N 18/2/1/9

AERIAL AND GROUND CENSUS OF WESTERN ETOSHA NATIONAL PARK

2295

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1. INTRODUCTION

The main object of this census was to estimate the total number of elephant occurring in the western portion of Etosha and to determine their age-sex and social status. In addition, estimates were made of Burchell's and Hartmann's zebra, springbok, gemsbok and giraffe numbers, while other species were recorded where possible. These figures were used to determine the number of animals to be culled or captured in this area.

2. METHODS

2.1 For the aerial census a fixed-wing aircraft (Cessna 172) seating two observers was used. In the case of elephant a total count was attempted, whereas the remaining species could only be estimated in number. For this purpose the aircraft flew at 150 km/h and 90m altitude covering 1 km-wide transects in areas of high density of animals. In areas of lower density, speed was increased up to 200 km/h, altitude to 120m and transect width to 2 km.

2.2 During the ground counts we made 24-hour observations on a total of 24 permanent waterpoints in the same area and in the same period as the aerial census. Elephants were categorised as adult bulls, adult cows, juveniles and calves in accordance with the system used by Laws (1969) and shown in Fig. 1. Where visibility was limited, namely on occasions at night, we listed the elephant under an "age-sex unknown" column.

Zebra were grouped according to species and a representative sample was aged as full-grown, immature and foals, following Smuts' (1974) and Joubert's (1971) methods. We also took samples of the gemsbok, springbok and giraffe to determine the number of young animals present.

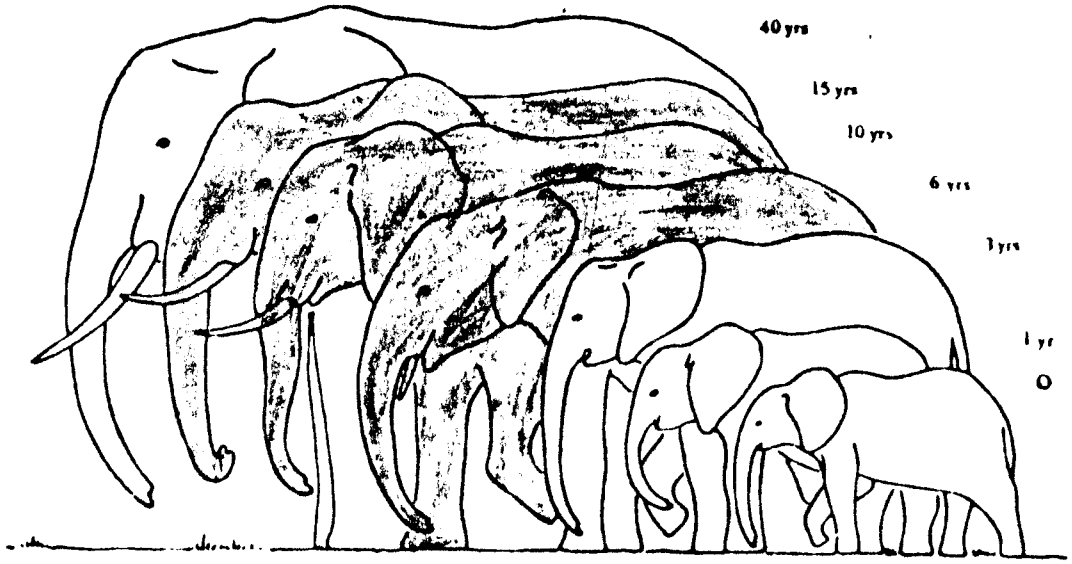
2.3 Fig. 2 shows the area censussed by aircraft and the waterpoints observed by ground. Note that the aircraft also flew random transects in Owambo, up to a point approximately 12 km north of Etosha's boundary, namely the previous outline of Etosha, to establish if elephant occurred there in significant numbers.

3. RESULTS

3.1 Aerial Counts

3.1.1 Fig. 3 shows the total number of elephant counted in each of the 10 census blocks inside Etosha and the two census blocks in Owambo. The total number of elephant was 1 819 for western Etosha (west of Namutoni, M'Bari and Lindpaal) and 30 for the Owambo section.

