

## THE CASE OF THE HANDLED STUDY POPULATION OF WILD DOGS (*Lycaon pictus*) IN KRUGER NATIONAL PARK

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*"We recommend caution in the selection of the means used for studying wild populations, especially of rare mammals, and, where possible, additional monitoring for negative impacts upon these populations*

and, *"... the effects of tagging may be subtle and important although difficult to detect.*  
(Moorhouse & Macdonald 2005)

*" ... there is a central question about the extent to which it is reasonable to intervene in a population when the species is endangered"*  
(Clutton-Brock 2003)

### THE DECLINE OF WILD DOG NUMBERS IN KRUGER NATIONAL PARK 1989 - 2005

The wild dog population in the southern district of Kruger National Park (KNP) has been studied since the 1960s. This district was reported as having the highest density of wild dogs in KNP and between 1975 and 1994 was described as either stable or increasing.

**Between 1993 – 2005 there was a dramatic decline in the KNP wild dog study population.** This decline followed the commencement in 1989 of a period of intensive, highly invasive research involving anaesthetization, radio-collaring and tissue sampling, collectively known as 'handling'.

In **2005 intensive invasive studies ended** and population data, previously based on intensive invasive techniques, was replaced by photographic competitions. The results of the photographic survey **2008 -9 showed an increase in the reported wild dog population.,**

Between 1989-94, the majority of KNP wild dog study population was handled in some way, including pups, yearlings, adults, in particular targeting the alpha (i.e. breeding) pairs. Packs were frequently located and monitored both from the air (helicopter) and on the ground. The levels of stress induced in individuals (some repeat darted and blood sampled) and their packs, is unknown.

Of the 201 pups that survived to at least 6 months old during the period between 1990 and 1/1/94, **pup survival to 12 months (1990-93) was 30%** (van Heerden et.al. 1995) only 60 surviving to 12 months .

**Only 16% of new born pups survived to become full adults at 2 years and between 1995-2000 there was a 50% drop in the study population in the southern district** (McCreery & Robbins 2001, Mills www).

This population decline occurred in what had **previously been described as a 'stable population', with high (71%) pup survival** (Reich 1981, Maddock & Mills 1994, Woodroffe et al 1997).

In July 2002 Dr. G. Mills (scientist in charge) reported:- **'The number of wild dogs is down to under 200 now from over 400 a few years ago, and we really don't know why'**. (African Conservation Organization).

In **2005 intensive invasive studies ended** and population data, previously based on intensive invasive techniques, was replaced by photographic competitions. The results of the photographic survey **2008-9 showed an increase in the reported wild dog population.**

In Kruger National Park (KNP) the wild dog population in the southern District of the National Park has been studied since the 1960s (Pienaar 1963, Reich 1981, Girman et.al. 1997, Ginsberg et.al. 1995). This District was reported as having the highest density of wild dogs in KNP (Creel et.al. 2004) and between 1975 and 1994 was described as either stable or increasing, as in the southern district between 1990-93 (Maddocks & Mills 1994, Ginsberg et.al. 1995).

It is stated that the KNP wild dog population **shows a clear tendency to decline and that the *current* demography of wild dogs leads to dynamics that are prone to collapse** (Creel et.al. 2004).

**Is the decline in the population of the highly endangered wild dog in this and other protected areas since 1985 causally linked with increasing use of various invasive-research techniques?**

The immobilisation/anaesthetization of mammals and other animals for the fitting of radio transmitters of various types, the collection of blood and other tissue samples for disease and genetic screening and in a few cases for vaccination is now routine 'field work'. Such invasive research techniques are collectively known as 'handling'.

The vital question of whether the association of handling with reduced longevity in the 'Serengeti' (Burrows 1994), the Masai Mara (Burrows 1995) and population decline in the intensively studied wild dog population in KNP, is causally related in some way to handling remains to be urgently resolved before more possibly avoidable population declines or disease outbreaks occur.

Analysis of long term data from 'Serengeti' (1965-91) clearly demonstrated a statistically significant association between handling and reduced longevity of both 'handled' individuals and their packs compared with those unhandled. IUCN Canid Specialist Groups reviewer of the 'Serengeti' evidence accepts this association but suggest that the association might be explained without assuming a causal relationship. (Woodroffe et.al. 1997).

