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On the status and distribution of ungulate mammals in the Cape Province, South Africa

Introduction

The present status and distribution of ungulate mammals—and indeed of practically all other members of the class—in South Africa is imperfectly known. The broad zoogeographical outlines have long been established (Sclater and Sclater, 1899), but precise detailed information is still lacking, particularly for the huge land area, most of it farmed, lying outside the National Parks and Game Reserves.

In the most recent works of reference, Roberts (1951) and Ellerman *et al.* (1953), as much detail as was available to the authors is included. But for the Republic of South Africa there is no work comparable in scope with that of Shortridge (1934) on South West Africa except Sclater (1900), which is still useful but in many ways out-of-date. Kettlitz (1955) has published a valuable account of some Transvaal game animals and recent papers dealing with South West Africa (Bigalke, 1958), Southern Rhodesia (Fraser, 1958) and Northern Rhodesia (Grimwood *et al.*, 1958 and Ansell, 1960) are available. That of Knobel (1958) on the Union (now Republic) of South Africa gives little information on land outside Parks and Reserves and is in some respects misleading.

Narrowing the field down to the Cape Province, there is only the early work of Hewitt (1931) and the short but interesting paper by Rand (1955). The work reported in the present preliminary paper represents an attempt to remedy the deficiency for a part of this Province. Further papers are planned, some of which will also deal with groups other than ungulates.

Methods

The idea of a questionnaire survey was that of C. J. Skead, who put it into operation whilst Director of the Kaffrarian Museum. Essentially it was devised as a method of collecting facts about the status of "game" and "vermin" upon which rational conservation and control measures could be based. On his arrival at King William's Town one of us (J.A.B.) took over this work with a view to covering all farms in the eastern Cape region. The other took up the study for the northern Cape from the McGregor Museum. The aim of surveying the entire Province has not yet been realised, but 55 of the 96 administrative units under the control of Divisional Councils have now been dealt with and the results form the basis of this paper.

The survey investigated a number of larger mammals of which only the ungulates will be considered here. For practical convenience two groups were created, viz.

Ann. Cape Prov. Mus. II. 1962. South Africa.

(A) Those large, obvious and well-known "game" antelope the numbers of which a farmer could reasonably be asked to estimate and which we expected to be present in our respective areas. From a conservationist's point of view the status of these forms is of particular interest.

(B) Other species, equally well-known to the farmer, the habits or habitats of which make the estimation of population almost impossible.

For (A) the farmer was asked to estimate the number of each species on his property, while for (B) he was merely requested to state whether or not each was present. Table 1 shows the species which comprised these groups.

TABLE 1.

UNGULATES LISTED ON THE QUESTIONNAIRES

GROUP A (Numbers asked for).		
Oribi	*Ourebia ourebi*	(King)
Klipspringer	*Oreotragus oreotragus*	(Both)
Vaal Ribbok	*Pelea capreolus*	(Both)
Rooi Ribbok	*Redunca fulvorufula*	(Both)
Springbok	*Antidorcas marsupialis*	(Both)
Blesbok	*Damaliscus dorcas phillipsi*	(Both)
Hartebeest	*Alcelaphus buselaphus*	(McG)
Black Wildebeest	*Connochaetes gnou*	(McG)
GROUP B (Presence or absence asked for).		
Aardvark	*Orycteropus afer*	(Both)
Dassie	*Procavia capensis*	(Both)
Tree Dassie	*Dendrohyrax arboreus*	(King)
Bush Pig	*Potamochoerus porcus*	(King)
Blue Duiker	*Cephalopus monticola*	(King)
Duiker	*Sylvicapra grimmia*	(Both)
Steenbok	*Raphicerus campestris*	(Both)
Grysbok	*Raphicerus melanotis*	(King)
Bushbuck	*Tragelaphus scriptus*	(King)
Kudu	*Tragelaphus (Strepsiceros) strepsiceros*	(Both)

The nomenclature is that of Ellerman *et al* (1953).

Key to third column:
King: Kaffrarian Museum questionnaires only.
McG McGregor Museum questionnaires only.
Both: on both questionnaires.

From the table it will be seen that a number of Cape ungulates were not listed. These were species known to be extinct or thought to be restricted to National Parks and Reserves. In most of the Kaffrarian Museum questionnaires and in all those sent from the McGregor Museum, farmers were asked to mention antelopes not listed on the forms. This resulted in some quite unexpected species being recorded, most of them introduced by interested farmers. An additional section of the questionnaire sought information on lambing (kidding) seasons in antelope. This will not be discussed here.

Results were calculated as follows. For all animals in each Division the ratio of the number of returns recording the species as present to the total number of completed questionnaires received was expressed as a percentage. Thus in the Aberdeen Division, of 36 completed questionnaires received, 25 reported the presence of Duiker. Evaluated as a percentage, this gives the figure 69·5 (Table 3). We have called this the "percentage occurrence". In addition, for animals in group (A), the farmers' numerical estimates were summed for each Division.

RESULTS

The data obtained from the questionnaires is summarised in Tables 2 and 3.

TABLE 2.
PERCENTAGE OCCURRENCE (*) OF CERTAIN UNGULATES IN 55 DIVISIONS OF THE PROVINCE OF THE CAPE OF GOOD HOPE, SOUTH AFRICA

Division	Aardvark	Dassie	Tree Dassie	Mt. Zebra	Bush Pig	Warthog
Aberdeen	94·5	83·4	13·9	—	—	—
Adelaide	—	84·5	39·6	1·7	31·1	—
Albany	67·5	82·0	24·8	—	50·4	—
Alexandria	59·5	40·5	57·2	—	64·3	—
Aliwal North	82·4	98·6	6·8	—	—	—
Barkly East	—	98·0	—	—	—	—
Barkly West	51·9	10·1	—	—	—	—
Bathurst	55·0	65·0	70·5	—	42·9	—
Bedford	—	82·4	33·4	—	31·4	—
Britstown	96·2	92·3	—	—	—	—
Burgersdorp	82·9	75·6	2·4	—	—	—
Cathcart	80·4	91·5	5·6	—	8·5	—
Colesburg	94·5	96·4	9·1	—	—	—
Cradock	91·3	83·7	4·4	1·9	1·9	—
De Aar	97·1	94·1	—	—	—	—
Dordrecht	50·0	90·0	4·0	—	—	—
East London	87·1	51·5	29·0	—	3·1	—
Elliott	5·6	97·1	12·5	—	—	—
Fort Beaufort	—	83·3	23·4	—	50·0	—
Gordonia	77·6	40·8	—	—	—	—
Graaff Reinet	96·3	94·4	6·6	—	4·7	—
Hanover	91·9	95·9	—	—	—	—
Hay	64·1	61·5	—	—	—	—
Herbert	67·3	52·2	—	—	—	—
Herschel	25·0	100·0	—	—	—	—
Hofmeyr	83·4	80·5	5·5	—	—	—
Hopetown	95·6	71·1	—	—	—	—
Humansdorp	57·8	77·8	6·7	—	25·5	—
Jansenville	89·1	86·5	16·2	—	10·8	—
Kimberley	62·1	37·1	—	—	—	—
King William's Town	85·8	71·5	53·6	—	†	—
Komga	96·1	73·0	73·0	—	9·6	—
Kuruman	91·7	15·7	—	—	—	—
Lady Grey	60·0	100·0	3·3	—	—	—
Maclear	27·1	95·9	6·2	—	—	—
Middelburg	95·5	93·3	5·6	—	—	—
Molteno	89·4	95·9	—	—	—	—
Pearston	100·0	90·0	10·0	—	25·0	—
Peddie	66·6	60·6	9·1	—	18·2	—
Philipstown	97·6	95·1	—	—	—	—
Port Elizabeth	33·3	33·3	22·2	—	100·0	—
Postmasburg	77·1	48·6	—	—	—	—
Queenstown	78·3	90·4	1·2	—	1·2	—
Somerset East	68·4	88·4	8·4	—	25·2	—
Sterkstroom	87·5	92·5	—	—	—	—
Steynsberg	85·5	83·5	—	—	—	—
Steytlerville	91·6	87·5	12·5	—	20·8	—
Stutterheim	80·0	75·5	24·4	—	17·8	—
Tarkastad	86·4	88·1	3·4	—	—	—
Uitenhage	74·4	58·9	33·3	—	84·5	—
Uniondale	45·1	93·5	6·4	—	12·9	—
Venterstad	77·8	83·4	—	—	—	—
Victoria East	74·0	52·2	17·8	—	47·8	—
Vryburg	71·0	0·6	—	—	1·2	0·6
Willowmore	81·1	70·7	3·4	—	—	—

* see text for explanation
† King William's Town division has Bush Pig although the survey produced no records

TABLE 2 (contd.i)

