GAME UTILISATION IN RHODESIA

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INTRODUCTION

Game ranching has been a going concern in the southern lowveld of Rhodesia for three years. Accomplishments to date are due much to the initial impetus provided by the Fulbright workers, Drs. Dasmann and Mossman and the National Museum organisation which arranged for them to work in this country. This paper is intended simply as a review of the progress made since 1961.†

As Dasmann and Mossman have pointed out (1961), demonstration of the economic value of wildlife does much to ensure its continuance, particularly where other (aesthetic and scientific) arguments fail. But certain special problems exist.

Rhodesia has a rainfall which starts over the bulk of the country almost simultaneously each season. Except perhaps in the extreme west, there is little or no evidence of seasonal game migrations. Most of our large mammals, except perhaps elephant, seem surprisingly localised in their movements. This localising, and ability to breed even under the most adverse conditions, and the uneven development pattern of the country have together led to the formation of pockets of very heavy population, too great for the unmanaged range to carry without grave deterioration. As the pockets cover large areas the problem is not one which can be shelved as trivial.

PATTERN OF VEGETATIONAL REGRESSION UNDER UNMANAGED CONDITIONS

A heavy population of game left to "balance itself" under artificial protection may alter its habitat and the two may go through the following successive stages of degradation (illustrated in Figure 1, page 329).

Stage 0

A wide spectrum of mammals and a wide range of birds, reptiles and insects, lives in apparent stability amidst a wide spectrum of plant species on a stable soil with good water relations.

(At this stage the direct influence of man's predation through heavy hunting is reduced by legislation and law enforcement; but his indirect effects usually increase e.g. by burning too early and frequently in the dry season or alternatively by imposing complete fire protection.)

* Now Wildlife Utilization Services (Pvt) Ltd, Bulawayo, Rhodesia.
† Paper received September, 1963.

Stage I

Mammals, especially those with no major predator but man, begin to approach more closely their potential rates of increase. With this growing pressure on the range, the amount of bare ground increases, more desirable grasses decrease, annual grasses, weeds, herbs and shrub seedlings increase.

Stage II

Characterised mainly by scrub encroachment with bare ground still increasing. At this level habitat is closer to optimum for some species and stimulates increase (e.g. amongst impala and eland) whilst other unadaptable species for which the habitat change has been adverse, decrease or disappear (e.g. sable and reedbuck). Surface water often suffers or vanishes, due to silting of pools and increased runoff lowering the water table. This causes still further concentration of game.

Stage III

Bare ground shows further increase. Palatable and semi-palatable shrubs decrease and tree damage begins (Plate 1). Browse lines are very apparent unless there are many elephant in which case branches are pulled down, causing browse lines to become ragged and difficult to observe. However, trees seldom eaten by elephants (such as *Trichilia roka*) exhibit marked browse lines (Plate 2).

Stage IV

Shrubs decrease and tree damage is accelerated. Apart from patches of unpalatable grasses and weeds, ground cover at the end of the dry season is sparse. Rhinoceros, bushbuck and bushpig sensitive to habitat change are likely to disappear, while many birds, reptiles and insects also vanish with their habitats.

Stage V

Trees are destroyed and conditions approximating desert exist (Plate 4). Surface water tends to run away and soil erosion is limited only by soil type and topography in relation to wind and rain. The spectrum of plant species is narrow and the same is true of all groups of animals (Figure 1 and Tables 1 and 2).

The above is intended only as a skeleton sketch of the ecological trends. While the different stages may be observed in different areas there is some overlap and a wide variety of minor modifications. Faulty burning aggravates matters at any stage of range deterioration.

Tables 1 and 2 are based on figures from the Urungwe non-hunting area in the Zambezi valley and illustrate the regression phases IV and V. Table 1 illustrates the declining species

