

African wild dog Conservation in Namibia

Phase 1 Final Report

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Introduction

Background to African wild dogs:

The African wild dog (*Lycaon pictus*), like many charismatic carnivores, heads the food chain, needs large home ranges and requires careful landscape-level management. Protected areas in isolation of surrounding landscapes are rarely large enough to secure their long-term conservation. African wild dog conservation is thus, in many respects, a microcosm of biodiversity conservation as a whole. Many classic examples of conservation biology challenges are epitomised by wild dogs. Problems of reintroductions, management, park-neighbour management and co-management, behavioural ecology and policy can all use the African wild dog for basic test cases. If we can sort out complex wild dog conservation, we are bound to solve problems for other taxa (ZSL, 2002).

In terms of species lists and classification schemes wild dogs are often classified in the following categories (Gittleman *et al*, 2001):

- ∅ Indicator species that reflect critical environmental alteration;
- ∅ Umbrella species that require large home ranges, thus if protected, will protect species;
- ∅ Flagship species that are popular and attract much interest;
- ∅ Endangered species that are most likely to become extinct (IUCN, 2004).

The documentation surrounding the wild dogs' decline over the past three decades is extensive. Even though listed as Endangered by the World Conservation Union since 1977 and protected under law throughout most of their range the population continues to decline. Today between 3000-5000 animals remain in perhaps 14 countries from a previous distribution across at least 39 countries (Woodroffe *et al*; 1997).

While protected areas represent an essential core component for landscape conservation, they are commonly too small to maintain viable population of such wide-ranging carnivores in the long term, and are always surrounded by areas in which carnivores and human must share access to natural resources. Competition with humans for resources always arouses strong reactions in the communities living with these top predators. The extensive ranging ecology of wild dogs often brings packs into contact with communities beyond the borders of parks and into land taken over for livestock farming. Thus even normally protected populations are subject to road kills, disease contracted from domestic dogs and depletion of wild prey (IUCN, 2004). Like other large predators, they occasionally kill livestock under some circumstances, and have been shot, snared and poisoned in most livestock areas irrespective of legal protection (Woodroffe *et al*; 1997). The impact of source-sink dynamics (edge effects), though poorly researched for the wild dog, is increasingly considered to be a significant threat to the continued existence of the African wild dog.



Figure 1. Past and present distribution of wild dogs. Light green areas show historical distribution; dark green areas show their approximate distribution (Woodroffe *et al*; 1997).

Although Namibia contains one of only 6-7 remaining viable populations, conservation support is limited.

The African wild dog in Namibia:

Historical records indicate that the wild dog was once present in all regions and habitats, even venturing into desert areas during periods of good rains, likely following the herds of migrating game. In the past 80 years that range has been vastly reduced, with indications suggesting a correlation with the expansion of the human population and associated conversion of land use into livestock farming (Lines & Metzger *in prep*). Now only the isolated northeast of the country contains a population that is thought to be viable. Scattered sightings of individuals and small packs/dispersal groups upto 500km to the south and west of the core population (Stander 2004), demonstrate the extraordinary ranging ability of the species. Quite whether this represents dispersals from our core population or dogs moving down from Angola or across from Botswana remains an unanswered question.

It is estimated that between 300-600 individuals live in the isolated northeast of Namibia (Figure 3) where only 5% of their range is within protected areas (Stander, 2004). The African wild dog is considered to be Namibia's most endangered mammal species (Griffin, MET Biodiversity Task Force, *pers comm.*).

Transboundary movement to Botswana (and likely Angola, Zambia and Zimbabwe) also occurs with pack ranges exceeding 3000km² compared to an average of 700km² for 5 other study sites across East and Southern Africa (Woodroffe *et al*, 1997).

The African wild dog has received the least research and conservation attention of all large carnivores in Namibia and very little is known about their population status, ecology and impact of conservation threats in this vast semi-arid system.

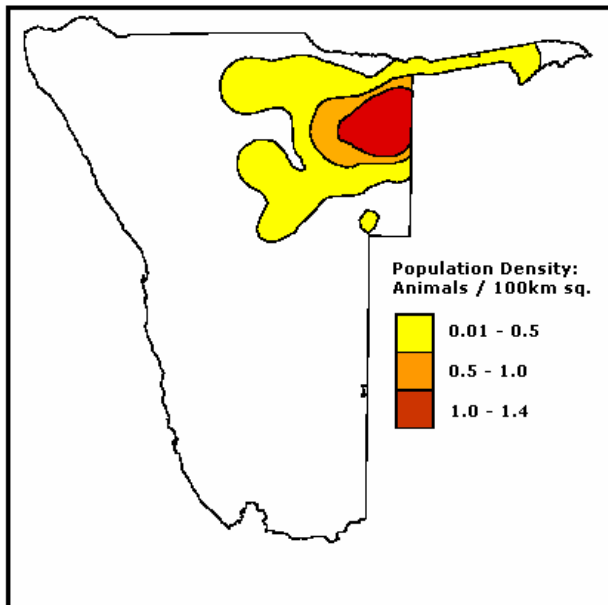


Figure 2: Current density/distribution in Namibia (Stander, 2004).

Significant natural fluctuations in the wild dog population make accurate population estimates for large undeveloped areas almost impossible. Nonetheless, since the start of the WDP reporting of wild dog sightings has increased by 300% over both study areas, nonetheless reliable monitoring systems within both MET and local communities are absent and amending this situation is critical to effective conservation planning.

Namibian Wild dog Project and National CBNRM Programme

The Namibian Wild dog Project (WDP) in the eastern communal lands of Namibia has its origins in the communal cattle and small-stock farming Herero communities of Okakarara district. This area is part of the central Kalahari ecosystem, a semi-arid savanna with no perennial surface water.

People and their livestock are restricted to the western areas with boreholes and pipelines, and to the few ephemeral drainage lines that flow eastwards towards the Okavango system in Botswana. Large areas in the east are uninhabited or with very low population density (mean <math><0.5\text{km}^2</math>). This area supports a significant population of wild dogs.

