

A Guide to the African Wild Dog

Roger Burrows

This guide includes information on the following topics:-

Names: Evolution:

Social Behaviour: including 'Young Wild Dogs are Top Dog Protocol' and
Transfer of alpha male status to a male from the youngest cohort.

Home Range: Pack Structure: Denning Season: Vocalization: Hunting: Feeding Hierarchy:

Mock Mounting : Dispersal/Emigration: Pack Dissolution/Fission: Aggression :

Invasive Research: Handling -Stress Hypothesis:

And suggests answers to frequently asked questions:-

Why are Wild Dogs so Rare and Endangered?

Do Research Techniques Adversely Affect Wild Dog Study Populations?

NAMES

The African Wild Dog - the most commonly used name for this charismatic animal is somewhat misleading . It is not a domestic dog 'gone wild' but is only found in Africa and is classified by scientists as being member of the family Canidae but is not in the genus *Canis* (to which the domestic dog belongs) and cannot interbreed with the domestic dog or any other members of the genus *Canis*.

The scientific Latin name of the African Wild Dog is '*Lycaon pictus*'- *Lycaon* (the genus) and ***pictus*** (the species) meaning painted. This is sometimes translated as 'Painted Wolf' but that is also misleading as it is not a wolf - it is only a very distant relative of the Grey wolf (*Canis lupus*) and of the domestic dog (*Canis lupus familiaris*) which is a domesticated Grey wolf. Other commonly used names in the literature include 'African Hunting dog', 'Cape Hunting Dog ', 'Painted Hunting Dog ' and in Kiswahili – Mbwa mwitu.

For consistency the species will be referred to here as the 'Wild Dog'

EVOLUTION

The Wild Dog and the wolf did have a common ancestor more than 2 million years ago after which the animals that we now call the Wild Dog and the Grey Wolf followed different genetic/ evolutionary pathways

Wild Dogs are thought to have first appeared about 2-3 million years ago in Africa to which they were and still are confined .

The first 'wolves' to be domesticated (and now known as the domestic dog) were in Asia, from where they spread throughout the world reaching Africa in the company of human immigrants by about 7000 years ago.

It is thought that humans first used 'domesticated wolves' some 1 million years ago in Asia to help them in hunting and in guarding them and their livestock. The wolves that became the first domestic dogs did so because their social behaviour allowed them to accept, not only unrelated wolves, but also humans as their pack 'leaders'. Wild Dogs will only accept the alpha pair in their pack as 'leaders' so they cannot be domesticated

Wild Dog social behaviour with its *'Young Dogs are Top Dog Protocol'* is very different from that of wolves / domestic dogs. and, due to genetic and behavioural differences, Wild Dogs, unlike the Ethiopian Wolf (*Canis simensis*), cannot inter-breed with domestic dogs.

SOCIAL BEHAVIOUR

Wild Dog Social Behaviour is very different to domestic dogs, wolves and other canids.

In wild dog society a probably **unique** protocol in mammal behaviour has been identified in which

'YOUNG WILD DOGS ARE TOP DOGS' and **ALPHA MALE STATUS is TRANSFERRED to a MALE from the YOUNGEST sexually mature COHORT without overt aggression.** .

In each litter of wild dog pups, the dominant or 'alpha' male and female pup in each litter is soon identifiable by their dominant behaviour when feeding - either when suckling or feeding from regurgitated food brought to the den by other pack members for the first 3-4 months of their life, or when older and taken to a kill made by the adults.

If two litters are produced in any one denning season, the first will be by the alpha female followed some days or weeks later by the second litter born to a subordinate female in the pack.

The subordinate's pups have priority of feeding at the kill and the dominant male and female pups of the subordinate's litter are 'top dogs' over the dominant pup of each sex in the alpha female's litter.

This protocol applies *despite* the parents of the subordinate's pups being subordinate to the alpha pair and the subordinate's pups being younger.

MALES

YOUNG MALE IS TOP DOG PROTOCOL in which

ALPHA MALE STATUS is transferred to a MALE from the YOUNGEST sexually mature COHORT, without any overt aggression, following the death of either of the alpha pair.

In wild dog society a probably **unique** protocol has been identified which I have called the '**young male is top dog**' protocol.

Young male wild dogs when still in their natal pack will **only accept the alpha female's mate as alpha male** in the pack and **only whilst the alpha female is still present in the pack** .

