

# European Studbook White Rhino, 2019

*Ceratotherium simum*

Lars Versteege, Safaripark Beekse Bergen



Current until 31.12.2019  
6th edition

**BEEKSE BERGEN**

**EUROPEAN STUDBOOK WHITE RHINO  
( *CERATOTHERIUM SIMUM* )**



**BEEKSE BERGEN**

**EUROPEAN STUDBOOK WHITE RHINO  
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**MARCH 2020**

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Because the technical information provided in the studbook can easily be misread or misinterpreted unless properly analysed, Safaripark Beekse Bergen and EAZA strongly recommend that users of this information consult with the editor in all matters related to data analysis and interpretation.

## Acknowledgements

The sixth edition of the European studbook of the white rhino lies before you. If it wasn't for your help, this studbook could not have been realized. Therefore, I would like to thank all the zoos participating in the white rhino EEP for keeping their ZIMS registration up to date. It is of the utmost importance that we communicate regularly with each other and make our wishes and changing situations known. We are all working towards the same goal, and with the continuous collaboration of the zoos we can help the conservation of the white rhino.

I hope that this studbook will contain the information needed to get a better view on the white rhino population and the challenges that lie before us. In case of any mistakes or misconceptions please contact me so we can make the information as correct as possible.

With kind regards,

Lars Versteegen



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## 1. Introduction

According to the IUCN red list the white rhino is rated as Near Threatened (IUCN 2020). There is however an ongoing and increased poaching threat and increasing illegal demand for rhino horn. Without conservation measures, the species would within five years meet the threshold for C1 (small population size and decline of 10% in 10 years) under Vulnerable, and potentially also criterion A3 (population size reduction of 30%) if poaching rates were to further increase. Even more reason that it is important to accomplish a sustainable population *ex-situ*.

The studbook is compiled to give a more detailed overview of the status of the white rhino EEP population. It starts of with the annual report of 2018 and 2019. The second chapter contains demographic and genetic analysis. For these analyses the computer program ZIMS for studbooks and PMx are used. An association file was made, containing only zoos participating in the white rhino EEP. In chapter 4 the main conclusion regarding the demographic analysis are drawn and important recommendations are given. Chapter 5 contains the ZIMS for Studbooks reports, again alphabetically ordered after the mnemonic. The first report is about the living population, followed by the births, transfers and deaths happened after the last studbook published, 2017-2019.

## 2. EEP Annual Report 2018/2019

### 2.1 Program information

- White Rhino (*Ceratotherium simum*)
- EEP established in 1992

### 2.2 Program personnel

**Species coordinator:** Ing. Lars Versteegen, Safaripark Beekse Bergen, Hilvarenbeek

**Species Committee members:**

- Richard Osterballe, Givskud / DK
- Koen Vanderschueren, Cambron / BE
- Barbara Jantschke, Augsburg / DE
- Frank Brandstätter, Dortmund / DE
- Jiri Hruby, Dvur Kralove / CZ
- Rui Bernardino, Lisboa / PT
- Tjerk Termeulen, Kerkrade / NL
- Jamie Craig, Burford (Cottswold) / GB
- Endre Sos, Budapest / HU
- Sarah Forsyth, Colchester / GB
- Flemming Nielsen, Kobenhavn / DK
- Ken Mackey, Dublin / IR
- Therese Hard, Borås / SE
- Christelle Vitaud, Peaugres / FR

**Veterinary advisors:**

- Chris Walzer, Vienna University
- Robert Hermes, IZW Berlin
- Torsten Möller, Kolmarden

### 2.3 Program activities

#### **Species Committee:**

- Last election: 2015
- Last meeting: 23-09-2018, EAZA annual conference, Athina

#### **Publications:**

- Studbook previous edition: 2017
- Best practice guidelines: 2018

#### **Conservation activities:**

Participants are encouraged to support the International Rhino Foundation and Save the Rhino International. For more information about the projects check the new EAZA Conservation Database ([www.eazaconservation.org](http://www.eazaconservation.org)).

#### **Research activities:**

There is continuous research on nutrition, genetics and veterinary issues. Some examples are listed below:

#### **Programme goals:**

Retain 90% of the genetic diversity for the next 100 years. The first effort is to become sustainable, by increasing the number of births. Due to a higher demand for this species, the target population will be set much higher than genetically needed.

## 2.4 Status and developments in the EEP population in 2018

Institutions	Status		Births		DNS		Transfers between EAZA zoos				Transfers with non-EAZA zoos				Deaths		Status	
	01-01-2018		M	F	M	F	In		Out		In		Out		M	F	31-12-2018	
	M	F					M	F	M	F	M	F	M	F			M	F
AL-AIN (UAE)	4	5	1	0												5	5	
AMNEVILLE (FR)	3	5	0	1					1	0						2	6	
ARNHEM (NL)	2	4	0	1												2	5	
ATHINAI (GR)	3	0							1	0						2	0	
AUGSBURG (DE)	2	4														2	4	
AVINTES (PT)	3	0														3	0	
BANDHOLM (DK)	1	2														1	2	
BARCELONA-ZOO (ES)	1	0														1	0	
BEAUVAL (FR)	2	3							1	0						1	2	
BEWDLEY (GB)	2	5	1	0												3	5	
BLAIRDRUMMOND (GB)	1	3														1	3	
BOISSIERE-DORE (FR)	1	3	1	1					0	1						2	3	
BORAS (SE)	1	3	1	0										0	1	2	2	
BRATISLAVA (SK)	1	1														1	1	
BUDAPEST (HU)	1	2														1	2	
BURFORD (GB)	4	3							2	0						2	3	
BURSA (TR)	0	0					3	0								3	0	
BUSSOLENGO (IT)	2	0														2	0	
CABERCENO (ES)	2	3														2	3	
CAMBRON-CASTEAU (BE)	2	2														2	2	
CHESSINGTON (GB)	3	0														3	0	
CHORZOW (PL)	1	3												0	1	1	2	
COLCHESTER (GB)	1	3					1	0						0	1	2	2	
DALTON-FURNESS (GB)	3	5							0	2						3	3	
DEIGNE (BE)	1	2														1	2	
DORTMUND (DE)	1	3														1	3	
DUBLIN (IE)	4	4														4	4	
DUISBURG (DE)	1	1														1	0	
*DVUR KRALOVE (CZ)	1	2					0	1								1	3	
EMMEN (NL)	1	2					0	1								1	3	
ERFURT (DE)	1	2	1	0												2	2	
ESTEPONA (ES)	1	0														0	0	
GELSENKIRCHEN (DE)	1	2							1	0						1	2	
GIVSKUD (DK)	1	5														1	5	
HILVARENBEK (NL)	3	6					2	0	0	1						5	5	
*HODENHAGEN (DE)	4	6														4	6	
JERUSALEM (IL)	2	0														2	0	
KERKRADE (NL)	1	1					0	1								1	2	
KESSINGLAND (GB)	2	3														2	3	
KOBENHAVN-ZOO (DK)	2	2	1	0												3	2	
KOLMARDEN (SE)	1	2	0	1												1	3	
KRENGLBACH (AT)	2	3							1	0						1	3	
LE CORNELLE (IT)	0	2					1	0								1	2	
LE VIGEN (FR)	1	0														1	0	
LES-MATHES (FR)	1	2														1	2	
LILLE (FR)	2	0														2	0	
LISBOA-ZOO (PT)	2	2														2	2	
LISIEUX (FR)	1	3	0	1			0	2								1	5	
MADRID-ZOO (ES)	1	1														1	1	
MALTON (GB)	2	0														2	0	
MARWELL (GB)	1	3														1	3	