3.1.2 The recorded number of seasonal pans, pools and gravelpits containing rain water are shown in Fig. 4.



a

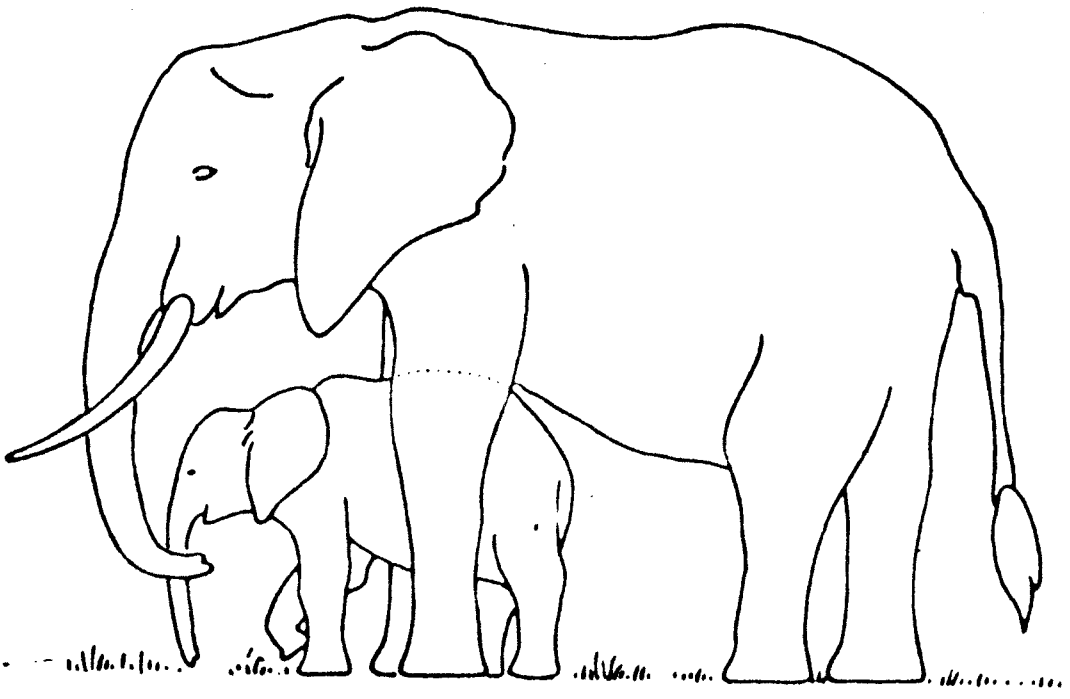


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Figure 16

a. Field age criteria for female Western Uganda elephants (L. a. africana)
b. Relation of average one-year-old calf to average adult female.

FIG. 1 : Diagram used to determine age classes of elephant during counts in the western sector of Etosha.

