Strategic Plan
for
Painted Dog Conservation
Organisation

2012 - 2017

Prepared by:
Painted Dog Conservation
Project Team

December 2011

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Project Summary

Project Name: Painted Dog Conservation Organisation.

Project Location: In Zimbabwe where Painted Dogs do or can exist.

Project Vision: To protect and increase the range and number of Painted Dogs, (*Lycaon pictus*) in Zimbabwe.

Contact Name: Peter Blinston

Address: PO Box 72, Dete, Zimbabwe

Project Start Date: January 1st, 2012

Project End Date: December 31st, 2017

Total Project Budget (2012):   USD 862,700

Brief Project Description: Painted Doc Conservation (PDC) was originally established as Painted Dog Research in 1992. At this time, human-induced carnage from snares, shooting and road kills accounted for 95% of all dog mortalities in Zimbabwe. Public reaction during presentations showed prejudice and ignorance towards Painted Dogs and it was clear that unless this situation was addressed, the species could become extinct. The initial emphasis was thus to identify the critical threats affecting Painted Dogs and develop a strategy that would make a substantial, lasting contribution to Painted Dogs, nature conservation and, very importantly, to the lives of the local people.

Strategic Plan for Painted Dog Conservation Organisation

Introduction

PDC is a relatively well established, Conservation Organisation, which is recognized nationally and internationally. A complex variety of programmes have already been implemented by PDC, many as a reaction to already identified threats. It has been recognized that the complexity of the situation and level of the programmes now requires a more structured approach, which will enable better monitoring and evaluation. It is recognized that in order to achieve our goals, we must determine the extent to which our actions are working – and we must be able to diagnose why some actions succeed while others do not. In recent years, there has been great convergence among conservation organizations in thinking about how best to plan and implement conservation actions.

We have chosen to develop the Strategic Plan following the steps of the "Open Standards for the Practice of Conservation" (CMP 2007)[1], which is a collective approach of professional conservation organizations to practice adaptive management via an iterative project cycle, which is fundamental to achieving effective conservation. These standards provide a framework and guidance for conservation action bringing together common concepts, approaches, and terminology in conservation project design, management, and monitoring in order to help practitioners improve the practice of conservation.

Following the steps of the Open Standards, we first identified who would be on the project team, articulated our geographic scope, a vision of what we hope to achieve, and the conservation targets that will be the focus of our work. The process takes into account the context in which PDC currently works, including threats and opportunities, and key stakeholders.

Once these basic parameters were described, the situational analysis was used to select and rank specific strategies aimed at reducing direct and indirect threats to the conservation targets. This resulted in an Action Plan, which specifies our goals, assumptions of the strategies and objectives. We also developed a Monitoring Plan that we will use to track progress towards our goals and objectives, and an Operational Plan that specifies the financial and human resources that we will need, and risks we should consider, when implementing our Action and Monitoring Plans.

1. Project Description.

Painted Dog Conservation Organisation is a Private Voluntary Organisation (PVO 13/ 2005). Registration with the Ministry of Social Welfare was completed in 2005 with the following Board of Trustees:

Chairperson:	**Mr Jerry Gotora**
Vice-Chairperson:	**Dr Gibson Mandishona**
Secretary / Treasurer:	**Catherine Kanhema**
Trustee:	**Chief J.B. Nelukoba – Dingaan**
Trustee:	**Mrs Tsitsi Sekeramayi**

The Board of Trustees is acknowledged here for their considerable contribution towards the evolution of Painted Dog Conservation Organisation leading to its recognition both nationally and internationally.

The Aims of the Painted Dog Conservation Organisation, as outlined in the registration, were initially identified as:

- To enhance the long term appreciation of the desirability of maintaining maximum biodiversity in Zimbabwe to the benefits of all generations of this country by promoting Painted Dogs as a flagship species.
- To promote the education of people in Zimbabwe in such matters.
- To promote the growth of the capital base of the Painted Dog Conservation Organisation.

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[1] CMP. 2007. Open Standards for the Practice of Conservation, v. 2.0. Conservation Measures Partnership.

- To ensure the financial stability of the on-going operations thereof.
- To achieve the long term objectives of its financial supporters
- To promote, support and where necessary or expedient to undertake and pursue such business as may be conducive to promoting the objects of the Painted Dog Conservation Organisation.

Our Goals to date have been expressed as:

1. To increase National and International awareness of the plight of Painted Dogs.
2. Ensure population stability by protecting and maintaining populations in the buffer zones as well as responding to any Painted Dog individual, pack or population in need of assistance.
3. Maintain and facilitate diversity within the gene pool of the Zimbabwe National Population.
4. Maintain and develop our anti-poaching unit (APU) initiative.
5. Maintain and further develop our Community Education Programme.
6. Maintain and further develop our Community Development work by linking more community needs with appropriate International Aid Organisations.

1A. Initial Project Team

Attached is the organisational chart for PDC, (Appendix 1) and below is a list of Project Team Members (Table 1). The Core Project Team worked on developing the Strategic Plan to its final draft, which was then submitted to the PDC Board for their input and final approval.

Table 1. Project Team Members and Roles.

Name	Organization	Role in Project
Core Team Members:		
Peter Blinston (PB)	Painted Dog Conservation	Team Leader Managing Director
Gregory Rasmussen (GSAR)	Painted Dog Conservation	Team member Research Director
Forgie Wilson (FW)	Painted Dog Conservation	Team member Assistant Manager
Agnes Ncube (AN)	Painted Dog Conservation	Team member Assistant Arts Coordinator
Gregory Gibbard (GG)	Painted Dog Conservation	Manager Administration/Accounting
Lorna Gumbo (LG)	Painted Dog Conservation	Team member Administrator
Wilton Nsimango (WN)	Painted Dog Conservation	Manager Education & Conservation
Other Team Members:		
Boniface Manda (BM)	Painted Dog Conservation	Community Liaison Officer
Dominic Nyathi (DNY)	Painted Dog Conservation	Conservation Clubs Co-ord.
Dought Nkomo (DN)	Painted Dog Conservation	Maintenance Supervisor
Enock Zulu (EZ)	Painted Dog Conservation	Manager Anti-poaching Units
Ganizani Phiri (GP)	Painted Dog Conservation	Education Officer

Name	Organization	Role in Project
Jealous Mpofu (JM)	Painted Dog Conservation	Tracker/Scout
Last Marozhoe (LM)	Painted Dog Conservation	Mechanic
Wilson Chuma (WC)	Painted Dog Conservation	Driver
Xmas Mpofu (XM)	Painted Dog Conservation	Head Keeper
Advisory Committee Members		
Arlyne Johnson (AJ)	Foundations of Success	Project Planning

1B. Project Scope, Vision, and Targets

Scope

The scope of the project is geographic and includes areas in Zimbabwe where Painted Dogs do or can exist (Figure 1) and within that a CORE OPERATING AREA which is defined as Campfire, Private Farms, Forestry and Communal lands adjacent to Hwange National Park (outlined in red in Figure 1).

Figure 1. Map of Project Area
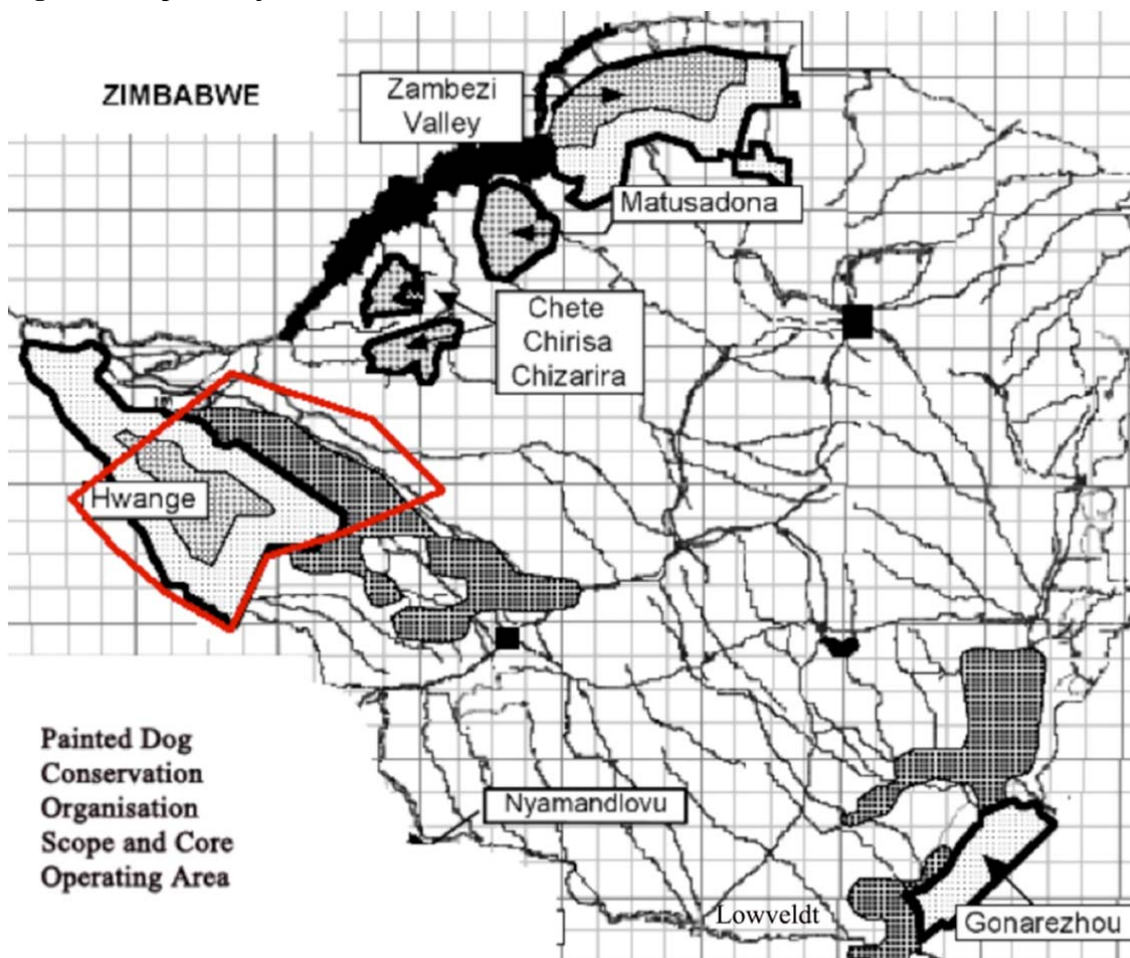
Vision[2]

To protect and increase the range and numbers of Painted Dogs, (*Lycaon pictus*) in Zimbabwe.

Conservation Targets

With the ultimate focus of this project being on the Painted Dog, the project seeks to protect or conserve five targets namely Painted Dogs; Kudu and Impala, which are the primary prey species of Painted Dog; and habitat areas of Miombo Woodland and Vlei Systems in the Core Operating Area plus the Zambezi Valley Escarpment.

Target 1: Painted Dogs
Description of Target:
- The Painted Dog (*Lycaon pictus*), is a unique carnivore exclusive to Africa.
- On the IUCN red list, they are highly endangered having been reduced to 1% of their former population.
- At the turn of the 20th century Painted dogs were mercilessly persecuted throughout Africa.
- In Zimbabwe, they were classified as vermin from 1906 until 1977 and slaughtered under the auspice of being putative cattle killers.
- During the 5 year period 1956±1961, at least 2,674 dogs were destroyed in Zimbabwe alone (Childes, 1988).
- To survive Painted Dogs need to live in packs that number no less than six adults and yearlings, however ideally the pack size should at least number 12 dogs plus their pups.
- In very healthy populations, packs have been known to include up to 40 individuals.
- Zimbabwe houses one of the keystone populations in three main eco-regions namely Hwange, Zambezi Valley and the SE Lowveldt to include Gonarezhou (Figure 1).
- The Zimbabwean population currently is estimated at 500 individuals however under ideal conditions if pack sizes could be increased to the same level they were 50 years ago this population could be tripled.
- To date, attention has largely been focussed on the issues affecting the "sink" population, which is the Gwayi Conservancy that borders Hwange National Park (HNP) (Figure 1). In the past dogs were shot on sight by farmers and this direct threat has now been replaced by illegal hunting with snares targeting small to medium size antelope species such as impala for bushmeat, which impacts directly on the prey species, as well as on the Painted Dogs who, as a widely foraging predator, are highly likely to encounter a snare. The recent example of the release of the "Bambanani" pack serves to illustrate the issues. This pack of seven dogs was released into HNP on August 28th, 2009. Within one week they had left HNP and were in the Gwayi Conservancy and in less than two months three had been killed in snares and two killed by cars. The sixth dog was recaptured as he was alone and failing to hunt, with the seventh dog having disappeared.
- While the above is undoubtedly true and still represents a formidable challenge, the situation in HNP, which is in fact the "source" population for Painted Dogs, has become critical for Painted Dogs. Research to date indicates that this is due to the practice of pumping water into artificial waterholes. This has led to a 17-fold increase in the elephant population, which has corresponded with a decline in the availability of suitable prey for Painted Dogs and cascaded to open up and create dystrophy in the habitat, thus reducing primary production.
- As such it is recognised that PDC needs to direct its attention on HNP. Otherwise, if current trends continue, the Painted Dogs are likely to become ecologically extinct in the HNP region.

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[2] A **vision** is a general summary of the desired state or ultimate condition of the project area or scope that a project is working to achieve (CMP 2007).

Target 2: Prey Species (Kudu and Impala)
Description of Target 2:
- The primary prey of Painted Dogs are Kudu and Impala, which collectively form 95% of the diet of Painted Dogs.
- Consequently Painted Dogs rely heavily on these species with PDC research showing that any reduction in numbers of these species directly impacts on the number of pups that a Painted Dogs pack can raise.
- Kudu and Impala rely heavily on their habitat, Kudu being browsers need woodland and thickets, while Impala utilise the vleis that essentially are seasonally wet grasslands, and the woodland ecotones.

Target 3: Miombo Woodland
Description of Target 3:
- Miombo woodland is a dry wooded area with sparse deciduous growth. This habitat has high variation and overlaps with deciduous forests and open savannas.
- This high variation and bush density also make this habitat ideal for Painted Dogs to hunt in. Here they have higher hunting success, shorter chase distances, procure more prey, and are less likely to be detected by lions and hyenas that will steal their food and kill pups.
- Overall these conditions lead to greater food intake, larger litters and higher pup survival. Consequently, anything that disturbs the woodland will significantly and directly impact on the Painted Dog population

Target 4: Zambezi Valley Escarpment
Description of Target 4:
- The Zambezi Valley is rich in biological diversity. The river's edge is overhung with a thick riverine fringe, mostly *Diasporus*, *Ficus* and other riverine species. Further inland is a floodplain fringed with Mopani forest and interspersed with winter thorn trees *Acacia albida*.
- The forests, wetlands and natural geographical features form unique and complex ecosystems that support abundant wildlife. The wilderness, landscapes and natural resources are of exceptional value.
- The vegetation in the area is dominated by *Acacia albida* trees, a thorn species 10 - 30m high with the classical shady umbrella canopy. It is able to tolerate sandier soils than other woodland species and serves to stabilize infertile sandbanks and reduce erosion.