The WDPs' aim is to better understand the interactions between wild dogs and humans and to mitigate conflict and other threats to national wild dog conservation. The WDP looks to link social and ecological approaches to conservation, working closely with people - ultimately trying to find ways of optimising benefits from wild dogs through tourism, while understanding their ecology and conservation threats within the actual and potential conflict zone.

Mission:

The WDP, supported by the Ministry of Environment and Tourism (MET), aims to ensure, in the long-term, a viable, free-ranging and secure population of wild dogs, as a component of wildlife based land-use through sustainable management practices, for the benefit of all Namibians.

This project has strong support from the communal communities in eastern Namibia. Human-wild dog conflict is amongst their top priority issues. Project support is endorsed by the registered conservancies in Otjozondjupa and is conducted in close collaboration with, in support of, and supported by the National Community-Based Natural Resource Management (CBNRM) programme. The communal conservancies don't only see wild dogs as a problem, but an opportunity to improve people's livelihoods.

This programme, through national policy and recent legislative reform, works to create incentives for communal farmers to conserve, manage and benefit from wildlife and tourism. The programme has three broad objectives:

- Ø To rebuild and sustainably manage wildlife and other indigenous biodiversity;
- Ø Generate income, diversify and improved livelihoods for communal farmers;
- Ø Empower and build capacity for management and development skills, to help poor rural people break out of rural poverty and pro-actively determine their own futures.

Part of the CBNRM programme involves extensive and ongoing consultations with community members, traditional authorities (chiefs and headmen), elected Councilors, government employees (e.g. Ministry of Environment, Ministry of Agriculture), etc. Arising from these consultations in the Otjozondjupa region, it became clear that one of the main problems being faced by communal farmers was that of predation of their stock by large predators. The most significant predator by far in this area was believed to be the wild dog.

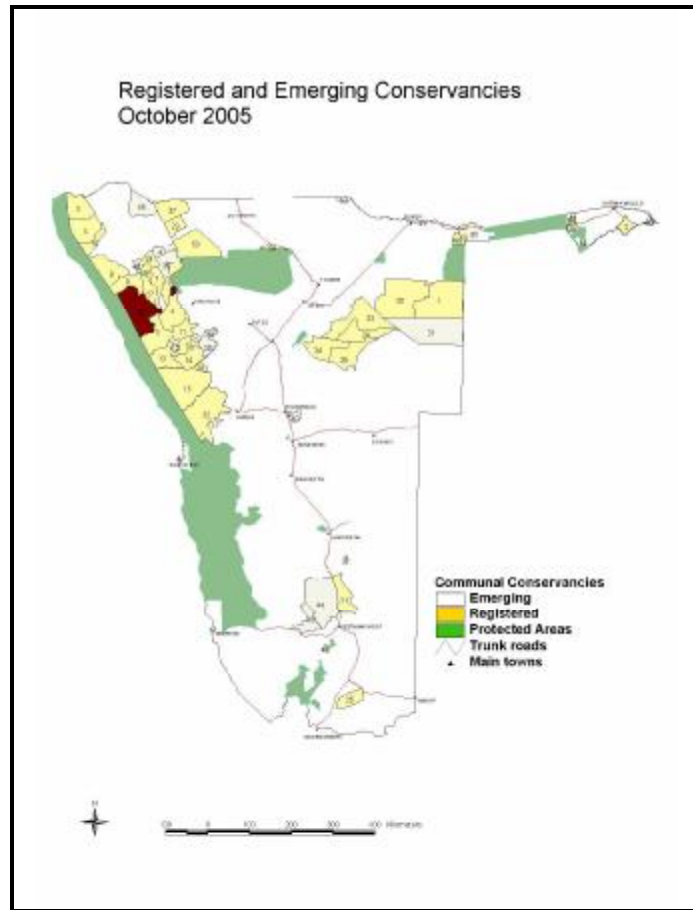


Figure 3: Land under conservation management in Namibia.

Currently there are 34 registered communal conservancies in Namibia covering >100,000km². This represents >13% of Namibia's' surface area. In context Namibia also has 14% of its landmass under protected area status and a further 5% under freehold Conservancies bring the total land surface under conservation management to >30% (NACSO, 2005).

Large areas under conservation management are the key to wild dog viability in Namibia and elsewhere.

Study Area

(adapted from Mendelsohn & Obeid, 2002)

Environmental characteristics:

Otjozondjupa Region in the northeast of Namibia is situated at the western edge of the Kalahari Basin. As such, most the area is covered by windblown sand and is generally flat – varying between 1400m ASL in the southwest to 1000m ASL in the east. Drainage lines flow east towards the Okavango Delta 100km to the east of the international border. Rain falls mainly in January and February varying from 350mm in the south to 450mm in the northern areas. Sporadic rainfall and high evaporation rates (upto 2,000mm annually) impact significantly on the vegetation types. Kalahari sands are dominated by woodlands, which are tall and broad-leafed in the higher rainfall areas, becoming progressively shorter and characterized more by shrubs and thorny species to the south. Dominant species include *Burkea africana*, *Commiphora africana*, *Terminalia sericea* and *Grewia spp.* Greatest plant diversity is matched by that of other phylum in areas of highest rainfall. Desertification, predominantly in the form of bush encroachment to the south and west, has occurred in many areas where pressure on grazing from intensive livestock farming is high.

The human element:

The total population in 2001 was 50,600, having grown by 2.6% pa since 1991. More than a third of all people live in towns. Almost half of the population is below 15 and the population density is extremely variable, with about 89% of the region being uninhabited. Approximately 7,000 San and 70,000 Herero people occupy this region.

Land and economy:

Land uses and the regions economy are dominated by farming, especially Herero cattle ranching where very large areas are fenced off as exclusive farms. Crop farming is seldom productive, and subsistence farming difficult. Livestock numbers consist of approximately 300,000 cattle and 180,000 sheep and goats combined. These livestock are restricted to areas where water is available. Livestock farming in the San areas (Tsumkwe District) is minimal with many of the inhabitants still relying on the vestiges of their hunter-gathering heritage together with seasonally available food aid. Income generated from wildlife dominates these areas but many of Namibia's poorest people live here.