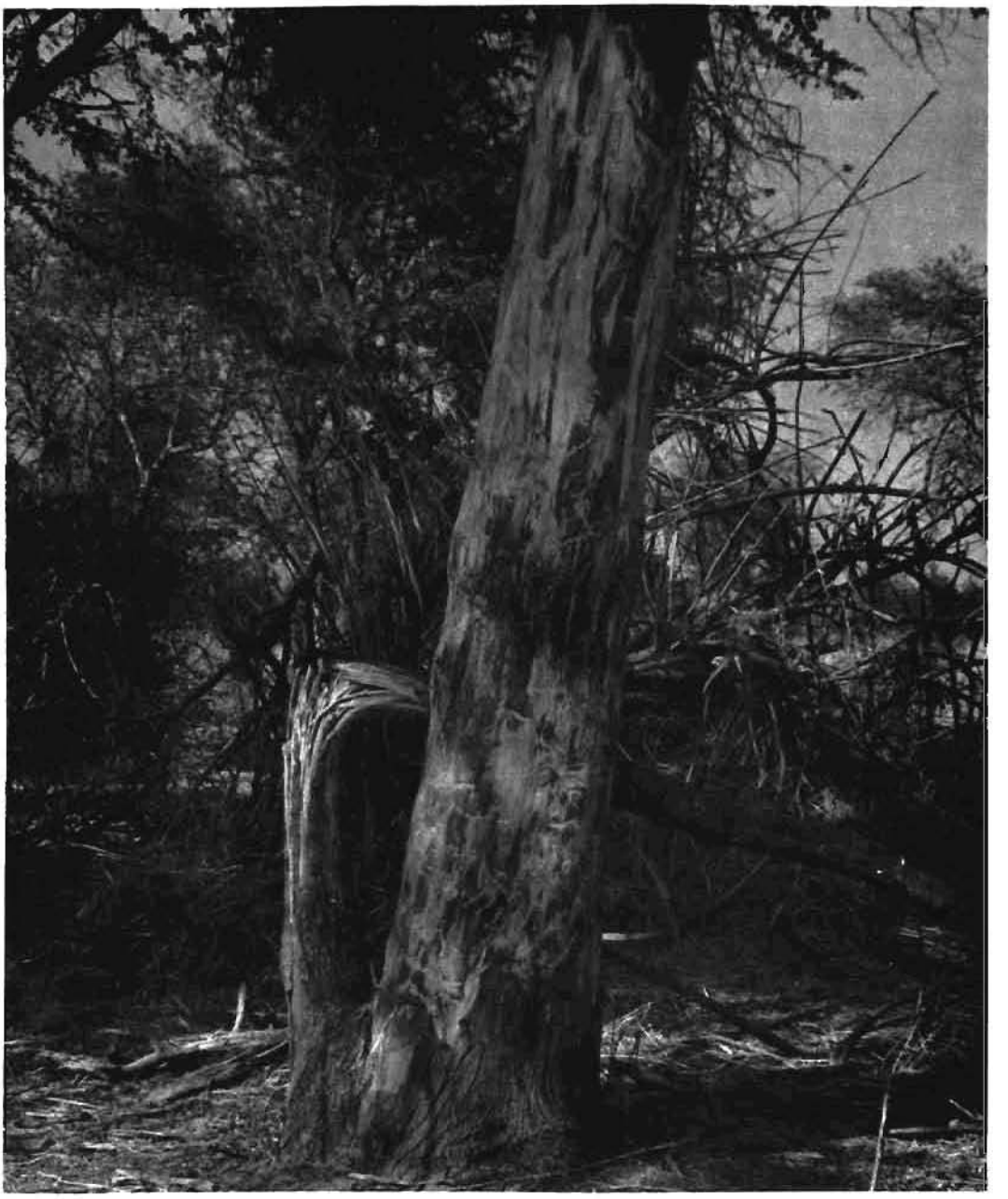


PLATE 1. Typical game damaged and dying *Acacia albida*. This one has been debarked by elephants and the tusk marks can still be seen. Note heavily overbrowsed and dying *Grewia sp* behind. (Urungwe Non Hunting Area—Zambezi Valley)

PLATE 2. View of an area reduced to Stage IV through game and fire pressure. Note: i. Clear browse line at 6 ft. level on *Trichilia roka* (over staff) due to buffalo, eland and kudu mainly. ii. Ragged browse line at about 20 ft. level on *Acacia albida* trees (background) due to elephants. iii. Complete disappearance of shrubs except for heavily browsed and dying *Lecaniodiscus fraxifolius* in the foreground. iv. Ringbarked *Acacia albida* (right middle distance) the work of elephants. (Urungwe Non Hunting Area—Zambezi Valley)