If **either** of the alpha pair in their pack dies, the pack will split, the females will leave and a **sexually mature male pup from the youngest cohort present will take over as the alpha male in the all male group and/or in any subsequently formed pack with unrelated females.**

If the former alpha male is the survivor he will remain in the pack as a subordinate.

With social behaviour so very different from that of domestic dogs, wolves and other canids it is not surprising that wild dogs have not been domesticated.

Temporary male alpha status in an all male group-

When a group of sexually mature males are left with young pups following *Pack Dissolution* or adopt 'lost' unrelated male pups from another pack and subsequently join a group of unrelated females to form a new pack, the alpha male in the adult group of males will act as temporary alpha male and breed with the alpha female in the new pack.

However, when the younger 'alpha' male pup is sexually mature he will, without overt aggression, take over as the alpha, i.e. the alpha breeding male in the pack, and mate with the existing unrelated alpha female. The older unrelated alpha male that has relinquished his temporary alpha status stays in the pack together with the other males but now as a non breeding subordinate .

The diverse range of circumstances in which this '*Young Male Protocol*' has been found to operate in free-living packs in contrasting habitats and in captive packs suggests that it is a basic genetically determined behaviour in wild dogs.

FEMALES

Unlike the alpha male, **the Alpha Female Retains her Alpha Status for Life when with her same age sisters and/or her female offspring.**

All female pups accept their mother as their alpha *as long as she is present in their pack or group*. If the pack splits following the death of the alpha male or if the alpha female in the pack is deposed and expelled from her pack by unrelated immigrant females, she and her female relatives will leave their former pack as a single sex group leaving behind any pups .

The Alpha Female retains her alpha status with her female relatives in the emigrating group and so retains her alpha breeding status when they join a group of unrelated males to form a new pack. One or more of her subordinate female relatives/offspring may remain with her and mate with subordinate male (s) in the new pack.

Genetic analysis of samples taken from litters (initially in southern Africa in the early 1990's) **showed that the pups in some litters had different fathers.**

This is **not** evidence that the alpha female mates with more than one male in the pack, it is the result of the alpha female in the pack taking over younger pups from a subordinate female (s). As the alpha female will usually 'take-over' the beta's litter and where the gap between the birth of the alpha and beta litter is short and thus the difference in size of pups negligible, it is easy to assume that all the pups belong to the alpha female but were sired by different males..

There is no evidence that, during the short period of each female's oestrus, they mate with more than one male. During oestrus the alpha female who remains in the pack is closely guarded by the alpha male at all times. However, when the female of a subordinate pair comes into oestrus the subordinate pair leave the immediate vicinity of the den and temporarily form a 'lone pair' living and hunting together away from the rest of their pack They may later rejoin the alpha's pack but only when the subordinate female is about to give birth when again they leave as a 'lone pair'.

With social behaviour so very different from that of domestic dogs, wolves and other canids it is not surprising that the complexity of their behaviour is little understood. .

The genetically determined protocols in both male and female wild dogs obviously have important implications for pack stability, longevity , survival and hence for the conservation, management and particularly for captive breeding and subsequent release of groups of wild dogs of this highly endangered species.

HOME- RANGE

Packs do not actively defend a well defined area of land i.e. they are not strictly 'territorial' if defined as defending a fixed area which is scent marked against intrusion from other members of the same species. If this were the case there would be little chance of any individual or small group of dispersing wild dogs joining existing packs as is often observed..

However, a pack (i.e. a group of wild dogs with a breeding pair) will occupy an ill defined area known as their 'Home -Range ' from which they make occasional long range excursions usually led by young wild dogs in their search for mates, but the alpha pair and their pack return, sometimes minus some dispersing offspring, to their home range for breeding. Wild dog observers often name their study packs after geographic features or land areas or a particularly individual of either sex with a strikingly marked coat.

The size of the home ranges is largely dependent upon the habitat occupied. In open grassland plains habitats such as the 'Serengeti' they can be up to 1,500 sq.km. but in mixed vegetation habitats such as the Selous Game Reserve in southern Tanzania they are between 150 – 850 sq.km.

