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ABSTRACT: Zimbabwe is the second largest agricultural producer in Africa and is responsible for the regional food security plan of the Southern Africa Coordination Conference member countries (SADCC).

Problem vertebrate management and research is an important function of the Department of National Parks and Wildlife Management, which is also responsible for conservation of natural resources in national parks. The country still contains large populations of wildlife species that at times conflict with man and his agricultural interests. Problem vertebrates and methods of control are briefly outlined.

INTRODUCTION

Zimbabwe is a tropical African country of 390,245 km^2 with approximately 16 people per km^2. It is situated between the Limpopo and Zambezi Rivers and altitudes range from 162 m to the highest mountain, Inyangani, 2,592 m above sea level.

Major crops are maize, wheat, cotton, tobacco and sugar. There are also over 5 million head of cattle. Agricultural production accounts for over one-third of the nation's foreign currency earnings. At the same time there is abundant wildlife within national parks and in farming areas. National parks comprise about 10 percent of the total land area.

Historically, control of problem wildlife has been the responsibility of the Department of National Parks and Wildlife Management. The first wildlife legislation was in 1902 but the "Game Department", as it was originally known, only came into being in the 1950s.

In 1975 a new Parks and Wildlife Act was passed, radically altering some aspects of the legislation and placing far more responsibility for wildlife in the hands of landowners or appropriate authorities for the land.

Basically, there are three categories of land: (a) state land such as national parks and forestry, (b) commercial lands consisting mainly of large, privately owned farms with sophisticated farming methods, and (c) communal lands occupied by various African ethnic groups. Until recently, this land was not privately owned and administration is through district councils.

In terms of the 1975 legislation, the appropriate authority for the land is responsible for controlling problem vertebrates, except for national problems such as disease outbreaks and quelea control. These national problems are tackled by government agencies.

In the commercial farming areas, farmers have been able to control most of the problem vertebrates in their lands. However, in communal areas where farmers are mainly at a subsistence level, they normally have insufficient equipment and expertise to tackle problem vertebrates effectively.

In these communal areas, the Department of National Parks and Wildlife Management assists with Problem Vertebrate Control Units. These units also ensure that monies derived from trophies are channeled back into respective district councils for use in rural development programs. This is a temporary measure until district councils are considered able to handle problem vertebrate control themselves.

During 1981, tribal councils were paid Zimbabwe dollars 595,612-00 derived from the sale of problem vertebrate products such as hides and tusks, or the sale of hunting concessions within tribal lands. Of this total, $ 143,871-00 was directly derived from problem elephants (M. Drury, personal communication).

POLICY RELATING TO PROBLEM VERTEBRATES

Prior to 1975, some species of animal were classed as "vermin" and a system of bounty payments operated for baboon, hyena, jackal and wild dog. These animals were destroyed at any opportunity, even within national areas.

Later the ecological importance of these animals was realized; and with the promulgation of the Parks and Wildlife Act (1975), the term "vermin" was changed to "Problem animal."

We are now careful to only consider individuals or groups of individuals as a problem when they come into conflict with man.

TYPES OF PROBLEM VERTEBRATES

In addition to the four designated problem mammals, the quelea bird (_Quelea quelea lathami_) is

recognized as a national problem species. Other vertebrates may sometimes become problems in the following circumstances.

    a. <u>When individual animals threaten human life</u>.

    This normally occurs when 1) They are under direct pressure from man, as in newly settled areas. 2) When they have been wounded by man or other agent. 3) In the case of large predators that are unable to secure natural food due to previous injuries or age and take to predation on man. 4) When natural prey becomes scarce, normally associated with human encroachment into the habitat.

    b. <u>When they cause damage to agricultural produce</u>.

    Most of the problem vertebrates fall in this category.

    Some of these such as elephant and buffalo move out of agricultural areas as human settlement expands but they may periodically make raids into the farms.

    Other animals have adapted to agricultural areas and remain there permanently and consistently cause damage to crops. Many of these have become nocturnal in habits.

    Problem vertebrates permanently in farming areas include bushpig, baboon, monkeys, porcupine, spring hare, and various problem birds.

    c. <u>Vertebrates that occasionally predate on livestock</u>.

    Normally this is caused by specific individuals and the species involved are mainly lion, leopard, and crocodile. In addition, jackal and hyena may build up their populations to the level where natural food is insufficient.

