

## Research report

### Recent records and conservation issues affecting the African wild dog in the Kasigau Corridor, south-east Kenya

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#### Abstract

We provide information on recent sightings (including a breeding record) and conservation status of African wild dogs within the Kasigau Corridor REDD+ Project Area (comprising 14 group ranches covering 2,000km<sup>2</sup>) in south-east Kenya. The records were obtained between November 2011 and November 2013 through a combination of systematic and anecdotal methods including transects, camera traps and community data monitors. A total of 23 confirmed wild dog encounters were recorded including a den with eight pups, four records from villages and two road kills along the Mombasa-Nairobi Highway. A camera trap at the den captured two lions barely 12 minutes after the dogs had vacated. The immediacy of this visit by the lions, and later by a spotted hyaena and black-backed jackal, indicates high potential for interference competition in this ecosystem for wild dogs. Additionally, presence of livestock within the ranches and prevalence of human habitations along the Kasigau Corridor make it difficult to completely eradicate human-carnivore contact and conflict. Yet, there are three reasons for a positive outlook for wild dog conservation in this area. First, the vast protected area network coupled with the recent campaign to rid the ranches of illegal livestock and convert them into conservancies will improve the conservation status of both protected and unprotected areas. Second, expanding conservation efforts under the REDD+ scheme will lead to improved wildlife habitats, reduced poaching, diminished overstocking and enhanced awareness and appreciation of wildlife, which will significantly increase connectivity, tolerance and 'safe' habitat for wild dogs. Lastly, these two preceding factors will enable the ongoing captive breeding programme to sidestep three core problems afflicting wild dog reintroduction programmes, namely: lack of sufficient habitat, poor connectivity and human-related conflicts.

#### Introduction

The Endangered African wild dog *Lycaon pictus* has disappeared from much of its former range, and is considered among the most endangered canids (Woodroffe and Sillero-Zubiri 2012). Besides disease, the major problems that wild dogs face in the wild are increasing

fragmentation of their habitat and human persecution, being still considered vermin in many places (Woodroffe et al. 2005). The only substantial wild dog population in East Africa has been considered to be in southern Tanzania; Kenya and Ethiopia have small populations but it is not clear whether these are viable in the long term (Fanshawe et al. 1997). The outlook for wild dogs in Kenya, while not hopeless, has not been good. Although it is reasonably widespread (e.g. McCreery

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and Robbins 2004, Githiru et al. 2008), there are no strongholds with high population density, and many sightings come from outside protected areas (Fanshawe et al. 1997). Until the 1980s wild dogs were considered reasonably common in the sprawling Tsavo Conservation Area (TCA) before drastically declining in the early 1990s: a researcher carrying out aerial surveys for ungulates in Tsavo East and West, and adjacent lands including Mkomazi Game Reserve in Tanzania, saw no wild dogs during a two year period in 1993-5 (Fanshawe et al. 1997).

Under severe population subdivision and diminished connectivity, population reintroduction, re-establishment or reinforcement may be important tools for preventing population extinction when factors causing the initial population declines are (at least partially) controlled (IUCN 1998, Sutherland 1998). Reintroduction of animals raised in captivity has played an important role in the conservation and recovery of certain species (e.g. Spalton et al. 1999, Osborne 2005, Biebach and Keller 2009). Reintroduction of wild dogs is technically possible provided some of the animals released are wild-caught, and that the newly-established population receives adequate protection, especially from persecution and disease (Ginsberg and Woodroffe 1997, Gusset et al. 2008). But it is fraught with difficulty. For instance, when six wild dogs were released into Tsavo West National Park from the Mt. Kenya region in 1997, four were re-sighted after two months, but eventually all animals were killed (Kock et al. 1999). Consequently, it has been postulated that reintroduction has potentially limited value for wild dog conservation since suitable release sites are in short supply; few reserves are sufficiently large and well-protected to sustain viable wild dog populations. While this could be overcome in parts of East Africa where sizeable protected areas exist, another potential hurdle for this region is that there are few wild dogs of eastern origin held in captivity.