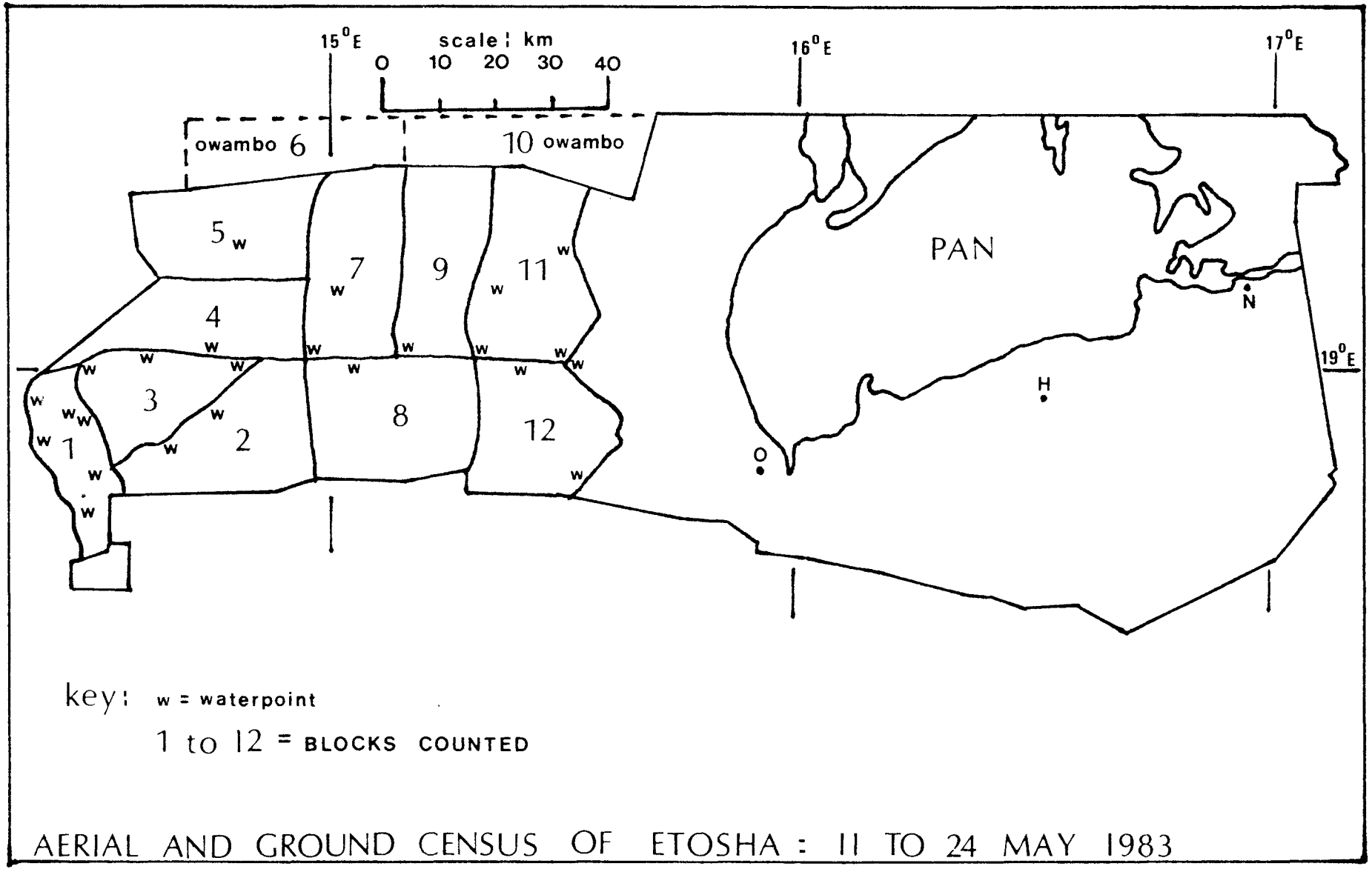

Fig 2 : Map of Etosha showing 12 blocks which were censussed by aircraft and 24 waterpoints where ground counts were done.