    A special case is the cheetah that occasionally kills small calves. They are given "Royal Game" status due to relative rarity and international concern over status. Royal Game may not be hunted nor products from such animals sold without the issue of a permit by government ministers. Control of cheetah is restricted to hunting specific individuals that persistently cause damage. However, during a five-year period only 10 permits were issued.

    An attempt is made to monitor changes in numbers of rarer vertebrates such as cheetah (Rushworth 1978, Sharp 1980). It is intended to develop capture techniques to enable relocation of problem cheetahs to national parks.

    d. <u>Vertebrates that transmit disease</u>.

    Jackals, for instance, may act as carriers of rabies and buffalo may carry foot-and-mouth disease. Species such as warthog (Phacochoerus aethiopicus), kudu (Trageiaphus strepsiceros) and bushbuck (Tragela-phus scriptus) are favored food for the blood-sucking tsetse fly that may carry trypanosomiasis blood parasite. This causes sickness in livestock and man.

    In the past these animals have been killed in large numbers in defined fenced corridors in an effort to restrict the distribution of tsetse fly. The emphasis is now on biological and chemical control of the tsetse fly itself, rather than by elimination of other vertebrates.

    Foggin (1981b) outlines some diseases that may be carried by wildlife in Zimbabwe and transmitted to livestock. Vultures of various species have also been accused of spreading disease such as anthrax. In Zimbabwe these birds are classed as Royal Game. One local study by Mundy and Brand (1978) failed to find anthrax spores in swabs taken from a large sample of captured vultures.

    Another problem group are animals that break down veterinary fences used in foot-and-mouth and tsetse eradication programs. For instance, elephant and buffalo may be shot in these areas to protect the fences.

MANAGEMENT TECHNIQUES

<u>Quelea</u> (<u>Quelea quelea lathami</u>)

    These birds are recognized to be Africa's main pest bird problem. The species found in Zimbabwe causes considerable damage. The number of birds killed in control operations varies considerably each year depending on movements of flocks within the subcontinent, and on favorable conditions for breeding. The main problem period is with irrigated winter wheat crops such as wheat, and with summer crops such as sorghum. During the winter of 1981 an estimated 86 million quelea were killed in Zimbabwe. If control is not undertaken, very considerable crop losses can occur.

    Research in Zimbabwe during 1977 led to development of a tractor-driven mist-blower method which effectively controls roosting concentrations confined to areas less than 100 meters wide (La Grange and Jarvis 1977).

    In larger or inaccessible places, aerial spraying at dusk is used (La Grange and Jarvis 1978). This method, using fixed-wing aircraft, was a local modification of a helicopter-based method used in

West Africa (Meinzingen 1980). This method has proved very successful but is more expensive than the ground-based mist-blower system.

Recent research has shown that quelea can be attracted to patches of sugar cane or napier fodder situated in areas readily accessible to the tractor and mist-blower method. In 1982 legislation has been introduced encouraging farmers to plant patches of these crops close to their grain lands to help decrease the cost of control operations (Jarvis and La Grange 1982).

Elephant (Loxodonta africana)

In a continent where elephant populations are considered to be threatened by poaching and destruction of natural habitat (Wylie 1980), Zimbabwe still has a large population in its national parks and in some of the agricultural areas. In the first half of 1981 a total of 201 elephant were shot in tribal farming areas due to crop raiding (National Parks unpubl. reports). In spite of this Cumming (in press) has shown that the elephant population continues to increase and the policy is to initiate periodic culling operations to keep the population at approximately its present level and so prevent excessive elephant damage to vegetation in the national parks.

In the case of problem elephants in croplands, these are normally bulls. Individual crop raiders are shot, preferably at night whilst causing damage. Shooting of one animal in a group of crop raiders is usually sufficient to chase the other members of the group out of the area.

It is essential to use a heavy caliber rifle capable of penetrating the brain from a frontal position. Night-shooting, without the aid of lamps or night sight, is normally directed at the lung.

Hippopotamus (Hippopotamus amphibius)

Hippos are confined to the major rivers, mainly in lower reaches. A few herds are further upstream in established pools, sometimes in agricultural areas. However, these established herds are not normally a problem unless crops are grown immediately adjacent to them.

The main problem hippos are usually bulls, forced to move upstream when displaced by the established herds. In many cases these animals have to be shot.

The situation is aggravated by adverse land-use practices in some areas causing destruction of natural vegetation and leaving the hippos with no alternative food other than crops. Most problems are in the dry season with illegal stream-bank cultivation.

