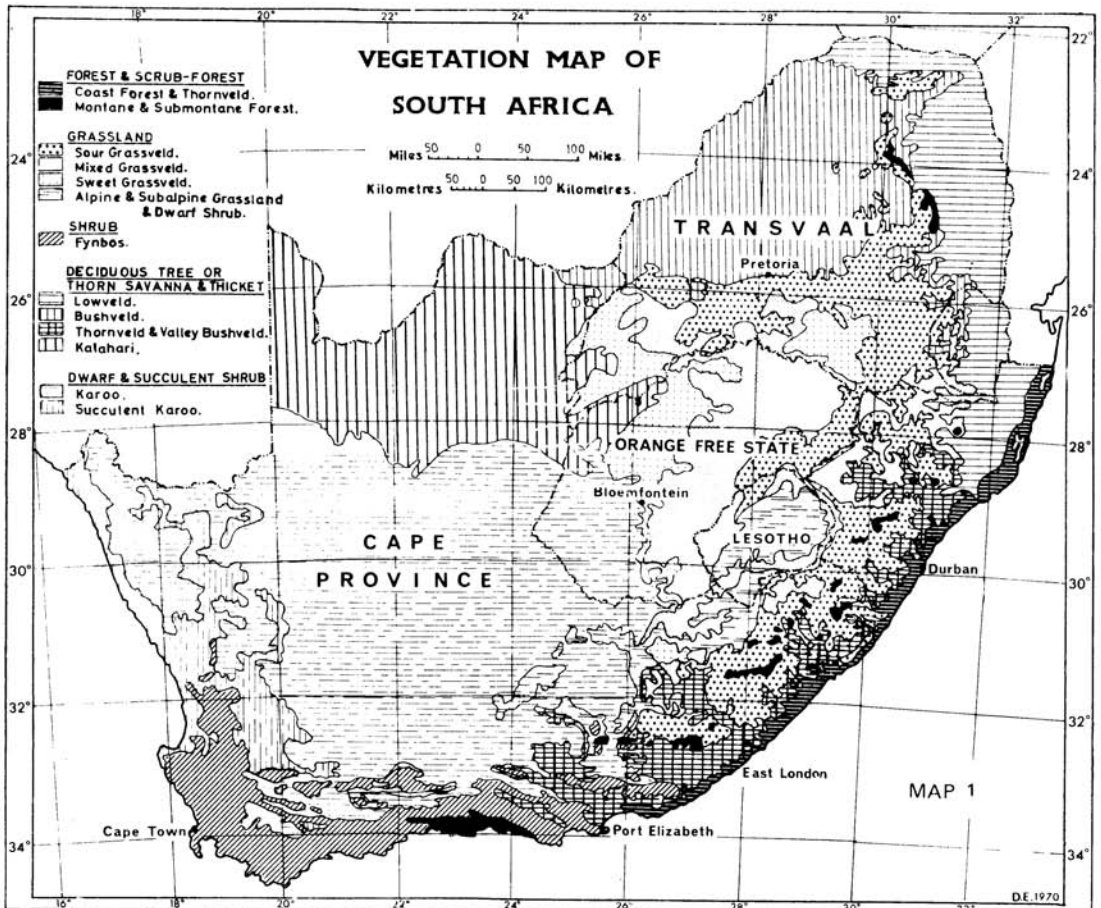
Both nature reserves and non-afforested State Forestry land thus cover 4 217 500 ha, or 3,4 per cent of South Africa. Of this total conserved area, however, the 2,3 million ha covered by two National Parks (the Kalahari Gemsbok National Park and the Kruger National Park) constitute more than half the total conserved area. This means that more than half the total conserved area in South Africa covers only that range of vegetation and habitat found in two reserves, covering 1,7 per cent of South Africa's surface, where the range of vegetation types is limited to eastern Lowveld and Kalahari dune types of vegetation (Maps 1 and 2).