MONTPELLIER (FR)	1	2					0	1	0	1						1	2	
MUNSTER (DE)	2	2	0	1	0	1										2	2	
NYIREGYHAZA (HU)	1	2														1	2	
OSNABRUCK (DE)	1	2														1	2	
PARIS-ZOO (FR)	2	0														2	0	
PEAUGRES (FR)	2	4	1	0					1	0						2	4	
PELISSANE (FR)	1	2														1	2	
PEMBROKESHIRE (GB)	3	0														3	0	
PLAISANCE-TOUCH (FR)	1	1														1	1	
PORT-ST-PERE (FR)	3	1														3	1	
POZNAN (PL)	1	1											1	0		0	1	
PRESCOT (GB)	1	6	1	0			1	0	0	1						3	5	
RAMAT-GAN (IL)	3	8	0	2												4	10	
SALZBURG-ZOO (AT)	3	3							2	0						1	3	
SCHWERIN (DE)	1	2														1	2	
SHARJAH (UAE)	2	3														2	3	
SIGEAN (FR)	3	4	1	0												4	4	
*SINGAPORE (SG)	3	5	1	1												4	6	
SOFIA (BG)	1	0														1	0	
TABERNAS (ES)	1	1														1	1	
THOIRY (FR)	1	1					1	0								2	1	
TORINO (IT)	0	0					2	0								2	0	
USTI-NAD-LABEM (CZ)	0	1														0	1	
VALENCIA-PARC (ES)	1	1														1	1	
VESZPREM (HU)	2	3														2	3	
WARMINSTER (GB)	1	3														1	3	
WHIPSDADE (GB)	1	5											0	1		1	4	
WOBURN (GB)	2	3							1	0			0	1		1	2	
ZLIN (CZ)	1	2														1	2	
<b>Total</b>	<b>132</b>	<b>184</b>	<b>10</b>	<b>9</b>	<b>0</b>	<b>1</b>	<b>11</b>	<b>6</b>	<b>11</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>5</b>	<b>141</b>	<b>187</b>

(no longer EAZA member, special conditions apply)

The total number of white rhino increased with 12 animals !!!! A total of 19 animals were born (10.9), of which all but one female survived and a total of 6 (1.5) animals died in 2018. Two of the female deaths were unexpected, but the remaining 4 were older animals. This explains the skew towards female deaths because of the large proportion original "import" females. Nevertheless a very successful year ending with 328 animals.

#### Transfers:

Amneville and Krenglbach sent a young male to Hilvarenbeek.  
 Athinai sent a juvenile male to Le Cornelle.  
 Beauval and Salzburg sent young males to Bursa.  
 Boissiere sent a young female to Kerkrade.  
 Burford sent 2 young males to Torino.  
 Colchester received their adult male back from Woburn.  
 Dalton-Furness sent 2 females to Lisieux.  
 Dvur Kralove received a female from Montpellier.  
 Emmen received a female from Hilvarenbeek.  
 Estepona sent their adult male to Prescott.  
 Montpellier received a female from Prescott.  
 Peaugres sent their young male to Thoiry.

The program difficulties and recommendations are being dealt with in the next two chapters.

2.5 Status and developments in the EEP population in 2019

Institutions	Status		Births		DNS		Transfers between EAZA zoos				Transfers with non-EAZA zoos				Deaths		Status	
	01-01-2019		M	F	M	F	In		Out		In		Out		M	F	31-12-2019	
	M	F					M	F	M	F	M	F	M	F			M	F
AL-AIN (UAE)	5	5														5	5	
AMNEVILLE (FR)	2	6						0	1							2	5	
ARNHEM (NL)	2	5	1	0				1	0							2	5	
ATHINAI (GR)	2	0														2	0	
*AUCKLAND (NZ)	2	1														2	1	
AUGSBURG (DE)	2	4						1	1							1	3	
AVINTES (PT)	3	0														3	0	
BANDHOLM (DK)	1	2														1	2	
BARCELONA-ZOO (ES)	1	0														1	0	
BEAUVAL (FR)	1	3	0	1	0	1										1	3	
BEWDLEY (GB)	3	5														3	5	
BLAIRDRUMMOND (GB)	1	3														1	3	
BOISSIERE-DORE (FR)	2	3														2	3	
BORAS (SE)	2	2														2	2	
BRATISLAVA (SK)	1	1											1	0		0	1	
BUDAPEST (HU)	1	2														1	2	
BURFORD (GB)	2	3	0	1												2	4	
BUSSOLENGO (IT)	2	0														2	0	
CABERCENO (ES)	2	3														2	3	
CAMBRON-CASTEAU (BE)	2	2	1	1				1	0							2	3	
CHESSINGTON (GB)	3	0														3	0	
CHORZOW (PL)	1	2														1	2	
COLCHESTER (GB)	2	2					0	1								2	3	
DALTON-FURNESS (GB)	3	3														3	3	
DEIGNE (BE)	1	2														1	2	
DORTMUND (DE)	1	3														1	3	
DUBLIN (IE)	4	4						1	0				1	0		2	4	
DUISBURG (DE)	1	0														1	0	
DVUR KRALOVE (CZ)	1	3														1	3	
EMMEN (NL)	1	3														1	3	
ERFURT (DE)	2	2														2	2	
ESTEPONA (ES)	0	0					3	0								3	0	
GELSENKIRCHEN (DE)	1	2														1	2	
GIVSKUD (DK)	1	5														1	5	
HILVARENBECK (NL)	5	5											1	0		4	5	
HODENHAGEN (DE)	4	6						2	0				0	1		2	5	
JERUSALEM (IL)	2	0														2	0	
KERKRADE (NL)	1	2														1	2	
KESSINGLAND (GB)	2	3														2	3	
KOBENHAVN-ZOO (DK)	3	2											1	0		2	2	
KOLMARDEN (SE)	1	3														1	3	
KRENGLBACH (AT)	1	3	2	0												3	3	
LE CORNELLE (IT)	1	2														1	2	
LE VIGEN (FR)	1	0														1	0	
LES-MATHES (FR)	1	2														1	2	
LILLE (FR)	2	0														2	0	
LISBOA-ZOO (PT)	2	2														2	2	
LISIEUX (FR)	1	5														1	5	
*LYMPNE (GB)	0	0					1	0								1	0	
MADRID-ZOO (ES)	1	1														1	1	
MALTON (GB)	2	0														2	0	

