

| Name of Plant                                     | Common Name           | Part eaten                    | Date observed        |
|---|-----------------------|-------------------------------|----------------------|
| <i>Mundulea sericea</i> ... ..                    | Cork bush ... ..      | Leaves and young shoots       | Aug. 1959            |
| <i>Maerua legati</i> ... ..                       | —                     | Leaves and shoots             |                      |
| <i>M. mashonica</i> ... ..                        | —                     | Leaves and stems              |                      |
| <i>Ormocarpum tri-</i><br><i>chocarpum</i> ... .. | —                     | Leaves and young shoots       | 13.12.58             |
| <i>Olea africana</i> ... ..                       | Wild olive ... ..     | Leaves                        | 30.7.58              |
| <i>Olax dissitiflora</i> ... ..                   | —                     | Leaves and young shoots       |                      |
| <i>Ochna natalitia</i> ... ..                     | —                     | Leaves and young shoots       |                      |
| <i>Pavetta schuman-</i><br><i>niana</i> ... ..    | —                     | Leaves and young shoots       | } 1.4.58<br>27.11.58 |
| <i>Pavetta schuman-</i><br><i>niana</i> ... ..    | —                     | Leaves and young shoots       |                      |
| <i>Panicum maximum</i> ... ..                     | Buffalo grass ... ..  | Leaves and stems (almost dry) | 5.8.58               |
| <i>Peltophorum afri-</i><br><i>canum</i> ... ..   | African wattle ... .. | Leaves and young shoots       | 30.7.58              |
| <i>Pluchea dioscoridis</i> ...                    | —                     | Leaves and stems              | 20.6.58              |
| <i>Pseudarthria hookeri</i> ...                   | —                     | Leaves and young shoots       | 27.11.58             |
| <i>Pterocarpus angolensis</i> ... ..              | Kiaat ... ..          | Leaves and young shoots       | 2.4.58               |
| <i>Plumbago zeylanica</i> ...                     | Plumbago ... ..       | Leaves                        | 27.3.58              |
| <i>Pseudolachnostylis moprouneaeifolia</i> ...    | Kudu-berry ... ..     | Fruit                         |                      |
| <i>Pseudocassine transvaalensis</i> ... ..        | Lepelhout ... ..      | Leaves and young shoots       |                      |
| <i>Portulacaria afra</i> ... ..                   | Spekboom ... ..       | Leaves and branches           |                      |
| <i>Piliostigma thonningii</i> ... ..              | Rhodesian baubinia    | Leaves and pods               |                      |
| <i>Parinari mobola</i> ... ..                     | Mobola plum ... ..    | Fruit                         |                      |

| Name of Plant  | Common Name                   | Part eaten  | Date observed      |
|--|-------------------------------|---|--------------------|
| <i>Ptaeroxylon obliquum</i> ... ..   | Sneezewood ... ..             | Leaves and shoots                                   | 27.6.58            |
| <i>Rhamnus zeyheri</i> ... ..  | Red ivory ... ..              | Leaves  |                    |
| <i>Randia obovata</i> ... ..   | —                             | Leaves  |                    |
| <i>Randia</i> sp. ... ..   | —                             | Leaves and young shoots                             | 27.11.58           |
| <i>Ricinus communis</i> ... ..   | Castor-oil tree ... ..        | Leaves, tops  | 1.5.58             |
| <i>Rothmannia fischeri</i> ... ..  | Rhodesian gardenia ... ..     | Leaves and fruit                                    | 16.6.58            |
| <i>Rhus transvaalensis</i> }<br><i>R. pyroides</i> }                       | Karee spp. ... ..             | Leaves and young shoots                             | 30.7.58<br>30.7.58 |
| <i>Rhoicissus cuneifolius</i> ... ..                                       | —                             | Leaves and young shoots                             | 27.11.58           |
| <i>Rhynchosia totta</i> ... ..   | —                             | Leaves and stems                                    |                    |
| * <i>Senecio</i> sp. nov. ... ..   | —                             |   |                    |
| <i>Sclerocarya caffra</i> ... ..   | Marula ... ..                 | Leaves, shoots and fruit                            | 27.11.58           |
| <i>Sochus oleraceus</i> ... ..   | Silk thistle ... ..           | Leaves and stems                                    | 27.11.58           |
| <i>Solanum</i> spp. ... ..   | Bitter apple ... ..           | Leaves, fruit and shoots                            | 22.10.58           |
| <i>Strychnos decussata</i> }<br><i>S. innocua</i> }<br><i>S. spinosa</i> } | Monkey oranges ... ..         | Leaves and shoots<br>Tips of young shoots and fruit | 22.10.58           |
| <i>Scilla cooperi</i> ... ..   | —                             | Flowers and flower stems                            |                    |
| <i>Salvadora australis</i> ... ..  | Transvaal mustard Tree ... .. | Leaves  | Winter months      |
| <i>Securidaca longipedunculata</i> ... ..                                  | Violet tree ... ..            | Leaves  |                    |
| <i>Strophanthus kombe</i> ... ..   | —                             | Leaves and tops                                     | 1.5.58             |
| <i>Sphedamnocarpus pruriens</i> ... ..                                     | —                             | Leaves and creepers                                 | 13.12.58           |

\* Must be checked.