Target 5: Vlei System
Description of Target 5:
- The vleis are an important and extensive part of the Hwange ecosystem and should function to provide significant fodder for the grazers, particularly in the dry season.
- During the wet season they should be flooded to the extent that due to water logging they exclude the trees and ensure a grass-only system.
- Currently the grass species are of such poor quality that they remain uneaten and thus this potentially valuable resource is of no value[3].
- The reason for the presence of these grass species (known as "increaser 3" species) is believed to be that the pumping of water concentrates herbivore pressure thus increasing trampling pressure. Due to selection pressure, the resultant grass species are all those that are either unpalatable, or low in grazing value. Pumping of water is also contributing to drying the vlei , thus allowing for tree encroachment

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[3] Rasmussen, G. S. A., Markus Gusset, F. Courchamp, and D. W. Macdonald. 2008 Achilles Heel of Sociality Revealed by Energetic Poverty Trap in Cursorial Hunters. American Naturalist

1D. Viability Assessment for All Targets with Current Status

We conducted a Viability Assessment[4] of Key Ecological Attributes (KEAs) of our five conservation targets to document their status today (ranging from *Poor* to *Very Good*) as well as what we would like the status of those targets to be in the future as a result of the project actions outlined in this strategic plan. Following is a summary of the Viability Assessment for the five conservation targets (see Appendix 2 for details):

Target 1: Painted Dogs

KEA 1.1 Painted Dog Pack Size. The current status of the pack size in six locations (see Appendix 2) ranges from *Poor* in HNP and the adjacent Victoria Falls area to *Good* in the Zambezi Valley. Whilst the average status across all six locations is considered to be *Fair,* the poor status of the Hwange population is of considerable concern. Here pack sizes are reduced to below the threshold of six, mortality is exceeding natality and there is no recruitment.

KEA 1.2. Painted Dog Distribution. Whilst it is estimated that the current distribution of Painted Dogs across Zimbabwe is *Fair,* it is reduced and it is imperative to maintain this status over the period of this 5-year strategic plan. Currently the distribution is fragmented due to pocketed threats as well as poor management of the habitat and game in areas such as Forestry Commission estate and the Gwayi Conservancy and surrounds of the protected areas. Attention to this is fundamental to continuance of the Zimbabwean population.

Target 2 Painted Dog Prey species (Kudu and Impala)

KEA 2.1 Abundance of Kudu and Impala at 23 waterholes in HNP. We estimate that the current status of Kudu and Impala in HNP is *poor* and aim to raise this status to *fair* by 2022. It is believed that the primary factor contributing to this poor prey status is the impact of elephants both from a point of view of competition for food as well as the dystrophy caused by the presence of the waterhole conservatively reducing the potential primary production by 70%.

Target 3: Miombo Woodland.

The status of the woodland habitat is in a *poor* condition throughout the Core Operating Area and its recovery is fundamental to the recovery of the Painted Dog population. Currently the impact of elephants relative to the waterholes is not only causing the vegetation to decline and be opened up, it is also responding by increased defence mechanisms. With these impacts known to extend up to 17 kilometres from the waterholes, it is estimated that the primary production of the park may well be reduced by 70% because of it. As *Baphia massaiensis* is one of the primary forage species, we have chosen to utilise *Baphia massaiensis* as an indicator species. Consequently KEAs chosen reflect the status and visibility of *Baphia massaiensis* and it is hoped that both KEA's can be improved from poor to fair over the 10 years ending in 2022.

KEA 3.1 Diameter at base height (DBH) of *Baphia masaaiensis* relative to PDC exclosure. By 2022, the DBH of *Baphia massaiensis* will be 65% of the PDC exclosure value in 2010 and thus rated as fair

KEA 3.2 Visibility index By 2022, the visibility index in designated sites (van Der Meer 2011) will be between 80-140 metres and thus rated as fair.

Target 4: Zambezi Valley and Escarpment

Essentially regulated by the Kariba Dam, currently this habitat is rated as fair, however there has been little research into it and it ranks as a high priority to do so in order to gain an understanding of the dynamics of this system and how it can be managed to ensure long term ecosystem function.

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[4] A **Viability Assessment** is a flexible and powerful methodology based on sound ecological principles that helps to define healthy targets and set appropriate and measurable goals (CMP 2007). The general purpose of conducting a viability assessment is to define how you will measure the health of your conservation targets over time. It helps you determine how your target is doing today, what a healthy target would look like, and what status you would like to see in the future as a result of your project actions.

Notwithstanding the latter KEA's chosen reflect typical issues associated with the instalment of dams, namely invasive species and recruitment issues. Currently in spite of being data deficient, this system has been deemed fair.

KEA 4.1 Reduce invasive plant species. By 2022, the abundance of invasive plant species in the Zambezi Valley ecosystem will be reduced to between 0.3 and 0.1% and thus rated as good.

KEA 4.2 Improve status of Acacia albida. By 2022, there will be a statistically significant increase in the DBH of *Acacia albida* in the Zambezi valley ecosystem and thus rated as fair.

Target 5: Vlei System.

The status of the vlei systems is poor as evidenced not only by a high percentage of "increaser 3" species, but also as evidenced by the fact that the grazer species are not eating the grass which remains ungrazed and throughout the vlei, is left at the end of the dry season as moribund grass. This can only be rectified by removing the water from the Vlei followed by a restorative reseeding programme. Consequently research into the dynamics of the system is essential however there will be no improved change unless there is a changed approach to pumping water.

KEA 5.1 Percentage of "Increaser 3" Unpalatable grass species. Currently the status is poor however by 2022, it is hoped it can achieve good status by reducing the percentage of "Increaser 3" grass species in Kennedy vlei system from ± 95% to 60%.

KEA 5.2 Improved grass cover. Currently the status is fair at but it is hoped it can be improved from fair to very good, and that by 2022, 80% of the Kennedy vlei system will be covered in grass. Whilst this will not necessarily represent all good grasses it will be a strong indicator that grazing pressure has been reduced.

1E. Critical Threats

Our team identified a series of direct threats to our conservation targets. These direct threats are human actions that directly affect one or more of our conservation targets. The following table describes each of the primary direct threats (see Table 2).

Table 2. Description of Direct Threats

Direct Threat	Description
Direct Threats to Fauna	
Legal Hunting	Quota setting related to the legal off take of Kudu and Impala, which are the major prey species of Painted Dogs
Road Kills	Vehicle collisions with Painted Dogs and their prey
Disease	Includes rabies, distemper, anthrax, foot & mouth that can infect Painted Dogs
Shooting Painted Dogs	Direct shooting of Painted Dogs resulting from a general human beliefs and dislikes of Painted Dogs
Illegal Hunting	Includes subsistence and some commercial poaching of Painted Dogs and their prey with wire snares and domestic dogs.
Trafficking of Painted Dogs	Instances of pups dug out of dens for breeding centres.
Direct Threats to Habitat	
Mining	Mining for coal, gold & diamonds that destroys habitats and indirectly leads to increased anthropogenic impacts on Painted Dogs and their prey
Dams	Impacts of the Kariba Dam & proposed Gwayi/Shangani

Direct Threat	Description
	hydropower dams
Veldt Fires	Unplanned burns of bush vegetation resulting from human carelessness
Pumping Water in Wildlife Areas	Artificial waterholes in wildlife areas in and around Hwange National Park that result in increased elephant populations which in turn affects the condition of the Hwange Miombo woodland and vlei ecosystems. This is turn has a negative impact on smaller ungulates and ultimately Painted Dogs in HNP and surrounding areas.
Wood collection and Logging	Wood collection for firewood and for construction of curios
Other	
Lack of PDC Capacity	Lack of capacity of PDC staff limits their ability to implement action and monitoring plans

The team then rated the threats according to three criteria: i.e., the scope of the area or population affected; the severity of the impact on the area or population affected; and the degree to which the effects of the threats could be undone if the threat were to cease (irreversibility). The purpose of this rating was to take an initial step toward narrowing down the focus of our efforts. Identifying the priority threats allows us to make sure our interventions address the greatest threats to our conservation targets, rather than those threats whose impact on our targets is minimal.

The process identified threats of Dams and Mining, which ranked very high and high respectively however the team considered PDC's ability to impact on these developments as being minimal and politically not appropriate. Thus no strategy was developed to deal with these threats beyond our commentary on any EIA on the environmental impact of such developments. Conversely the pumping of water in wildlife areas was identified as a very high threat and a critical area that PDC would address as a high priority.(We present the results from the threat ranking in Appendix 3).

1F. Situation Analysis

We used our conservation targets and direct threats as a starting point to lay out, in a diagram, the context of PROJECT SCOPE. We identified the underlying causes (indirect threats and opportunities) that are driving the direct threats at the PROJECT SITE. The purpose of this exercise was to come to agreement as a group on the different forces influencing the site and then we identified the CORE OPERATING AREA as the region where the majority of the conservation actions are currently undertaken. It should be noted here that the Project Team, while recognising the importance of the Core Operating Area, stressed the need to also understand the factors impacting other key Painted Dog populations, specifically the Zambezi Valley (see Figure 1). As the Zambezi Valley may well represent one of the major Painted Dog populations on the continent, it is fundamental that PDC has a good understanding of this population. This understanding will, amongst other things, allow for comparisons with other Painted Dog populations that are not faring so well. Consequently research into this population is a priority in order to understand how it functions, as well as related threats such as inbreeding.

The conceptual model is presented in the Figure 2 below.

Figure 2. Conceptual Model for Painted Dog Conservation Organisation.
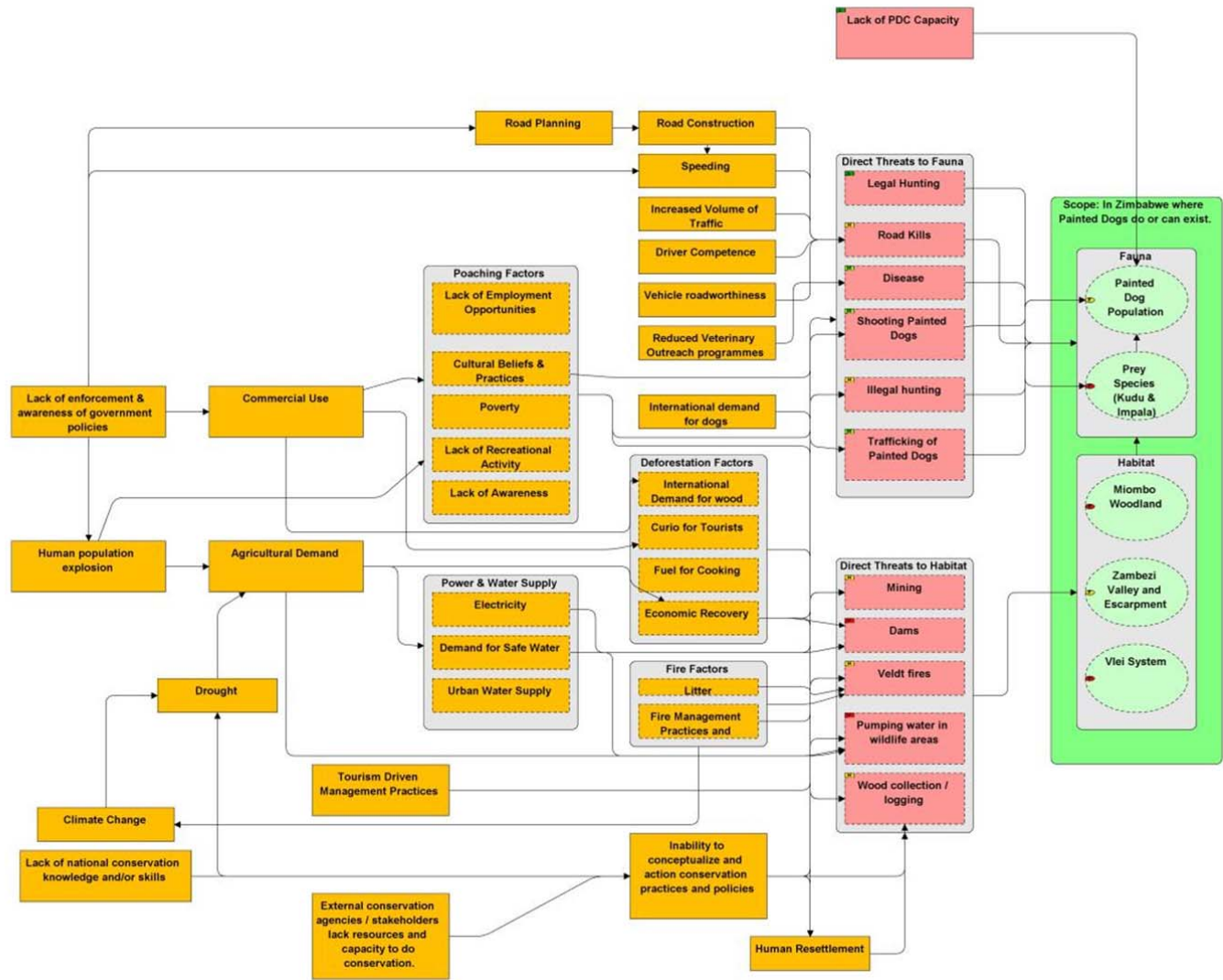
The PDC conceptual model was developed over the course of several weeks using the expertise and knowledge of PDC project team (see Table 1). The group went through a facilitated exercise (with Arlyne Johnson, FOS) to identify first the **PDC conservation targets** (green ovals), then the **direct threats** (pink boxes) that impact our targets, and the **indirect threats** that drive them (orange boxes). The diagram represents the collective experience and knowledge of PDC staff that live and work within the scope of PDC. The diagram illustrates very clearly that the PDC targets are impacted by **multiple factors** and thus their status is affected by the interaction and summation of **"cumulative impacts."**

The left most portion of the model highlights **indirect factors** such as the general lack of enforcement and a lack of awareness of government policies and how this affects, for example, poaching or vehicle speed. As you move closer to the targets, the relationship between the factors and how they affect the conservation targets becomes more direct.

Strategies and **activities** were developed and brought forward by the group to affect conservation of the targets. For each strategy the team developed detailed **theories of change**, which included how the information and understanding produced by PDC activities will ultimately influence management decisions and conservation of our targets (see results chains in the Action Plan section).

2. Action and Monitoring Plans.

The Action Plan indicates who will be doing what and when on the implementation of the conservation actions. In contrast, the Monitoring Plan indicates what and when the monitoring will be done to evaluate the effectiveness of these conservation actions and the status of the conservation targets.