MARWELL (GB)	1	3																1	3	
MONTPELLIER (FR)	1	2																	1	2
MUNSTER (DE)	2	2																	2	2
NYIREGYHAZA (HU)	1	2	1	0	1	0													1	2
OSNABRUCK (DE)	1	2																	1	2
PARIS-ZOO (FR)	2	0																	2	0
PEAUGRES (FR)	2	4	1	0															3	4
PELISSANE (FR)	1	2																	1	2
PEMBROKESHIRE (GB)	3	0																	3	0
PLAISANCE-TOUCH (FR)	1	1																	1	1
PORT-ST-PERE (FR)	3	1											0	1				3	0	
POZNAN (PL)	0	1																	0	1
PRESCOT (GB)	3	5					0	2	0	1					1	0			2	6
RAMAT-GAN (IL)	3	10	0	1					1	3									2	8
*ROMA (IT)	0	0					2	0											2	0
SALZBURG-ZOO (AT)	1	3																	1	3
SCHWERIN (DE)	1	2																	1	2
SHARJAH (UAE)	2	3																	2	3
SIGEAN (FR)	4	4																	4	4
SINGAPORE (SG)	4	6	0	1								1	1						3	6
SOFIA (BG)	1	0																	1	0
TABERNAS (ES)	1	1																	1	1
*TAIPEI (TW)	1	5																	1	5
THOIRY (FR)	2	1												0	1				2	0
TORINO (IT)	2	0																	2	0
USTI-NAD-LABEM (CZ)	0	1												0	1				0	0
VALENCIA-PARC (ES)	1	1																	1	1
VESZPREM (HU)	2	3																	2	3
WARMINSTER (GB)	1	3																	1	3
WHIPSNADE (GB)	1	4																	1	4
WOBURN (GB)	1	2																	1	2
ZLIN (CZ)	1	2																	1	2
*ZURICH (CH)	0	0					1	3											1	3
<b>Total</b>	<b>144</b>	<b>193</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>4</b>		<b>143</b>	<b>192</b>	

(no longer EAZA member, special conditions apply)

The total number of white rhino decreased with 2 animals. A total of 11 animals were born (6.5), of which nine (5.4) survived and a total of nine (5.4) animals died in 2019. The female deaths were older animals, but within the male deaths we also had some "veterinary losses" which we are investigating. Nevertheless, a succesful year ending with 335 animals, including new participants Auckland, Lympne, Roma, Taipei and Zurich. Of the new participants, Lympne and Rome started with a bachelor group while Auckland and Taipei joined EAZA, automatically adding their rhino to the EEP. Zurich, being outside of the EU had the possibility to import 1.3 from Israel.

#### Transfers:

Amneville and Augsburg sent a young female to Prescott (Knowsley).

Arnhem sent a young male to Roma, together with a young male from Augsburg.

Cambron and Hodenhagen sent 3 young males to Estepona.

Colchester received an adult female from Prescott (Knowsley).

Dublin sent a young male to Lympne.

Ramat Gan sent 1.3 animals to Zurich for their new savannah.

### 3. Analysis of the EEP population

#### 3.1 Feasibility goal

Goal of this EEP is to retain 90% gene diversity over a time span of 100 years. According to calculations of the software program PMx, 90% of gene diversity can be maintained up to 270 years. Succeeding in our goal is therefore possible. We could even exceed our goal and maintain around 95.4% of the genetic diversity for the coming 100 years.

However, the question remains whether unexpected difficulties can impede the achievement of these goals. To answer this question the population is analysed in more detail on demographic and genetic level.

#### 3.2 Demographic analysis

Since the start of the EEP in 1992 we have seen a population growth. Currently, 57% of the rhino population are female, compared to 54% in 1992 (Figure 1). A relative overrepresentation of females is beneficial to the population's chances of reproduction as the optimal breeding facility is a rhino herd of at least 1.3 or 2.3 adult animals (EAZA Best Practice Guidelines, 2018). But with a growing population it is even more important to have enough bachelor group holders ! The overall population growth indicates that we are moving towards a sustainable population.

