

A suggested management strategy for stock-raiding lions in Namibia

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Lion predation on domestic stock from farms bordering conservation areas causes a serious conflict of interest between farmers and conservationists. During a four-year study in northern Namibia, the options for alleviating this conflict were investigated. Long-term records of individual lions permitted the categorization of stock-raiding lions as habitual 'problem animals' or 'occasional stock raiders'. Management strategies for each group under varying conditions are presented, with optimal solutions emerging as translocation for occasional stock raiders and elimination for problem animals. Success of the strategies depends on long-term monitoring of individual lions and co-operation between farmers and conservation authorities.

Rooftogte deur leesers op mak vee op plase wat grens aan bewaringsgebiede veroorsaak ernstige belangebotsings tussen boere en bewaringsgesindes. Tydens 'n vierjaarstudie in noordelike Namibia is strategieë wat hierdie konflik kan verlig, ondersoek. Langtermyn individuele rekords het dit moontlik gemaak om veerwende leesers as 'gewoonte-probleemdiers' of 'geleentheds-veerowers' te kategorieer. Bestuurstrategieë vir elke groep onder verskillende omstandighede is bespreek, met die optimale oplossing wat na vore tree, die oorpasing vir geleentheds-rowers en uitwissing vir probleemdiere. Die sukses van hierdie strategie is afhanklik van langtermyn-monitoraksies van individuele leesers en ook samewerking tussen boere en bewaringsowerhede.

Keywords: Domestic livestock, lion, Namibia, *Panthera leo*, problem animal

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Introduction

Recent changes in the distribution of the lion *Panthera leo* reflect the fact that large predators in Namibia and all over Africa are destroyed at an alarming rate with the increase of pastoralism along conservation areas containing large carnivores (Guggisberg 1962; Schaller 1972; Anderson 1981). The borders of conservation areas present a particular problem as experienced in Zimbabwe (Van der Meulen 1977) and in South Africa (Anderson 1981). In this paper I discuss the problem and offer solutions in areas bordering Etosha National Park and in large portions of Damaraland and Kaokoland, Namibia (Figure 1). Cattle and goat farmers in these areas suffer substantial losses annually to stock-raiding lions. It was difficult to ascertain quantitative figures on annual losses, but during 22 investigated stock-raiding cases between 1984 and 1988 I confirmed reports of 46 cattle, 13 goats, eight donkeys and three horses killed by lions.

Etosha National Park, hereafter referred to as Etosha, occupies an area of 22 270 km² with its co-ordinates centering at 19° S and 16° E in northern Namibia (Figure 1). Intensive cattle farming occurs along the boundaries of Etosha. The southern and eastern boundaries are occupied by fenced cattle farms and to the north and west lie the Owambo and Herero tribal areas. Both the Owambo and the Herero are cattle and goat farmers with no farm boundaries and livestock moving over large areas. Etosha was fenced in 1973. Lions can nevertheless move in and out of Etosha, owing to the constant burrowing activities of mainly warthogs.

An average of 37 lions (Figure 2) were killed annually between 1982 and 1986 on the farms bordering Etosha. All originated from Etosha, since no lions are resident

on the farmlands. It is impossible to know what percentage of Etosha's lion population is killed by farmers annually, since population estimates vary from 260 in 1975, 500 in 1980, 300 in 1983 to 200 in 1986 (Gaerdes 1975; Berry 1987). In recent years members of the Directorate of Nature Conservation and Recreational Resorts



Figure 1 Etosha National Park, Damaraland, Kaokoland and the Skeleton Coast Park in northern Namibia.