Our action plan includes the following components:

- **Goals** for each of our targets;
- **Strategies** to directly address the target (e.g., restoration) and/or strategies to address indirect threats, opportunities, or direct threats that are affecting the target;
- **Results chains** that lay out our assumptions about how each strategy we undertake will help us achieve our targets;
- **Objectives** related to results specified in our results chains; and
- **Activities** we will need to undertake for each strategy.

We present the goals and indicators for each target, objectives and indicators for high priority direct threats, and then use our strategies as our organizing framework. For each strategy, we include:

- **A results chain**;
- **Objectives** related to the results in that chain;
- **Indicators** for the objectives and other key results; and
- **Activities** associated with the strategy.

2A. Formal Action Plan: Goals, Strategies, Assumptions, and Objectives

<u>**Targets and Goals**</u>

Target 1: Painted Dogs

 Goal 1.1: By 2022, Painted Dog pack sizes will reach ≥6 in Hwange, ≥5 in Gwayi, ≥6 in Victoria Falls and Matetsi, ≥10.2 in Gonarezhou, and ≥9.2 in Save Valley.

 Goal 1.2: By 2022, Painted Dogs will be present in ≥94 Quarter Degrees Squares across Zimbabwe.

Target 2: Prey Species (Kudu and Impala)

 Goal 2.1: By 2022, increase the Kudu population in the Hwange National Park sample area to at least 1,750 individuals.

Goal 2.2: By 2022, increase the Impala population in the Hwange National Park sample area to at least 700 individuals.

Target 3: Miombo Woodland

Goal 3.1: By 2022, the visibility index in designated sites of Miombo Woodland habitat (van Der Meer 2011) will be <75 metres

Goal 3.2: By 2022, the DBH of *Baphia massaiensis* will be 65% of the exclosure value in 2010

Target 4: Zambezi Valley and Escarpment

Goal 4.1: By 2022, reduce the percentage leaf crown cover of invasisve plant species as measured in May relative to other plant species in the Zambezi Valley ecosystem

Goal 4.2: By 2022, increase the DBH of *Albida* in the Zambezi valley ecosystem so that there is a statistically significant change in the DBH from measurements taken in 2012.

Target 5: Vlei System

Goal 5.1: By 2022, reduce the percentage of "Increaser 3" grass species in Kennedy vlei system to 60%

Goal 5.2: By 2022, 80% of the Kennedy vlei system will be covered in grasses.

Direct Threats and Objectives for the Direct Threats

Direct Threat 1: Legal Hunting of Kudu and Impala

Objective 1: By end of 2013, no Kudu and Impala will be legally shot for rations within Zimbabwe Parks & Wildlife Manangement Authority (ZPWMA) Estates

Direct Threat 2: Road Kills

Objective 2: By 2022 the Painted Dog road kill index on Kazungula to VF, VF to BYO road will be reduced by 80%

Direct Threat 3: Disease

Objective 3: By 2022, the Painted Dog disease index in the core operating area will be reduced by 80%

Direct Threat 4: Shooting Painted Dogs

Objective 4: By 2022, no Painted Dogs will be shot across the scope area

Direct Threat 5: Illegal Hunting

Objective 5: By 2022 there will be an 80% reduction in number of snares collected for each 100Km patrolled in the core operating area

Direct Threat 6: Wood Collection and Logging

Objective 6: By 2022 reduce the amount of wood collected for cooking by 10%

Direct Threat 7: Trafficking of Painted Dogs

Objective 7: By 2022, in areas where dogs are known to exist, there will be no reported cases of dogs dug out of dens

Direct Threat 8: Mining

Objective 8: By the end of each year from 2012 to 2022, identify the number of hectares where mining is active in the core operating area of PDC

Direct Threat 9: Dams

> **Objective 9:** By the end of each year from 2012 to 2022, identify the number of hectares where dam construction is active in the core operating area of PDC

Direct Threat 10: Veldt Fires

> **Objective 10:** By 2022, the area annually affected by fire is less than 10% of the core operating area.

Direct Threat 11: Pumping Water in Wildlife Areas

> **Objective** 11.1: By 2022, reduce the number of pumps in HNP by 50%

> **Objective** 11.2: By 2017, all existing pumps in HNP will be converted to solar

> **Objective** 11.3: By 2022, there will be no pumped waterholes in Vlei systems in HNP

Direct Threat 12: Lack of PDC Capacity

> **Objective 12:** By 2017 PDC infrastructure and staff capacity at desired level This includes training of staff in their relevant areas, appointment of GM, Financial Controller / Accountant plus second in charge in key positions such as Bush Camp, tracking (Jealous). Building capacity in terms of Field Research capabilities.

<u>**Strategy Selection Process**</u>

Our team considered our conceptual model, looked for key factors where we could intervene, and then brainstormed a series of strategies to address those factors. We then narrowed down the strategies by ranking strategies according to the following questions:

- **Potential Impact -** If implemented, will the strategy lead to desired changes in the situation at the project site?
- **Feasibility -** Would the project team be able to implement the strategy within likely time, financial, staffing, ethical, and other constraints?

We rolled up the ratings to get an overall summary rating for the strategy.

To further prioritize the seven strategies, we did a comparative ranking among the seven strategies (Table 3) that is based on Potential Impact of the strategy (ranked from 1-7 with 7 as the having the highest potential impact), Feasibility (ranked from 1-7 with 7 having the highest feasibility), and Capacity of PDC to implement the strategy (ranked from 1-3 with 3 being High, 2 being Medium, and 1 being Low). The scores for each strategy were totalled in the final column with the highest score indicating the highest priority strategy for implementation. PDC Organisational development was not ranked as such but was considered fundamental for the other strategies to be undertaken and thus was rated as a priority.

Table 3. Ranking of Potential Strategies.

Strategy	Potential Impact	Feasibility	PDC Do	Total
1. Land/water management	7	7	3	17
2. Species management	6	6	3	15
3. Education and awareness	5	5	3	13
4. Law and policy	4	4	2	10
5. Land/water protection	3	1	2	6
6. Livelihood, economic and other incentives	2	2	2	6
7 External capacity building	1	3	2	6
	28	28	17	73
PDC Organisational Development				

Figure 3. Conceptual Model with Strategies
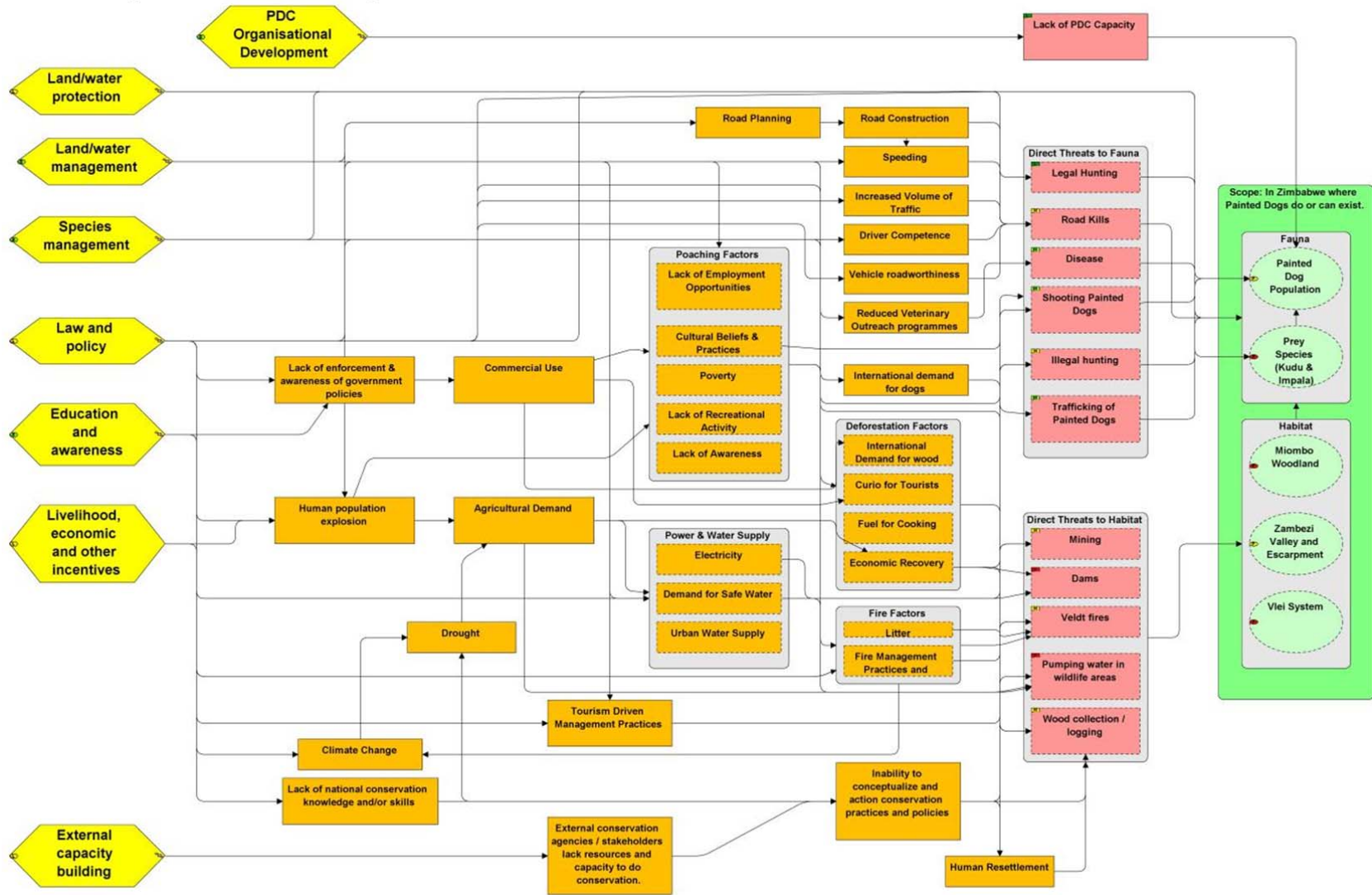
Strategies, Assumptions, and Intermediate Objectives

Strategy 1: Land and Water Management

Description of Strategy: Actions directed at conserving or restoring sites, habitats and the wider environment.[5] The aim of this strategy is to protect and improve suitable habitats for Painted Dogs and their prey species in the Core Operating Area.

Factor(s) the Strategy Will Address: This strategy will address the Direct Threats of illegal hunting, wood collection / logging and pumping water in wildlife areas within the Core Operating Area.

Assumptions Linking The Activities in This Strategy to Project Targets (Figure 4):

1) Anti-Poaching Units. Currently the PDC anti-poaching units (APU) patrol in the Core Operating Area and specifically the areas of this that fall outside HNP. Joint patrols are conducted inside HNP with ZPWMA scouts at their request. The assumptions of the Land and Water Management strategy are that the APU will provide a blanket of protection that will lead to a reduction in illegal hunting activities and thus a reduction in the mortality of Painted Dogs and their prey species. It is further assumed that as a side product of anti-poaching there will also be a reduction in wood collection and logging due to the arrest of persons acting illegally in the forest areas, which will have a positive impact on the habitat for Painted Dogs and their prey species, specifically the Miombo woodland.

2) Research on the Impacts of Water Pumping in Wildlife Areas. Painted Dog numbers have crashed in HNP from a healthy pack size averaging ≥14 dogs in 1970 to average pack sizes of ≤3 dogs in 2011 (See Appendix 2). This fivefold decline is correlated to a change in the habitat structure, and prey decline commensurate with a 4.5 fold increase of elephants from c. 8,000 in 1970 to c. 36,000 in 2011. On the basis that the high elephant population is linked to the pumping of water, we assume that targeted multidisciplinary ecosystem research will provide both insight and a valid argument that will lead to increased understanding of the negative impact of the water pumping in wildlife areas, which will result in a change in the pumping strategy to both reduce the volume, and distribution of water pumped. By doing this it is hoped that the Hwange ecosystem can be restored to one where both the prey and vegetative structure will once again benefit Painted Dogs as a species and avert possible extirpation from HNP.

To achieve these objectives three main research activities have been chosen:

1. Define the ecological issues associated with the pumping of water that are leading to both a dystrophic habitat and reduced biodiversity.

2. In order to be better equipped to advise on decisions on distribution and water volume pumped, to determine species specific water requirements, and deterrents that would facilitate species other than elephants to drink at new water points.

3. As great areas are currently deemed dystrophic, to investigate possible remedial strategies to speed up any recovery in the event that water pumping was altered and elephant populations reduced.

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[5] Definition from Salafsky, N., D. Salzer, A. J. Stattersfield, C. Hilton-Taylor, R. Neugarten, S. H. M. Butchart, B. E. N. Collen, N. Cox, L. L. Master, S. O'Connor, and D. Wilkie. 2008. A Standard Lexicon for Biodiversity Conservation: Unified Classifications of Threats and Actions. Conservation Biology 22:897-911.