For 3-5 months of each year when pups are born and raised they remain and hunt in a more restricted area around their den site. When the pups are old enough to join the adults, the pack ranges more widely. Many wild dogs emigrate from their natal pack - known as primary emigration- in single sex groups when 18 months-2 years old , often referred to as 'yearlings', and often travel very long distances searching for mates e.g. from the southern 'Serengeti' plains in Tanzania to areas in and around the Masai Mara National Reserve in Kenya, some 100-120 km to the north.

PACK STRUCTURE

A wild dog pack is a dynamic entity with often rapid fluctuations in pack size and composition.

A 'pack' is defined as a collection of wild dogs of both sexes **containing at least one potential breeding pair**. Single sex 'groups' do not constitute a pack and should not be described as such . The simplest pack consists of a single male and an unrelated female .

The size and composition of a wild dog pack often changes significantly over a 12 month period as pups are born and older wild dogs born in the pack emigrate in single sex groups looking for breeding opportunities. Thus, a successfully breeding wild dog pack is a dynamic entity with often rapid fluctuations in pack size and composition.

Most packs consist of a number of closely related males and a number of adult females unrelated to the males but with the females usually related to one another, often sisters, or sometimes sisters with their mother with the latter the dominant (alpha) female in the group.

Alpha and Beta status

Alpha status – Potential alpha individuals of both sexes in a litter become apparent to observers soon after birth so that when yearlings in single sex groups meet to form a new pack, the alpha female and alpha male of each group bond immediately as the alpha pair and are immediately accepted as such by the other wild dogs. The alpha Male – retains his alpha status only whilst his

alpha female is alive. The alpha female retains her alpha status over both any same age sisters and related younger females for life.

How to identify alpha pair in a wild dog pack – when the alpha female urinates, the alpha male will urinate over (i.e. cover) the same place with his urine raising one or both hind legs to do so. Such behaviour, known as **Raised Leg Urination (RLU)**, is only shown by the alpha wild dogs and is therefore useful in identifying the alpha pair when observers encounter a pack for the first time.

Beta Status – some packs also contain a subordinate, or beta pair usually a same age but subordinate sister of the alpha female and a subordinate male, the latter either a same age or older brother or sometimes the father of the alpha male. **The beta pair may also produce a litter of pups but always after the alpha pair.** Sometimes a subordinate male and female from the same pack will undertake secondary emigration together and can breed successfully even without other wild dogs as 'helpers'. Same age but subordinate sisters of the alpha female may undertake secondary emigration to obtain breeding opportunities with unrelated males. Likewise subordinate same age or older brothers of the alpha male in a pack will also sometimes leave a pack also to find breeding opportunities.

Some packs have a more complex composition as sometimes unrelated young females may first 'shadow' and then may join an existing pack.

These 'new' unrelated females are accepted as pack members by the unrelated males in the pack who view them as potential mates and have been seen in some cases hunting with the 'new' females who have priority at kills. The alpha female in the existing pack will be left with the pups at the den during the hunt and may not be adequately fed by the males on their return.

The existing alpha female will not accept the new females and this results in serious fighting for dominance between the existing alpha female in the pack and the alpha female in the younger, unrelated female immigrant group, but pack males take no part in such fights. If the alpha female in the pack defeats the immigrant alpha female, both combatants often receiving severe bite injuries, then she can maintain her alpha position while the 'new' females are outcasts and will probably leave the area. whilst the males resume normal feeding of pups and their old alpha female.

Adoption of unrelated pups - in other cases a group of adult males will adopt unrelated male pups that they encounter. In this case when the male group meets one or more females, one of the older males becomes alpha for the first breeding season, **but in subsequent years the now sexually mature alpha male pup in the adopted group will take over as alpha male and mate with the existing unrelated alpha female.** The former temporary alpha male remains in the new pack together with the other older males, all as subordinates. **This is a strategy that benefits the alpha female who retains her status and reproductive potential with a younger male** and also benefits the older males who have the security of remaining in a viable pack. and the alpha female has experienced male 'helpers' when raising her next litter with the new young alpha male.

Single sex groups - these result either due to the emigration of usually 18 month to 2 year old wild dogs of both sexes from their natal pack, or the result of an existing pack splitting into single sex groups of adults when one of the alpha wild dogs in a pack dies (see Pack dissolution/Pack fission below). Single sex 'groups' do not constitute a pack and should not be described as such.

PACK DISSOLUTION/PACK FISSION.

If either of the alpha pair dies the pack will split into single sex adult groups, a process known as pack dissolution or pack fission.

