PARC NATIONAL DE LA GARAMBA /

GARAMBA NATIONAL PARK PROJECT

RECENSEMENT GENERAL /

GENERAL AERIAL COUNT

MAY 1993

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Mbayma Atalia, Monungu Likango
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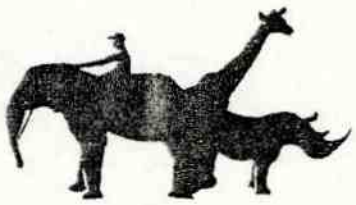

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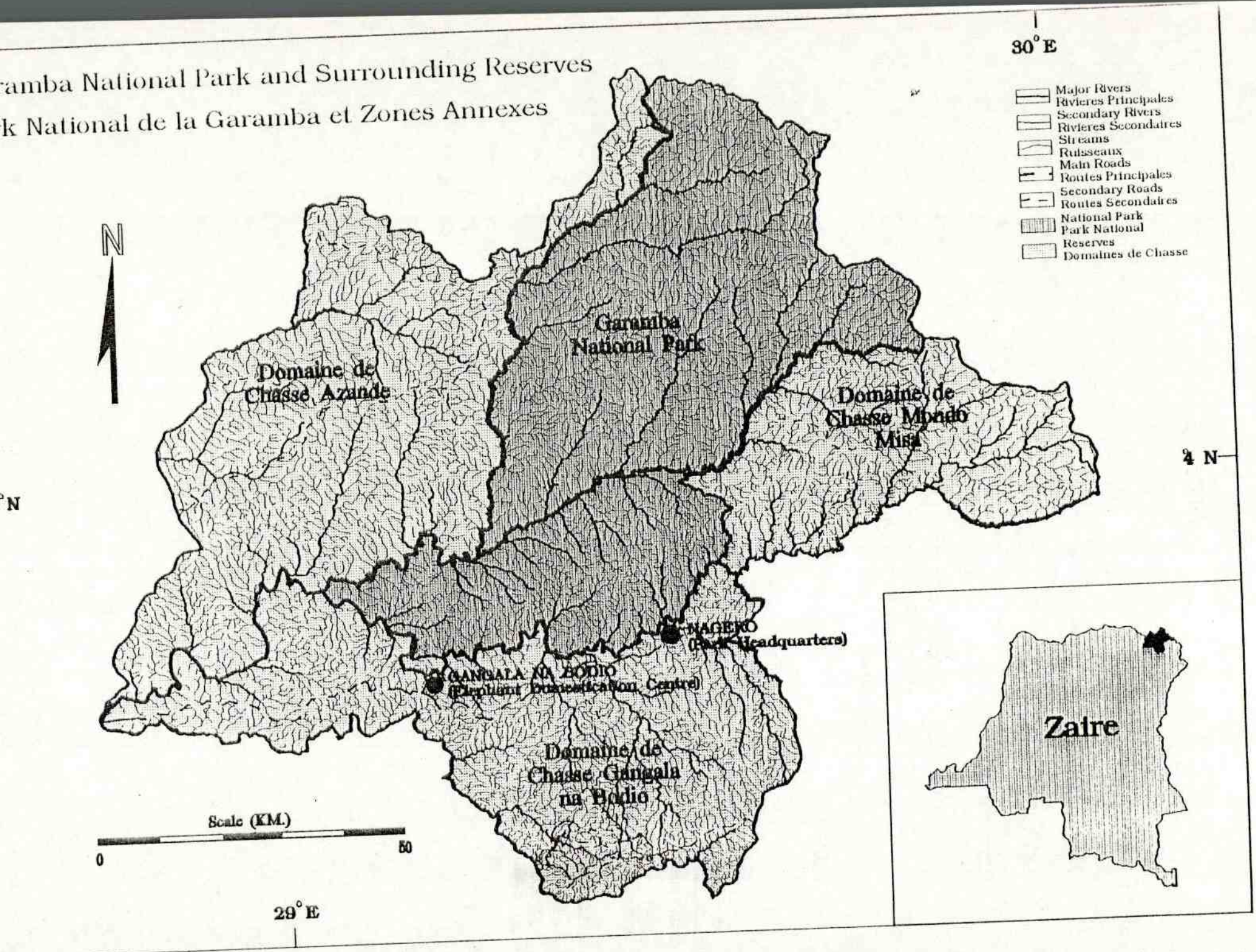

ramba National Park and Surrounding Reserves
k National de la Garamba et Zones Annexes
30° E
Major Rivers
Rivieres Principales
Secondary Rivers
Rivieres Secondaires
Streams
Ruisseaux
Main Roads
Routes Principales
Secondary Roads
Routes Secondaires
National Park
Park National
Reserves
Domaines de Chasse
N
Garamba
National Park
Domaine de
Chasse Azande
Domaine de
Chasse Mondo
Missi
4 N
°N
NAGERO
(Park Headquarters)
GANGALA NA BODIO
(Elephant Domestication Centre)
Domaine de
Chasse Gangala
na Bodio
Zaire
Scale (KM.)
0
50
29° E

GARAMBA NATIONAL PARK AND RESERVES

GENERAL COUNT 1993

INTRODUCTION

As part of the ecosystem monitoring carried out by the Garamba National Park Project, a general aerial census of the Park and surrounding Domaines de Chasse was carried out from the 10th to 17th May 1993.

The Garamba National Park (4,900 km^2) is situated between 4° and 3° North and 29° and 30° East in the north east corner of Zaïre, adjacent to the Sudan boundary. It is surrounded on three sides by Reserves (the Domaines de Chasse Azande, 2,892 km^2 to the west, Gangala na Bodio, 2,652 km^2 to the south, and Mondo Misa, 1,983 km^2 to the east). All these areas were counted. On the north east, within Sudan, the park is bordered by the Lantoto Game Reserve. Due to the political situation this area was not counted.

The park is situated within the sudano-guinean savanna biome. The southern two thirds of the park comprises long grass savanna dominated by *Loudetia arundinacea* with *Hyparrhenia* species. The Reserves are dominated by a complex of deciduous *Combretum* woodland and gallery forest. Within them is limited human settlement and gold mining.

The first aerial census of the area was carried out in 1976 (Savidge et al 1976) by an FAO project. Since then the ecosystem has been censused in 1983 during a survey of northern white rhinos (*Ceratotherium simum cottoni*) (Hillman et al 1983) and since 1984 as part of the Garamba National Park project. (Hillman Smith 1989)

The basic counting method has remained standard throughout, but methods of analysis have varied. The 1993 count was carried out in conjunction with the establishment at Garamba of a Global Information System (GIS) for data handling and analysis. The GIS programme IDRISI has been used in mapping the vegetation cover, and a Garmin Global Positioning System (GPS) was used to locate the positions of transects and sub-units.

METHODS

The counting method was the standard aerial systematic transect sampling count described by Norton Griffiths (1978) used throughout east Africa. Heights, strip widths and general application of the method have been standard throughout the series of counts. Analysis was carried out using Jolly's method 2 (Norton Griffiths 1978) in the spreadsheet programme Quattro, and mapping used Idrisi and ArcInfo.

Aircraft:	Cessna 206, 9Q-CBR
Pilot:	Fraser Smith
Front Seat Obs.:	Kes Smith
Middle Seat Obs.:	Mbayma Atalia
	Monungu Likango
Rear Seat Obs.:	Emmanuel de Merode
	Eza Kobode
	John Watkin
	Amube Ndey
Analysis design:	John Watkin
Mapping:	Emmanuel de Merode
Analysis:	John Watkin, Kes Smith. All contributed data entry.
Census zone:	Garamba National Park and Domaines de Chasse Azande, Gangala-na-Bodio and Mondo-Misa Total area 15,175 km^2

Stratification:

For analysis the area was divided into Park and Domaines de Chasse. The park was stratified on the basis of elephant density. Areas are as follows:

Park:	5,500 km^2
North Park:	3,550 km^2
South Park:	1,950 km^2
Domaines:	9,675 km^2

Sample intensity:

6.7 %

Transects were spaced at 5 km intervals and flown North/South Strip widths were preset according to Norton Griffiths (op.cit.) and calibrated by flying at different heights over markers spaced at 20 metre and 100 metre intervals on the airstrip. Observers counted the numbers of spaces between markers included within the strip widths, to calculate the observed widths. These passes were carried out both during training, before counting began and at the beginning and end of each counting flight. The results are shown in Figure 2, and were used to calculate strip widths for each transect and sub-unit.

On the basis of this calibration the average combined strip width for middle seat observers was:

Total area:	333.3 m.
Park:	335.3 m.
North:	333.9 m.
South:	336.7 m.
Domaines:	369.8 m.

Average Height: 348 ft a.g.l.
Heights a.g.l. per sub-unit were recorded by the front seat observer and used in combination with calibrated strip widths to calculate sample areas per sub-unit, which were then used in the calculations of population estimates.

Positioning: Transects were sub-divided into 5 km sub-units. The GPS was pre-programmed to locate the beginnings and ends of every transect. Sub-units boundaries were located by distance from the end of transect in 5 km multiples.

Season: This general ecosystem census aimed primarily at animal numbers is always timed for the beginning of the wet season, which is the time of maximum visibility. The grass is short and the air is cleared of the haze which prevails in the dry season.

Species: Species were counted by both middle and rear seat observers, as listed on the Table: Codes des Especes. Signs of human habitation and land use were also counted. Elephant and other species carcases were classified as:

FR Fresh, with flesh present
BR Recent bones, with rot patch present
BW Bones white and old

In this high rainfall, high scavenger density environment, fresh recognisable rot patches remain for a considerably shorter time than in east Africa. Carcases monitored have usually remained at stage BR less than two months.

Habitat factors : Within each sub-unit the front seat observer recorded the height a.g.l. as measured by the radar altimeter and estimated percentages of the following habitat parameters in units of 10% intervals:

Tree cover, as percent of sub-unit
Tree greenness as percent of trees present
Bush cover, as above
Bush greenness, as above
Grass cover, as above
Grass greenness, as above
Long old grass, as percent of grass present

Burn, as percent in sub-unit
Water availability,

0 = none
1 = available to humans and livestock
2 = limited availability
3 = unlimited availability
4 = running water
5 = floods

Agriculture, as percent in sub-unit
Vegetation zones

Mapping: Vegetation maps were produced using IDRISI in a Toshiba 3300SL. A topographic map of the park and reserves was produced using Arc/Info.

Observers: The middle seat observers had previous counting experience over the park. The rear seat observers were gaining experience in this particular field, and the two sets of data were analyzed separately and used comparatively.

PARC NATIONAL DE LA GARAMBA, RECENSEMENT GENERAL

CODES DES ESPECES

CODE	NOM FRANCAIS	NOM ANGLAIS
EL	Elephant	Elephant
RH	Rhino	Rhino
HI	Hippopotame	Hippo
CO	Cobe de buffon	Kob
BU	Buffle	Buffalo
GI	Girafe	Giraffe
BL	Bubale	Hartebeest
WB	Waterbuck	Waterbuck
RO	Antelope rouane	Roan
RE	Redunca	Reedbuck
OR	Ouribi	Oribi
GU	Guib harnache	Bushbuck
CG	Cephalophe Grimm	Grey duiker
CJ	Ceph. jaune	Yellow-backed duiker
CR	Ceph. dos rouge	Red-flanked duiker
ED	Eland	Eland
SI	Sitatunga	Sitatunga
PH	Phacochere	Warthog
HY	Hylochere	Giant Forest hog
PO	Potamochere	Bushpig, Red river hog
LI	Lion	Lion
HY	Hyene	Hyena
LE	Leopard	Leopard
BN	Babouin	Baboon
SC	Singe colobe	Black & White Colobus
SP	Singe Patas	Patas monkey
SB	Singe de Brazza	De Brazzas monkey
SV	Singe vervet	Vervet monkey

Carcases ou des os d'elephant, ou d'autres especes.
Registrez l'espece si possible ou non-identifie sous NOTES

FR	Carcase fraiche	Fresh carcase
BR	Os recent avec aire de pourriture	Bones recent with rot patch
BW	Os blanc ou gris sans pourit	Bones white or grey without rot patch

Signes des humains

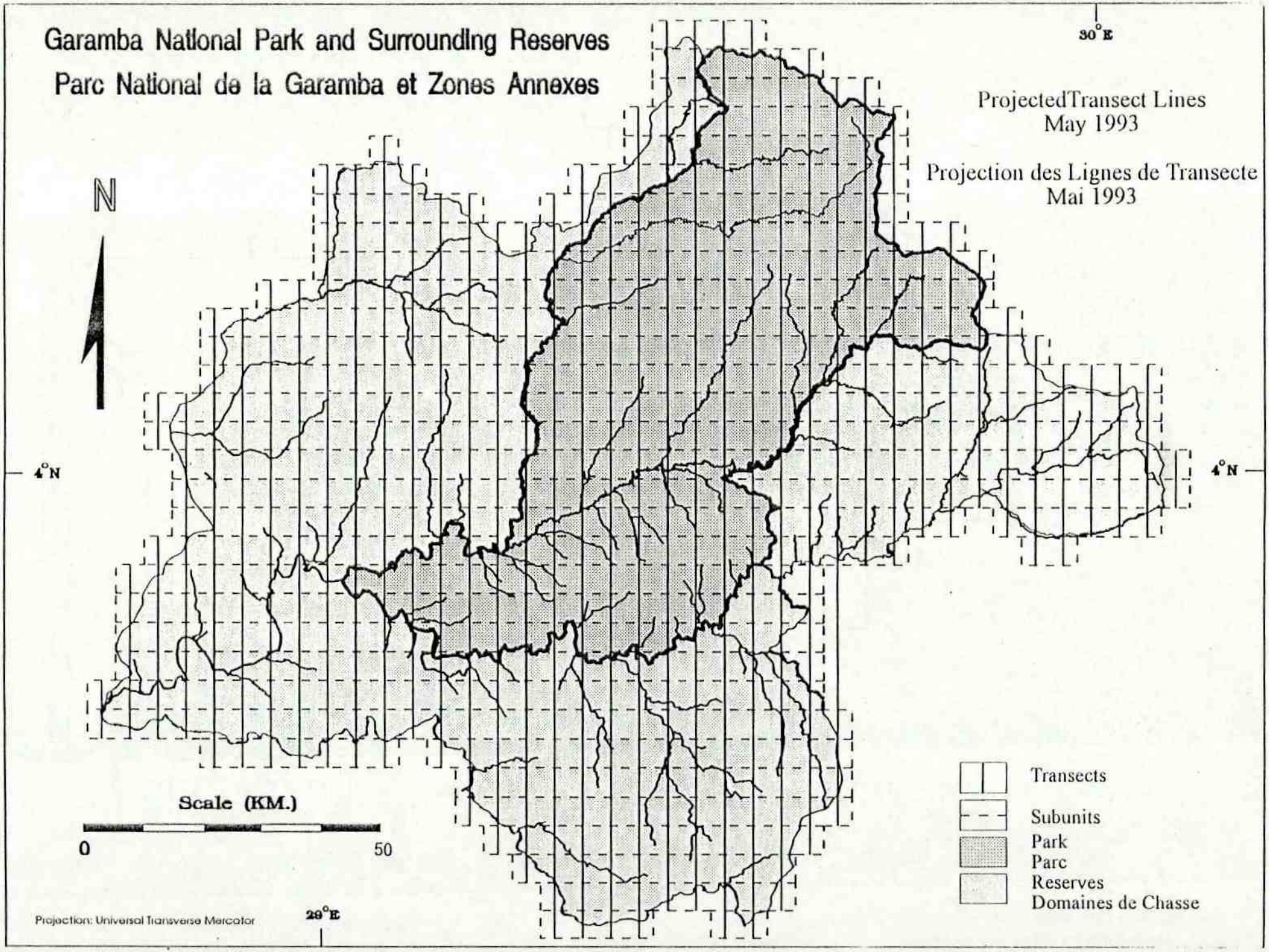
VA	Vaches	Cattle
SH	Chevres/moutons	Shoats
MH	Maison d'habit'n	Living hut
MA	Maison abandonne	Abandoned hut
AS	Ancien site d'hab	Old living site
	Sous notes classifiez comme village ou famille/ en route ou en sentier	
RT	Route	Road
SE	Sentier	Footpath
CB	Camp.braconniers	Poachers camp (recent)
CA	Camp.ancien	Old poachers camp
PE	Peche	Fishing
MI	Mine	Mine
MA	Mine abandone	Abandoned mine site

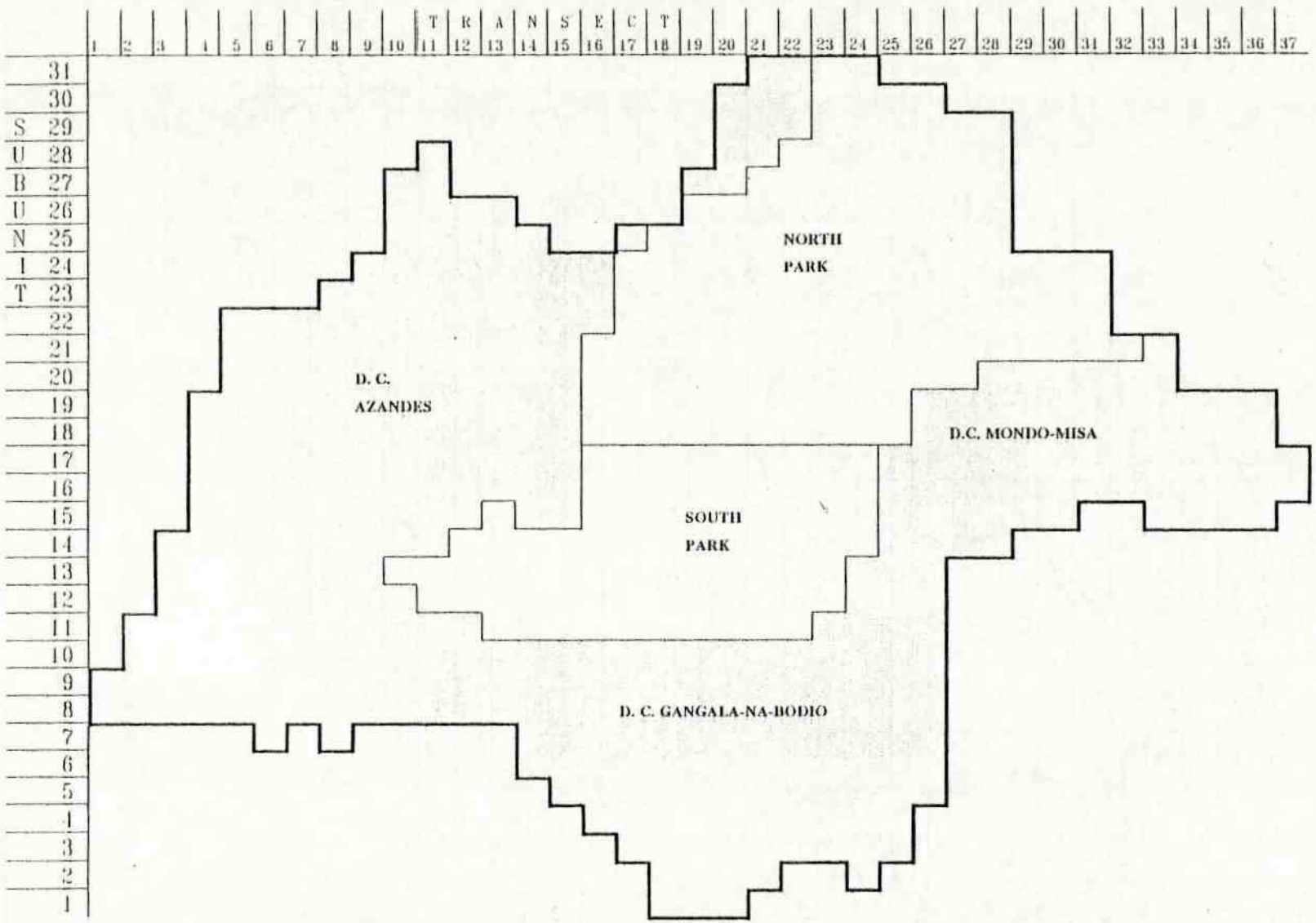
Parc National de la Garamba

General Count–May 1993

GPS Waypoints

Transect	South		North	
1.	03.34.50	28.33.36	03.40.14	28.33.36
2.	03.34.50	28.36.18	03.48.20	28.36.19
3.	03.34.50	28.39.01	03.53.44	28.39.01
4.	03.34.50	28.41.44	04.07.14	28.41.44
5.	03.34.50	28.44.27	04.09.56	28.44.27
6.	03.32.08	28.47.10	04.15.20	28.47.10
7.	03.34.50	28.49.52	04.15.20	28.49.20
8.	03.32.08	28.52.34	04.18.02	28.52.35
9.	03.34.50	28.55.18	04.20.44	28.55.18
10.	03.34.50	28.58.01	04.28.52	28.58.01
11.	03.34.50	29.00.43	04.28.52	29.00.43
12.	03.34.50	29.03.25	04.26.08	29.03.25
13.	03.34.50	29.06.08	04.26.08	29.06.08
14.	03.29.26	29.08.51	04.23.26	29.08.51
15.	03.26.43	29.11.34	04.20.44	29.11.34
16.	03.24.02	29.14.17	04.20.44	29.14.17
17.	03.21.20	29.16.59	04.23.26	29.16.59
18.	03.15.56	29.19.42	04.23.26	29.19.42
19.	03.15.56	29.22.25	04.28.50	29.22.25
20.	03.15.56	29.25.08	04.28.50	29.25.08
21.	03.18.38	29.27.50	04.39.38	29.27.50
22.	03.21.20	29.30.33	04.39.38	29.30.33
23.	03.21.20	29.33.16	04.39.38	29.33.16
24.	03.18.38	29.35.59	04.39.38	29.35.59
25.	03.21.20	29.38.41	04.36.56	29.38.41
26.	03.26.44	29.41.24	04.36.56	29.41.24
27.	03.51.02	29.44.07	04.34.14	29.44.07
28.	03.51.02	29.46.49	04.34.14	29.46.49
29.	03.53.44	29.49.32	04.20.44	29.49.32
30.	03.53.44	29.52.15	04.20.44	29.52.15
31.	03.56.26	29.54.58	04.20.44	29.54.58
32.	03.56.26	29.57.40	04.12.38	29.57.40
33.	03.53.44	30.00.18	04.12.38	30.00.18
34.	03.53.44	30.03.05	04.07.14	30.03.05
35.	03.53.44	30.05.48	04.07.14	30.05.48
36.	03.53.44	30.08.31	04.07.14	30.08.31
37.	03.56.26	30.11.14	04.01.50	30.11.14


Garamba National Park and Surrounding Reserves
Parc National de la Garamba et Zones Annexes
30°E
ProjectedTransect Lines
May 1993
Projection des Lignes de Transecte
Mai 1993
N
4°N
4°N
Scale (KM.)
0
50
Transects
Subunits
Park
Parc
Reserves
Domaines de Chasse
Projection: Universal Transverse Mercator
29°E



RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DES DOMAINES DE CHASSE, STRATA

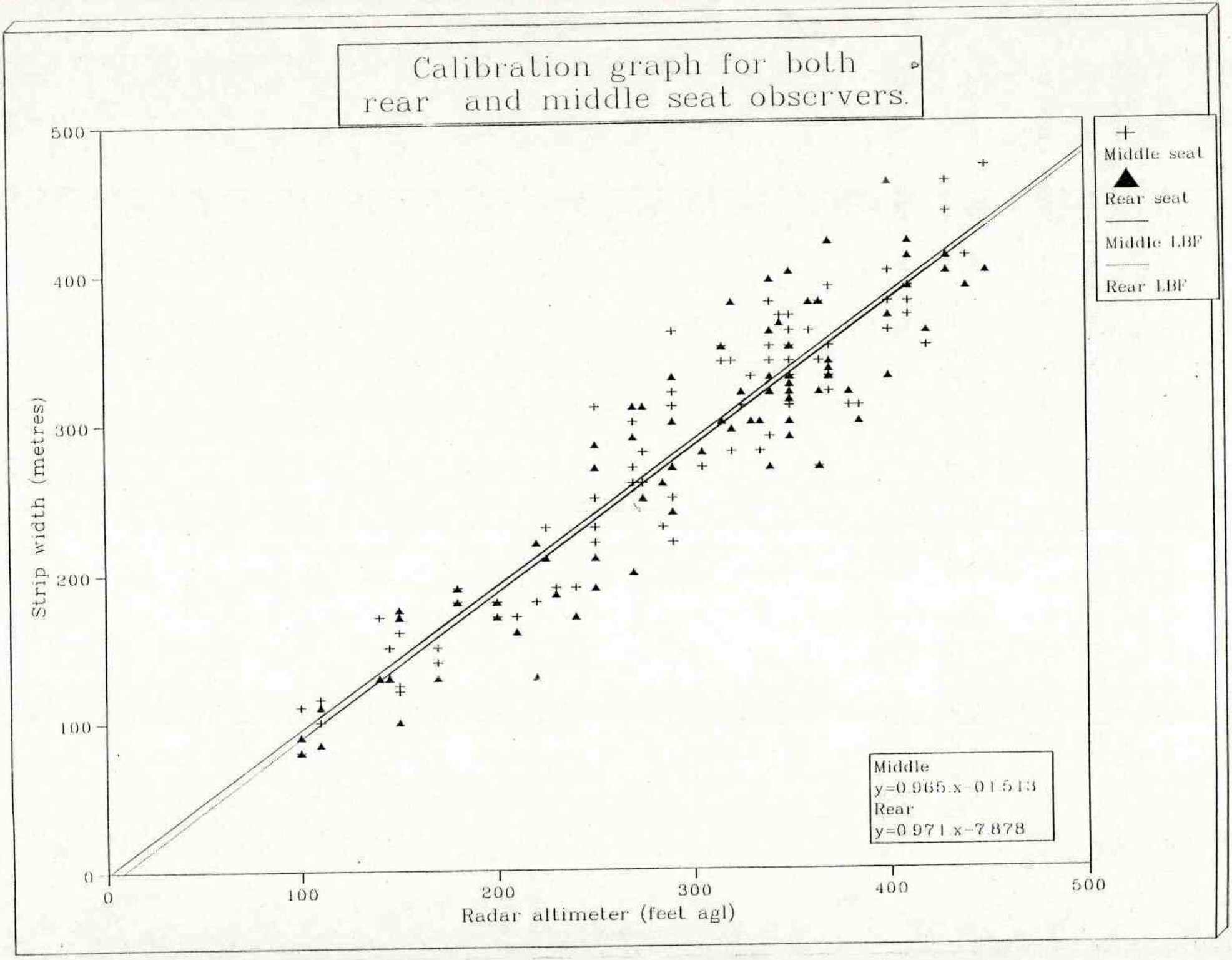
RESULTS

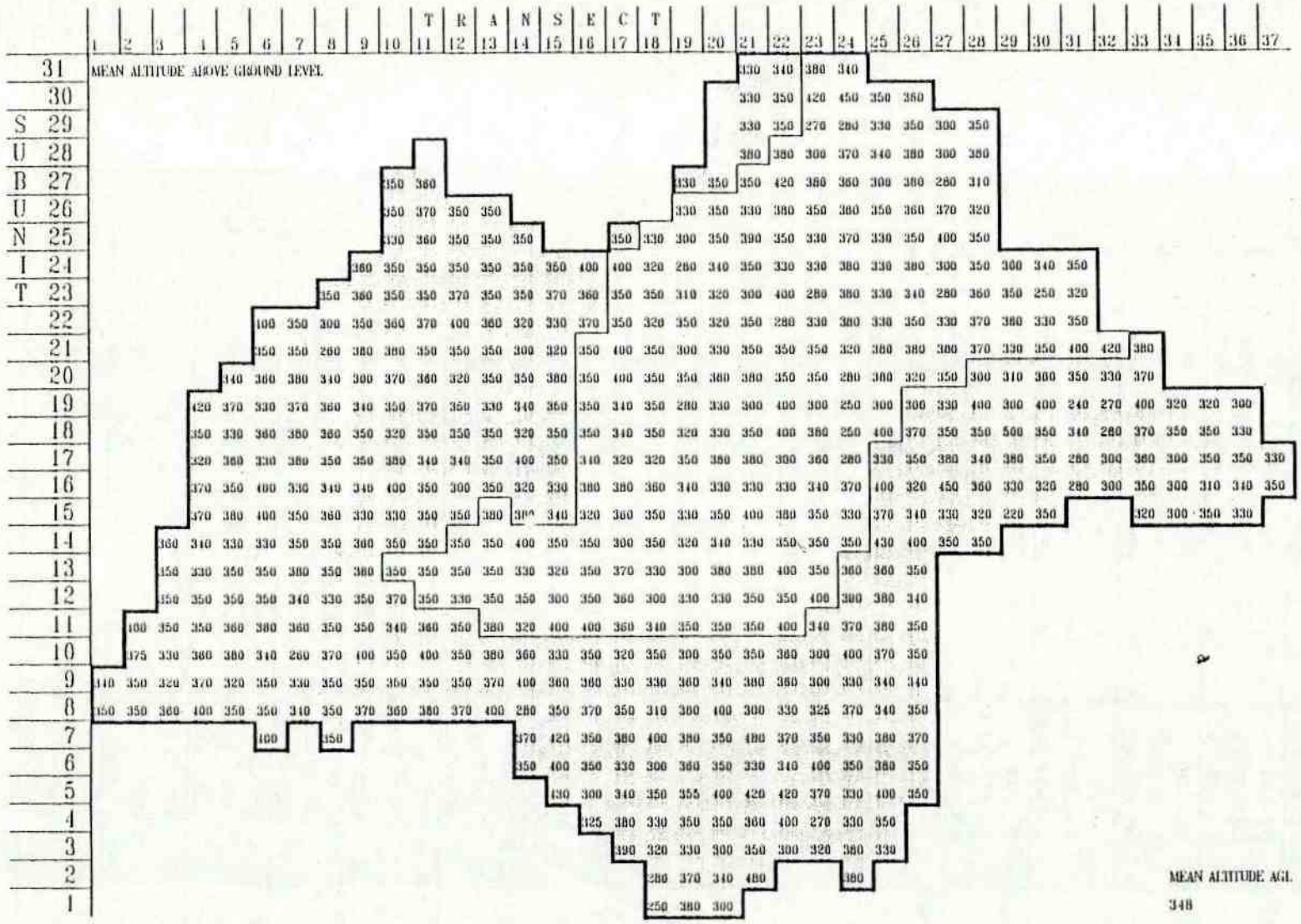
The **calibration graph** shows the results of all calibration flights over the markers, for both middle and rear seat observers. The regression formulas were used in the calculations of actual strip width in combination with the **map of altitudes** per sub-unit. These figures were then combined with the maps of animal observations to calculate population estimates,

All species results for the total area and for the strata and combined estimates are given in the following **tables.**

The maps plot **animal distributions** based on direct observations and on **densities. Vegetation presence and condition** is plotted using IDRISI and ArcInfo.