Figure 4. Assumptions Linking the Land and Water Management Strategy to Project Targets
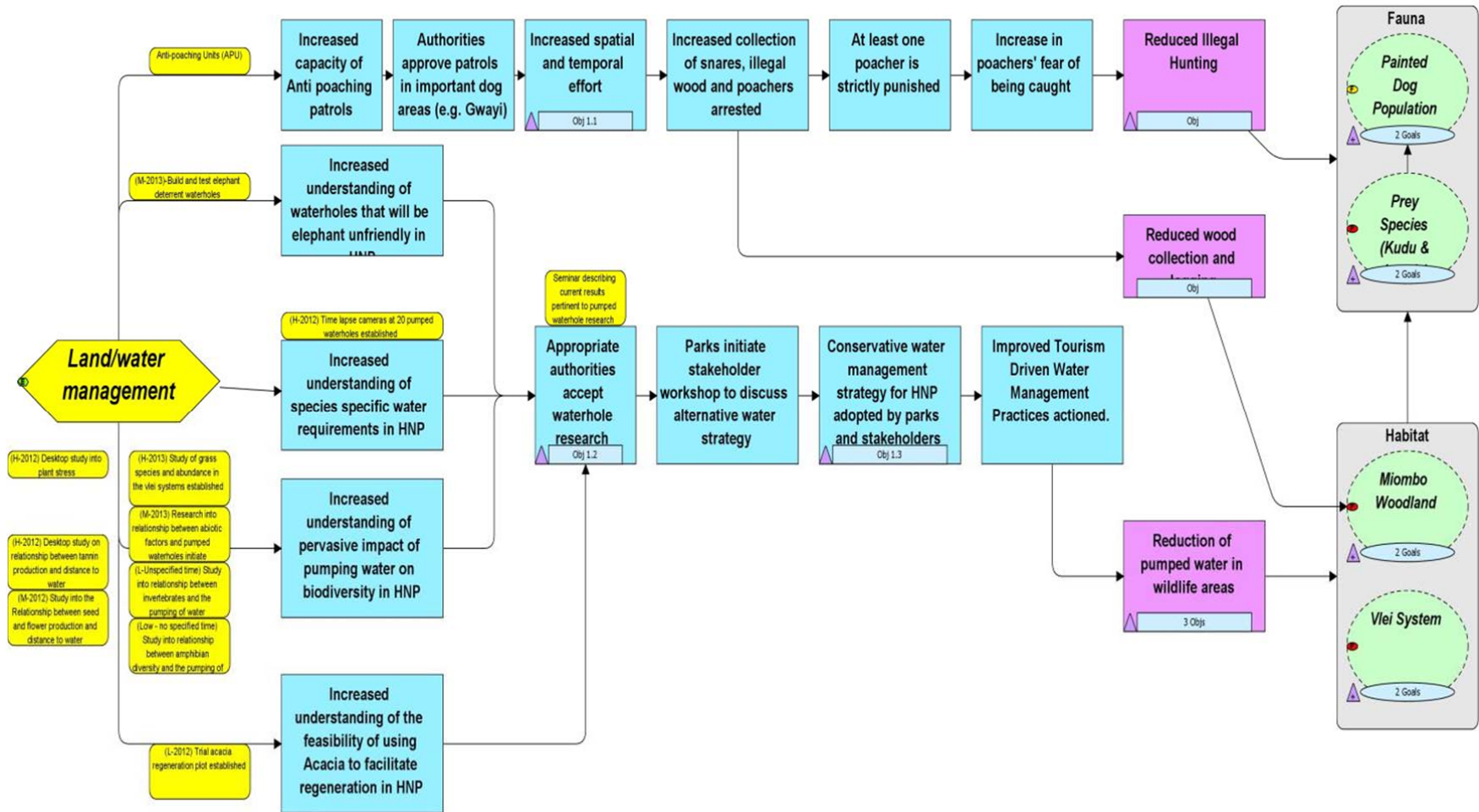
Table 4. Activities and Objectives Associated with Strategy 1: Land and Water Management

Strategy 1: Land and Water Management: Aimed at reducing the Direct Threats of illegal hunting, wood collection / logging and pumping water in wildlife areas.			
Objective 1.1: By end of 2012 APU are being deployed on a daily basis throughout the core operating area			
Activity	**Person responsible**	**Start Date**	**Comments**
Anti-poaching Units (APU)	EZ, FW, PB	2012	Already underway
Objective 1.2: By end of 2012 the Parks Board ratifies the research results on the negative impacts of water pumping in wildlife areas and calls for preparation of an alternative water pumping strategy.			
Objective 1.3: By 2013 the Parks Board adopt an action plan regarding a conservative water management strategy			
Activity	**Person responsible**	**Start Date**	**Comments**
1. Time lapse cameras at 20 pumped waterholes. 2. Desktop research study into plant stress. 3. Desktop study into thorn defence relative to pumped water. 4. Desk top study on relationship between tannin production and distance to water.	GSAR	2012.	These are High priority activities that entail current data being written up ready for presentation. Details will be found in the 2012-2017 plan for Painted Dog Research being produced. (See Appendix 4 Integrated Research Proposal for the Painted Dog *Lycaon pictus* in Zimbabwe)
Seminar describing current results pertinent to pumped waterhole research	GSAR , PB	Beginning of second quarter in 2012.	This is a High priority activity that will take place at NP head office in Harare and maybe roll out into regional offices (specifically HNP). Prepare alternative water pumping strategies.
Implement study into the Relationship between seed and flower production and distance to water	GSAR	2012	This is a Medium priority activity; possible future research topic.
Establish trial *Acacia* regeneration plot	GSAR	2014	This is a Low priority activity; possible future research topic.
Establish study of grass species and abundance in the vlei systems	GSAR	2012-13	This is a High priority activity for the future,
Initiate research into relationship between abiotic factors and pumped waterholes	GSAR	2013	This is a Medium priority activity for the future,
Build and test elephant deterrent waterholes	GSAR	2014	This is a Medium priority activity for the future,

Strategy 2. Species Management.

Description of Strategy: Actions directed at managing or restoring species, focused on the species of concern itself[6]

Factor(s) the Strategy Will Address: Aimed at reducing the Direct Threats of road kills, shooting Painted Dogs, illegal hunting, frequency and intensity of veldt fires, and trafficking of Painted Dogs.

Assumptions Linking The Activities in This Strategy to Project Targets (Figure 5):

1) Rehabilitation of Painted Dogs. Assumptions are that with the establishment of (and formalized) intervention guidelines by PDC and ZPMWA pack integrity will be maintained leading to an increase in the number of dog packs and mean pack sizes. Intervention guidelines would include rehabilitating injured dogs, snare removal, treatment of Painted Dogs in the wild, pack formation from orphaned Painted Dogs and or the translocation of perceived problem packs into safe areas. To facilitate this a Rehabilitation Facility has already been established by PDC and daily monitoring of collared packs across Zimbabwe is underway.

2) National Painted Dog Census and Databases. The last national Painted Dog census and threat assessment was carried out in 1997 (Rasmussen 1997)[7]. On the premise that it is impossible to conserve a species if one does not have accurate data pertinent to its distribution, density and threats, it is intended to conduct Painted Dog census and threat assessment at a national level to update the data on dog distribution, density and threats. Following a four year period of intensive research on the national pack it is intended that genetic demographic and threat data will be available to inform an update of the national action plan. Simultaneously it is intended to produce a land use map where painted dog populations will be overlaid and thus facilitate the conceptualisation of a landscape strategy for Painted Dogs to include designated corridors and landscape incentives and deterrents in the relevant areas. Following the adoption of a significantly updated national action plan, it is assumed that the threats will be addressed for the direct benefit of Painted Dogs and the continued integrity of the national Zimbabwean dog pack.

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[6] For example, this strategy may include managing specific plant and animal populations of concern. Species recovery to include manipulating, enhancing or restoring specific plant and animal populations. Disease/parasite management. Reintroducing of species to places where they formally occurred or benign introductions. Ex situ conservation protecting biodiversity out of its native habitats such as captive breeding, artificial propagation or gene banking.

[7] (Rasmussen, G. S. A. 1997. Conservation status of the painted hunting dog Lycaon pictus in Zimbabwe, Ministry of Environment & Tourism. Harare, Zimbabwe, Department of National Parks & Wildlife Management. 47 pp.)

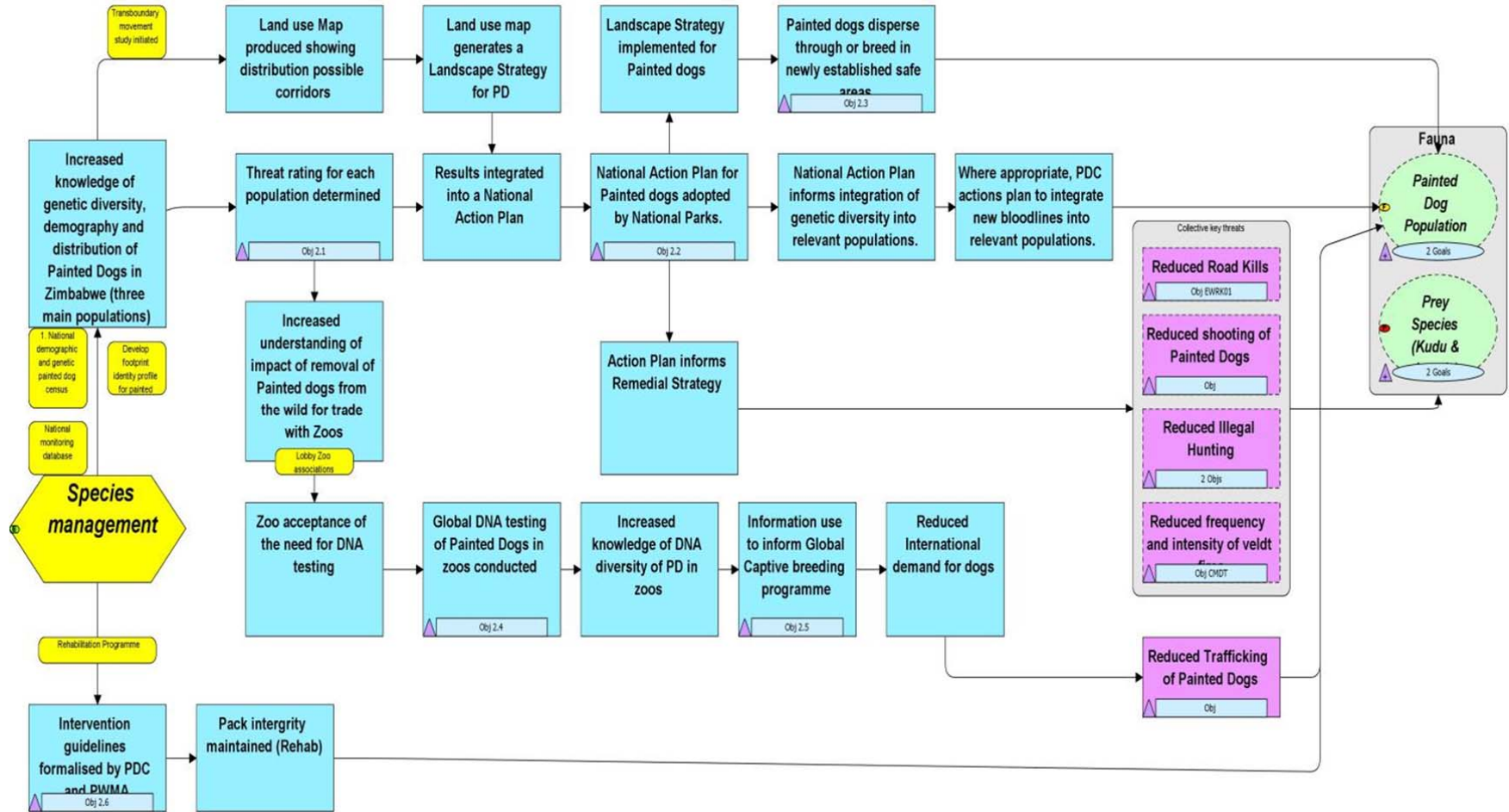**Figure 5. Assumptions Linking the Species Management Strategy to Project Targets**

Table 5. Activities and Objectives Associated with Strategy 2. Species Management.

Strategy 2. Species Management			
Aimed at reducing the Direct Threats of road kills, shooting of Painted Dogs, illegal hunting, frequency and intensity of veldt fires, and trafficking of Painted Dogs.			
Objective 2.1: By 2017, all available data on dog demographics, mortality, and threats compiled into a status report			
Objective 2.2: By 2017, the National Action Plan is updated in conjunction with ZPMWA			
Objective 2.3: By 2022 sightings of dogs recorded in 50% of the QDS's dispersal corridors identified in the dispersal map			
Activities	**Person responsible**	**Start Date**	**Comments**
National demographic and genetic Painted Dog census	GSAR	2012	High priority activity
National monitoring database	GSAR	2012	High priority activity mainly desk top.
Transboundary movement study initiated	GSAR , PB	2012	High priority activity
Develop footprint identity profile for Painted Dogs	GSAR	2012	High priority activity
Objective 2.4: By the end of 2014, DNA testing of Painted Dogs in zoos is completed			
Objective 2.5: By 2016, Global Captive Breeding Programme established			
Activities	**Person responsible**	**Start Date**	**Comments**
Lobby Zoo associations	GSAR	2012	High priority, largely desk top activity. May entail future meetings with Zoo associations.
Objective 2.6: By end of 2012 intervention guidelines formalised by PDC and ZPMWA			
Activities	**Person responsible**	**Start Date**	**Comments**
Rehabilitation Programme	XM, JM, GSAR , PB	2012	These are high priority activities currently underway.

Strategy 3: Education and Awareness

Description of Strategy: Actions directed at people to improve understanding and skills, and influence behaviour[8].

Factor(s) the Strategy Will Address: Aimed at reducing the Direct Threats of road kills, shooting Painted Dogs, wood collection and logging, the impact of mines and dams, illegal hunting, and the frequency and intensity of veldt fires.

Assumptions Linking The Activities in This Strategy to Project Targets (Figure 6):

1) HIV/AIDS Programme. With an HIV / AIDS programme providing for the health of the human population in the core operating area, it is assumed that there will be an increase in the knowledge of PDC Aims and Objectives and that this will lead to an increase in the percentage of the human population in our core operating area with a positive attitude towards PDC and an increased positive

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[8] EG; Formal education enhancing knowledge and skills of students in a formal programme or training enhancing knowledge, skills and information exchange for practitioners, stakeholders, and other relevant individuals in structured settings outside of formal programmes. Monitoring workshops or training courses for park managers, stakeholder education on specific issues. Awareness and communications raising environmental awareness and providing information through various multi media, world wide web or through environmental publishing.

attitude towards nature. The assumption is that through formal and informal education programmes, the level of knowledge, understanding and empathy for Painted Dogs and nature as a whole will increase.

2) Painted Dog Awareness Campaign. It is assumed that awareness of the protected status of Painted Dogs and the negative impact of poaching, road kills and shooting will lead to an increase in the fear of punishment and thus a reduction in the incidents of Painted Dogs being killed in snares, being run over by cars and being shot.

3) Happy Readers. It is assumed that this potential activity will lead to an increase in the level of literacy in English and in turn a capacity for learning which will lead to an improved quality of life and an increase in the number of adults with a positive attitude towards PDC. This will lead to a reduction in illegal hunting activities, which impacts on the Painted Dogs and their prey species.

4) Outreach Programme – Arts & Crafts and Community Development Through the development of environmentally friendly crafts and more sustainable farming practices it is assumed that household incomes will rise and thus quality of life. This will lead to a reduction in illegal hunting and wood collecting and also an increase in the number of adults with a positive attitude towards PDC.

5) Kids for Science is another proposed future activity that assumes that children with improved conservation science skills will lead to an increase in the number of children taking science O and A levels and thus an increase in the capacity to conceptualize conservation issues, which will lead to more conservation practitioners and a reduction in illegal hunting practises.

6) Bushcamps and Conservation Clubs. It assumed that these activities will lead to increased understanding of ecology and conservation concepts, including an understanding of adaptations and the value of biodiversity. This will lead to increased empathy and understanding of nature, and conservation by people residing in our core operating areas, which will result in a reduction in illegal hunting, the collection of wood and a decrease in the frequency of veldt fires.

7) Technical Advice on the Environmental Impact of Infrastructure Development. Assumptions are that by providing technical advice on the negative impact of infrastructure development (mines, dams, roads, human settlements, etc.) then consideration for the habitat will follow and thus the impact of such developments will be minimized.