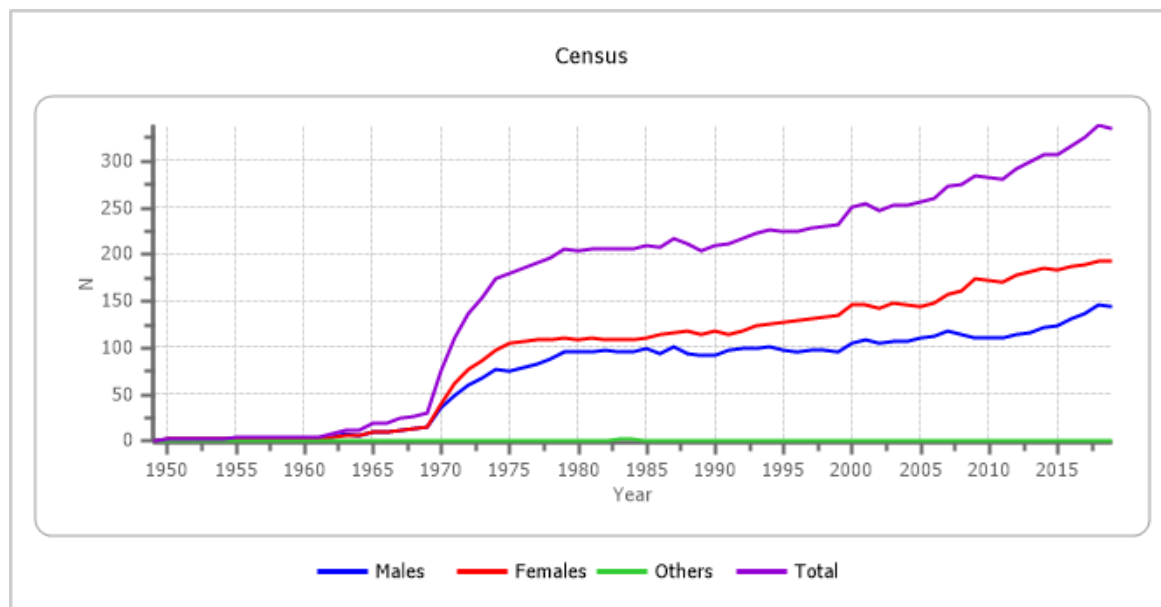


Figure 1: Population size by sex

Figure 2 depicts an in depth overview of causes of population growth over the last 24 years. The number of calves born has been increasing, with a new record of 22 calves born in 2016. The number of deaths has been relatively stable, with the old original 1970's import animals dying out. Looking at the age pyramid (Figure 4) there is a group of 15 high-age individuals at the top of the pyramid at risk of dying of natural causes, hence these deaths should not be attributed to management choices.

An important notice is the absence of imports in the year 2013 to 2019 (except 2017). In order to maintain a viable population, animals from South Africa were imported in preceding years. This was a result of the sluggish reproduction rate in captivity. But with the increase of births the EEP has been sustainable for the last 7 years already ! The only reason for the 2017 importation was the geographic location of the new participant.

[Appendix 3](#) gives the overview of white rhino numbers per country.

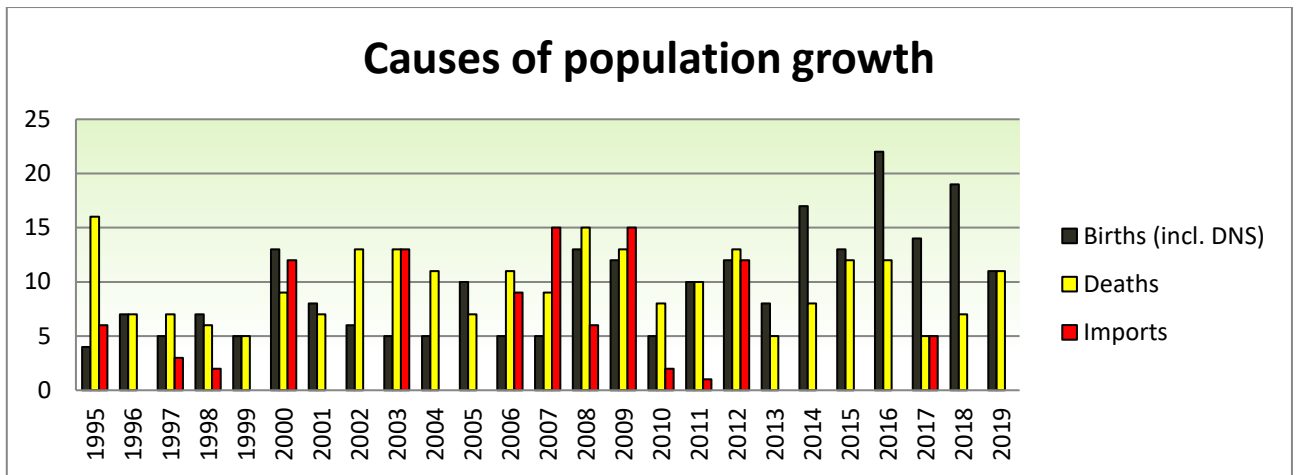


Figure 2: Causes of population growth

As mentioned earlier there is a group of 15 individuals at risk of dying of old age. The setting of the number 15 is realized with the help of the age pyramid combined with the rates for age-specific mortality ( $Q_x$ ) (Figure 3). Looking at the males there is a rise in the risk of dying at the age of 38, for females this is also at an age of 38, but the risk rises slower than for males. Taken this gender specific cut off into account, it can be deferred from the age pyramid that a total number of 15 animals are at an increased risk of dying.