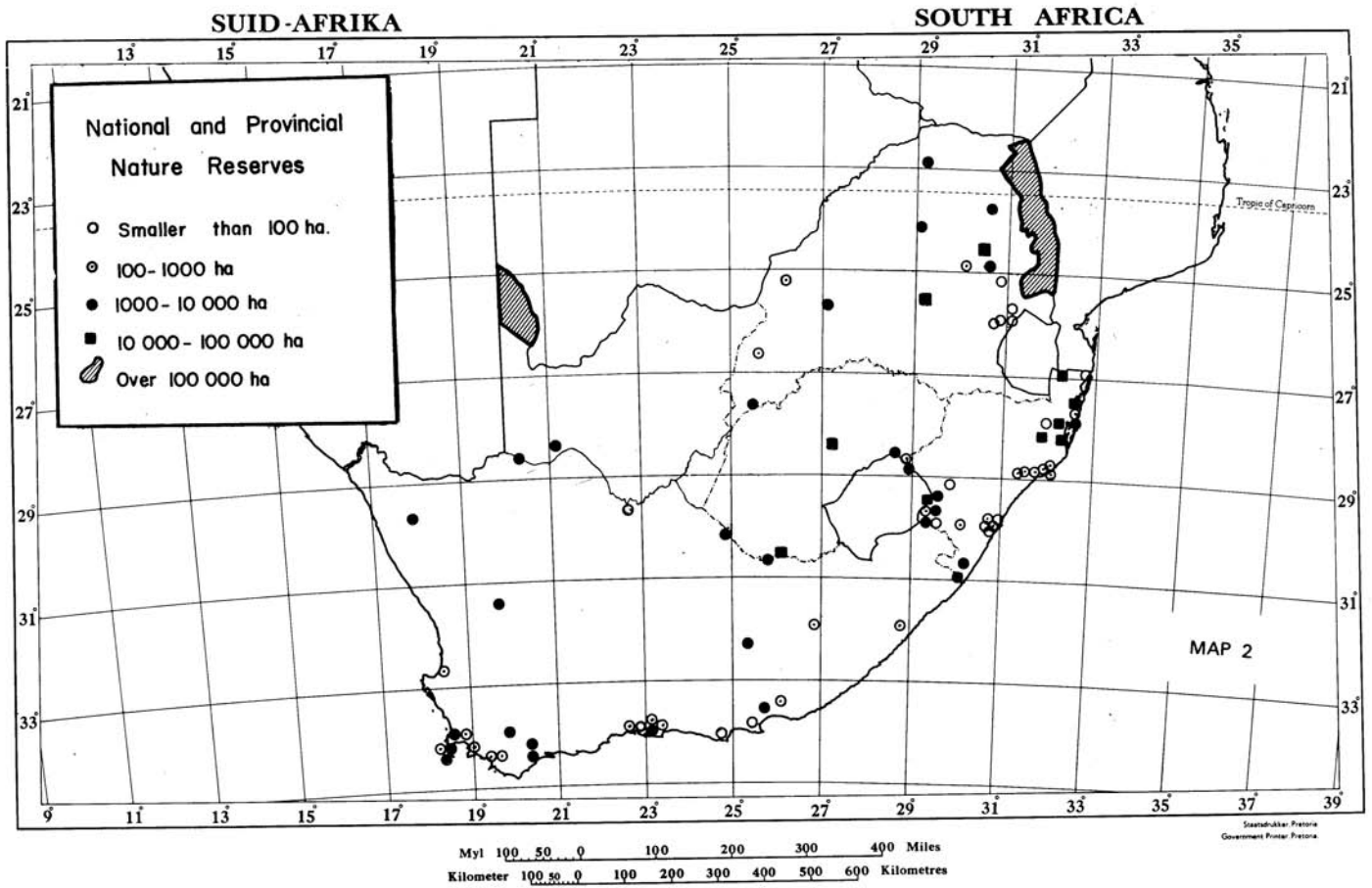
In view of the rapid expansion of urban areas and the population growth rate, attention may also be focussed on the fact that already urban areas are half (2 127 000 ha) the total conserved area. The area covered by urban living space can thus be expected within the near future to exceed that area presently covered by non-agricultural natural open land.