A **summary table** gives species totals based on the combined stratified estimates and on densities per km^2 and biomasses per km^2.


Calibration graph for both rear and middle seat observers.
Strip width (metres)
Radar altimeter (feet agl)
0
100
200
300
400
500
Middle seat
Rear seat
Middle LBF
Rear LBF
Middle
y=0.965.x-01513
Rear
y=0.971.x-7.878



MEAN ALTITUDE PER TRANSECT

230 369 346 361 352 361 350 342 354 355 359 349 358 347 357 338 357 332 335 346 360 361 341 347 357 353 343 349 340 340 323 317 364 274 336 330 340

RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DES DOMAINES DE CHASSE, MAI 1993

PARC NATIONAL DE LA GARAMBA. GENERAL CENSUS MAY 1993

SUMMARY OF POPULATION TOTALS, DENSITIES AND BIOMASSES

SPECIES	POPULATIONS:	STRAT.	PARK	NORTH	SOUTH	DOMAINE
ELEPHANT	TOTALS	8883	8768	1194	7511	178
	DENSITIES/Km2	0.58	1.59	0.34	3.85	0.02
	BIOMASS/Km2	1461.24	3985.39	840.9	9629.87	45.99
BUFFALO	TOTALS	31163	30665	16188	14426	549
	DENSITIES/Km2	2.04	5.58	4.56	7.4	0.06
	BIOMASS/Km2	1050.27	2871.35	2348.4	3810.07	29.21
HARTEBEESTE	TOTALS	3523	3444	1496	1937	89
	DENSITIES/Km2	0.23	0.63	0.42	0.99	0.01
	BIOMASS/Km2	35.78	97.06	65.33	54	1.43
KOB	TOTALS	7247	6738	484	6200	5634
	DENSITIES/Km2	0.48	1.23	0.14	3.18	0.06
	BIOMASS/Km2	42.97	110.25	12.26	286.14	524
WATERBUCK	TOTALS	1465	1113	408	700	356
	DENSITIES/Km2	0.1	0.2	0.11	0.36	0.04
	BIOMASS/Km2	19.25	40.47	22.99	71.84	7.36
WARTHOG	TOTALS	2844	2692	922	1759	163
	DENSITIES/Km2	0.19	0.49	0.26	0.9	0.02
	BIOMASS/Km2	13.07	34.26	18.18	63.13	1.18
HIPPO	TOTALS	1014	1022	60	954	0
	DENSITIES/Km2	0.07	0.19	0.02	0.49	0
	BIOMASS/Km2	73.48	204.53	18.73	538.05	0
REEDBUCK	TOTALS	75	75	45	30	0
	DENSITIES/Km2	0.01	0.01	0.02	0	0
	BIOMASS/Km2	0.29	0.82	0.77	0.92	0
BUSHBUCK	TOTALS	179	75	76	0	104
	DENSITIES/Km2	0.01	0.01	0.02	0	0.01
	BIOMASS/Km2	0.83	0.96	1.49	0	0.75
ORIBI	TOTALS	91	90	91	0	0
	DENSITIES/Km2	0.01	0.02	0.03	0	0
	BIOMASS/Km2	0.09	0.26	0.41	0	0
GREY DUIKER	TOTALS	90	75	76	0	15
	DENSITIES/Km2	0.01	0.01	0.02	0	0
	BIOMASS/Km2	0.12	0.27	0.43	0	0.03
YB DUIKER	TOTALS	60	15	15	0	45
	DENSITIES/Km2	<0.01	<0.01	<0.01	<0.01	<0.01
	BIOMASS/Km2	0.08	0.05	0.09	0	0.09
RF DUIKER	TOTALS	165	120	91	30	45
	DENSITIES/Km2	0.01	0.02	0.03	0.02	0
	BIOMASS/Km2	0.22	0.44	0.51	0.31	0.09
RHINO	TOTALS	60	60	0	60	0
	DENSITIES/Km2	0	0.01	0	0.03	0
	BIOMASS/Km2	5.89	16.41	0	45.86	0
ROAN	TOTALS	151	150	151	0	0
	DENSITIES/Km2	0.01	0.03	0.04	0	0
	BIOMASS/Km2	1.47	4.1	6.39	0	0
BUSHPIG	TOTALS	45	0	0	0	45
	DENSITIES/Km2	0	0	0	0	0
	BIOMASS/Km2	0.27	0	0	0	0.41

DISCUSSION

Methods

The use of the GPS proved excellent in locating and guiding the transects and locating sub-unit boundaries. A more sophisticated Trimble, compatible with UTM and with software to plot the flight paths would be even better.

There was a training aspect to the count. Six middle/rear seat observers gained experience in the system of counting, data entry and analysis. There are now four long term IZCN observers at the park. With the two consultant members of the team (JW & EdM) the system of count analysis has now been revised and made compatible with the GIS system being adopted at the park. A standard method has been established using base map spread sheets in Quattro into which the raw data is entered by each pair of observers. The average heights above ground level are combined with the calibration formulae to give strip widths per sub-unit, which are brought into the calculations by combining the different spreadsheets. The GIS system IDRISI is used in mapping the vegetation cover. The base data sheets and methods of analysis are being written up as a separate guide.

Stratification of analysis was based on elephant distribution within the park and on the difference between park and reserves. The combined stratified analyses reduced the confidence limits of the order of 10 to 50% for different species. For elephants it was reduced to a standard error of 35% at 95% confidence limits.

Animal numbers

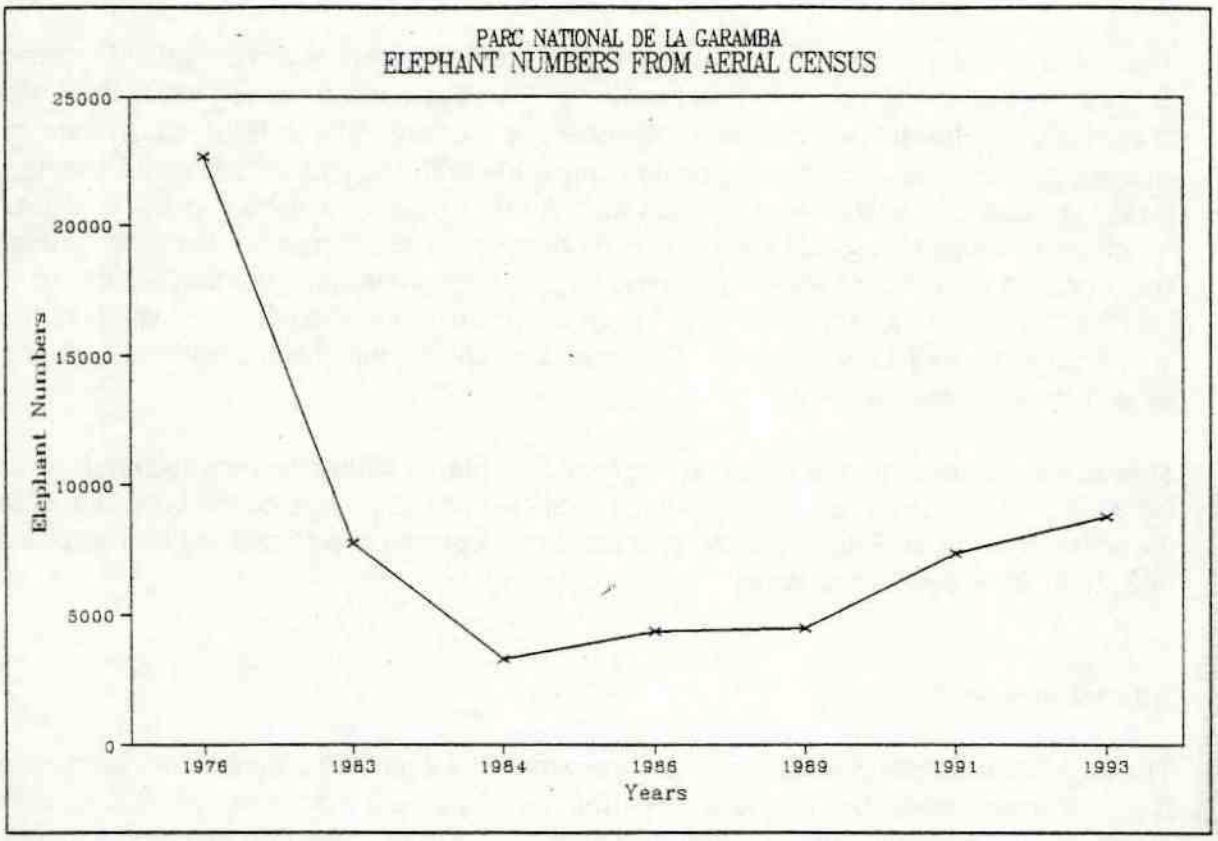
The population estimates within the Park from the 1991 count are included for comparison. All species numbers with the exception of buffalo and hippo are higher in 1993. It is difficult to assess exactly how much of this difference may be due to improved observer technique, but the middle seat observers were standard throughout both counts.

The reduction in buffalo numbers is not significant within the confidence limits, but may be a real reflection of the increased poaching due to the availability of arms and ammunition in the area from the Sudan war and to the pressures of a reduced economy and the presence of several thousand refugees.

This type of count is not ideal for hippos, which tend to be very local in distribution and for which correction factors are necessary to deal with numbers above or below water. A specialised hippo count made in 1988 (Hillman Smith 1989) calculated a correction factor of 58% for direct counts of hippos. Applying this factor to the current numbers would indicate a hippo population more of the order of 1748 individuals. Their distribution remains the same as that found in 1988, with a concentration along rivers bordered along both sides by protected areas. Very few occur along the rivers which form the boundaries of the park, where they are more vulnerable to poaching from the human population in the domaines de chasse.

Rhino numbers of 60 $\pm$ 57 are almost twice the number of 31, known from individual recognition to exist, but with such small numbers confidence limits are inevitably extremely proportionately high.

Elephant numbers have continued to rise. The graph indicates the trend in elephant numbers estimated by this method of aerial census from 1976 to the present. The figures are presented in the Table. The 1984 count was carried out



during the late dry season with the primary aim of examining seasonal distribution. It is not a period of good visibility due to the long grass and the figures were probably lower than would have been achieved at a season comparable to the other counts. There had been a drastic reduction in elephant and rhino numbers due to poaching between 1976 and the start of the project in 1984. Poaching of elephants was brought under control through the combined action of the project and the IZCN staff, as evidenced by the change on carcase ratios from 1 dead : 8 live in 1983 through 1 : 23 in 1984, 1 : 86 in 1986 to 1: 576 in 1991 (Hillman Smith 1989 and own data).

Elephant numbers from aerial counts.

DATE	EST.in PARK	± S.E.	EST.in DOM.	METHOD	SOURCE
1976	22,670	± 11,790	-	Aer.syst.sample	Savidge et al 76
1983	7,742	± 3,690	0	" " "	Hillman et al 83
1984	3,300	± 509	-	" " "	Hillman Smith 89
1986	4,339	± 1,648	0	" " "	Hillman Smith 89
1989	>4,065		-	Aer.block count	Hillman Smith 89
1991	7,389	± 2,922	231	Aer.syst.sample	Own data
1993	8,705	± 1,584	178	" " "	Smith et al 93

There continued to be a time lag in recovery of the elephant population, however, probably due to losses of juveniles, whose mothers had been eliminated, the two year gestation period and the time taken to re-establish a good breeding cohort. In 1991 and 1993 the increase in the elephant population resulting from better protection is becoming obvious.

During April and May, the early wet season, the elephants tend to aggregate into large groups. One such group of approximately 600 elephants was seen outside the count boundaries, indicating that the population estimate is probably a minimum and numbers may be higher.

Despite an increase in poaching indicated by patrol monitoring, no fresh elephant or other large mammal carcases were seen in transect, although they break down very quickly, particularly in the wet season. Monitoring of carcases has indicated that depending on whether a carcase was situated on an existing clear termitaria patch or not it may become indistinguishable anything from two weeks to two months post death. This is in considerable contrast to arid areas where, for example in Amboseli National Park, Kenya, elephant carcases have been visible ten years after death.

There continues, however to be poaching pressure from the north, which is currently increasing due to arms that are available from the Sudan war and to the national economic situation. Due to the location of the controlling head-quarters in the south, and to the long narrow shape of the park, poaching is more difficult to control in the north. This is evidenced by the distribution map of the elephants. As a result there is a high elephant density in the south of the park ($3.85/km^2$). Over many years, this and the action of fires has exacerbated a contrast between a grassland habitat within the park and a domination of woodland in the surrounding reserves. Better protection and the increasing elephant population has therefore led, since 1991 to more numerous and longer term movements of elephants outside the park, particularly into the Domaine de Chasse Gangala na Bodio to the South. These movements and the presence of elephants in the domaine during the day showed up on both the 1991 and 1993 distribution maps. Large numbers of elephants were seen along the southern peripheries of the park either entering the park in the early mornings or waiting to cross into the domaine in the evenings.

This has in turn resulted in increasing negative elephant/human interactions and to vegetation modifications. This elephant question needs urgent examination and integrated management planning and action is required for the park and reserves together for the sake of long term conservation of the ecosystem.

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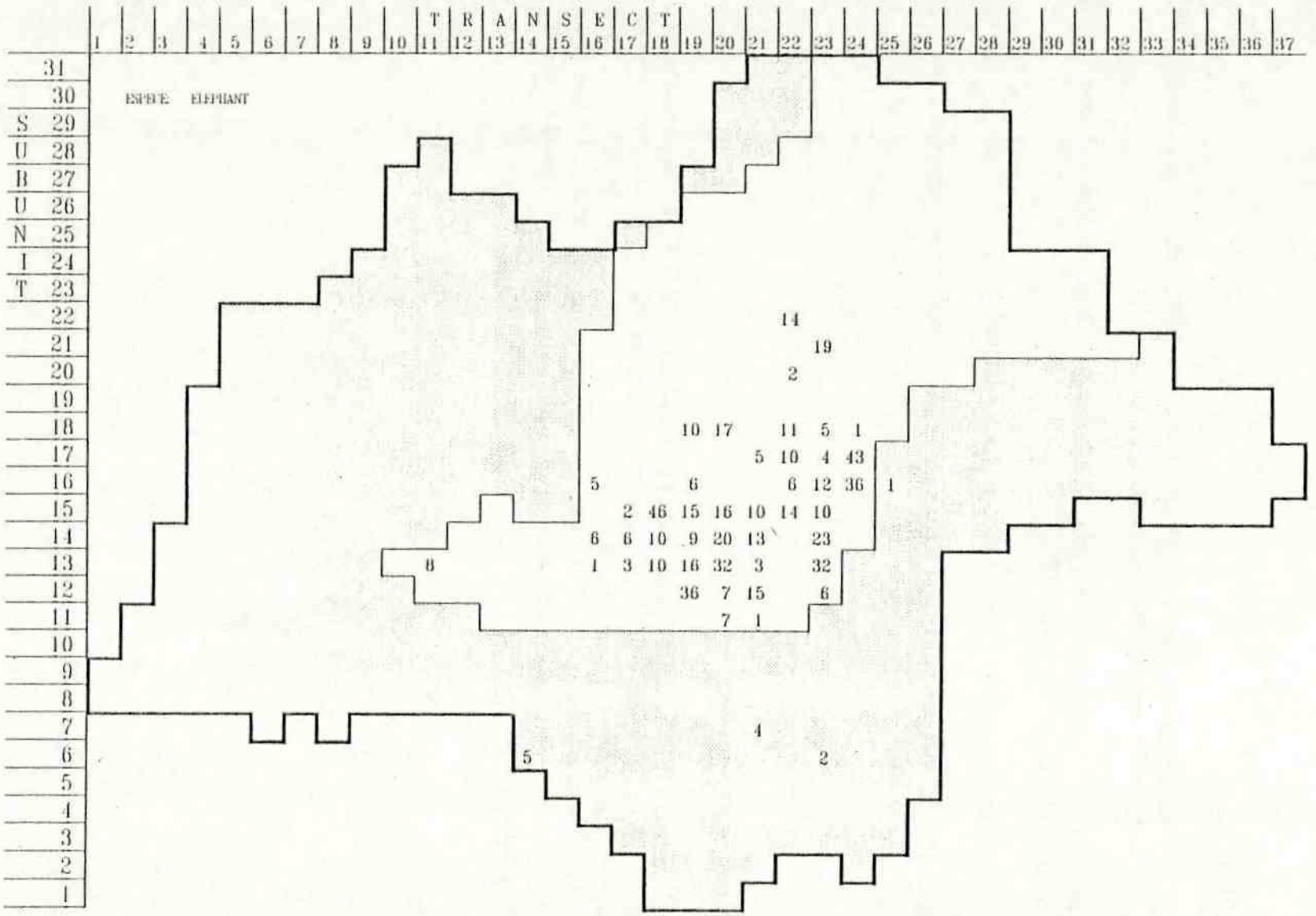
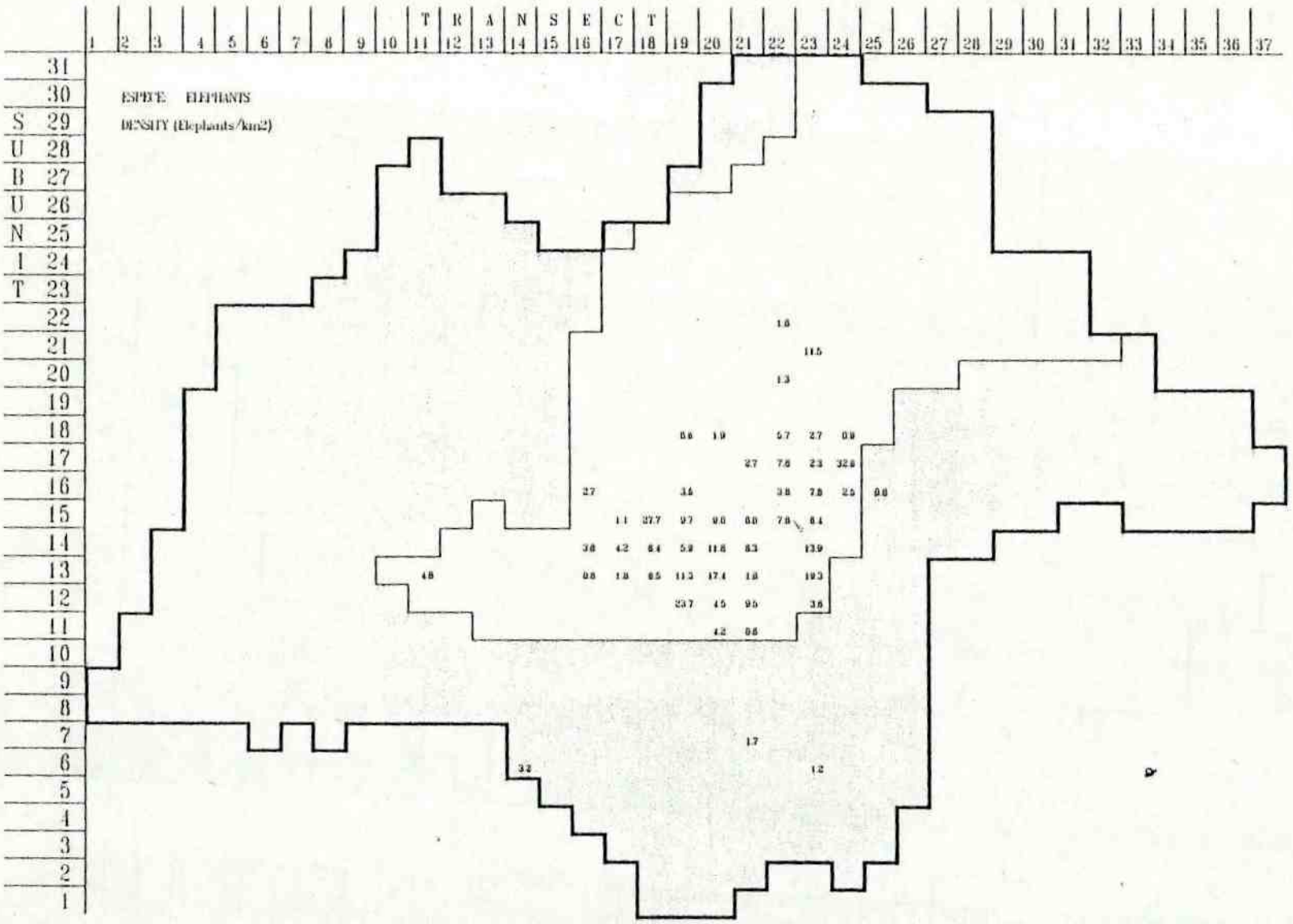


RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DES DOMAINES DE CHASSE, MAI 1993



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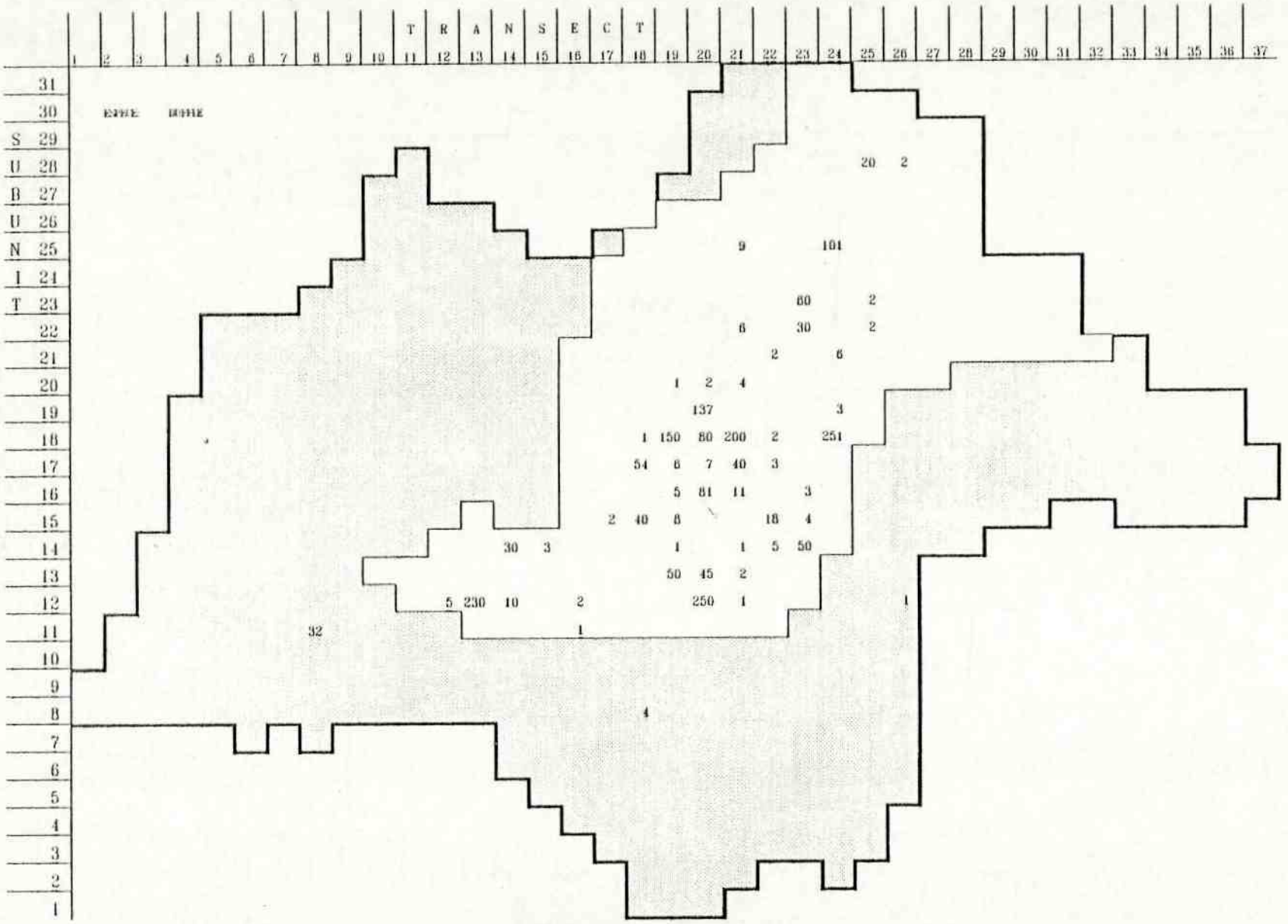