| Name of Plant                    | Common Name           | Part eaten               | Date observed |
|----------------------------------|-----------------------|--------------------------|---------------|
| <i>Sesbania bispinosa</i> ...    | —                     | Leaves and shoots        | Winter months |
| <i>Sarcostemma viminalis</i> ... | Melktou ...           | Leaves and young shoots  |               |
| <i>Synadenium cupulare</i> ...   | —                     | Leaves                   |               |
| <i>Spirostachys africana</i> ... | Tamboti ...           | Leaves                   | 1.4.58        |
| <i>Trichilia emetica</i> ...     | Natal mahogany ...    | Leaves and shoots        | 27.11.58      |
| <i>Tagetes minuta</i> ...        | Khaki bush ...        | Leaves and stems         | 1.4.58        |
| <i>Terminalia sericea</i> ...    | Silver Terminalia ... | Leaves and young shoots  | 27.11.58      |
| <i>Talinum cafferum</i> ...      | —                     | Leaves and tips of stems | 15.12.58      |
| <i>Trema guineense</i> ...       | Pigeonwood ...        | Leaves                   | 14.4.58       |
| <i>Tecomaria capensis</i> ...    | Cape honey suckle ... | Leaves                   | 16.6.58       |
| <i>Thylachium africanum</i> ...  | —                     | Leaves and shoots        | 22.8.58       |
| <i>Thunbergia dregeana</i> ...   | —                     | Leaves and stems         |               |
| <i>Triumfetta hirsuta</i> ...    | —                     | Leaves and stems         | 27.11.58      |
| <i>*Urginea altissima</i> ...    | Slangkop ...          | Leaves and flower stems  | 6.10.58       |
| <i>Vangueria infausta</i> ...    | Medlar ...            | Leaves and fruit         | 20.2.59       |
| <i>Verbena</i> sp. ...           | Verbena sp. ...       | Leaves and shoots        | 27.11.58      |
| <i>Ximenia caffra</i> ...        | Sour plum ...         | Leaves and young shoots  | 13.12.58      |
|                                  |                       | Leaves                   | 27.11.58      |
| <i>Xylia africana</i> ...        | —                     | Leaves                   | 18.6.58       |
| <i>Xeromphis obovata</i> ...     | —                     | Leaves and shoots        | 23.8.58       |
| <i>Ziziphus mucronata</i> ...    | Buffalo thorn ...     | Leaves                   |               |
| <i>Xylothea</i> sp. ...          | "Shihlekêla" ...      | Leaves and shoots        | 22.10.58      |

\* Must be checked.

# ELAND

[*Taurotragus oryx oryx* (Pallas)].

Feeds chiefly on leaves, shoots and fruits of shrubs but is also partial to young grass.

| Name of Plant                            | Common Name                  | Part eaten                | Date observed          |
|--|------------------------------|---------------------------|------------------------|
| <i>Acacia tortilis</i> ... ..            | Umbrella thorn ... ..        | Leaves and pods           | 20.11.58               |
| <i>Albizzia harveyi</i> ... ..           | —                            | Leaves and shoots         |                        |
| <i>Boscia albitrunca</i> ... ..          | Witgatboom ... ..            | Leaves and branches       |                        |
| <i>Baphia obovata</i> ... ..             | 'Nyando' ... ..              | Leaves                    | 18.6.58                |
| <i>Colophospermum mopane</i> ... ..      | Mopane ... ..                | Leaves and young shoots   | } 21.4.58<br>21.10.58  |
| <i>Combretum apiculatum</i> ... ..       | Red bush-willow ... ..       | Young branches and leaves |                        |
| <i>C. spp.</i> ... ..                    | <i>Combretum</i> spp. ... .. | Leaves                    | } 21.10.58<br>6.12.57  |
| <i>Cenchrus ciliaris</i> ... ..          | Blue buffalo grass ... ..    | Young plants              |                        |
| <i>Cymbopogon excavatus</i> ... ..       | Turpentine grass ... ..      | Young, green leaves       | 21.10.58               |
| <i>Clerodendrum pleiosciadium</i> ... .. | —                            | Leaves and shoots         | 18.6.58                |
| <i>Diospyros mespiliformis</i> ... ..    | Transvaal ebony ... ..       | Leaves                    | } 26.2.58<br>6.12.57   |
| <i>Dalbergia melanoxylon</i> ... ..      | Zebrawood ... ..             | Leaves and young branches |                        |
| <i>Dolichos linearis</i> ... ..          | —                            | Whole plant               |                        |
| <i>Digitaria</i> sp. ... ..              | Finger grass sp. ... ..      | Young plants              | } 20.11.58<br>21.10.58 |
| <i>Eragrostis superba</i> ... ..         | Heart-seed grass ... ..      | Young green leaves        |                        |
| <i>Grewia</i> spp. ... ..                | Raisin-bush spp. ... ..      | Leaves                    | 18.6.58                |
| <i>Guibourtia conjugata</i> ... ..       | Baster mopanie ... ..        | Leaves                    |                        |
| <i>Gossypium herbaceum</i> ... ..        | Wild cotton ... ..           | Leaves and shoots         |                        |