A 'handling-stress hypothesis' (Burrows 1992) suggesting that handling induced stress resulting in disease outbreaks in each handled pack is currently the only *mechanism* that might explain the loss of all the Serengeti-Mara ecosystem wild dog study population between 1986-91(not 1990-91 as claimed by Woodroffe 1997) and the survival of a non-study population in adjacent areas (Burrows et.al. 1994 & 1995, Burrows 1995, East et.al. 1997, Hofer and East 1997).

In 'Oryx' (2001) Woodroffe claims - "*The risks associated with immobilization and radiocollaring are questionable in Serengeti, and undetected elsewhere*" and "*The benefits of these interventions therefore appear to outweigh the costs at present.*"

**The validity of Woodroffe's claims is highly questionable based on the data from all the handled wild dog study populations, including KNP.**

It is vital to know what factors may have contributed to the sudden change in KNP wild dog demography post 1989 and the post 1994 population crash and review the validity of the evidence for and against the claimed benefits of routine invasive research techniques on this highly endangered species.

**Handling data from the Kruger National Park.**

In the KNP southern district study area in the 5 years (1989 to 1/1/94) 169 skin or blood samples were collected from 92 adults *and 77 pups from 9 packs* (Girman et. al. 1997).

Between 1990-93 nineteen pups >6 months were anaesthetized in KNP (van Heerden et.al. 1995) and between 1989 and 1994 , 15 wild dogs of unspecified age were anaesthetized for the fitting of radio-collars, 15 for radio-implants and 28 for blood sampling ( Ginsberg et. al. 1995)

It is not known however if some of the 169 samples taken in KNP were from the same individual. i.e. multiple handling, if biopsy darting is included as 'handling'. For example - were some of the pups sampled, probably by biopsy dart but not anaesthetized, later anaesthetized as adults and conversely were some anaesthetized adults and pups subsequently biopsy darted?

Of the 201 pups that survived at least until 6 months old during the period between 1990 and 1/1/94, pup survival to 12 months ( 1990-93) was 30% ( van Heerden et.al. 1995) just 60 surviving to 12 months .

In 1989 just one pup was sampled but a further 76 were sampled between 1990-1993 (Girman et.al. 1997) probably all by biopsy dart.

The survival of pups in KNP study area in the 1970s before invasive handling began was 71% (Reich 1981). In 1989 soon after invasive research began in 1988, this had fallen to 56 % (Fuller et.al. 1992, Mills www). Then between 1990-93 pup survival fell dramatically to 25-33% (van Heerden et.al. 1995) coincident with the rapid expansion of invasive handling.

The population decline post 1995 occurred in what had previously been claimed to be a 'stable population' with 71% pup survival (Reich 1981, Maddock & Mills 1994, Woodroffe et.al. 1997).

Between 1989-94 the majority of the KNP wild dog study population was handled in some way and subsequently frequently monitored both from the air (by helicopter) and on the ground . The level of stress induced in individuals in the monitored study packs in KNP is unknown.

### **Handling in KNP included:-**

- i. Biopsy darting of adults and pups
- ii. The anaesthetization of pups (van Heerden et.al. 1995, Girman et.al. 1997).
- iii. Handled individuals in KNP study population were often selectively targeted based on their social status, sex and/or age.
  - a. The alpha pair, if known, in each pack were selected for genetic research sampling either by anaesthetization for blood sampling or skin sampling by biopsy dart (Girman et.al. 1997 and 2001).
  - b. Usually a large adult male was selected for the fitting of heavy (900g.) satellite collars starting in 1989 (Gorman et.al. 1992).

### **Handling Stress and the Kruger population decline**

Immobilization of dominant females (usually the only breeding female in KNP packs), has been shown in captivity to result in considerable stress and repeat immobilization of adult females is thought to have contributed to social unrest in a captive wild dog pack (van Heerden & Kuhne 1985). The effect of multiple handling of free living individuals is unknown.