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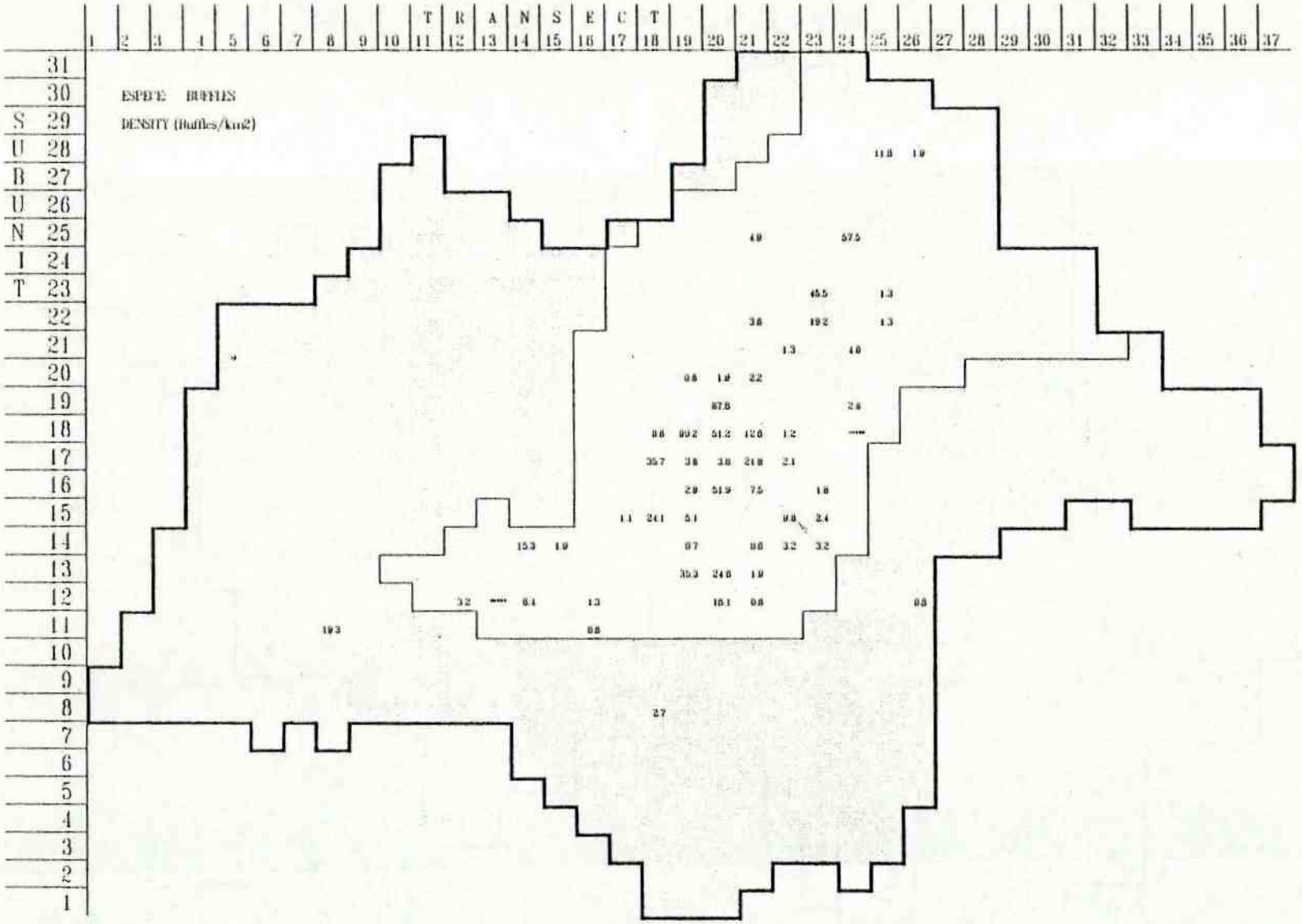

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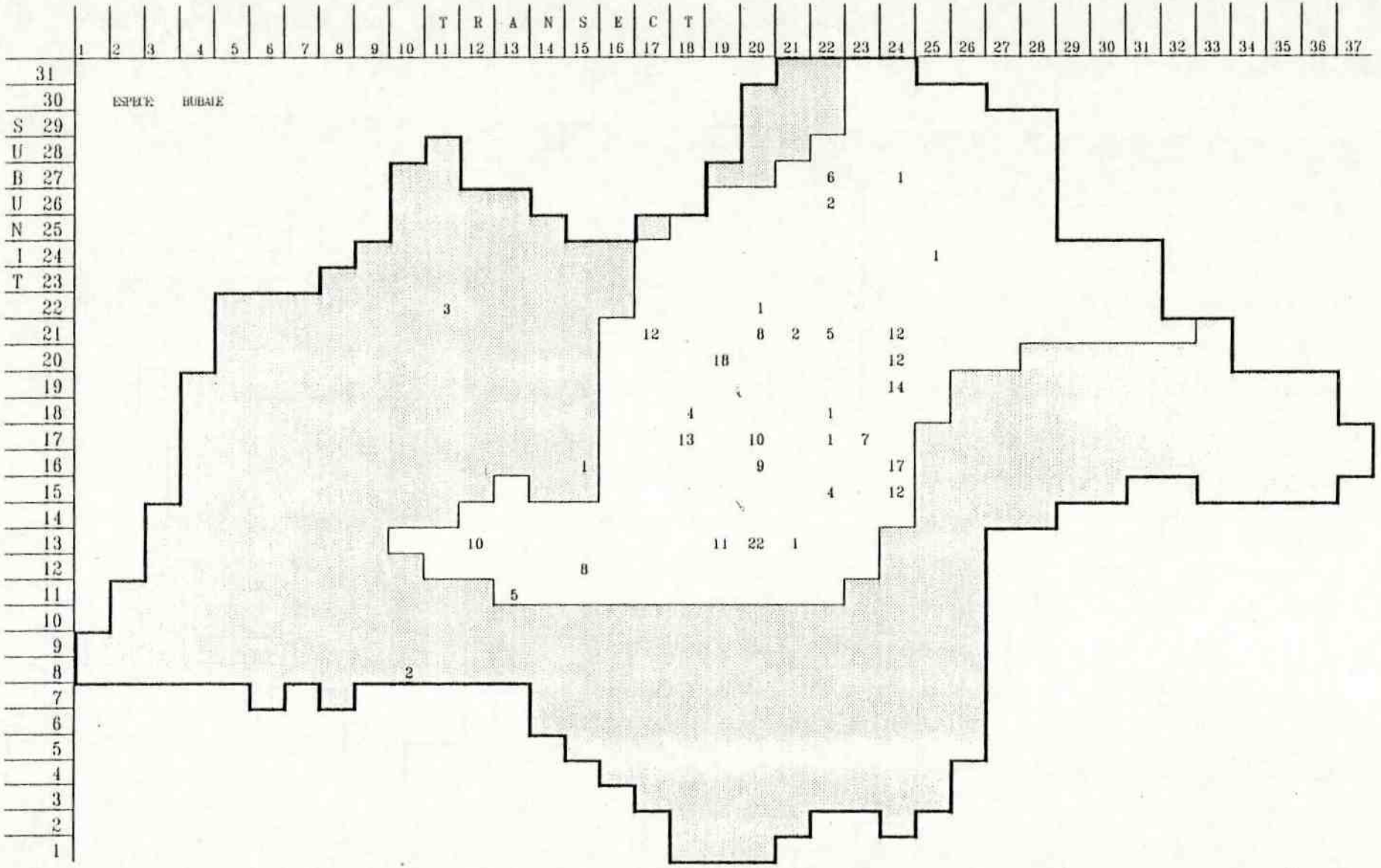

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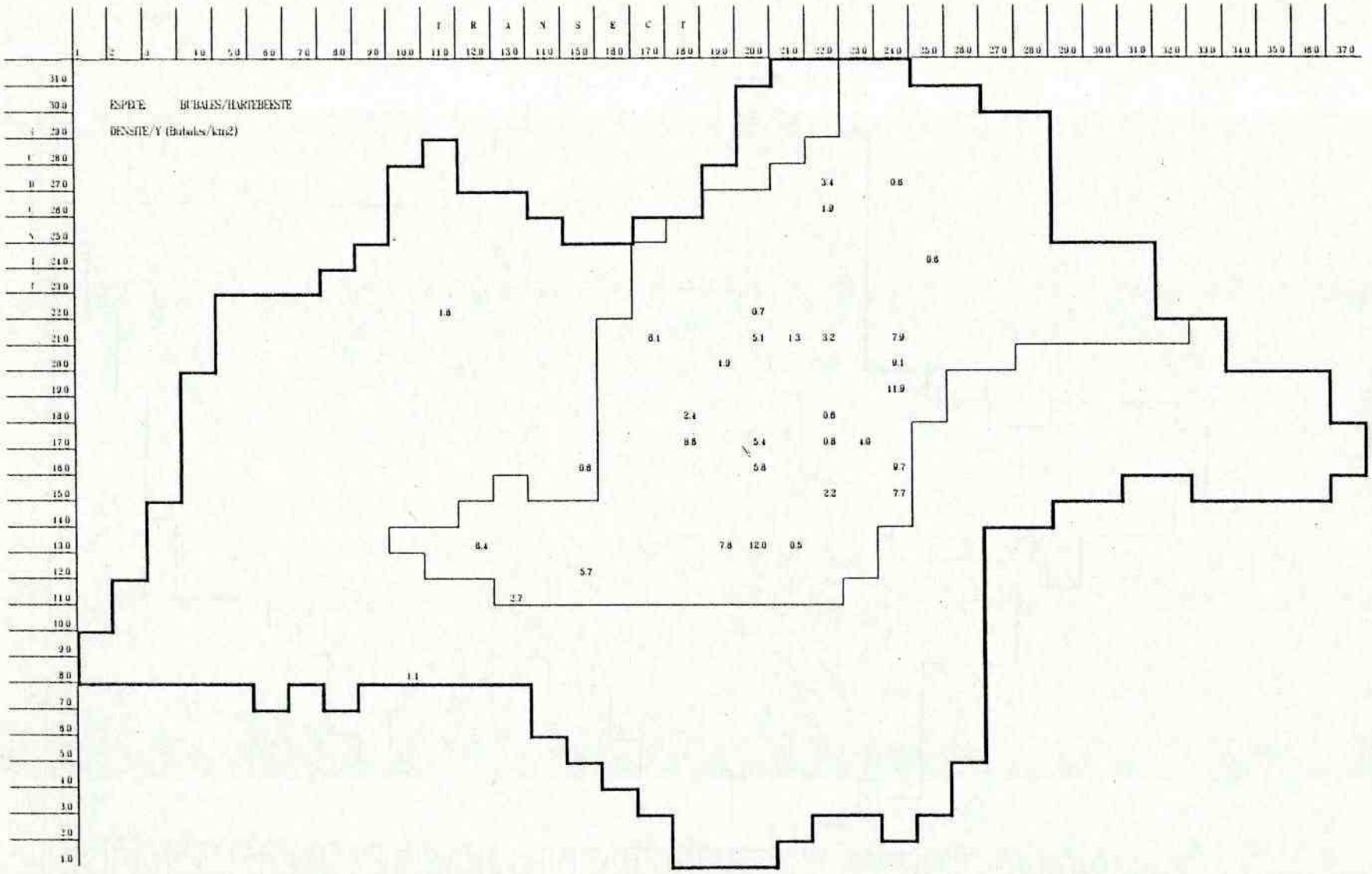
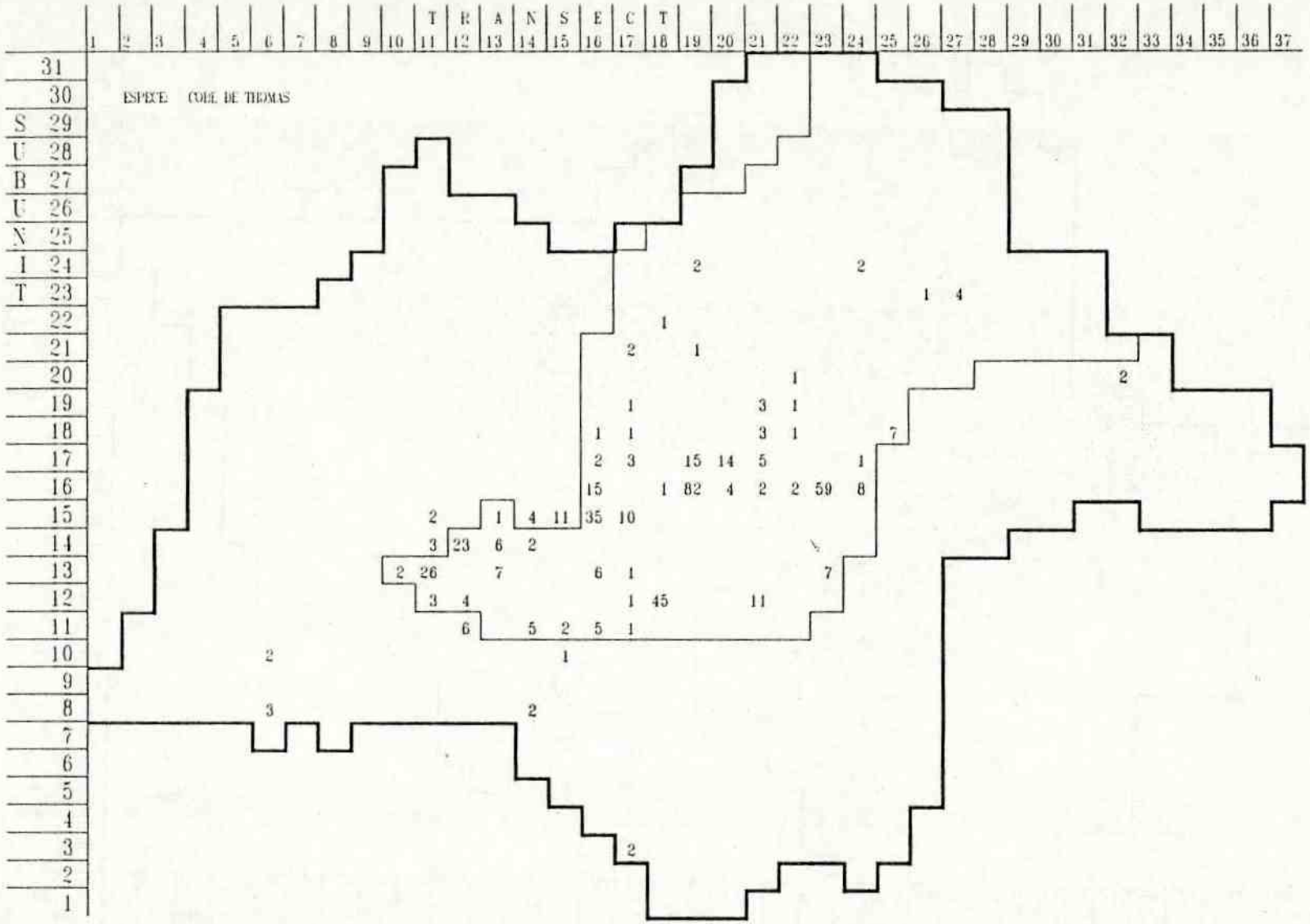
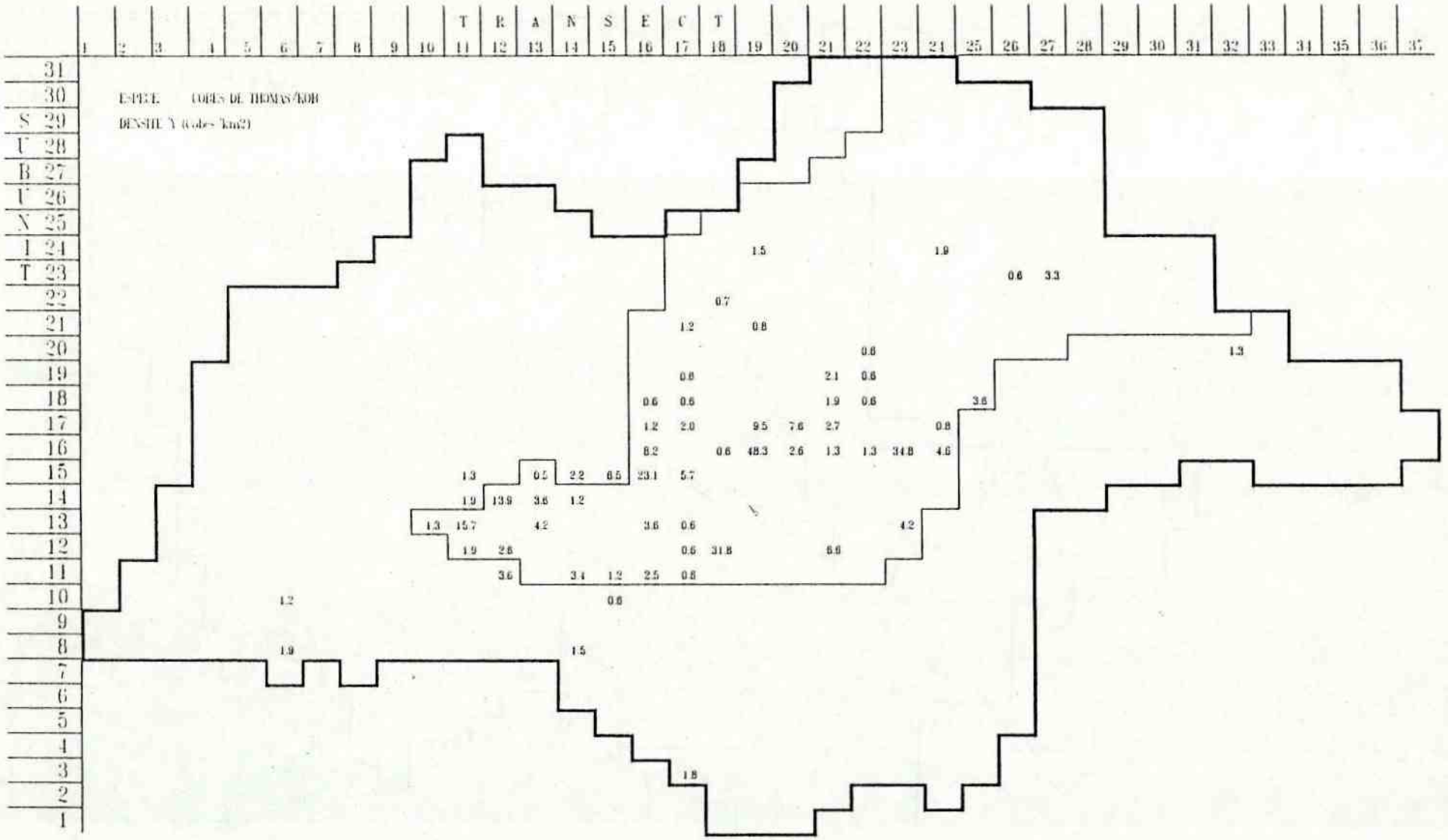


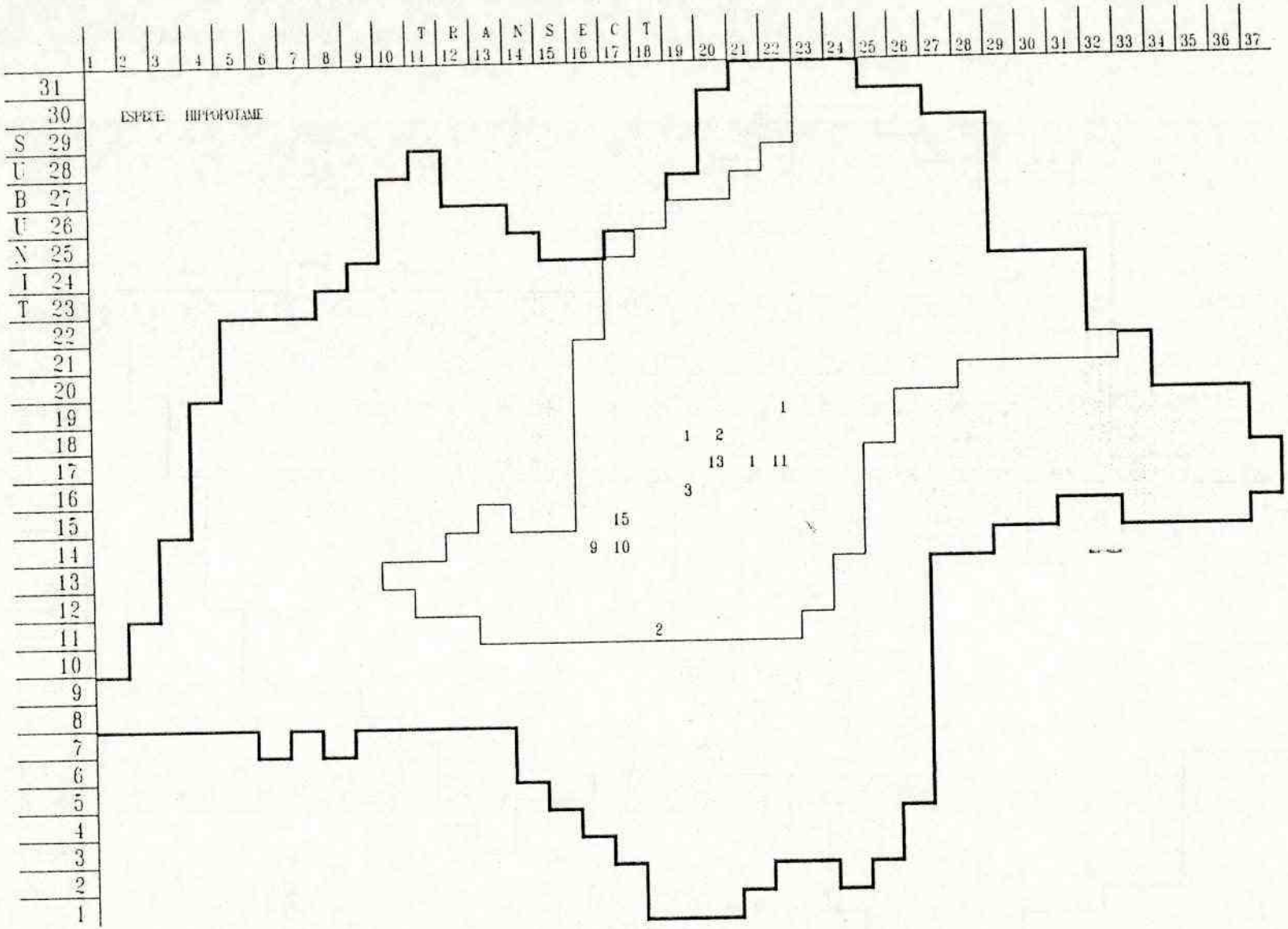
RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DES DOMAINES DE CHASSE MAI 1993



RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DES DOMAINES DE CHASSE, MAI 1993



RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DES DOMAINES DE CHASSE. MAI 1993



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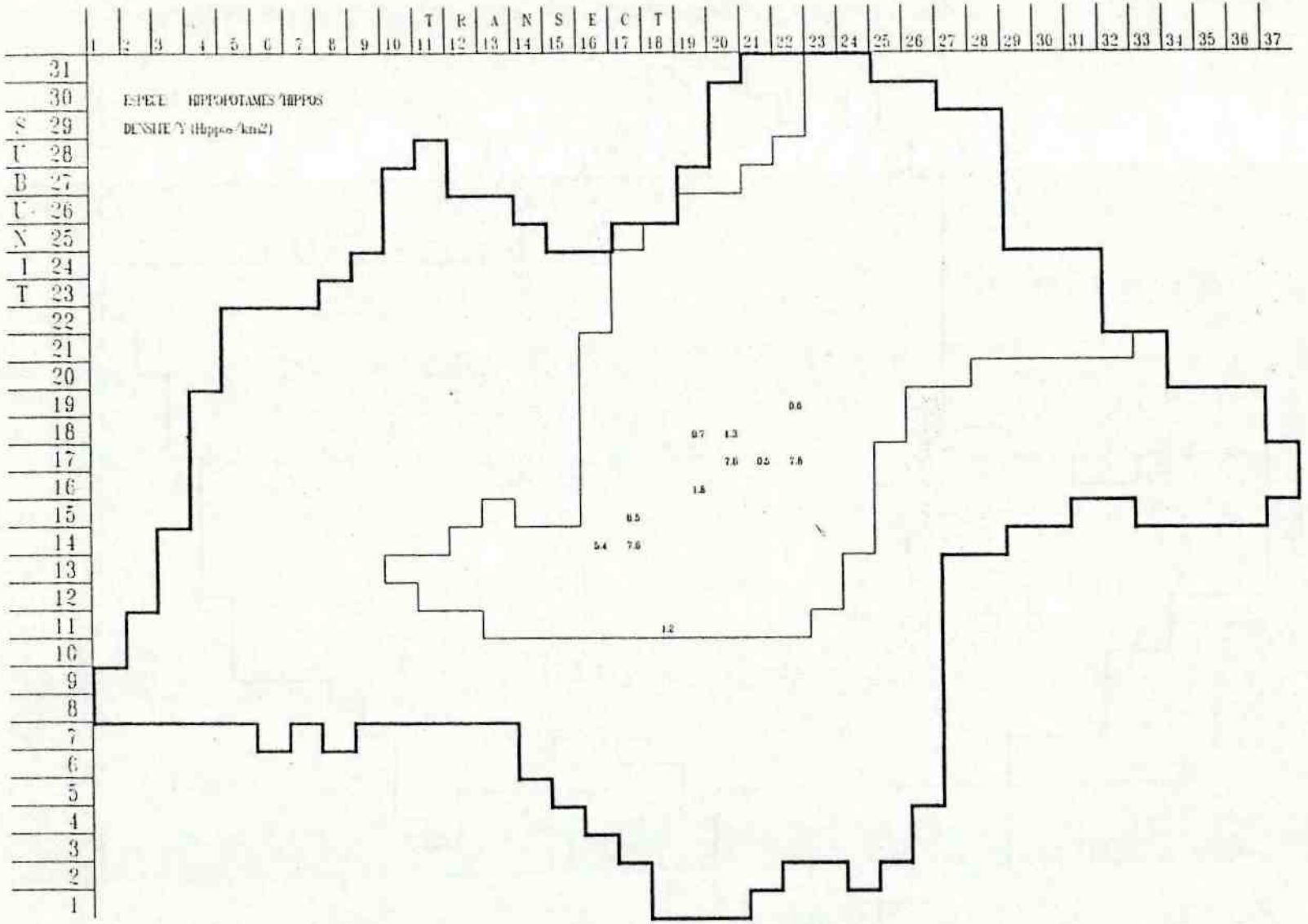

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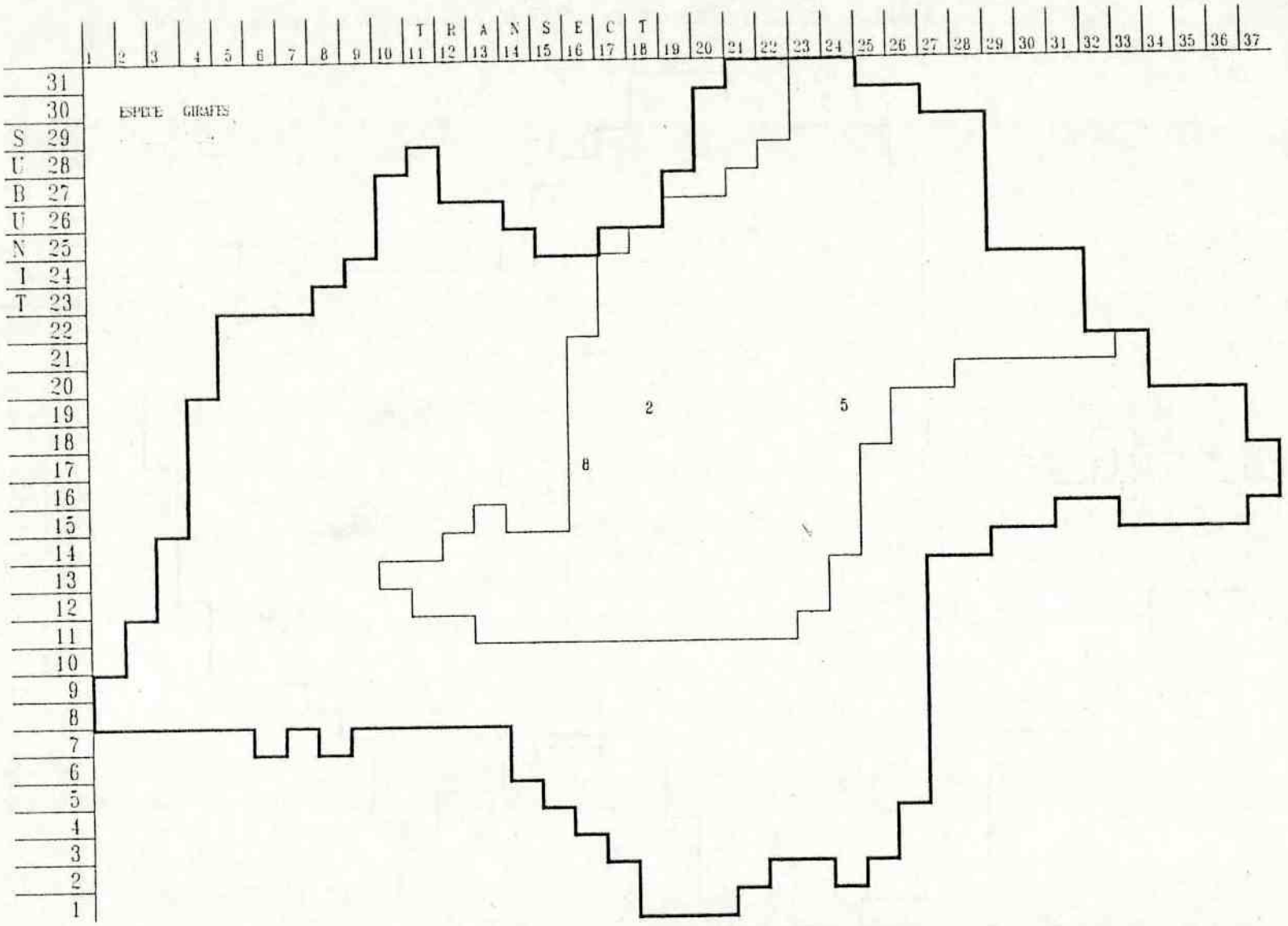