Division	Blue Duiker	Duiker	Steen-bok	Grys-bok	Oribi	Klip-springer	Vaal Ribbok	Rooi Ribbok
AB	—	69·5	97·3	2·8	—	11·1	11·1	19·4
AD	25·8	93·1	58·6	5·2	—	1·7	25·8	39·6
ALB	34·9	93·0	51·9	49·6	3·1	—	3·1	10·1
AL	45·0	81·0	21·0	73·8	11·9	—	2·7	4·8
A.N.	1·4	1·4	27·0	4·1	1·4	—	45·9	33·8
B.E.	—	—	4·1	38·8	—	—	69·4	75·5
B.W.	—	96·2	91·1	—	—	—	1·3	—
BAT	57·0	100·0	25·0	35·0	35·0	—	—	—
BED	17·6	90·2	82·4	15·7	—	—	45·1	72·5
BRI	—	11·5	100·0	—	—	7·7	—	—
BUR	—	—	46·4	—	—	—	29·2	46·3
CAT	2·8	23·9	9·8	2·8	—	—	28·2	21·1
COL	—	16·3	83·6	—	—	1·8	38·2	51·0
CRAD	1·9	54·4	81·5	1·9	—	13·1	33·7	41·3
D.A.	—	8·8	88·2	—	—	14·7	26·5	5·9
DORD	—	—	2·0	16·0	—	—	50·0	26·0
E.L.	67·7	80·6	12·9	12·9	—	—	—	3·1
ELL	—	2·8	5·6	11·2	—	—	5·6	5·6
F.B.	6·7	76·6	26·6	12·0	—	—	20·0	10·0
GOR	—	61·2	93·9	—	—	20·4	—	—
G.R.	0·9	57·0	86·0	3·7	—	39·2	36·4	42·1
HAN	—	—	89·9	—	—	2·0	14·3	4·1
HAY	—	74·4	97·4	—	—	5·1	—	—
HBT	—	52·2	95·6	—	—	1·8	7·9	2·7
HER	—	50·0	25·0	75·0	—	25·0	25·0	—
HOF	—	19·4	88·9	—	—	16·8	13·9	30·6
HOP	—	40·0	100·0	—	—	2·2	13·3	4·4
HUM	55·5	79·0	32·1	86·6	5·5	21·1	32·2	22·1
JAN	2·7	78·4	83·8	27·1	2·7	5·4	—	—
KIM	—	90·3	95·2	—	—	—	11·3	4·8
KWT	75·0	82·1	10·7	17·8	—	—	—	3·6
KOM	88·5	94·2	13·5	34·6	—	—	7·7	7·7
KUR	—	99·1	100·0	—	—	2·8	5·6	0·9
L.G.	—	—	3·3	13·6	3·3	—	36·7	50·0
MAC	—	—	—	2·8	2·8	—	10·4	8·3
MID	—	31·4	85·4	—	—	19·1	50·5	37·1
MOL	—	2·1	21·6	—	—	2·1	53·2	36·2
PEA	—	85·0	100·0	20·0	—	30·0	5·0	5·0
PED	48·5	94·0	51·5	27·3	—	3·2	3·3	3·3
PHIL	—	4·9	90·2	—	—	—	12·2	—
P.E.	66·7	89·0	33·3	77·9	—	—	—	—
POS	—	93·3	95·2	—	—	18·1	7·6	1·9
Q	1·2	32·5	37·4	—	—	1·2	32·5	54·2
S.E.	7·6	87·4	98·5	27·4	—	14·7	18·9	23·1
STE	—	5·0	20·0	—	—	—	47·5	50·0
STEY	—	5·8	69·9	—	—	7·8	38·8	64·1
ST	4·2	79·2	87·5	58·4	—	62·5	12·5	20·8
STUT	20·0	75·5	8·9	—	—	—	—	22·2
TARK	—	8·5	61·0	—	—	10·2	44·1	76·2
UIT	25·6	100·0	28·2	82·0	—	15·4	7·7	17·9
UN	6·4	90·4	51·6	93·5	—	77·5	83·9	6·4
VEN	—	5·5	77·8	—	—	—	44·4	61·1
V.E.	17·4	82·5	60·9	26·1	—	—	—	—
VRY	—	93·8	96·3	—	—	—	—	—
WILL	1·7	60·3	82·7	10·3	—	31·1	15·5	17·2

TABLE 2 (contd. ii)

Division	Springbok	Gemsbok	Blesbok	Hartebeest	Bl. Wildebeest	Bushbuck	Kudu	Eland
AB	86·1	—	19·4	—	—	—	63·9	—
AD	36·4	—	20·7	—	—	63·8	34·4	—
ALB	8·5	—	4·7	—	—	70·5	39·8	—
AL	4·8	—	—	—	—	78·5	—	—
A.N.	6·8	—	9·5	—	—	—	—	—
B.E.	—	—	6·1	—	—	—	—	—
B.W.	11·4	—	3·8	2·5	—	—	31·6	1·3
BAT	—	—	—	—	—	83·2	—	—
BED	74·5	—	25·4	—	1·9	52·9	21·3	—
BRI	69·2	—	7·7	—	—	—	—	—
BUR	58·6	—	41·5	—	—	—	—	—
CAT	9·8	—	25·1	—	—	4·2	—	—
COL	72·8	—	18·2	—	—	—	—	—
CRAD	58·7	—	19·6	—	—	—	—	—
D.A.	82·4	—	14·7	—	—	—	—	—
DORD	6·0	—	14·0	—	—	—	—	—
E.L.	—	—	—	—	—	80·1	—	—
ELL	—	—	—	—	—	2·8	—	—
F.B.	6·7	—	6·7	—	—	63·3	23·1	—
GOR	51·0	16·3	6·1	2·0	2·0	—	6·1	6·1
G.R.	67·3	—	16·8	—	—	0·9	43·9	—
HAN	85·6	—	20·4	—	—	—	—	—
HAY	56·4	3·8	20·5	—	—	—	16·7	2·6
HBT	66·4	1·8	23·9	1·8	1·8	—	20·4	0·9
HER	—	—	—	—	—	—	—	—
HOF	80·5	—	5·5	—	—	—	—	—
HOP	75·6	—	13·3	—	—	—	2·2	—
HUM	—	—	—	—	—	68·9	—	—
JAN	45·9	—	—	—	—	2·7	64·9	—
KIM	80·0	1·6	16·1	9·7	3·2	—	17·7	3·2
KWT	—	—	—	—	—	75·0	—	—
KOM	—	—	—	—	—	98·0	—	—
KUR	36·1	5·7	1·9	8·3	—	—	0·9	2·8
L.G.	3·3	—	3·3	—	—	—	—	—
MAC	—	—	—	—	—	—	—	—
MID	75·3	—	15·7	—	—	—	—	—
MOL	8·5	—	8·5	—	—	—	—	—
PEA	65·0	—	—	—	—	—	75·0	—
PED	—	—	3·3	—	—	75·8	21·2	—
PHIL	85·4	—	26·8	—	2·4	—	—	2·4
P.E.	11·1	—	11·1	—	—	66·7	—	—
POS	50·5	0·9	14·3	—	—	—	0·9	2·9
Q	15·7	—	19·3	—	—	—	—	—
S.E.	69·5	—	16·8	—	—	23·2	55·8	—
STE	10·0	—	25·0	—	—	—	—	—
STEY	81·5	—	31·1	—	—	—	—	—
ST	58·4	—	12·5	—	—	4·2	95·8	—
STUT	—	—	2·2	—	—	46·7	2·2	—
TARK	54·2	—	33·9	—	—	—	—	—
UIT	—	—	—	—	—	69·2	38·5	—
UN	—	—	—	—	—	—	3·2	—
VEN	66·8	—	38·9	—	—	—	—	—
V.E.	4·4	—	8·7	—	—	69·6	52·2	—
VRY	13·0	—	5·6	8·6	—	—	1·2	0·6
WILL	48·3	—	13·8	—	—	—	39·6	—

Note: Abbreviations of Divisions as in Table 3.

TABLE 3.
POPULATION ESTIMATES OF CERTAIN UNGULATES REPORTED FROM 55 DIVISIONS OF THE PROVINCE OF THE CAPE OF GOOD HOPE, SOUTH AFRICA

Division	Abbreviation	Oribi	Klipspringer	Vaal Ribbok	Rooi Ribbok
Aberdeen	AB	—	100	105	181
Adelaide	AD	—	—	220	1114
Albany	ALB	8	—	32	326
Alexandria	AL	13	—	12	14
Aliwal North	A.N.	—	—	424	229
Barkly East	B.E.	—	—	431	977
Barkley West	B.W.	—	—	—	—
Bathurst	BAT	63	—	—	—
Bedford	BED	—	—	962	1723
Britstown	BRI	—	25	—	—
Burgersdorp	BUR	—	—	56	601
Cathcart	CAT	—	—	279	310
Colesburg	COL	—	6	401	874
Cradock	CRAD	—	151	428	1181
De Aar	D.A.	—	65	108	120
Dordrecht	DORD	—	—	195	199
East London	E.L.	—	—	—	4
Elliott	ELL	—	—	6	6
Fort Beaufort	F.B.	—	—	61	80
Gordonia	GOR	—	112	—	—
Graaff Reinet	G.R.	—	516	852	3671
Hanover	HAN	—	15	77	22
Hay	HAY	—	98	—	—
Herbert	HBT	—	10	164	11
Herschel	HER	—	5	6	—
Hofmeyr	HOF	—	61	36	456
Hopetown	HOP	—	8	76	19
Humansdorp	HUM	29	258	352	210
Jansenville	JAN	—	30	—	—
Kimberley	KIM	—	—	99	78
King William's Town	KWT	—	—	—	—
Komga	KOM	—	—	39	35
Kuruman	KUR	—	11	75	5
Lady Grey	L.G.	6	—	326	256
Maclear	MAC	2	—	45	48
Middelburg	MID	—	237	932	988
Molteno	MOL	—	5	357	219
Pearston	PEA	—	102	5	30
Peddie	PED	—	6	—	—
Philipstown	PHIL	—	—	54	—
Port Elizabeth	P.E.	—	—	—	—
Postmasburg	POS	—	236	94	14
Queenstown	Q	—	—	234	956
Somerset East	S.E.	—	187	218	1035
Sterkstroom	STE	—	—	414	277
Steynsberg	STEY	—	18	362	851
Steytlerville	ST	—	420	14	54
Stutterheim	STUT	—	—	—	161
Tarkastad	TARK	—	34	754	1391
Uitenhage	UIT	—	41	11	229
Uniondale	UN	—	578	411	13
Venterstad	VEN	—	—	134	207
Victoria East	V.E.	—	—	—	—
Vryburg	VRY	—	—	—	—
Willowmore	WILL	—	475	89	93
Total		121	3810	9950	19268

TABLE 3 (contd.)

Division	Springbok	Blesbok	Hartebeest	Black Wildebeest
AB	2,139	75	—	—
AD	449	281	—	—
ALB	1,045	215	—	—
AL	15	—	—	—
A.N.	28	150	—	—
B.E.	—	114	—	—
B.W.	1,216	36	5	—
BAT	—	—	—	—
BED	3,661	479	—	—
BRI	2,426	72	—	—
BUR	927	230	—	—
CAT	300	551	—	—
COL	3,946	351	—	—
CRAD	4,044	376	—	—
D.A.	6,726	101	—	—
DORD	22	127	—	—
E.L.	—	—	—	—
ELL	—	—	—	—
F.B.	100	115	—	—
GOR	4,136	25	6	1
G.R.	6,125	353	—	—
HAN	4,675	268	—	—
HAY	1,604	130	—	—
HBT	6,863	359	5	8
HER	—	—	—	—
HOF	1,768	17	—	—
HOP	3,701	63	—	—
HUM	—	—	—	—
JAN	617	—	—	—
KIM	11,407	512	312	16
KWT	—	—	—	—
KOM	—	—	—	—
KUR	3,116	17	108	—
L.G.	3	9	—	—
MAC	—	—	—	—
MID	5,556	928	—	—
MOL	192	132	—	—
PEA	1,496	—	—	—
PED	—	10	—	—
PHIL	3,564	339	—	9
P.E.	2	2	—	—
POS	3,137	152	—	—
Q	175	348	—	—
S.E.	3,359	475	—	—
STE	65	113	—	—
STEY	2,774	550	—	—
ST	479	21	—	—
STUT	—	3	—	—
TARK	1,000	387	—	—
UIT	—	—	—	—
UN	—	—	—	—
VEN	374	193	—	—
V.E.	—	14	—	—
VRY	1,615	135	624	—
WILL	986	62	—	—
Total	95,833	8,890	1,060	34

Note: The Abbreviations used in the second column of p. 1 of this table are the same as those in Table 2 and on the maps.