Okakarara District study site: Human-wild dog conflict zone.

Okakarara District (E17.5^o-19^o, S20^o-21.5^o) covers an area of 18,951km² and contains a population of c.21,000 people dominated by the livestock farming Herero communities. Language is uniform within this Herero community. The area is bordered to the northwest, west and southwest by fenced commercial land, both game and livestock farming. Conflict with predators is believed to be a significant factor affecting the viability of the wild dog population in this and adjacent area. This site is also part of the National CBNRM programme and there are 4 registered communal conservancies within the boundaries of the district. Tourism is very low in this area and the vast majority of income is generated from live sales of cattle. Wildlife numbers and low in areas close to human habitation, although small ungulate species such as common duiker and steenbok are present in larger numbers (Lines, 2003a).

Tsumkwe District study site: Non-conflict zone.

The second site centers around Nyae Nyae conservancy in the east of Tsumkwe District (E19°-21°, S19°-20°) covering an area of 8,900km² and containing a population of c.3,000 predominantly San bushmen of the Ju[^]Hoansi group. Traditional hunter-gathering remains the mainstay of local livelihoods with limited tourism income from sales of locally produced jewelry and camping fees. Significant revenue from safari hunting provides the community with means to fund small-scale development projects through the conservancy management with the assistance of external NGOs. Wildlife utilisation is seen as the best option for long-term development. Livestock farming is on the increase but stocking rates remain low and centered around approximately 30-35 semi-permanent villages. Game populations have stabilized in recent years and are now on the increase with good numbers of kudu, wildebeest, springbok, duiker and steenbok – all considered suitable prey species for wild dogs.

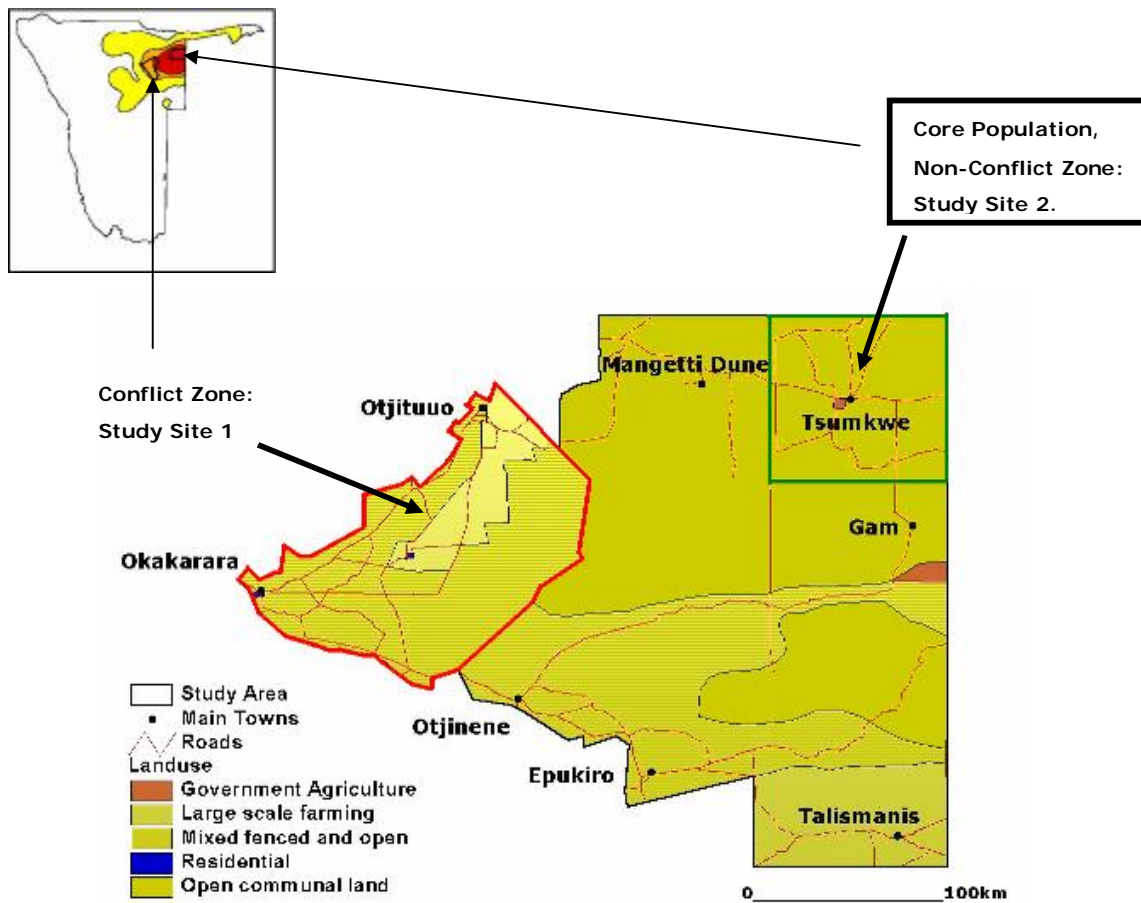


Figure 4: Conflict and non-conflict study sites

Objectives & Outcomes

OVERVIEW

Effective conservation of any species depends upon correctly identifying the threatening processes which cause decline or hinder recovery. Only by identifying these threats can the most appropriate conservation activities be determined (Caughley, 1994) and implemented. Past debate and research on threats to the wild dog (Woodroffe *et al.*, 1997b) provided grounding for developing research priorities for the WDP. While it was recognised that threats are dynamic (Ginsberg, J.R. & Woodroffe, R. 1997a) only long-term research and monitoring can assess the impact of existing threats and identify new threats that might emerge while determining whether old threats are still relevant (Woodroffe 2000; Woodroffe *et al.*, 1998, 1999a).