It may be noted that in this report the total area of nature reserves is more conservative than that given in the previous paragraphs, amounting to 2 696 993 (Table 1) as compared with the official area of 2 959 000 ha. The difference is due to a number of reserves having been rejected at this stage as incapable of being considered reasonably permanent areas managed specifically for conservation.

The distribution of nature reserves considered in this report is shown on Map 2, and of State Forest Reserves on Map 3. Apart from the large Kruger and Kalahari Gemsbok National Parks, these maps show the clustering of conserved areas (a) along the Natal, southern and southeastern Cape Province coast, and (b) along the mountainous areas of the southwestern, southern and southeastern Cape Province, the Natal and eastern Transvaal Drakensberg. There are relatively few nature reserves and no State Forest Reserves in the drier interior and western parts of the

* *Abstract of Agricultural Statistics. 1971. Div. Agric. Mark. Res., Dept. Agric. Econ. & Marketing.*


VEGETATION MAP OF
SOUTH AFRICA
FOREST & SCRUB-FOREST
Coast Forest & Thornveld.
Montane & Submontane Forest.
GRASSLAND
Sour Grassveld.
Mixed Grassveld.
Sweet Grassveld.
Alpine & Subalpine Grassland & Dwarf Shrub.
SHRUB
Fynbos.
DECIDUOUS TREE OR THORN SAVANNA & THICKET
Lowveld.
Bushveld.
Thornveld & Valley Bushveld.
Kalahari.
DWARF & SUCCULENT SHRUB
Karoo.
Succulent Karoo.
Miles 50 0 50 100 Miles
Kilometres 50 0 50 100 Kilometres.
TRANSVAAL
Pretoria
ORANGE FREE STATE
Bloemfontein
LESOTHO
CAPE
PROVINCE
Durban
East London
Port Elizabeth
Cape Town
MAP 1
D.E.1970


SUID-AFRIKA
SOUTH AFRICA
National and Provincial
Nature Reserves
Smaller than 100 ha.
100- 1000 ha
1000- 10 000 ha
10 000- 100 000 ha
Over 100 000 ha
Tropic of Capricorn
MAP 2
Staatsdrukker Pretoria
Government Printer Pretoria
Myl 100 50 0 100 200 300 400 Miles
Kilometer 100 50 0 100 200 300 400 500 600 Kilometres