Discussion

(*a*) *Evaluation of Method*

A point not yet raised is the coverage obtained by the questionnaires. In all, 11,824 forms were sent out and 3057 were completed and returned, a percentage return of 25·9. In general, it is probably a fair assumption that farmers sufficiently interested in wild life to maintain or re-introduce it on their properties will have filled in their questionnaires. Conversely, those with little or no wild life will not have returned the forms. The conclusion to be drawn from this argument is that, although only one-quarter of the farmed land of the Divisions concerned is represented by our results, the animal population of this fraction is, in fact, more nearly the population of all the land. It is practically impossible to decide whether this is true or not, but we feel that in the case of the larger antelope at any rate, which under present conditions exist mainly by the grace of the farmer, strengthened by the deterrent effect of the game laws, the populations reflected by our figures represent a safe minimum, perhaps not too far removed from the maximum.

In the case of species for which only "percentage occurrence" was calculated, the most interesting aspect to emerge is their relative status and distribution. All these figures are not to be taken too seriously; they are intended to give only a rough idea of the position.

(*b*) *Conservation Aspects*

The following ungulates, known to have occurred in some parts at least of the Cape Province in historic times, are now extinct: White Rhinoceros, Burchell's Zebra, Quagga, Hippopotamus, Giraffe, Red Duiker (? see Sclater, 1900, Vol. 1 p. 162), Roan Antelope, Blaauwbok and Tsessebe.

A few other species were extinct but have been re-introduced on a small scale. Black Rhinoceros (a pair) have recently been brought into the Addo National Park. (Note: As this paper is being revised for publication we learn that the Hippopotamus has now also been re-introduced into the Addo Park). Black Wildebeest are presently found, according to our questionnaires, on two farms in each of the Divisions of Kimberley and Herbert and on one farm in each of those of Gordonia (doubtful, probably Blue Wildebeest is meant), Philipstown and Bedford. They have also been released in the Mountain Zebra National Park, Cradock. When Bigalke (1947) carried out his survey of the species he found only three herds in the Cape Province. The largest of these, on De Beers Company property near Kimberley, has not been included by us since most of the land concerned is in fact situated in the Orange Free State. One of the remaining two was in the enclosures at Groote Schuur (Cape Town), where these animals still occur, while the other was on a farm in the Graaff Reinet Division. We received no record from here. It is pleasing to note the improvement, slight though it is, in the status of the Black Wildebeest since 1947.

The third re-introduced species is the Impala, of which we have the following records: Kimberley (1 farm, 25 head), Herbert (1 farm, 4 head), Philipstown (1 farm, 9 head). All of these occurrences are outside the original range of Impala which, in historical times, do not appear to have come much further south than the vicinity of Kuruman. It is likely that Blesbok were also at one time extinct in the Province, since the majority of extant herds stem from introductions, but proof one way or the other is almost impossible to obtain. The species is now widespread (Map XI).

Some non-indigenous forms have also been introduced, viz. Inyala and Lechwe (one farm in the Adelaide Division) and Fallow Deer (in eight Divisions). Red, Sambar and Spotted Deer also occur in the Western Cape but not in the area surveyed.

Our results show that several species have become exceedingly scarce. In the Eastern Province this applies to Oribi in particular, (Table 2), a fact already stressed by Skead (1953). The same holds for Reedbuck for which, although it was not listed on the questionnaires, we obtained the following records: East London, 2 farms one with 4, the other an unspecified

number; Komga, 5 farms, one with 5, one with 3 and three with unspecified numbers.

Mountain Zebra (Table 2) and Bontebok were not dealt with specifically in our survey but they should be mentioned as being amongst the very rare forms. We think we have "discovered" a new herd of Mountain Zebra for we have a record from Adelaide of which Skead (1956) was apparently not aware. Hartebeest (Tables 2 and 3) have long been extinct in much of the Province and it is alarming to see how unsatisfactory their status has become in the Northern Cape. Our estimate of 1060 is nonetheless much higher than that of Rand (1955) who used a different method to arrive at a figure of 350 for the entire Province.

Other species which are very rare indeed on farmed land are Gemsbok and Eland (Table 2) and Blue Wildebeest. None of them were listed on our forms so that some herds may well have been missed, but the position revealed by our results is disappointing. Population estimates obtained are: *Gemsbok*—Kimberley, 1 farm, 20; Herbert, 2 farms, 10; Postmasburg, 1 farm, 1; Hay, 3 farms, 8; Kuruman, 4 farms, 23+; Gordonia, 8 farms, 809; Total 871. *Eland*—Kimberley, 2 farms, 4+; Herbert, 1 farm, 6; Postmasburg, 3 farms, 23; Hay, 2 farms, 8; Barkly West, 1 farm, 5; Kuruman, 1 farm, 14; Vryburg, 1 farm, 16; Gordonia, 3 farms, 20; Philipstown, 1 farm, 4; Total 100. In most if not all cases the animals were obtained elsewhere and introduced by farmers. *Blue Wildebeest*—One landowner in the Kuruman Division recorded 2 while another stated that they sometimes trekked onto his property. It would seem that this antelope is practically extinct on farmed land in the Cape.

Hartebeest, Gemsbok, Eland and Blue Wildebeest are found in considerable numbers in the Kalahari Gemsbok National Park and sporadic mass movements sometimes bring large herds from the Bechuanaland Protectorate over the Molopo River into the Gordonia, Kuruman and Vryburg Divisions (see e.g. Cape Nature Conservation Report, 1958). These animals are however merely transient visitors.

Of the three antelope restricted largely to high country, the Klipspringer is the least abundant. Our population estimate of 3810 suggests that it is in some danger of extinction. Rand (*op. cit.*) gives a figure of 6,550 for the entire Province. For Vaal and Rooi Ribbok, on the other hand, our totals of 9,950 (Rand: 5,970) and 19,268 (Rand: 3,755) respectively are surprisingly high.

The Kudu is unique among the larger antelope for there is good evidence that its range is increasing and it is now found in parts from which it has long been absent. This has also been remarked by Skead (1958). In view of the animal's quite well marked preference for heavily bushed, rocky country it can only be expected in a few Divisions but within these the percentage occurrence has proved to be generally high, especially in the South-West (Map X).

Blesbok are reported from 42 of the 55 Divisions and the total population estimate of 8,890 is very much higher than that of Rand (*op. cit.*, 2,138 for the whole Province). Although the percentage occurrence is nowhere very great, the status of the species is quite satisfactory when one considers that most of the herds arise from introduced stock. The animal is widely available for sale, indeed it is now almost a beast of commerce, and one can confidently predict an upward trend in its future status.

The Springbok is the most numerous and widespread medium-sized game animal in the area investigated, with an estimate of not less than 95,833 (Rand: 14,280). Only 12 of the 55 Divisions reported no Springbok, 10 of these also lacking Blesbok; this appears to reflect unsuitable habitat conditions. There is and has been a great deal of Springbok re-stocking, although perhaps not to the same extent as with Blesbok since original stocks of the first-named survived quite widely when farms were settled and fenced.

Duiker and Steenbok enjoy an extensively widespread distribution and a high percentage occurrence. Broadly speaking the same is true of the Antbear and, to the regret of the farming community, of the Dassie, except in flat country. As there are grounds for suspecting a

confusion between Dassie and Tree Dassie ("Bush Baby" of the eastern region of the Province), our data on the latter is rather suspect. It does occur extensively in the eastern region.

The status of Bushbuck, Blue Duiker and Bushpig, within their limited ranges, appears to be satisfactory, but in many Divisions the percentage occurrence of Grysbok is low.

(*c*) *Zoogeographical Aspects*

From information obtained in a survey of this nature it is difficult to extract zoogeographical data. For most species of ungulates the main factor influencing occurrence is, and has been for a long time, the human one. Nevertheless in the case of some species, whose elusive habits, or the vegetational or topographical features of the country in which they live, have protected them from extermination, interesting distribution patterns have emerged. They are not new or startling, but serve to confirm more or less objectively our existing ideas, showing a correlation between vegetation and/or topography and distribution, almost in spite of the activity of man.

In the areas studied four species—Bushpig, Grysbok, Blue Duiker and Bushbuck—occur only in the southernmost portion, i.e. the south-eastern Cape. Of the 33 Divisions in which some or all are found, 20 or 21 (the one Aliwal North record is doubtful) have Bushbuck, 24 have Bushpig, 26 have Blue Duiker and 31 have Grysbok. From Maps I, II and III it is clear that Bushpig, Blue Duiker and Bushbuck occupy very similar ranges, being most frequent in the Divisions nearest the coast and dropping off as one moves inland. They are centred about the Divisions in which the vegetation is predominantly Bushveld, Macchia, Forest and Scrub-Forest (Acocks, 1953, Map II) or combinations of these types. Their concentration appears to diminish as the Karoo influence increases and they are absent both in the Karoo proper and further north. Although Bushpig is also recorded in the Vryburg Division, this must be treated with reserve. Two farmers wrote "Bosvark" on their forms, one of them also adding "Vlakvark" (Warthog). It seems highly unlikely that Bushpig would live in the environment provided by the Vryburg Division. Warthog are found in the Kalahari Gemsbok Park further west and may thus conceivably also be present in Vryburg but the question needs further investigation.

In the case of Grysbok (Map IV) the pattern is similar to that shown by Bushpig, Blue Duiker and Bushbuck but another centre of distribution is revealed by the survey, viz. the north-eastern corner of our area (Divisions of Herschel, Maclear, Barkly East and four adjacent ones). Here the vegetation is Scrubby Mixed Grassveld and Mixed Grassveld (Acocks, *op. cit.*) and high mountains with sheltered valleys predominate. Apparently this country is ecologically suitable for Grysbok—they are probably restricted to the valleys—but not for the other three "south-eastern" species.

Map V illustrates the rather neat distribution pattern of the Duiker. The survey showed it to have the highest percentage occurrence in the extreme south (Bushveld, Macchia, Forest and Scrub Forest and related types) and in the extreme north (Bushveld), i.e. in areas with good cover. In the predominantly Karoo Divisions it proved to be rare and no records were forthcoming from Hanover. It also appears to be absent in five mountainous Divisions (Burgersdorp, Lady Grey, Barkly East, Maclear and Dordrecht).

These findings indicate that while cover in the form of dense vegetation is a habitat requirement common to Bushpig, Blue Duiker, Bushbuck, Grysbok and Duiker, the last named tolerates a wider range of environmental conditions. It is widespread in the dry bush country of the northern Cape where the other four species are absent.