In an attempt to address this, the George Adamson Wildlife Preservation Trust (GAWPT) launched East Africa's first captive breeding and translocation programme for the African wild dog in 1995. Since then, multiple releases have taken place around their Mkomazi Game Reserve base in Tanzania, extending to the southern portions of Tsavo West National Park in Kenya. Most recently, a pack of ten wild dogs was released at the Tsavo West/Mkomazi border in February 2013, following which nine were located by telemetry (one dog was collared per released pack) over the first month of release in Mkomazi Game Reserve before they entered Tsavo West National Park (<http://www.georgeadamson.org/allnews/article.1302>). Additionally, a pack of 20 wild dogs (one wearing a collar) was seen in Tsavo West National Park in April 2013 (<http://www.georgeadamson.org/allnews/article.1252>). Thus, though releases have had mixed success, these re-sightings do point to survival potential for the released packs.

Yet, conducting surveys and conservation of a species that is not only naturally at low densities but also has vast home ranges is not easy. Surveys typically yield significant uncertainty surrounding population estimates, further complicated by the species' tendency to population fluctuations (Rasmussen 1997). Given this, any spatially explicit information of sightings would provide valuable contribution to knowledge regarding current status of this species. This paper provides recent information on the presence and distribution of African wild dogs in south-east Kenya inside private and group ranches that form the corridor of land between Tsavo East and West National Parks. Besides also highlighting a confirmed breeding record, we explore some conservation issues in this area given ongoing conservation activities based on Reduced Emissions from Deforestation and Degradation (REDD+) projects run by Wildlife Works.

## Methods

### Study area and REDD+

The wider Tsavo ecosystem consists of a vast area encompassing the Tsavo Conservation Area (TCA) which includes the Tsavo East, Tsavo West and Chyulu National Parks (KWS 2008), plus a suite of community-owned Group Ranches. Covering over 21,000km<sup>2</sup>, the TCA is the

largest protected area complex in Kenya. It is contiguous with South Kitui National Reserve to the north, and Mkomazi Game Reserve in Tanzania to the south, bringing the total continuous Protected Area complex to around 26,000km<sup>2</sup> (KWS 2008). This complex forms vital habitat for migratory and wide-ranging species, especially the African elephant *Loxodonta africana* and big carnivores.

This paper mainly restricts itself to the Kasigau Corridor REDD+ Project Area, which includes 14 Group Ranches – formally designated as Cattle Ranches – covering an area of about 2,000km<sup>2</sup> (Figure 1). These group ranches are part of that land that forms a corridor (the Kasigau Wildlife Corridor) between the Tsavo East and Tsavo West National Parks. They are located to the southeast of the Taita Hills, an area of high conservation value and the northern most extent of the Eastern Arc Mountain range (Burgess et al. 2007). The 14 ranches are currently being conserved under a REDD+ scheme that aims to provide financial incentives through tapping into the carbon market to help protect forests. REDD+ is a climate change mitigation strategy introduced by the United Nations to help stop destruction of the world's tropical forests by providing sustainable alternatives to rural communities (Ebeling and Yasué 2008, Angelsen et al. 2009). Wildlife Works has pioneered practical REDD+ solutions that are acceptable to both the rural communities and to the marketplace ([http://www.wildlifeworks.com/saveforests/forests\\_kasigau.php](http://www.wildlifeworks.com/saveforests/forests_kasigau.php)).

The climate in the Kasigau Corridor REDD+ Project Area is semi-arid, with average annual rainfall in the 300-450mm range. There are no permanent water sources. Though irregular and prone to fail, rains typically occur seasonally twice a year, in November and April, known as the *grass rains* and the *long rains* respectively. The vegetation has been stratified into three main regimes:

- Montane Forest: On the hill slopes, there exist fragments of montane forest, similar in vegetation composition to the cloud forest fragments of the Taita Hills (Wilder et al. 2000).
- Dryland Forest: The majority of the REDD+ Project Area (almost 90%) is comprised of *Acacia-Commiphora* Dryland Forest, where the dominant species include: *Acacia tortilis*, *A. nilotica*, *A. bussei*, *Commiphora africana*, *C. campestris*, and *C. confusa*. Few emergent hardwoods include *Terminalia spinosa*, *Melia volkensii*, and *Boscia coriacea*.
- Savannah Grassland: At the lowest elevations of the Project Area (8%), the Dryland Forest transitions to patches of grassland and open shrubs with the occasional *Acacia zanzibarica*.