It is recognised that there is an urgent need to evaluate the current programmes such as the HIV / AIDS, Children's Bush Camp, Conservation Clubs to determine if they are indeed contributing as assumed towards desired attitudinal and behavioural changes that will impact positively on the PDC targets. It is considered that consultation with a professional in Social Science will be required to design evaluation survey methods and extract the data. This will help us understand if we are doing the right thing and when we can expect to see the desired changes.

Figure 6. Assumptions Linking the Education and Awareness Strategy to Project Targets
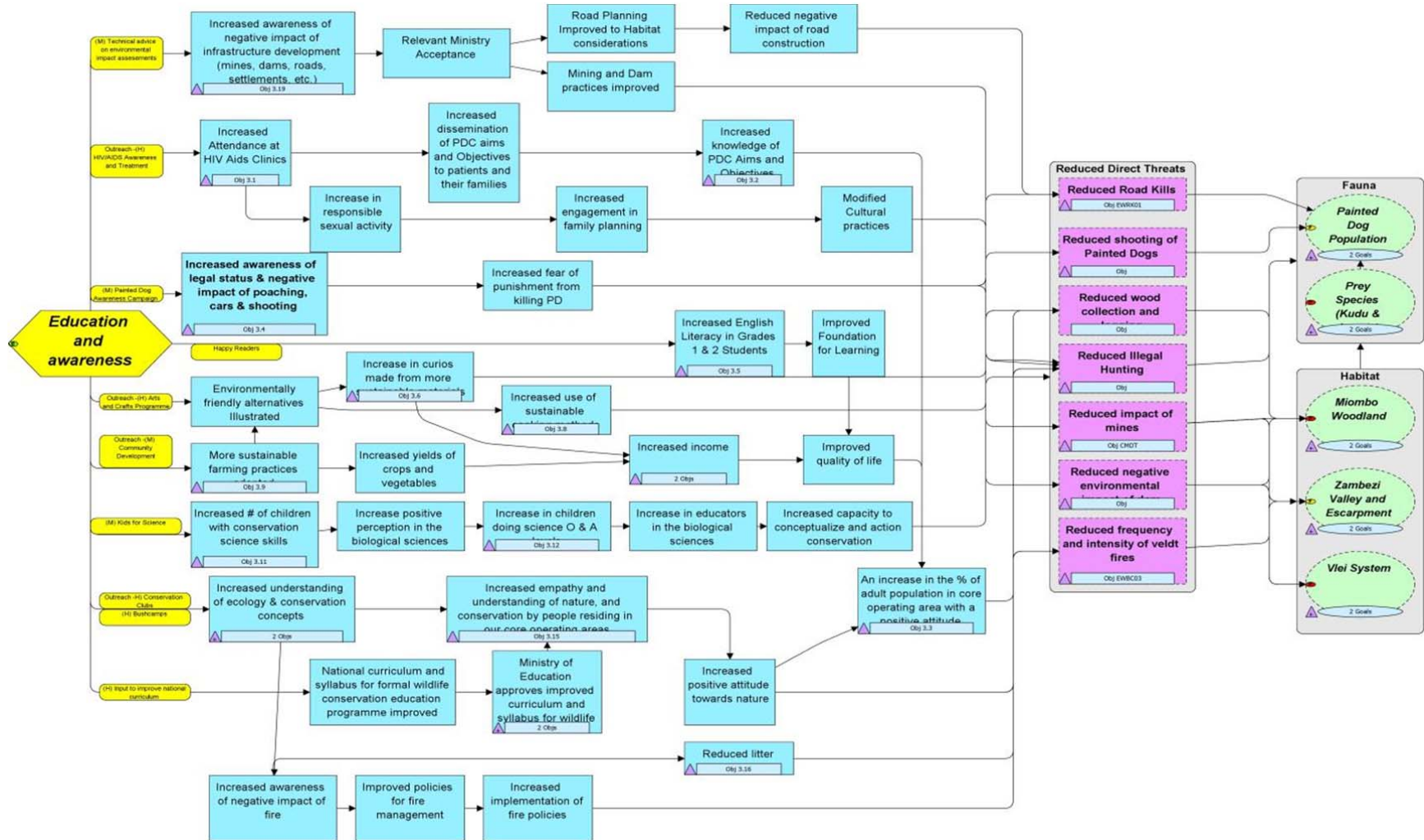
Table 6 Activities and Objectives Associated with Strategy 3: Education and Awareness

Strategy 3: Education and Awareness.
Aimed at reducing the Direct Threats of road kills, shooting Painted Dogs, wood collection and logging, the impact of mines and dams, illegal hunting, and the frequency and intensity of veldt fires.

Objective 3.1: By end 2012, 20% of the population in Dete, Mabale & Lupote are attending the clinics for testing

Objective 3.2: By the end of 2014 the HIV clinic patients will have increased knowledge and support of PDC aims and objectives

Objective 3.3: Yearly from 2012 to 2022, there will be an increase in the % of adult population in the core operating area with a positive attitude towards PDC.

Activity	Person responsible	Start Date	Comments
Outreach HIV/AIDS Awareness and Treatment	DNY, FW, PB	2012	High priority to measure the impact for PDC

Objective 3.4: By end of 2014, 90% of the adult population in the core operating area are aware of the legal status of Painted Dog and negative impact of poaching, cars & shooting

Activity	Person responsible	Start Date	Comments
Painted Dog Awareness Campaign	BM, GSAR, JM, PB, WC	2012	Addressing following threats: Road Kills and Shooting of Dogs

Objective 3.5: By end of 2014, there is a measurable increase in the level of English literacy in grade 1 & 2 children in the 19 schools that attend the bushcamp

Activity	Person responsible	Start Date	Comments
Happy Readers	GP, WN	2012	This is proposed activity requiring capital of USD20,000 to purchase a set of books for each of the 19 schools that will then be distributed by PDC.

Objective 3.6: By end of 2012 90% of curios at the Art and Craft centre are being made from wire, reeds and batiks.

Objective 3.7: By 2022 artisans at the Art and Craft centre have an average annual income that is above the poverty datum line

Activity	Person responsible	Start Date	Comments
Outreach: Arts and Crafts Programme	AN, FW	2012	Currently underway.

Objective 3.8: By end of 2017, at least 10% of households in targeted communities are not using wood for cooking

Objective 3.9: By end of 2017, 20 farmers in each of the wards of Mabale, Lupote and Silewu are practising sustainable farming techniques

Objective 3.10: By 2017, the 20 farmers in each of the wards of Mabale, Lupote and Silewu that use sustainable farming techniques will have increased incomes.

Activity	Person responsible	Start Date	Comments
Outreach Community Development	WN	2012	This is of medium priority and mainly entails engaging appropriate expert organisations in farming etc..

Strategy 3: Education and Awareness. (cont..)
Aimed at reducing the Direct Threats of road kills, shooting Painted Dogs, wood collection and logging, the impact of mines and dams, illegal hunting, and the frequency and intensity of veldt fires.

Objective 3.11: By 2017 50 children from the 5 secondary schools in our core operating area have participated in the Kids for Science programme

Objective 3.12: By 2017 25% increase in number of children taking science O and A levels in local secondary schools

Activity	Person responsible	Start Date	Comments
Kids for Science	Not specified	Not specified	This is a proposed future activity.

Objective 3.13: By the end of each year from 2012 to 2022, the average score in an ecology and conservation concepts test of children in Form 2 in the 5 secondary schools that attended the Bush camp is significantly higher than children that did not attend the bush camp

Objective 3.14: By the end of each year from 2012 to 2022, the average score is 90% in the Bushcamp post camp questionnaires

Activity	Person responsible	Start Date	Comments
Bushcamps	GP, WN, DN, WC	2012	Currently underway. There is a need to engage a Social Scientist here to help us evaluate the programme plus also design additional questionnaires.

Objective 3.15: By the end of 2022, 50% of the people in the core operating area have developed empathy and understanding of nature and conservation

Objective 3.16: By the end of 2012 there is a measurable reduction in the amount of litter in the core operating area

Activity	Person responsible	Start Date	Comments
Conservation Clubs	DNY, WN	2012	

Objective 3.17: By 2013 the improved curriculum and syllabus for wildlife conservation education programme has been approved by the Ministry of E,SC.

Objective 3.18: By 2014 the improved curriculum and syllabus for wildlife conservation education programme has been implemented nationally in all primary schools.

Activity	Person responsible	Start Date	Comments
Input to improve national curriculum	WN	2012	Input has already been given as requested by Ministry.

Objective 3.19: By end of 2022 there is an Increased awareness of negative impact of infrastructure development (mines, dams, roads, settlements, etc.) on the habitat.

Activity	Person responsible	Start Date	Comments
Technical advice on Environmental Impact Assessments (EIA)	GSAR	From 2012	Input into EIA will be given when requested.

Strategy 4: Law and Policy

Description of Strategy: Actions to develop, change, influence, and help implement formal legislation, regulations, and voluntary standards[9].

Factor(s) the Strategy Will Address: Aimed at reducing the Direct Threats of trafficking, road kills, disease, shooting Painted Dogs, illegal hunting, and the numbers of Kudu & Impala hunted on quota in safari areas and within Parks Estates

Assumptions Linking Activities in This Strategy to Project Targets (Figure 7):

1)   **CITES Appendix 1 Listing.** The assumption is that an appendix 1 listing will lead to increased control over trade in Painted Dogs and thus reduce the impact of trade on the wild population which will in turn contribute to an increase in the number of dog packs and mean pack sizes.

2)   **Reduce Speed Limits on Roads.** Through lobbying for appropriate legislation leading a reduction of speed limits on selected roads combined with effective enforcement it is assumed that Painted Dog road kills will be reduced, which will contribute towards and increase the number of dog packs and mean pack sizes.

3)   **Vaccination Programme.** The assumption is that the spread of deadly diseases such as rabies and distemper to the Painted Dog population will be reduced through regular vaccination programmes of domestic dogs. Reducing mortality in this way will thus contribute towards and increase the number of dog packs and mean pack sizes.

4)   **Revise Quota System on Impala and Kudu**. The assumption is that if ZPMWA are aware of and accept that kudu and impala are key prey species for Painted Dogs, needed so that Painted Dogs can maintain viable pack sizes, then ZPMWA will remove kudu and impala from all NP ration quotas and from quotas in safari hunting areas. The assumption is that this will then lead to an increase in these prey species populations, which will inturn make more food available for Painted Dogs which will thus contribute towards an increase the number of dog packs and mean pack sizes.
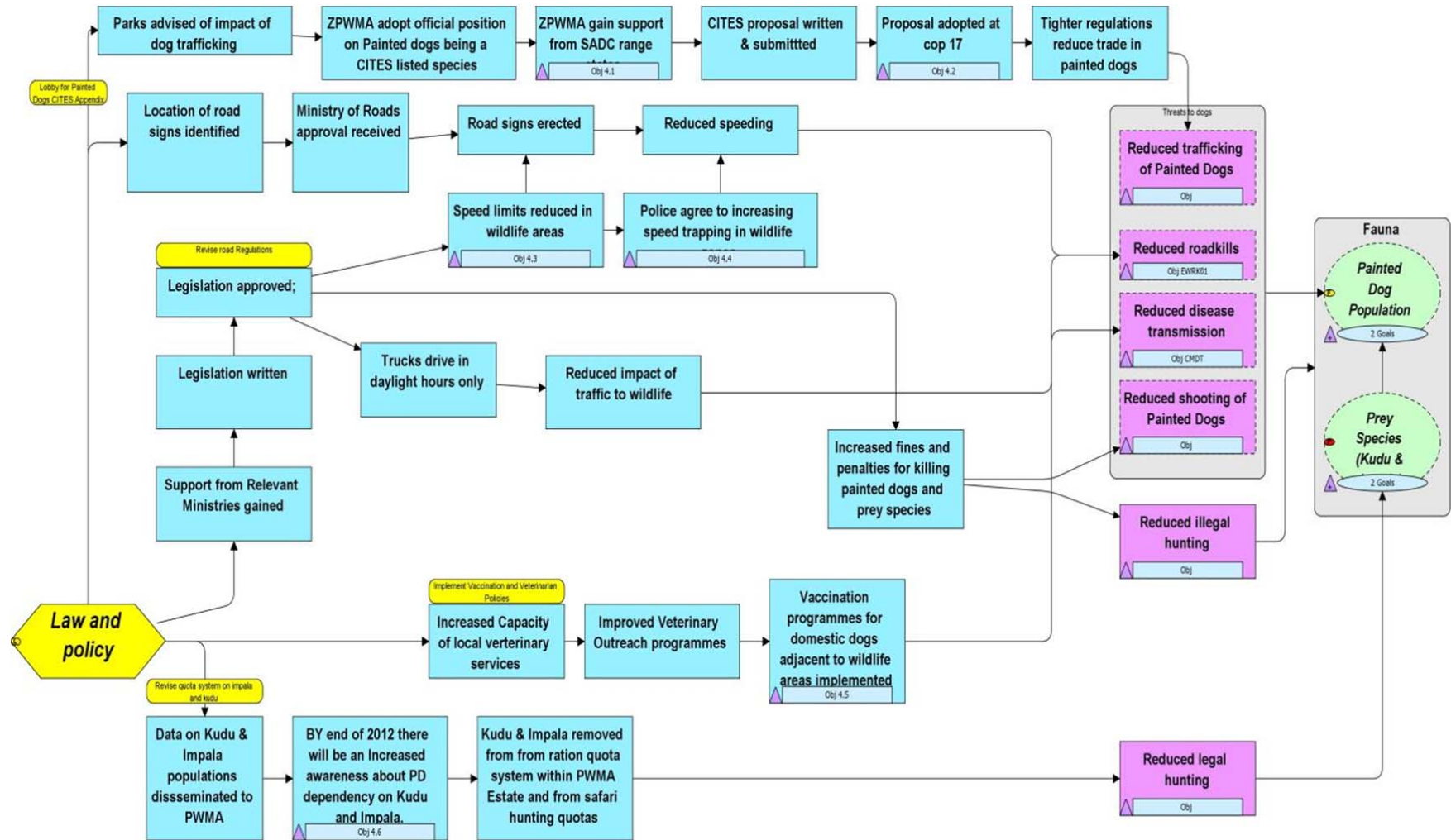
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[9] E.G. legislation making, implementing, changing, influencing, or providing input into formal

Government sector legislation or polices at all levels: Global: promoting conventions on biodiversity, wildlife trade laws like CITES. National: Providing technical data to policy makers, species protection laws, hunting bans. Policies and regulations making, implementing, changing, influencing, or providing input into policies and regulations affecting the implementation of laws at all levels.

Private sector standards and codes setting, implementing, changing, influencing, or providing input into voluntary standards and professional codes that govern private sector practice.