| Name of Plant                                     | Common Name             | Part eaten   | Date observed                     |
|---|-------------------------|--|-----------------------------------|
| <i>Heeria insignis</i> ... ..                     | Lowveld resin-bush ...  | Young shoots   | 21.10.58                          |
| <i>Heteropogon contortus</i> ... ..               | Assegai grass ... ..    | Young green leaves   | 21.10.58                          |
| <i>Indigofera</i> sp. ... ..                      | —                       | Young leaves and shoots  | 21.10.58                          |
| <i>Lonchocarpus capassa</i> ... ..                | Appelblaar ... ..       | Leaves and shoots  | } 20.11.58<br>21.10.58            |
| <i>Lycium albiflorum</i> ... ..                   | —                       | Leaves and branches  |                                   |
| <i>Lachnopylis oppositifolia</i> ... ..           | —                       | Leaves and flowers   |                                   |
| <i>Panicum coloratum</i> ... ..                   | Buffalo grass ... ..    | Young plants   | } 21.10.58<br>6.12.57<br>20.11.58 |
| <i>Phragmites communis</i> ... ..                 | Reed ... ..             | Tops of plants   |                                   |
| <i>Pavetta catophylla</i> ... ..                  | —                       | Leaves   |                                   |
| <i>Pteleopsis myrtifolia</i> ... ..               | —                       | Leaves and tips of branches  | 18.6.58                           |
| <i>Panicum maximum</i> ... ..                     | Buffalo grass ... ..    | Young green leaves   | 21.10.58                          |
| <i>Setaria ho'stii</i> ... ..                     | Green Timothy grass ... | Young green leaves   | 21.10.58                          |
| <i>Spirostachys africanus</i> ... ..              | Tamboti ... ..          | Found in stomach of eland snared on Western boundary in District 8 | 21.4.58                           |
| <i>Sclerocarya caffra</i> ... ..                  | Marula ... ..           | Fruit  |                                   |
| <i>Strychnos innocua</i> }<br><i>S. spinosa</i> } | Monkey oranges ... ..   | Fruit and Leaves   |                                   |
| <i>Solanum</i> sp. ... ..                         | —                       | Leaves   |                                   |

| Name of Plant                    | Common Name       | Part eaten   | Date observed |
|----------------------------------|-------------------|--|---------------|
| <i>Themeda triandra</i> ...      | Red grass ...     | Young green leaves. Also found in stomach of eland snared on W. boundary in District 8 | 21.4.58       |
| <i>Urochloa rhodesiensis</i> ... | —                 | Young green leaves   | 21.10.58      |
| <i>Vernonia fastigiata</i> ...   | —                 | Leaves and flowers   |               |
| <i>Ziziphus mucronata</i> ...    | Buffalo thorn ... | Fruits and leaves  |               |

### BUFFALO

[*Syncerus caffer caffer* (Sparman)].

Buffalo feed mainly on grass and not specially young grass, because old veld is well grazed. It has been recorded that they feed on the following:

| Name of Plant                     | Common Name                | Part eaten                 | Date observed |
|-----------------------------------|----------------------------|----------------------------|---------------|
| <i>Andropogon gayanus</i> ...     | Blue grass sp. ...         | Leaves                     | 23.8.58       |
| <i>Aristida</i> sp. ...           | Bristle grass sp. ...      | Leaves and stems           | 23.8.58       |
| <i>Brachiaria nigropedata</i> ... | Spotted False Paspalum ... | Young plants in the spring |               |
| <i>Bothriochloa insculpta</i> ... | Pinhole grass ...          | Young plants, tops         | 26.2.58       |
| <i>Colophospermum mopane</i> ...  | Mopane ...                 | Leaves                     | 6.12.57       |
| <i>Cenchrus ciliaris</i> ...      | Blue buffalo grass ...     | Leaves                     | 26.2.58       |
| <i>Cyperaceae</i> spp. ...        | Sedge spp. ...             |                            | 6.12.57       |
| <i>Digitaria</i> spp. ...         | Finger grass spp. ...      |                            | 26.2.58       |
| <i>Eragrostis superba</i> ...     | Heart-seed grass ...       | Leaves                     | 6.12.57       |
| <i>E.</i> spp. ...                | Love grass spp. ...        | Leaves                     |               |
| <i>Euclea divinorum</i> ...       | Gwarri ...                 | Leaves and shoots          |               |
| <i>Enneapogon cenchroides</i> ... | —                          | Young plants               | 26.2.58       |

| Name of Plant                                     | Common Name             | Part eaten              | Date observed |
|---|-------------------------|-------------------------|---------------|
| <i>Echinochloa stagnina</i> ... ..                | Water grass ... ..      | Leaves and stems        | 18.6.58       |
| <i>Grewia</i> spp. ... ..                         | Raisin-bush spp. ... .. | Leaves                  |               |
| <i>Heteropogon contortus</i> ... ..               | Assegai grass ... ..    | Young (spring)          | 6.12.57       |
| <i>Hyparrhenia dissoluta</i> ... ..               | Tambookie grass ... ..  | Leaves and young plants | 6.10.58       |
| <i>Phragmites communis</i> ... ..                 | Reeds ... ..            | Leaves                  | 26.2.58       |
| <i>Panicum coloratum</i> }<br><i>P. maximum</i> } | Buffalo grass ... ..    | Leaves                  | 26.2.58       |
| <i>Schmidtia bulbosa</i> ... ..                   | Sand quick grass ... .. | Leaves and young plants | 25.11.58      |
| <i>Scilla cooperi</i> ... ..                      | —                       | Leaves                  | 6.10.58       |
| <i>Themeda triandra</i> ... ..                    | Red grass ... ..        | Leaves                  | 6.12.58       |
| <i>Typha capensis</i> ... ..                      | Bulrush ... ..          | Leaves                  | 7.10.58       |
| <i>Urochloa mossambicensis</i> ... ..             | —                       | Leaves                  | 6.12.57       |
| <i>Vellozia retinervis</i> ... ..                 | Bobbejaanstert ... ..   | Young green leaves      | 6.10.58       |

### C. PREDATOR CONTROL.

After thorough discussions between the Ranger and Biological Sections a new policy on predator control was formulated and submitted to the Director.

#### A. POLICY:

- (i) The policy of 1946-54 of inconsistent control could only lead to chaos and therefore drastic measures had to be taken to save the situation.

The drastic steps became even more necessary because of the preceding period of drought and the lack of proper grazing control.

- (ii) At present, after four years, an investigation became necessary and it appeared that a policy of predator control was sound and essential in the programme of nature conservation in the Kruger National Park, although the application thereof could be modified from time to time.