There is little doubt that darting wild dogs results in an increase in serum cortisol concentrations and the incidences of inter and intra-specific aggression may be an indication that trauma is an important cause of death in the free ranging wild dogs of KNP. It is known that darting of female wild dogs results in considerable stress and highly elevated serum cortisol concentrations (van Heerden et.al.1995).

**Again referring to KNP, "Whatever the cause of trauma, a traumatized dog is one likely to fall prey to another predator"** (van Heerden et.al. 1995).

In KNP the largest single cause of mortality in both adults and pups is lion predation, which accounts for 33% (of 57), known deaths (van Heerden et.al. 1995). Within a week in 1989 of a satellite collar (900g.) being fitted to a large male in a KNP study Pack (containing 18 adults and 21 pups 6 weeks old) 7 pups were killed by lions (Gorman et.al. 1992). The longevity of the 8 individuals in KNP fitted with such devices is not reported but the mortality of 40 dogs over one year old fitted with radio transmitters is 'relatively high' being 35% (Mills 1993).

Stress in the study packs resulting from the 'handling' (including by dart biopsy), of 80 pups and 92 adults including at least 7 alpha females and 7 alpha males ( normally the only breeding individuals in a KNP pack) between 1989-94 (Girman et.al. 1997) has to be considered as a factor likely to be causally associated with the observed change in demography in KNP post 1989 particularly poor pup survival.

The effect of handling on reproductive success in wild dogs is unknown but data from captive and translocated packs suggest that it is considerable (van Heerden & Kuhne 1985, Woodroffe 1997, Hofmeyr 2001).

This 'handling' of, at the very least, 59 % of the adults *and* 65% of the pups between 1989-1/1/94 in the KNP must be considered as possibly causally related to the dramatic falls in pup number from 81 on 1/1/95, to 32 on 1/1/96. The population decline post 1995 occurred in a previously 'stable population', with high (71%) pup survival (Reich 1981, Maddocks & Mills 1994, Woodroffe et.al. 1997).

The levels of 'trauma /stress' induced in individuals (some repeat darted and blood sampled) and their packs in the KNP when almost the entire population was, depending on the 'definition' used, handled in some way between 1989-94 and subsequently located by helicopter and frequently monitored both from the air and on the ground has yet to be established.

**".... the current demography of wild dogs in KNP leads to dynamics that are more prone to collapse"** (Creel et.al. (2004) *Biology & Conservation of Wild Canids*).

This quote relates to the dramatic post-1988 decline in pups survival and 50% decline in the KNP study population in 1995.

**The reason for the demographic changes in KNP is unclear despite intensive handling and monitoring.**

In a statement relating to the period 1989-2000 it is stated that:- "*Litter size was on a par with earlier surveys but pups survival to 10 months had decreased to 34% (56% and 61% in 1989 and 1995 , respectively).* (Mills www.)

Why, given frequent monitoring, did the dramatic decline in pup survival from 71% in 1975-78, to 56% in 1989, to 30% between 1990-93 (Reich 1981, Mills www, van Heerden et.al. 1995) and again from 61% to 34% between 1995-2000 ( Mills www), go unnoticed?

Likewise, why did the dramatic decline in numbers in the study population in the KNP southern district between 1995-2000 of 50% in a population formerly considered to be 'relatively' stable', (Mills www.) only become apparent following a photographic survey?

It is reported that unusual rainfall occurred in the Lowveld during the study period 1990-99 and an hypothesis (Mills www.), suggests that the changes in rainfall could explain the poor pup survival and dramatic KNP population decline between 1995-2000. There is no mention of a 'rainfall problem' from 1990-94 and this hypothesis cannot explain the declines in pup survival between 1989-1990 and again in 1995 and must therefore be considered extremely unlikely.

Might not trauma/stress associated post 1988 with biopsy darting and immobilisation of pups and the various forms of handling of their parents (including 7 alpha males and 7 alpha female) and adult helpers be a significant causal factor in the decline in KNP pup survival post 1988 and hence reflected in the decline in adult numbers between 1995-2000?

**The decline in KNP pup survival data is possibly another example of previously unrecognized yet growing evidence of adverse effects of invasive handling.**