Bushpig (Potamochoerus porcus)

Bushpig are distributed throughout Zimbabwe but are concentrated in higher rainfall areas. Jones (1978) found they were omnivorous and confined to feeding in wet areas as their ability to root is dependent on soil moisture content. At the onset of the main rains they move out into seasonal crop lands.

Main crops damaged are maize, potatoes, ground nuts, pineapples and the exposing of irrigated fruit tree roots.

Bushpig are nocturnal and have a keen sense of smell and hearing. As a result they are very difficult to capture or kill. Research is currently directed to produce an effective means of control. Prior to the research, the only successful methods have been poisoning or hunting animals at night in the crop lands. Experienced hunters can account for 50 pigs in a year but the average is only 4 or 5.

Recently research has shown that established fenced enclosures can be used to attract pigs to an out-of-season crop enclosed in the fenced area and situated close to the crop lands. Success with this method depends on attracting pigs early enough in the season before other crops are available.

Portable fenced enclosures have also been successful in wet areas, using fermented maize as bait. In both systems the pigs drop the gate bypassing through a trip-wire placed to ensure the entire group enters before closing. Once inside, they can be hunted the following day or killed by trap guns placed around the fence.

In addition, the crop can be protected by fencing off zones between broken country and vleis frequented by pigs and the croplands. This fence need only be 50 cm high, consisting of opaque plastic sheeting spread between two plain wires.

Elsewhere within the crop lands, pigs can be killed or deterred by high-voltage electric current in a wire placed close to the ground. Research has also led to development of trap guns used at established feeding sites, using fermented maize, during the dry season. Also night-hunting with a shotgun has been improved by reducing barrel length to improve bullet spread and by providing a locally made single-point sighting arrangement to assist aiming.

Baboon (Papio ursinus) and Vervet monkey (Cecopithecus aethiops)

These animals occur in troops of up to 100 (Kenmuir 1975) and may cause a wide variety of crop damage, including cereals, fruits, vegetables and even sugar cane. Jordaan (1981) reported one case where a troop of baboon destroyed an estimated $20,000 worth of cane. Ocassionally, baboons may also kill goat kids.

The main problem areas are places with broken relief where lands are relatively small and are surrounded by numerous hills in which these animals take refuge.

Baboon and monkeys have been controlled using Telodrex poison (Shell chemicals). Animals are attracted to prebaited areas using maize cobs or fruit. After a few days, when the animals frequent the bait, it is poisoned by painting on the maize cobs, or by injecting into fruit.

Baiting is preferably done in overnight roosting areas to reduce animal movements after being poisoned. Recovery and burning of carcasses is essential due to the persistence of this poison. Production of the poison has recently been stopped following recommendations from world conservation movements.

At present research is being undertaken to find a substance as effective as Telodrex but more target-specific.

Porcupine (Hystrix africaeaustralis)

These animals are widespread and nocturnal, causing damage to maize, potatoes and ground nuts. They are successfully controlled using the fenced enclosure system developed for bushpig. They have also traditionally been hunted at night using trained dogs and shotguns.

Spring Hare (Pedetes capensis)

These are mainly a problem in communal areas associated with sandy soils. They may feed on most grain and vegetable crops.

Control is mainly by hunting at night with dogs and a spotlight. Some success has been achieved using engine exhaust gasses in their burrows.

Other Problem Bird Species

Although quelea are by far the greatest avian cause of damage, other species have caused appreciable damage in some instances; e.g., doves (Beesley 1978) and fruit-eating species such as black-eyed bulbul (Pycnonotus barbatus layardi).

Difficulty has been experienced reducing populations of problem birds that do not roost communally and so cannot be killed effectively at night. Walk-in traps and scaring devices all seemed to have little impact.

Recently trials were undertaken with mist nets placed in fruit orchards. These have shown that effective crop protection can be achieved in fruit orchards that are not too extensive (Jarvis 1982).

Lion (Panthera leo)

Normally lion are a problem in cattle-ranching areas adjacent to national parks. Sometimes entire prides are involved but often it is individuals that are unable to capture wild animals due to age or injury.

Lions are easily controlled when they return to their kills. Control can either be by shooting from a hide overlooking the carcass, using spotlights, or by poisoning using strychnine. Also Canadian bear traps can be used around the carcass.

Van der Meulen (1977) reports success in the capture and relocation of lions using the drug Phencyclidine (Sernylan) at the rate of 250 mg per adult animal. Recent trials in Mtetsi area have shown similar success using baited pieces of meat impregnated with the same drug.