The distribution of the Springbok is more subject to the influence of man than that of the preceding forms, since it can be freely bought and is often used for restocking. Nevertheless the survey shows a largely "natural" pattern (Map VI). As one would expect of a typical plains animal, the highest percentage occurrence is in the Karoo Divisions and falls off to

the south and east and to the north. From most of the densely bushed coastal Divisions and from some of those in high mountainous country no records were obtained. North of the Orange River we suspect human influence to have been more important than elsewhere in accounting for the quite low percentage occurrence. Since Springbok are numerous in the Kalahari Gemsbok National Park at present it seems likely that they were equally common in the similar country of the northern Divisions in the past. Much of the land presently farmed in Gordonia, Kuruman and Vryburg has only been settled comparatively recently and while it was unoccupied crown land illicit hunting decimated the fauna.

Vaal and Rooi Ribbok (Maps VII and VIII) show a distribution in conformity with their preference for hilly terrain. On the whole they were reported most frequently from the most mountainous Divisions. Similarly Klipspringer (Map IX) records came mostly from mountainous areas or from hilly parts of otherwise flat country, e.g. the Langeberg and Korannaberg ranges and the Kuruman Hills in the Divisions of Postmasburg, Kuruman and Hay and the koppies along the Orange River in Gordonia.

Kudu, lovers of thick cover, ideally, it would seem, in combination with rocky hills, are centred around two parts of the country surveyed, the south-west and the north. In the south-west (Map X) koppies or thick bush, or both, predominate and the percentage occurrence is high. In the north suitable habitat occupies a relatively small percentage of the total area, e.g. in the northern Cape Kudu are more or less confined to the Vaal and Orange Rivers, the flanks of the Ghaap Plateau and the Langebergen. The percentage occurrence is consequently lower.

We have mapped the Blesbok records (Map XI) mainly for the sake of showing where they are now found and not from zoogeographical considerations. As has already been pointed out, practically all present occurrences are the result of restocking.

The ubiquitous forms—Antbear, Steenbok and Dassie—have not been mapped. In the case of the latter, Table 3 shows that it is very rare or absent in the flat Kalahari country of the northern Cape. The remaining species dealt with in this survey are now so rare that they are of little zoogeographical interest.

We are left with animals not mentioned in the questionnaires but which must be touched on for the sake of completeness. The Elephant, formerly very widespread over the Province, is now of course restricted to the Knysna Forests and the Addo National Park while the Buffalo remains in the last-named sanctuary only. The Bontebok, always with a restricted range, has been adequately dealt with in the literature (Bigalke, 1955 and Skead, 1958).

It is apposite to note here an old record, mentioned by Sclater (1900) but apparently since forgotten. Burchell (1822), who was very well aware of the difference between Quagga, Zebra and Mountain Zebra, wrote that he saw a herd of Mountain Zebra at Kosi Fountain. This is now called Khosis and is situated in the Ghatlosi Native Reserve, Kuruman Division. In his entry for July 2nd, 1812, he also says "The dauw, or 'mountain horse', inhabits, as I was informed, the Kamhanni Mountains", now the Kuruman Hills. If his observation is correct there must have been an interesting population of *Equus zebra*, isolated from others of this species by hundreds of miles of flat country.

The occurrence of three ungulates, now extinct in the Province (Impala have been reintroduced), in historical times, is of some zoogeographical interest. The Impala (Barrow, 1806, Lichtenstein, 1812, Burchell, 1822 and Thompson, 1827) was quite common in the vicinity of Kuruman. The Tsessebe was described by Burchell from the same area, having previously been encountered there by Truter and Somerville (see Sclater, 1900. Vol. 1 p. 146) while Cumming (1850) saw it in what is now the Division of Herbert. Truter and Somerville (Barrow, 1806) found Roan Antelope near Kuruman and Cumming (*op. cit.*) shot one on the west bank of the Vaal, near the present village of Campbell in the Herbert Division. All three must have been at the south-western limit of their range when in the northern Cape

and a zoogeographical investigation of this area might well reveal some interesting data on tropical or sub-tropical intrusive forms.

Summary

The results of a questionnaire survey of ungulate mammals on farms in 55 Divisions in the eastern and northern parts of the Cape Province are reported. 11,824 forms were sent out and 3,057 (25·9%) were completed and returned by farmers. Population estimates were obtained for Oribi (121), Klipspringer (3,810), Vaal Ribbok (9,950), Rooi Ribbok (19,268), Springbok (95,833), Blesbok (8,890), Red Hartebeest (1,060) and Black Wildebeest (34). The occurrence of another ten species was studied while farmers supplied data on several additional species not listed on the questionnaires. The method of interpreting the results of the survey is given and it is pointed out that both population estimates and percentage occurrence are not claimed to give anything more than a rough idea of status and distribution. The results are discussed from the points of view of conservation and of zoogeography.

Acknowledgements

The authors wish to acknowledge their indebtedness to the numerous farmers who co-operated by returning completed questionnaire forms, often with much valuable additional information; also to members of the staffs of the Kaffrarian and McGregor Museums for the part they played in preparing and distributing the forms. One of us (R.C.B.) is particularly indebted to Messrs. De Beers Consolidated Mines Ltd. for duplicating questionnaires; to Mr. D. Hallam and Miss B. Rees of the Company's Geology Department for assistance with mapping; and to Mr. G. P. Grobbelaar for handling most of the questionnaires.

Discussion.

Dr. Pringle: Having also had experience of questionnaire surveys, I agree with Dr. Bigalke that figures obtained in this way should not be taken too seriously. For instance, I realized about 10 years ago that Oribi might be nearing extinction in the Eastern Cape and made a personal census, obtaining a count of 51 animals as against your figure of 121. As regards the Kuruman area which has interested so many of the speakers, old records indicate that although there were no wells, people were able to travel freely through the district in historical times because there was plenty of surface water. I would suggest that the area has become very much drier within the last 150 years.

Dr. Stuckenberg: Distribution in historical times is best studied in relation to the former distribution of vegetation and for this purpose I have found Acock's Map No. 1 very helpful.

Dr. Talbot: Has Dr. Bigalke tried to establish how close farmers' estimates are?

Dr. Bigalke: Yes. The general tendency seems to be to overestimate numbers in species regarded as pests; but the larger ungulates are nowadays carefully looked after by conservation-conscious landowners, and estimates for these species are usually reasonably accurate.

Dr. Winterbottom: With regard to the numerical increase and extended range of the Kudu, is it possible that this animal may be filling an ecological niche left vacant by other species which have been shot out?

Dr. Bigalke: Yes; but it is also possible that it is the result of growing bush encroachment.

Mr. Skead: The Kudu influx has occurred in areas which they used to occupy in historic times and it is my impression that they are simply returning to the places from which they were previously driven away or exterminated.

Mr. Liversidge: In South West Africa a similar increase amongst Kudu has been attributed to the increased number of water holes now available.

Dr. Bigalke: This is possible, of course, but Kudu are able to survive in waterless areas.

Mr. Attwell: Is it possible that in the case of Vaal and Rooi Ribbok Gause's principle may be operating?

Dr. Stuckenberg: Does fencing, by preventing natural movements, play a part?

Mr. Skead: Ribbok can easily jump fences.

Dr. Pringle: And so can Kudu; but jackal-proof netting may be a factor affecting smaller species, especially in the Karoo.