## B. PRINCIPLES:

- (i) Any application of the policy must be based on a thorough knowledge of the function of the predator in the animal kingdom.
- (ii) The ecological composition of the Kruger National Park is such that it is imperative that animals must enjoy full protection against predation in certain areas so that their numbers may be increased and that rare species which might be threatened with extinction, may be ensured of survival.
- (iii) Under the present conditions of a limited number of watering points it is also essential to promote their utilisation by temporary control measures.

The same applies to isolated natural drinking holes when necessitated by conditions.
- (iv) With respect to scientific veld management the function of the predator is realised in the prevention of strip- or overgrazing.
- (v) Under present conditions of occurrence, distribution and habits of the rarer predators it appears that no control measures are necessary against the following:

Brown hyaena, all jackals, caracals, serval cats, civets and other smaller types of cats, badgers and otters.
- (vi) In contrast the control on cheetah, leopard, spotted hyaena and wild dogs can be justified only in cases of unnatural behaviour or where a rare species is threatened by predation.

With regard to the following, control measures may be introduced:

  - (a) Where a troop of wild dogs lingers in the habitat of reedbuck, mountain reedbuck, or that of any other rare antelope species.
  - (b) Leopard in areas where attempts are made to re-establish nyala.
- (vii) Crocodiles are kept out of all artificial watering places and isolated natural pools, except in the case of the Hape pan (Pafuri area).
- (viii) Baboons are destroyed only for misbehaviour in rest camps or at staff quarters.
- (ix) Lion are controlled only under the following circumstances:
  - (a) Where the existence of a rare antelope species is threatened.
  - (b) Where re-establishment of game in an understocked area is encouraged.
  - (c) Where the presence of a pride of lion is deflecting other animals away from an isolated water hole.
  - (d) Where the prey-predator ratio has been disturbed in favour of the predator by extensive drought, epidemics or a radical change in the grazing.



- (e) Where abnormally large prides exert extensive local pressure in a particular area.
- (x) Considering the accepted natural role of all predators, control will be justified only on biological grounds, and it must under no circumstances be influenced by pressure exerted by visitors or neighbours.
- (xi) Predators may be destroyed in terms of the regulations or where prescribed by health measures.

### C. APPLICATION.

In terms of the present conditions the following changes of the existing system are proposed:

- (i) In the following breeding areas (control areas): O (Klopperfontein), N (Nwashitsumbe), M (Nkulumbene), K (Dzombo), J (Makadze), I [Letaba River (Gorge)], H (Bangu-Nwanetzi), P (Timbavati), Q & R (Nwaswitsontso), F [Sabi (Gorge)], D (Nwatamiri), B (Mstawu-Mklari), and C (Mlambane) control is lifted and these areas will be subjected to special observation for the next year. Regular records, necessary for the obtaining of permission to act, will be collected with respect to prey-predator relations, as well as to numbers and vulnerability of rare species of game.
- (ii) In the control areas (breeding areas) I (Mbyashishe) and E (Mbyamide) a conservation program covering predator control, water conservation and pasture management will be compiled within the next few months after a thorough investigation by the Biologist and Ranger Sections; in the meantime these will be subjected to special observations.
- (iii) The following areas: A (Pretoriuskop), G (Mlondozi), and the new area P<sub>1</sub> (the upper reaches of the Shishakashangondzo and in the vicinity of the new dam — Chalons—Batavia—Swartkop), also the new area B<sub>1</sub> (Nahpe—Komapite—Samarola—Sithlabe—Mtsawu) and the new area C<sub>1</sub> (upper reaches of Mlambane—Mtjulu—Machuluane), Q<sub>1</sub> (Kolwane area), new control area S (Malopene—Shivulane—Tuti) are recommended to become control areas for the following reasons:
  - P<sub>1</sub>: Owing to the threatening of the existence of the last small herds of roan, tsessebe, sable and reedbuck.
  - G: To improve the established waterbuck and wildebeest populations and for the protection of tsessebe, mountain reedbuck and sable and possibly to help the re-establishment of roan.
  - A: The population numbers of blue wildebeest, zebra and waterbuck are not as expected, and the existence of the rarer species such as reedbuck, sable, bushbuck and red duiker is threatened.

- B<sub>1</sub> : Protection of the only established roan community south of the Sabie and existing sable, waterbuck and mountain reedbuck (Ship Mountain).
- C<sub>1</sub> : Protection of the established sable herds and mountain reedbuck and the re-establishment of roan. The small communities of warthog, reedbuck and mountain reedbuck must be built up.
- Q<sub>1</sub> : Tsessebe, sable and reedbuck must be protected.
- S : Protection for growing, nomadic herds of sable, roan and blue wildebeest and a possible re-establishment of eland.

Control in these areas must be limited to the predator which in terms of the details of the principles given above, justifies action.

- (iv) Control area CR (Crocodile River) towards the east of Malelane is abolished because there is no biological justification for control, especially because farmers along the boundary kill all predators as vermin. The crocodiles which are found in large numbers in this river are not controlled in any case.
- (v) In the Pafuri area a predator population must be built up because of the conditions of overpopulation and pasture.
- (vi) Over and above the areas mentioned the right to control may be authorized in terms of the general principles, in any other case, after thorough investigation.

#### D. METHOD.

- (i) Action will be authorized on request by the Ranger Section and after a thorough investigation by the Biological Section.
- (ii) Individual attention must be given to the training and teaching of new Rangers in this respect and their powers of observation and initiative must be stimulated.

At all times the question of predator-prey relationships will be discussed with Rangers as individuals or as groups, especially with respect to the function of the predator and the role it performs either to the benefit or the detriment of the prey animal.