### Wildlife in the study area

Except Rukinga Ranch which was converted into a Wildlife Sanctuary in the late 1990s following its acquisition by Wildlife Works, all group ranches in Kasigau Corridor REDD+ Project scheme and surrounding ranches have livestock (mainly cattle, shoats and camels) at different stocking intensities. The wild herbivore biomass is dominated by African elephant, Cape buffalo *Syncerus caffer* and giraffe *Giraffa camelopardalis*, while densities are highest for Kirk's dik dik *Madoqua kirkii* and lesser kudu *Tragelaphus imberbis* (M. Githiru, unpublished report). The rest of the herbivore community is composed of other potential prey species for wild dogs (Creel and Creel 1995) such as Grant's gazelle *Gazella granti*, gerenuk *Litocranius walleri*, warthog *Phacochoerus aethiopicus*, impala *Aepyceros melampus*, common duiker *Sylvicapra grimmia*, as well as species less commonly taken such as zebra – both the common zebra *Equus quagga* and Endangered Grevy's zebra *Equus grevyi*, eland *Taurotragus oryx*, kongoni *Alcelaphus buselaphus* and oryx *Oryx beisa*. Common carnivores that are likely to directly compete with wild dogs include lion *Panthera leo*, leopard *P. pardus*, cheetah *Acinonyx jubatus* and spotted hyena *Crocuta crocuta*; other medium-sized ones include black-backed jackal *Canis mesomelas*, caracal *Felis caracal* and serval cat *Felis serval*. Like most rangelands in Kenya, the Tsavo ecosystem, including the REDD+ Project Area, has experienced severe contractions in the size and distribu-

tion of wildlife, mainly attributed to increased human and livestock populations and changes in land use (Andanje 2002, WRI 2007).

#### *Breeding in wild dogs*

In most wild dog packs, a dominant (alpha) female is the mother of all the pups which are sired by an alpha male, although two or three females may breed on some occasions (Fuller et al. 1992, Kingdon 1997). A breeding female gives birth about once a year, with litters averaging about 8-10 pups, though as many as 23 have been recorded (Fuller et al. 1992). Despite the large litters, survival is typically low. Besides predation from interspecific competitors, other sources of mortality include disease, starvation and flooded dens. Being a cooperative breeder, all pack members are involved in caring for the pups. Indeed an Allee effect has been invoked when pack size falls below a critical threshold, and adult helpers are unable to bring back sufficient food for the lactating mother or pups (Courchamp and Macdonald 2001). When pups are about 3-4 weeks old, they appear above ground with black and white hair, and small ears that soon develop to their distinctive oversized proportions. Yellow markings begin to appear at 6-7 weeks. Pups are moved to different dens during the season and are weaned at around 10-12 weeks, by which time they can follow the adults (Kingdon 1997).

#### *Data collection*

The wild dog records reported in this article were collected through systematic and anecdotal methods. Systematic methods included quarterly road and aerial transect counts of large mammals, daily ranger patrols across the entire Kasigau Corridor REDD+ Project Area, randomly placed camera traps within Rukinga Wildlife Sanctuary, and designated Community Data Monitors who inform the REDD+ Project of all incidences of human-wildlife conflict that happen in and around their villages. Anecdotal records were obtained during opportunistic game drives across the entire Kasigau Corridor, from artisanal miners within these group ranches, and from motorbike operators serving the miners and livestock herders in the general area. We did not include data from the TCA (Tsavo East, West and Chyulu NPs) in this article.

## Results

#### *Distribution and description of sightings*

There were a total of 23 separate confirmed wild dog encounters across the Kasigau Corridor REDD+ Project Area and immediate environs during the two-year period from November 2011 - November 2013 (Table 1, Figure 1). Though Rukinga Wildlife Sanctuary dominates with eight records, the probability of sighting was also highest here from greater visitor numbers, besides being the only ranch where camera trap surveys were undertaken during this period. The pair of wild dogs captured by our camera trap (Figure 2) appeared to be stalking a lesser kudu which was captured in full flight in the immediate preceding frame before the dogs appeared. Other sightings were made from other ranches including Taita, Bura and Taita Hills Sanctuary, the latter two which are not part of the current REDD+ Project Area (Figure 1). The rest of the records were from the villages and ranches surrounding the REDD+ Project Area reported by the community biodiversity monitors, miners or motorbike operators. Lastly, two records (not shown in Figure 1) were road kills along the Mombasa-Nairobi Highway adjacent to the Kasigau Corridor about 50 and 60km north of Voi town.