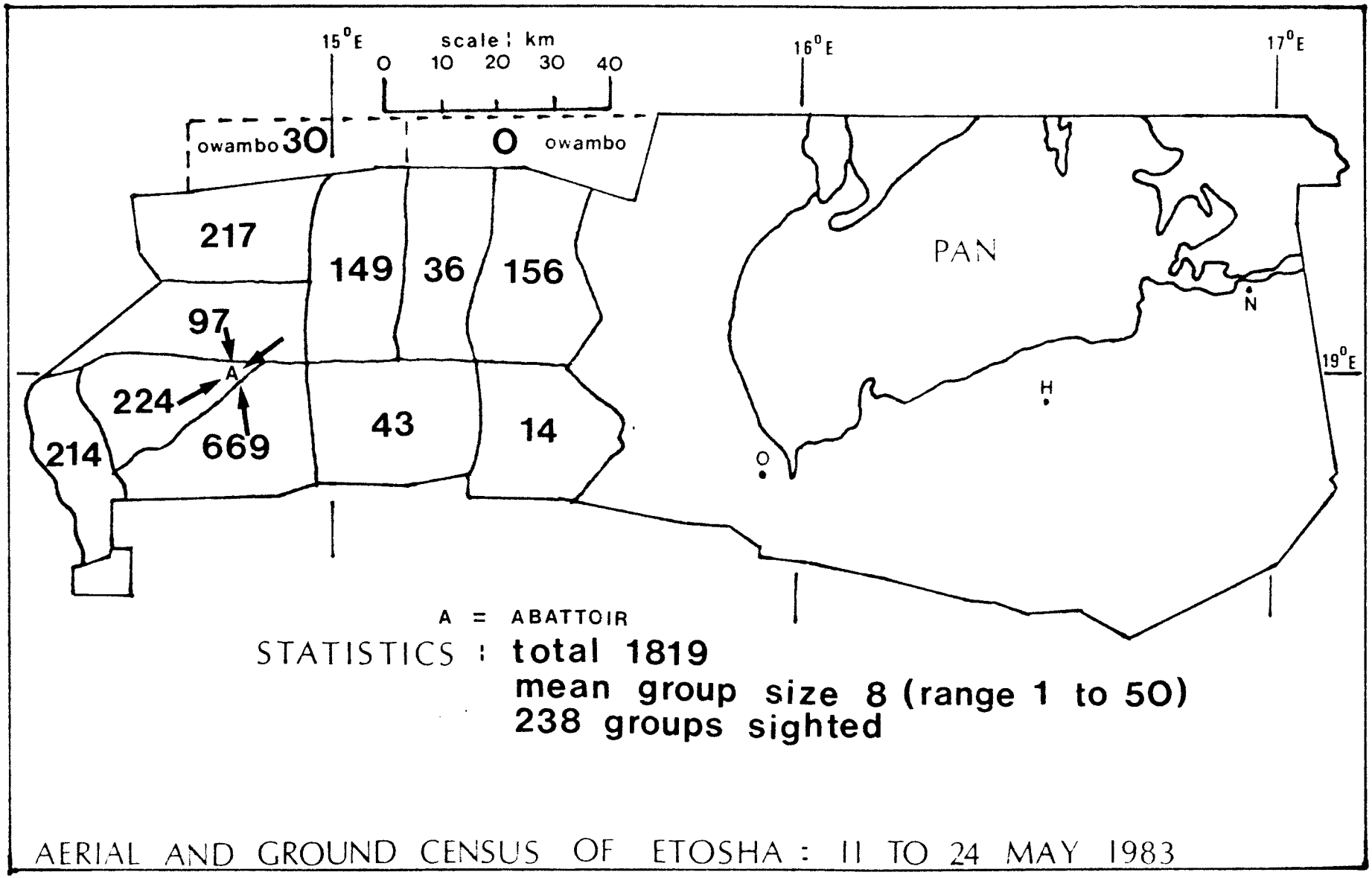

FIG. 3 : Map of Etosha giving total number of elephant counted in each of 12 census blocks.