- (iii) All data and recommendations must be honest and devoid of personal prejudice. Ignoring of this will be considered in a very serious light.
- (iv) Concerning the practical execution of the policy, it will only be justifiable if it is done in a humane way, with consideration of cubs and outstanding male specimens. Under no circumstances may bait, poison, traps or other cruel methods be used.
- (v) It is undesirable to discuss the action with anybody else but the rightful authority.

- (vi) In all cases of acting a written report must be handed in immediately and it must refer to the type of animal, the place and the circumstances.
- (vii) In exceptional cases the Ranger can in the spirit of the above principles, act summarily but a report giving motives must be forwarded immediately.

#### E. AUTHORITY.

- (i) Final authority and approval for action is vested in the Director.
- (ii) Except in special cases [(vii)] all requests directed to the Director will be brought up at the December Meeting of the Board, because during that time, which is the normal lambing and calving season of most prey animals, the necessity for control measures can best be judged.
- (iii) At the June Meeting the Board must be furnished with a detailed report of the progress or otherwise of the animal stocks and rare species where control was applied or released.

#### D. GAME MOVEMENTS ALONG THE WESTERN BOUNDARY.

In the South giraffe broke the Numbi-Sabi fence on three different occasions and a herd of sable also broke through at Numbi during May. Generally however, the fence was respected and proved to be an effective barrier.

As a result of the building of artificial watering holes and controlled burns along the Western boundary of the Tshokwane Section, the movements of migrating game (especially blue wildebeest and zebra) were especially interesting.

The general impression is that these artificial control methods definitely influenced the trek rhythms which this year were characterized by a series of restless to and fro movements in contrast with the previous seasonal movements which could be predicted with great regularity. These changes cannot be explained in terms of the freak rainfall or climatological factors, as becomes evident below:

5-8th March, 1958 — Large herds of wildebeest and zebra present in the vicinity of Pswaeni near the border. The veld is dense and the fire-break nearly overgrown.

1st April, 1958 — Wildebeest and zebra back at Lipape since 25.3.58. They are grazing near the boundary between Pswaeni and Lipape and water at the pools between the boundary and the picket. A number of lion has been following the herds.

5th June, 1958 — Large herds counted a few miles south of the Lipape between Pswaeni and the Manzentonto Dam. Large numbers also recorded in the vicinity of Mahlobyanine and Jeukpeulhoek. The veld in this area still fairly green.

Middle June, 1958 — An enormous concentration of game arrives at Lipape and roughly half move directly off to the Sand River across Mala-Mala. The rest drink chiefly from the waterholes in the Lipape and Hlangolweni.

9.7.1958 — The only large herds of wildebeest and zebra along the border are found south of the Lipape.

17.7.1958 — Large herds of wildebeest spotted from the air in the upper reaches of the Kolwane at Nyekeyekeni pan which still held water.

5.9.1958 — Large herds of wildebeest again seen south of the Lipape but especially in the vicinity of Pswaeni along the western boundary.

21.9.1958 — Since the rains of the 16th the wildebeest left the Sand River and Lipape and are again present in large numbers at Pswaeni.

27.9.1958 — There are exceptional numbers of wildebeest and zebra on the burn south of the Manzentonto, from the large U-bend up to Mahlobyanine. They drink in the Manzentonto (dig in the sand) and small pans on the banks of the river. Large herds are found along the border from Pswaeni to Mahlobyanine and also at the Manzentonto dam.

6.10.1958 — There was a large concentration along the border from Pswaeni up to Mahlobyanine, especially opposite Sarabank. A herd of more than 100 is drinking at the Lipape Dam.

20.10.1958 — A large herd of wildebeest drink at Lipape dam and an appreciable concentration of zebra and wildebeest one mile south of Lipape.

24.10.1958 — A large herd of wildebeest was met with at the end of the Hatomi detour. Judging by their very shy behaviour they must be coming from the Western boundary. Appreciable numbers drink at Lipape.

2.11.1958 — A wildebeest concentration was seen at the Hutomi Dam and is most probably the same one seen at Sundweni on 24.10.1958.

7.11.1958 — Large herds are distributed along the western boundary between Lipape and Pswaeni and along the road to the Manzentonto dam.

18.11.1958 — The migrating game leave the Park and for the following two months few wildebeest and zebra are seen along the western boundary except in the vicinity of Mahlobyanine and opposite Jeukpeulhoek.

Middle March, 1959 — Large herds move back into the Park and by the 23rd a large number of wildebeest is again drinking at Pswaeni.

18.4.1959 — Enormous concentration of especially wildebeest at Pswaeni and Manzentonto dam and also fairly far south towards Lipape.

20.5.1959 — The greatest number of wildebeest back at Lipape.

The situation along this boundary is being given further attention.

With the marking of game in order to collect more information about their movements as object, a special type of gun, patented by Crossman Arms Co., U.S.A., was tried out. The gun fires a tube fitted with a hollow barbed needle designed in such a way that it injects a paralysing medium (Nicotine-alkaloid) into the animal when it strikes it. This mechanism is ingenious and almost infallible, but unfortunately the gun is not very accurate and in its present form nearly useless under prevailing conditions in the Park, because very few shots actually hit the target. At present the specifications of a German gun, which is said to give excellent results, is awaited.

A report on the conditions along the western boundary between the Sabie and Olifants Rivers regarding water, pasture and game communities, was compiled for the information of the Foot and Mouth Disease Commission.

## E. VELD BURNING.

### 1. VELD BURNING RESEARCH.

#### (a) *Burning Experiments.*

##### (1) *Protection of Experimental Plots.*

All plots for experimental veld burning now have outer and inner 24 ft. wide fire-break roads which are graded annually. Fire-break roads of the same width also separate the individual plots. The Roads Section is at present making double width roads round the control plots to limit to a minimum the danger of their burning.