#### *Den observation*

On 30 June 2013, Wildlife Works rangers spotted two adult wild dogs with a pup near their base station at the northern tip of Rukinga Wildlife Sanctuary (sighting S14, Figure 2). Though their tracks were often seen, the dogs were not re-sighted for several weeks until the rangers came across what they thought was a den on 18 July 2013; a black-backed jackal carcass was seen nearby. A camera trap was placed at a strategic position near the point and it turned out to be an active den with eight pups (sighting S15, Figure 3). Over a six-day period, the

camera trap captured a series of day and night pictures of the eight pups and several adults, including a regurgitation session at dawn (Figure 3). However, two days after the camera trap was set, the dogs shifted again and disappeared from the general area. Interestingly, just 12 minutes after they had vacated the den, two lions were captured by the camera trap near the den entrance. The lions stayed for a short while and returned a few hours later at dusk appearing to watch the den curiously. Over the course of four days after the dogs had vacated, an elephant, a black-backed jackal and a spotted hyaena were also captured around the den.

## Discussion

#### *Distribution and status*

The wild dogs encountered in this area varied from a single individual to a pack of 17 individuals. It is not possible to ascertain whether all dogs in a given pack were sighted at each encounter, although for some sightings such as the single adult seen from the air, some effort was made to circle the area looking for more individuals in vain. As such, based on the sighting locations, dates and pack sizes, it is difficult to designate these sightings into distinct packs with any confidence. On the one hand, there could be two distinct packs, one on the northern side of the project area and extending into Tsavo East (as attested by the two road-kills), and another on the southern end stretching into Tsavo West and Mkomazi Game Reserve (Figure 1). On the other hand, given documented annual pack range sizes of 150-3,800km<sup>2</sup> (Fuller et al. 1992), it is also possible that these sightings represented a single pack roaming the entire REDD+ Project Area of 2,000km<sup>2</sup> and beyond. Only more regular sightings, ideally of complete packs and perhaps with some individual identification, will enable us tease this out with more certainty. We also acknowledge that the picture we present here is almost certainly incomplete. We believe that numerous wild dog sightings along the Kasigau Corridor go unreported. A collaborative effort is necessary to develop a simple reporting mechanism involving the major players across the Kasigau Corridor including wildlife agencies, ranch owners, artisanal miners, and livestock herders, in addition to having community scouts at key points along the inhabited areas.

Given that wild dogs perhaps attain the highest densities in thicker bush (Woodroffe and Sillero-Zubiri 2012), the area that they can potentially occupy in the Tsavo ecosystem dominated by dryland *Acacia-Commiphora* woodland is vast. It encompasses both protected areas (Tsavo East, Tsavo West and Chyulu National Parks, Mkomazi Game Reserve) and the Kasigau Corridor ranches which are not under formal protection, but can now be protected under the REDD+ scheme. Yet, actual availability of this area for wild dogs, and hence occupancy, might be hampered by interspecific competition from the larger carnivores like lions and hyaenas (e.g. Carbone et al. 1997, Mills and Gorman 1997), plus the presence of livestock within the ranches and in human habitations, with the attendant conflicts and risks e.g. from contact with domestic dogs or accidental snaring. However, the recent move by the Kenyan Government and Kenya Wildlife Service to expel illegal livestock and herders from group ranches (<http://allafrica.com/stories/201308192280.html>), coupled with the drive to convert the ranches into conservancies bodes well for wild dog persistence in this area. Moreover, the proximity of the Tsavo ecosystem to the Arawale-Boni system (which is about 150km to the northeast of Tsavo East National Park) where wild dogs have been recently reported (Githiru et al. 2008), could imply that there might be occasional exchange of individuals between the two ecosystems given dispersal distances of >200km have been documented through non-optimal habitat (Davies-Mostert 2012).

#### *Breeding and interspecific competition*

From the camera trap images, the pups' ears were in the process of developing to their distinctive oversized proportions and yellow markings were becoming apparent (Figure 4). Hence, we estimate that they were 6-7 weeks old.