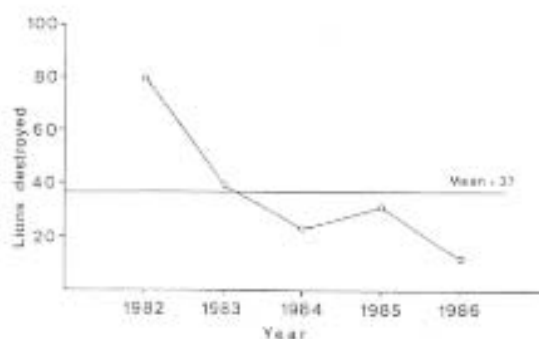


Figure 2 Number of lions destroyed on farmland bordering Etosha National Park, between 1982–1986.

have been individually marking Etosha lions in an effort to determine population size. Based on 141 marked lions the Etosha population estimate for February 1989 lies between 268–343 adult and sub-adult lions (Stander, in press). Such figures as are available suggest that as much as 10% of the lion population may be killed by farmers each year.

The Kaokoveld, an arid region west of Etosha, contains Kaokoland, Damaraland, and the Skeleton Coast Park (Figure 1), and supports a low lion population. Approximately 30 lions, or 0,08 lions per 1000 km², are estimated to inhabit the entire area (D. Gilcrest 1988, pers. comm.). Probably only six individuals, or 0,4 lions per 1000 km², occur in the Skeleton Coast Park (Bridgeford 1985). Only the Skeleton Coast Park provides some legal protection to lions.

During four years as an employee of the Directorate of Nature Conservation and Recreational Resorts the author was charged with the responsibility of solving problems resulting from stock predation by lions. When it was deemed unnecessary to kill stock-raiding lions, they were either lured back into Etosha or translocated to different areas. The success of these attempts suggests a strategy that could save the lives of stock-raiding lions and prevent further economic losses to farmers, and alleviate friction between farmers and the conservation authorities.

Methods

Close and regular contact was kept with the farming community near Etosha, with the result that many farmers reported lion problems to the conservation authorities. Attempts were made to solve stock loss problems in the shortest possible time. Decisions on the course of action were made based on the histories of the lions and of the particular situation.

Lions responsible for stock losses fell into two broad categories: 'problem animals' and 'occasional raiders'. Those individuals with histories of habitual stock raiding were regarded as problem animals. Individuals with known histories and no previous record of stock raiding were classed as occasional raiders. If the history of a raiding lion was not known and the problem not recurrent, this lion was also categorized as an occasional

raider until proven otherwise.

Whenever possible lions were translocated away from the problem area. With occasional raiders, translocation merely served the purpose of disrupting their present activities and was not intended to move them permanently from their home ranges. When large prides with cubs moved onto farmland, the immobilization of the entire group was not always practicable and the occasional raiders were then lured back into Etosha using a fresh carcass and tape recorded sounds of feeding lions. Breaks in the boundary fence were then secured.

Problem animals were either destroyed or translocated over long distances (> 100 km), preferably to areas high in ungulate densities, low resident lion densities and with low incidence of stock farming. In only two cases were problem animals lured back into Etosha.

Lions that were translocated were first immobilized using standard darting equipment. All immobilizations were performed at night with the aid of a fresh carcass as lions were less shy and more approachable when feeding in darkness. A combination of 6,3 mg/kg Ketamine hydrochloride and 3 mg/kg Xylazine hydrochloride was initially used as the immobilizing agent (Van Wyk & Berry 1986). Starting in 1986 Zoletil (CI-744) was used (King, Bertram & Hamilton 1977). Dosage strengths varied from 0,6 to 15 mg/kg depending on the required duration of immobilization (P.E. Stander & P.vdB. Morkel 1989 unpubl. data). All lions immobilized were permanently marked with a hot brand (Orford 1986) and whenever possible a radio collar was fitted to one individual in a group. Radio-collared lions were located mostly from the ground and sometimes from an equipped aircraft.

Results

During the period 1985 to 1988, 22 cases of stock raiding involving 69 lions were investigated (Table 1). Based on their individual histories 54 of these lions (13 cases) were categorized as occasional raiders and 15 (nine cases) as problem animals.