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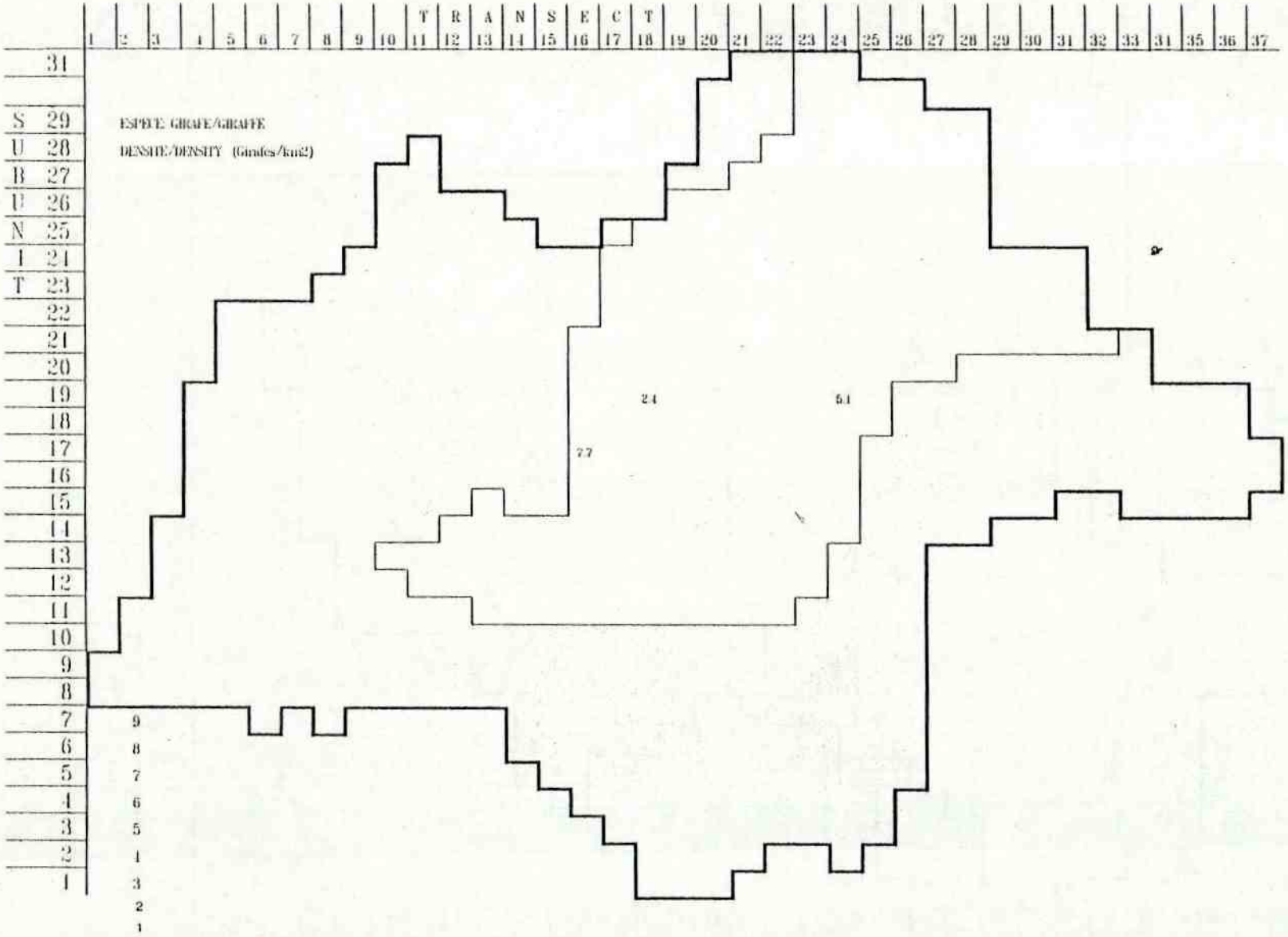

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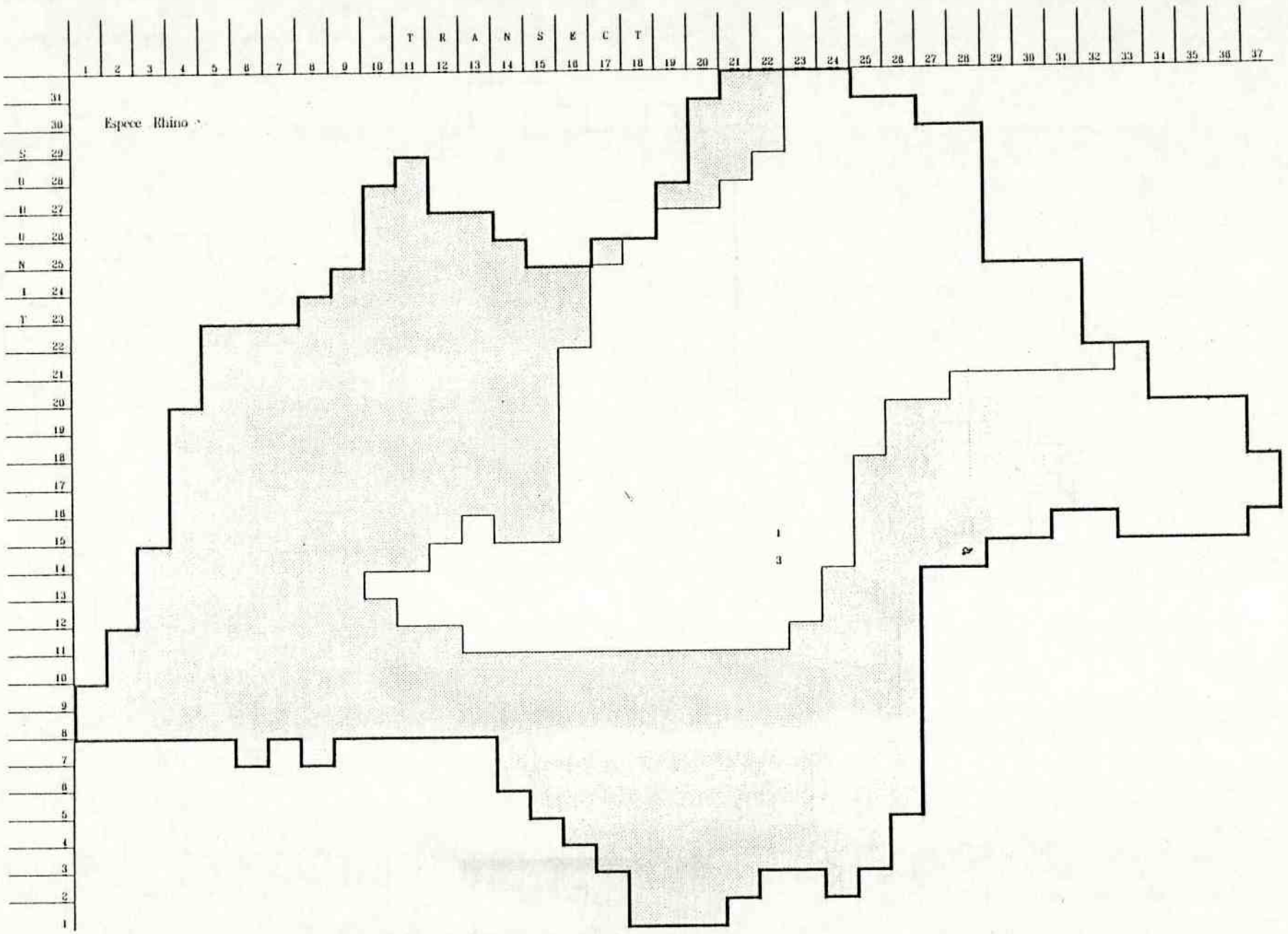

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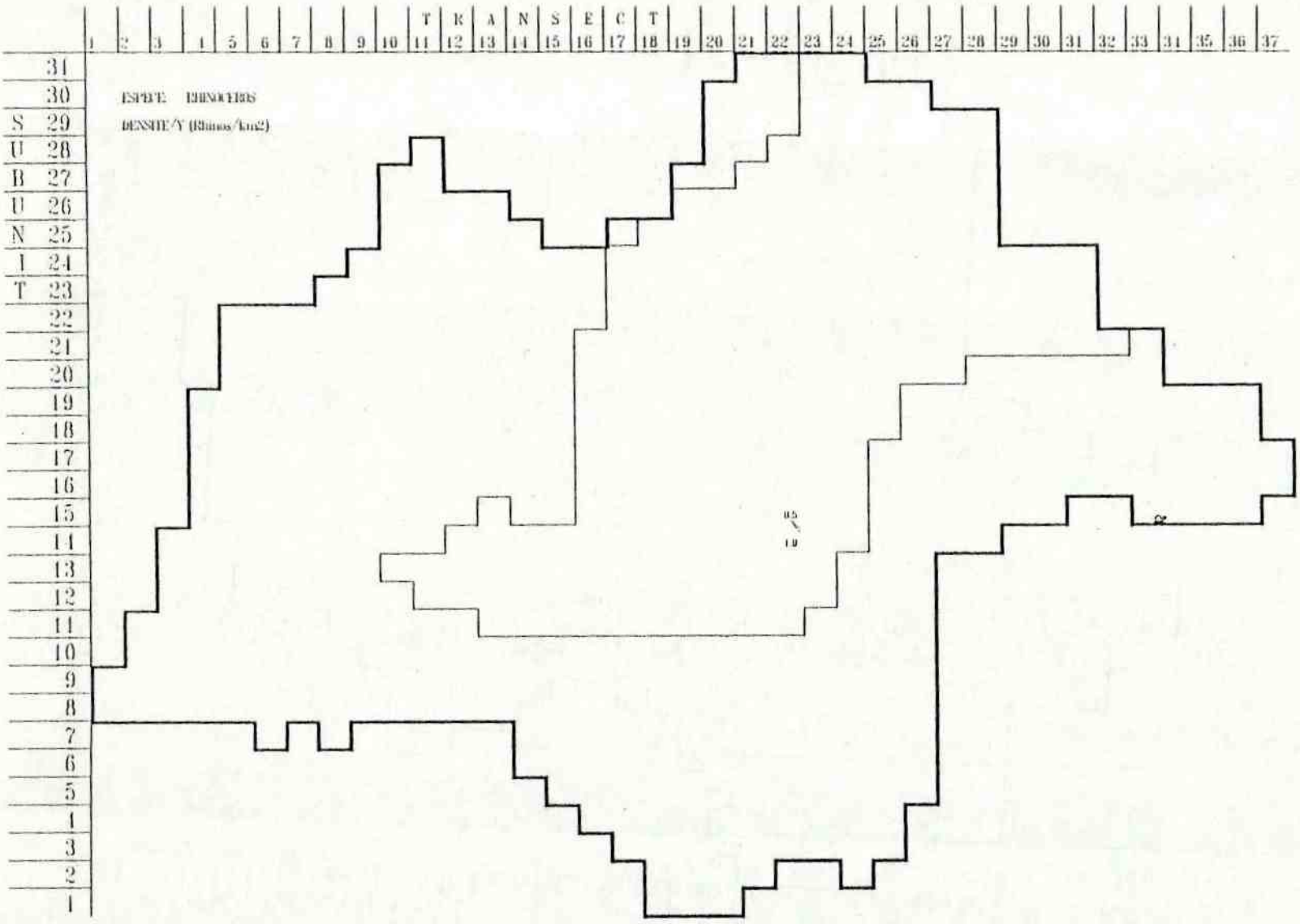

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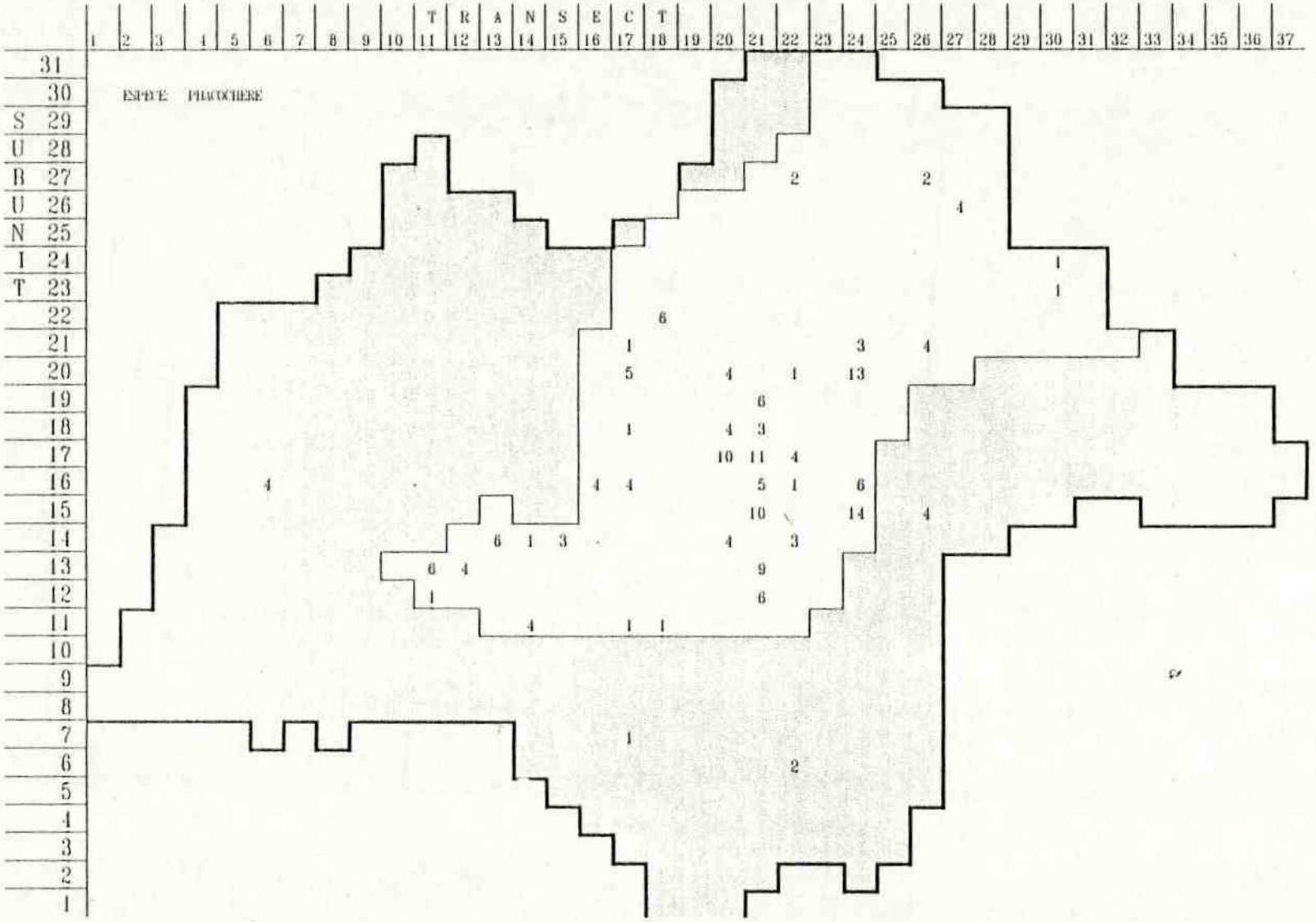
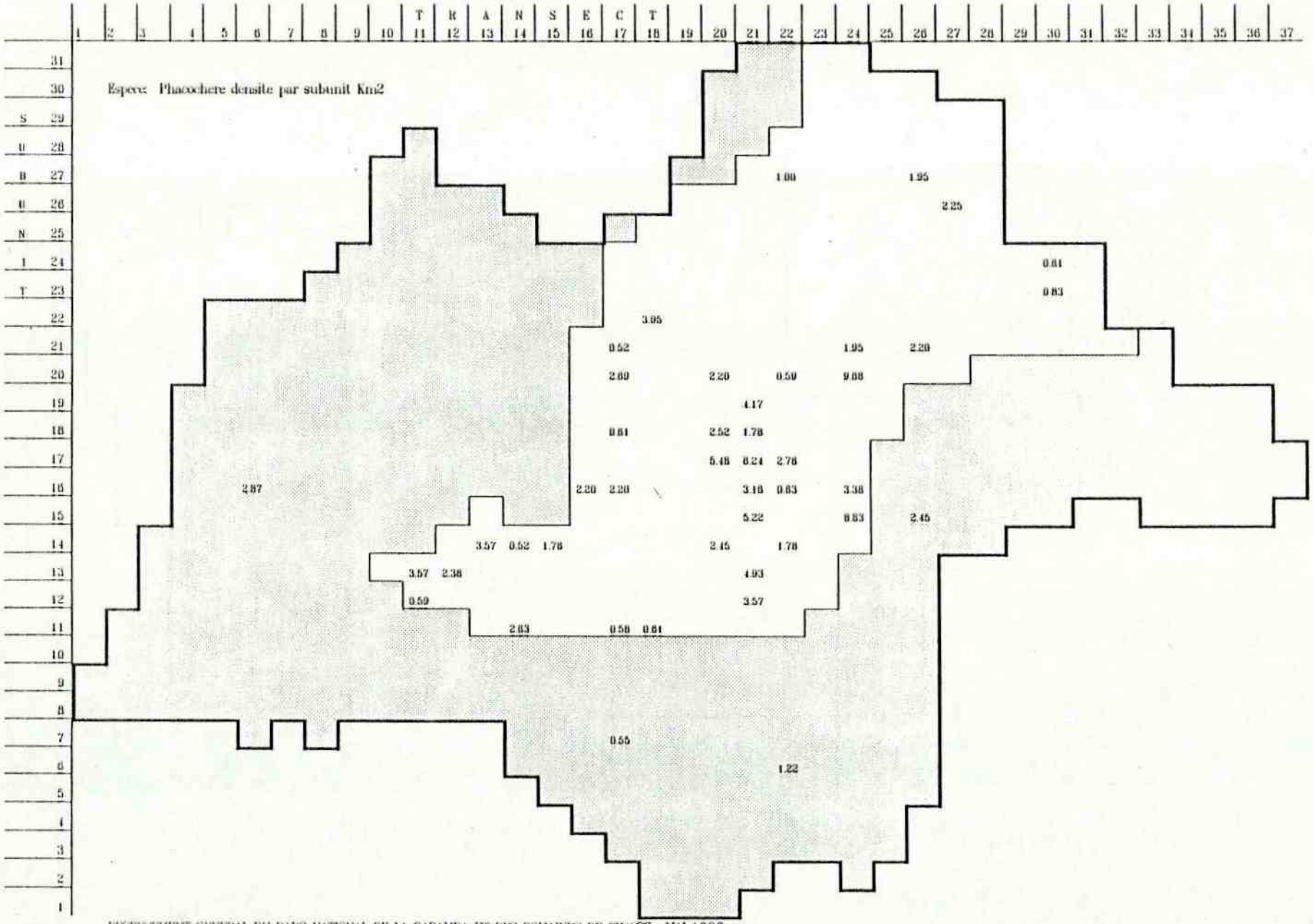


RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DES DOMAINES DE CHASSE, MAI 1993



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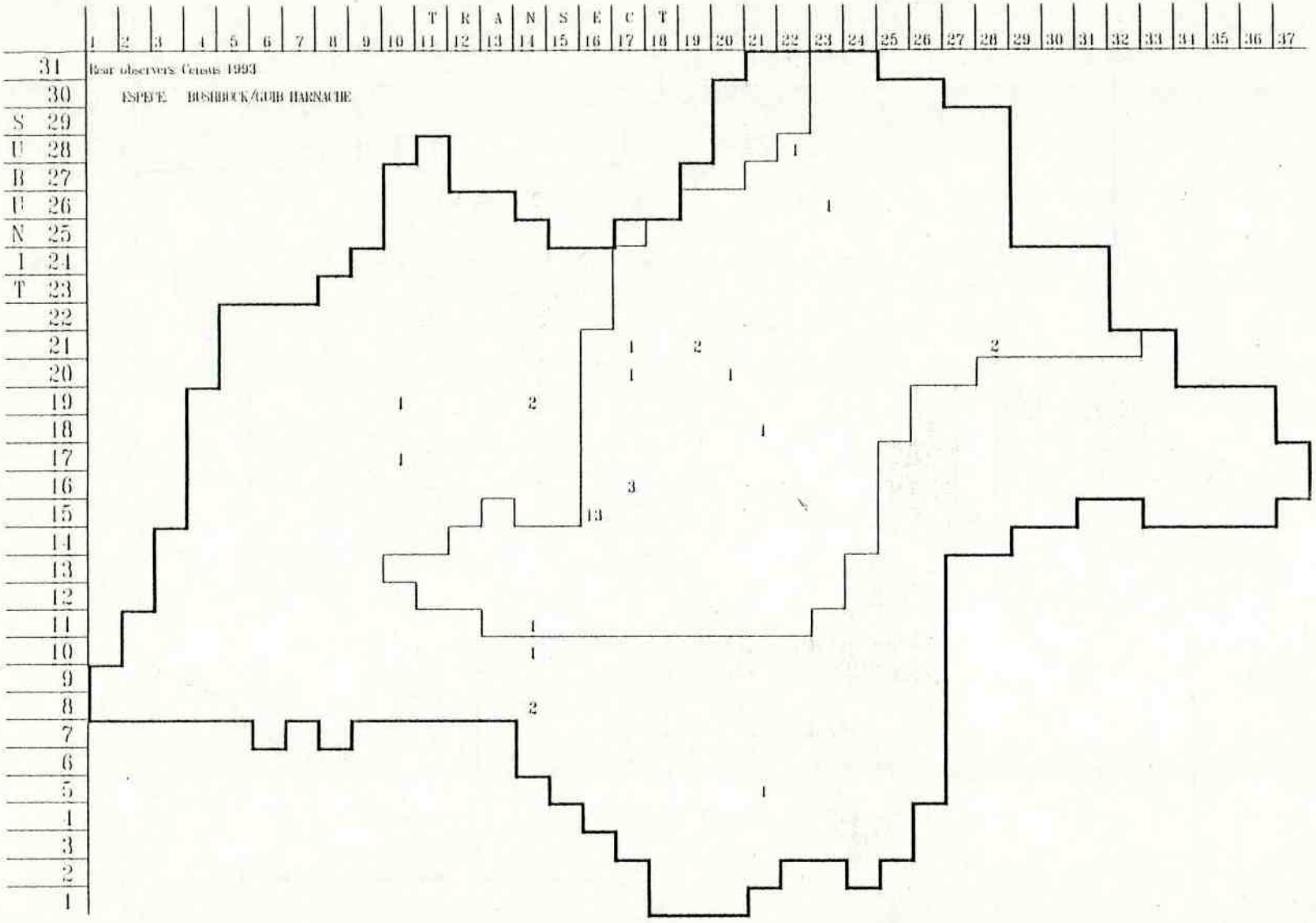

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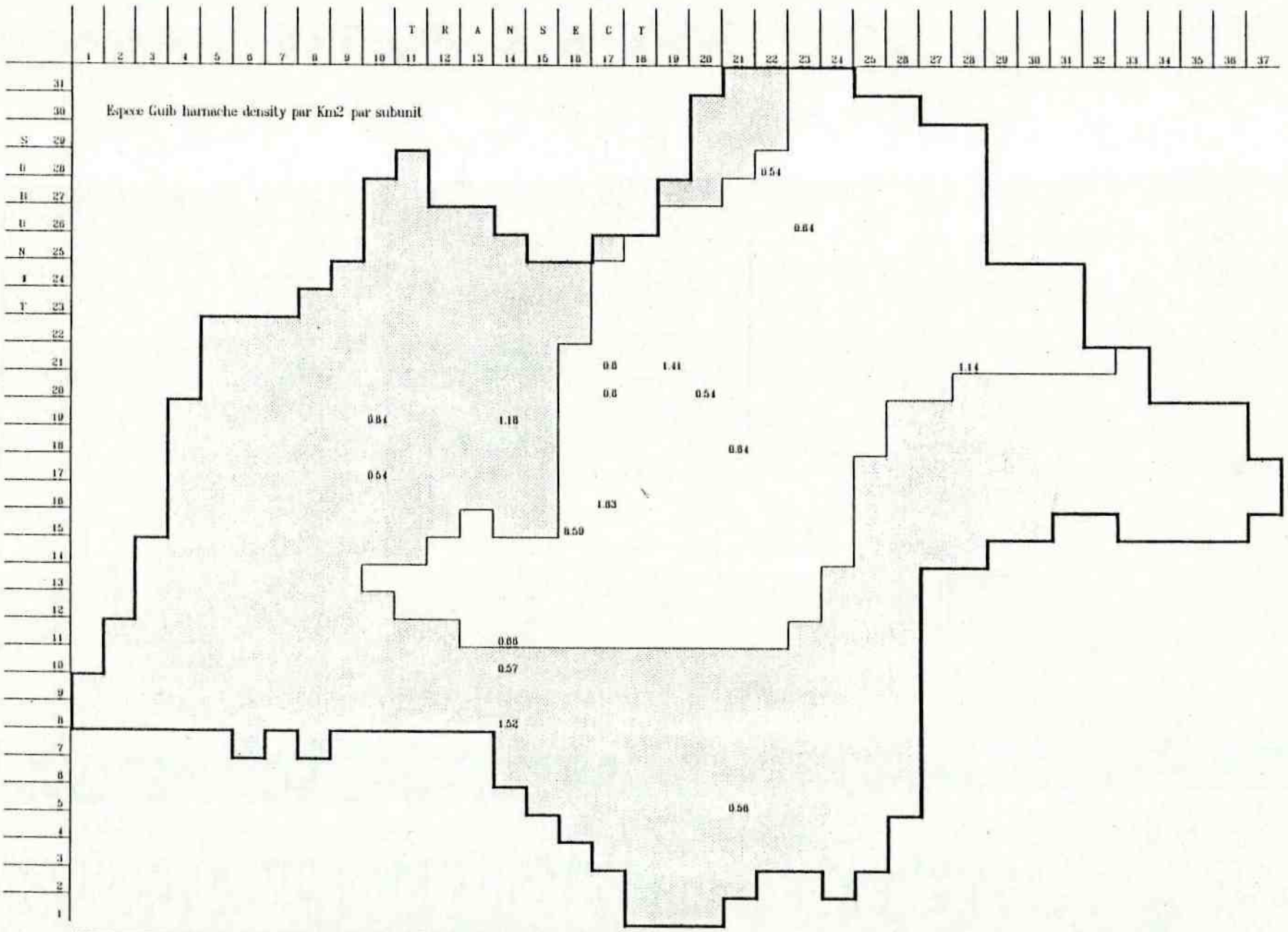