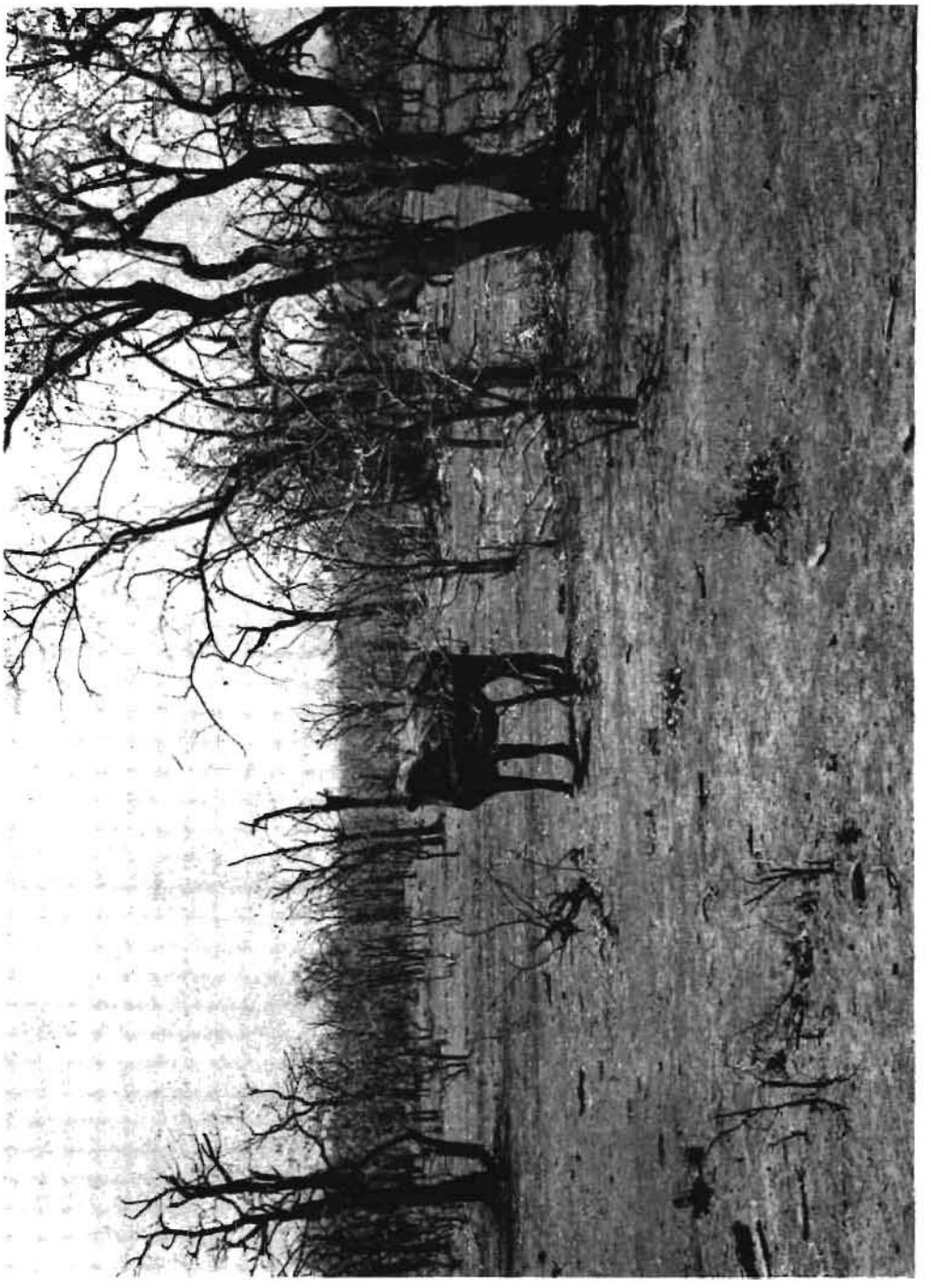


PLATE 3. View of an area reduced to Stage IV by cattle and game. The beast in the picture is feeding on thick *Colophospermum mopane* stems, nothing else being available. (N.E. of Tuli Circle)

PLATE 4. One of the many thousands of head of game being lost annually in Southern Rhodesia through starvation. This female fawn impala was caught by hand being too weak to escape and died a few minutes after this picture was taken. Note bare ground typical of millions of acres. (Tuli Circle)

and volume of plants, with grasses and shrubs too depleted to measure and 76·1 per cent of the trees of all species dying while there is only 0·1 per cent regeneration. Table 2 illustrates the same type of picture in the animal community with 29·4 per cent of the species still increasing while 71 per cent of the species are decreasing or have disappeared. It is stressed that this case is due purely to lack of management and has nothing to do with past hunting in any form. Figure 1 is a diagrammatic illustration of the entire picture.