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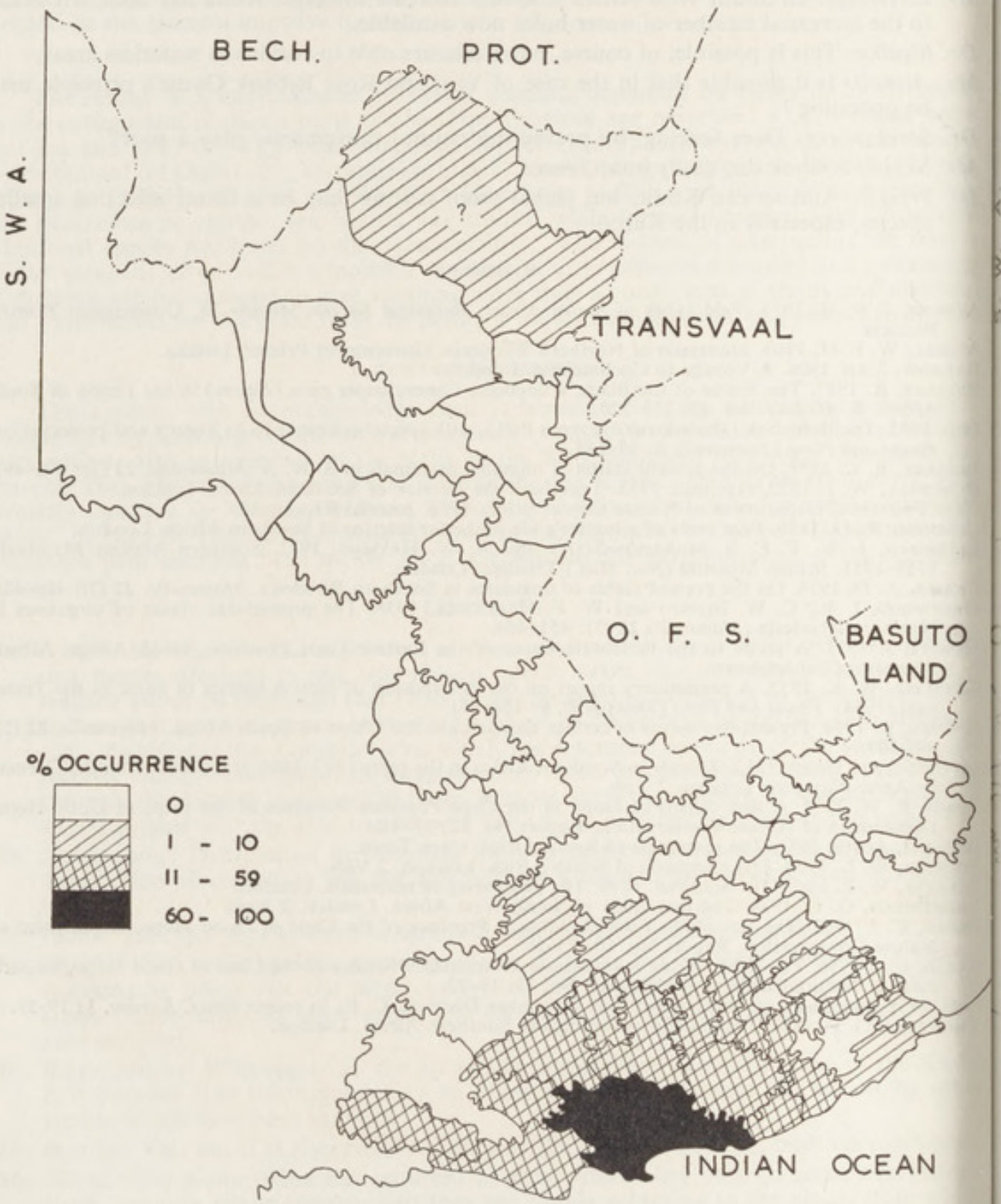
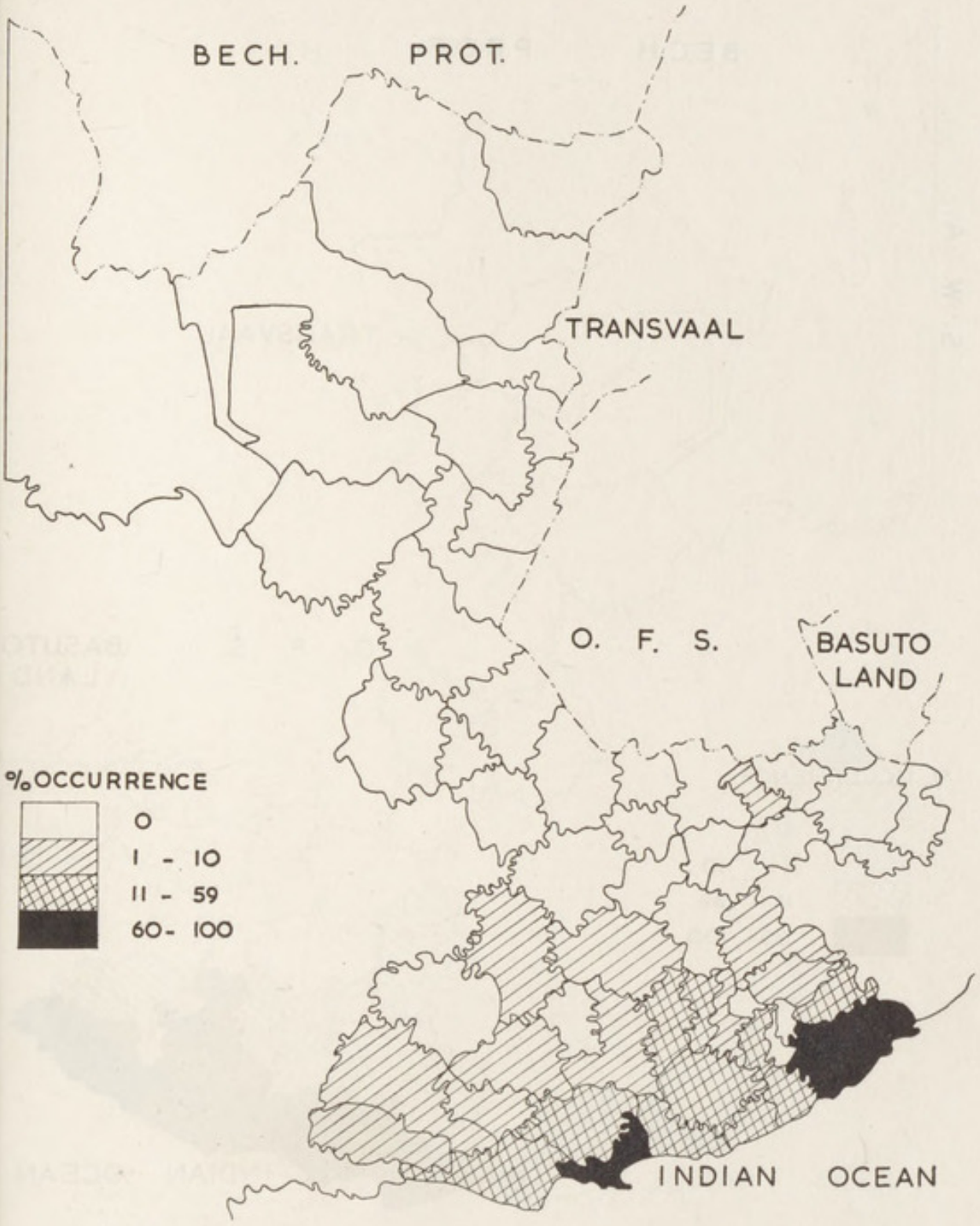
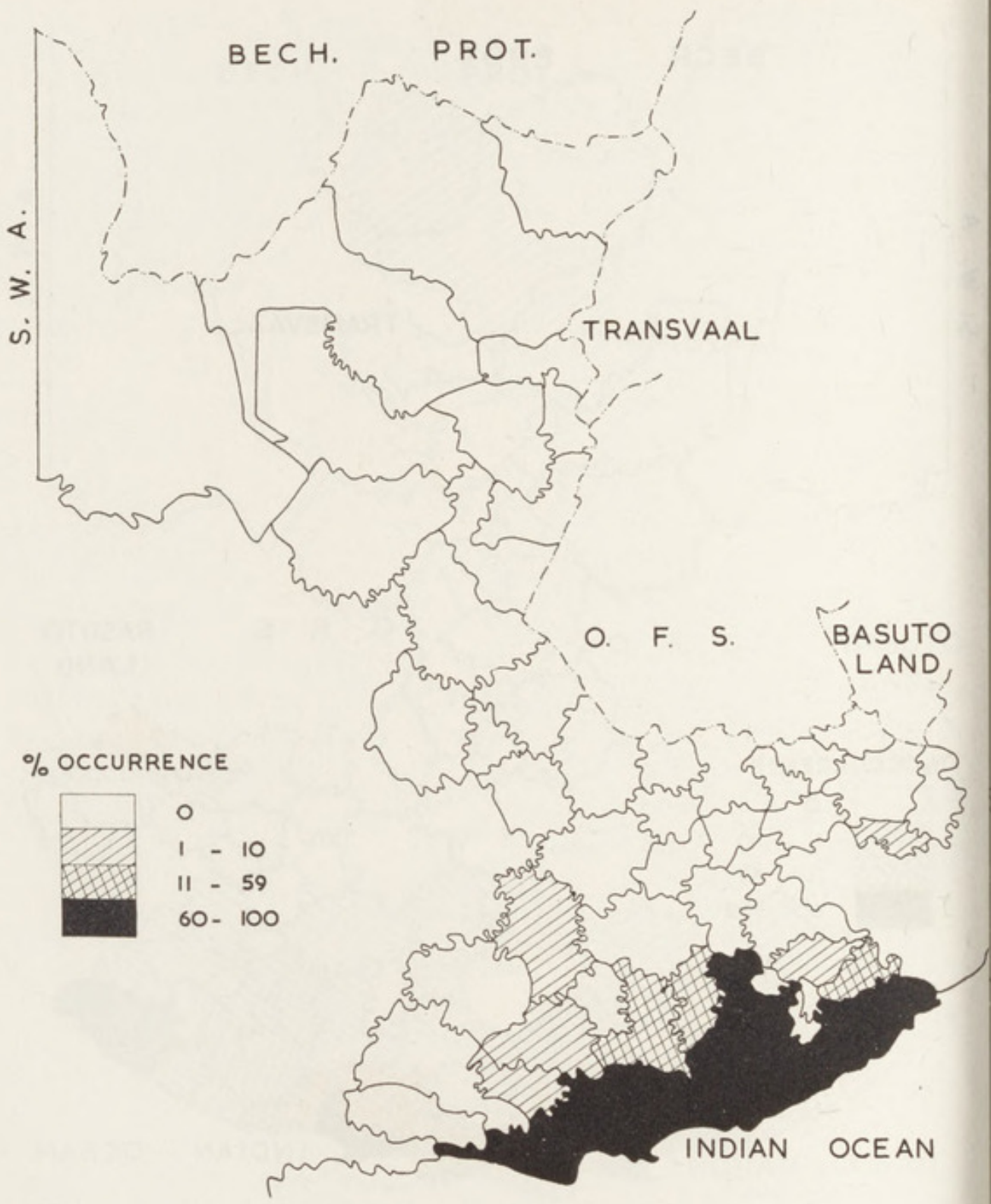


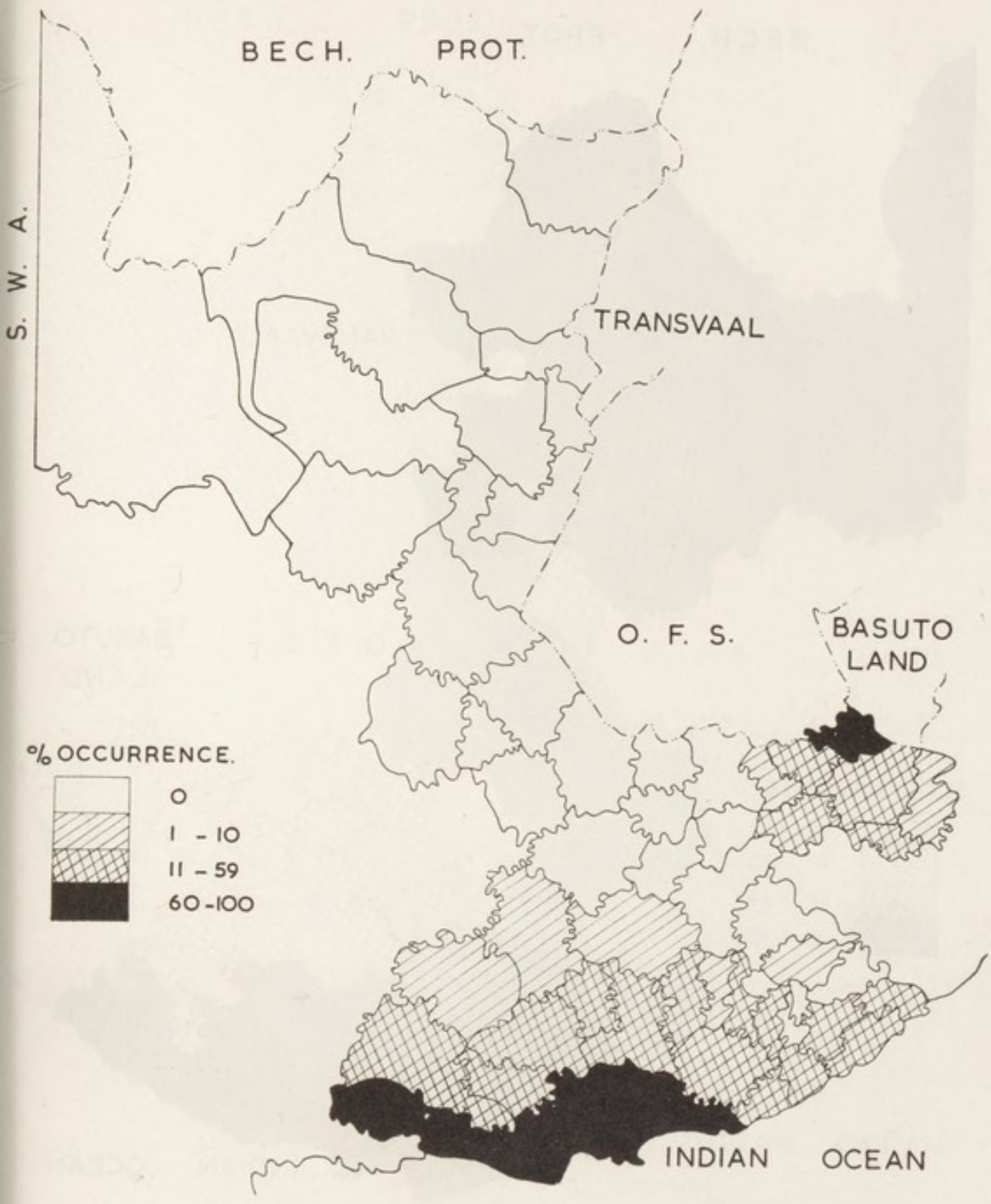
Map I. Distribution of Bushpig based on "Percentage Occurrence".