While the ultimate threat to wild dogs is from destruction and fragmentation of wildlife-friendly habitat, associated with human encroachment, effectively conserving wild dogs within such landscapes demands insights into the proximate threats that undermine the viability of remaining wild dog populations (Woodroffe 2000; Woodroffe *et al.*, 1998, 1999a).

But, just because a factor causes mortality does not mean that it is a threat. All animals have to die of *some* cause, and factors which cause mortality, even if they are anthropogenic, may have no effect on population viability if they simply kill animals that would otherwise have died of other causes. Also, because causes of mortality vary from place to place, conclusions will be influenced by the locations where wild dogs are under study. For example, it would not be possible to extrapolate threats to wild dogs outside protected areas on the basis of causes of mortality measured in the interior of a large reserve (IUCN, 2004).

RESEARCH ON HUMAN-WILD DOG CONFLICT IN FARMING COMMUNITIES

Background

Given the long tradition of wild dog persecution, it is important to ask what the reasons are behind human-wild dog conflict. Although in recent times public perception of wild dogs has improved, historically the majority of people held negative views towards them, handing these views down through generations and via migrations (Sillero-Zubiri & Switzer 2004). Interestingly many perceptions in local communities support wild dog conservation. Wild dog kills are seen as a useful source of meat for the Shona communities in Zimbabwe (Rasmussen, *pers comms*) and the San communities in Namibia (Lines, *pers obs*). The Masai of East Africa regard them as assets as prey on wildebeest which compete for grazing with their cattle (Sillero-Zubiri & Switzer 2004).

Although myths, folklore and legends profess tales of wild dogs killing people there are no confirmed records of such incidents. Where attacks have happened it is probably due to an individual rabid animal in 'furious' phase, attacking people repeatedly during the short period that they survive. With the reduction of rabies these rare incidents have dropped dramatically and are now seldom ever reported (Linnell *et al.*, 2000).

Ever since the earliest periods of herding livestock many carnivores have been persecuted for their role as predators of domesticated livestock. Policies to reduce wild dog populations in an attempt to safeguard livestock or game populations existed within our generation but expenditure on such policies often outstripped the cost of depredation. While depredation is nearly always overstated (Pringle, 1977), predation of livestock and valuable farmed game is nonetheless a reality, often spread out unevenly throughout the farming community, with a few individuals bearing the brunt of the financial damage. Deliberate killing of wild dogs – often illegal – is an important cause of mortality, especially outside protected areas. One reason for this lethal control is that in many areas wild dogs are perceived to be serious predators of valuable livestock and game species and are killed either in response to depredation or with the intention of preventing it. It was partly for this reason that colonial governments often considered wild dogs to be 'vermin' and sponsored their eradication from many areas (Fanshawe *et al.*, 1991).

Livestock and game farming, both for commerce and subsistence, is the major land use across much of Africa and livestock often share the landscape with wildlife or occupy areas immediately adjoining reserves. This has two implications for wild dog conservation. First, it may mean that wild dogs inhabiting protected areas become involved in conflicts with neighboring farmers, risking being shot, speared or poisoned as predators (or perceived predators) of livestock and game, and potentially undermining population viability. Second, it may mean that, if conflicts can be resolved, large areas of land dedicated to commercial or subsistence livestock farming have the potential to support globally important populations of wild dogs in the long term. Hence, resolving conflicts with farmers is a high priority for wild dog conservation (IUCN, 2004).

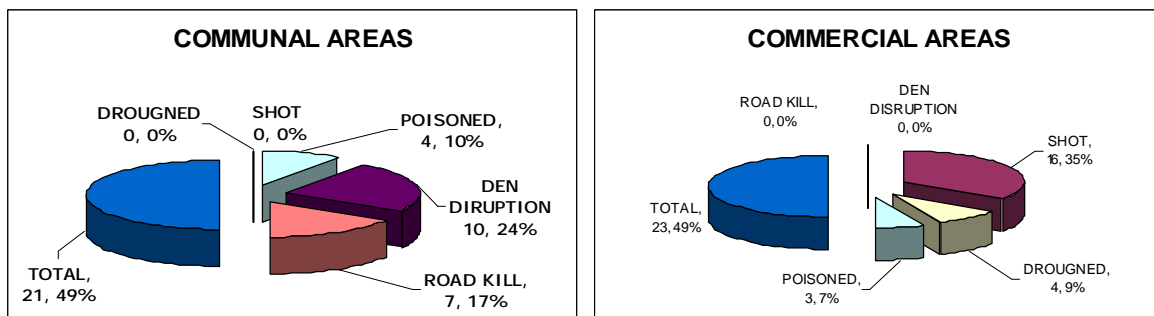


Figure 5: Confirmed wild dog deaths in Namibia (2003-5).

Okakarara District - Conflict Study Site: Results (Summarized from Lines, 2003a)

While historical record keeping at both community and MET level can only be considered sporadic at best, the 2002/3 Communal Farm Survey derived some significant findings that have become the basis of a local human-wild dog mitigation strategy in partnership with local stakeholder groups. Key results are summarized below:

1. Livestock Predation:

- Ø Predation by all carnivores on cattle only 15% of total losses;
- Ø Wild dog accounting for 1 in 6 cattle losses and 0.6% of small stock losses;
- Ø For every cattle loss to wild dogs 30 are stolen;
- Ø Losses to wild dogs spatially skewed to disproportionately effect a few farmers;
- Ø Stock theft, poisonous plants, birthing problems, injuries and drought are all more significant loss causes than predators;

	Total Livestock Numbers	Average Herd Size/ Homestead	Total Losses	Average Losses / Homestead	Average lost to Predators	Average losses to Wild dogs
Small stock	5757	68.5	1823	21.7	5.6	0.03
Large stock	6842	81.5	1053	12.5	2.0	0.3

Table 1: Livestock Numbers & Losses at Homestead Level (2002/3).

2. Community attitudes and perceptions:

- Ø >80% of community want wild dog populations to decline (70% for all predators);
- Ø Wild dogs (and all predators in general) believed to have larger impact on livestock than reality;
- Ø Predators represent the greatest deviation in perceived threat to actual loss for all loss causes.