TABLE 1. TOTAL RESULTS FROM 17 TRANSECTS CONDUCTED ON ZAMBEZI RIVER FLOOD PLAIN (1961) TO CHECK STATUS OF VEGETATION UNDER GAME PRESSURE
(These Transects were based on trees because other vegetation had deteriorated too far for realistic measurement.)

Species	Condition Classes of Trees		
	Mature and sound	Mature dead or dying	Regenerating (ages 1 yr to mature)
Acacia albida	211	711	Nil
Kigelia pinnata	82	124	2
Piliostigma thoningii	Nil	44	Nil
Trichilia roka	20	126	Nil
Lonchocarpus capassa	41	70	Nil
Acacia spp.	10	49	Nil
Ficus spp.	3	12	Nil
Diospyros mespiliformis	1	6	Nil
Ziziphus mauritiana	Nil	18	Nil
Tamarindoides indica	Nil	14	Nil
Cordyla africana	2	16	Nil
Combretum imberbe	10	75	Nil
Undetermined	Nil	11	Nil
Ostryoderris stuhlmanii	Nil	1	Nil
*Croton megalobotrys**	22	11	Nil
Diospyros sp.	1	Nil	Nil
Bridelia cathartica	Nil	1	Nil
Garcinia livingstonii	1	2	Nil
Khaya nyasica	Nil	1	Nil
Sterculia sp.	Nil	2	Nil
Totals	404	1,294	2
Per cent	23·8	76·1	0·1

* Particularly unpalatable—bark forms a fish poison of some strength.

TABLE 2. EXTRACT FROM SURVEY OF GAME STATUS INDICATING NARROWING OF SPECTRUM ZAMBEZI VALLEY (1961) IN AREA OF INVESTIGATIONS REPRESENTED IN TABLE 1 AND PLATES 1 AND 2

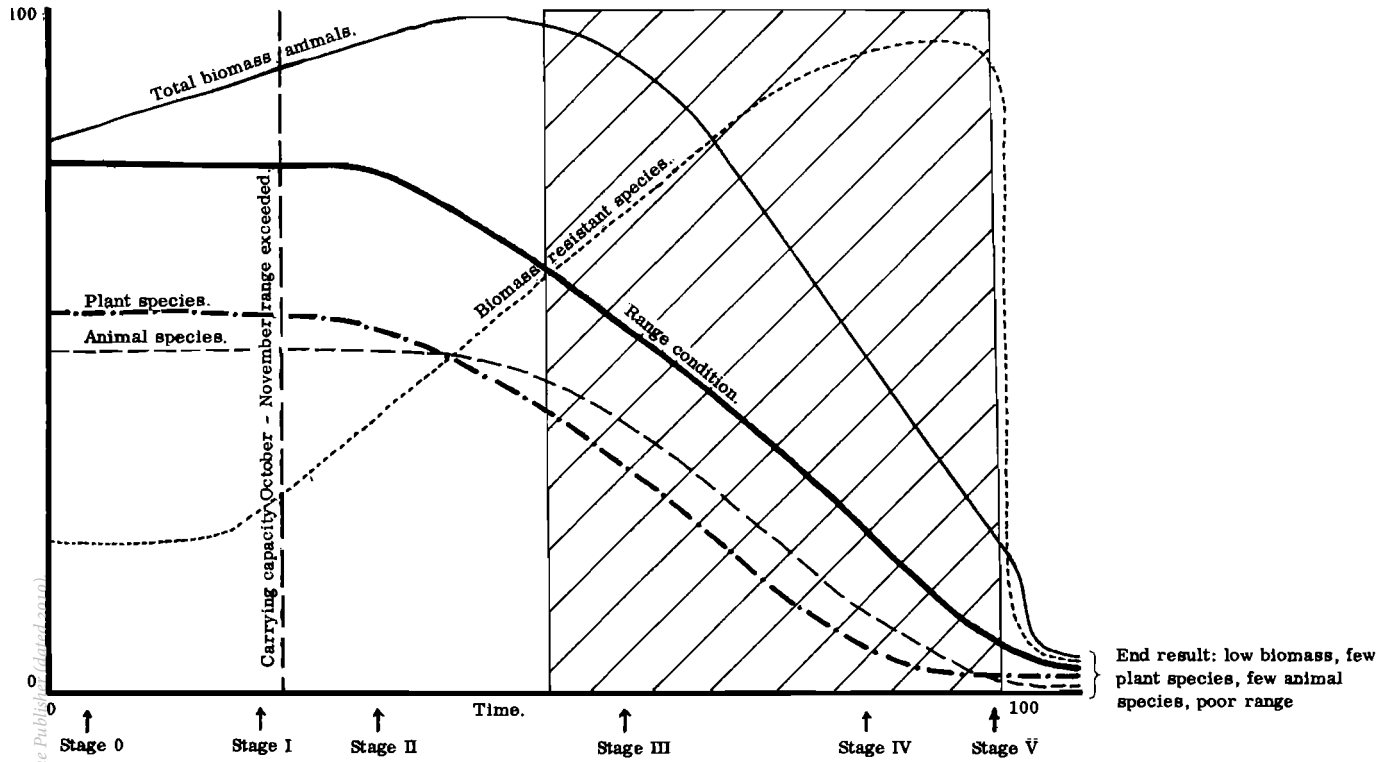
Species	Abundance classes				
	Abundant	Plentiful	Few	Scarce	Believed disappeared or below recovery
Buffalo	XX		– –		
Elephant	XX		– –		
Impala	XX		– –		
Waterbuck		XX	?		
Eland		XX	?		
Kudu		?	XX		
Rhino		– –	XX		
Bushbuck	– –			XX	
Warthog	– –	XX			
Zebra		– –	XX		
Sable	– –			XX	
Roan		?			XX
Reedbuck		?			XX
Bush pig	– –				XX
Hippo*		– –			XX
Duiker		?			XX
Grysbok			?		XX