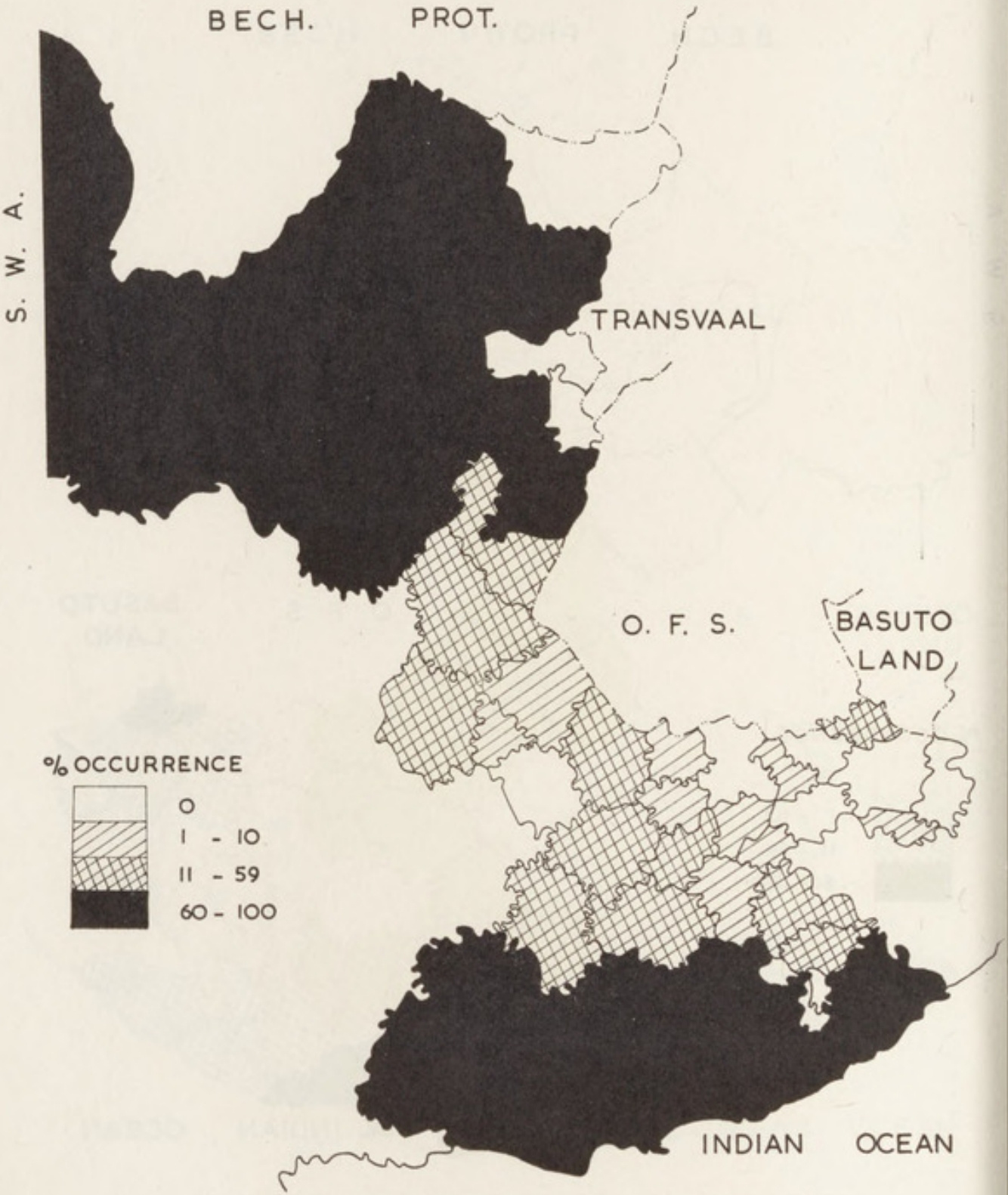
Map II. Distribution of Blue Duiker based on "Percentage Occurrence".



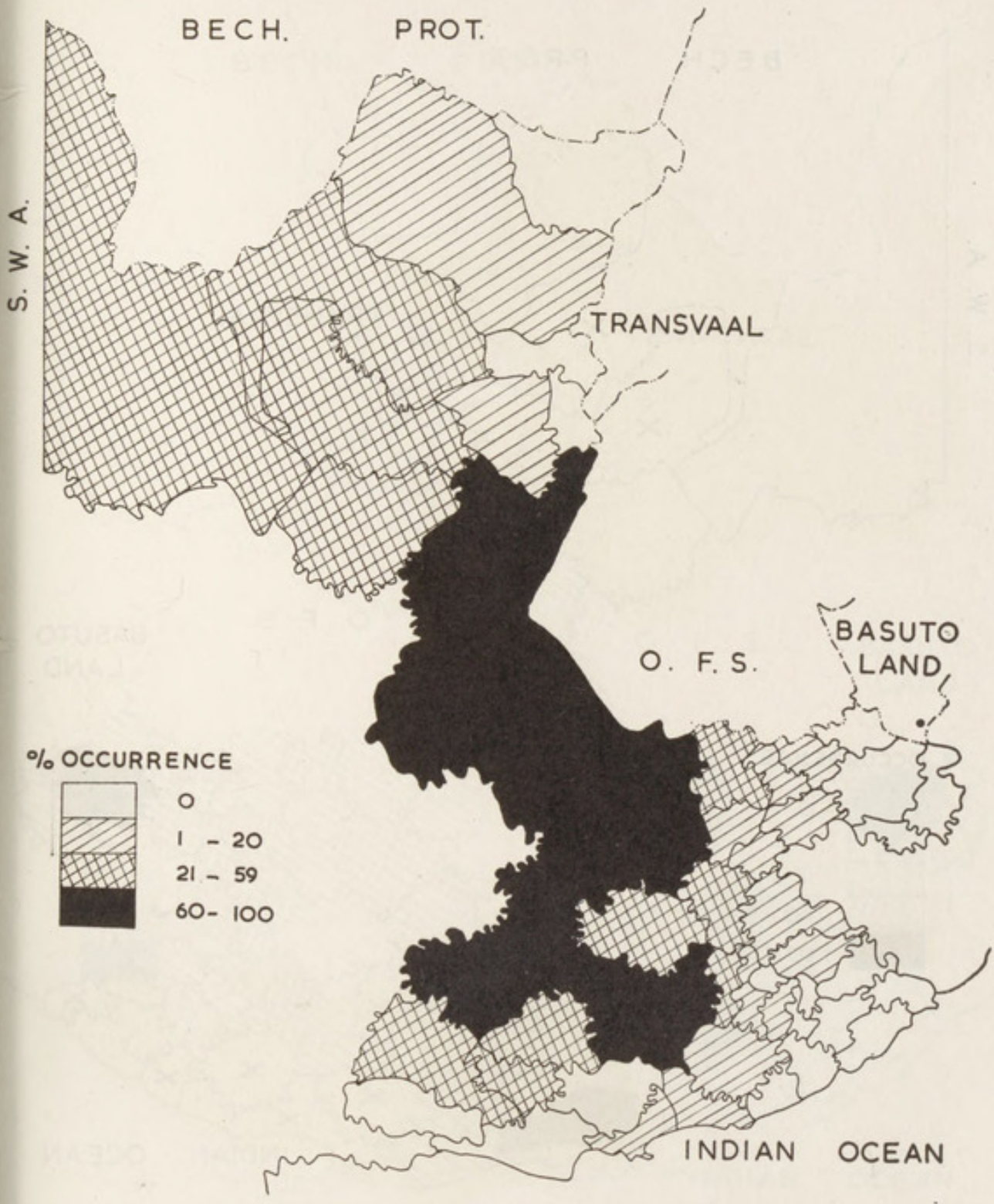
Map III. Distribution of Bushbuck based on "Percentage Occurrence"



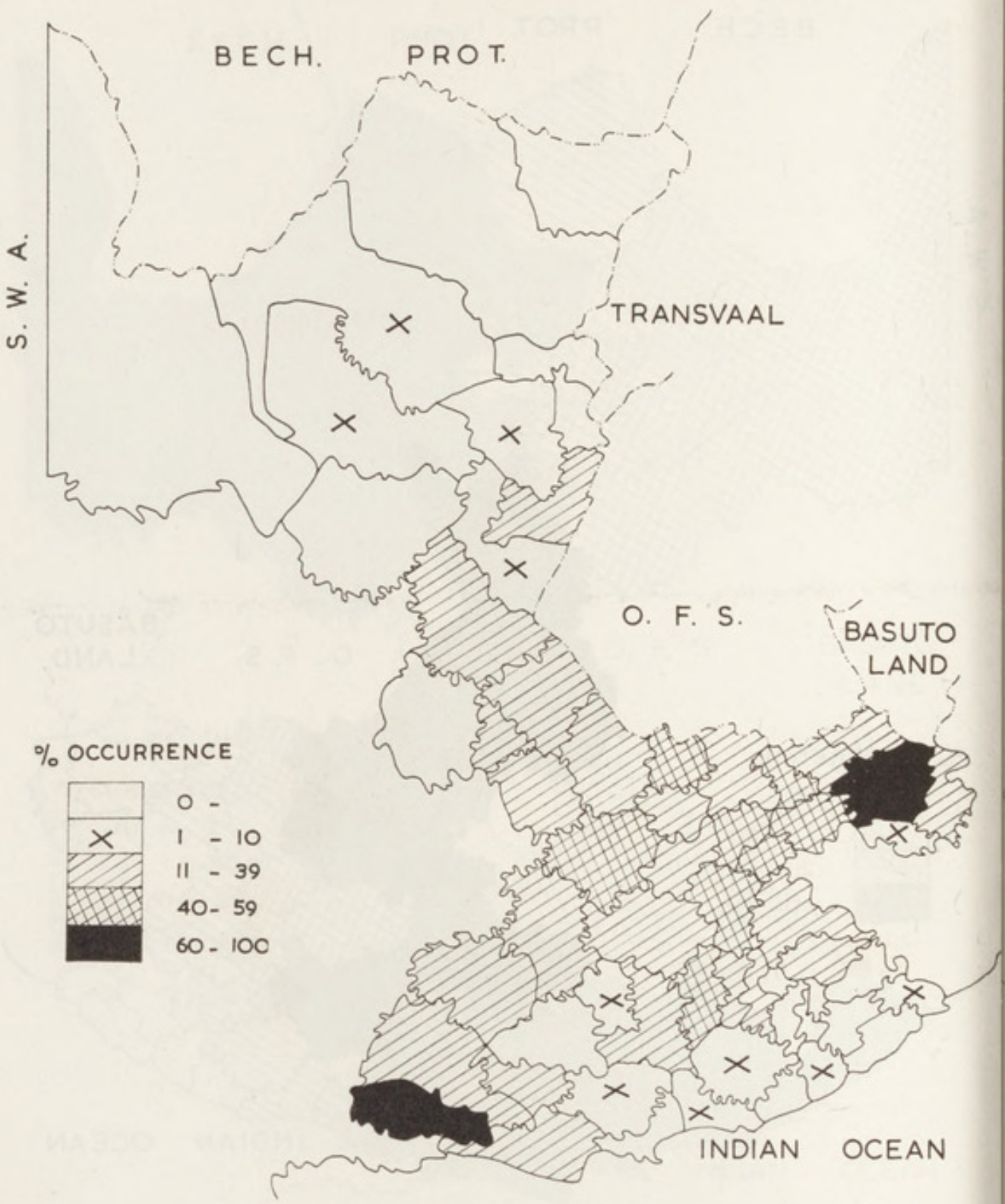
Map IV. Distribution of Grysbok based on "Percentage Occurrence"