3. Human depredation of wild dogs very hard to collect but:

- Ø Outside denning periods little success killing wild dogs which become very illusive if harassed, even semi-nocturnal;
- Ø The absence of good transport, communication and firearms in these areas undoubtedly reduces the effective depredation rates;
- Ø Farmers chase wild dogs on horseback but chases limited to fence lines;
- Ø Two recorded incidents of deliberate road kills (6 deaths);
- Ø Three known incidents of dens excavated/smoked out and water sources poisoned with unknown adult/pup mortality*.

[*7 pups buried alive but recovered by conservancy member and relocated to AfriCat Foundation where 6 now alive and well indicating change in attitude between farming community and supporting NGOs.]

Tsumkwe District (Nyae Nyae Conservancy) Non-Conflict Study Site: Results

Historical record keeping at both community and MET level significantly better than in Okakarara District due to Event Book System – a Natural Resource Monitoring Programme initiated when Nyae Nyae Conservancy registered in 1995. Nonetheless records are only available for predation of livestock, not other causes.

1. Livestock Predation, Villages 2004/5:

- Ø 4 incidents of predation by all carnivores on cattle, none to wild dogs;
- Ø 51 incidents of predation by all carnivores on small stock, none to wild dogs.

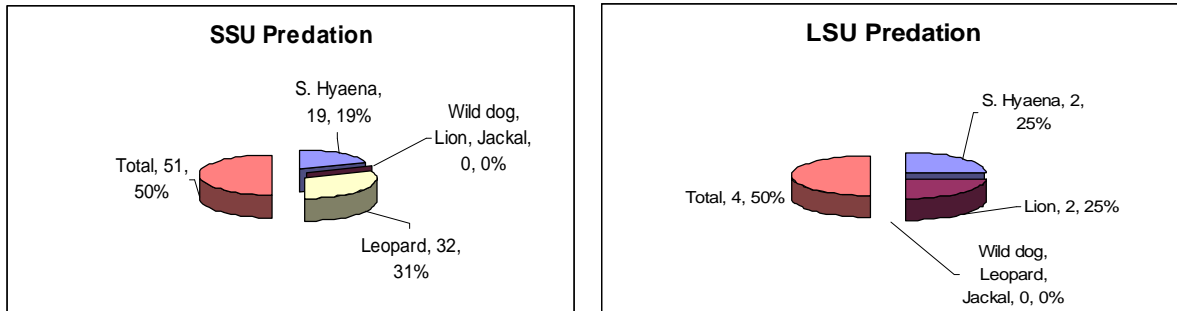


Figure 6: Small and large stock predation by carnivores in Nyae Nyae (2004/5)

SSU = small stock units = sheep & goats, LSU= large stock units = cattle

1.1 Livestock Loss, Agricultural Farm 2004/5:

- Ø Only 1 large commercial livestock farm in Nyae Nyae;
- Ø Records only kept for cattle;
- Ø Wild dogs recorded breeding within farm boundaries in 2005;
- Ø No losses to wild dogs (only 3 records of losses to wild dogs since 1987).

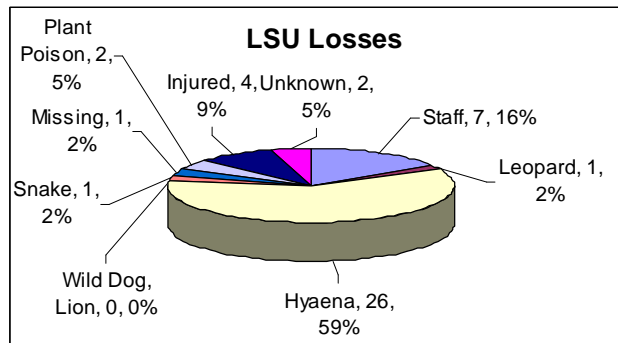


Figure 7: Cattle Losses in Agricultural Farm, Nyae Nyae (2004/5)

2. Community attitudes and perceptions:

- Ø 37 villages interviewed without single negative comment about wild dogs;
- Ø Wild dogs widely seen as beneficial as can be driven off kills, providing easy access to protein for hunter-gathering community;

3. Human depredation of wild dogs:

- Ø No incidents of local community killing wild dogs in 2004/5;
- Ø No incidents of Agricultural Farm staff deliberately killing wild dogs since 1987;
- Ø Three records of wild dog deaths since 1992:
 - § 2 adults and 5 pups hit by vehicles on main road (two incidents);
 - § 1 adults snared.

By mapping these conflict/non-conflict settlements across land use, in relation to the latest data available from the Carnivore Atlas (Stander, 2004) on wild dog density/distribution, it is clear that a close correlation exists between areas of higher wild dog density and areas of more intensive livestock farming. Large areas to the east of Okakarara District have very low conflict settlement density and therefore potentially provide suitable habitat for wild dogs beyond their core area in Tsumkwe District. But detailed ecological data in these isolated areas is deficient.

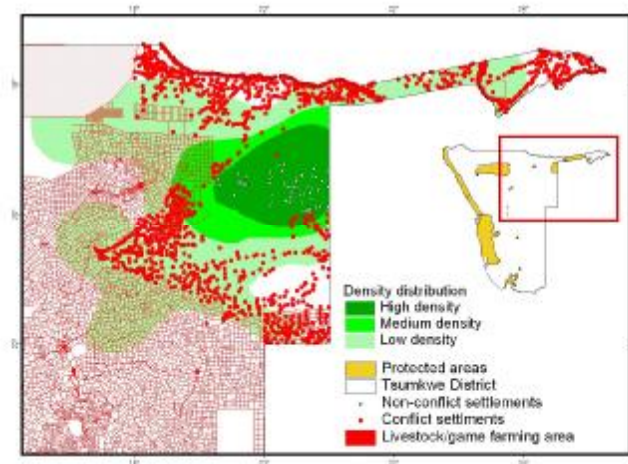


Figure 8: Farming settlements in relation to wild dog density/distribution.