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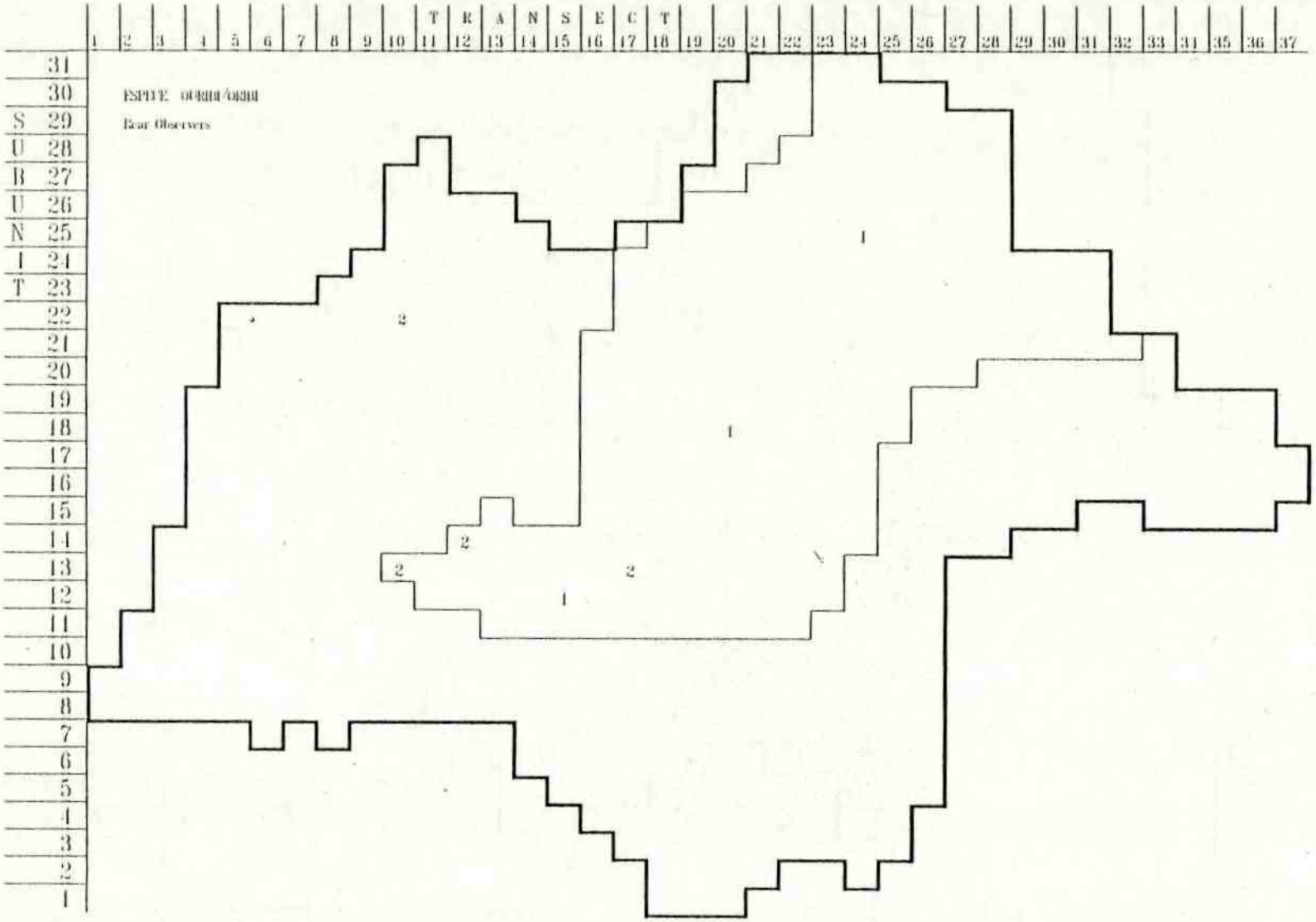

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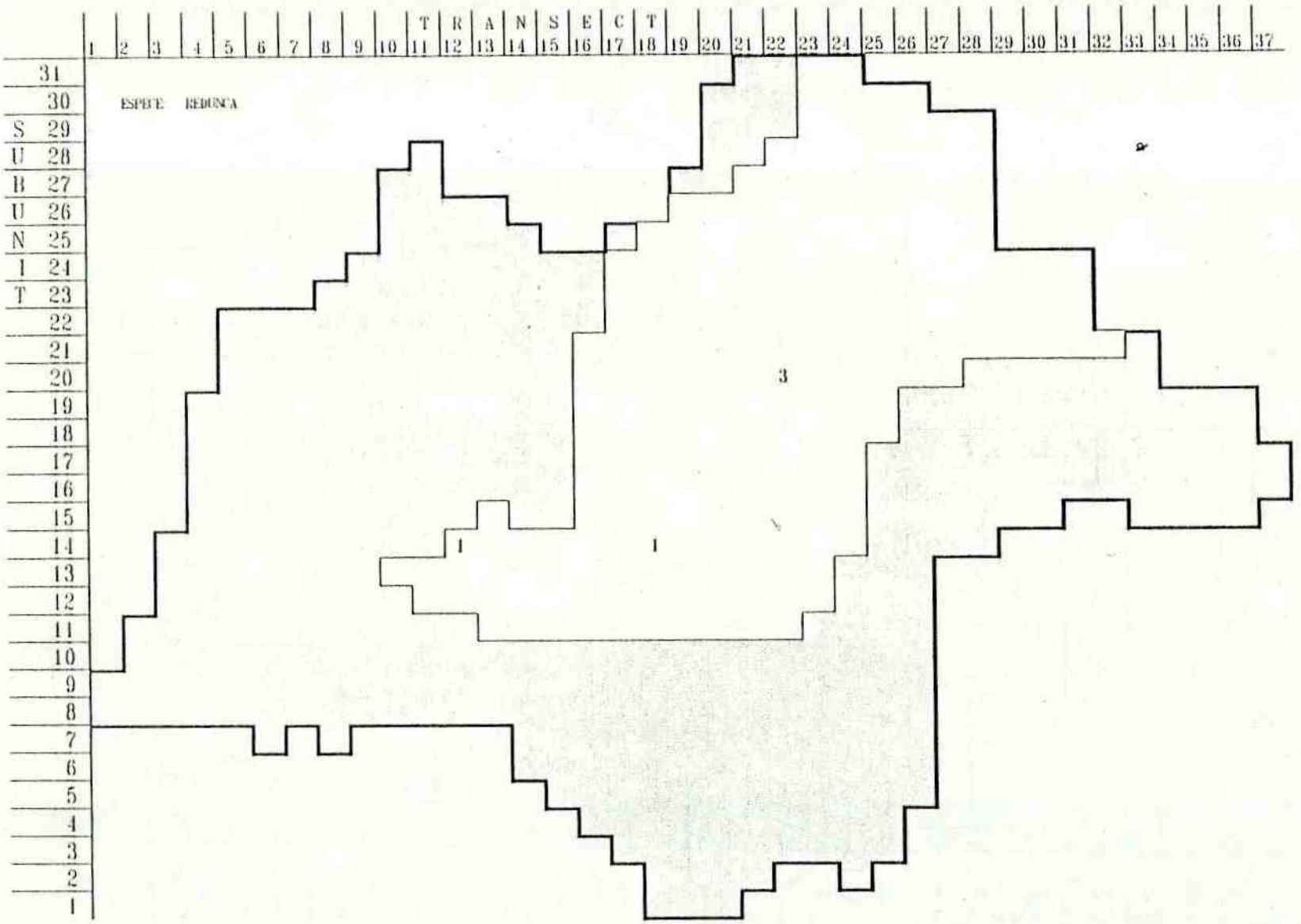

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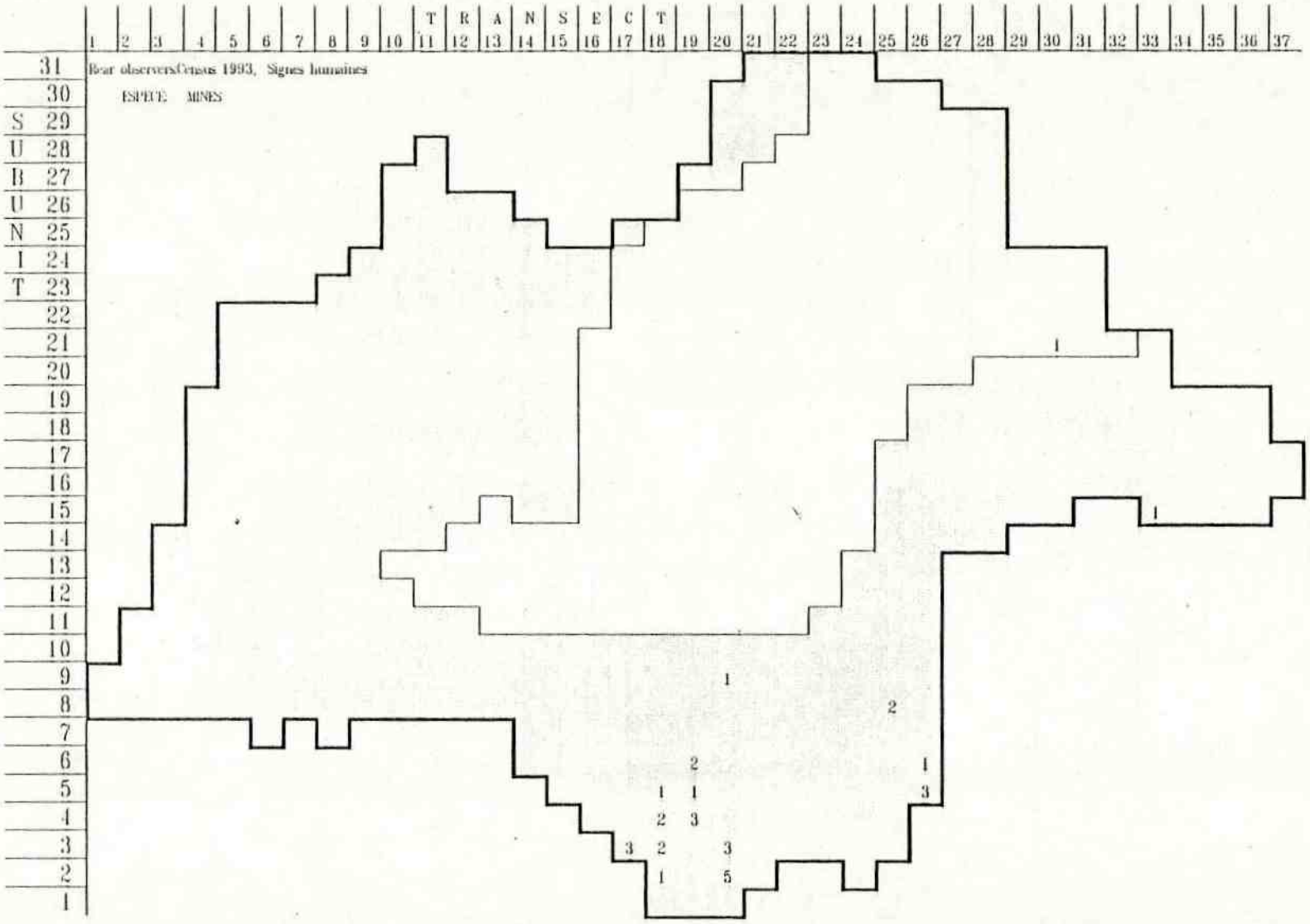

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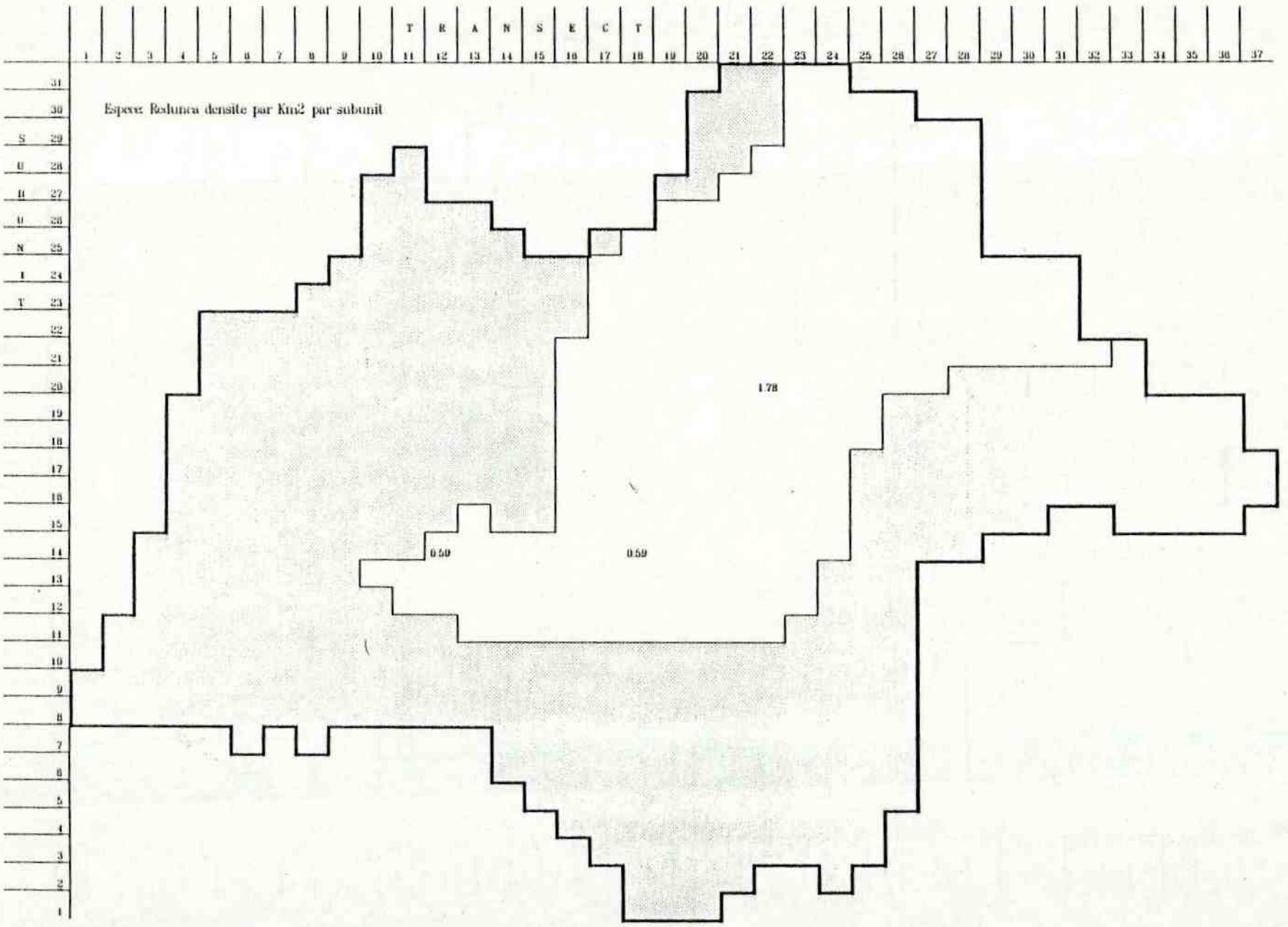

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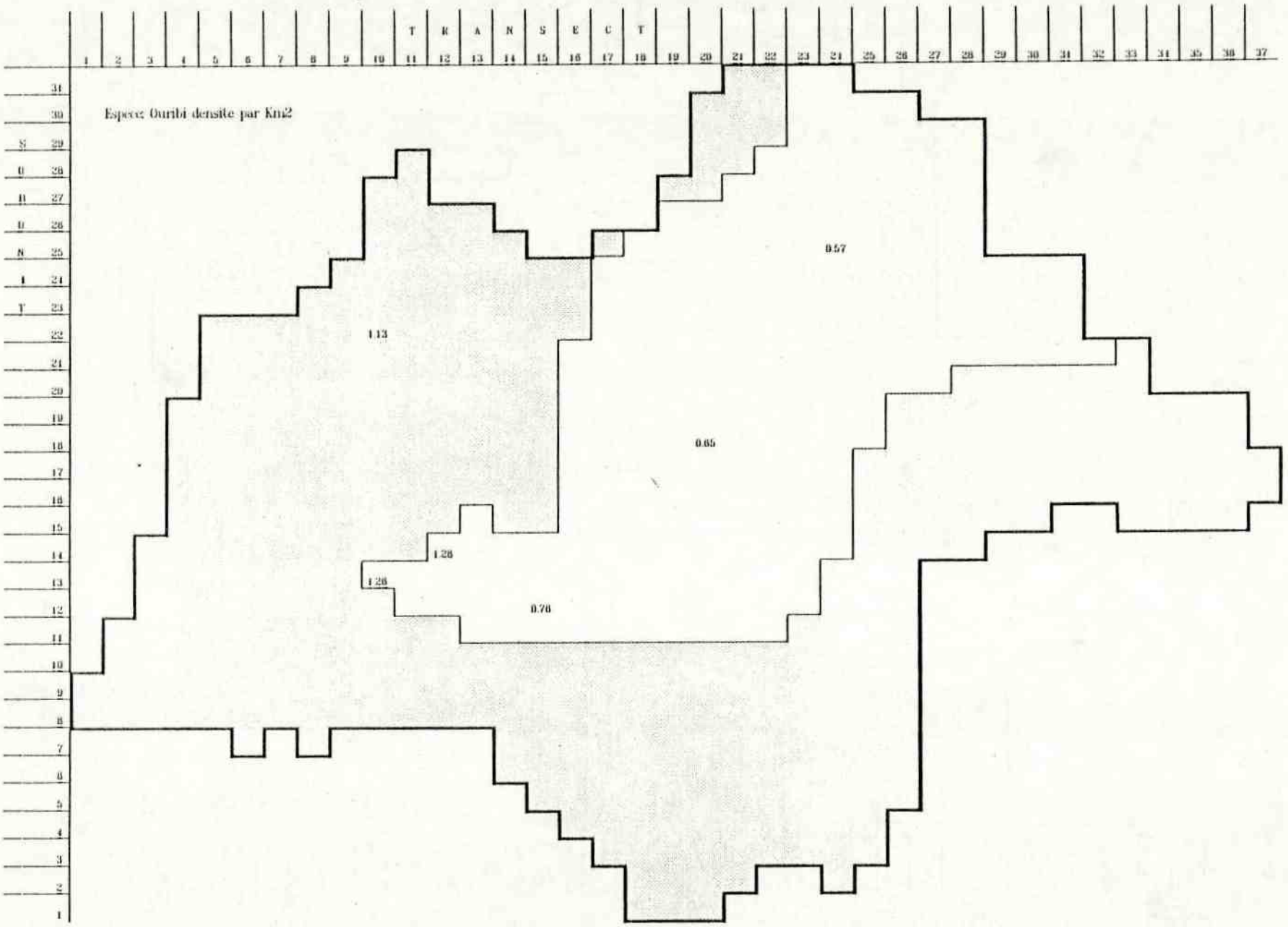

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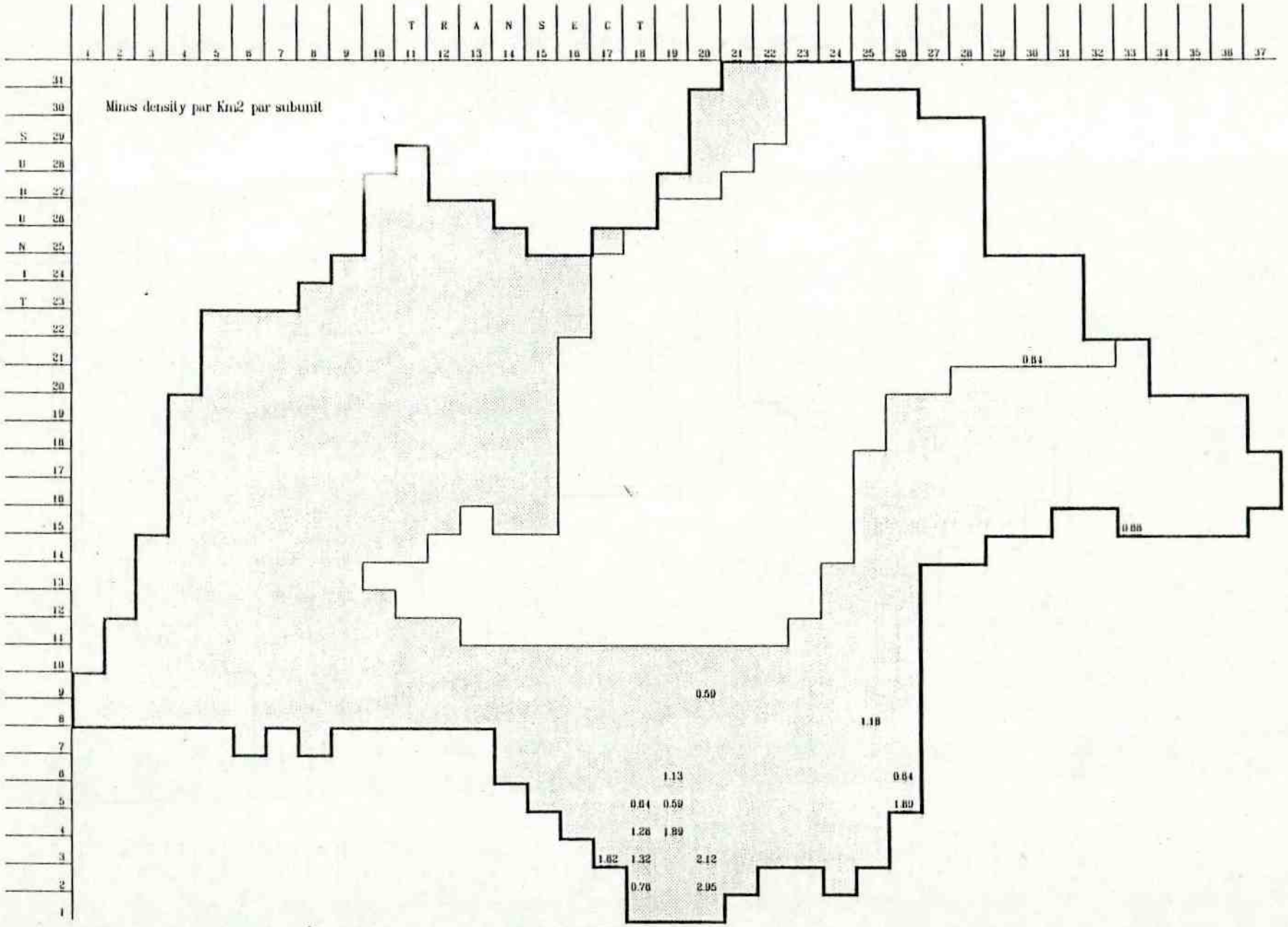

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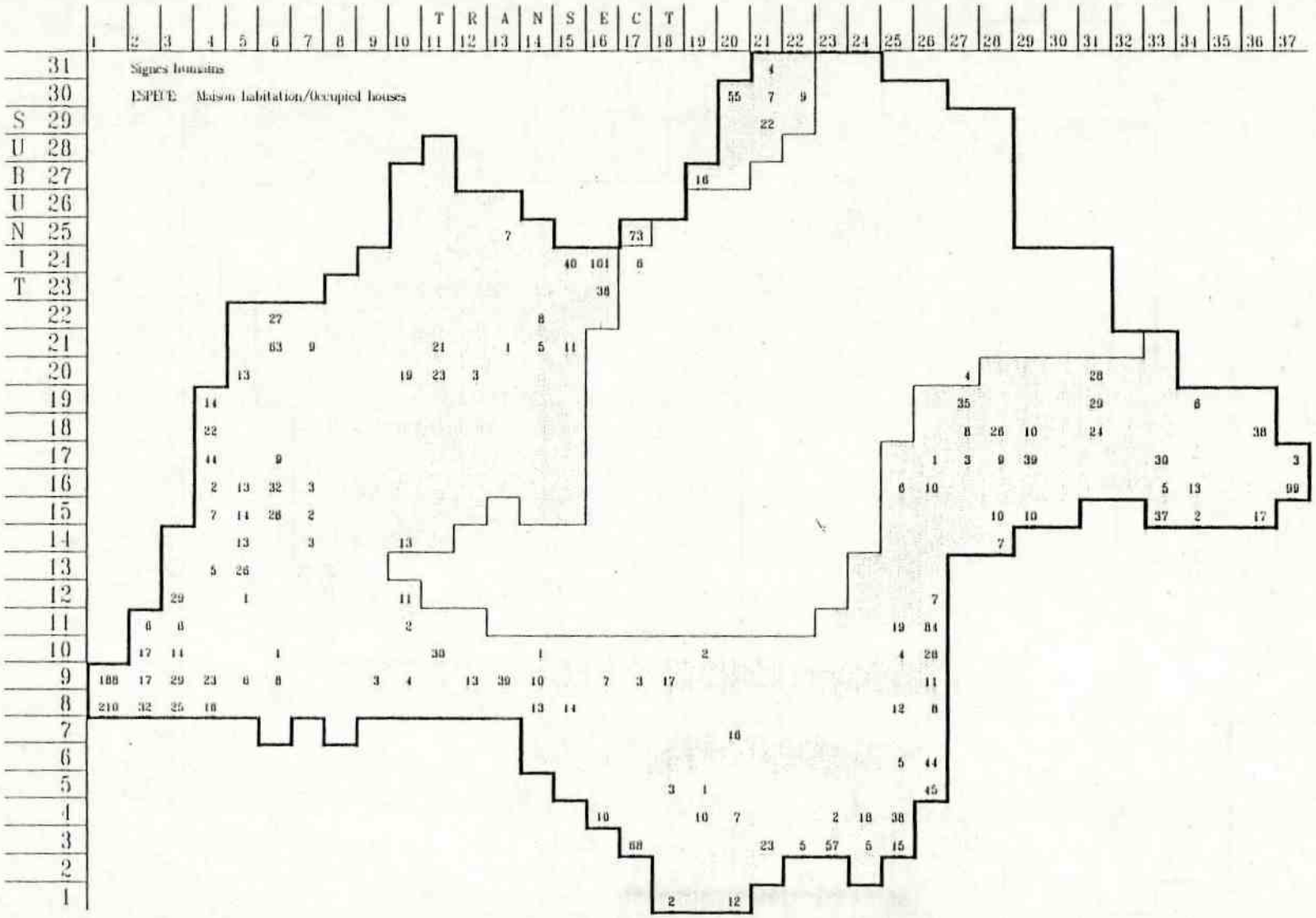