The system of protection of the experimental plots is satisfactory and no instances of fire penetrating and destroying the plots have occurred. After discussion with the Warden the burning of strips surrounding the experimental blocks has been transferred to the Game Ranger personnel and this work has been undertaken during the past year by the Game Rangers in whose sections the experimental blocks are situated.

The numbers erected at the experimental plots in the Mopane-veld are still being broken off and scattered by elephants. The iron standards, to which the numbers are attached, are uprooted, crushed and scattered so far afield, that they are found with difficulty. A number of concrete blocks, which will bear the numbers in future, have recently been completed and will be

erected in the Mopane-veld; it is hoped that the concrete blocks will prove more satisfactory than the iron standards.

## (2) Botanical Surveys.

The first series of botanical surveys at Satara, Nahpe and Pretoriuskop experimental plots have been completed in the course of the year. (The surveys in the Mopane-veld were concluded in 1957/58.) All botanical surveys have been analysed and tabulated to date.

The veld burning experiments in the large-leaved, deciduous woodland and in the combretum-veld are now in their fifth year. In these two veld types annual burning (August) has been executed 5 times, biennial treatments (February, April, August, October and December) 3 times and triennial treatments (February, April, August, October and December) once. (The series of triennial treatments could be initiated only in 1958.) The burning experiments in the Satara area (Knobthorn-Marulaveld) have been in existence for three years and those in the Mopane-veld, for two years.

In the veld types where the burning experiments already exist over the period of 5 years, (Nahpe and Pretoriuskop), the botanical surveys were repeated during March of this year on the control plots and, if time allows, will be extended to the annual and possibly the biennial treatment areas.

An analysis of the principal changes, which took place during the past five years, in the botanical composition of the control plots in the above-mentioned two veldtypes is given below:

### *Pretoriuskop Experimental Plots.*

#### *Grass Surveys.*

- (i) On all control plots a marked decrease (often to 50%) in the total cover percentage of grasses took place. This must be ascribed to the fact that many of the grass tufts die off because of age and the accumulation of old decaying plant matter is unfavourable for the establishment of young seedlings.
- (ii) In all cases there is a slight to a clearly marked decrease in the actual cover percentage of *Hyparrhenia dissoluta* (thatch grass). *Hyparrhenia dissoluta* is the dominant grass species in the plant composition of the large-leaved deciduous woodland with tall grass if the veld is burned regularly; if the veld is not burned, the plant succession is apparently thrown back and eventually develops in an entirely different direction. As *Hyparrhenia dissoluta* decreases in importance other grasses, such as *Schizachyrium semiberbe*, *Eragrostis* spp., and, on some plots, *Elyonurus argenteus*, increase in importance. As a result of the environ-

mental differences at the various experimental plots, no general trend in the plant succession can at this stage be perceived.

- (iii) On some control plots pioneer plants such as *Helichrysum nudifolium* var. *leiopodium*, form an important component of the plant composition (especially on Kambane control plot); on others *Vernonia natalensis* forms an important component (Shaben control plot). As a result of the dying off of grass tufts, bare patches originate at some places, and they are then colonized by pioneer plants.

#### Tree and Shrub Surveys.

As tree and shrub successions take place at a much slower pace relatively than herb and grass successions, there are practically no conclusions which can be drawn from the surveys done after a period of five years.

#### Nahpe Experimental Plots.

##### Grass Surveys.

- (i) As in the case of the Pretoriuskop Control Plots, a marked decrease in the total cover percentage of the grasses on the Nahpe control plots took place. (In the case of the Nahpe control plots approximately 60%).
- (ii) On all the control plots in the Nahpe vicinity there was a sharp decrease in the cover percentage of the *Digitaria* spp. (finger grasses). On plots where *Schmidtia bulbosa* occurs a relatively sharp decrease in the cover percentage of this grass species took place. The cover percentage of *Setaria flabellata* shows in some instances a slight decrease and in others a marked one.
- (iii) *Brachiaria* spp. show an increase in some instances, but the cover percentage in general remains relatively uniform. *Eustachys paspaloides* shows a small increase in the cover percentage in most instances.
- (iv) Plants such as *Panicum maximum* (buffalo grass) and a few other species show no uniform tendency — in some cases there is an increase, while in others the cover percentage shows a decrease.

#### Tree and Shrub Survey.

The remarks made about the Pretoriuskop experimental plots are applicable. No uniform tendency in the tree and shrub successions has been observed.



### (3) *Photographic Surveys.*

The first series of photographic surveys begun in 1957, was completed during the year and a photograph of every experimental plot is, therefore, available. All the photographs are filed.

### (4) *Veld Burning.*

Routine veld burning according to schedule was carried out successfully in April, August, October, December (1958) and February (1959) on those plots which receive annual and biennial treatments. The plots to receive triennial treatments were treated for the first time during February, April, August, October and December in the Pretoriuskop, Nahpe and Satara areas. The triennial treatment was started in 1957 on the Mopane-veld plots.

The veld burning programme was executed successfully and only one plot caught fire (possibly due to a whirlwind) when an adjacent plot was being burned at Mareyo during August, 1958. The fire was, however, soon extinguished and only a small portion of the plot was burnt. This specific plot was scheduled for burning in October, so no actual harm was done.

Another plot, in the Shaben Block, was inexplicably burnt in October, 1958. It is assumed that the fire was started by native cyclists (a cycle path crosses the area). They have since been prohibited from using the path. The plot was scheduled for burning in December. A botanical survey of this area planned to take place before being burnt, had then to be undertaken immediately after the fire.

Routine readings and observations noted during all treatments undertaken, were recorded in a special register. Later observations of treated plots will also be recorded in this register.