Occasional raiders

Etosha National Park

The age and sex structure of occasional raiders (Table 2) was similar to that of the entire Etosha population ($p > 0,70$; χ^2 test, Siegel 1956). However, more sub-adult

Table 1 The total number of stock-raiding episodes investigated and management actions taken during 1985 through 1988. The total number of lions present during stock-raiding episodes is given in parenthesis

	Lions			Total
	Lions destroyed	Lions lured back	Lions translocated	
Occasional raiders	4(23)	3(19)	6(12)	13(54)
Problem animals	4(8)	2(2)	3(5)	9(15)
Total	8(31)	5(21)	9(17)	22(69)

Table 2 A comparison of the age and sex compositions of the Etosha lion population (as of January 1987), occasional raiders, and problem animals

	Adult males %	Adult females %	Sub-adult males %	Sub-adult females %	Cubs %	n
Etosha population	24.8	39.2	11.7	10.7	12.1	214
Occasional raiders	14.8	27.8	24.1	20.4	13.0	54
Problem animals	30	10	40	20	0	10

males and females were present. Farmers destroyed 23 occasional raiders before attempts could be made to save them. The behaviour of occasional raiders during stock raiding indicated a lack of experience and they were easily killed. Nineteen occasional raiders were lured back into Etosha. Six of these lions remained in the immediate area, four returned to the farms and the rest moved back to their known home ranges. Four of the nineteen lions continued stock raiding four months later and were destroyed.

Twelve occasional raiders (five cases) were translocated. The results of these translocations are presented below (Cases 1 to 5).



Figure 3 Observed locations of a marked lioness from the Ozonjuitji m'Bari pride before, and for one year after, translocation back into Etosha National Park.

Case 1. An adult lioness of the Ozonjuitji m'Bari pride was captured on farmland after killing four cattle (Figure 3). She was radio collared and released 5 km inside Etosha. This lioness was located several times during the following year and remained within her known home range, and discontinued stock raiding.

Case 2. After stock raiding by lions had been reported on a farm 15 km SE of Findpaal (see Figure 3), a sub-adult male and female were captured. These individuals were unknown to local field staff (T.J. Archibald 1986, pers. comm.) The two lions were individually marked and released at Eindpaal, 15 km from the capture site, and were observed in the same area three months later. During the following year the boundary farmers of that area did not report any further stock losses or lion activities on their farms.

Case 3. The Gemsbokvlakte pride occupying a home range of approximately 600 km² was often observed and was not known to move onto farmland. A sub-adult male was captured on the southern boundary as it was leaving Etosha. It was radio collared and translocated 5 km to Ombika (Figure 4). Two days later five other members of the Gemsbokvlakte pride were captured in the same area in a similar situation as the sub-adult male. The five lions were translocated 30 km to Ondongab (Figure 4). The entire Gemsbokvlakte pride was observed several times within its known home range during the following year, and no stock raiding was reported.

Case 4. A typical lion problem came about when four Etosha lions (two males and two females) killed a cow on the farm Nadubib, 20 km SE of Namutoni (Figure 5). Prior to this incident a single adult male lion killed 21 cattle during four months on this farm. Despite extensive



Figure 4 Observed locations of a sub-adult male and five other members of the Gemsbokvlakte pride before, and for one year after, the translocation in Etosha National Park. See Figure 3 for key.