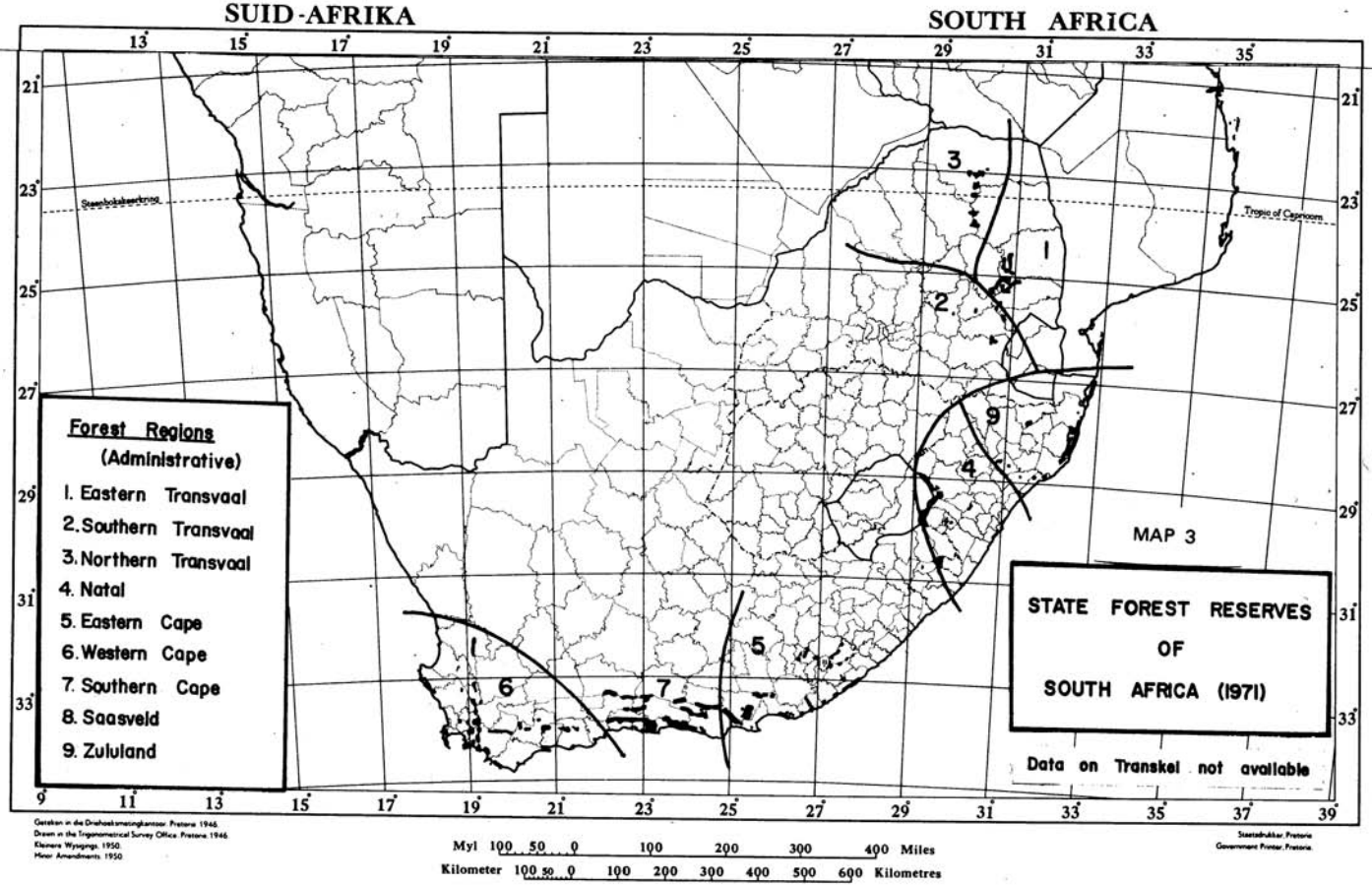

SUID-AFRIKA
SOUTH AFRICA
Steenbokskeerkring
Tropic of Capricorn
Forest Regions
(Administrative)
1. Eastern Transvaal
2. Southern Transvaal
3. Northern Transvaal
4. Natal
5. Eastern Cape
6. Western Cape
7. Southern Cape
8. Saasveld
9. Zululand
MAP 3
STATE FOREST RESERVES
OF
SOUTH AFRICA (1971)
Data on Transkei not available
Myl 100 50 0 100 200 300 400 Miles
Kilometer 100 50 0 100 200 300 400 500 600 Kilometres
Staatsdrukker, Pretoria
Government Printer, Pretoria

Table 1

List of reserves shown on Map 2

Cape Province	*Name of Reserve*	*Veld Type No.*	*Area (ha)*
2520, 2620*	Kalahari Gemsbok National Park	16	958 657
2820 CB	Augrabies Falls National Park	32	3 708
2821 AC	Spitskop Nature Reserve (Upington)	16	1 130
2917 DB	Hester Malan Wild Flower Reserve	33	5 200
2922 DA, DB	**Prieska Nature Reserve	32	24
3024 BB	Rolfontein Provincial Nature Reserve	36	5 200
3025 DB	Oviston Provincial Nature Reserve	36	2 580
3119 BC, BD	Akkerendam Nature Reserve (Calvinia)	39	2 300
3126 DD	Madeira Nature Reserve (Queenstown)	50	856
3128 DB	N'dule Nature Reserve	44	162
3218 CB	Rocher Pan Provincial Nature Reserve	34	390
3225 AB, AD	Mountain Zebra National Park	37	6 533
3318 CD	Table Mountain Nature Reserve	69	2 900
3318 DD	**Andries Venter Research Station	69	146
3319 DD	Vrolijkheid Provincial Nature Reserve	26	2 570
3422 BB	Goukamma Provincial Nature Reserve	46	1 720
3322 DC	The Lake Nature Conservation Station	46	411
3323 CD	Keurbooms Recreational Resort	4	556