Readings and observations noted before, during and after a veld burning are: weather conditions, wind velocity and direction (measured), temperature (measured) and temperatures at different levels above the ground. Temperatures during veld burning are taken at 1' 6", 3', 6' and 12' above ground level, respectively. Apparatus for the recording of soil moisture content is ready for use and a comparison of the soil moisture content of the different treated plots will commence shortly.

### (5) *Preliminary observations on veld burning experiments.*

#### (a) *Large-leaved, Deciduous Woodland with Tall Grass.*

Observations made during the past year confirm to a large extent the observations reported previously.

#### (i) *Veld burning during February.*

Generally, plots in this area burn comparatively well leaving very little waste during February, though the heat is not excessive as the grasses are



still relatively green. In most instances tall seed stalks of grasses, such as *Hyparrhenia dissoluta* (thatch grass), *Trachypogon capense*, etc., remain unburned. Herbs in most instances are badly singed. Shrubs are not destroyed, although the leaves are sometimes severely singed. Trees are relatively little damaged during February veld burning: large mesophytic trees are well protected by *Panicum maximum* (buffalo grass) which grows in the shade of these trees and does not burn very well.

Grasses and shrubs sprout relatively well after February veld burning. It is again conspicuous that *Dichrostachys nyassana* sprouts poorly on all the plots after veld burning. Pioneer plants, such as *Vernonia kraussii*, *V. natalense*, *Geigeria* cf. *zeyheri*, *Gazania monroi*, *Agathisanthemum bojeri*, *Helichrysum nudifolium* var. *leiopodium*, *Anthospermum rigidum*, *Solanum* spp., *Acalypha* spp., and a large number of leguminous plants, among which *Alysicarpus vaginalis* and *Zornia capensis* probably are the most important, are very conspicuous in the majority of the plots burned during February.

Plots burned during this month are grazed lightly in some instances, in others, fairly heavily. After burning, the sprouting grasses most heavily grazed are *Hyparrhenia dissoluta* (thatch grass), *Sporobolus eylesii*, *Loudetia simplex*, *Setaria flabellata*, and *Panicum maximum*. After veld burning the young shoots of shrubs are eaten and those most heavily browsed are: *Gymnosporia senegalensis* (Senegal pendoring), *Dichrostachys nyassana* (sickle bush), *Terminalia sericea* (silver terminalia), *Strychnos spinosa* (monkey orange), *S. innocua* (monkey orange), *Mundulea sericea* (cork bush), *Ziziphus mucronata* (buffalo thorn) and *Piliostigma thonningii* (Rhodesian baubinia).

The principal animals grazing the plots burnt during February are wildebeest, zebra, reedbuck, waterbuck, warthog, kudu, giraffe, duiker, steenbuck, sable antelope and hares.

### (ii) Veld Burning During April.

Conditions are usually much drier during April, than in February, with the result that fires are all hotter and consequently less waste is obtained. Often, however, many grass seed stalks, especially of *Hyparrhenia dissoluta*, do not burn. Herbs are generally completely destroyed and shrubs suffer extensive damage; damage is more excessive than that during February, but large trees are protected by *Panicum maximum* (buffalo grass) growing underneath.

On account of the drier conditions the grasses with the exception of *Hyparrhenia dissoluta*, sprout poorly and more slowly after April veld burning. Shrubs, however, generally sprout reasonably well after April veld burning but *Dichrostachys nyassana* is the only exception as it sprouts poorly. Relatively few pioneer plants appear after the April veld burning: species observed

are chiefly *Anthospermum rigidum*, *Vernonia natalense*, *V. kraussii*, *Eriosema* sp., *Geigeria* sp. cf. *G. zeyheri*, *Gazania monroi* and *Epaltes alata* (the latter especially in marshy places).

Plots burned during April are usually grazed fairly heavily but the intensity of the grazing is limited by the game present in the area. However, every year during March, certain portions of the Pretoriusskop sour veld are burned according to a biennial rotation scheme and this in turn entices the game from the burned plots. Where experimental plots are heavily grazed, practically no selective grazing takes place.

The grasses most heavily grazed after the April veld burning are *Setaria flabellata*, *Loudetia simplex*, *Panicum maximum* (buffalo grass), *Urochloa mosambicensis*, *Elyonurus argenteus*, *Hyparrhenia dissoluta*, *Cynodon dactylon* and *Digitaria* spp.

The principal shrubs, of which young shoots are eaten after burning, are *Terminalia sericea* (silver terminalia), *Gymnosporia senegalensis* (Senegal pen-doring), *Sclerocarya caffra* (marula), *Dalbergia melanoxylon* (zebrawood), *Flacourtia hirtiuscula*, *Dichrostachys nyassana* (sickle bush), *Rhoicissus cuneifolius*, *Ochna natalitia*, *Peltophorum africanum* (African wattle), *Mundulea sericea*, *Combretum suluensis*, *Rhus pyroides*, *Cassia petersiana* (dwarf cassia), *Combretum guenzii*, *Ormocarpum trichocarpum*, *Strychnos innocua*, *Pavetta schumanniana*, *Gymnosporia buxifolia*, *Acacia gerrardi*, *A. exuvialis*, *Lonchocarpus capassa*, *Ximenia caffra* and *Grewia* spp.

The principal animals grazing the plots after the April veld burning are wildebeest, zebra, impala, steenbuck, reedbuck, kudu, giraffe and hares.