If the alpha male dies the other males will usually remain in their former pack's home range. As the young males do not mate with their mother she and the females will leave the pack, often travelling long distances looking for new males, whilst the males remain in the former packs home range and await the arrival of new females. **Thus close in-breeding in free-living packs is unusual.**

If the alpha female dies and the alpha male survives he will lose his alpha status and a male from the youngest cohort (age group) present will take over as alpha male without any overt aggression. The previous alpha male will remain with the other males (and any pups present) as a very subordinate but valuable pack member – he knows the territory, good hunting areas and where to find water and avoid potentially dangerous areas such as woodland areas with high lion populations.

DENNING SEASON

The **time of birth** and rearing of pups, usually occurring once a year, **varies depending on location and habitat**, e.g. woodland or open plains, where the wild dogs live. The mother must have a plentiful supply of locally available water during lactation and the pack needs a good supply of locally available prey near the den site .

In Selous and Ruaha wooded habitats the wild dogs breed in the dry season when prey species are concentrated around the water sources.

In Serengeti the wild dogs breed in the wet season when there are plenty of temporary water supplies and when the wildebeest and other migrant herbivores gather on the plains where they produce their offspring, thus providing a plentiful an easy source of food for wild dogs.

Pups - are usually born once a year. Litter size varies, usually between 4–12 pups.

Pups remain below ground in the den until 3 or 4 weeks old. Then they will begin to emerge to explore , suckle and to feed on meat regurgitated to them by the rest of the pack until they are old enough to be taken to the kill where **pups are given priority of feeding**. The rest of the pack stand back and wait their turn until the pups are finished feeding and so guard the pups and prevent hyaena , lions, jackals or vultures taking over the kill.

In each litter an ‘alpha’ male and female pup in their respective single sex groups soon emerge.

When the pups are about 3 months they are old enough to leave the area of the den and join the pack to roam widely in search of prey but, when the pack hunts, the pups are usually left behind to await a pack member returning to take them to the kill. When they are old enough to keep up with the hunting pack pups have feeding priority at the kills.

Packs with more than one breeding pair -

If there is more than one breeding pair in the pack then the **pups of the alpha pair will be born first. The beta’s pups may be born days or weeks after the alpha female’s pups. The alpha female will often take over the pups of the beta.**

Therefore, it must not be assumed that all the pups belong to the alpha.

Alpha Female 'TAKE-OVER' of Beta Female's pups.

The alpha will sometimes carry the beta's pups to her own den. It is unlikely that this results in harm to the pups and reports that alpha female will deliberately seek out and kill any of beta's pups are ill-founded.

The 'take over' of beta's pups is to the advantage' of the alpha female because she will potentially have more helpers to feed her next year's litter. The gap between birth of alpha and beta litters varies. If the age gap is just a few days or weeks, the beta female will have to suckle both alpha and beta pups and to remain at the den as 'baby sitter' and so have to beg for food from the returning pack after hunting. The natural priority for the pack is to feed any pups present so the beta female has to actively solicit for food to be regurgitated to her. She does so by whining and adopting very submissive postures.

Although the beta female is confined to the alpha's den area at this time it will be her pups that have priority even over the 'alpha's pups when they are later all present together and feed at a 'kill'. It will also be the younger alpha male pup from her litter that would be the potential alpha breeding male when, as yearlings, the combined males from the alpha and beta litters emigrate together to find young females and start a new pack..

Despite claims to the contrary **it is possible for a single pair of wild dogs to raise a litter of pups on their own even when their den is close to an active hyaena den** as recorded in the Serengeti.

VOCALISATION

Wild Dogs do not howl like a wolf nor repeat bark like a domestic dog other than a single, gruff bark when alarmed. Their characteristic vocalisations are a bird-like twittering and a submissive whining and a distinctive plaintive call known as "who call" when alone and separated from their pack or group.

HUNTING

The ritualized pack behaviour or "Wind-up" prior to hunting is often started by a subordinate wild dog which, being lower down in the feeding hierarchy (see below), has probably had less to eat than the others. Such wild dogs will approach resting pack members with ears back and with crouching gait. This generates general excitement and activity in the pack mainly involving submissive behaviour, bird like 'twittering' calls, urination and defecation. Soon all the pack members are involved and the excitement ends when the pack quickly leave their resting area to start a hunt. If the pack has fed well in the previous hunt this new 'hunt' some hours later may simply result in play and exploration or a 'walk about' session rather than a serious hunt.