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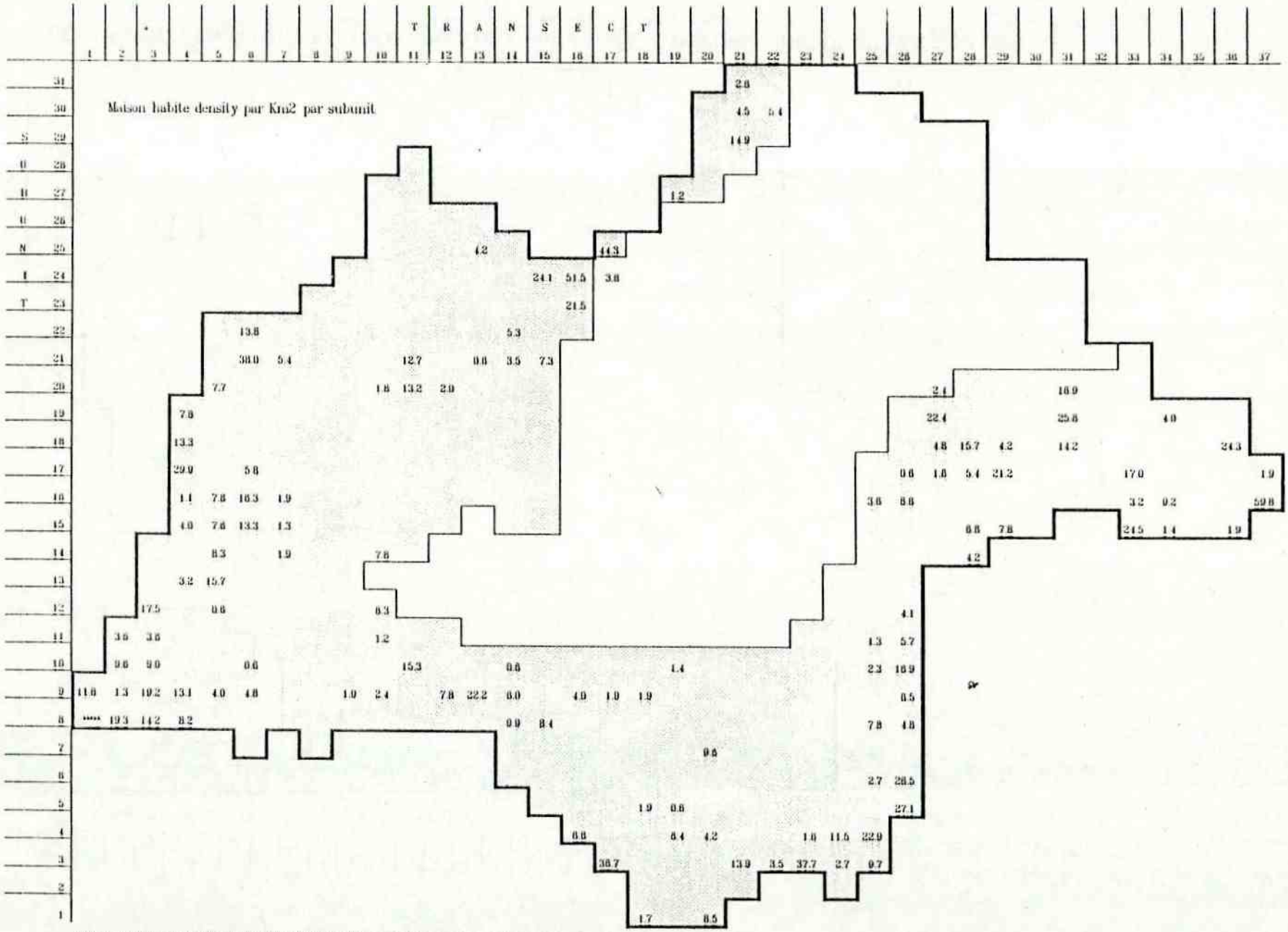

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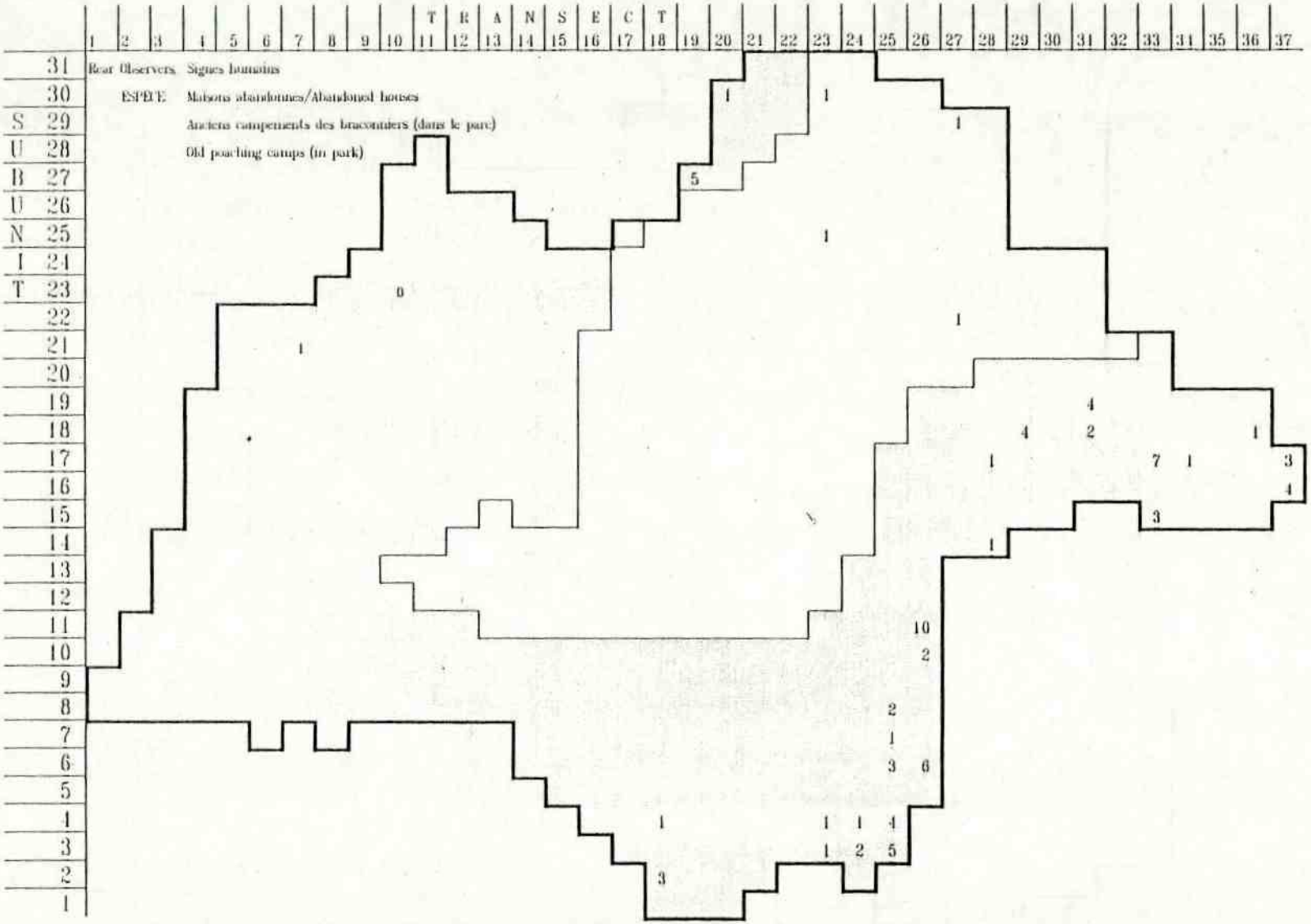

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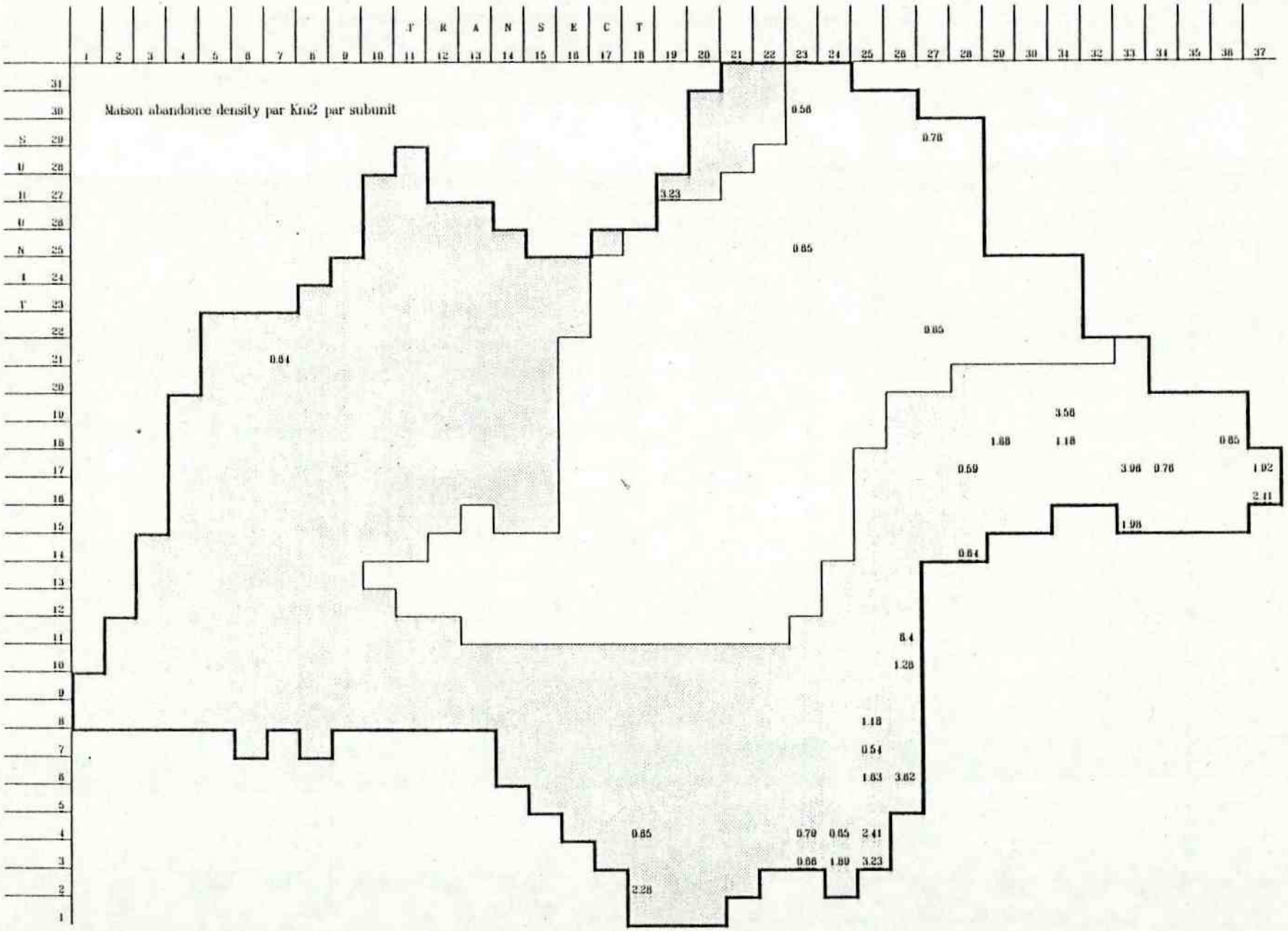


RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DES DOMAINES DE CHASSE, MAI 1993

CENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DOMAINES DE CHASSE, Mai 1993
IMATION DES POPULATIONS
DDLE OBSERVERS

	AREA					ELEPHANT						BUFFALO					
TRANS	TOTAL	PARK	NORTH	SOUTH	DOMAINE	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	3.31				3.31	0				0		0				0	
2	7.09				7.09	0				0		0				0	
3	11.62				11.62	0				0		0				0	
4	20.80				20.80	0				0		0				0	
5	21.95				21.95	0				0		0				0	
6	27.77				27.77	0				0		0				0	
7	25.22				25.22	0				0		0				0	
8	27.95				27.95	0				0		32				32	
9	28.92				28.92	0				0		0				0	
10	34.06	1.68		1.68	32.38	0	0		0	0		0	0		0	0	
11	34.44	3.36		3.36	31.08	8	8		8	0		0	0		0	0	
12	31.85	4.95		4.95	26.90	0	0		0	0		5	5		5	0	
13	32.67	8.70		8.70	23.97	0	0		0	0		230	230		230	0	
14	33.33	6.72		6.72	26.61	5	0		0	5		40	40		40	0	
15	34.25	6.58		6.58	27.67	0	0		0	0		3	3		3	0	
16	35.67	18.69	6.72	11.96	16.98	12	12	0	12	0		3	3	0	3	0	
17	39.39	24.16	12.40	11.77	15.23	11	11	0	11	0		2	2	0	2	0	
18	39.81	24.35	13.06	11.29	15.46	66	66	0	66	0		99	95	1	94	4	
19	43.39	24.68	13.54	11.14	18.71	92	92	10	82	0		221	221	151	70	0	
20	44.86	26.46	14.65	11.82	18.40	99	99	17	82	0		602	602	219	383	0	
21	51.83	28.68	16.57	12.11	23.16	51	47	0	47	4		274	274	219	55	0	
22	50.30	31.47	19.41	12.06	18.83	57	57	27	30	0		30	30	4	26	0	
23	47.43	33.14	22.81	10.33	14.29	113	111	24	87	2		147	147	90	57	0	
24	50.05	29.30	22.91	6.39	20.75	80	80	1	79	0		361	361	361	0	0	
25	47.99	21.37	21.37		26.62	1	0	0		1		24	24	24		0	
26	44.10	18.98	18.98		25.12	0	0	0		0		3	2	2		1	
27	26.32	15.80	15.80		10.52	0	0	0		0		0	0	0		0	
28	26.80	15.18	15.18		11.62	0	0	0		0		0	0	0		0	
29	16.33	6.53	6.53		9.80	0	0	0		0		0	0	0		0	
30	16.33	6.10	6.10		10.23	0	0	0		0		0	0	0		0	
31	13.97	6.82	6.82		7.15	0	0	0		0		0	0	0		0	
32	9.12	2.02	2.02		7.10	0	0	0		0		0	0	0		0	
33	12.25				12.25	0				0		0				0	
34	7.54				7.54	0				0		0				0	
35	8.07				8.07	0				0		0				0	
36	7.92				7.92	0				0		0				0	
37	3.27				3.27	0				0		0				0	
Total	1017.97	365.71	234.87	130.84	652.26	595.00	583.00	79.00	504.00	12.00		2076.00	2039.00	1071.00	968.00	37.00	
Sum squ	35938.07	8234.62	3891.28	1314.84	14128.19	47995.00	47129.00	1695.00	35052.00	46.00		*********	*********	*********	*********	1041.00	
Sum (Z*y)						27285.93	16178.33	1478.88	5261.13	280.87		92761.06	50916.93	19846.23	10307.35	981.46	
R=Σy/Σz						0.5	1.59	0.34	3.85	0.02		2.04	5.58	4.56	7.40	0.06	
Var y						1067.41	1470.51	82.99	1294.11	1.17		16350.77	23751.87	11891.75	11389.55	27.89	
Var z	220.30	109.98	40.40	12.39	73.05						STRAT.						STRAT.
Covar zy						303.22	314.02	27.15	96.63	1.93	TOTAL	990.13	840.72	362.44	191.23	9.14	TOTAL
						ELEPHANT						BUFFALO					
					Pop.est.(Y)	8869.74	8767.85	1194.07	7511.30	178.00	8883.37	30947.19	30664.92	16188.02	14426.47	548.82	31163.31
					SE(Y)	2475.01	1890.25	496.52	1504.35	82.96	1586.34	10139.38	9214.84	5790.85	5338.66	410.11	7886.91
					95% C.I.	5049.02	3856.11	1012.89	3068.86	169.24	3109.22	20684.33	18798.27	11813.33	10890.87	836.63	15458.35
					'95% C.I.as	56.92	43.98	84.83	40.86	95.08	35.00	66.84	61.30	72.98	75.49	152.44	49.60

TRANSECT	HARTEBEEST						KOB						WATERBUCK					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0				0		0				0		0				0	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	0				0		5				5		1				1	
7	0				0		0				0		2				2	
8	0				0		0				0		3				3	
9	0				0		0				0		1				1	
10	2	0		0	2		2	2		2	0		8	8		8	0	
11	3	0		0	3		34	29		29	5		2	2		2	0	
12	10	10		10	0		33	27		27	6		9	4		4	5	
13	5	5		5	0		14	14		14	0		5	5		5	0	
14	0	0		0	0		13	7		7	6		4	2		2	2	
15	9	8		8	1		14	2		2	12		0	0		0	0	
16	0	0	0	0	0		64	64	1	63	0		8	6	0	6	2	
17	12	12	12	0	0		22	20	4	16	2		1	1	1	0	0	
18	17	17	4	13	0		47	47	1	46	0		4	0	0	0	4	
19	29	29	18	11	0		100	100	3	97	0		2	1	0	1	1	
20	50	50	9	41	0		18	18	0	18	0		2	1	1	0	1	
21	3	3	2	1	0		24	24	6	18	0		15	15	7	8	0	
22	19	19	14	5	0		5	5	3	2	0		9	8	6	2	1	
23	7	7	0	7	0		66	66	0	66	0		17	17	8	9	0	
24	68	68	39	29	0		11	11	2	9	0		1	1	1	0	0	
25	1	1	1		0		7	7	7		0		0	0	0		0	
26	0	0	0		0		1	1	1		0		1	0	0		1	
27	0	0	0		0		4	4	4		0		1	1	1		0	
28	0	0	0		0		0	0	0		0		0	0	0		0	
29	0	0	0		0		0	0	0		0		2	2	2		0	
30	0	0	0		0		0	0	0		0		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	0	0	0		0		2	0	0		2		0	0	0		0	
33	0				0		0				0		0				0	
34	0				0		0				0		0				0	
35	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	235.00	229.00	99.00	130.00	6.00		486.00	448.00	32.00	416.00	38.00		98.00	74.00	27.00	47.00	24.00	
um squ	9037.00	9007.00	2287.00	3076.00	14.00		25096.00	23996.00	142.00	22662.00	274.00		896.00	736.00	157.00	299.00	68.00	
m (Σy)	10506.84	5817.85	1796.24	1229.25	185.67		19645.79	9771.25	545.24	4151.97	992.01		3965.68	1587.76	493.77	393.72	555.56	
=Σy/Σz	0.23	0.63	0.42	0.99	0.01		0.48	1.23	0.14	3.18	0.06		0.10	0.20	0.11	0.36	0.04	
Var y	209.57	305.77	106.90	139.24	0.36		519.79	694.08	5.11	794.64	6.53		17.68	22.63	7.13	10.84	1.46	
Var z						STRAT.						STRAT.						STRAT.
ovar zy	112.26	98.94	32.44	21.38	2.22	TOTAL	174.30	120.36	9.50	74.47	8.95	TOTAL	35.26	18.69	8.96	6.32	3.68	TOTAL
	HARTEBEEST						KOB						WATERBUCK					
Yest.(Y)	3503.17	3443.98	1496.37	1937.44	89.00	3522.81	7244.86	6737.56	483.68	6199.80	563.66	7247.14	1460.90	1112.90	408.10	700.46	355.99	1464.55
SE(Y)	1147.65	1036.11	555.48	579.88	44.84	804.26	1771.00	1640.83	107.87	1173.52	185.35	1192.96	317.01	305.60	141.24	156.09	86.18	227.46
95% C.I.	2341.21	2113.67	1133.18	1182.96	91.48	1576.35	3612.84	3347.29	220.05	2393.99	378.11	2338.20	646.70	623.42	288.12	318.42	175.80	445.82
C.I.as	66.83	61.37	75.73	61.06	102.79	44.75	49.87	49.68	45.50	38.61	67.08	32.26	44.27	56.02	70.60	45.46	49.38	30.44

TRANSECT	WARTHOG						HIPPO						REEDBUCK					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0				0		0				0		0				0	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	4				4		0				0		0				0	
7	0				0		0				0		0				0	
8	0				0		0				0		0				0	
9	0				0		0				0		0				0	
10	0	0		0	0		0	0		0	0		0	0		0	0	
11	7	7		7	0		0	0		0	0		0	0		0	0	
12	4	4		4	0		0	0		0	0		1	1		1	0	
13	6	6		6	0		0	0		0	0		0	0		0	0	
14	5	5		5	0		0	0		0	0		0	0		0	0	
15	3	3		3	0		0	0		0	0		0	0		0	0	
16	4	4	0	4	0		9	9	0	9	0		0	0	0	0	0	
17	13	12	7	5	1		25	25	0	25	0		0	0	0	0	0	
18	7	7	6	1	0		2	2	0	2	0		1	1	0	1	0	
19	0	0	0	0	0		4	4	1	3	0		0	0	0	0	0	
20	22	22	8	14	0		15	15	2	13	0		0	0	0	0	0	
21	50	50	9	41	0		1	1	0	1	0		0	0	0	0	0	
22	13	11	3	8	2		12	12	1	11	0		3	3	3	0	0	
23	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
24	36	36	16	20	0		0	0	0	0	0		0	0	0	0	0	
25	0	0	0		0		0	0	0		0		0	0	0		0	
26	10	6	6		4		0	0	0		0		0	0	0		0	
27	4	4	4		0		0	0	0		0		0	0	0		0	
28	0	0	0		0		0	0	0		0		0	0	0		0	
29	0	0	0		0		0	0	0		0		0	0	0		0	
30	2	2	2		0		0	0	0		0		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	0	0	0		0		0	0	0		0		0	0	0		0	
33	0				0		0				0		0				0	
34	0				0		0				0		0				0	
35	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	190.00	179.00	61.00	118.00	11.00	-	68.00	68.00	4.00	64.00	0.00		5.00	5.00	3.00	2.00	0.00	
Sum squ	4954.00	4801.00	551.00	2518.00	37.00		1096.00	1096.00	6.00	1010.00	0.00		11.00	11.00	9.00	2.00	0.00	
Sum (2*y)	8491.66	4290.12	1045.49	1152.81	264.44		2887.29	1722.94	62.24	756.21	0.00		222.55	123.70	58.23	16.23	0.00	
R=Σy/Σz	0.19	0.49	0.26	0.90	0.02		0.07	0.19	0.02	0.49	0.00		0.00	0.01	0.01	0.02	0.00	
Var y	110.51	154.91	20.76	113.55	0.94		26.97	40.68	0.32	52.64	0.00		0.29	0.45	0.53	0.12	0.00	
Var z						STRAT.						STRAT.						STRAT.
Covar zy	90.67	65.63	18.29	20.43	1.96	TOTAL	28.23	29.17	1.02	14.72	0.00	TOTAL	2.36	2.01	1.09	0.25	0.00	TOTAL
	WARTHOG						HIPPO						REEDBUCK					
Pop.est.(Y)	2832.35	2692.02	922.01	1758.60	163.16	2843.77	1013.68	1022.67	60.46	953.82	0.00	1014.28	74.54	75.20	45.34	29.81	0.00	75.15
SE(Y)	809.58	747.18	223.04	517.42	73.86	568.27	433.53	400.61	32.29	356.54	0.00	358.00	45.72	44.56	42.52	19.15	0.00	46.63
95% C.I.	1651.55	1524.25	455.01	1055.54	150.67	1113.81	884.40	817.25	65.86	727.33	0.00	701.67	93.26	90.91	86.74	39.08	0.00	91.40
95% C.I.as	58.31	56.62	49.35	60.02	92.34	39.17	87.25	79.91	108.94	76.26	ERR	69.18	125.12	120.90	191.29	131.10	ERR	121.63

TRANSECT	BUSHBUCK						ORIBI						GREY DUIKER					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0																	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	0				0		0				0		0				0	
7	0				0		0				0		0				0	
8	1				1		0				0		0				0	
9	0				0		0				0		0				0	
10	0	0		0	0		0	0		0	0		0	0		0	0	
11	1	0		0	1		0	0		0	0		0	0		0	0	
12	2	0		0	2		0	0		0	0		0	0		0	0	
13	0	0		0	0		0	0		0	0		0	0		0	0	
14	0	0		0	0		0	0		0	0		0	0		0	0	
15	1	0		0	1		0	0		0	0		0	0		0	0	
16	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
17	2	2	2	0	0		0	0	0	0	0		0	0	0	0	0	
18	0	0	0	0	0		1	1	1	0	0		2	2	2	0	0	
19	2	2	2	0	0		0	0	0	0	0		0	0	0	0	0	
20	0	0	0	0	0		1	1	1	0	0		1	1	1	0	0	
21	1	1	1	0	0		0	0	0	0	0		0	0	0	0	0	
22	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
23	1	0	0	0	1		1	1	1	0	0		0	0	0	0	0	
24	0	0	0	0	0		2	2	2	0	0		0	0	0	0	0	
25	0	0	0		0		0	0	0		0		0	0	0		0	
26	0	0	0		0		1	1	1		0		0	0	0		0	
27	0	0	0		0		0	0	0		0		0	0	0		0	
28	0	0	0		0		0	0	0		0		2	2	2		0	
29	0	0	0		0		0	0	0		0		0	0	0		0	
30	0	0	0		0		0	0	0		0		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	0	0	0		0		0	0	0		0		1	0	0		1	
33	0				0		0				0		0				0	
34	1				1		0				0		0				0	
35	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	12.00	5.00	5.00	0.00	7.00		6.00	6.00	6.00	0.00	0.00		6.00	5.00	5.00	0.00	1.00	
Sum squ	18.00	9.00	9.00	0.00	9.00		8.00	8.00	8.00	0.00	0.00		10.00	9.00	9.00	0.00	1.00	
Sum (Σy)	432.70	126.36	66.44	0.00	162.33		276.29	161.52	115.32	0.00	0.00		187.21	105.52	71.13	0.00	7.10	
R=Σy/Σz	0.01	0.01	0.02	0.00	0.01		0.01	0.02	0.03	0.00	0.00		0.01	0.01	0.02	0.00	0.00	
Var y	0.39	0.36	0.47	0.00	0.21		0.20	0.29	0.37	0.00	0.00		0.25	0.36	0.47	0.00	0.03	
Var z						STRAT.						STRAT.						STRAT.
Covar zy	2.85	2.13	1.02	0.00	1.08	TOTAL	3.09	3.01	2.15	0.00	0.00	TOTAL	0.61	1.18	1.09	0.00	-0.29	TOTAL
	BUSHBUCK						ORIBI						GREY DUIKER					
Pop.est.(Y)	178.89	75.20	75.57	0.00	103.83	179.41	89.44	90.24	90.69	0.00	0.00	90.69	89.44	75.20	75.57	0.00	14.83	90.41
SE(Y)	52.55	39.20	39.81	0.00	34.50	52.68	35.96	32.65	31.81	0.00	0.00	31.81	44.18	40.74	39.67	0.00	13.23	41.81
95% C.I.	107.20	79.96	81.21	0.00	70.38	103.25	73.37	66.62	64.89	0.00	0.00	62.34	90.13	83.12	80.92	0.00	26.98	81.95
95% C.I.as	59.93	106.34	107.46	ERR	67.78	57.55	82.03	73.82	71.55	ERR	ERR	68.74	100.77	110.53	107.07	ERR	181.89	90.65

TRANSECT	YELLOW BACKED DUIKER						RED-FLANKED DUIKER						RHINO					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0				0		0				0		0				0	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	3				3		0				0		0				0	
7	0				0		0				0		0				0	
8	0				0		0				0		0				0	
9	0				0		0				0		0				0	
10	0	0		0	0		2	2		2	0		0	0		0	0	
11	0	0		0	0		0	0		0	0		0	0		0	0	
12	0	0		0	0		0	0		0	0		0	0		0	0	
13	0	0		0	0		0	0		0	0		0	0		0	0	
14	0	0		0	0		1	0		0	1		0	0		0	0	
15	0	0		0	0		1	0		0	1		0	0		0	0	
16	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
17	0	0	0	0	0		1	1	1	0	0		0	0	0	0	0	
18	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
19	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
20	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
21	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
22	0	0	0	0	0		0	0	0	0	0		4	4	0	4	0	
23	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
24	0	0	0	0	0		3	3	3	0	0		0	0	0	0	0	
25	1	1	1		0		0	0	0		0		0	0	0		0	
26	0	0	0		0		0	0	0		0		0	0	0		0	
27	0	0	0		0		1	1	1		0		0	0	0		0	
28	0	0	0		0		0	0	0		0		0	0	0		0	
29	0	0	0		0		0	0	0		0		0	0	0		0	
30	0	0	0		0		0	0	0		0		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	0	0	0		0		1	1	1		0		0	0	0		0	
33	0				0		0				0		0				0	
34	0				0		1				1		0				0	
35	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	4.00	1.00	1.00	0.00	3.00		11.00	8.00	6.00	2.00	3.00		4.00	4.00	0.00	4.00	0.00	
Sum squ	10.00	1.00	1.00	0.00	9.00		19.00	16.00	12.00	4.00	3.00		16.00	16.00	0.00	16.00	0.00	
Sum (z*y)	131.29	21.37	21.37	0.00	83.30		368.22	133.23	98.94	3.36	61.82		201.19	125.87	0.00	48.23	0.00	
R=Σy/Σz	0.00	0.00	0.00	0.00	0.00		0.01	0.02	0.03	0.02	0.00		0.00	0.01	0.00	0.03	0.00	
Var y	0.27	0.04	0.06	0.00	0.24		0.44	0.60	0.62	0.27	0.08		0.43	0.70	0.00	1.07	0.00	
Var z						STRAT.						STRAT.						STRAT.
Covar zy	0.59	0.25	0.42	0.00	0.84	TOTAL	1.82	0.27	1.69	−0.10	0.25	TOTAL	2.53	2.83	0.00	0.95	0.00	TOTAL
	YELLOW BACKED DUIKER						RED FLANKED DUIKER						RHINO					
Pop est.(Y)	59.63	15.04	15.11	0.00	44.50	59.61	163.98	120.31	90.69	29.81	44.50	165.00	59.63	60.16	0.00	59.61	0.00	59.61
SE(Y)	45.34	14.31	14.11	0.00	38.40	40.92	57.36	55.32	44.54	29.01	21.57	57.36	56.86	55.56	0.00	56.11	0.00	56.11
95% C.I.	92.50	29.20	28.79	0.00	78.35	80.20	117.01	112.86	90.86	59.17	44.01	112.43	115.98	113.34	0.00	114.46	0.00	109.97
95% C.I.as	155.12	194.16	190.50	ERR	176.06	134.53	71.35	93.80	100.19	198.52	98.89	68.14	194.51	188.40	ERR	192.00	ERR	184.47