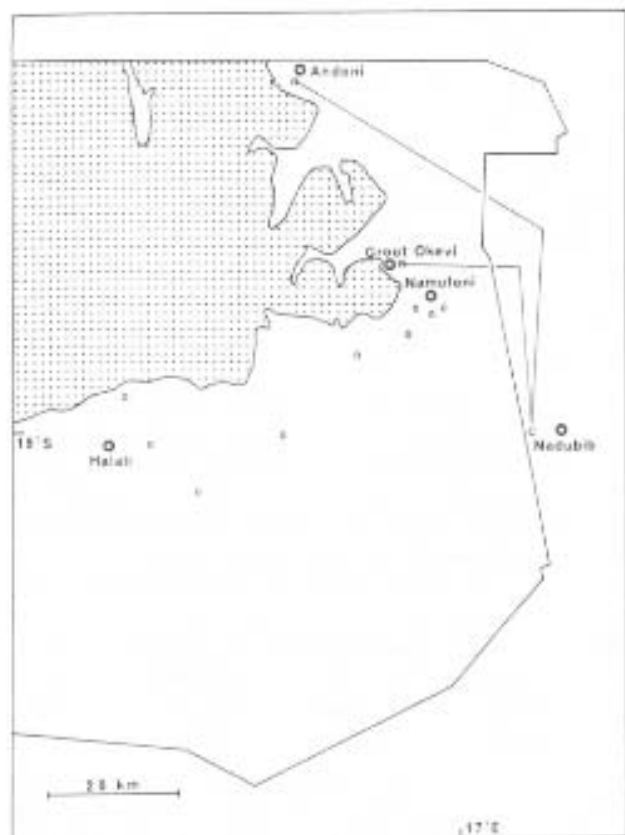


Figure 5 Observed locations of an adult male and female lion for one year after translocation from the farm Nadubib back into Etosha National Park. See Figure 3 for key.

efforts the lion could not be stopped.

The farmer shot an adult female, and two of the three remaining lions (an adult male and an adult female) were immobilized. The fourth lion, an adult male, disappeared. The two captured lions were unknown to local field staff at the time (W. Hugo & R. Dujardin 1987, pers. comm.), and owing to the ease with which they were captured, they were categorized as occasional raiders. It was suspected that the three lions accompanied the problem animal on its stock-raiding habits, and that the wary problem animal fled owing to our activities.

The captured male lion was radio collared and translocated to Andoni, 70 km away (Figure 5). With the use of radio telemetry his movements were observed during the following year. The lion did not return to stock raiding at Nadubib and was located to the area south and east of Halali.

The captured lioness was marked with a visual collar and translocated 35 km to Groot Okevi (Figure 5). She remained in the vicinity of Namutoni where she was observed frequently by the local field staff and tourists (J. van der Reep 1988, pers. comm.) for more than one year.

Evidence supporting the assumption that the above translocated lions were occasional raiders that had accompanied the problem animal, was provided when stock raiding on this farm continued with evidence that

they were not involved. Two months later the problem animal, an adult male lion, was destroyed and no further stock raiding occurred.

Case 5. An adult lioness was captured on the border 35 km west of Ombika (Figure 6) after the remainder of her pride (13 lions) was destroyed on farmland for killing

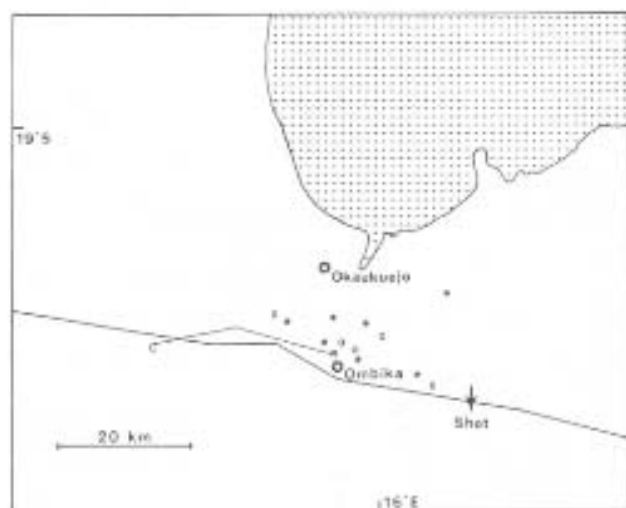


Figure 6 Observed locations of an adult lioness of the Ombika pride before and after translocation back into Etosha National Park. See Figure 3 for key.