Young wild dogs start to hunt when they are about 12 months old but do not become expert hunters until they are about 18 months old. It is soon after this that they will need to leave their natal pack to find breeding opportunities of their own.. A single wild dog, even a lactating female, can kill prey up to the size of a male Grant's gazelle on its own but for larger prey (e.g. wildebeest, zebra, giraffe) they usually hunt co-operatively.

Wild dogs can chase at speeds of up to 60 k.p.h.. Hunting usually takes place early in the morning and late in the afternoon when it is cool and they also hunt at night when there is good moonlight.

Wild dogs are able to eat their prey immediately even after a long chase because they have the ability to allow their body temperature to rise and do not need time to recover before they start eating. This ability differs from some other predators (e.g. cheetah), which need a recovery period, during which they 'pant' to reduce their body temperature before being able to feed and by so doing, may lose their kill to scavengers.

Prey species – in Selous and Ruaha – mainly impala. In Serengeti – wildebeest when available during the migration, otherwise Thomson's and Grant's gazelle. Small prey such as Dik-dik are frequent prey in woodlands

FEEDING HIERARCHY

Unlike the behaviour of other carnivores there is no aggression or fighting when wild dogs are feeding at a kill as there is a strictly , probably unique, feeding order observed.

The wild dog (s) which make the kill will eat as much food - usually viscera - as quickly as possible before other members of the pack arrive.

If the pups are too young to go to the kill they are left behind at the den with an adult female as 'baby sitter'. After eating at the kill the other pack members return to the den to feed the pups with regurgitated meat.

Wild dogs can regurgitate 'fresh' i.e. undigested food up to 12 hours after a kill. The pups solicit food to be regurgitated to them by older dogs , as will any adult female who has remained as guardian at the den. Whilst the pups are being fed at the den not only do the yearlings have priority at the kill but they are the most keen and efficient helpers in feeding the pups by bringing food back from the kill and regurgitating it to the pups before returning again to feed at the kill so acting as food conveyors.

Pups have priority at the kill -

After the pups have left the den when about 3-4 months old and can join the rest of the pack at a kill they will be allowed to feed first whilst the rest of the pack stand around guarding them and defending the kill from scavengers. When younger beta pups are also in a pack they have priority even over alpha pups at a kill.

Alpha female and yearlings are the second group to feed with older subordinate adult wild dogs last.

Sometimes the pups will take up to 2 hours to feed on the kill whilst the yearlings and any others in the pack will stand around watching and guarding the kill. When the pups have finished, the 'alpha' pair and the yearlings can feed. Any older subordinate adults are the last to feed on what remains. If the kill is small then by the time the pups and yearlings have finished there may be very little left for the others. If so, those lowest in the feeding hierarchy leave and make another kill.

When the pups are old enough to feed at a kill with the alpha female all older wild dogs stand back and await their turn . This may encourage wild dogs approaching 2 years old, and now lower in the feeding hierarchy, to leave the pack , not only for breeding opportunities but for better access to kills.

Feeding of the beta female following take-over of her pups by the alpha female.

The alpha female in a pack will be the first to produce her pups in any one breeding season. If one or more subordinate females also den in the core range of the pack then these will be born some days or weeks after the alpha's. If the subordinate female(s) den is located near the alpha female's den, she will either carry or lead the younger pups back to her den. She then has the younger pups with her own pups in her den.

There is no good evidence that the alpha female kills the subordinates pups although some may possibly die accidentally while being transported

After the alpha female has taken over all the pups, the beta female is now either excluded from the den or, as has been observed a number of times, she is left behind at the den as 'baby sitter' and forced to suckle both litters of pups.

The lactation period is short and pups soon develop teeth, so suckling the older alpha pups will, depending on the gap between the litters, be an increasingly painful experience for the beta female.

The alpha female is now free to accompany the rest of the pack at a kill

When the pack return from a hunt the beta female solicits for food to be regurgitated to her. If unsuccessful she will have to rely on her mate, the beta male, or leave the den and make a kill herself. It is thought that being low down in the feeding hierarchy is an incentive to the beta pair to leave the pack and set up a another den some small distance from the den of the alpha pair.