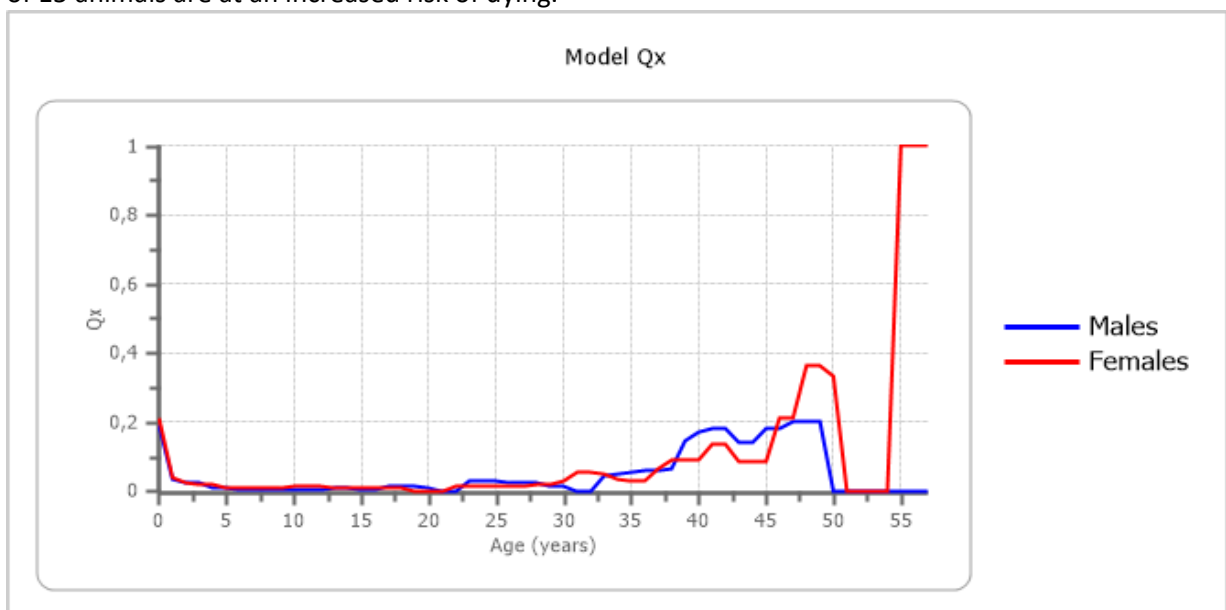
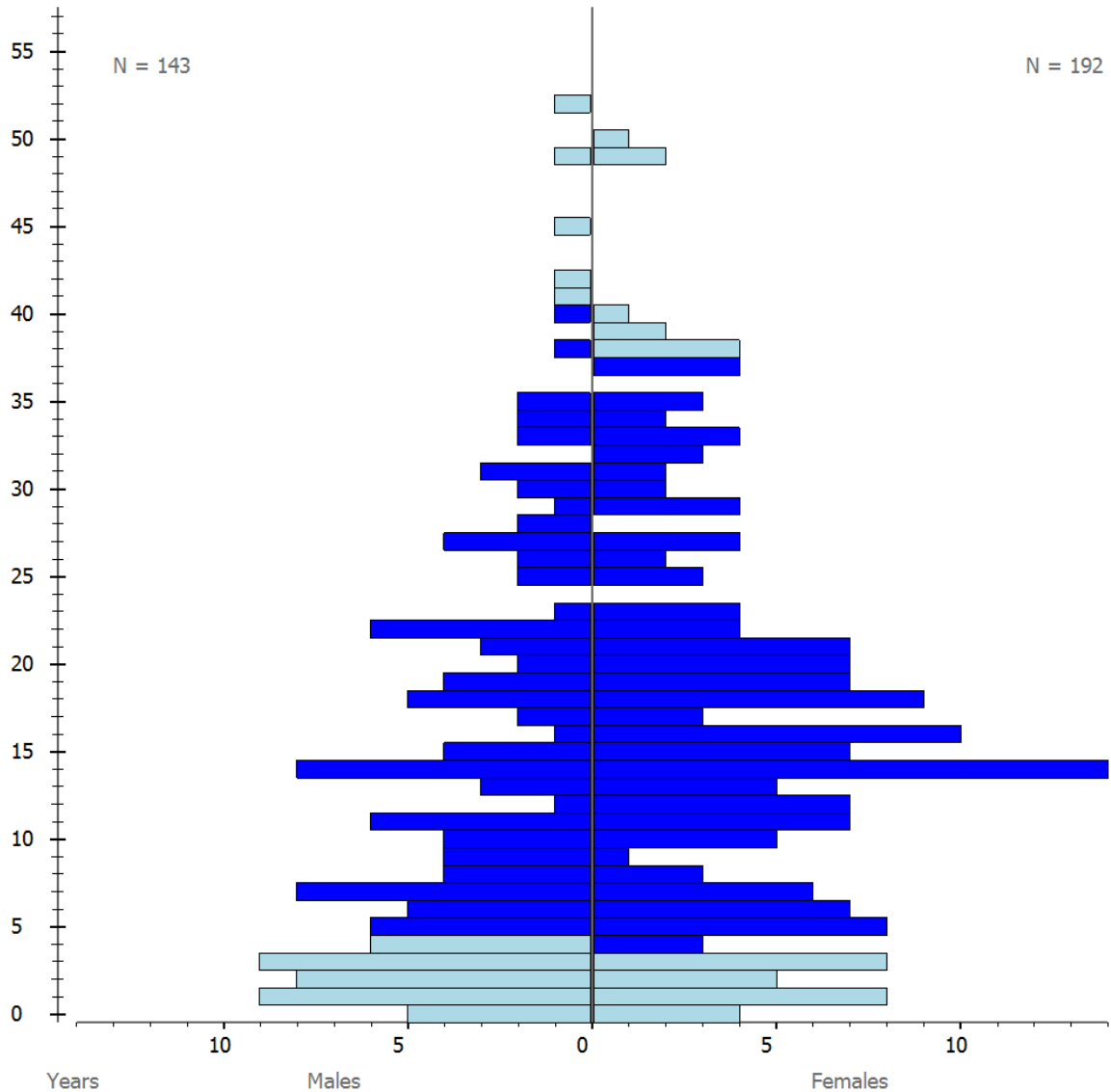


Figure 3: Age-specific Mortality ( $Q_x$ )

An important detail that (figure 3) shows is that there is 19% chance that a newborn calf dies before reaching the age of 1 year. This holds for both sexes. When we want to maintain the growth rate of 1, a minimum of at least 9.4 births is necessary, taking into account the probability that a pair will breed is set to 50%.



**Figure 4: Age pyramid white rhino EEP population**

The age pyramid provides us with information about the structure of the population. A healthy population will look like a pyramid. A large number of young animals at the base. When growing older, animals will die, ending with a few old animals at the top. Note that the dark blue refers to fertile animals, while the light blue ones are pre- or post reproductive. Currently, the base of the pyramid is smaller than desirable, especially in the female age class of 8 to 10 year. This is not surprising considering the slow reproductive reate historically. However, the last 8 years were quite successful, which also shows in the age pyramid. There is a high potential of females that could reproduce in the age of 5 – 18 years old.

Another way to look at fertility is age-specific fecundity (Mx). **Figure 5** shows us that females are reproductive at an age from 4 through 36, with a high chance of giving birth between the age of 8– 30 years. It can be deferred from figure 7 that no female was able to breed after 37 years of age. The raw (i.e. non smoothed) Mx rates can be found in [Appendix 1](#).

Since rhinos can live up to 50 years, the species is reproductive senescence. Meaning that they have a post-reproductive period were they are growing old without reproducing. Males differ from females in a way that they are reproductive at an age of 5 until 41, with a peak at 9 through

27 years of age. However the numbers regarding the reproductive success of males are an underestimation. Since the social structure requires relatively more females, males are often kept in bachelor groups, depriving them of the possibility to reproduce. It is assumed that the main problems concerning reproduction lies not with the males. Therefore, for further analysis the focus will be on the female rhinos.