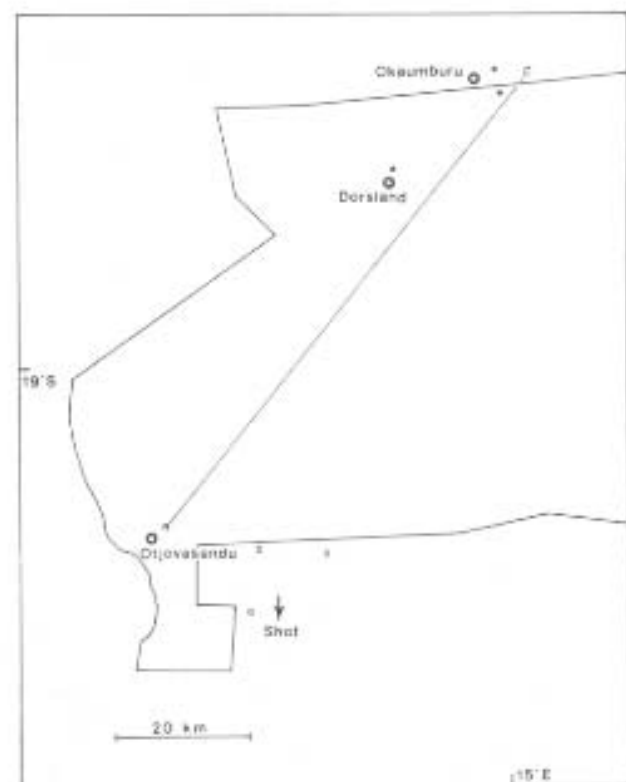


Figure 7 Observed locations of three young lions before and after translocation back into Etosha National Park. See Figure 3 for key.

seven cattle. The pride, which had been studied intensively prior to the incident (Orford 1986; Stander & Stander 1988), had never been known for stock raiding. This lioness which suffered a fractured lower back leg from a gin trap was radio collared and released at Ombika. During the following five months the lioness roamed from one extreme point of the known pride home range to the other, before moving onto farmland once again where she was destroyed by a farmer.

The success of translocating occasional raiders is evident in the reduction of lions destroyed on the borders of Etosha, from 1982 to 1986 (Table 1).

No occasional raiders were dealt with in the Kaokoveld.

Problem animals

Most problem animals were adult and sub-adult males (Table 2). Problem animals were very wild and difficult to immobilize or destroy. They were habitual stock raiders and apparently aware of the dangers involved. Eight of the 15 problem animals were destroyed, two were lured out of farmland and five were translocated to assess these management options.

Etosha National Park

Two problem animals were lured back into Etosha. Both returned to stock raiding within days and were destroyed. Another six problem animals were killed, and each case exemplified the shrewdness of these individuals. Three lions were translocated (Case 6).

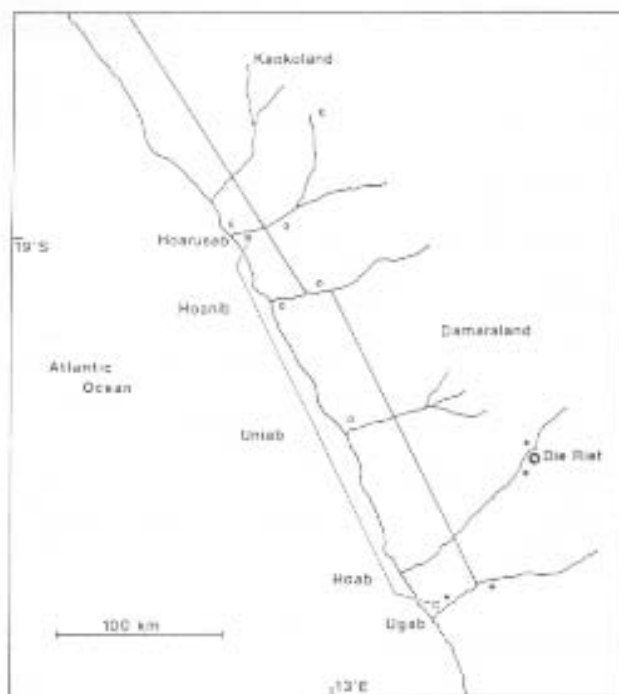


Figure 8 Observed locations of a marked lioness before, and for one year after, translocation in Skeleton Coast Park. See Figure 3 for key.