Mock Mounting

This must be distinguished from true mounting during sexual activity which only occurs in the short period of each year when adult females are in oestrus.

Mock Mounting may occur when feeding at a kill when one wild dog may be seen to 'mount' another from the rear. This is not sexual activity but an attempt by one to force the other to release food items it is eating or, in the case of pups, to obtain a 'play' object from another.

Mock mounting in wild dogs is usually an attempt by a subordinate to obtain an 'object' from an individual higher in the feeding hierarchy.

DISPERSAL / EMIGRATION OF 'YEARLINGS'

Dispersal / emigration of wild dogs from their natal pack in same sex groups usually occurs when they are aged between 18 months – 3 years old.

When **both** the alpha pair are alive, and a new litter of pups are present, the 'yearlings' (males and females) when aged 18 months – 2 years old must leave their natal pack if they are to have breeding opportunities of their own because they cannot breed with their mother or father or brothers or sisters.

Eventually unrelated yearling groups of the opposite sex will meet up and a new pack is formed.

As the alpha status in pups of both sexes in their litter is determined when still young and is retained, as soon as the unrelated group of young wild dogs of opposite sex meet up to form a new pack, the alpha pair is instantly formed and identifiable (see RLU).

Note: in the case of females dispersing together with their mother (or adoptive mother) after the death of the alpha male, their mother retains her alpha status and so can mate with the new unrelated young alpha male .

AGRESSION - between packs and single sex groups

There is little evidence of 'chivalry' (i.e. overt concern for the welfare of females) in male wild dog behaviour. Males will help to feed the breeding female (s) and her pups in a pack and defend the pack from predators. However, when two packs meet and fighting results it is the females that fight one another, sometimes inflicting serious bite wounds, but the males take no part and do not defend their pack's females from attack by the unrelated females.

Sometimes a group of young dispersing females attack the alpha female in an established pack and, again, the pack males do not interfere. This may be because the attackers in this case are younger females that may displace the mother of the young males born in that pack and would thus give some of the young males in the pack the possibility of immediate breeding opportunities; whilst their father, the former alpha male, and perhaps his subordinate brothers will be able to remain as vital 'helpers' in the new pack from which the former alpha female and her female offspring have been expelled.

Such fights between females can sometimes lead to fatalities. Likewise if a group of emigrating young males encounter a small pack they may attack and displace the alpha male and take over the female(s) in the pack. Older males are sometimes killed during such encounters, or fail to survive alone after being injured.

OTHER FACTS

- 1) There is no authenticated case of a human being attacked by a wild dog. Pups and yearlings however are very curious and will come close to and even shelter in the shade beneath tourist vehicles but will back off if alarmed by sudden movements or noise.
- 2) The **coat pattern of each wild dog is different** so it is possible to identify individuals.
- 3) Wild dogs have only 4 digits on each foot, and no 'dew claw'.
- 4) Weight 18-27Kg. Height 70-75cm. Body Length 75-100cm. Tail Length 30-40cm.
- 5) Lifespan 10 years.
- 6) Females but not males have been known to survive on their own for at least 3 years, one observed hunting and feeding successfully even when in the company of spotted hyaena .

WHY ARE WILD DOGS SO RARE AND ENDANGERED?

Even though :-

- 1) they are very successful lone and co-operative hunters of a wide variety of prey species
- 2) they co-operate as a group in feeding , and defending pups of alpha and often beta, or even lower ranking females and so packs have the ability to rapidly increase their numbers due to their ability to raise large litters .

3) they avoid lions but even in Serengeti there is no data showing lion predation to be a major problem despite unsubstantiated claims to the contrary. They often live in close proximity to spotted hyaena with again little evidence of direct predation by hyaena on wild dog pups or that prey stealing is a major problem.

4) it is frequently reported that wild dogs are particularly vulnerable to canid diseases via contact with domestic dogs, there is **no data basis for this claim**. Wild dogs are no more susceptible to diseases than are other carnivores in their area. However, disease outbreaks in other species have occurred when the local domestic dog population has been experimentally vaccinated against rabies only or vaccinated with a combined mixture of Canine Distemper, Canine Parvovirus and rabies vaccines as around the Serengeti Mara post 1991. The first and only case of Canine Distemper related mortality took place in 2007 in an area to the east of SNP where mass vaccination of local domestic dogs was/is ongoing.