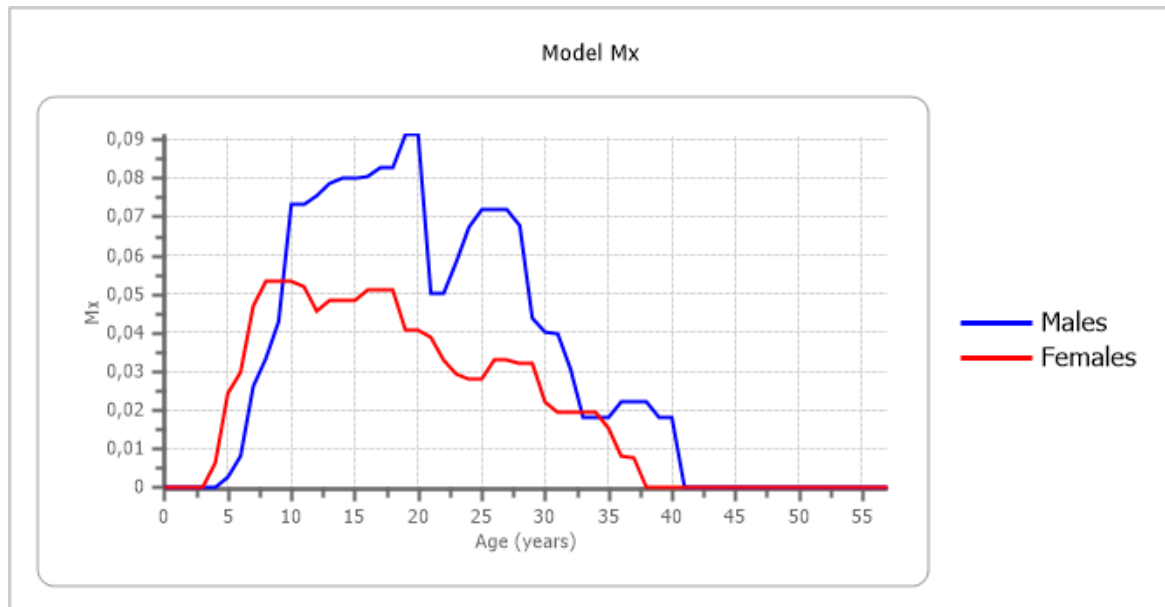


Figure 5: Age-specific Fecundity (Mx)

There are probably multiple reasons that a high percentage of female white rhinos do not breed. As veterinary research suggests one possible explanation is that the development of reproductive pathology and ovarian inactivity is an age-related consequence of long non-reproductive periods. This ageing process of the genital organs can be prevented with the achievement of at least one pregnancy (Hermes *et al.*, 2006). To prevent this from happening, each female between the ages of 6 to 20 years, which fails to reproduce, is checked for reproductive pathologies.

Another initiative taken to stimulate breeding is the transfer of young females out of their maternal herd. Since 2007 it is the strong conviction of the white rhino EEP that it is necessary to transfer adolescent females out of their maternal herd. This would stimulate natural breeding. In nature, adolescent females disperse to nearby regions, eventually joining other adolescent animals or adult females without calves. As of yet, it is too early to conclude whether transferring adolescent females prevents them from becoming a flat liner and/or make them start breeding naturally. However, preliminary results are very positive. Figure 6 displays the females of the white rhino EEP population. They are categorized in breeding or not (yet) breeding. The animals that are not breeding are further divided by age. The percentages refer to the proportions of females of a specific group (e.g. 'Breeding' or 'Not (yet) breeding, age <10') as a function of the total female population. With the data of the four previous studbooks; 2009, 2011, 2015 and 217, a first provisional view appears.

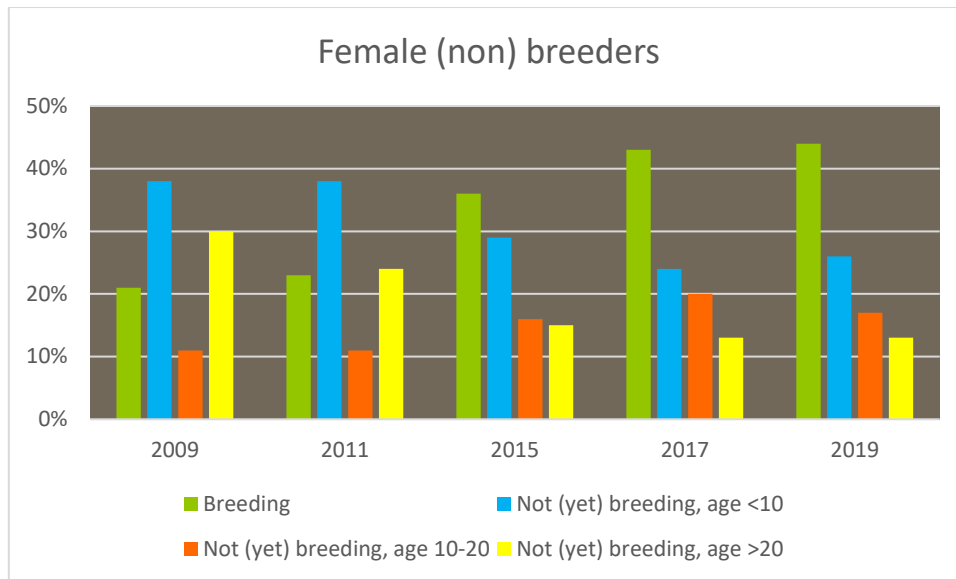


Figure 6: Female (non) breeders

An increase of more than 50% is seen for the females that were able to breed, going up from nearly 21%, 23% and 36% in 2009, 2011 and 2015 respectively, tot over 45% currently. This is of course what we have wished for all those years. Another positive change is the reduction of 13% of animals that did not breed in the age class younger than 10 years. However, an inverse affect can be observed for females that have not (yet) bred in the age class 10 – 20 years, however this stabilised again in the last 5 years. For animals in the oldest age class there is again a reduction visible in the percentage of female rhinos that have not (yet) bred. This reduction is probably caused by the death of the elderly animals, resulting in a smaller reference population. Instead of the percentage of female (non) breeders, [Table 1](#) displays the absolute numbers of female (non) breeders per selected class. For a more detailed overview of the numbers of female (non) breeders see [appendix 2](#).