Tracking and capturing harassed, free-ranging wild dogs through fenced farmlands, both communal and commercial, remains an illusive goal under current circumstances. Thus to gain a better understanding of conflict in these areas, the level of human-induced depredation and impact on population viability, it will be necessary to utilize more resources to collar and monitor packs from unfenced, non-conflict areas that range into the conflict areas.

OTHER FACTORS AFFECTING WILD DOG CONSERVATION

Population and Ranging Ecology:

Wild dog populations are known to fluctuate significantly, even when largely unaffected by human-induced depredation, the major cause of population decline across Africa (Woodroffe *et al.*, 1997, Creel & Creel 2002). Accurate measures of density are notoriously hard to establish and data from open systems and farmlands is conspicuously absent from literature. Nonetheless data from seven study sites (e.g. Mills & Maddock, 1994; Creel & Creel, 1995, 1996; Frame *et al.*, 1979; Laurenson *et al.*, 1990) indicates densities ranging from 0.67-4.0 wild dog / 100km².

Preliminary data from Okakarara District, largely based on sightings reports and local knowledge, indicated the presence of 50-100 wild dogs in 5-6 packs (plus dispersal units) in an area of c.19,000km² giving a density of 0.26 – 0.52 wild dogs / 100km². The coarseness of this estimate is acknowledged and it is not believed that the resources will become available to refine this estimate further for some time. By comparison the Carnivore Atlas estimated densities in the area ranging from 0.01-0.5 wild dogs / 100km².

Following a second denning season in Nyae Nyae we have been able to positively identify 4 packs totaling 35 adults (2,5,9,19) excluding pups. There are possibly another 10 dogs in dispersal units but it is apparent that packs will split and reform so extensive research will be required to further understand this phenomena and refine the estimates further. As with Okakarara District dogs are moving in and out of study areas with freedom. A *minimum* density of 0.5 wild dogs/100km² is attained for the 8,900km² of Nyae Nyae Conservancy. This figure compares with an estimate for 0.5-1.4 wild dogs/100km² from the Carnivore Atlas (Stander, 2004).

Previous research in Nyae Nyae and Kaudom National Park to adjacent to the north (Stander, 1994) indicated ranging ecology far in excess of any data yet presented from other study populations (mean >3000km²; range=1800-4200km²; n=4 packs). To date the range of the only currently collared pack during the denning period is 125km². Ranging ecology changes by at least an order of magnitude once the pups gain mobility and dens are abandoned so this figure will increase dramatically.

Diet and availability of wild prey:

Scats have been collected in Nyae Nyae conservancy. To date, microscopic analysis of hair scale patterns, in collaboration with Cheetah Conservation Fund, indicates diversity of prey species but cannot accurately indicate proportions of prey in diet without knowledge of prey species passage rates through the dogs. So data regarding confirmed kills and hunts with unknown outcomes has also been collected.

Prey Species	% presence in scat (n=173)	% confirmed kills (n=10)	% Observed hunts (n=4)
Kudu	3.8	50	75
Steenbok	34.6	10	0
Common Duiker	57.7	40	25
Rabbit	3.8	0	0
Total	100	100	100

Table 2: Analysis of wild dog diet and prey selection.

Baseline presence/absence and relative abundance data on a suite of game species was collected in Okakarara District during the 2002/3 Communal Farm Survey. Indicators suggest a significant reduction in all game species adjacent to human habitation, with the notable exclusion of steenbok that can be considered locally common. This data is being used by the CBNRM programme facilitators in Okakarara District to further develop a monitoring system for wildlife in the recently registered 4 conservancies that make up the District.

A long-term arial monitoring programme of game density and distribution in Nyae Nyae conservancy has revealed steadily increasing populations of ungulate species for the past 8 years, augmented by introductions of kudu, oryx, hartebeest, wildebeest and springbok. A road strip count of small ungulates (duiker and steenbok) did not take place in 2005 and will be conducted in collaboration with MET staff and students from the Polytechnic throughout 2006.

Competition with other large carnivores:

Accurate measures of large carnivore density rely on identification of known individuals, their grouping and ranging ecology which is very resource intensive and hence costly (Schaller, 1972). Furthermore, these techniques do not allow for future monitoring of population trends.

Lion remain largely absent from both the Okakarara and Nyae Nyae study sites. Sporadic sightings of sub-adult and adults males in Nyae Nyae correlate with nomadic populations in areas of lower prey biomass and increased conflict with local communities. Current density in Nyae Nyae is estimated at <0.1 lions/100km² in comparison with 1.2-1.7 lion / 100km² in Kaudom NP. Lion density in Okakarara is expected to be below 0.01 lion / 100km² – locally absent.

Spotted Hyaena numbers are certain to have increased with the reduction of competition from lion since persecution and a reduction in prey species occurred in the 90's. Previous research indicated a density of 1.3-2.3 hyaena / 100km² for Nyae Nyae. This data needs updating.

Accurate figures for spotted hyena in Okakarara District are unavailable as the local community was unwilling to support acoustic sampling methods they believed would draw in lion to the farming areas. Nevertheless interviews with the farming communities indicated low densities of hyena. No incidents of farmers killing hyena were recorded.