5) they live and thrive in areas with only occasional losses of some wild dogs in some packs, in areas with traditional pastoralists and their largely unvaccinated domestic dogs (e.g. Laikipia-Samburu areas of Kenya). The wild dogs just keep their distance and avoid close contact.

SO WHY ARE WILD DOGS SO RARE ?

1) Loss of habitat:- they naturally live at low densities and need large home ranges and in recent times they have lost large areas of their former habitats as have the local Maasai pastoralists with whom the wild dogs formerly shared the Serengeti plains.

2) Persecution :- until the 1970s they were considered as vermin and persecuted by hunters and even by rangers in Serengeti and some 'conservationists' who carried out extermination campaigns in some National Parks (e.g.. Queen Elizabeth N.P. Uganda). Today they may be persecuted when they go outside the protected areas, especially when they are seen as a threat to domestic livestock .

3) Known causes of significant wild dog mortality are:-

i. Road kills by tourist and other vehicles driven at high speed on main and bush roads particularly after nightfall.

ii Snares set by poachers although not intended for wild dogs

4) Human disturbance at wild dog dens during denning season –

i. Vehicles approaching too close and possibly over the den holes causing collapse

ii. The recent popularity of walking safaris visiting wild dog dens when pups are present is now another factor being linked to poor pup survival. Such disturbance is known to result, in some cases, in pups being moved to other dens and so exposed during transfer either to predation or becoming lost. In woodland areas and dense bush pathways made for human access on foot or in vehicles to dens make den sites obvious (as is also the case with cheetah dens) and so easy access for predators, particularly lions claimed to be a major problem for wild dogs denning in woodland habitats.

5) Invasive Research :-

i. The experimental vaccination of free living wild dogs against rabies in the Serengeti-Mara ecosystem 1988-90 was followed by the **selective extinction of the entire study population** by

mid 1991. An unvaccinated **non study population persisted and persists to date** in adjacent Maasai pastoralist areas outside the protected wildlife conservation areas.

This non-study population not only persisted *outside protected areas* of 'Serengeti' (and so in potential contact with man and domestic dogs claimed - to be the major reservoirs of disease infection in wild dogs) but increased and expanded their range back into parts of the protected Serengeti post 1991 up to the present (May 2012) and survived not only a major Canine Distemper epidemic 1993-94 affecting wildlife species in Serengeti-Mara, but also survived during a rabies epidemic of International importance in domestic dogs, other livestock and some wildlife species outside the protected areas from late 2002 -05.

This unvaccinated non-study population of wild dogs survived these epidemics but local domestic dogs vaccinated against rabies, canine distemper and parvovirus, died.

ii) Anaesthetization/ Radio-collaring/ Blood sampling Between 1986-90, 6 study packs in the Serengeti sector of the ecosystem died out within 4 months of a radio-collaring event. In all cases the wild dog(s) anaesthetized and radio-collared were in a pack formed post dispersal /emigration i.e. they were not in their natal pack.

In the only sample obtained, rabies was confirmed in an unvaccinated but recently radio-collared young subordinate female who had recently produced a litter of pups , but there was no general rabies problem and wild dog packs, and other wildlife, in adjacent or overlapping home ranges, were not affected . The empty collar of this female was recovered and rabies was confirmed in the carcass of another young female from the same pack that was located being eaten by a group of the pups born earlier in the year.

HANDLING STRESS-HYPOTHESIS (Burrows, 'Nature' 1992)

Many mammalian species carry latent viruses, including rabies, which can be reactivated by stress in some cases . Handling-induced stress, as measured by highly elevated peripheral serum cortisol concentrations, results from immobilization of captive wild dogs (van Heerden & Kuhn 1985). Corticosteroids tend to inhibit the body defences, which prevent latent infections becoming apparent (Kaplan,C., 1977) . This stress mechanism perhaps reactivates rabies virus latent in ' handled' carrier wild dogs with the disease spreading within but not between, the widely separated packs, by oral social contact.

Losses of all packs after vaccination, together with sporadic pack deaths after collaring, could be explained by this hypothesis, as any carrier wild dog(s) would be 'hit' during whole pack vaccination but only selected by chance for radio-collaring.

It is possible that rabies virus persists in wild dogs in a normal host-parasite relationship (Carey & McLean, 1983, May, 1986) with some naturally immune individuals.