Table 1: Number of female (non) breeders

	2009	2011	2014	2017	2019
	<i>n females</i>	<i>n females</i>	<i>n females</i>	<i>n females</i>	<i>n females</i>
Total females EEP population	154	159	173	180	192
Breeding	32	36	62	77	86
Not (yet) breeding, age < 10	59	60	50	44	49
Not (yet) breeding, age 10 – 20	17	25	35	36	33
Not (yet) breeding, age > 20	46	38	26	23	24

The age classes previously chosen are in some cases insufficient to analyse the effect of transferring adolescent females out of their maternal herd. For instance, the age class of females not yet breeding under the age of 10 years also contains animals which are pre-reproductive. The same holds true for the oldest age class but now containing animals that are post-reproductive. For future analyses new age classes are setup, see index [Figure 7](#). Another additional change is that animals that did not survive the first month after birth (DNS) are excluded from the analysis. These animals did not reach reproductive age and therefore did not have the chance to contribute to the breeding population.



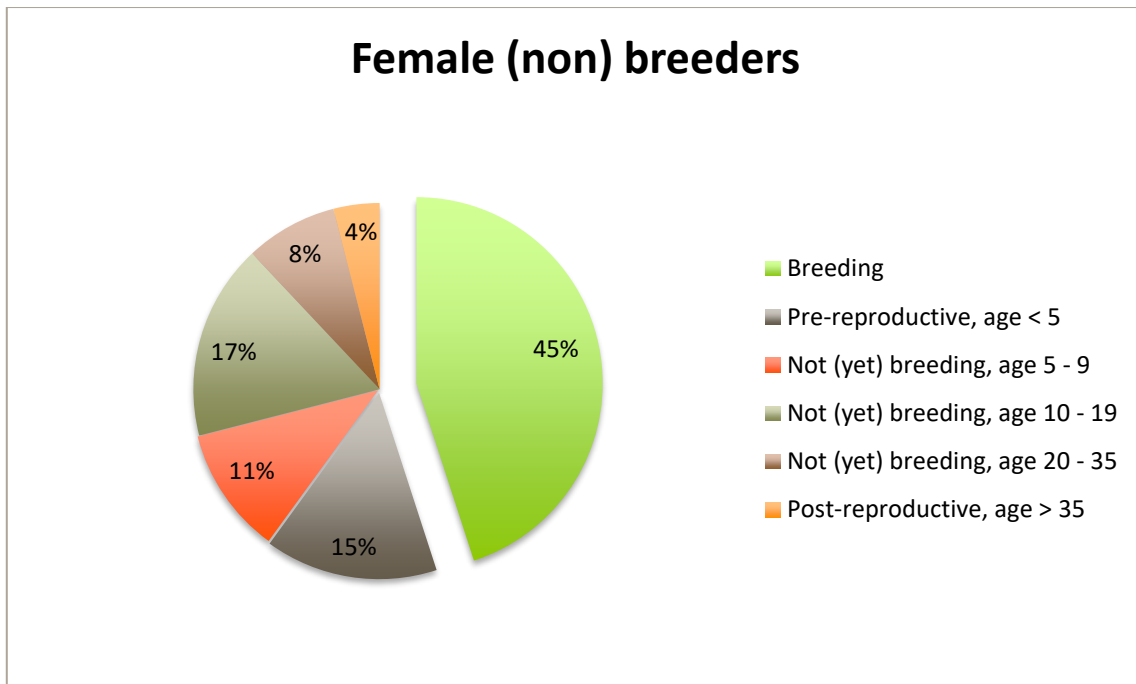


Figure 7: Female (non) breeders, 2019

With the alteration of the age classes it now becomes visible that within the youngest age class, 15% has not reached the reproductive age yet. So instead of thinking that 26% (figure 6) of this female class has not yet managed to breed, this is lowered to 11% (figure 7), a better representation of reality.

Table 2 shows an additional way to look at the female (non) breeders comparing 2017 and 2019. The first column represents the age classes as in figure 7. The second column displays the number of females of the current EEP population, sorted per age class. The last two columns reflect the females that have not yet reproduced. The percentages noted are not a comparison with the total female population. Instead, it reflects the percentage of animals that have not yet bred in that age class. Looking at the first age class, 0 – 4,99. During 2019, 29 female rhinos were younger than 5 years. Of those 29 animals, none have managed to reproduce, so 100% did not give birth. This is not surprising since female rhinos can become reproductive between 4 and 5 years of age. Interestingly, the second age class (between 5 and 9,99), breeding has lowered from 68% to 81% not breeding, but in the further three age classes the percentage of non breeding animals has gone down compared to 2017. So it seems female rhino start breeding later, but continue breeding throughout their reproductive life.

A more detailed overview of the numbers of female (non) breeders see [appendix 2](#).

Table 2: Female (non) breeders, 2017

Age class Years	Total females		Not (yet) breeding females			
	n 2017	n 2019	n 2017	N 2019	% 2017	% 2019
Breeding	77	87	-	-	-	-
0 - 4,99*	31	29	31	29	100	100
5 - 9,99	19	26	13	21	68	81
10 - 19,99	77	72	36	33	47	46
20 - 34,99	34	50	13	16	38	32
35 -	19	17	10	8	53	47

\* DNS excluded from analysis

### 3.3 Genetic analysis

Table 3 summarizes the results of the genetic analysis.

The living white rhino EEP population in 2019 was founded by 132 animals. From the founding population there are currently still 229 descendants alive. The gene diversity within the population is 0,9879. With an ancestry known for 100% with a certainty of 98.9% this indicates that the population is genetically diverse. This also reflects in a low mean-kinship value (0,0121) and mean inbreeding (0,0127). The mean-kinship is a measurement of the average relatedness of an individual to the living descendant population.

However, the Founder Genome Equivalent (FGE) and Founder Genome Surviving (FGS) are a lot lower than the population size. The FGE value stands for the number of wild caught individuals (founders) that would produce the same amount of gene diversity as is present in the living, descendant population. FGS reflects the number of original founder genomes surviving in the captive population. Both are a measurement of the loss of genetic variation due to bottlenecks in the founding population, where FGE also reveals disparities in founder representation. **It is known that the wild rhino population underwent a severe population crash in the early 20<sup>th</sup> century. Resulting that the wild population was derived from a maximum of 100 founders. This makes the assumption that a wild caught animal is unrelated to another wild caught rhino or animal in the captive population, and therefore a potential founder, very unreliable. However, since genetic screening of all the animals is not desirable, for management purposes every wild caught animal that has reproduced a fertile offspring is noted as a founder of the EEP population.**

Of the white rhino EEP population now 45% has managed to breed. This means that not all individuals in the population have contributed to the transmission of genetic material to the next generation. Even the animals that did reproduce did not equally contribute. Therefore the concept of the Effective Population Size ( $N_e$ ) was developed. The  $N_e$  shows the number of breeding individuals in an idealised population that would show the same rate of genetic drift and of inbreeding as the population under consideration. Where a random breeding population of constant size, equal sex ratio, and with non-overlapping generations defines an ideal population. In case of the white rhino EEP population, the mean Effective Population Size is 91.18 individuals. Goal is to increase the  $N_e$  in the future.