Implication of disease for the viability of wild dogs in Namibia

Disease has potentially a significant impact on the viability of wild dog populations. Wild dogs are known to be susceptible to a number of infectious diseases and their social behaviour facilitates the transmission of infectious pathogens among individuals (Laurenson *et al.*, 2004). The infection of one pack member may therefore rapidly affect the whole pack and may thus result in catastrophic losses. It is confirmed that an outbreak of infectious disease has contributed to the extinction of at least one wild dog population in East Africa (Kat *et al.*, 1995; Woodroffe *et al.*, 2004). Likewise, although there are so far no data on disease outbreaks and associated mortalities in wild dogs, apart from some historical records (Gaerdes, 1976), disease could potentially also have a significant impact on the wild dog population in this country. Wild dog-pathogenic diseases like Rabies, Canine distemper or Parvoviral infection readily occur in Namibia (Schneider, 1994) and also a study conducted 8 years ago in the Tsumkwe District provided evidence that the sympatric wild dog populations has indeed been exposed to disease (Laurenson *et al.*, 1997). To investigate and monitor the occurrence and dynamics of wild dog-relevant diseases in Namibia is therefore of great significance for the long-term conservation of the species in this country. An important first step in this context is to look at and monitor the local domestic dog population in Namibia's core wild dog area. Since wild dogs always occur at low densities the persistence of highly pathogenic diseases in the wild dog population alone is very unlikely (Laurenson *et al.*, 1997). Instead, the existence of a reservoir in another species and the occurrence of spill-over infections from those reservoir hosts is necessary. One very likely reservoir are domestic dogs (e.g. Kat *et al.*, 1995; Van Heerden *et al.*, 1995). In a serological survey of local domestic dogs and wild dogs conducted in 1993/94 in Tsumkwe District (Laurenson *et al.*, 1997), antibodies against a number of infectious diseases was found in the domestic dog population, three of which also occurred in the sampled wild dogs. Domestic dogs are very popular in rural Africa and hence dog numbers are steadily increasing with the growing human population, which simultaneously also increases the risk of transmission of pathogens from sick domestic dogs to wild dogs.

While in 1993/94 the local domestic dog population in Tsumkwe District was only around 137 dogs: 107 dogs in 28 villages plus an estimated 30 dogs in Tsumkwe town (=Ø 3.64 dogs/village (Laurenson *et al.*, 1997), a village survey conducted by the wild dog project staff in October/November 2005 now revealed a domestic dog population of around 190 individuals in 31 inhabited villages (=Ø 6.13 dogs/village). The number of domestic dogs in Tsumkwe town is estimated to have increased by up to an order of magnitude since 1993/94. Therefore the increase in the local domestic dog population is dramatic. Similar to the situation 10 years ago, the population is still skewed towards younger animals (median age = 1.5 years (n=67)) and the turnover-rate (percentage of animals under 1 year) is very high (44.3%). According to the dog owners, pup mortality, as well as mortality among adult dogs is high, the causes of death being mostly unknown. Since veterinary care is virtually non-existent in the area, apart from an annual Rabies-vaccination program conducted by Veterinary Services since 1994, it seems likely that at least part of those mortalities is attributed to infectious diseases. In order to verify this assumption, to monitor the occurrence and long-term dynamics of infectious diseases within the local dog population and to assess the effectiveness of the annual Rabies-vaccination, blood samples survey from 67 domestic dogs (1-4 dogs/village) were collected during the village survey and will be screened for relevant diseases.

EDUCATION / AWARENESS INITIATIVES TO REDUCE CONFLICT

To date the WDP has initiated and/or assisted with a number of local education and awareness projects focusing on both farming communities and other stakeholder groups. A summary of activities follows:

Activity: Training workshops on Integrated Predator and Livestock Management
 Area: Okakarara District (conflict study site)
 Stakeholder Group: Communal farmers, conservancy members and traditional authorities
 Frequency: 6 x 1 week courses
 Exposure: 20-25 participants/course
 Partner: Cheetah Conservation Fund, Smithsonian Institute, Namibia Development Trust, Wilderness Safaris, MET.

Activity: Environmental Education (EE) radio show in local Ju\`Hoansi language
 Area: Tsumkwe town, Nyae Nyae
 Stakeholder Group: All members of the community, focusing on youths
 Frequency: Bi-weekly
 Partner: Namibia Broadcasting Corporation

Activity: EE exposure trips to CCF and Etosha NP
 Area: Tsumkwe town, Nyae Nyae (non-conflict study site)
 Stakeholder Group: Local youth groups
 Frequency: Bi-annual in 2005
 Attendance: 25 youths
 Partner: The Ministry of Education, CCF, MET.

Activity: Radio interviews in OtjiHerero, English, Afrikaans, Ju\`Hoansi and German on wild dog conservation and integrated predator and livestock management
 Area: Windhoek, Okakarara, Otjiwarongo, Grootfontein and Tsumkwe Districts
 Stakeholder Group: All members of the community
 Frequency: 12 interviews in 3 years
 Partner: Namibia Broadcasting Corporation

Activity: Articles on wild dog conservation in press
Area: Local, National and International press
Stakeholder Group: General public
Partner: Magazines: Conservation, Forum (all Namibia).
Newspapers: New era, Die Republikein (all Namibian)
Newsletters: Peoples Trust for Endangered Species, TUSK Trust, Kennel Club, Rufford Conservation (all UK).

Activity: Publications on wild dog conservation: *Predators on Livestock Farms*,
Integrated Predator and Livestock Management (content supplied),
Truth About Wild Dogs (poster and pamphlet).
Area: Across communal and commercial farming sector
Stakeholder Group: Farmers, youth groups and MET staff
Partner: CCF, Communal Conservancies in Otjozondjupa, Namibia Development Trust, NARREC, MET

INCENTIVE-DRIVEN INITIATIVES (TOURISM) FOR WILD DOGS

Low game numbers, poor infrastructure and a homogenous livestock dominated (largely fenced) farming landscape precludes much opportunity for wildlife and wild dog tourism in Okakarara District in the short or medium term.

In contrast there is vast scope for low impact/high income enterprises in Nyae Nyae conservancy. Since June 2004 the WDP has hosted 3 EE groups at Klein Dobe EE Centre, trialing various packages with a focus on interpretive hunting / gathering walks with the local San community, photographic trips and wild dog tracking. Traditional skills are being promoted and training offered to community members. An accredited national tour operator, organized the bookings, transport and catering. Fees were paid into a dedicated not-for-profit fund at the Namibian Nature Foundation and cover EE initiatives in the area, running costs of the WDP for the duration of the trip, while providing funds for the maintenance and upkeep of Klein Dobe EE Centre. The fund also ensures that Nyae Nyae conservancy receives their tourist entrance fees that currently are only paid sporadically. Unfortunately the initiative met with local resistance due to the inability of the WDP to ensure every member of the Conservancy (752) benefited immediately and directly, as is the somewhat impractical *modus operandii* in the area when it comes to income generating initiatives.