Table 1. Confirmed wild dog sightings across the Kasigau Corridor REDD+ Project Area, south-east Kenya, between November 2011 and November 2013; GPS readings are given as latitude-longitude decimal degrees.

<i>Code</i>	<i>Record</i>	<i>Site</i>	<i>Date</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Pack size</i>	<i>Detection</i>	<i>Description</i>
S01	Sighting	Rukinga Wildlife Sanctuary	05-Nov-11	-3.63709	38.76124	12	Game drive	All adults
S02	Sighting	Taita Ranch	01-Dec-11	-3.85104	38.88890	2	Carbon sampling	All adults (near dam)
S03	Sighting	Rukinga Wildlife Sanctuary	09-Jan-12	-3.83244	38.75009	17	Ranger patrol	All adults
S04	Sighting	Kasigau Ranch	07-Feb-12	-3.85754	38.56336	4	Ranger patrol	All adults
S05	Sighting	Rukinga Wildlife Sanctuary	04-Jun-12	-3.85235	38.78665	15	Ranger patrol	All adults
S06	Sighting	Rukinga Wildlife Sanctuary	03-Jul-12	-3.74083	38.73341	2	Camera trap	Adults chasing lesser kudu
S07	Sighting	Rukinga Wildlife Sanctuary	11-Oct-12	-3.81122	38.80646	2	Ranger patrol	All adults
S08	Road-kill	Near Tsavo River Bridge	15-Oct-12	-3.01948	38.47317	1	Wildlife works staff	Road-kill: Adult male
S09	Road-kill	Near Tsavo River Bridge	01-Mar-13	-2.93123	38.41131	1	Wildlife works staff	Road-kill: Juvenile
S10	Sighting	Jora Village	02-Mar-13	-3.82859	38.62778	3	Community monitor	All adults
S11	Sighting	Ngambenyi Village	06-Mar-13	-3.85705	38.62479	3	Community monitor	All adults
S12	Sighting	Rukinga Wildlife Sanctuary	31-May-13	-3.61986	38.76242	2	Game drive	All adults
S13	Sighting	Kuranze area	05-Jun-13	-3.93503	38.69196	2	Miner	1 female adult, 1 pup
S14	Sighting	Rukinga Wildlife Sanctuary	30-Jun-13	-3.60715	38.78987	3	Ranger patrol	2 adults, 1 pup
S15	Breeding	Rukinga Wildlife Sanctuary	20-Jul-13	-3.59893	38.79377	9	Camera trap	Den: 8 pups, mother
S16	Sighting	Bura Ranch	12-Aug-13	-3.93394	38.66129	1	Aerial transect	Adult
S17	Sighting	Taita Ranch	16-Sep-13	-3.75321	39.01709	5	Game drive	All adults
S18	Sighting	Bura Ranch	05-Oct-13	-3.93502	38.65082	1	Miner	Adult
S19	Sighting	Kasigau Ranch	15-Oct-13	-3.88794	38.58689	4	Motorbike operator	All adults (near water pan)
S20	Sighting	Taita Hills Wildlife Sanctuary	19-Oct-13	-3.55819	38.23302	12	Game drive	All adults
S21	Sighting	Kuranze area	06-Nov-13	-4.00879	38.64287	15	Miner	All adults
S22	Sighting	Kasigau Ranch	10-Nov-13	-3.88794	38.58689	Several	Motorbike operator	Fresh tracks (near water pan)
S23	Sighting	Kasigau Ranch	10-Nov-13	-3.87407	38.59289	12	Motorbike operator	All adults
GAWPT	Breeding	Mkomazi Game Reserve	01-Jan-95	-4.08588	38.08185			Captive Breeding Programme