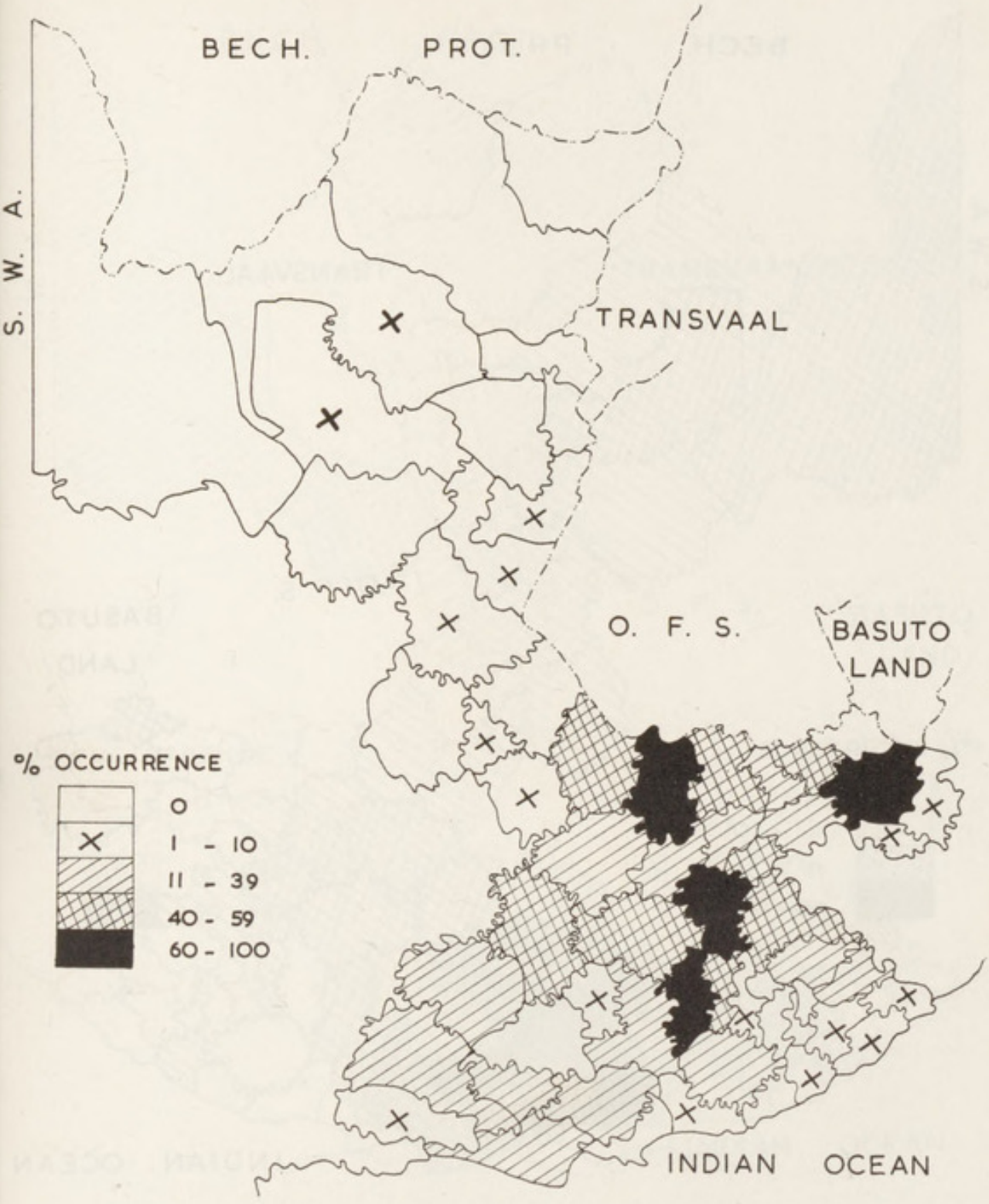
Map V. Distribution of Duiker based on "Percentage Occurrence"



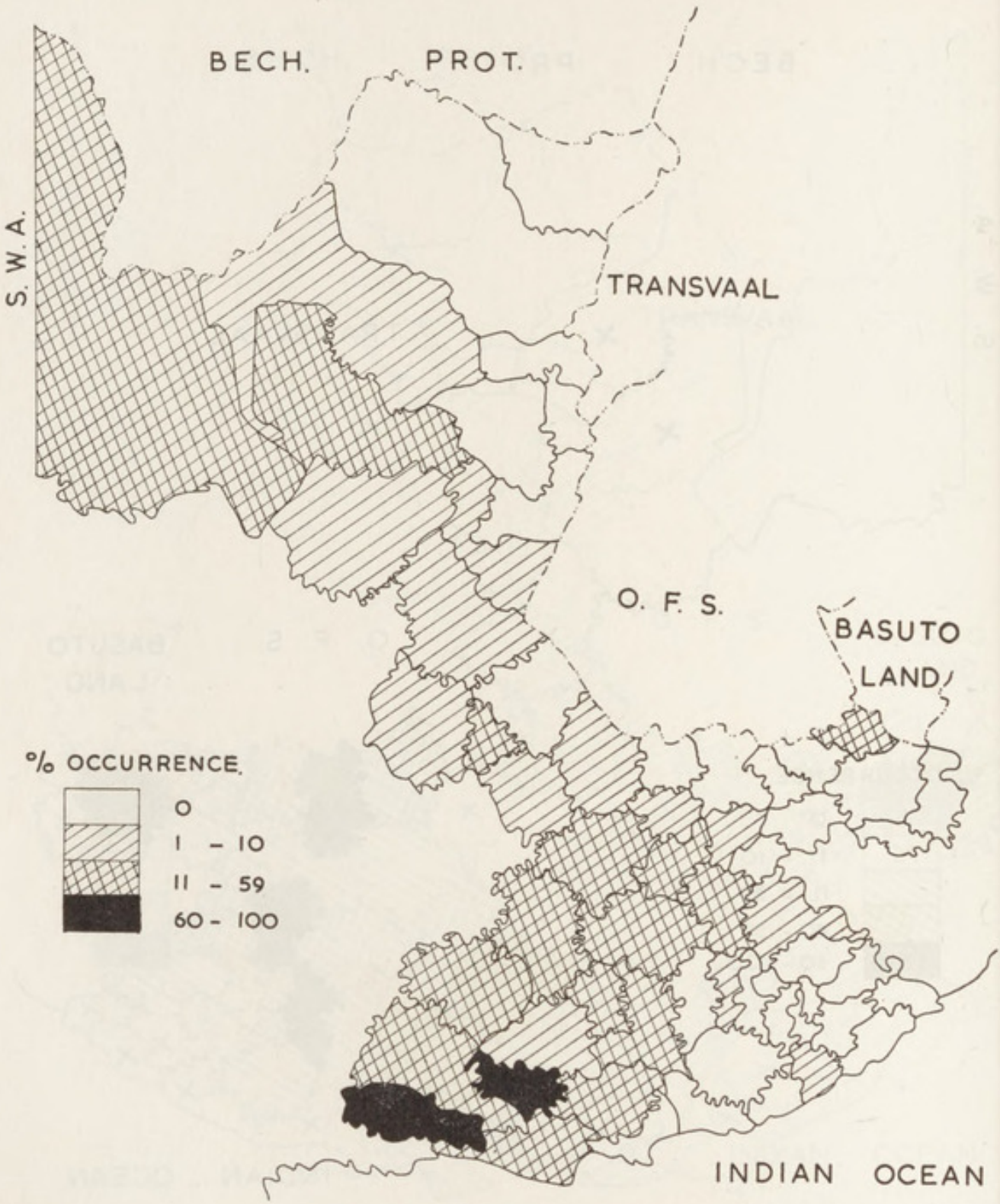
Map VI. Distribution of Springbok based on "Percentage Occurrence"