Case 6. Four lions (an adult female and three two-year-old cubs) were responsible for some stock losses near Okaumburu (Figure 7). The adult female was destroyed but the three young lions survived and continued stock raiding. They were captured in the same area and released at Otjovasandu, 100 km from Okaumburu. This was an area of relatively high lion densities and hopes were placed on the possibility that they might be accepted into a pride. The translocation was not successful as the three lions continued stock raiding on bordering farmland. They were destroyed one month later.

Kaokoveld

Two coastal roaming lions of the Skeleton Coast Park (Cases 7 and 8) that had repeatedly been responsible for stock losses at Die Riet (Figure 8), were translocated.

Case 7. An adult female was immobilized at the Ugab River mouth (Figure 8) after a 16-day attempt, and translocated to the Hoaruseb River, 200 km to the north, where fewer farming activities occur. She remained in the area of the Hoaruseb River for five months and then moved south to the Hoanzib River and Uniab River (S. Braine 1987, pers. comm.), and eventually back to the Hoanzib River (L. Scheepers 1989, pers. comm.). To this date, 27 months after the translocation, the lioness is still observed occasionally in the vicinity of the Hoanzib River, and no further stock raiding has been reported.

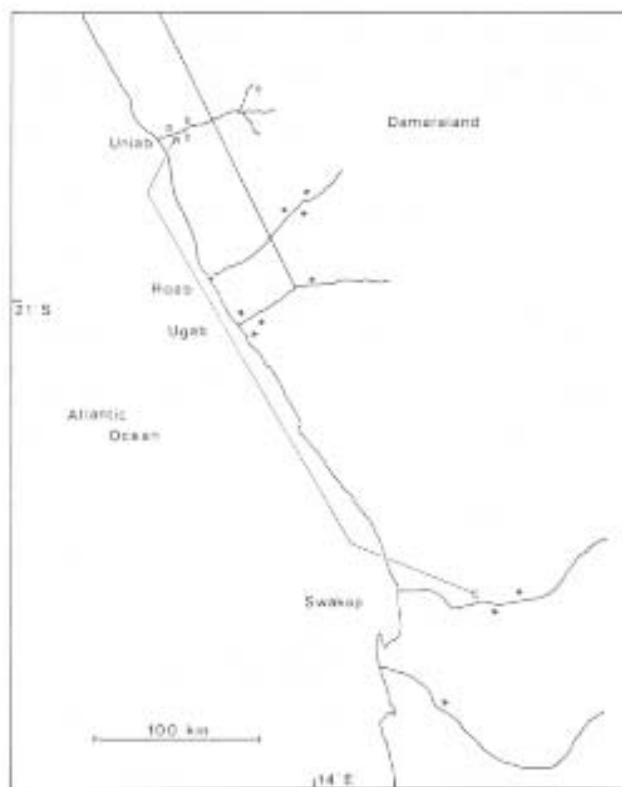


Figure 9 Observed locations of an adult male lion before, and for one year after, translocation back into Skeleton Coast Park. See Figure 3 for key.

Case 8. After the female (*Case 7*) had been immobilized her companion, an adult male, moved far south causing considerable damage to stock farmers (Figure 9). On 19/11/1987 M. Britz (1987, pers. comm.) immobilized the lion in the Swakop River and transported him over a distance of 300 km to the Uniab River where he was released. Here the lion met up with the female (*Case 7*), and is still believed to be in the area one year after the translocation (R. Braby 1988, pers. comm.). No further stock losses at Die Riet have been reported.