**The figures 2520 refer to the co-ordinates of latitude (25°S) and longitude (20°E) at the northwest or top left hand corner of every degree square of latitude and longitude. The letters as in 2820 CB refer to successive quarters (C) of the one degree square, and to successive quarters (B) of the half degree square.*

***Reserves less than 100 ha whose future viability is doubtful, due to their smallness.*

Table 1 *(continued)*

3325 BC, BD, DA,DB	Addo Elephant National Park	23	7 515
3325 DC	**Settlers Park Nature Reserve	2	54
3326 AC	Thomas Baines Nature Reserve	7	243
3418 AB	The Rondevlei Bird Sanctuary	47	101
3418 AB	Silvermine Nature Reserve	69	2 020
3418 AD	Cape of Good Hope Nature Reserve	69	7 965
3418 BB	The Helderberg Nature Reserve	69	245
3419 AD,	Fernkloof Nature Reserve	47	171
3419 BC	The Salmons Dam Nature Reserve	69	633
3420 AB	Bontebok National Park	46	2 784
3420 AD	De Hoop Provincial Nature Reserve	47	5 150
3423 AA,AB	Tsitsikama Forest and Coastal National Park	4	2 589
3423 AB	The Robbeberg Nature Reserve	4	171
3424 BB	**Seekoei River Provincial Nature Reserve	70	57
	Total:		1 024 741,0
Natal			
2632 CC, CD	Ndumu Game Reserve	10	10 116
2632 DD	Kosi Bay Nature Reserve	1	20
2732 BC, BD, CD, DC	St. Lucia Game Reserve	1	36 863
2732 CA, CB, CC	Mkuzi Game Reserve	10	25 091
2732 CC	Hluhluwe Game Reserve	6	4 620
		10	18 450
2732 CD	False Bay Park	1	2 248
2732 DA	Sordwana Bay National Park	1	411
2828 DB	Rugged Glen Nature Reserve	44	380
2828 DB, DD	Royal Natal National Park	44	6 070
		58	670
		65	1 350
2831 BB	Umfolozi Game Reserve	6	11 930
		10	35 820
2831 CD	Dhlinza Forest Nature Reserve	5	168
2831 CD	Entumeni Nature Reserve	5	393
2831 DC, DD	Umlalazi Nature Reserve	1	906
2831 DD	Richards Bay Game Reserve	1	810
2831 DD	Enseleni Nature Reserve	1	292
2832 AD	St. Lucia Park	1	12 545
2832 CC	Richards Bay Park	1	393

Table 1 *(continued)*

2929 AB, AD, BA, BC	Giants Castle Reserve and Park	44 58	13 520 13 520
2929 BB	Harold Johnston Nature Reserve	65	88
2929 BC	Kamberg Nature Reserve	44	2 229
2929 CB	Vergelegen Nature Reserve	44	587
2929 CD	Coleford Nature Reserve	44	1 271
2929 CD,DC	Himeville Nature Reserve	44	49
2929 DA	Loteni Nature Reserve	44	4 006
2930 CC	Soado Forest Nature Reserve	23	497
2930 DB, DD	Krantzkloof Nature Reserve	5	455
2930 DD	Moor Park Nature Reserve	1	264
2930 DD	Stainbank Nature Reserve	1	80
2930 DD	North Park Nature Reserve	1	25
2930 DD	Paradise Valley Nature Reserve	1	19
3030 CA, CB	Oribi Gorge Nature Reserve	23	1 781
3030 CC. 3130. AA	Umtamvuma Nature Reserve	13	±3 000
	Total:		210 937,0
Transvaal			
2229 CC, CD	Langjan Nature Reserve	14	1 674
2230-2530	Kruger National Park	9	64 842
		10	416 036
		11	337 730
		15	532 000
		18	9 500
2330 DA, DC	Hans Merensky Nature Reserve	11	5 181
2429 AA	Percy Fyfe Nature Reserve	19	2 938
2430 BC, BD, DA, DB, DD	Blyderivierspoort Nature Reserve	8	12 240
		11	7 400
		18	9 500
		19	2 670
2430 CC	Berghoek Nature Reserve	18	707
2430 DC	Ohrigstad Dam Nature Reserve	8	2 562
2527 CA	Rustenburg Nature Reserve	20	2 896
2529 AC,AD, CA,CB	Loskop Dam Nature Reserve	18	10 729
2530 BB	**Vertroosting Nature Reserve	9	27
2530 DD	**Thorncroft Nature Reserve	8	16
2530 DD	**Cythna Letty Nature Reserve	8	6
2531 CA	**Tinie Louw Nature Reserve	9	10
2531 CC	**Ida Döyer Nature Reserve	8	31
2625 DA	Barberspan Nature Reserve	50	447
2725 CB, DA	S.A. Lombard Nature Reserve	50	3 659
	Total:		1 422 801,0