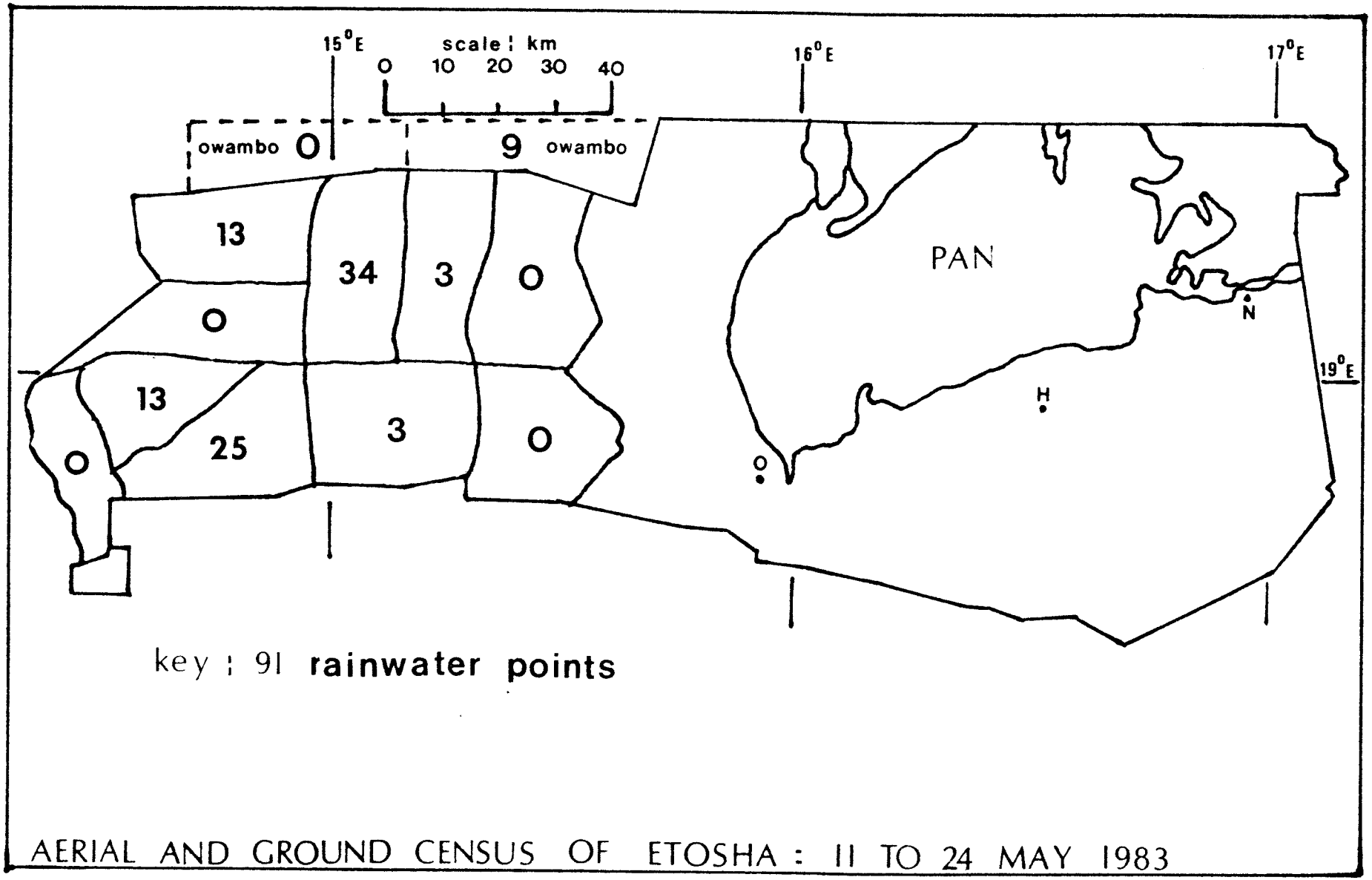

Fig. 4 : Map of Etosha giving the total number of rainwater pools and pans seen in the 12 census flights.

3.1.3 Table 1 gives an estimate of some other animal species' numbers, although this is probably an underestimate of considerable magnitude and should be used as an indication only.

3.2 Ground Counts:

3.2.1 In Table 2 we show the age and sex classes of elephant and give mean group size.

3.2.2 Table 3 summarizes the age classes of zebra.

3.2.3 Table 4 gives the totals of all animals counted at the waterholes.

4. DISCUSSION

4.1 Elephant

If the total number counted during this census (1 819) is compared to the number counted in 1982 (Berry and de Villiers, 1982) for the same area (672) then it is evident that, apart from the increase brought about by birthrate, a massive immigration of elephant has taken place into the western part of Etosha. This immigration may be related to the direct and indirect effects of the prevailing drought. Predominant, fresh elephant tracks leading through new stands of grass on the northern boundary of Etosha was a definite indicator of large scale immigration. In 1982 mean group size of elephant was 9, compared to 6 in 1983.

The waterhole counts for age-sex determination yielded a total of 873 elephants (48% of the total of 1 819 counted by aircraft). This lower count was probably largely due to the presence of 91 temporary pans holding rainwater which attracted the majority of elephants. Of these, 25 pans occurring to the east of the dolomite hills in census block 2 were of significant size.

Six relatively fresh elephant carcases were seen during the aerial census compared to 54 carcases in 1982. This mortality does not appear significant if the total elephant population is taken into account.

The waterhole counts reflect a virile and expanding population structure with 35% being adult cows and 52% being juveniles and calves (Table 2). Adult bulls consequently comprise a relatively low figure (13%) of the sample taken.

4.2 Burchell's zebra

Because the aircraft's speed and restricted visibility, coupled with flying altitude, made it impossible to distinguish between Burchell's and Hartmann's zebra, we combined the two species' into a total number (2 533). The waterhole counts gave a total of 3 114, in the proportion of 1 Burchell's zebra to 1,1 Hartmann's zebra.

In 1982 the aerial census gave totals of 1 941 Burchell's and

Table 1: Aerial estimates of numbers of Burchell's and Hartmann's zebra, springbok, gemsbok and giraffe in the western section of Etosha (May 1983).

Species	Census Block no.	Estimated number	Totals
Burchell's/ Hartmann's zebra	1	960	2 533
	2	807	
	3	434	
	4	255	
	5	-	
	6	-	
	7	10	
	8	13	
	9	-	
	10	-	
	11	54	
	12	-	
Springbok	1	78	1 461
	2	563	
	3	164	
	4	129	
	5	-	
	6	-	
	7	300	
	8	33	
	9	-	
	10	-	
	11	54	
	12	140	
Gemsbok	1	348	1 441
	2	453	
	3	197	
	4	134	
	5	20	
	6	-	
	7	32	
	8	62	
	9	6	
	10	-	
	11	88	
	12	101	

Table 1 (contd.)

Giraffe	1	51	
	2	90	
	3	44	
	4	-	
	5	-	
	6	-	217
	7	-	
	8	3	
	9	-	
	10	-	
	11	12	
	12	17	

Table 2: Age-sex classes of elephant determined by 24-hour counts at 24 waterholes in the western sector of Etosha (May 1983). Age classes are according to Laws (1969). +

Total number of elephants seen	Age-sex unknown		Adult (> 15 yrs.)				Juvenile (3-15 yrs.)		Calf (< 3 yrs.)	
			♂		♀					
	No.	%	No.	%	No.	%	No.	%	No.	%
873 ++	210	24	89	13	230	35	240	36	104	16

\+ Detailed count sheets have been placed on File N 18/2/1/9 at the Etosha Ecological Institute.