Serum samples taken up to 2 years before vaccination showed that packs had been exposed to rabies with some individuals carrying significant, possibly protective levels of rabies - neutralizing antibody (Gascoyne et al 1993)

This stable system could be disrupted by handling-induced stress in some individuals, resulting in early death (Soave, 1964) of wild dogs in packs, and vaccine-induced delay (Haig, 1977) in emergence of rabies in the vaccinated packs.

TO WHAT EXTENT DO INVASIVE RESEARCH TECHNIQUES ADVERSELY AFFECT WILD DOG STUDY POPULATIONS?

In Serengeti-Mara - a statistically significant correlation has been found between invasive 'handling' of wild dogs and reduced longevity in Serengeti-Mara following the introduction of routine blood sampling and radio-collaring of study packs and groups post 1985.

The extinction of the entire study population in both sectors of the ecosystem followed mass experimental rabies vaccination of the study packs in 1989-90. The only confirmed cause of death was rabies.

In Kruger National Park - a dramatic population decline took place between 1995 - 2005 in the most intensively studied only free-living population of wild dogs in South Africa. In 1995 there were reported to be 157 wild dogs in 12 packs by 2005, when intensive invasive research is claimed to have ceased the population had declined to just 45 in 8 packs an all time low since observations had begun in 1989.

The decline post 1995 was during a period of particularly intensive invasive 'handling' of both adults and pups for radio collaring and implants and for blood and tissue sampling for genetic research

The results of a recent photographic demographic survey to determine numbers present in 2008-9 reports that there are now some 84 wild dogs in the Kruger National Park., indicating a recovery in the population following cessation of intensive invasive 'handling'.

In Selous Game Reserve - In Selous males, particularly older large males, so probably including a high proportion of alpha males, but few females, were selected for radio-collaring and blood sampling. In this study it is claimed that in a typical mating period several males suffered bite wounds on the face and neck but no injuries observed due to fighting over food.

It is also reported that alpha male status in a pack changed as often as three times a year but alpha females were replaced less often usually after being evicted from a pack by immigrant females.

Such frequent changes in alpha male status within a pack has not been reported in any other wild dog study population including Serengeti where wild dog behavioural research began in mid 1960. The highly unusual aggressive behaviour and changes in alpha status, claimed to occur in Selous study packs, is not reported to occur in any other study population in Africa.

However, it is well known that alpha wild dogs can lose their status following injuries in inter-pack clashes or following wounds after being caught in snares or injured in traffic accidents. A possibility is that the physical 'handling' of alpha males (and females) precipitates aggression directed towards the recently 'handled' individuals. This perhaps results from changes in their physical appearance following the attachment of a large radio collar, with or without an external aerial, and loss of the wild dog's 'natural' scent now replaced with 'foreign' smells of humans and their chemicals.

Question:- Were the claimed frequent change in alpha status and associated injuries observed amongst the males in Selous packs the result of handling induced physical harassment /aggression towards these alpha wild dogs?

The possibility is that handled alpha wild dogs lose their high social status after being selected for radio-collaring and blood sampling by researchers. As a pack's longevity is dependent on the survival of both of the founding alpha wild dogs the loss of one and the resulting Pack Dissolution that would follow could explain the very short life of individual study packs and the low pup survival as in Kruger National Park.

This possibility has not been investigated by researchers using highly invasive ' tools' on one of the most highly endangered and charismatic species of canid in Africa.

'The adverse effects of tagging may be subtle and important, although difficult to detect' (Tuytens Macdonald & Raddam (2003))

' . the resolution of one question remains imperfectly ragged, despite exhaustive attention, and that is whether handling or vaccinating wild dogs had inadvertently contributed to their demise in the Serengeti-Mara ecosystem' (David Macdonald, Chair of the Canid Specialist Group, in Preface to: - IUCN, Species Survival Commission, Canid Specialist Group (CSG), Status Survey & Conservation Action Plan, 'The African Wild Dog' (Woodroffe et.al.1997)).

"It is likely. that in many studies any adverse effects [of handling] are either unnoticed, perhaps because they are rare, or, more likely, because they are not reported" (Laurenson 1992).

" from our results and PVA models presented previously (Burrows et al 1995 ,Ginsberg et al 1995b), it is difficult to determine whether the extinction of the Serengeti wild dog population is more likely to be due to chance alone (Ginsberg et al 1995b) or to invasive research methods