TRANSECT	ROAN						BUSHPIG						VERVET MONKEY					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0				0		0				0		0				0	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	0				0		0				0		0				0	
7	0				0		0				0		0				0	
8	0				0		0				0		0				0	
9	0				0		3				3		0				0	
10	0	0		0	0		0	0		0	0		0	0		0	0	
11	0	0		0	0		0	0		0	0		0	0		0	0	
12	0	0		0	0		0	0		0	0		0	0		0	0	
13	0	0		0	0		0	0		0	0		0	0		0	0	
14	0	0		0	0		0	0		0	0		0	0		0	0	
15	0	0		0	0		0	0		0	0		1	0		0	1	
16	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
17	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
18	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
19	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
20	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
21	1	1	1	0	0		0	0	0	0	0		0	0	0	0	0	
22	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
23	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
24	9	9	9	0	0		0	0	0	0	0		0	0	0	0	0	
25	0	0	0		0		0	0	0		0		0	0	0		0	
26	0	0	0		0		0	0	0		0		0	0	0		0	
27	0	0	0		0		0	0	0		0		0	0	0		0	
28	0	0	0		0		0	0	0		0		0	0	0		0	
29	0	0	0		0		0	0	0		0		0	0	0		0	
30	0	0	0		0		0	0	0		0		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	0	0	0		0		0	0	0		0		0	0	0		0	
33	0				0		0				0		0				0	
34	0				0		0				0		0				0	
35	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	10.00	10.00	10.00	0.00	0.00		3.00	0.00	0.00	0.00	3.00		1.00	0.00	0.00	0.00	1.00	
Sum squ	82.00	82.00	82.00	0.00	0.00		9.00	0.00	0.00	0.00	9.00		1.00	0.00	0.00	0.00	1.00	
Sum (Z*y)	502.28	292.34	222.75	0.00	0.00		86.75	0.00	0.00	0.00	86.75		34.25	0.00	0.00	0.00	27.67	
R=Ey/Ez	0.01	0.03	0.04	0.00	0.00		0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	
Var y	2.20	3.53	4.76	0.00	0.00		0.24	0.00	0.00	0.00	0.24		0.03	0.00	0.00	0.00	0.03	
Var z						STRAT.						STRAT.						STRAT.
Covar zy	6.31	6.06	4.42	0.00	0.00	TOTAL	0.12	0.00	0.00	0.00	0.94	TOTAL	0.19	0.00	0.00	0.00	0.28	TOTAL
	ROAN						BUSHPIG						VERVET MONKEY					
Popest (Y)	149.07	150.39	151.15	0.00	0.00	151.15	44.72	0.00	0.00	0.00	44.50	44.50	14.91	0.00	0.00	0.00	14.83	14.83
SE(Y)	127.75	125.11	125.87	0.00	0.00	125.87	43.59	0.00	0.00	0.00	38.33	38.33	14.45	0.00	0.00	0.00	12.80	12.80
95% C.I.	260.61	255.22	256.78	0.00	0.00	246.71	88.92	0.00	0.00	0.00	78.20	75.13	29.48	0.00	0.00	0.00	26.12	25.10
95% C.I.as	174.82	169.71	169.89	ERR	ERR	163.23	198.83	ERR	ERR	ERR	175.73	168.84	197.76	ERR	ERR	ERR	176.09	169.18

RANSECT	TOTAL	PARK	BABOON NORTH	SOUTH	DOMAINE	
1	0				0	
2	0				0	
3	0				0	
4	0				0	
5	0				0	
6	0				0	
7	0				0	
8	20				20	
9	0				0	
10	0	0		0	0	
11	0	0		0	0	
12	0	0		0	0	
13	0	0		0	0	
14	0	0		0	0	
15	0	0		0	0	
16	0	0	0	0	0	
17	0	0	0	0	0	
18	0	0	0	0	0	
19	7	7	7	0	0	
20	0	0	0	0	0	
21	0	0	0	0	0	
22	0	0	0	0	0	
23	0	0	0	0	0	
24	0	0	0	0	0	
25	0	0	0		0	
26	0	0	0		0	
27	0	0	0		0	
28	0	0	0		0	
29	0	0	0		0	
30	0	0	0		0	
31	0	0	0		0	
32	0	0	0		0	
33	0				0	
34	0				0	
35	0				0	
36	0				0	
37	0				0	
Total	27.00	7.00	7.00	0.00	20.00	
Sum squ	449.00	49.00	49.00	0.00	400.00	
Sum (Z*y)	862.78	172.76	91.77	0.00	559.06	
R=Σy/Σz	0.03	0.02	0.03	0.00	0.03	
Var y	11.92	2.13	2.88	0.00	10.81	
Var z						STRAT.
Covar zy	3.33	2.79	1.10	0.00	5.71	TOTAL
	BABOON					
Pop.est.(Y)	402.49	105.27	105.80	0.00	296.66	402.47
SE(Y)	304.15	99.23	100.42	0.00	255.96	274.95
95% C.L.	620.46	202.44	204.87	0.00	522.15	538.91
95% C.L.as	154.16	192.29	193.63	ERR	176.01	133.90

RECENSEMENT GENERAL DU PARC NATIONAL DE LA GARAMBA ET DOMAINES DE CHASSE, Mai 1993
ESTIMATION DES POPULATIONS
REAR OBSERVERS

TRANS	AREA					ELEPHANT						BUFFALO					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	3.35				3.35	0				0		0				0	
2	7.06				7.06	0				0		0				0	
3	11.58				11.58	0				0		0				0	
4	20.73				20.73	0				0		0				0	
5	21.92				21.92	0				0		0				0	
6	27.88				27.88	0				0		0				0	
7	25.23				25.23	0				0		0				0	
8	27.91				27.91	0				0		22				22	
9	29.00				29.00	0				0		0				0	
10	33.93	1.66		1.66	32.27	0	0		0	0		0	0		0	0	
11	34.40	3.32		3.32	31.09	0	0		0	0		0	0		0	0	
12	31.55	4.88		4.88	26.68	0	0		0	0		4	4		4	0	
13	32.45	8.65		8.65	23.80	0	0		0	0		203	203		203	0	
14	33.23	6.69		6.69	26.54	7	0		0	7		57	57		57	0	
15	34.51	6.55		6.55	27.96	0	0		0	0		3	0		0	3	
16	35.54	18.61	6.63	11.98	16.93	8	8	0	8	0		3	3	0	3	0	
17	39.58	24.41	12.59	11.82	15.17	10	10	0	10	0		1	1	0	1	0	
18	39.43	24.14	12.88	11.27	15.28	35	35	0	35	0		136	136	1	135	0	
19	43.06	24.39	13.32	11.06	18.67	71	71	5	66	0		175	175	151	24	0	
20	44.80	26.36	14.56	11.81	18.44	63	63	14	49	0		633	633	334	299	0	
21	51.43	28.44	16.37	12.07	22.99	43	39	0	39	4		153	153	78	75	0	
22	50.39	31.46	19.41	12.05	18.93	74	74	27	47	0		24	24	8	16	0	
23	47.20	32.98	22.58	10.40	14.22	128	126	39	87	2		135	135	128	7	0	
24	49.84	29.18	22.89	6.29	20.66	79	79	4	75	0		303	303	302	1	0	
25	48.46	21.28	21.28		27.18	0	0	0		0		25	25	25		0	
26	44.15	19.06	19.06		25.09	0	0	0		0		0	0	0		0	
27	26.07	15.66	15.66		10.42	0	0	0		0		0	0	0		0	
28	26.73	15.06	15.06		11.67	0	0	0		0		0	0	0		0	
29	16.41	6.47	6.47		9.94	0	0	0		0		0	0	0		0	
30	16.30	6.09	6.09		10.21	0	0	0		0		0	0	0		0	
31	13.91	6.79	6.79		7.12	0	0	0		0		0	0	0		0	
32	8.98	2.00	2.00		6.98	0	0	0		0		0	0	0		0	
33	12.24				12.24	0				0		0				0	
34	7.42				7.42	0				0		0				0	
35	7.95				7.95	0				0		0				0	
36	7.89				7.89	0				0		0				0	
37	3.22				3.22	0				0		0				0	
Total	1015.77	364.12	233.64	130.49	651.65	518.00	505.00	89.00	416.00	13.00		1877.00	1852.00	1027.00	825.00	25.00	
Sum squ	55802.97	8169.90	3853.45	1310.55	14123.50	40398.00	39513.00	2487.00	25070.00	69.00		*********	*********	*********	*********	493.00	
Sum (Z,y						24092.41	14528.34	1766.73	4330.81	306.17		82491.94	45408.38	18653.24	8698.14	697.87	
R=Ey/Ez						0.51	1.39	0.38	3.19	0.02		1.85	5.09	4.40	6.32	0.04	
Var y						920.72	1292.04	126.32	966.64	1.79		14839.20	21809.62	11667.26	8088.71	13.23	
Var z	219.91	109.33	40.16	12.53	73.52						STRAT						STRAT
Covar zy						274.21	296.98	33.47	19.55	2.14	TOTAL	860.06	731.30	338.01	160.80	7.15	TOTAL
						ELEPHANT						BUFFALO					
					Pop est (Y)	7738.62	7627.92	1352.32	6216.73	193.01	7762.06	28041.29	27974.07	15604.81	12328.85	371.18	28304.83
					SE(Y)	2347.77	1828.22	623.10	1372.93	115.99	1512.16	9898.45	9203.96	5872.14	4589.20	316.34	7459.41
					95% C.I.	4789.45	3729.57	1271.13	2800.77	236.62	2963.84	20192.83	18776.07	11979.16	9361.97	645.33	14620.45
					95% C.I.a	61.89	48.89	94.00	45.05	122.59	38.18	72.01	67.12	76.77	75.94	173.86	51.65

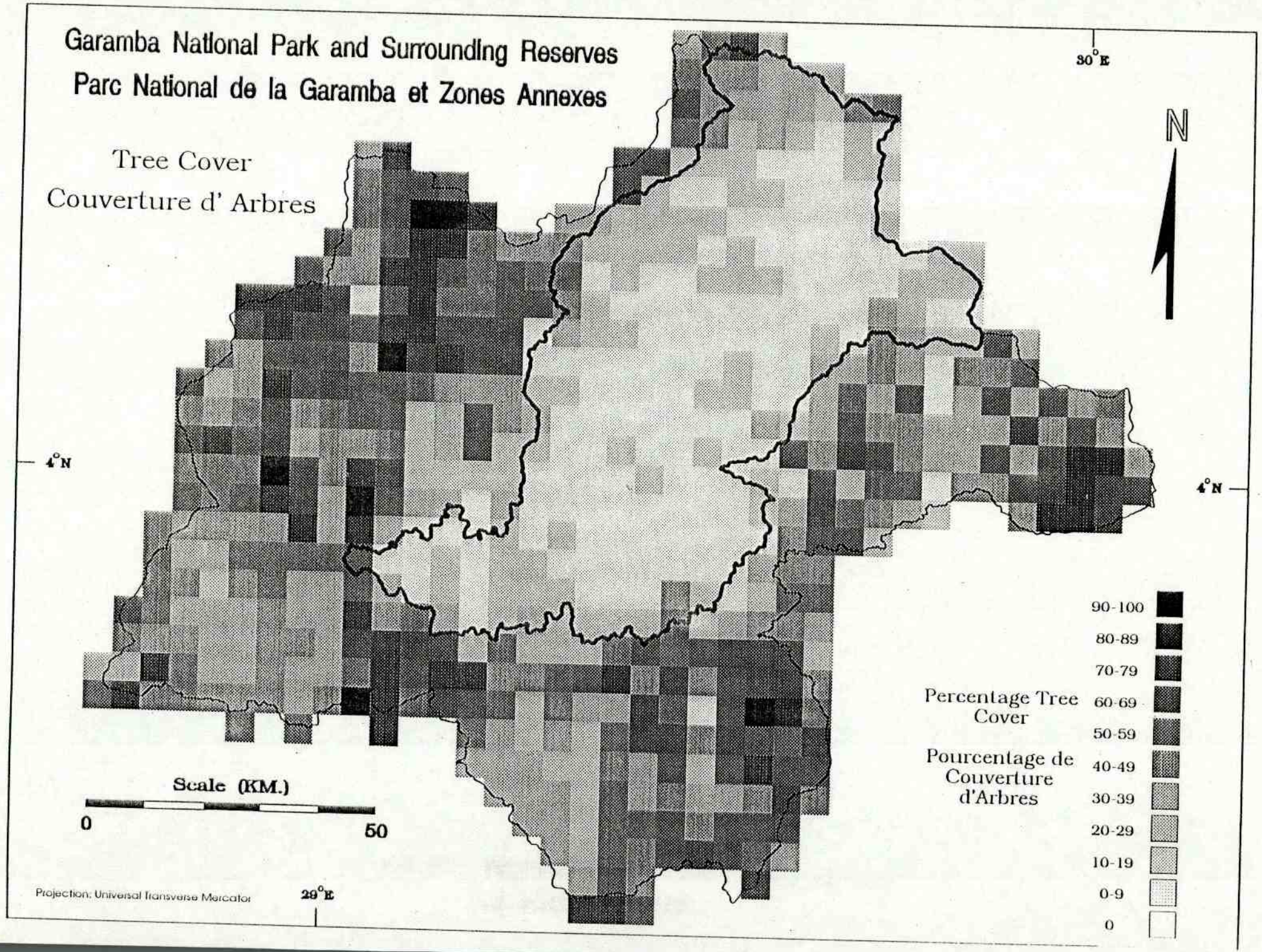
TRANS	HARTEBEEST						KOB						WATERBUCK					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0				0		0				0		0				0	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	0				0		0				0		1				1	
7	0				0		0				0		4				4	
8	0				0		3				3		2				2	
9	1				1		0				0		1				1	
10	0	0		0	0		0	0		0	0		9	8		8	1	
11	1	1		1	0		8	5		5	3		4	3		3	1	
12	1	1		1	0		24	19		19	5		7	3		3	4	
13	11	11		11	0		9	9		9	0		7	7		7	0	
14	0	0		0	0		4	4		4	0		10	6		6	4	
15	3	3		3	0		3	2		2	1		8	4		4	4	
16	1	1	0	1	0		38	37	2	35	1		10	8	0	8	2	
17	13	13	12	1	0		26	22	5	17	4		6	6	3	3	0	
18	31	31	18	13	0		41	41	2	39	0		5	0	0	0	5	
19	28	28	16	12	0		126	126	2	124	0		1	0	0	0	1	
20	35	35	1	34	0		25	25	4	21	0		0	0	0	0	0	
21	31	31	16	15	0		16	16	3	13	0		8	7	7	0	1	
22	0	0	0	0	0		4	4	1	3	0		9	9	7	2	0	
23	7	7	1	6	0		68	66	2	64	0		12	11	1	10	1	
24	30	29	15	14	1		13	13	0	13	0		0	0	0	0	0	
25	2	2	2		0		0	0	0		0		0	0	0		0	
26	0	0	0		0		1	1	1		0		0	0	0		0	
27	0	0	0		0		0	0	0		0		0	0	0		0	
28	1	1	1		0		0	0	0		0		0	0	0		0	
29	0	0	0		0		0	0	0		0		0	0	0		0	
30	0	0	0		0		1	0	0		1		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	0	0	0		0		0	0	0		0		0	0	0		0	
33	0				0		0				0		0				0	
34	0				0		0				0		0				0	
36	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	196.00	194.00	82.00	112.00	2.00		408.00	390.00	22.00	368.00	18.00		104.00	72.00	18.00	54.00	32.00	
Sum squ	5188.00	5128.00	1212.00	2060.00	2.00		25856.00	25320.00	68.00	23782.00	62.00		832.00	534.00	108.00	360.00	104.00	
Sum (z.y)	8645.20	4829.29	1296.04	1158.97	49.67		17034.82	9330.28	319.60	3846.64	426.16		3977.53	1305.10	310.80	424.09	767.86	
R=Ey/Ez	0.19	0.53	0.35	0.86	0.00		0.40	1.07	0.09	2.82	0.03		0.10	0.20	0.08	0.41	0.05	
Var y	115.27	158.71	51.03	87.41	0.05		593.25	850.32	2.47	1053.84	1.48		14.99	14.03	5.56	11.83	2.12	
Var z						STRAT.						STRAT.						STRAT.
Covar zy	90.68	79.91	21.62	21.22	0.40	TOTAL	162.05	143.48	5.02	70.80	3.03	TOTAL	31.18	7.51	5.48	6.49	5.67	TOTAL
	HARTEBEEST						KOB						WATERBUCK					
Pop est (Y)	2928.13	2930.33	1245.95	1673.73	29.89	2949.38	6095.28	5890.87	334.28	5499.41	267.25	6100.94	1553.70	1087.54	273.50	806.98	475.10	1555.59
SE(Y)	835.68	717.77	385.41	439.79	19.89	585.11	1983.84	1814.49	82.76	1556.45	101.75	1561.97	293.50	274.81	134.29	166.24	111.07	240.84
95% C.L.	1704.78	1464.25	786.23	897.17	40.57	1146.81	4047.03	3701.56	168.84	3175.17	207.57	3061.46	598.74	560.61	273.95	339.12	226.59	472.05
95% C.L.as	58.22	49.97	63.10	53.60	136.61	38.88	66.40	62.84	50.51	57.74	77.67	50.18	38.54	51.55	100.16	42.02	47.69	30.35

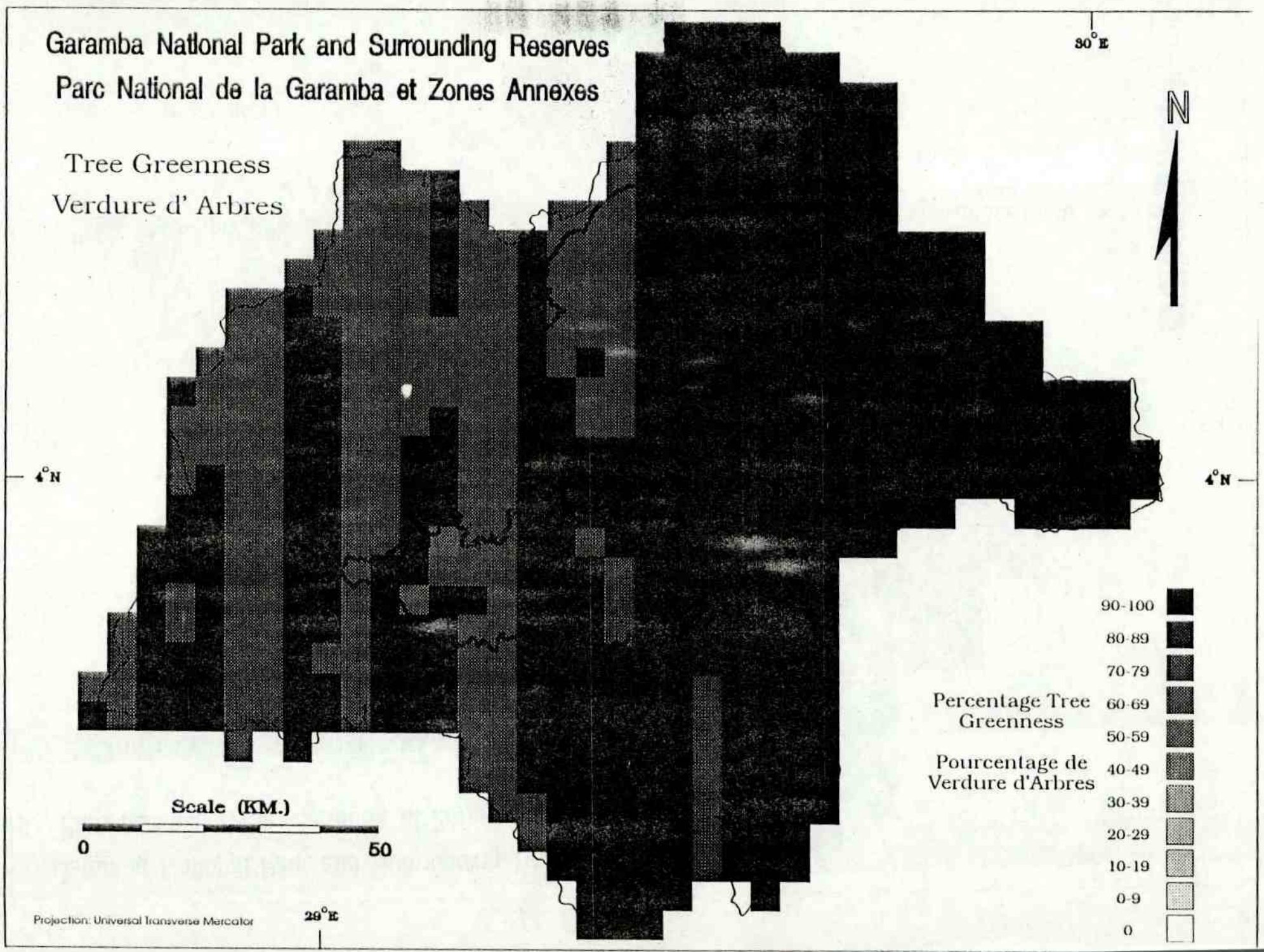
ANS	WARTHOG						HIPPO						GIRAFFE					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0				0		0				0		0				0	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	4				4		0				0		0				0	
7	0				0		0				0		0				0	
8	0				0		0				0		0				0	
9	0				0		0				0		0				0	
10	0	0		0	0		0	0		0	0		0	0		0	0	
11	7	7		7	0		0	0		0	0		0	0		0	0	
12	4	4		4	0		0	0		0	0		0	0		0	0	
13	21	16		16	5		0	0		0	0		0	0		0	0	
14	10	6		6	4		0	0		0	0		0	0		0	0	
15	5	5		5	0		0	0		0	0		0	0		0	0	
16	11	10	0	10	1		8	8	0	8	0		13	13	0	13	0	
17	25	24	9	15	1		26	26	0	26	0		0	0	0	0	0	
18	4	4	0	4	0		2	2	1	1	0		4	4	4	0	0	
19	9	9	4	5	0		2	2	1	1	0		0	0	0	0	0	
20	21	21	4	17	0		16	16	2	14	0		0	0	0	0	0	
21	63	63	13	50	0		0	0	0	0	0		0	0	0	0	0	
22	0	0	0	0	0		10	10	1	9	0		0	0	0	0	0	
23	7	7	3	4	0		0	0	0	0	0		0	0	0	0	0	
24	29	29	18	11	0		0	0	0	0	0		6	6	6	0	0	
25	1	1	1		0		0	0	0		0		0	0	0		0	
26	2	2	2		0		0	0	0		0		0	0	0		0	
27	4	4	4		0		0	0	0		0		0	0	0		0	
28	1	1	1		0		0	0	0		0		0	0	0		0	
29	0	0	0		0		0	0	0		0		0	0	0		0	
30	11	1	1		6		0	0	0		0		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	0	0	0		0		0	0	0		0		0	0	0		0	
33	0				0		0				0		0				0	
34	0				0		0				0		0				0	
35	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	239.00	214.00	60.00	154.00	21.00		64.00	64.00	5.00	59.00	0.00		23.00	23.00	10.00	13.00	0.00	
n squ	6933.00	6478.00	638.00	3674.00	95.00		1104.00	1104.00	7.00	1019.00	0.00		221.00	221.00	52.00	169.00	0.00	
(Zy)	9994.59	4907.72	1060.54	1568.52	430.08		2699.10	1617.00	74.72	699.19	0.00		918.83	513.62	188.82	155.74	0.00	
Ey/Ez	0.24	0.59	0.26	1.18	0.03		0.06	0.18	0.02	0.45	0.00		0.02	0.06	0.04	0.10	0.00	
Var y	149.70	203.95	26.64	149.50	2.31		27.59	42.09	0.55	56.21	0.00		5.74	9.00	2.88	11.27	0.00	
Var z						STRAT.						STRAT.						STRAT.
ver zy	95.37	69.08	18.94	28.43	1.67	TOTAL	26.17	27.44	1.20	13.64	0.00	TOTAL	7.98	6.80	3.49	3.05	0.00	TOTAL
	WARTHOG						HIPPO						GIRAFFE					
est(Y)	3570.52	3232.42	911.67	2301.39	311.79	3524.85	956.12	966.71	75.97	881.70	0.00	957.67	343.61	347.41	151.95	194.27	0.00	346.22
SE(Y)	961.03	889.16	266.87	566.34	131.78	639.78	445.73	420.02	33.74	386.21	0.00	387.68	208.24	205.55	98.35	186.11	0.00	210.50
% C.L.	1960.51	1813.88	544.41	1155.32	268.84	1253.97	909.28	856.84	68.83	787.88	0.00	759.86	424.80	419.32	200.64	379.67	0.00	412.58
% C.L.as	54.91	56.12	59.72	50.20	86.23	35.58	95.10	88.63	90.60	89.36	ERR	79.34	123.63	120.70	132.05	195.43	ERR	119.17