Monitoring and enforcing compliance with laws, policies and regulations, and standards and codes at all levels initiating criminal and civil litigation

Figure 7. Assumptions Linking the Law and Policy Strategy to Project Targets

Table 7. Activities and Objectives Associated with Strategy 4: Law and Policy

Strategy 4: Law and Policy. Aimed at reducing the Direct Threats of trafficking, road kills, disease, shooting Painted Dogs, illegal hunting, and the numbers of Kudu & Impala hunted on quota in safari areas and within Parks Estates			
Objective 4.1: By the end of 2012 SADC countries support ZPWMA proposal for Painted Dogs to be given CITES Appendix 1 listing.			
Objective 4.2: At COP 17 in 2013 Painted Dogs get CITES Appendix 1 listing			
Activity	**Person responsible**	**Start Date**	**Comments**
Lobby for Painted Dogs CITES Appendix 1 listing	GSAR, PB	2012	There is a report with George Indeer Maur which still needs to be widely distributed
Objective 4.3: By end of 2013 speed limit on identified roads within core operating area reduced to 80kph			
Objective 4.4: By 2013 police operate with speed guns twice a week on designated roads within core operating area			
Activity	**Person responsible**	**Start Date**	**Comments**
Revise road Regulations	FW, PB	2012	Desktop activity. Proposal already submitted to ministry.
Objective 4.5: Vaccination programme of domestic dogs conducted every second year from 2012 to 2022 in core operating area			
Activity	**Person responsible**	**Start Date**	**Comments**
Implement Vaccination and Veterinarian Policies	FW, PB, GSAR	2012	Fully funded programme by Wildlife Vets International in conjunction with the Gov Vet in Hwange, Dr Zishiri. PDC are facilitators only
Objective 4.6 : By end of 2012, ZPWMA accept that kudu and impala must not be included on ration quotas to conserve Painted Dogs.			
Activity	**Person responsible**	**Start Date**	**Comments**
Revise quota system on impala and kudu	GSAR, PB	2012	

Strategy 5: Land and Water Protection

Description of Strategy: Actions to identify, establish or expand parks and other legally protected areas, and to protect resource rights.

This is a future strategy that PDC may attempt to develop and would include issues such as the fencing of Matobos NP and the creation of a Meta population for Painted Dogs or the annexing of Gwayi Conservancy under HNP. PDC may also be involved at some level, if requested, in the creation of Trans frontier Parks.

Strategy 6: Livelihood, Economic and Other Incentives

Description of Strategy: Actions to use economic and other incentives to influence behavior.

This is a recognised strategy however it is considered that any activities undertaken would be peripheral to PDC.

Strategy 7: External Capacity Building (PDC's Social Corporate Responsibility).

Description of Strategy: Actions to build the infrastructure to do better conservation.

EG: Creating or providing nonfinancial support and capacity building for government agencies and communities.

PDC has no formal activities under this strategy at the moment other than the acceptance of both

National and International Students. Informal donations to ZPWMA, HRDC and ZRP do occur

Strategy 8: PDC Organisational Development

Description of Strategy: Actions directed at PDC Core operational structure, facility maintenance and specifically development of infrastructure such as accommodation and essential facilities. This includes appointment of GM, Financial Controller / Accountant plus second in charge in key positions such as Bush Camp, tracking (Jealous) and building capacity in terms of field research capabilities.

Factor(s) the Strategy Will Address: Aimed at reducing the Direct Threat of a lack of capacity within PDC.

Assumptions Linking This Strategy to Project Targets: The assumption is that PDC requires adequate capacity in terms of infrastructure and qualified staff to implement any or all of the strategies and thus impact on the direct threats to the targets and that in particular this will impact mostly on the Painted Dogs.

Figure 8. Assumptions Linking the PDC Organisational Development Strategy to Project Targets

Table 8. Activities and Objectives Associated with Strategy: PDC Organisational Development

Strategy 8: PDC Organisational Development.
Aimed at increasing PDC capacity in terms of infrastructure for Management and staff as well as ensuring adequate and appropriate staff are in place.
Objective 8.1: By the end of 2014 PDC Base Camp construction completed.
Objective 8.2: By 2017 PDC staff requirements fulfilled. This includes appointment of GM, Financial Controller / Accountant plus second in charge in key positions such as Bush Camp, tracking (Jealous). Building capacity in terms of Field Research capabilities.

Activity	Person responsible	Start Date	Comments
Construction of Base Camp	PB, DN, GSAR	2012	Sept 2011 – Nov 2011: Purchase materials, transport to site and undertake ground works / site preparation. Jan 2012 – June 2012: Foundations, water pipes, lay electric cable and all ground works complete on three senior staff houses. July 2012 – Sept 2012: External and internal structure plus roof up to completion on three staff houses, one senior staff house, vehicle workshop and stores Oct 2012 - Dec 2012: Internal fixtures and fittings completed three staff houses, one senior staff house, vehicle workshop and stores
Appoint General Manager, Financial Controller / Accountant. Undertake appropriate Staff Training for existing Staff. Ensure adequate cover in terms of a number 2 in key positions.	PB, GG, FW	2012	

2B. Monitoring Plan

We have developed a monitoring plan for each goal and objective, and in some cases, other key results or factors. As above, we have organized the monitoring plan by strategy. For simplicity's sake, however, we present the monitoring plan for the goals and direct threat objectives first because multiple strategies address the same goals and direct threat objectives.

Table 10. Overall Project Monitoring Plan

MONITORING PLAN FOR PROJECT GOALS				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Goal 1.1: By 2022, Painted Dog pack sizes will reach ≥6 in Hwange, ≥5 in Gwayi, ≥6 in Victoria Falls and Matetsi, ≥10.2 in Gonarezhou, and ≥9.2 in Save Valley.				
Painted Dog mean adult and yearling pack size	Direct sightings and intensive research	Continuous	GSAR	Research team / Student
Goal 1.2: By 2022, Painted Dogs will be present in ≥94 Quarter Degrees Squares in Zimbabwe.				
QDSs where Painted Dogs are present	Direct sightings and intensive research	Continuous	GSAR	Research team / Student
Goal 2.1: By 2022, increase the Kudu population in Hwange National Park sample area to at least 1,750 individuals.				
Number of Kudu at 23 designated waterholes in Hwange National Park	Direct sightings	Annually	Wildlife Environment Zimbabwe	
Goal 2.2: By 2022, increase the Impala population in sample area of Hwange National Park to at least 700 individuals.				
Number of Impala at 23 designated waterholes in Hwange National Park	Direct sightings	Annually	Wildlife Environment Zimbabwe	
Goal 3.1: By 2022, the visibility index in designated sites of Miombo Woodland habitat will be <75 metres				
Visibility index	(Method as per van Der Meer 2011)	2017	GSAR	Research team / Student
Goal 3.2: By 2022, the DBH of *Baphia massaiensis* will be 65% of the enclosure value in 2010				
DBH of *Bafia masaaiensis* relative to PDC enclosure	Vegetation transects	2017	GSAR	Research team / Student
Goal 4.1: By 2022, reduce the abundance of invasive plant species in the Zambezi Valley ecosystem				
Invasive plant species	Vegetation transects	2016	GSAR	Research team / Student
Goal 4.2: By 2022, increase the DBH of *Albida* in the Zambezi valley ecosystem				
DBH of *Albida*	Vegetation transects	2016	GSAR	Research team / Student
Goal 5.1: By 2022, reduce the percentage of "Increaser 3" grass species in Kennedy vlei system to 60%				
Percentage of "Increase 3" grass species	Point transect method	2013	GSAR	Research team / Student
Goal 5.2: By 2022, 80% of the Kennedy vlei system will be covered in grasses				
Percentage of Kennedy vlei system covered in grasses	Point transect method	2013	GSAR	Research team / Student

MONITORING PLAN FOR PROJECT DIRECT THREAT OBJECTIVES				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Direct Threat Objective 1: By end of 2013, no Kudu and Impala will be legally shot for rations within ZPMWA Estates				
Quota from parks HQ	Check quota from parks HQ	Ongoing	PB, GSAR	
Direct Threat Objective 2: By 2022 Painted Dog road kill index reduced by 80% on Kazungula to VF, VF to BYO road				
Road kill index	Check PDC database	Biannually	GSAR	Research team / Student
Direct Threat Objective 3: By 2022, the Painted Dog disease index will be reduced by 80% in the core operating area				
Painted Dog disease index	Check PDC database	Biannually	GSAR	Research team / Student
Direct Threat Objective 4: By 2022, no Painted Dogs will be shot across the scope area				
Painted Dogs shot across the scope	Check PDC database	Biannually	GSAR	
Direct Threat Objective 5: By 2022 there will be an 80% reduction in number of snares collected for each 100Km patrolled				
# of snares collected per 100km patrolled	Patrol reports	Annually	GSAR	Research team / Student
Direct Threat Objective 6: By 2022 reduce the amount of wood collected for cooking by 10%				
# of households using wood for cooking in Dete	HRDC Records	Annually	FW / WN / DNY	
Direct Threat Objective 7: By 2022, in areas where dogs are known to exist, there will be no reported cases of dogs dug out of dens				
# of reports of pups dug out of dens	PDC database	Annually	GSAR	
Direct Threat Objective 8: By the end of each year from 2012 to 2022, identify the number of hectares where mining is active in the core operating area of PDC				
Hectares of land being mined	Satellite imagery	Annually	GSAR	Research team / Student
Direct Threat Objective 9: By the end of each year from 2012 to 2022, identify the number of hectares where dam construction is active in the core operating area of PDC				
Hectares of land affected by dam construction	Satellite imagery	2016	GSAR	Data from EMA
Direct Threat Objective 10: By 2022, the area annually affected by fire is less than 10% of the core operating area				
Percent area affected by fire in core operating area	Satellite imagery	Annually	GSAR	Data from EMA
Direct Threat Objective 11.1: By 2022, reduce the number of pumps by 50% in HNP				
Number of pumped waterholes in HNP	Parks data record	Biannually	GSAR, ZPWMA	
Direct Threat Objective 11.2: By 2017, all existing pumps in HNP converted to solar				
Number of pumped waterholes converted to solar	Parks data records	Biannually	GSAR, ZPWMA	

MONITORING PLAN FOR PROJECT DIRECT THREAT OBJECTIVES (cont..)				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Direct Threat Objective 11.3: By 2022, no pumped waterholes in Vlei systems in HNP				
Number of pumped waterholes in Vlei systems in HNP	Parks data records	Biannually	GSAR, ZPWMA	
Direct Threat Objective 12: Lack of PDC Capacity				
PDC facilities and staff levels	PDC staff records and ground observations	Annually	PB	

MONITORING PLAN FOR STRATEGY 1: LAND WATER MANAGEMENT				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Objective 1.1: By end of 2012 APU being deployed on daily basis throughout core operating area				
Area patrolled (sq. km)	Daily Patrol reports	2012	EZ	Core operating area
Objective 1.2: By end of 2012 Parks Board ratifies the research results and calls for preparation of alternative water pumping strategy.				
Minutes of Parks board meeting	Check at Parks HQ	2012	GSAR, PB	
Objective 1.3: By 2013 parks action plan created regarding a conservative water management strategy				
An action plan for water pumping	Check at Parks HQ	2013	GSAR, PB	

MONITORING PLAN FOR STRATEGY 2: SPECIES MANAGEMENT				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Objective 2.1: By 2017, all available data on dog demographics, mortality, and threats compiled into a status report				
Status report on PD range and threats in Zimbabwe	Data records	2017	GSAR	Research team / Student
Objective 2.2: By 2017, the National Action Plan is updated in conjunction with ZPMWA				
National Action Plan for PD	Data records	2017	GSAR	Research team / Student
Objective 2.3: By 2022 sightings of dogs recorded in 50% of the QDS's dispersal corridors identified in the dispersal map				
Sighting by QDS in PDC Database	Data records	2022	GSAR	Research team / Student
Objective 2.4: By the end of 2014, DNA testing of PD in zoos is completed				
Results from DNA testing of PD in zoos	Data records	2014	GSAR	Research team / Student

MONITORING PLAN FOR STRATEGY 2: SPECIES MANAGEMENT (cont..)				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Objective 2.5: By 2016, Global Captive Breeding Programme established				
Global Captive Breeding Programme	Data records	2016	GSAR	Research team / Student
Objective 2.6: By end of 2012 intervention guidelines formalised by PDC and ZPWMA				
Published guidelines	Data records	2012	GSAR	Research team / Student

MONITORING PLAN FOR STRATEGY 3: EDUCATION AND AWARENESS				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Objective 3.1: By end 2012, 20% of the population in Dete, Mabale & Lupote are attending the clinics for testing				
Number of people attending each clinic for testing	Clinic records	Month end	FW	each clinic
Objective 3.2: By the end of 2014 the HIV clinic patients will have increased knowledge and support of PDC aims and objectives				
Level of knowledge of PDC aims & objectives	Survey	2014	DNY	each clinic
Objective 3.3: Yearly from 2012 to 2022, the number of people with positive attitudes towards PDC will improve measurably				
% of population with a positive attitude to PDC within our core operating area	Survey	2017 & 2022	BM	Core operating area
Objective 3.4: By end of 2014, 90% of the adult population in the core operating area are aware of the legal status of PD and negative impact of poaching, cars & shooting				
% of the adult population in the core operating area that are aware of the legal status of PD and negative impact of poaching, cars & shooting	Survey	2014	WN	Core operating area
Objective 3.5: By end of 2014, there is a measurable increase in the level of English literacy in grade 1 & 2 children in the 19 schools that attend the bushcamp				
Average % score of the class in English reading exams	Schools reading test	2014	WN	19 schools that attend the bushcamp
Objective 3.6: By end of 2012 90% of curios at the art centre are being made from wire, reeds and batiks				
Number of curios made from other materials not wood	Data Records	2012	AN	Dete
Objective 3.7: By 2022 artisans at the Art and Craft centre have an average income above the poverty datum line				

MONITORING PLAN FOR STRATEGY 3: EDUCATION AND AWARENESS (cont..)				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
By 2022 artisans at the Art and Craft centre have an average income above the poverty datum line	Data Records	2022	AN, FW, GG	3 Wards, Mabale, Lupote, Silewu
Objective 3.8: By end of 2017, at least 10% of households in targeted communities not using wood for cooking				
% of households in targeted communities not using wood for cooking	Data Records	2017	BM	Dete
Objective 3.9: By 2017, 20 farmers in each of the wards of Mabale, Lupote and Silewu are practicing sustainable farming techniques				
Number of farmers in each of the wards of Mabale, Lupote and Silewu are practicing sustainable farming techniques	Data Records	2017	WN, Agritex & partners	3 Wards, Mabale, Lupote, Silewu
Objective 3.10: By 2017, the 20 farmers in each of the wards of Mabale, Lupote and Silewu have increased incomes				
Kilos of Produce sold	Data Records	2017	WN, Agritex & partners	3 Wards, Mabale, Lupote, Silewu
Objective 3.11: By 2017 50 children from the 5 secondary schools in our core operating area have participated in the KFS programme				
Number of children from the 5 secondary schools in our core operating area that have attended the KFS programme	Data Records	Not specified	Not specified	Fatima, Nechilibi, Dampa, Detema, Marist secondary schools
Objective 3.12: By 2017 25% increase in number of children taking science O and A levels in local secondary schools				
% increase of children taking science O and A levels in local secondary schools	Data Records	Not specified	Not specified	Fatima, Nechilibi, Dampa, Detema, Marist secondary schools
Objective 3.13: By the end of each year from 2012 to 2022, the average score in an ecology and conservation concepts test of children in Form 2 in the 5 secondary schools that attended the Bush camp is significantly higher than children that did not attend the bush camp				
Average score in an ecology and conservation concepts test	Data Records	Annually	WN	19 schools that attend the bushcamp
Objective 3.14: By the end of each year from 2012 to 2022, the average score is 90% in the bushcamp post camp questionnaires				
Average score in an ecology and conservation concepts test	Data Records	Annually	WN	Fatima, Nechilibi, Dampa, Detema, Marist secondary schools