Table 1 *(continued)*

O.F.S.			
2827 AC, AD	Willem Pretorius Game Reserve	49	11 134
2828 BC, DA	Golden Gate Highlands National Park	44 56	3 300 1 100
3026 AC, CA	Tussen-die-Riviere Nature Reserve	36	± 23 000
	Total:		38 534,0
	Grand Total:		2 696 993,0

country. From the unequal spread of conserved areas over the country it may be expected that certain vegetation types are reasonably well conserved whereas others are not, or poorly, represented by conservation areas. This is borne out by the more detailed analyses of the conservation status of different vegetation types in later sections of this report.

It may, however, be concluded here that a more equable and wider spread of conservation areas throughout the country is, in the future siting of conservation areas, needed to provide a more adequate coverage of the various ecological and plant geographical variations found in South Africa.

Nature reserves regarded as permanently conserved areas are distributed according to provinces as follows:- 1 024 741 ha, or 1,4 per cent of the Cape Province; 210 937 ha, or 2,3 per cent of Natal; 38 534 ha, or 0,3 per cent of the Orange Free State; and 1 422 801 ha, or 4,9 per cent of the Transvaal. On the basis of the relative proportion of their total area that is conserved by nature reserves, and not taking into account conservation status according to the degree of vegetation diversity present in a province, the Transvaal is the best conserved province and the Orange Free State is the least well served at present. However, Natal has the greatest density, or number of reserves relative to its area, followed by the Transvaal, Cape Province and Orange Free State. Although the number of reserves and area under conservation in the Orange Free State is excessively low, this province has the least diversity and range of vegetation of any of the provinces.

3. *Size structure of nature reserves*

Table 2 shows the distribution of 83 nature reserves of the National Parks Board and provincial conservation agencies according to size classes.

Nearly half the reserves are less than 1 000 ha in area and 84 per cent are less than 10 000 ha in size. Although the high percentage of small reserves suggests an endeavour to satisfy important local conservation requirements, this is probably only partially true. The low percentage, 15 per cent of reserves over 10 000 ha in area, seems to confirm that conservationists have considerable difficulty in acquiring the larger reserves. The lack of

Table 2
Distribution of nature reserves in size classes (excluding State Forest Reserves)

Province	< 100 ha	100-1 000 ha	1 000-10 000 ha	10 000-100 000 ha	100 000 ha	Total Province	% Province
Cape Province	3	12	16	–	1	32	39
Transvaal	5	2	6	2	1	16	19
Natal	6	12	7	7	–	32	39
Orange Free State	–	–	1	2	–	3	4
Total South Africa	14	26	30	11	2	83	
South Africa %	17	31	36	13	2		

large reserves in the conservation structure is striking for, as will later be shown, the least agriculturally valuable arid areas have virtually no conservation.