Species Increasing = 29%
Species Decreasing = 71%

Present status: XX (Departmental Survey Reports)
Suspected status about 60–100 yrs ago. (Based on Literature): – –
Guessed Status (Based on known habitat changes): ?
N.B. Believed disappeared or below recovery does not preclude *reinvasion.*
* Hippo are well represented in the river but seldom use the southern bank through lack of food.

Millions of acres in Rhodesia can currently be classified as Stage III, IV, or V, and some of the best game areas are in such condition that they fall into the crosshatched zone in Figure 1. In some areas this state has been caused primarily by cattle overstocking, in

FIG I. Diagrammatic curves of biomass, range condition, number of animal species, and number of plant species under unmanaged conditions.



TOTAL POPULATION, NUMBER OF SPECIES, MEASURE OF RANGE CONDITION. ARBITRARY UNITS.

some by cattle and game together and in some by game only. Almost any attempt to delve into the causes in any particular area so soon after the event only serves to exacerbate human passions. One can only accept the areas as they stand and look to the future. The range must ultimately carry the human population, whatever the actual land use, and therefore every effort should be made to return it to productive stability.

THE PLACE OF GAME RANCHING (UTILISATION)

No idea has yet been brought forward which will return damaged lands to a satisfactorily productive level without tremendous capital expense. No claim can be made that game ranching is the answer. In the pockets of heavy game population, however, utilisation may well provide the solution. Game ranching, management, utilisation—call it what one will—is able to answer three important needs.

(*a*) *Range Improvement*

Game management is virtually range management by the reduction of populations to a level which can comfortably be carried on the October/November range.

(*b*) *Economics*

Game utilisation fortunately requires low capital outlay and low recurrent expenditure while providing an excellent return on the investment. Under this system of utilisation land is reclaimed cheaply while continuing to produce new wealth without prior capitalisation.

(*c*) *Conserving Wildlife*

This system ensures the survival of wildlife in a well-managed healthy condition, and encourages tourism.

TECHNIQUES

Censuses

We have, as yet, no accurate method of conducting a complete census on our range-lands. Drs. Dasmann and Mossman introduced to this country the strip census technique run from roads. This checked satisfactorily against a known population and was applied on Henderson's Ranch in 1959 (Dasmann & Mossman 1962). Since then it has not again been used on this ranch because of disturbance which arose from the high level of activity on roads during cropping operations.