To date there is to be 1 introduction of wild dogs into a large fenced private reserve (following acclimatization in a release boma) as a consequence of pups being recovered from an excavated den in Okakarara District. The partner in this project is Okonjima Lodge/AfriCat Foundation.

DEVELOPMENT OF A NATIONAL MANAGEMENT PLAN

A preliminary National Management Plan has been completed and is outlined below:

Vision statement:

To ensure, in the long-term, a viable and secure population of African wild dogs, as a component of wildlife based land-use through sustainable management practices, for the benefit of all Namibians.

Objectives:

1. Maintain and expand the range of wild dogs in large continuous tracks of land, managed for wildlife.

Strategies:

- Maintain integrity of existing protected areas where viable wild dog populations occur;
 - Reintroduce wild dogs to protected areas, within their former range;
 - Promote expansion, and if need be, reintroduction of wild dogs into Etosha NP;
 - Liaise and foster co-operation of wild dog management in trans-boundary areas;
 - Assess the economics of wild dogs through a cost/benefit analysis.
2. Improve the image of wild dogs through an awareness campaign and dissemination of factual information.

Strategies:

- Research the actual impact of wild dogs in areas of conflict with livestock farmers;
 - Embark on an intensive public relations campaign to combat the negative image and perception of wild dogs;
 - Establish and promote effective livestock management practices to reduce conflict.
3. Establish meta-populations in smaller areas.

Strategies:

- Identify areas, including freehold land, suitable to reintroduce wild dogs;
 - Through a "custodianship" scheme, make wild dogs available to freehold land, and other areas, suitable for reintroduction;
 - Develop guidelines for reintroduction of wild dogs and implement a "meta-population" management strategy.
4. Improve the economic value of wild dogs.

Strategy: Develop and promote specific wild dog-based tourism needs.

5. Improve and standardize conflict mitigation measures.

Strategies:

- Develop a Reaction Plan;
- Develop a conflict resolution manual;
- Investigate a self-insurance scheme.

Conclusions

The WDP has made significant progress on a number of key issues relevant to human-wild dog conflict mitigation and awareness raising of wild dog conservation in Namibia. Key stakeholder groups have been approached and working relationships developed in two large study large sites. Under a complex socio-political environment where a mosaic of land use and land tenure dominates wild dog conservation issues outside of protected areas, the need for developing strong working relationships cannot be stressed enough. Trust is built slowly and not without considerable challenges. These challenges are often underestimated and remain one of the most important factors influencing progress.

A core wild dog population has been confirmed around Nyae Nyae and the protection of this population is critical to long term viability of the species in Namibia. The *minimum* density of this population appears similar to the previous study 10 years ago but, given the volatile fluctuations that occur in wild dog populations, we can only assume to have viewed a brief 'snap-shot' in what must be a much longer cyclical pattern. It is hypothesised that increasing human population and livestock farming around the core wild dog area is very likely to have negative effects on viability as with a number of other study sites. The influence of edge-effects (Woogroffe, 1998) needs long term research and is unquantifiable at this stage given the complex dynamics involved.

Wild dogs in Namibia appear less robust to such changes in comparison to, for example, leopard, jackal and cheetah which have persisted on farmlands under pressure from significant human-induced depredation for generations and even increased in numbers with the decrease in competition from larger predators such as lion and hyaena. Long term monitoring of this population and depredation rates at the edges is vitally important if integrity of the core population is to be maintained.

Baseline data on additional threats to the wild dog population indicates road kills to be a significant factor and this must be addressed through education and awareness raising, road signs and associated initiatives.

Disease impacts are hard to quantify as the discipline of wildlife epidemiology is in its relative infancy. A long term monitoring project will continue for both wild dogs, domestic dogs and other sympatric carnivores. Wild dog samples will be sent to the UC Davis as part of a collaborative multi-site study to assess implications of disease and management options.

Tourism development is a very high priority for wild dog conservation in Namibia – demonstrating sustainable mechanisms for increasing the species value to landowners. The WDP sees the exposure it has developed in this area within both the private and public sector as one of the most important achievements to date. We must build on this exposure and initial successes to derive sustainable benefits for the communities living with wild dogs. Initial responses from tourism operators to our 3 trialled trips in 2005 were excellent. The challenge is overcoming current barriers to entry. Private sector conservation initiatives involving an integration of research, education and tourism are new to many stakeholders. Responses can vary from enthusiasm to apathy to suspicion and even hostility making progress on any front difficult.

Logistics of operating in isolated rural communities with little if no infrastructure continue to be time consuming and costly. The WDP is pressing for NGOs in the area to combine resources to overcome some of these logistical bottlenecks.

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2006 PROJECT ACTIVITIES

1. **Maintain monitoring of core population:**
 - Ø Population, ranging and feeding ecology;
 - Ø Mortality and natality;
 - Ø Dispersals into adjacent farming areas;
 - Ø Competition from other large carnivores;
 - Ø Disease threats.

2. **Monitor conflict in adjacent areas:**
 - Ø Circumstances surrounding wild dog predation of livestock;
 - Ø Circumstances surrounding human-induced depredation of wild dogs.

3. **Continue EE initiatives to promote wild dog conservation:**
 - Ø Support training workshops within local farming communities;
 - Ø Provide youth groups with exposure to carnivore conservation through:
 - Talks, presentations, videos, radio shows;
 - Camp-based trips (Klein Dobe EE centre);
 - Field trips to other EE centres around Namibia.

4. **Continue to develop wild dog-based tourism trips:**
 - Ø Focus on core population with strong local training / employment component;
 - Ø Pressure key stakeholders to promote and implement wild dog reintroduction to large fenced reserves, providing management support.

5. **Maintain support for adoption and implementation of a Wild Dog National Management Plan.**

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