An adequate size of reserve is necessary for two basic reasons, ecological and genetic. While small reserves are important and necessary to conserve important local ecosystems and species, the small number of large reserves (13 over 10 000 ha) is considered to be a weakness in the present conservation structure, since in South Africa we have a large range of ecological types and a considerable genetic diversity associated with some 18 000 angiosperm species alone. Small reserves are highly susceptible to surrounding land use pressures that threaten their permanency, and to surrounding environmental changes that threaten the existence of the ecosystems being conserved. An example of this is the small Cape Flats reserve for the protection of *Isoetes*, whose future is extremely doubtful because of the surrounding drainage for housing development. Another larger example is the St Lucia Lake System where, especially during drought years, water inflows vital to the lake and swamp ecosystems have been radically reduced by agricultural and other land use which controls water supplied by the catchment. The fact that heavy rains and "normal" seasons may restore the original salinities does not necessarily imply that the biological situation is so readily restored, nor that a fluctuating aquatic regime is the same as that which gave rise to the original ecosystems that were the object of conservation.

Apart from the inherently lower long-term potential for stability of small ecosystems protected in small reserves, owing to the high ratio of the normally vulnerable margin to total area of the ecosystem, small reserves are only suited to the simplest forms of control and management. Increasing visitor-needs also can only be balanced with difficulty against conservation requirements.

Frankel (1971) has pointed out that "Wild species, like all living beings, require adequate, and often large gene pools for adaptation to

environmental variation and change, which is a condition for continuing existence; in practice this means an appropriate *size and diversity of nature reserves.* Principles of population genetics and dynamics are often disregarded in planning nature reserves". He concluded (Frankel 1970): "Wild species can only be preserved in the context of communities within their natural habitats, botanical or zoological gardens with semi-natural conditions providing only for the relatively short-term survival of wild species as wild plants and animals in captivity are deprived of the necessary range of variation which a breeder would provide under full domestication. The size of a reserve determines whether the estimated minimum viable population size is present for the various species in the reserve. To maintain adequate variation at the allelic level in natural populations a minimum population size is of the order of thousands rather than hundreds. Reserve size is also important as large reserves provide for migration and gene flow between populations unrestricted by the spatial isolation found in small reserves, and thus of a long-term adaptive advantage for potentially interbreeding populations in large reserves. Genetic and evolutionary considerations thus strongly reinforce ecological requirements for a series of adequate size".

It is recommended that wherever possible and as soon as possible the present size structure of South African reserves be changed in favour of the larger reserves, by enlargement of existing reserves wherever possible and by the creation of large new reserves.

4. *Conserved areas in relation to veld types and main vegetation types*

South Africa has been classified and well mapped at a scale of 1: 1 500 000 into 70 Veld Types, averaging nearly 1,7 million ha each in area, and seven main vegetation types by Acocks (1953). This provides a basis for a broad survey of the conservation status of the vegetation. Map 1 is a simplified vegetation map based on these veld types. The concept of the veld type first requires some comment in relation to the survey.

4.1 *The veld type as a basis for assessing conservation status*

As defined by Acocks (1953), the veld type is a unique South African vegetation class concept with a strong utilitarian purpose, but which is based upon fundamental ecological considerations. It is defined by Acocks, not very aptly but with an agricultural purpose in mind, as "a unit of vegetation whose range of variation is small enough to permit the whole of it to have the same farming potentialities", and "the concept of the Veld Type as adopted can allow quite a wide botanical variation . . . but being a vegetation unit, this variation is limited to variation in the relative importance of members of a group of species occurring all through its area. When the species change, a new Veld Type must be established".

The veld type is based upon a large number of actual samples of vegetation in which all the species are recorded with estimates of their

density. Since the samples are large, several ha in size, and emphasis is placed upon floristic composition, the veld type provides a floristically defined vegetation class at an extensive landscape level, which may include a number of physiognomic types. Since floristic composition is related to physiognomy and reflects habitat, the veld type may be considered as encompassing a recurrent pattern of ecosytems whose overall floristic composition constitutes the definition of the veld type.

In a national assessment of the conservation status of the vegetation, the area of a veld type that is conserved thus indicates the extent to which the particular ecosystems that constitute that veld type, and which are typical of different parts of the country, are conserved. It does not, however, necessarily indicate which particular ecosystems are conserved within the broad class "veld type", for these ecosystems occurring in the conserved areas are the object of more detailed studies, as for the Check Sheet survey. A number of specific ecosystems requiring conservation are considered later in this report.