#### (iii) Veld Burning During August.

Conditions are already fairly dry during August and comparatively hot fires are obtained, especially where a thick mat of old grass has accumulated. Such conditions are usually encountered on the biennial and triennial experimental plots. On experimental plots receiving an annual treatment (burning is executed in August only), there is no accumulation of old material as a result of the annual fire and the fact that the grasses do not grow so luxuriantly after being regularly burned over a period of years. At the annual treatments very hot fires are, therefore, not encountered, but the plots burn reasonably clean, except for the grass stalks of *Hyparrhenia dissoluta* which remain. Consequently damage to shrubs and trees caused by annual veld burning during August is relatively small.

In the biennial and triennial veld burning during August, the fires are very hot and the plots are burned clean. Small shrubs are generally burnt to the ground. Damage to trees is also fairly severe and *Panicum maximum* patches around the larger trees do not have the same protective effect during veld burning in August as with the February, April and December treatments.

During the past year it has been noted that the grasses and shrubs sprout well after being burnt during August. This can possibly be ascribed to the good rains which fell in the area during September and October. It has, however, been found that if a dry period precedes the veld burning and the spring rains are late, the grasses sprout very poorly in contrast with the shrubs which sprout well and are relatively lightly browsed after the August veld burning; on the other hand the grasses are heavily grazed as they are often the only green pasture in the area. As stated, the conditions during the past year were slightly unusual, in that the spring rains were early, with the resulting plentiful green pasture in the area, so that the game did not concentrate so heavily on the experimental plots. None of the grasses was heavily grazed.

On most plots after veld burning during August, 1958, there was little evidence of shrubs being browsed. The only shrubs lightly browsed were *Ximenia caffra* (sour plum), *Pappea capensis* (doppruim), *Euclea multiflorum* (lgwarri), *Pavetta schumanniana*, *Gymnosporia senegalensis* (Senegal pendoring), *Acacia gerrardi* (red thorn), *Sclerocarya caffra* (marula), *Antidesma venosum* (voëlsit), *Terminalia sericea* (silver terminalia), *Combretum guenzii*, *Ehretia amoena*, *Annona chrysophylla* (wild custard apple), *Dalbergia melanoxylon* (zebrawood), *Gymnosporia buxifolia* (pendoring), *Pseudarthria hookeri*, *Combretum suluense* (Zulu combretum), *Dichrostachys nyassana* (sickle bush), *Lonchocarpus capassa* (appelblaar), *Desmodium lasiocarpum*, *Cassia petersiana* (dwarf cassia) and *Combretum apiculatum* (red bushwillow).

Game grazing the plots were, without exception, the same as those mentioned in the discussions on the veld burning during February and April.

The high percentage of pioneer plants (principally herbs) which appeared on the August treated plots, was conspicuous. The chief species were *Epaltes alata* (particularly in marshy spots), *Vernonia natalense*, *Zornia capensis* and *Agathisanthemum bojeri*.

It must also be stated here that *Dichrostachys nyassana* (sickle bush) sprouted relatively well after the veld burning during August.

#### (iv) Veld Burning During October.

The heat of the fires during October (as is the case in others) is determined to a large extent by the condition of the grass on the one hand, and the quantity of the dry material accumulated during two or three years on the other. At some of the plots (cf. Kambane) a considerable accumulation of old material occurs in the veld type under discussion and even should the grass already be slightly green in October, the fires are still excessively hot. Shrubs are burned back completely and even big trees are singed to the crowns. Trees and shrubs are usually fairly vulnerable during October as

most are beginning to bud after the dry season and a number of species are already in bloom. In plots where the soil is poorer and the accumulation of old material is not so great, the fires are slow and not as hot. Generally the fires burn off everything except the seed stalks of *Hyparrhenia dissoluta* which may be left unburnt. The protective influence of patches of *Panicum* again becomes important during October (depending on the amount of rain which fell prior to the veld burning).

Temperature tests were carried out during the veld burning in October, 1958, on two plots in the Pretoriusskop area. On plot No. 1 in the Numbi block (plot burnt every 2 years) the temperatures were low. At a height of 1' 6" above the ground temperatures of between 400°F and 500°F were measured. At 3', 6' and 12' above the ground the temperatures did not reach 400°F. On plot No. 11 in the Shaben block (burnt triennially) temperatures were considerably higher. At 1' 6" above the ground the temperature went up to between 700°F and 800°F. At 3' it was between 500°F and 600°F, at 6' between 400°F and 500°F, and at 12' under 400°F (temperatures below 400°F could not be measured).

Grasses, as well as shrubs, sprout readily after veld burning in October, but this is again determined by the amount of rain that precedes the veld burning, or falls immediately after. After the October veld burning of 1958, *Dichrostachys nyassana* (sickle bush) and *Lannea discolor* (bakhout) sprouted well on certain plots.

It has been noted that grasses as well as shrubs on all plots burnt in October are generally lightly grazed. The only grass on such plots which is comparatively well grazed, is *Urochloa mosambicensis*. The following are the most important shrubs which are slightly browsed: *Annona chrysophylla* (wild custard apple), *Terminalia sericea* (silver terminalia), *Pavetta schumanniana*, *Triumphetta hirsuta*, *Gymnosporia buxifolia* (pendoring), *Gymnosporia senegalensis* (Senegal pendoring), *Combretum suluense* (Zulu combretum), *Lippia asperifolia*, *Rhoicissus cuneifolius* and *Senecio* sp. nov.

The animals which feed chiefly on these shrubs are kudu, but spoor of sable, reedbuck, wildebeest, zebra, warthog, steenbuck, impala and giraffe were also found.

After the October, 1958, veld burning few herbs and pioneer plants were noticed on some plots, on others spring communities were prominent and *Triumphetta hirsuta* was the commonest species present.

#### (v) Veld Burning During December.

Grass on plots burnt in December is only partially destroyed because it is already very green. The grass burns slowly and gives off a considerable amount of smoke. Fires are never very hot, and where temperatures were