MONITORING PLAN FOR STRATEGY 3: EDUCATION AND AWARENESS (cont..)				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Objective 3.15: By the end of 2022, 50% of the people in the core operating area have developed empathy and understanding of nature and conservation				
% of the people in the core operating area that have empathy and understanding of nature and conservation	Survey	2017 & 2022	BM	Core operating area
Objective 3.16: By the end of 2012 there is a measurable reduction in the amount of litter in the core operating area				
Amount of Litter	Survey	2012	DNY	Core operating area
Objective 3.17: By 2013 the improved curriculum and syllabus for wildlife conservation education programme has been approved by the Ministry of E,SC.				
The curriculum and syllabus for wildlife conservation education programme approved by the Ministry of E,S,C	Documented School Curriculum & Syllabus	2013	WN, DEO-CDU	Nationally
Objective 3.18: By 2014 the improved curriculum and syllabus for wildlife conservation education programme has been implemented nationally in all primary schools.				
Lesson Plans for improved curriculum and syllabus for wildlife conservation education programme being delivered	Data Record	2014	WN, DEO	Nationally
Objective 3.19: By the end of 2022 there is an Increased awareness of negative impact of infrastructure development (mines, dams, roads, settlements, etc.) on the habitat.				
EIA rreports	Data records	2022	FW, WN, DNY	Core operating area

MONITORING PLAN FOR STRATEGY 4: LAW AND POLICY				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Objective 4.1: By End of 2012 SADC countries support ZPWMA proposal for Painted Dogs to be given CITES Appendix 1 listing.				
SADC countries sign proposal	Data record	2012	GSAR, PB, ZPWMA	
Objective 4.2: Painted Dogs have CITES Appendix 1 listing				
Painted Dogs are listed on CITES Appendix 1	Data record	COP 17	GSAR, PB, ZPWMA	
Objective 4.3: By end of 2013 speed limit on identified roads within core operating area reduced to 80kph				
Speed limit signs	Road signs	2013	FW, PB GSAR	
Objective 4.4: By 2013 police operate with speed guns twice a week on designated roads within core operating area				
Police present twice per week with speed guns along designated roads in core operating area	Observation	2013	FW, BM	
Objective 4.5: Vaccination programme of domestic dogs conducted Every second year from 2012 to 2022 in core operating area				
Vaccination programme	Data records	Bi Annually	FW, PB	
Objective 4.6: By end of 2012, ZPWMA accept that kudu and impala must not be included on ration quotas to conserve Painted Dogs.				
Kudu and Impala on quota within PWMA Estates	Data records	2013	GSAR, PB	

MONITORING PLAN FOR STRATEGY: PDC ORGANISATIONAL DEVELOPMENT				
What? *(Indicator)*	**How?** *(Methods)*	**When?**	**Who?**	**Comments**
Objective 8.1: By end of 2014 PDC Base Camp Construction Completed				
PDC Staff housing completed and operational	Site Inspection	2012	PB, GSAR, FW, GG, DN	
Objective 8.2: by 2017 PDC Staff Requirements Fulfilled				
Staff in place	PDC Staff Records	2017	PB, FW, GG, GSAR	

3. Budget for 2012. For Action and Monitoring Plans.

Painted Dog Conservation: 2012		Work Days	Projected Expenses	TOTAL
Item	**Who**	**Total**	**Total**	
STRATEGY 1. Land/water Management	EZ, FW, GSAR, PB	403		
(M-2012) Study into plant stress implemented	GSAR	11	1,100	
(M-2012) Research into thorn defence relative to pumped water implemented	GSAR	11	1,100	
(H-2012) Trial acacia regeneration plot established	GSAR	4	1,700	
(H-2012) Time lapse cameras at 20 pumped waterholes established	GSAR	16	5,600	
(H-2012) Study into the Relationship between seed and flower production and distance to water implemented	GSAR	9	2,800	
(M-2012) Study on relationship between tannin production and distance to water implemented	GSAR	11	1,100	
Annual seminar series describing current results pertinent to pumped waterhole research	GSAR, PB	5	1,100	
Anti-poaching Units (APU)	EZ, FW, PB	336	80,200	
SUB TOTAL				**94,700**
STRATEGY 2: Species Management	GSAR, JM, PB, XM	724		
National demographic and genetic Painted Dog census	GSAR	90	26,800	
Transboundary movement study initiated	GSAR	90	28,800	
National monitoring database	GSAR	6	600	
Rehabilitation Programme	GSAR, JM, PB, XM	538	123,000	
SUB TOTAL				**179,200**
STRATEGY 3. Education and Awareness	AN, BM, DN, DNY, FW, GP, GSAR, JM, PB, WC, WN	1,428		
Outreach -(H) HIV/AIDS Awareness and Treatment	DNY, FW, PB	108	51,200	
Outreach -(M) Community Development	WN	60	9,000	
Outreach -(H) Arts and Crafts Programme	AN, FW	253	25,000	
(H) Bushcamps	DN, GP, WC, WN	391	80,000	
Outreach -H) Conservation Clubs	DNY, GP, WN	302	30,000	
(M) Painted Dog Awareness Campaign	BM, GSAR, JM, PB, WC	244	29,200	
(M) Technical advice on environmental impacts	BM, FW, GSAR, WN	48	6,000	
(H) Input to improve national curriculum	WN	12	1,000	
Happy Readers	GP, WN	10	21,000	
SUB TOTAL				**252,400**
STRATEGY 4. Law and Policy	FW, GSAR, PB	55		
Get Painted DogsCITES listing	GSAR, PB	16	8,100	
Revise quota system on impala and kudu	GSAR, PB	8	2,300	
Revise road Regulations	FW, GSAR, PB	12	800	
Implement Vaccination and Veterinarian Policies	FW, GSAR, PB	19	1,000	
SUB TOTAL				**12,200**

Item	Who	Total	Total	
STRATEGY: PDC Organisational Development	DN, FW, GG, GSAR, LG, LM, PB, WC	1,404		
PDC Core Operations	DN, FW, GG, GSAR, LG, LM, PB, WC		124,000	
PDC Base Camp	FW, GG, GSAR, PB, WC.		200,000	
SUB TOTAL				324,000
TOTAL PROJECT COSTS: 2012				**862,500**