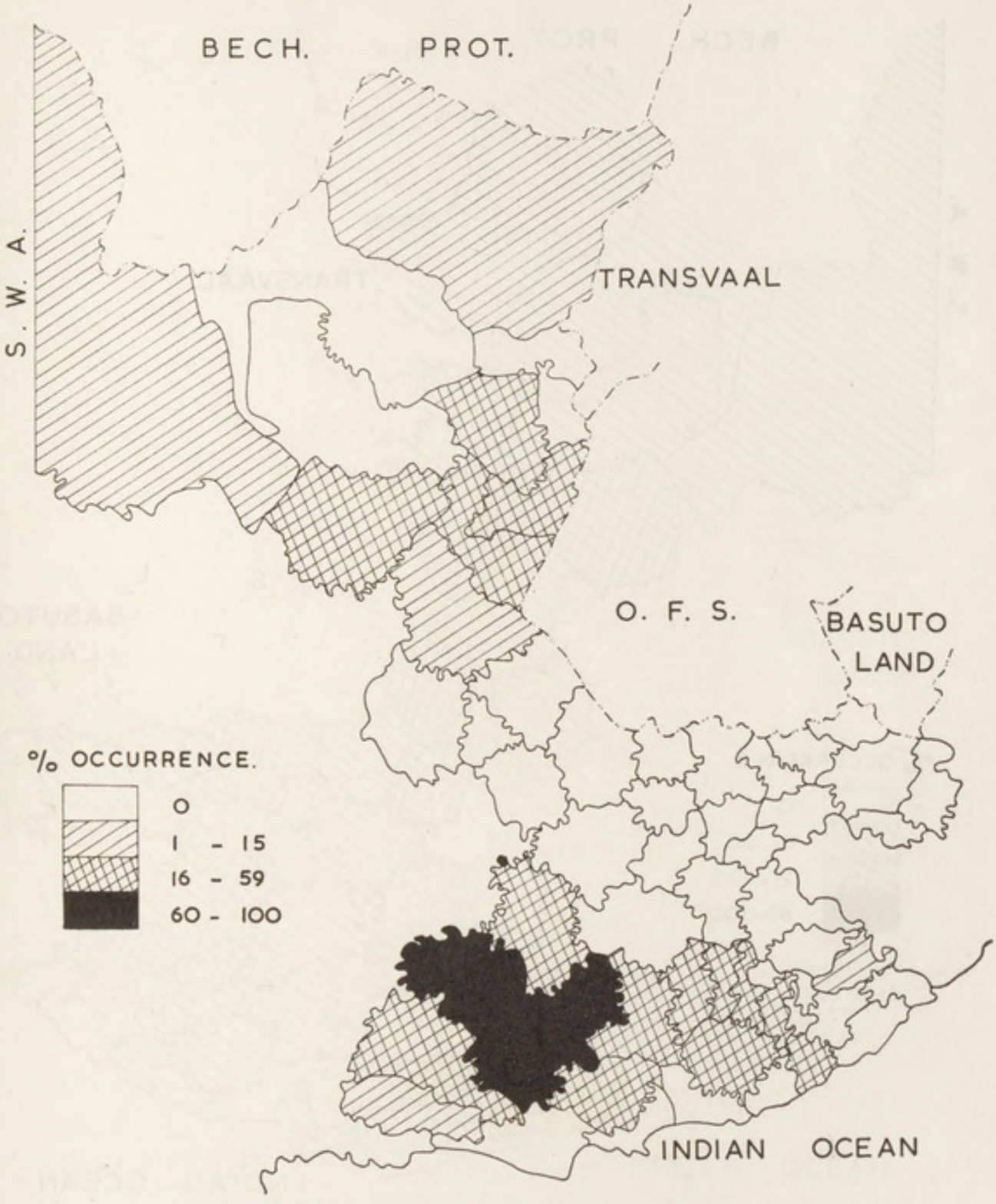
Map VII. Distribution of Vaal Ribbok based on "Percentage Occurrence"



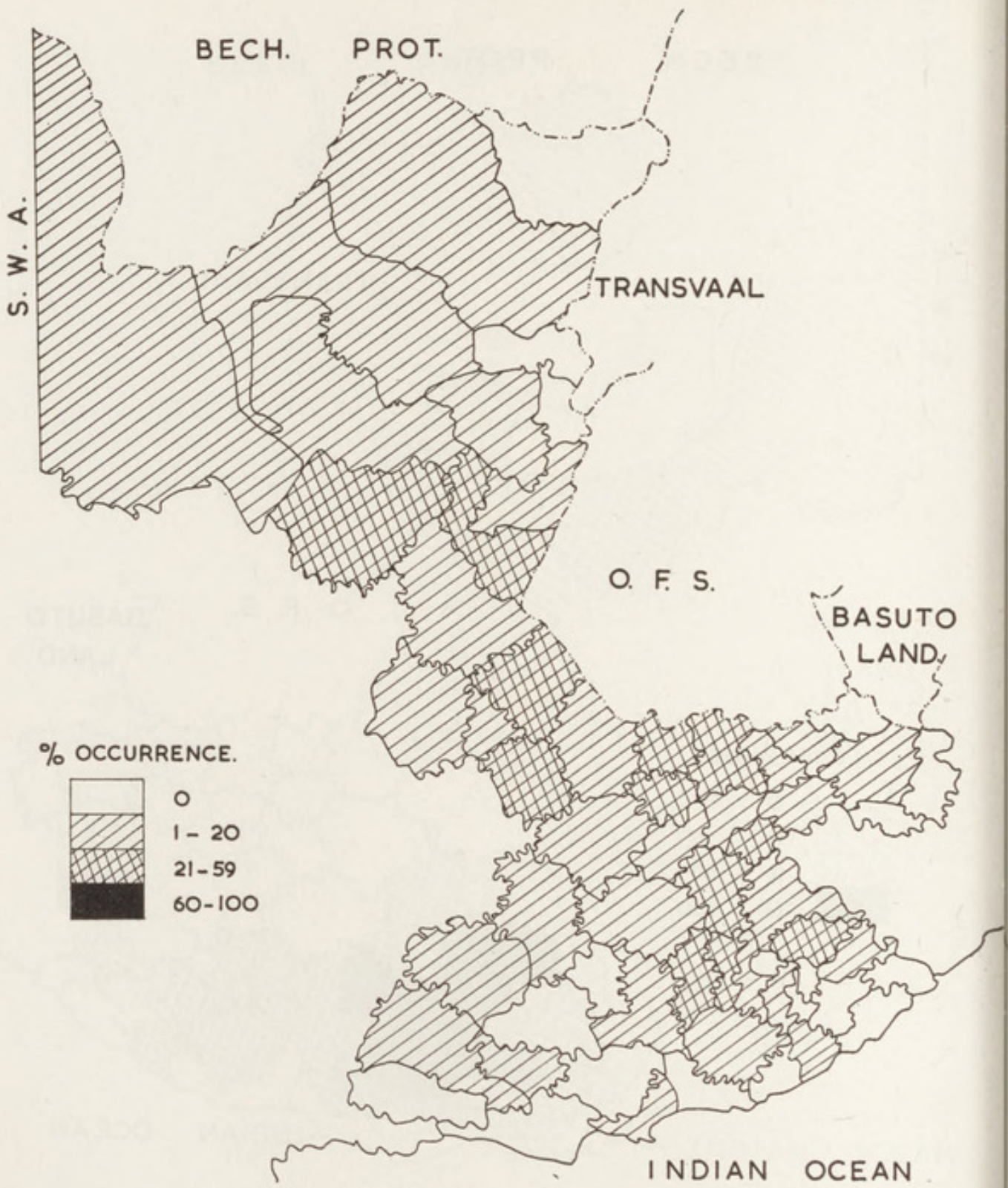
Map VIII. Distribution of Rooi Ribbok based on "Percentage Occurrence"



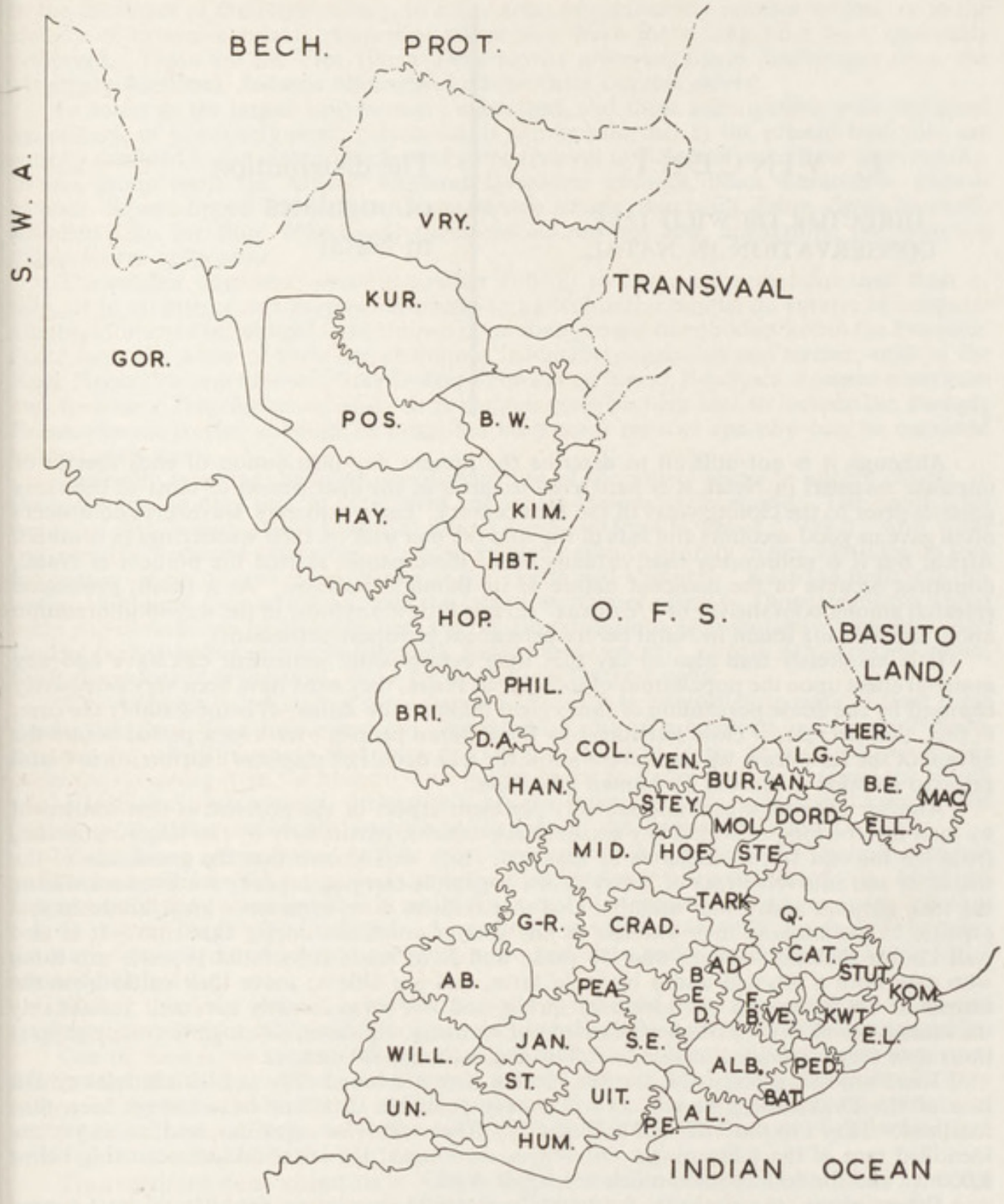
Map IX Distribution of Klipspringer based on "Percentage Occurrence"



Map X Distribution of Kudu based on "Percentage Occurrence"



Map XI Distribution of Blesbok based on "Percentage Occurrence"



Key Map. Showing names of Divisions, abbreviated as in Table 3. Divisions without names were not included in the survey.