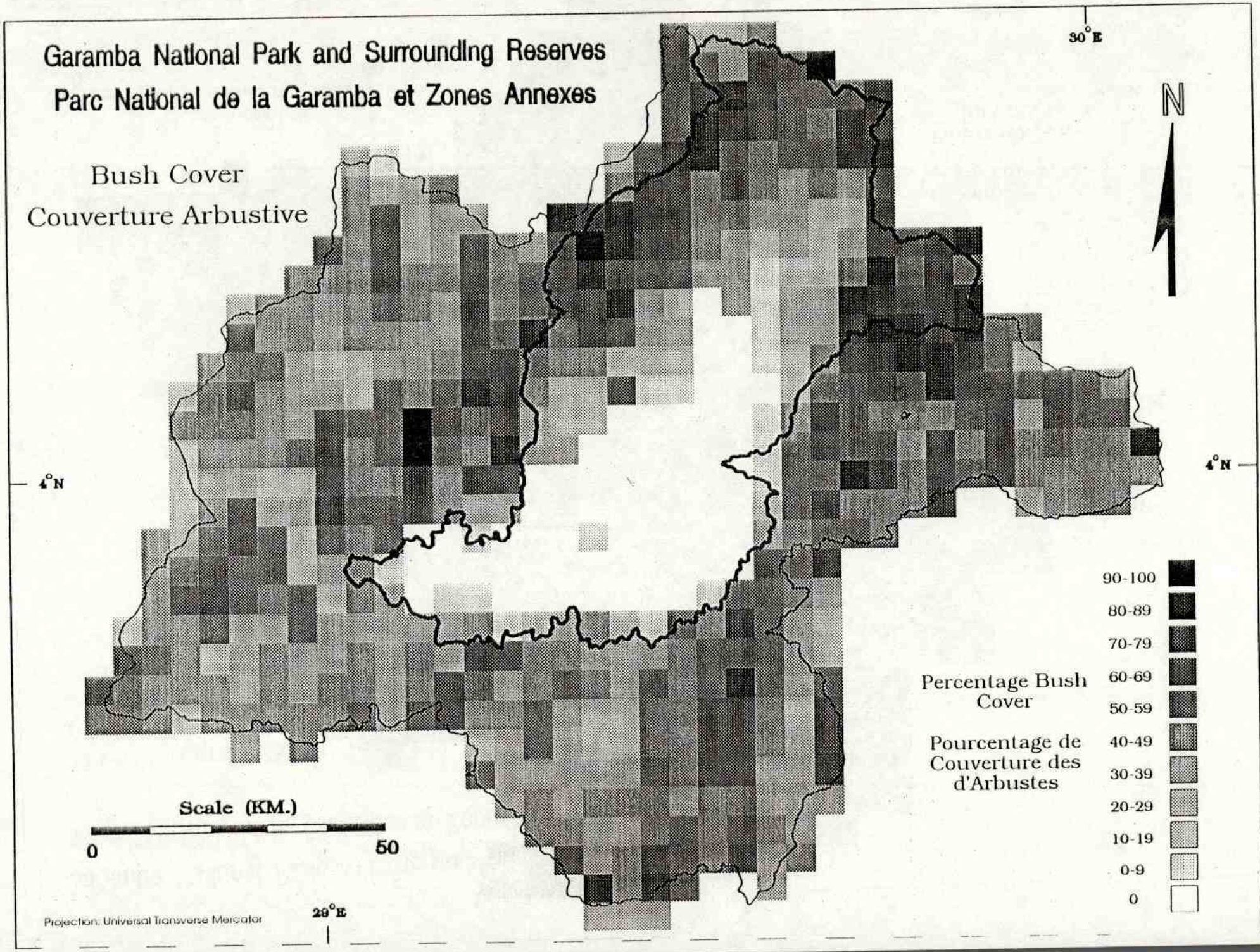
TRANS	REEDBUCK						BUSHBUCK						ORIBI					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0				0		0				0		0				0	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	0				0		0				0		0				0	
7	0				0		0				0		0				0	
8	0				0		0				0		0				0	
9	0				0		0				0		0				0	
10	0	0		0	0		2	0		0	2		4	2		2	2	
11	0	0		0	0		0	0		0	0		0	0		0	0	
12	0	0		0	0		0	0		0	0		2	2		2	0	
13	0	0		0	0		1	0		0	1		0	0		0	0	
14	0	0		0	0		6	1		1	5		0	0		0	0	
15	0	0		0	0		0	0		0	0		1	1		1	0	
16	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
17	0	0	0	0	0		2	2	2	0	0		2	2	0	2	0	
18	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
19	1	1	1	0	0		2	2	2	0	0		0	0	0	0	0	
20	2	2	2	0	0		2	2	1	1	0		1	1	1	0	0	
21	0	0	0	0	0		2	1	1	0	1		0	0	0	0	0	
22	2	2	2	0	0		1	1	1	0	0		0	0	0	0	0	
23	0	0	0	0	0		1	1	1	0	0		0	0	0	0	0	
24	0	0	0	0	0		0	0	0	0	0		1	1	1	0	0	
25	2	2	2		0		0	0	0		0		0	0	0		0	
26	0	0	0		0		0	0	0		0		0	0	0		0	
27	0	0	0		0		0	0	0		0		0	0	0		0	
28	0	0	0		0		2	2	2		0		0	0	0		0	
29	0	0	0		0		0	0	0		0		0	0	0		0	
30	0	0	0		0		0	0	0		0		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	0	0	0		0		0	0	0		0		0	0	0		0	
33	0				0		0				0		0				0	
34	0				0		0				0		0				0	
35	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	7.00	7.00	7.00	0.00	0.00		21.00	12.00	10.00	2.00	9.00		11.00	9.00	2.00	7.00	2.00	
Sum squ	13.00	13.00	13.00	0.00	0.00		63.00	20.00	16.00	2.00	31.00		27.00	15.00	2.00	13.00	4.00	
Sum (z.y)	330.35	182.59	123.81	0.00	0.00		808.49	280.02	154.87	18.50	244.02		407.14	123.98	37.44	43.25	64.54	
R=Σy/Σz	0.01	0.02	0.03	0.00	0.00		0.02	0.03	0.04	0.02	0.01		0.01	0.02	0.01	0.05	0.00	
Var y	0.32	0.49	0.63	0.00	0.00		1.42	0.62	0.63	0.12	0.80		0.66	0.52	0.11	0.70	0.11	
Var z						STRAT.						STRAT.						STRAT.
Covar zy	3.84	3.26	2.21	0.00	0.00	TOTAL	6.44	4.09	2.55	0.32	2.38	TOTAL	2.92	-0.84	0.69	0.52	0.81	TOTAL
	REEDBUCK						BUSHBUCK						ORIBI					
Pop.est.(Y)	104.58	105.73	106.36	0.00	0.00	106.36	313.73	181.26	151.95	29.89	133.62	315.46	164.33	135.94	30.39	104.61	29.69	164.69
SE(Y)	47.17	44.89	44.17	0.00	0.00	44.17	99.20	48.29	42.14	19.39	76.16	89.17	70.06	55.71	19.22	46.60	28.53	57.92
95% C.L.	96.23	91.57	90.11	0.00	0.00	86.57	202.38	98.52	85.97	39.55	155.36	174.78	142.91	113.65	39.20	95.06	58.20	113.52
95% C.L.as	92.02	86.60	84.72	ERR	ERR	81.39	64.50	54.35	56.58	132.33	116.27	55.40	86.96	83.60	129.00	90.87	196.00	88.93

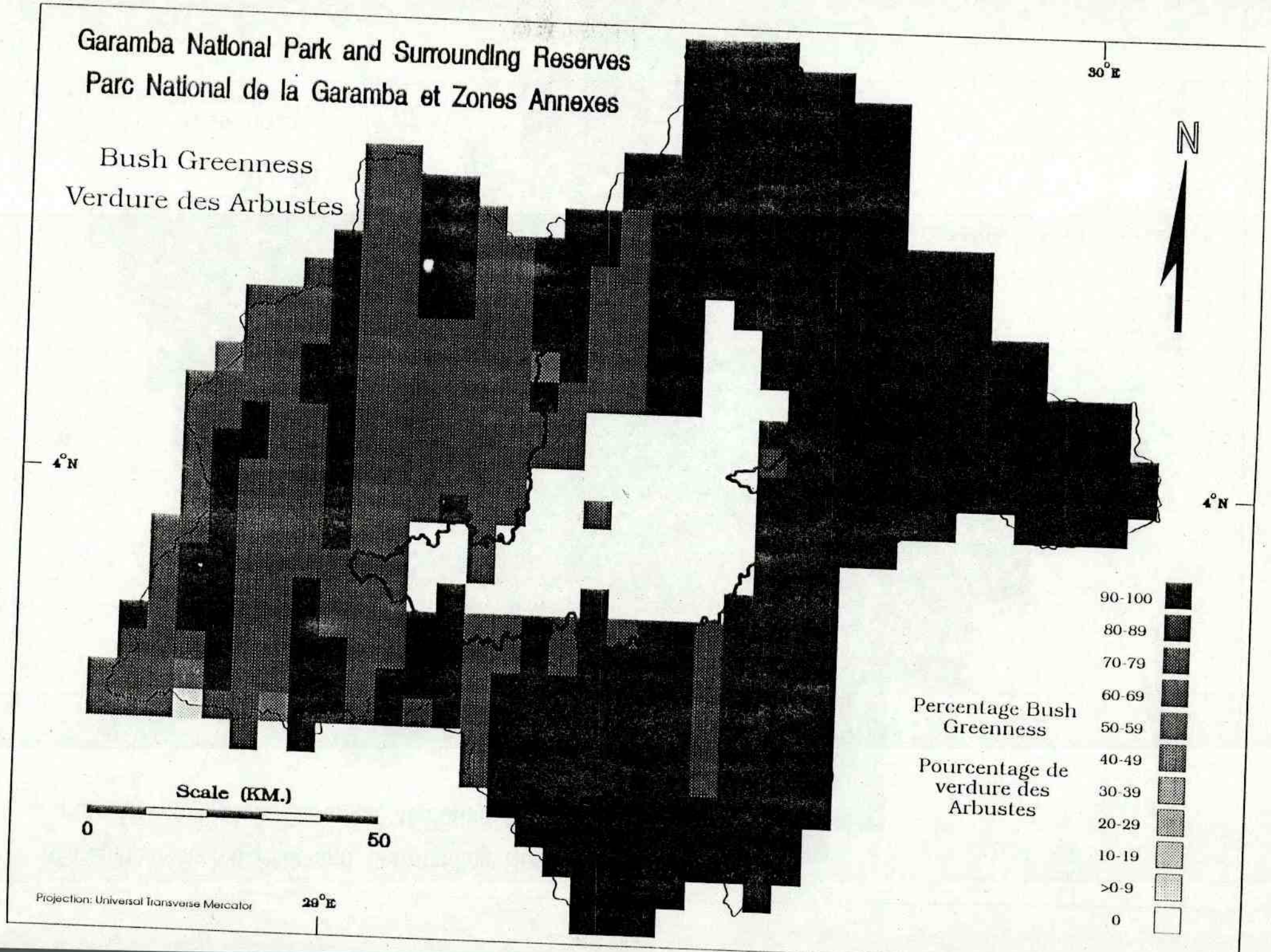
TRANS	GREY DUIKER						YELLOW BACKED DUIKER						RED-FLANKED DUIKER					
	TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE		TOTAL	PARK	NORTH	SOUTH	DOMAINE	
1	0				0		0				0		0				0	
2	0				0		0				0		0				0	
3	0				0		0				0		0				0	
4	0				0		0				0		0				0	
5	0				0		0				0		0				0	
6	0				0		0				0		0				0	
7	0				0		0				0		0				0	
8	0				0		0				0		0				0	
9	0				0		0				0		0				0	
10	0	0		0	0		0	0		0	0		0	0		0	0	
11	0	0		0	0		0	0		0	0		0	0		0	0	
12	1	1		1	0		0	0		0	0		0	0		0	0	
13	0	0		0	0		0	0		0	0		1	0		0	1	
14	0	0		0	0		0	0		0	0		2	2		2	0	
15	0	0		0	0		0	0		0	0		0	0		0	0	
16	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
17	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
18	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
19	0	0	0	0	0		0	0	0	0	0		2	2	1	1	0	
20	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
21	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0	
22	1	1	0	1	0		0	0	0	0	0		1	1	1	0	0	
23	1	1	1	0	0		0	0	0	0	0		0	0	0	0	0	
24	1	1	1	0	0		0	0	0	0	0		1	0	0	0	1	
25	0	0	0		0		0	0	0		0		0	0	0		0	
26	0	0	0		0		0	0	0		0		0	0	0		0	
27	0	0	0		0		2	2	2		0		0	0	0		0	
28	1	1	1		0		0	0	0		0		0	0	0		0	
29	0	0	0		0		0	0	0		0		0	0	0		0	
30	0	0	0		0		0	0	0		0		0	0	0		0	
31	0	0	0		0		0	0	0		0		0	0	0		0	
32	1	0	0		1		0	0	0		0		0	0	0		0	
33	0				0		0				0		0				0	
34	0				0		0				0		0				0	
35	0				0		0				0		0				0	
36	0				0		0				0		0				0	
37	0				0		0				0		0				0	
Total	6.00	5.00	3.00	2.00	1.00		2.00	2.00	2.00	0.00	0.00		7.00	5.00	2.00	3.00	2.00	
Sum squ	6.00	5.00	3.00	2.00	1.00		4.00	4.00	4.00	0.00	0.00		11.00	9.00	2.00	5.00	2.00	
Sum (Z.y)	214.70	113.56	60.53	16.93	6.98		52.15	31.31	31.31	0.00	0.00		285.26	93.61	32.73	24.45	44.47	
R=Σy/Σz	0.01	0.01	0.01	0.02	0.00		0.00	0.01	0.01	0.00	0.00		0.01	0.01	0.01	0.02	0.00	
Var y	0.14	0.18	0.15	0.12	0.03		0.11	0.17	0.24	0.00	0.00		0.27	0.36	0.11	0.31	0.05	
Var z						STRAT.						STRAT.						STRAT.
Cover zy	1.39	1.56	1.16	0.27	-0.30	TOTAL	-0.08	-0.02	0.52	0.00	0.00	TOTAL	2.59	0.66	0.56	0.39	0.26	TOTAL
	GREY DUIKER						YELLOW BACKED DUIKER						RED-FLANKED DUIKER					
Pop.est (Y)	89.64	75.52	45.58	29.89	14.85	90.32	29.88	30.21	30.39	0.00	0.00	30.39	104.58	75.52	30.39	44.83	29.69	104.92
SE(Y)	32.15	27.68	21.87	19.50	14.85	32.85	29.37	29.56	28.90	0.00	0.00	28.90	43.85	42.24	19.43	31.21	20.06	41.88
90% C.L.	65.58	56.46	44.61	39.77	30.29	64.38	59.91	60.30	58.95	0.00	0.00	56.64	89.45	86.17	39.63	63.66	40.92	82.08
95% C.L.as	73.16	74.76	97.87	133.08	204.04	71.28	200.52	199.60	193.98	ERR	ERR	186.37	85.54	114.10	130.42	142.01	137.82	78.24

MAISON ABANDONNE					
TOTAL	PARK	NORTH	SOUTH	DOMAINE	
0				0	
0				0	
0				0	
0				0	
0				0	
0				0	
1				1	
0				0	
0				0	
0	0		0	0	
0	0		0	0	
0	0		0	0	
0	0		0	0	
0	0		0	0	
0	0		0	0	
0	0	0	0	0	
0	0	0	0	0	
4	0	0	0	4	
5	0	0	0	5	
1	0	0	0	1	
0	0	0	0	0	
0	0	0	0	0	
4	2	2	0	2	
3	0	0	0	3	
15	0	0		15	
18	0	0		18	
2	2	2		0	
2	0	0		2	
4	0	0		4	
0	0	0		0	
6	0	0		6	
0	0	0		0	
10				10	
1				1	
0				0	
1				1	
7				7	
84.00	4.00	4.00	0.00	80.00	
828.00	8.00	8.00	0.00	812.00	
2718.01	97.28	76.48	0.00	1414.05	
0.08	0.01	0.02	0.00	0.12	
17.70	0.33	0.44	0.00	17.75	
					STRAT.
11.44	1.54	1.42	0.00	0.14	TOTAL
MAISON ABANDONNE					
1254.91	60.42	60.78	0.00	1187.76	1248.54
369.70	39.16	38.36	0.00	373.97	375.93
754.19	79.88	78.26	0.00	762.90	736.83
60.10	132.21	128.76	ERR	64.25	59.02


Garamba National Park and Surrounding Reserves
Parc National de la Garamba et Zones Annexes
Tree Cover
Couverture d' Arbres
30°E
N
4°N
4°N
90-100
80-89
70-79
60-69
50-59
40-49
30-39
20-29
10-19
0-9
0
Percentage Tree Cover
Pourcentage de Couverture d'Arbres
Scale (KM.)
0
50
Projection: Universal Transverse Mercator
29°E

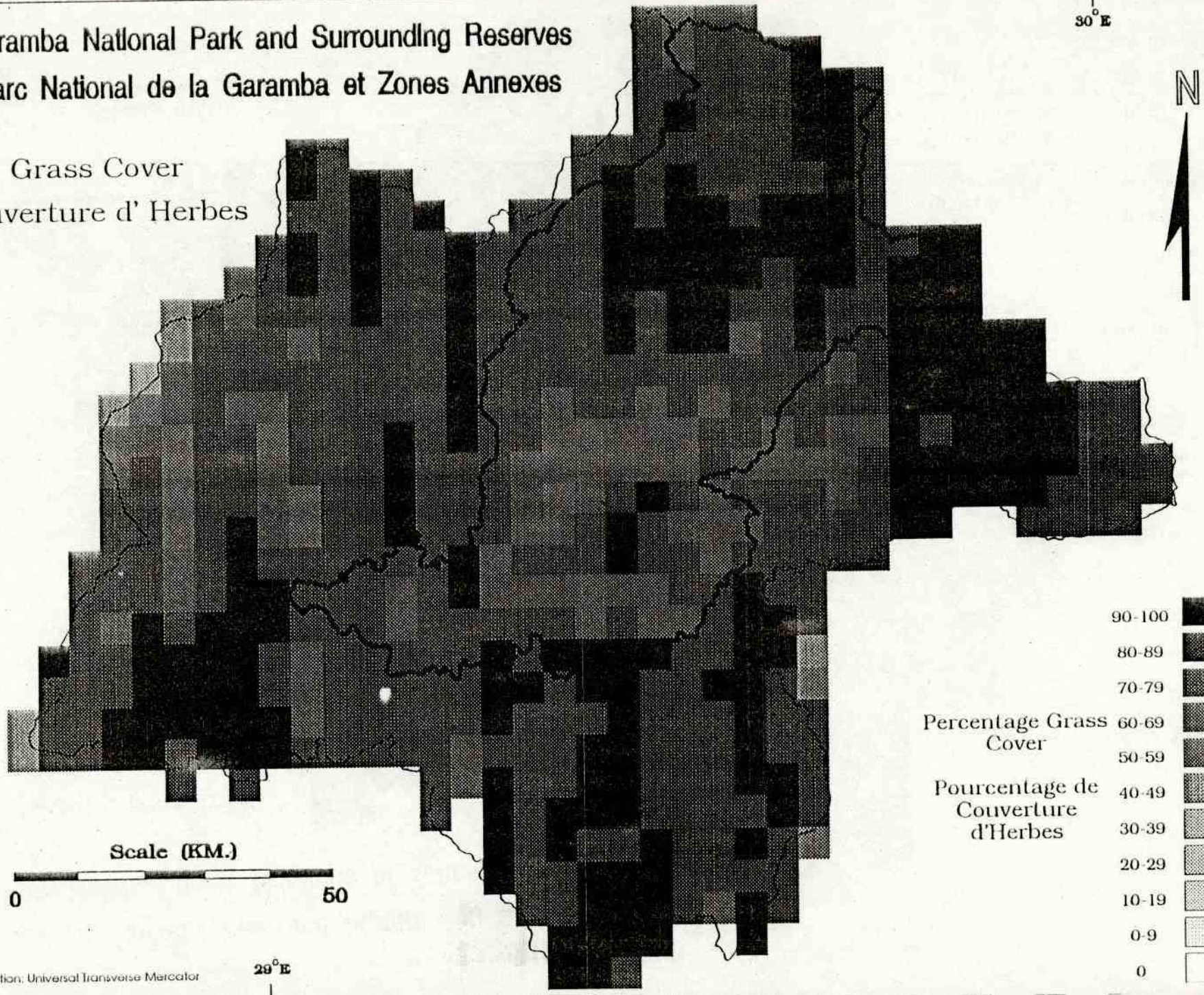

Garamba National Park and Surrounding Reserves
Parc National de la Garamba et Zones Annexes
Tree Greenness
Verdure d' Arbres
30°E
N
4°N
4°N
90-100
80-89
70-79
60-69
50-59
40-49
30-39
20-29
10-19
0-9
0
Percentage Tree Greenness
Pourcentage de Verdure d'Arbres
Scale (KM.)
0
50
Projection: Universal Transverse Mercator
29°E


Garamba National Park and Surrounding Reserves
Parc National de la Garamba et Zones Annexes
Bush Cover
Couverture Arbustive
30°E
N
4°N
4°N
90-100
80-89
70-79
60-69
50-59
40-49
30-39
20-29
10-19
0-9
0
Percentage Bush Cover
Pourcentage de Couverture des d'Arbustes
Scale (KM.)
0
50
Projection: Universal Transverse Mercator
29°E


Garamba National Park and Surrounding Reserves
Parc National de la Garamba et Zones Annexes
Bush Greenness
Verdure des Arbustes
30°E
N
4°N
4°N
Scale (KM.)
0
50
Percentage Bush Greenness
Pourcentage de verdure des Arbustes
90-100
80-89
70-79
60-69
50-59
40-49
30-39
20-29
10-19
>0-9
0
Projection: Universal Transverse Mercator
29°E

Garamba National Park and Surrounding Reserves
Parc National de la Garamba et Zones Annexes

Grass Cover
Couverture d' Herbes



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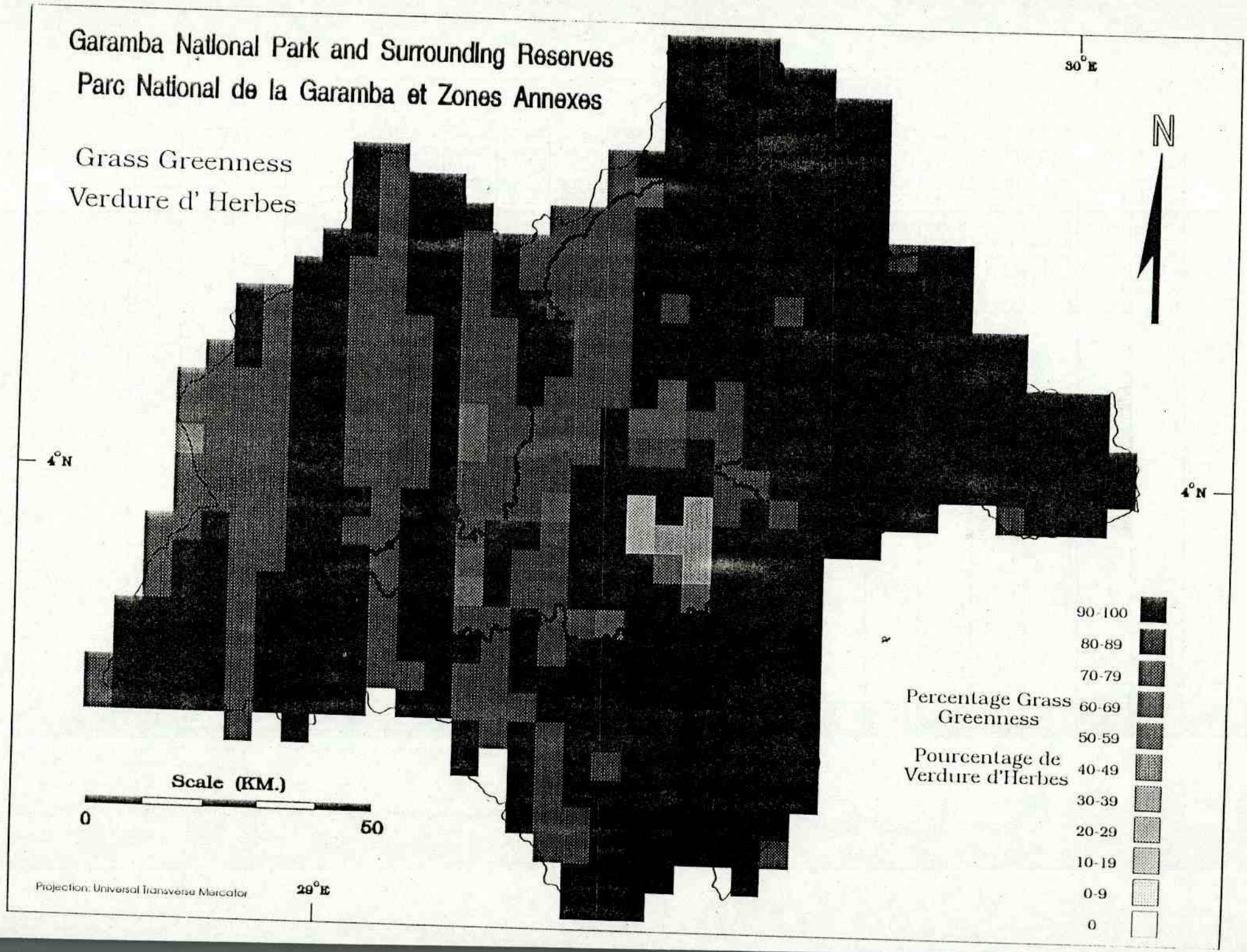
Garamba National Park and Surrounding Reserves
Parc National de la Garamba et Zones Annexes
Grass Greenness
Verdure d' Herbes
30°E
N
4°N
4°N
90-100
80-89
70-79
Percentage Grass Greenness
60-69
50-59
Pourcentage de Verdure d'Herbes
40-49
30-39
20-29
10-19
0-9
0
Scale (KM.)
0
50
Projection: Universal Transverse Mercator
29°E

PARC NATIONAL DE LA GARAMBA, - GENERAL SYSTEMATIC AERIAL SAMPLE COUNT
April 1991

Stratum : Park only
Z = 4077 km2 (northernmost region not counted due to Sudan war)

TR	time mins	length km	width km	area z	EL	RH	HI	BU	GI	CO	BL	WB	RO	RE	OR	CG	GU	CJ	CR
7																			
8	17.46	4.4	0.39	1.716						6									
9	19.26	10	0.39	3.9	12					42									
10	17.53	14	0.39	5.46				7		67									
11	20	26	0.39	10.14	52			39		41	4								
12		17	0.39	6.63	3		17	58	1	12		2							
13	15.03	17	0.39	6.63	15		4	153	1	17		8			1				
14	19.25	34	0.39	13.26	4		3	374	11	11		12							2
15	18.93	65.2	0.39	25.428			3	14	1						2		1		
16	18.73	67	0.39	26.13	14		19	467		6	1	4					3		
17	21.4	71.4	0.39	27.846	27		14	459		7	9	1					2		
18	22.68	74.4	0.39	29.016	96		52	222		14	2								
19	20.24	74	0.39	28.86	156	2	60	178		1	13	7							
20	20.55	70	0.39	27.3	176			417		13	15	2	1			1			
21	17.38	63.2	0.39	24.648	18			158			15	9		1					
22	17.38	58.2	0.39	22.698	3			79	13	13	4	6		1					
23	18.25	36.4	0.39	14.196				20		13	14								
24		27	0.39	10.53						4		5		1					
25		22.6	0.39	8.814															
26		17.2	0.39	6.708															
27		16	0.39	6.24													1		1
28		16	0.39	6.24															1
29		14.4	0.39	5.616															
30																			
31																			
32																			
Sum y or Sum z		815.4		318.006	576	2	172	2645	27	267	77	56	1	3	3	1	7	0	4
Sum z2 or Sum y2				6606.6339	68884	4	7184	883647	293	9329	933	424	1	3	5	1	15	0	6
Sum (zy)				NA	14468.376	57.72	4382.04	61066.044	479.622	2957.214	1819.272	1025.076	27.3	57.876	57.486	27.3	165.75	0	39
R				1.8112866	1.8112866	0.0062892	0.5408703	8.3174531	0.0849041	0.8396068	0.2421338	0.1760973	0.0031446	0.0094338	0.0094338	0.0031446	0.0220122	0	0.0125784
sy2					2562.0606	0.1818182	278.06061	26935.517	12.374459	289.9329	31.595238	13.402597	0.0454545	0.1233766	0.2186147	0.0454545	0.6082251	0	0.2510823
sz2					95.710052	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421	69.921421
s zy					292.49527	1.3719221	90.276727	1087.2881	4.2543766	-42.96297	33.631	10.266961	0.6116753	0.691026	0.6724545	0.6116753	3.0745844	0	-0.896156
Pop.Est.				5124.1297	7384.6154	25.641026	2205.1282	33910.256	346.15385	3423.0769	987.17949	717.94872	12.820513	38.461538	38.461538	12.820513	89.74359	0	51.282051
Var Y					8537903.7	605.93592	926622.96	89755483	41240.478	966388.72	105286.12	44665.754	151.48445	411.17382	728.57677	151.48445	2026.9469	0	836.82227
SE Y					2921.9691	24.615766	962.61257	9473.9371	203.07752	983.05072	324.47823	211.34274	12.307902	20.277421	26.992161	12.307902	45.021627	0	28.927881
95% CI.	(1.SE Y)				6077.6958	51.200793	2002.2342	19705.789	422.40124	2044.7455	674.91473	439.5929	25.600436	42.177037	56.143695	25.600436	93.644985	0	60.169992
95% CI. %					82.302131	199.68309	90.798991	58.11159	122.02702	59.734138	68.367985	61.229011	199.6834	109.6603	145.97361	199.6834	104.34727	ERR	117.33148