Appendix 1. PDC Organisational Structure

```
                    ┌─────────────────────────────────────────┐
                    │   Painted Dog Conservation Organisation  │
                    │           Board of Trustees              │
                    └─────────────────────────────────────────┘
                              │                    │
                    ┌──────────────────┐   ┌──────────────────┐
                    │ Managing Director │   │ Research Director │
                    └──────────────────┘   └──────────────────┘
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- Painted Dog Conservation Organisation Board of Trustees
  - Managing Director
    - Assistant Manger
      - Security
    - Administrator
      - Clerk
        - Reception
        - Clerical Assistantt
      - Housekeeper
      - Stock Clerk
        - Driver - Duties allocated by the Assistant Manager
    - Mechanic
    - Education & Community Development
      - Education Officer
        - Bush Camp Household Staff
        - Bush Camp Guides
        - Bush Camp Grounds staff
      - Community Outreach
    - Anti Poaching Manager
      - APU Units
    - Maintenance Supervisor
      - Maintenance Team
  - Research Director
    - Research Head tracker
    - Rehabilitation Facility Supervisor
      - Dog Keepers

Appendix 2. Viability Assessment for All Targets with Current Status

Legend	◯ Target	🗝 Key Ecological Attribute	△ Indicator	📏 Measurement	◯ Goal

Item	Current Status	Poor	Fair	Good	Very Good	Source
◯ 1. **Painted Dog Population**	Fair					
🗝 **Painted Dog Pack Size**	Fair	1 - 5	6 - 8	9 - 12	≥ 13	Onsite Research
△ Painted Dog Mean Adult &Yearling Pack Size (Hwange)	Poor					
📏 2011-10-05			↘3.8			Intensive Assessment
📏 1997-06-01				↘7.0		Intensive Assessment
◯ **2022-01-01**			◯≥ 6			
△ Painted Dog Mean Adult &Yearling Pack Size (Zambezi Valley)	Good					
📏 2010-10-15				➡12.5		Intensive Assessment
📏 1997-01-01				➡11.13		Intensive Assessment
◯ **2022-01-01**					◯≥13.5	
△ Painted Dog Mean Adult & Yearling Pack Size (Gonarezhou)	Fair					
📏 2011-11-15			↘ 8.5			Expert Knowledge
📏 1997-06-15				↘10.2		Intensive Assessment
◯ **2022-01-01**				◯≥10.2		
△ Painted Dog Mean Adult & Yearling Pack Size (Save Valley Conservancy and surrounds)	Fair					
📏 2009-07-05			↘8.0			Intensive Assessment
📏 1997-07-15				➡10.7		Intensive Assessment
◯ **2022-01-01**				◯≥9.2		

Item	Current Status	Poor	Fair	Good	Very Good	Source
△ Painted Dog Mean Adult & Yearling Pack Size (Vic Falls, Matetsi, Chizarira, Matusadona)	Poor					
📏 2011-10-05		➡4.4				Intensive Assessment
📏 1997-06-15		➡4.1				Intensive Assessment
◯ **2017-10-18**			◯6			
△ Painted Dog Mean Adult & Yearling Pack Size (Gwayi Nyamandlovu)	Poor					
📏 2011-11-05		⬇2.2				Intensive Assessment
📏 1997-06-15			➡6.6			Intensive Assessment
◯ **2022-01-01**		◯≥5				
🔑 **Painted Dog Distribution**	Fair	<70	71 –100	101 - 120	>121	Onsite Research
△ Quarter Degree Squares (QDS) where Painted Dogs are present	Fair					
📏 2011-11-05			⬇75			Intensive Assessment
📏 1997-06-15			↗99			Intensive Assessment
◯ **2022-01-01**			◯≥94			

Item	Current Status	Poor	Fair	Good	Very Good	Source
◯ **2. Prey Species (Kudu & Impala)**	Poor					
🔑 **Abundance of kudu & impala at 23 waterholes in Hwange National Park**	Poor					
△ # of Kudu at 23 waterholes in Hwange National Park	Poor	<1200	1200-2000	>2000-3500	>3500	Onsite Research
📏 2002-10-17		↗750				Intensive Assessment
◯ **2022-01-01**			◯>1750			
△ # of Impala at 23 waterholes in Hwange National Park	Poor	≤ 700	701 - 1000	1000-1200	>1200	Onsite Research
📏 2002-10-17		➡400				Intensive Assessment
◯ **2022-01-01**			◯>700			

Item	Current Status	Poor	Fair	Good	Very Good	Source
⬭ 3. **Miombo Woodland**	Poor					
🗝 Diameter at base height of *Bafia masaaiensis* relative to PDC enclosure	Poor	< 50 %	51 – 70 %	71 – 90 %	> 90	
🔺 Mean DBH of *Basia masaaiensis* expressed as a percentage of the enclosure value in 2010	Poor					Onsite Research
📏 2010-07-05			⬇ 25%			Rapid Assessment
⬭ **2022-01-01**				⬭65%		
🗝 Visibility index	Poor	>150 metres	75-150 metres	50-75 metres	<50 metres	
🔺 Visibility index	Poor					Onsite Research
📏 2009-10-21		⬇ >150				Expert Knowledge
⬭ **2018-10-18**				⬭<75		

Item	Current Status	Poor	Fair	Good	Very Good	Source
⬭ 4. **Zambezi Valley & Escarpment**	Fair					
🗝 Albida recruitment						Not specified
🗝 Invasive species	Fair	>2%	1.1 – 2%	0.3 – 1.1%	0	
🔺 Abundance of invasive plant species in the Zambezi valley ecosystem	Fair					Rough Guess
📏 2011-11-08			?			Rough Guess
⬭ **2022-11-08**				⬭< 0.1 %		

Item	Current Status	Poor	Fair	Good	Very Good	Source
⬭ 5. **Vlei System**	Poor					
🗝 Abundance of "Increaser 3" grass species in Kennedy vlei system	Poor					
△ Percentage of "Increaser 3" grass species in Kennedy vlei system	Poor	85 - 100%	84 - 60 %	60 -40%	≤39%	Expert Knowledge
📏 2010-03-05			? 95%			Expert Knowledge
⬭ **2022-01-01**				⬭**60%**		
🗝 Proportion of Kennedy vlei system covered in grasses	Fair					
△ Percentage of Kennedy vlei system covered in grasses	Fair	25%	26 - 50%	51 - 75%	≥76%	Onsite Research
📏 2011-10-05				? 35%		Expert Knowledge
⬭ **2022-01-01**					⬭**80%**	

Appendix 3. Direct Threats Rating – Summary Table

Threats \ Targets	Miombo Woodland	Vlei System	Zambezi Valley and Escarpment	Painted Dog Population	Prey Species (Kudu & Impala)	Summary Threat Rating
Legal Hunting				Low	Low	Low
Road Kills				High	High	High
Disease				Medium	Medium	Medium
Shooting Painted Dogs				High		Medium
Illegal hunting				High	High	High
Trafficking of Painted Dogs				High		Medium
Mining	High	High	High	High	High	High
Dams	High	Very High	Very High	High	High	Very High
Veldt fires	High	High	Medium	High	Medium	High
Pumping water in wildlife areas	High	High	High	Very High	Very High	Very High
Wood collection / logging	High	Medium	Medium	Medium	High	High
Lack of PDC Capacity				Low		Low
Summary Target Ratings	High	Very High	High	Very High	Very High	Very High

Appendix 4: Integrated Research Proposal for the Painted Dog Lycaon pictus in Zimbabwe

Synopsis

Following a population contraction in Africa from 500,000 individuals down to 5,000 in the last century, the painted dog (*Lycaon pictus*) is IUCN listed as Endangered. Zimbabwe houses three main populations namely Hwange, Zambezi valley and the Low veldt region, which includes Save valley and Gonarezhou. The last national census was undertaken from May 1994 - January 1997. This census revealed a reasonably healthy population of some 700 individuals ((95% confidence limits upper 784, lower 611, mean 698) (Rasmussen 1997). As at 2011, this census has not been repeated, however research data shows that during this time period pack sizes in the Hwange population have crashed, with those in the Zambezi valley remaining stable Fig.1.
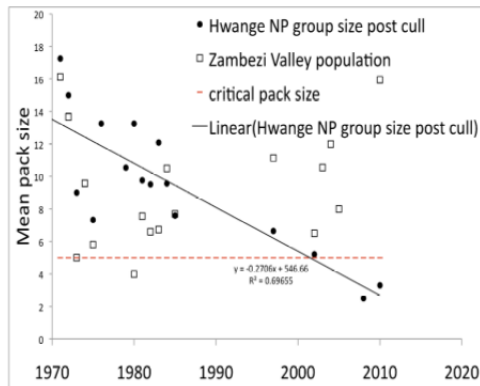

Figure 1 : Mean pack sizes for the Painted dog *Lycaon pictus* in Hwange National park Zimbabwe

Current DNA data indicate that along with Laikipia in Kenya, the SE Low veldt has the lowest genetic diversity in Africa. These results are however not surprising as both the Laikipia and the SE Low veldt populations are recently founded. Hwange has the highest genetic diversity in Africa. However, across all populations, morphological data from skulls has shown increasing asymmetry, skull compression and tooth crowding as the century has progressed (Rasmussen 2009). Thus indicating that former levels of heterozygosity were significantly higher. This is not surprising as from 1905 – 1970 the population was both persecuted and culled under a bounty scheme that slaughtered so many that at one point returns were zero because the population was so low no painted dogs could be found to shoot. Consequently understanding the landscape in terms of corridors and metapopulation management is essential to maximise extant genetic diversity.

As highlighted the painted dog population in Hwange is cause for great concern as mortality is currently exceeding natality and it is therefore no longer a source population as it should be. Furthermore its extirpation would not only undermine Zimbabwe's position as a stronghold for the species, but also send a detrimental conservation signal to the international community. The decline of painted dogs in Hwange is deemed causal to the combination of a dystrophic habitat and reduced prey, caused by high elephant numbers that are linked to provision of pumped water (Rasmussen 2009).

The dystrophic habitat and habitat structure detrimentally affects the dogs in three ways. Firstly it opens up the habitat, which increases detection by kleptoparasites, and they will lose more food or have pups killed. Secondly, prey flight distances are greater making hunting attempts fewer, and chase distances longer (Rasmussen 2009). Natural causes of mortality are documented as inter-specific competition with lions that both steal food and kill the dogs, and hyaenas that steal food from dog kills, starvation and disease. Thirdly, den sites are compromised due to open habitat structure (van der Meer 2011), which increases pup mortality due to lions and hyaenas. Consequently the integrity of woodland habitat is essential for successful painted dog populations.

In addition, due to their increased capacity to compete for food, the high elephant numbers are linked to significant prey reduction (Valeix et al 2008), which in turn impacts the dogs as they are insufficiently fed to produce viable offspring and raise pups to adulthood.

In view of the situation, focal research will be divided into three thematic areas. Firstly with a view to producing a data driven strategic plan for the National pack, work with the dogs themselves will focus on the genetic integrity, distribution, demography, transboundary movements and threats nationally. Secondly due to the dire concern for the Hwange population, the impact of artificial waterholes and resultant elephant population will be investigated. Here the foci will be on the extent of the vegetative

changes and consequential loss of primary production, increase in plant defences, reduction in reproductive capacity, and stress in the plants caused by over utilisation and the resultant decline in prey species. Thirdly in the hope that scientific arguments will prevail, investigate restorative measures that could be used to mitigate the impact of the waterholes on the surrounding vegetation, to speed up recovery of damaged areas, as well as contribute to reducing the elephant impact in a number of regions.

Species Research

The last national painted dog census and threat assessment was carried out in 1997 (Rasmussen 1997). On the premise that it is impossible to conserve a species if one does not have accurate data pertinent to its distribution, density and threats, it is intended to conduct a painted dog census and threat assessment nationally in order to update the data on dog distribution, density and threats. Following a four-year period of intensive research on the national pack it is intended that genetic demographic and threat data will be available to inform and update the national action plan. These data will be collected by collation of sightings and photographs nationally, as well as the undertaking of intensive ground truthing surveys. These surveys will entail spoor transects, interviews and resident fieldwork where packs will be followed, and with faecal, blood and tissue samples being collected. This work will target all areas of Zimbabwe where dogs are suspected to occur and will involve fitting individuals in packs with satellite/GPS/remote download collars.

It is further intended to produce a land use map where painted dog populations will be overlaid and thus facilitate the conceptualisation of a landscape strategy for painted dogs to include designated corridors and landscape incentives and deterrents in the relevant areas. Following the adoption of a significantly updated national action plan, it is then intended that the threats be addressed for the direct benefit of painted dogs and the continued integrity of the national Zimbabwean dog pack.

Specific actions and outputs will therefore be as follows

1. National Demographic And Genetic Painted Dog Census

This census will target areas as follows:

1.1 Genetic diversity: Increased knowledge of genetic diversity, demography and distribution of Painted Dogs in the three main populations in Zimbabwe (Ecoregions: Zambezi Valley, Hwange, SE Low veldt). In order to understand historic levels of heterozygosity, ancient DNA will also be analysed in collaboration with the Zimbabwe Natural History Museum, and other participating museums in neighbouring countries were additional samples may be found. Contemporary samples will also be collected through blood, tissue and faeces. With respect to faecal DNA, effort will be made to improve this method in collaboration with Harvard University.

1.2 Threats: Threats to each population will be gathered through fieldwork, which will entail collaring and following packs. Anthropogenic impacts, survival, demographic and disease status as well as hunting success will be identified for the three eco-regions. The goal will be to map the threats, and thus to develop strategies relevant for each threat. More specifically it is intended to compare factors in Hwange National Park, Zimbabwe where there has been a precipitous decline, with Mana Pools, where there has not been an observed decline. The decline in Hwange has been attributed to failure to reproduce, with low litter sizes and high pup mortality. Most importantly it is believed tied to the inability to bank sufficient energy and it is intended to explore the energetic costs and benefits between the Hwange and the Zambezi populations to determine what factors are contributing to the declining Hwange population. Prey intakes, kleptoparasitic rates, foraging times will be translated into energetic parameters to determine the per capita Net Rate of Daily Intake and those will be compared between the populations. It is further intended that to fully understand the Zimbabwean population, these data will also be collected in Gonarezhou for comparative purposes.

1.3 Distribution and corridor identification: It is intended to produce an updated land use map for Zimbabwe, which will show the updated distribution and highlight possible corridors. Such a map will use up to date satellite imagery to identify vegetation density as well as identify impacted areas. Overlaying the dog distribution will facilitate the development of a landscape strategy where important areas are identified and strategies can be implemented to ameliorate threats in target areas.

1.4 Transboundary movement study: This will form part of the both the national census as well as the wildlife corridor formation and ecological threat assessments. It will entail fitting satellite GPS collars to packs in all eco-regions as well as collaboratively with researchers in Botswana, Zambia, Mozambique and South Africa. As corridors identified for the dogs will in all probability serve as valuable indicators of routes for other species, it is intended that the research outcome will contribute to our understanding of the value of the Zimbabwean and transboundary populations. Most importantly it will reinforce the role of the trans-frontier parks as well as provide valuable information to facilitate trans-boundary species agreements.

2. Impact Of Waterholes In Hwange

The Hwange ecosystem is a semi-arid, frost-trapped, Kalahari fossil-dune sand system. However a frost-free geological/climatic period c.2000 years ago (Haynes 1996; Haynes and Klimowicz 2005; Stokes et al. 1998) allowed the tree canopy to grow high enough to serve as nurse trees by protecting the understory from frost. The resultant vegetation growth stabilized the dunes (Stokes et al. 1998) and resulted in the vegetative ecosystem seen today. One of the major anthropogenic impacts on this ecosystem has been the artificial provision of water, which has facilitated the increase of elephant numbers. In 1928, elephant numbers were estimated at 1000 individuals (Davidson 1967) and numbers increased to more than 8000 by 1971, despite culling, which commenced in 1966 (Williamson 1975). This population growth was attributed to anthropogenic mediation via the provision of over 60 boreholes to supply water (Cumming 1981) . The population was then held at 13,000 elephants until culling ceased in 1986 when the elephant population then asymptotically reached 44,492 animals in 2001 (Chamaillé Jammes et al. 2007; Dunham and Mackie 2002). The impact of elephant biomass increasing from 8% to 73% of herbivore community was correlated with biomass declines in browsers (78% (excluding giraffe)) and grazers (35%) (Valeix et al. 2007). In addition, from 1986 – 1995 kudu and impala declines were correlated with low dry season rainfall, but currently have rallied slightly as a consequence of high dry season rainfall (Valeix et al. 2008). At the same time, the system has become increasingly dystrophic (habitats which are both low in basic nutrients and toxic), with significant reduction in species richness and diversity (Conybeare, 1991). Increasing elephant populations can be linked to all these changes through their impact on the vegetation. Vegetation plots have shown mean annual reductions in tree densities of 5% in bush land, 2% in woodland and 7% in wooded grassland (Conybeare, 1991), with reduced tree recruitment being compounded by fire and frost (Holdo 2003; Holdo 2005). All of these resulted in more open habitat, thus increasing predator detection by prey, flight distances and, concomitantly, chase expenditure. More pertinently, the high elephant numbers impact the whole ecosystem, by moving its state to one where the vegetative layer increases investment in chemical and mechanical defence, thus resulting in a less productive, diverse system, that is increasingly oligotrophic. Hwange is a low nutrient, semi-arid system on sand, with frost-trapping prevalent, and as such, is vulnerable to disturbance - such as the removal of vegetation cover – triggering a return to its original desert state. Should this occur, the nature of the system means there would be no anticipated recovery until the advent of another frost-free geological period.

On the basis that the high elephant population and the dystrophic habitat is linked to the pumping of water, and is cascading to reduce habitat quality for both painted dogs and their and prey. It is thus intended to target research that will provide both insight into why Painted dog numbers have crashed in Hwange National Park from a healthy packs averaging ≥14 dogs in 1970 to average pack sizes of ≤3 dogs in 2011. This five fold decline is correlated to the change in the habitat structure, and prey collapse commensurate with a 4.5 fold increase of elephants from c. 8000 in 1970 to c. 36.000 in 2011

(Rasmussen 2009). It is hoped that this research will lead to increased understanding of the negative impact of the water pumping in wildlife areas, which will result in a change in the pumping strategy to both reduce the volume, and distribution of water pumped. By doing this it is hoped that the Hwange ecosystem can be restored to one where both the prey and vegetative structure will once again benefit painted dogs as a species and avert possible extirpation from Hwange.

2.1 Determination of the ecological issues associated with the pumping of water that are leading to both a dystrophic habitat and reduced biodiversity.

2.1.1 Study on relationship between tannin production and distance to artificial water

This study will investigate the relationship between polyphenolic production in *Baphia massaiensis* in relation to pumped water. As Baphia is a facultative tannin producer it is expected that there will be an increase in tannin production with decreasing distance from water. Measurements will be taken in situ using a tannin meter with eight leaves being randomly sampled from each tree. It is hypothesised that these ecological changes will initiate a positive feedback mechanism whereby there is reduced vegetative growth and reproduction due to costs of polyphenolic production, which in turn increases the severity of frost primarily due to the loss of nurse trees. It is therefore probable that these factors can also to explain the decline in ungulate densities.

2.1.2 Research into thorn defence relative to pumped water implemented

On the premise that species will divert available energy from growth and reproduction into defence, this study will investigate thorn length and internode distance relative to pumped waterholes. These data will serve to further our understanding between the lack of productivity and the increasing dystrophy and ecotoxicity.

2.1.3 *Study into the Relationship between seed and flower production and distance to water implemented*

Under the same tenet that an increased energetic investment into defence will reduce reproductive capacity, this study will investigate seed and flower production relative to pumped waterholes. Here seed weight and shape will be used as an indicator of seed quality and viability. Flowering density will be measured using indexed colour photos of acacia.

The anticipated result is that trees near water will have less flowering potential and produce seeds of poorer quality. This in turn will not only affect the recruitment of these species, but also the gramivores that depend on them and may explain why increased elephant populations has been linked to reduced avian species and in particular raptors at the top of the food chain (Cumming *et al.* 1997).

2.1.4 Study into grass species and abundance in the vlei systems.

To date no study has been undertaken on the vlei and therefore grass systems in Hwange. As a C4 species, the graminae potentially represent a high grazing resource. Consequently research into the relationship between the grasses and associated abiotic factors (pH. soil compaction, sand colour, drainage) and distance to pumped waterholes will be initiated. Most importantly, observations indicate that the grasses are not being sufficiently grazed. This indicates that due to increased pressure the remaining species are either nutrient poor or phytotoxic making them unsuitable for grazing. This lack of grazing is evidenced at the end of the dry season when the vleis, which should be denuded of grass, remain ungrazed. Expected results would be a high presence of "Increaser 3" grass as well as altered ph and reduced drainage due to impaction both of which will affect nutrient uptake. Understanding the grasses will facilitate development of management strategy to improve the grass structure and thus the grazing value for the benefit of the grazers.

3 Investigate habitat restorative measures as well as investigate strategies that could be used to mitigate the impact of the waterholes

3.1 In order to be better equipped to advise on decisions on distribution and water volume pumped, to determine species specific water requirements, and deterrents that would facilitate species other than elephants to drink at new water points.

>   *3.1.1 Calculate the seasonal water consumption need of all the major herbivores so that water requirements for each species can be calculated.*

This will be achieved using time lapse cameras over a wide area. These cameras will take pictures of the waterholes every 12 minutes and provide relative estimate of waterhole usage by the various species. It is intended that these data will advise management to facilitate any decisions regarding the inclusion or removal of water points.

>   *3.1.2 Build and test elephant deterrent waterholes*

With a view to determining if elephant activity can be reduced at water holes, as has been initiated in Kenya, a study to see if deterrents can be used to selectively reduce elephant pressure in key areas will be undertaken. Such methods would include playing bee or gunshot noises or mechanically by building troughs that are surrounded by rocks and only having a small water volume. The effect of these deterrents would be monitored using time lapse cameras.

3.2 As great areas are currently deemed dystrophic, to investigate possible remedial strategies to speed up vegetative recovery in the event that water pumping was altered and elephant populations reduced.

>   *3.2.1 Trial Acacia regeneration plots established in pilot areas to determine if this can speed up the restorative process.*

This investigation will include evaluating the role of Acacia as a pioneer to provide nurse tree protection for the establishment of non-thorn tree seedlings. Trial seeding plots will be grown to see which acacia species will achieve the desired goal and furthermore the best way of planting them so that they do not simply get browsed to destruction.

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