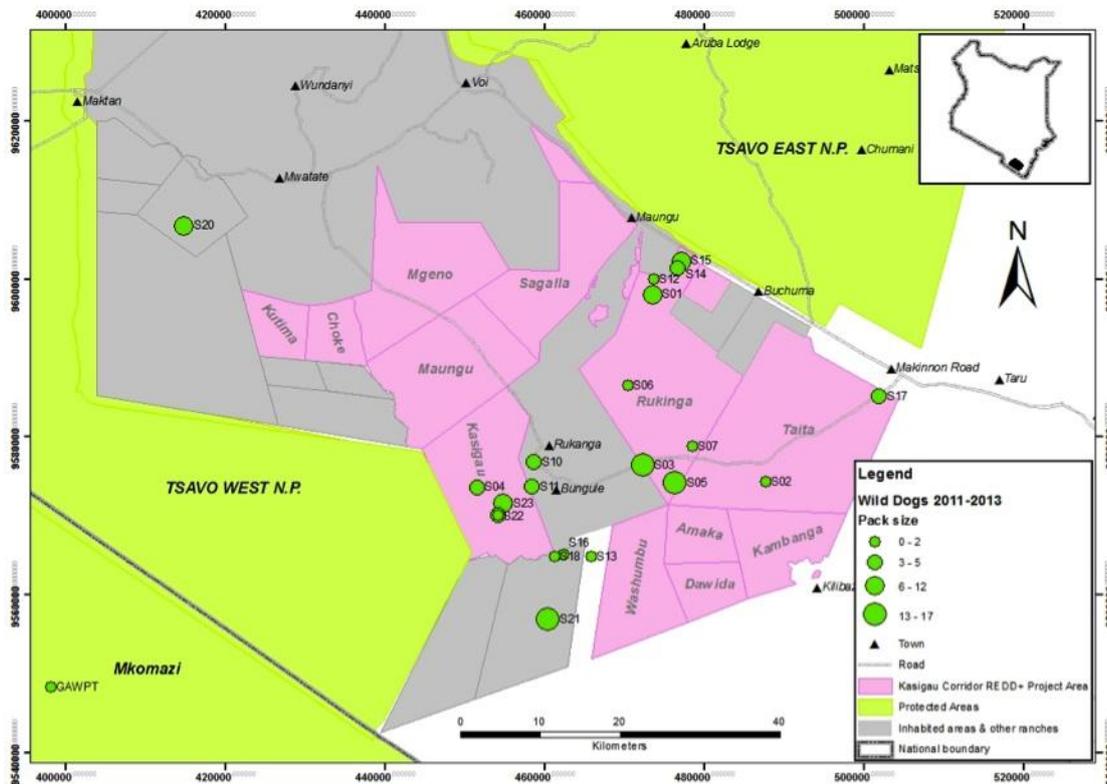


Figure 1. Locations where wild dogs were sighted across the Kasigau Corridor REDD+ Project Area, south-east Kenya, between November 2011 and November 2013. The labels for the wild dog records correspond to the column 'Code' in Table 1. Inset is a map of Kenya showing the location of the Kasigau Corridor REDD+ Project Area.



Figure 2. Camera trap image of two wild dogs within the Rukinga Wildlife Sanctuary, south-east Kenya – Sighting S06 on Table 1.

diacy of the visits to the den by the lions and later spotted hyaena, as well as the black-backed jackal carcass, highlights the high potential for interference competition in this ecosystem for wild dogs (e.g. Palomares and Caro 1999, Creel and Creel 2002, Webster et al. 2011). This could also explain the reason for little activity around the den by the adult dogs. During the two days we made camera trap observations, only once were two adults captured in the same frame. There were long stretches of time, sometimes up to seven hours, when the camera did not record any activity around the den. The den was most active during feeding (regurgitation) times and immediately after when the pups wandered around the den in the presence of an adult. Alongside cheetahs, wild dogs are considered subordinate to top predators, mainly lions and spotted hyaenas (Hayward and Slotow 2009). Competition avoidance has been shown to be the primary cause of the temporal partitioning in activity between subordinate and top predators (Saleni et al. 2007), with wild dogs being shown to consistently move directly away from lion roars in experiments, suggesting that lions do represent an immediate high-level threat (Webster et al. 2011). Indeed, several studies in similar habitat to our study area have demonstrated that interspecific competition with larger sympatric carnivores limits wild dog density. In the Selous Game Reserve (Tanzania) for instance, interference competition from hyaenas at wild dog kills was common and reduced wild dogs' feeding time, while wild dogs were commonly killed by lions and occasionally by hyaenas (Creel and Creel 1996).