Discussion and Recommendations

The results strongly suggest that problems with stock-raiding lions can often be alleviated without killing the lions, if the history of the individuals is known. The distinction between problem animals and occasional raiders determines which management action will yield the best results.

Occasional raiders

Translocation appears to be the most successful management option for occasional raiders. Luring occasional raiders back into Etosha was not as successful as the lions often remained in the immediate area, and four out of 19 resumed stock raiding. Lions which had been translocated short distances (< 100 km) all returned to their known home ranges upon recovery from immobilization and did not continue with stock raiding on the periphery of their territories. Only one of the 12 occasional raiders translocated from farmland eventually moved out of Etosha again and was destroyed. This lioness (*Case 8*) stayed in Etosha and within her pride home range for five months before moving onto farmland. Considering her unusual situation, that her entire pride was destroyed and that she suffered a fractured back leg, this lioness became a problem animal when she returned to stock raiding. The other 11 translocated occasional raiders discontinued any stock-raiding activities for at least one year after the translocation.

The age and sex structure of the occasional-raider category was not significantly different from that of the Etosha population. Occasional raiders consisted mainly of whole prides or groups including adult females and cubs.

Problem animals

When considering the translocation of problem animals, five factors need to be taken into account: (i) the distance of translocation (> 100 km), (ii) the proximity of domestic stock farms, (iii) the availability of prey, (iv) the presence or absence of resident lions, and (v) the high time commitment required to capture wary problem lions.

The translocation of two problem animals (*Cases 1 and 2*) on the Skeleton Coast, when moved > 100 km into areas of sufficient prey densities, no stock-farming activities, and no resident lions, was successful. The translocation of three young lions (*Case 3*) in Etosha, to an area that bordered different domestic stock farms was not successful.

The experience of others confirms this hypothesis that the success of translocating lions to a new area is distance related. Anderson (1981) discussed the successful translocation of two wild lionesses to the Umfolozi Game Reserve, South Africa — a distance exceeding 100 km. Two out of six lions were successfully translocated over a distance of 45 km in the Rukomechi area, Zimbabwe, by Van Der Meulen (1977). Two males that were moved over 27 km returned to their former territory within five months (Van Der Meulen 1977).

Areas that meet the requirements for successfully translocating problem animals are rare. When the conditions cannot be met it is recommended that these lions be destroyed. This would be beneficial for (i) the lion population of that area, as observations suggest that problem animals may influence inexperienced lions who then join them in stock raiding, and (ii) for good relations between farmers and the conservation authorities. Constant stock losses owing to problem animals invariably cause friction between the farmers and conservation bodies, which may jeopardize future conservation efforts on farmland.

Problem animals were mostly adult and sub-adult males. It is suggested that these lions were either ousted by incoming males during pride takeovers in the case of adults (Schaller 1972; Bertram 1975; Packer & Pusey 1983) or driven from their natal prides in the case of sub-adults (Schaller 1972; Bertram 1973, 1975; Van Orsdol, Hanby & Bygott 1985), moving onto farmland and becoming specialized stock raiders. Management strategies described by Anderson (1981), and Venter & Hopkins (1988) address this particular problem of nomadic lions leaving conservation areas.

Insofar as the translocation efforts were successful they depended on a long term monitoring program, involving constant contact with the farming community and individual recognition and record-keeping of lions, aided by the use of radio-telemetry.

Stock raiding on the borders of conservation areas highlights a particularly sensitive issue, namely the universal conflict of interest between local farmers and conservationists. The importance of maintaining harmonious relations in border areas cannot be over-emphasized. The traditional response to stock raiding has been to destroy the offending or simply the first lion observed whenever possible, a practice which has resulted in the destruction of the lion population in some parts of the Kaokoveld. The strategy suggested here is sensitive to the needs and aims both of farmers and conservationists, and to the lions themselves.

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