For many species strip-counting never provides constant figures. The cause in some would appear to be a non-random distribution pattern and in others (duiker, steenbok and grysbok) a secretive habit. Under our thickly-bushed conditions the method appears to be most usable

for impala but constant figures have also been obtained for kudu and zebra at a higher level of sampling. On the open, undulating, riverine flats of the Zambezi valley constant figures were not obtained for any species.

Over two years strip-counting from a vehicle has been satisfactorily used on Buffalo Range Game Ranch (Owner G. C. Style).

1961	Distance sampled	130·9 miles
	Vertical distance	70·2 yds.
	Strip width	140·4 yds.
	Number of impala	1,807
	Stocking rate	1 : 3·9 acres
1962	Distance sampled	90 miles
	Vertical distance	73·3 yds.
	Strip width	146·6 yds.
	Number of impala	1,123
	Stocking rate	1 : 4·6 acres

There is no way in which the degree of accuracy of these censuses over 21,000 acres can be ascertained. The results were considered satisfactory mainly on the slender grounds that the 1961 figure appeared realistic, based on two factors: firstly, the owner's previous estimate (he is a cattleman who has been on the ranch for eight years); secondly, the writer's observation of density and spoor and dropping signs compared with his experience of other areas surveyed. Further the 1962 census was conducted at a time when many gravid females were missing from the herds and when impala were scattered over a wide area of the ranch due to disturbance by cattle herders. The observed reduced density was borne out by the lower stocking rate indicated in the census. However, unsatisfactory this method may be, we have not yet found a better method of ground census.

Air censuses, as an alternative present many problems. The nature of the ground cover renders detailed observation most difficult and the disturbing effects of noise and speed in conventional aircraft must be overcome. However after unsuccessful attempts from the ground to count hippo amongst extensive reedbeds and pools on Buffalo Range the task was completed accurately and in a short while by flying low and taperecording numbers so as to avoid taking one's eyes off the animals. Even hippo fully submerged were seen clearly and photographing was not necessary as schools were small. It is interesting that during 40 minutes flying over the area in which the ground survey had indicated a population of one impala to four acres—a total of over 5,000—not one was seen from the air.

Further work on air census techniques is intended, as the method commends itself where such vast areas are involved and where large herds of, for instance, buffalo, require counting.

Density Indices

Because of doubts inherent in census techniques and because trends are more important than a

knowledge of numbers in management we are turning to density indices based on other factors. The following activities are undertaken when initiating a game ranching scheme.

(i) A reconnaissance survey indicates for each species whether it is present, well represented or abundant.

(ii) An assessment of the range indicates its present condition and more important, the trend viewed economically as well as ecologically (productive subclimax vegetation is often more desirable than unproductive climax in this country).

(iii) A study of the internal dynamics of each section of the animal population provides an insight into its health as a population, a factor which affects its productivity and cropping potential.

(iv) A crop is then decided on in terms of number, sex, and, age after considering population level, population health (trend), feeding and trampling habits, range condition, range trend and the desired subclimax level.

(v) Measurements and/or photographs are taken to follow vegetation trends quantitatively.

The population information on which the crop was assessed was sparse. Some means is required to detect any change in population level before it has proceeded far enough to be observed casually and this is the role fulfilled by "density index transects".

Droppings have been selected as the basis for the density indices as they are directly related to the population density and are reasonably stable and static, being unaffected by the many factors which influence attempts to count the animals themselves—cloudy weather, noises, scents, wind, shyness, nocturnal activity, cover density and so on. Other density-related factors like spoor, calls, sightings per unit time etc., could have been used but were not as they were not considered suitable for all species under the various conditions of soil and vegetation encountered.

The density index figures are obtained by counting droppings on permanent transects two miles long and two yards wide. Each sample from an area is thus 3,520 square yards. For better distribution of the sampling within each area, each transect is divided into four sections of half a mile length, these sections being separated from one another and scattered within the area. Droppings of all species are recorded if any part of the group lies within the sampled belt. Groups which have weathered and disintegrated more than an estimated 50 per cent are not recorded, neither is one pellet without any sign of the group from which it came—except in the case of hare. Ideally these transects should be re-recorded three or four times a year to indicate the seasonal picture; in practice due to personnel shortages, they are run once a year in the same season. Where this method is in use no attempt is necessarily made to estimate the population; the trend alone is under observation.

Since density index transects have only been conducted for a short while, no yearly changes in population level have been detected and no significant changes of level are believed to have taken place during this time. Fluctuations due to local movements have been watched out of interest (not as part of a project) and are readily reflected in the density indices.