*Conservation issues and outlook: REDD+ project*

The African Wild Dog has been described as mysterious, elusive, and enigmatic - the restless corsairs of the African plains (<http://www.georgeadamson.org/dogs>). Their ranging behaviour and hunt-

This could suggest that during the den shift on 30 June 2013 when the dogs were first spotted, they could have been about 3-4 weeks old, most likely the first shift from their natal den. The pack thus used this particular den for about three weeks in total. Tellingly, two lions appeared at the den immediately after the dogs had vacated. The imme-

ing methods gives them the unfortunate vermin badge, rendering them targets for elimination by farmers, hunters and pastoralists. Their management hinges on six key limiting factors: prey availability, vast ranges, persecution, cooperative hunting and breeding, interference competition and diseases. With the livestock within ranches and human habitations along the Kasigau Corridor, it is practically impossible to completely eradicate human-carnivore contact and the resultant conflict.



Figure 3. Camera trap image of an adult wild dog regurgitating to pups at dawn within the Rukinga Wildlife Sanctuary, south-east Kenya – sighting S15 on Table 1. The actual den is highlighted in yellow. (NB: the date ribbon was left out because this camera mal-functioned soon after it was placed by the den, and reset its dates back to factory settings.)



Figure 4. Camera trap image of eight wild dog pups at their den within the Rukinga Wildlife Sanctuary, south-east Kenya – sighting S15 on Table 1.

The recent efforts to erect electric fences at various points around Tsavo East and West National Parks to keep elephants out of farmlands are unlikely to stop wide-ranging species like wild dogs from coming into contact with humans and livestock. Despite this, we believe there are three reasons for an optimistic outlook for the wild dogs in the Tsavo ecosystem: The TCA protected area network, REDD+ conservation projects, and captive breeding programme. First, the protected area network covering a total of about 26,000km<sup>2</sup> of near-ideal wild dog habitat can sustain several packs, even considering competition from other carnivores. Prey availability should not be a major limiting factor given the abundance of medium-sized antelopes which are the preferred prey (e.g. kudu, impala, warthog, Grant's gazelle, kongoni) and several small-sized ones like duikers and dik diks. The recent campaign to rid the ranches of illegal livestock and herders and convert some of these ranches into conservancies will improve the conservation status of both protected and unprotected areas across this ecosystem, besides reducing persecution from wild dogs taking livestock. Secondly, the problem of poor connectivity across

this protected area network is being resolved by conservation efforts under REDD+. These projects bring about improved wildlife habitats and reduced poaching for bushmeat (thus enhancing prey availability), besides reducing the need for overstocking that was previously prevalent in these group ranches as the sole source of revenue. This further reduces wild dog contact with humans, shoats and domestic dogs, the latter which reduces chances of disease transmission. The presence of the wild dog den in Rukinga Wildlife Sanctuary could be an effect of this, because livestock have been excluded from this specific ranch for more than ten years. Moreover, the awareness and education programmes under REDD+ on the importance of biodiversity, especially for the ecotourism that is compatible with REDD+ initiatives, could enhance tolerance to wild dogs, further reducing persecution (e.g. Lindsey et al. 2005). The REDD+ programme is being expanded to include additional ranches within the Kasigau Corridor plus ranches between Chyulu and Amboseli National Parks to the northwest, which will significantly increase connectivity and 'safe' habitat for wild dogs. Lastly, the protected area network and the REDD+ initiatives combine to make the ongoing captive breeding programme a viable endeavour, because the released packs will have the vast protected area network to roam and new safer areas to use as extra habitat or as corridors, thereby averting the usual glitches of wild dog reintroduction programmes (Gusset et al. 2008). Though it is possible that this wild dog population could suffer the problems associated with small population sizes (Ginsberg et al. 1995) including Allee effects which could engender pack collapses (Courchamp and Macdonald 2001), the released individuals may help in averting this.

More basic data around proper pack identification and understanding their movement patterns could further augment our findings and improve conservation and management of wild dogs in this study area. Finally, it is also important to determine the actual impact of wild dogs on livestock in the area, and the effectiveness of current techniques to reduce this impact, given that some human-wild dog contact remains inevitable. Such information will help determine the combination of husbandry practices, local legislation, compensation and education needed to allow wild dogs and people to coexist (e.g. Woodroffe et al. 2005).

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