++ Number of groups = 96
Mean group size = 9
Range = 1 - 50

Table 3: Age classes of Burchell's and Hartmann's zebra determined by observations at 24 waterholes in the western sector of Etosha (May 1983). Age classes follow Smuts (1974) and Joubert (1971).

Species	Ratio of species (n1= 1 483 Burchell's) (n2= 1 631 Hartmann's)	Full grown (> 3 yrs.)		Juvenile (1-2 yrs.)		Foal (< 1 yr.)	
		No.	%	No.	%	No.	%
Burchell's	1 Burchell's: 1,1 Hartmann's	422	76	79	14	54	10
Hartmann's	1 Hartmann's: 0,91 Burchell's	246	83	20	7	30	10

Table 4: Total number of all animals counted at 24 waterholes, during 24-hour counts in the western sector of Etosha (May 1983). +

Species	Total number counted	Grand total
Hartmann's zebra	1 631	
Burchell's zebra	1 483	
Wildebeest	25	
Springbok	861	
Gemsbok	363	
Hartebees	46	
Kudu	54	
Eland	65	
Impala	-	5 840
Giraffe	89	
Warthog	114	
Roan	27	
Rhino	33 ++	
Elephant	873	
Lion	15	
Spotted Hyaena	9	
Brown Hyaena	3	
Jackal	121	
Ostrich	61	

\+ The detailed count sheets for each waterhole have been placed on File N 13/4/1/1 at the Etosha Ecological Institute.

++ A total of 40 rhino were counted from the aircraft.

2 654 Hartmann's zebra in the same area, a combined total of 4 595 zebra. Consequently the 1983 figures of 1 483 Burchell's and 1 631 Hartmann's zebra counted at waterholes can be safely regarded as absolute minimum figures since large numbers of zebra were seen at the rainwater pans during the aerial count.

Account must also be taken of the 499 Burchell's and 1 088 Hartmann's zebra removed by the capture team in 1981/82.

The foal count of a representative sample of 555 Burchell's and 296 Hartmann's zebra was 7 percent in both species. This indicates that immigration rather than a rapidly expanding resident population is the main reason for the increased numbers of zebra in the west of Etosha.

4.3 Springbok

Aerial estimate was 1 461 and the ground count 861 springbok. A sample of 320 showed that 75 (23%) was less than one year old. The 1982 aerial census gave a total of 2 708 springbok and the 1983 figures must be seen as a gross underestimate.

4.4 Gemsbok

Aerial estimates were 1 441 compared to the ground count of 363. As with all species, except elephant, these figures should be regarded as a gross underestimate of gemsbok numbers. In 1982 a total of 3 683 gemsbok were counted in the same area. A 1983 sample of 75 gemsbok gave a total of 18 immatures (24%). No young calves were seen at the waterholes which is predictable in the case of gemsbok, since the calves are hidden whilst the cows forage and drink (Walther, 1978).

4.5 Giraffe

Aerial counts were 217 and ground counts were 89. Again this is a gross underestimate of actual giraffe numbers. In 1982 the aerial census recorded 513 in the same area.

4.6 General

Upon completing the aerial census the aircraft carried out a series of random transects over the remaining areas of Etosha, namely Okaukuejo, Halali, and Namutoni, during a period of three days. Although the figures recorded for elephant sighted during these flights cannot be taken as an indicator of total numbers, we give them as follows: Okaukuejo (220), Halali (160), Namutoni (190), a total of 570 in addition to the figure of 1 819 counted in the west.

In the Namutoni area five fresh kudu carcases were sighted, some lying on the Etosha Pan in the vicinity of Poacher's Point. This contradicts our earlier supposition that rabid kudu would be more likely to be drawn to waterholes and die in their vicinity. Consequently, the mortality rate of kudu may be considerably higher than that obtained from checks at waterpoints.

The recent ground and aerial observations indicate that the rabies epidemic among Etosha's kudu has spread from Namutoni to Poacher's Point in the north and Okerfontein to the west.

5. ACKNOWLEDGEMENT

We appreciate the interest and enthusiasm of the pilot, Mr P. Lamusse, during the aerial counts.

6. REFERENCES

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Okaukuejo
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