The system is considered the most reliable available and has been adopted in practice but the need for research is great and the opportunity wide open. What level of sampling by fixed lines is required to detect a significant change in the level of each species? What sampling level

would be required to give equivalent results if the transects were randomised and not fixed? How should the sampling level alter with different range types if at all? These sorts of answers are needed not only for game ranching but also for our hunting areas and National Parks where study of trends and status of the population is long overdue.

Still in the early experimental stage is the idea of using hunter success in terms of space and time as an index. This has had to await the development af constant and efficient cropping means and is being put into practice for the first time in 1963.

Cropping

In this field we have obtained excellent results and yields are adequate to meet current demands. However, these are limited by poor marketing facilities and yields will have to improve if the demand increases. A satisfactory technique for cropping requires:

i humanity;
ii economy;
iii efficiency in terms of man hours;
iv low wounding loss;
v low disturbance and scattering;
vi selectivity (sexes and ages);
vii little damage to meat;
viii ability to bleed carcases;
ix no association with humans.

Although sporting methods can be used in certain instances (e.g. game birds), they are not generally recommended because of disturbance and the high level of wounding almost always associated with them. Few alternatives, fulfilling all or most of the above requirements are available, and the methods currently in use apart from hunting on foot are:

(*a*) *Night Hunting*

The normal night hunting known to most proved to be slow, inefficient, inhumane and non-selective but from this has been developed a highly efficient means answering all requirements. Hunting is done from an open four-wheel drive vehicle with neither top or windscreen and preferably no driver's door. Full headlights are used plus two hand held, very bright spotlights operated from a seat behind and slightly above the driver. The spot considered best is oval and horizontal. There should be no items in front of the driver which will reflect light back into his eyes and the spotlights especially that on his left, must be held well behind his head, particularly when shooting.

One person to bleed and load sits in the passenger seat. Weapons are held in open racks over the dashboard and are not in any way tied down. For some reason, held at this point in the vehicle they seldom, if ever, become dislodged. The weapon most used is a 12-bore repeating shotgun but a silenced ·22 rifle fitted with telescopic sights and a 7 mm. or other medium calibre rifle fitted with the same type of sights are often carried.

The cropper travels along the ranch tracks on dark moonless periods at a speed dictated by the bush density, while the two light operators sweep their lights backwards and forwards searching their respective sides. The moment that eye reflections are seen the spotter touches the driver's shoulder and holds the light onto the eyes. Immediately the driver swings off the track and drives right up to the animals as quickly as he can. At this stage in thick bush and thorn, the wear and tear on vehicle and occupants is heavy, but tough leather jackets prove a big help. Once up to the animals the driver has to act very fast and start shooting to cause confusion before the bulk move off. Once confusion has set in the tendency to run off is less and impala have in the past often come towards the vehicle to escape their shadows and have been known to scramble under it or jump into the back. Although it might appear more efficient to have the driver do nothing but drive while the person in the passenger seat does the killing, this has not been found to be the case in practice. When cropping animals of impala size the shotgun with relatively small shot is used (No. 3, 4 or AAA) as killing pattern appears to matter more than shot size up to a point and anyway only head shots are taken. With headlights and two spotlights the cropper is able to see all that he requires to be sure of selecting the sex and age groups desired. Death is rapid and the wounding rate low, with competent operators fluctuating around 5·7 per cent for all species. Immediately the shooting is over the bleeder cuts throats and carcases are loaded. This describes only the basic technique; individuals develop their own minor modifications to suit their particular skill and style.

Night vehicle hunting has been used over three years and no "education" of the animals appears to have taken place. Kills per mile have remained at a fairly constant and consistently high level. The carcases are clean and well bled, and the game is not scattered in any way. Some ranchers claim (and I agree) that game is now tamer than when operations began.

(*b*) *Hide and Silenced Weapon*

This method is used by day or night and is highly selective. Zebra, wildebeest, eland, warthog, sable, waterbuck and others seldom obtained in the night vehicle operations can often be cropped by this method.

Hides placed downwind of concentration areas (usually 30–40 yd. from the edge of water) are made of reeds, sacking and bush or are cut into anthills and embankments, always with the object of giving the hunter full unimpeded view through 180° and space to swing a weapon through this arc without striking any obstacles. There should be a solid bar along the front to act as a "dead rest" for any angle of fire. Although the front from above the dead rest—about 18 in. above the ground—is completely open, the hunter and his movements are concealed by a long overhanging eave and deep shadow within against a solid dark background. No animals (except baboon) have revealed any ability to see into a hide so constructed, even at distances as short as three yards.