Because a veld type is a relatively broad class of vegetation embracing a number of ecosystems, it must obviously be borne in mind when locating new reserves in a veld type that these will cover one or more specific ecosystems. Either a very large area or a number of reserves are required to conserve the range of ecosystems found in a veld type. No reserves in a veld type means that no ecosystems and vegetation of a major distinctive kind are being conserved.

4.2 *Veld types conserved by National Parks, provincial game and nature reserves*

The area of each veld type conserved by National Parks, provincial game and nature reserves is shown in Table 3 (see also Map 2).

Half, or 35 of the 70 veld types have no National Park or provincial nature reserve, and a further 20 veld types have only one or two reserves. Two veld types, Coastal Tropical Forest and Thornveld and Highland Sourveld have, respectively, 14 and 10 reserves each (Table 1), but these reserves are so small as to cover only 2,7 per cent and 0,8 per cent of the areas of the veld types (Table 3) and are almost entirely limited to one of the two provinces in which these veld types occur.

On the basis of the percentage of each veld type that is conserved, outstandingly well conserved veld types are those covered by the Kruger National Park – the Lowveld with 27 per cent of its area conserved, Mopani Veld (26 per cent) and Arid Lowveld (20 per cent). Moderately well conserved veld types, with between 5 per cent and 7 per cent of their area under conservation by National Parks and provincial nature reserves, are the Kalahari Thornveld, Lowveld Sour Bushveld and Zululand Thornveld. Conservation of the Kalahari Thornveld is actually far less satisfactory than it appears. This is a large heterogeneous veld type in which the one large reserve present covers only the Kalahari dune variation, whereas the extensive shrub variations to the south that grade from Kalahari to Karoo are represented by one reserve of 1 130 ha at

Upington. A further four veld types, Coastal Tropical Forest and Thornveld, Pondoland Coastal Plateau Sourveld, Northeastern Mountain Sourveld and *Themeda-Festuca* Alpine Veld, have between 1 per cent and 3 per cent of their areas conserved. The distribution of reserves in these veld types is such that there are serious omissions in the conservation of the various components of the veld types. The remaining 60 veld types have less than 1 per cent or no areas conserved by National Parks and provincial nature reserves.

Because there are only 10 out of 70 veld types for which 38 National Parks and provincial nature reserves conserve more than 1 per cent of the area of the veld type, to adequately conserve the range of vegetation found in South Africa both the number and size of National Parks and provincial nature reserves needs to be very greatly increased. The acquisition of new and large reserves by these agencies is a matter of considerable urgency if they are to play their proper role in providing adequate conservation of the large number of veld types that are at present inadequately conserved.

4.3 *Veld types conserved in unafforested areas of State Forest Reserves*

The area of each veld type conserved in unafforested areas of the State Forest Reserves is shown in Table 3 and the distribution of these reserves by Map 3.

While management of the unafforested portions of the State Forest Reserves is primarily for the conservation of vegetation, soil and water resources, the areas shown in Table 3 actually represent an over-estimate of conserved land. These unafforested areas include also residential areas, roads, firebreaks and other non-natural areas required for management and utilization of the afforested parts. Because of the major contribution of the State Forest Reserves to conservation in South Africa, these data are included even though they represent somewhat of an over-estimate. It should also be noted that data for the Transkei have not been included in Table 3 and Maps 2 and 3.

There are 50 veld types not covered by unafforested State Forest Reserves, but the fact that only 20 veld types occur in State Forest Reserves is not unexpected as these areas were originally demarcated for potential afforestation and the protection of water catchments and vegetation in the higher rainfall areas. Three veld types are conserved in State Forest Reserves but not by National Park and provincial conservation agencies, so that the chief contribution of the State Forest Reserves is to the conservation of 17 veld types that are also represented in National Parks and provincial reserves. In view of the large area of unafforested state land involved (see section 2), the contribution of the State Forest Reserves to the conservation of a number of these 17 veld types is a considerable one.

On the basis of the percentage of each veld type that is conserved, the conservation by the State Forestry Department of 47 per cent of the area