When lion do not return to carcasses due to previous unsuccessful poisonings (often when farmers have used Toxaphine cattle dip as a poison) the lion become very cunning and difficult to control.

Some success can be achieved by tracking fresh spoor the morning after the kill. Trained dogs can help expose the lion and reduce risks to the hunter.

Leopard (Panthera pardus)

In Zimbabwe leopards are still abundant. Smith (1977) studied a population in the Matopos area and found they had a home range of approximately 18 km2, containing one male and one or two females. Similarly they are widespread in farmland but seldom more than two in any locality.

As with lions, they normally kill individual animals, but if caught in an enclosure with many animals, they may kill them all. Leopard are easily controlled if they return to the carcass by shooting at night with the aid of a light or with poison or Canadian bear traps.

In addition trap guns may be used and several successful techniques have been evolved by farmers. In all cases it is ensured that the animal has to expose itself to the trap gun in order to retrieve the bait. Some success has also been achieved with walk-in cage traps.

Spotted Hyena (Crocuta crocuta)

These are a danger to livestock, particularly when occurring in large packs of 15 to 20 animals. They are efficient killers and can often be detected by cattle having tails bitten off and bite marks on the hind quarters. One ranch reported over 1,000 head of cattle killed by hyena in one year.

These animals move along set paths and usually lie up in underground burrows or under rocks. Coyote-getters can be successfully used against individuals. When larger numbers exist, more effective control is achieved using poisons.

Individuals may become very cunning and kill randomly over a large area making control more difficult.

Black-backed Jackal (Canis mesomelas) and Side-striped Jackal (Canis adustus)

These animals, especially the black-backed jackal, may kill newborn calves or lambs. However, both may be a major problem as carriers of rabies. A high proportion of all confirmed rabies cases in Zimbabwe are in these animals. For instance in the years 1964 to 1972, 359 out of 846 confirmed cases were in jackals (Williamson unpublished letter to Director of National Parks 1976).

When jackals are infected and bite livestock or man, these become infected. During 1981, 5 humans died as well as 135 jackals, 60 dogs, 28 cattle, 4 horses, 3 pigs, 1 sheep, 1 leopard, 4 mongooses, and 1 honeybadger (Foggin 1981a). These represent confirmed cases reaching the laboratories. Some cattle ranchers have claimed hundreds of cattle killed in one year from rabies.

Control is directed at reducing the overall jackal population in the infected areas. Rabies is considered a national problem and is tackled by government agencies using coyote-getters or poison baits. Coyote-getters are used in preference to poisoned baits whenever possible and normally reduction in jackal numbers is relatively easy.

Crocodile (Crocodylus niloticus)

These reptiles are associated with major river systems and become problems mainly in areas where natural food is less available.

In the dry season, when crocodiles remain in a few pools, capture is relatively easy using the spring trap developed by Loveridge and Blake (1972). This copes with crocodiles over 2 meters in length. After capture, the animals are tranquilized with Gallamine (Flaxadil) at the rate of 1 to 1.25 mg per 350 mm body length.

With the increased interest in game safari enterprises, crocodiles have been relocated in many dams in farming areas. Currently demand far exceeds the supply.

Buffalo (Syncerus caffer)

Control is mainly aimed at eradication of the species from designated areas in the interest of disease control, as mentioned earlier. This is either done using a conventional plastic boma capture method, or they are hunted from the air using helicopters (La Grange 1975).

Experiments have been conducted by the Department of Agriculture involving capture of foot-and-mouth-free calves from herds within national parks. These are used to create foot-and-mouth-free herds Ultimately, these are intended for re-introduction into lowveld areas where the buffalo have been shot out (Coetsee and Taylor 1978).

Recent Developments In Problem Vertebrate Control In Zimbabwe

The Department of National Parks and Wildlife Management has recently formed a unit to coordinate control operations and to initiate more monitoring and research programs to find better ways of managing problem animals and of assessing crop damage.

These programs should assist the training of problem vertebrate staff and the fanning community. It is intended to help train hunting clubs and self-help units formed by fanners to combat problem vertebrates in their areas.

Effective problem vertebrate control is hampered by insufficient and antiquated transportation and equipment and a shortage of trained staff. An efficient organization is needed if Zimbabwe is to maintain its present rating as the second largest agricultural producer on the African continent. The country has also been appointed by member countries of the Southern Africa Coordination Conference (SADCC) to devise their regional food security plan.

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