Cropping is done chiefly with the silenced ·22 and the wounding rate is very low in competent hands. There is little disturbance of game and no association with humans. No hide is entered or left if game is in sight and no shot is fired if the wind should change and blow towards the game (except in the case of a single animal).

The technique at night is to prepare batteries and lights and then wait in the dark. When animals are heard at the water the lights are switched on (a single lamp will suffice) and the cropping done. On ranches where this has been tried it has not proved very satisfactory since most game appeared to water during the day.

The drawbacks to hide shooting are: firstly, slowness if game is sparse; and secondly, difficulty in bleeding and placing carcases in the shade without revealing the hunter's presence when game is abundant. Incoming animals walk unconcernedly between dead ones but the carcases go off rapidly if left ungutted in the sun during hot weather.

Even when not cropping, hide observation provides valuable data on sex and age classifications difficult to obtain due to the thick bush and poor visibility experienced almost everywhere.

(*c*) *Humane Snare*

Although propaganda has blown to tremendous proportions the cruelty of the snare, in reality the main objection is their efficiency which can be devastating. A snare really becomes cruel when it remains on the animal causing long suffering but it is debatable whether this is any more cruel than a sportsman's bullet in the stomach or a shattered leg.

In view of the efficiency and economy of snares experiments were started and led to the development of a humane snare which seldom breaks; and when it does, is designed to fall off the animal within a few yards. This has been achieved by the use of strong flexible steel cable with a steel thimble in the eye which prevents the eye from closing under pressure and enables the snare to spring off if broken. In practice the degree of success has been high in that the great majority have sprung off when broken. Because of the efficiency of the other methods and the marketing bottleneck there has been no call to use humane snares on a scale sufficient to provide the statistics required to test the selectivity of the method.

A modification of the humane snare has been designed and used for over a year which holds mainly males of the male horned species and holds all alive for later culling or marking. This modification is basically a "Crosby Clamp" firmly attached to the cable and preventing the noose from tightening. Details are due for publication in a separate paper but it has become apparent that the method is selective to a significant degree and is a highly successful and cheap means of capturing live game. Game caught can be killed and bled for marketing, moved elsewhere, or more often, marked and released to study movement. By means of this capture method a number of wildebeest, impala, kudu, zebra and eland have been marked using paint, ear tags, mane and tail clippings or cow bells. Some animals have been trapped twice and one wildebeest was trapped three times. Information is being pieced together to form a picture of the extent of the range of one group of wildebeest but, due to dense bush and a low level of follow up observation, movements in detail within the range cannot yet be mapped. This range has so far proved to be very limited: in the region of ten miles across its greatest length and to a large degree this is thought to be forced movement due to overstocking and consequent poor range condition. Surprisingly a marked springhare has been found to travel almost as far (six miles) over 56 nights including crossing a river (P. A. Johnstone).

Although this humane snaring, alive and dead, has proved its worth to some extent the accident rate with live trapping is still considered too high: around 22·3 per cent (some due to accidents not really connected with the traps efficiency, such as flooded rivers causing delays in inspection and leopards killing animals held). Improvement is needed and work is continuing. The advantages which render this method worth further exploration are: almost complete lack of disturbance to game, economy, and humanity with high efficiency in the killing snare.

CONCLUSIONS

The above methods of cropping are coping with demands, keeping game as tame or tamer than it was, and not scattering it. However demands are increasing and advances are needed. Electrocution and temporary drugging at water appear promising lines for future research.

SUMMARY

1. In the absence of appropriate management, vegetational regression occurs and appears to pass through five stages.

2. Game ranching (i.e. cropping of game for food) may result in range improvement. (1965. The Pilot game ranching scheme has now shown considerable visible range improvement.) It does however, provide the ranch owner with some return on his investment and ensures the survival of wildlife under well managed conditions.

3. Census techniques are discussed and a density index based on faeces counts is commended.

4. Cropping techniques in current use are described. Hunting at night from a vehicle and by day or night from a hide have given adequate yields to fulfil present demands, but improvements will be needed. The basic requirements for a good cropping technique are discussed.

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