Table 3: Genetic summary

Genetic Summary	
Founders	132
Potential (additional)	47
Living Animals (N)	335
Living Descendants	229.50
% Ancestry Known	100%
% Ancestry Certain	98.9%
Gene Diversity	0,9879
Gene Value	0,9873
Population Mean Kinship	0,0121
Mean Inbreeding	0,0127
Founder Genome Equivalent (FGE)	41.47
Founder Genomes Surviving (FGS)	88.08
Effective Population Size ( $N_e$ )	91.18
$N_e/N$	0,2736

#### 4. Conclusion and recommendations

The white rhino EEP is tackling many difficulties. The major problem historically has always been the relatively low growth rate. However, the last couple of years the growth rate is steadily increasing. For the last 7 years the population has had more births than deaths, meaning a growth rate of  $>1$ , so no longer declining but stable. With no import in the last seven years (exception 2017 because of the geographic location of the new holder), this really is an indication that the white rhino EEP is growing into a self-sustainable population.

The steadily increasing growth rate is co-created by another very positive development, more institutions are starting to breed with their animals. The white rhino EEP is strongly convinced that it is necessary to transfer adolescent females out of their maternal herd, like they do in the wild. It is however too early to find statistical evidence which confirms the hypothesis that young females, which are transferred out of their maternal group, are more likely to start breeding naturally. A very positive trend is that the percentage of female rhinos breeding is increasing, over the last 8 years. By the end of 2019, 45% of the total female rhino population has managed to breed. Each potential breeding animal, which is for some reason not breeding, is recommended to get assessed for hormone profile and after that for reproductive problems by ultrasound. If this does not have any result, an exchange with another female from another herd is recommended.

Every zoo keeping white rhino has to consider the social behaviour aspects of this species. This means that white rhinos preferably should be kept in social groups in large exhibits. The recommendation is to have a rhino breeding facility for at least 1(2).3 (adult) rhinos, with the possibility to create a separate territory for the (second) male. There should also be space to keep calves long enough in the group, with 1 hectare space in the outside exhibit. All zoos that keep one or two animals (not male bachelor groups) should consider this and act accordingly for the benefit of the species. Any zoo with sub-optimal white rhino exhibits should work to improve their facilities or take the decision to stop keeping the species. The challenge in the coming years will be to establish more larger breeding herds by adding young females to existing herds. Also additional (separate) space for males is welcome, either in the breeding institutions (retired breeding males) or bachelor groups.

## 5. ZIMS for Studbook reports

### 5.1 Living population during 2018 – 2019

Stb #	Current Location	Birth Location	House Name	Current Local ID	Sex	Status	Age	Sire	Dam
2053	AL AIN	S.AFRICA	CHOTY	A7110020	F	Alive	14Y,2M,16D	WILD	WILD
2097	AL AIN	AL AIN	NELOY	202019	M	Alive	8Y,0M,27D	2049	2051
2098	AL AIN	AL AIN	LEON	204030	M	Alive	7Y,10M,17D	2049	2052
2049	AL AIN	S.AFRICA	JUMBO	A7110016	M	Alive	14Y,2M,16D	WILD	WILD
2166	AL AIN	AL AIN	FAYAL	B1407001	F	Alive	5Y,8M,16D	2049	2051
2051	AL AIN	S.AFRICA	LALITA	A7110018	F	Alive	14Y,2M,16D	WILD	WILD
2052	AL AIN	S.AFRICA	LILY	A7110019	F	Alive	14Y,2M,16D	WILD	WILD
2050	AL AIN	S.AFRICA	RONY	A7110017	M	Alive	14Y,2M,16D	WILD	WILD
2218	AL AIN	AL AIN	NOLA	B1512010	F	Alive	4Y,3M,7D	2049	2052
2260	AL AIN	AL AIN	SUDAN	B1804003	M	Alive	1Y,11M,16D	2097	2052
1480	ARNHEM	KOLMARDEN	IZALA	618043	F	Alive	16Y,2M,16D	WILD	1478
230	ARNHEM	UMFOLOZI	Freya	03559	F	Dead	45Y,7M,19D	WILD	WILD
1340	ARNHEM	WHIPSSNADE	Kwanzaa	610882	F	Alive	19Y,3M,2D	1011	654
907	ARNHEM	WHIPSSNADE	Gingabelle	611828	F	Alive	32Y,2M,21D	89	102
1025	ARNHEM	PARIS ZOO	GILLOU BB25	613853	M	Alive	27Y,7M,9D	91	651
2249	ARNHEM	ARNHEM	Wiesje	7649	F	Alive	2Y,7M,7D	1025	1480
2259	ARNHEM	ARNHEM	Naomi	8159	F	Alive	2Y,0M,16D	1025	1340
T114	ARNHEM	ARNHEM	Diederik	9523	M	Alive	0Y,7M,2D	1025	1480
1632	ATTICAZOO	WHIPSSNADE	JABARI	MCS001	M	Alive	12Y,2M,18D	1011	489
1636	ATTICAZOO	WHIPSSNADE	SHAKA	MCS002	M	Alive	12Y,0M,10D	1011	654
1409	AUCKLAND	HAMILTON	Inkosi	A70061	M	Alive	18Y,2M,11D	1356	1358
1356	AUCKLAND	NATAL PK	Zambezi	A70060	M	Alive	30Y,5M,16D	WILD	WILD
2077	AUCKLAND	HAMILTON	Jamila	B80490	F	Alive	8Y,0M,11D	1273	1357
1626	AUGSBURG	S.AFRICA	KIBIBI	2008FS	F	Alive	15Y,2M,16D	WILD	WILD
1526	AUGSBURG	WHIPSSNADE	Bantu	2014AV	M	Alive	14Y,5M,11D	1011	489
1625	AUGSBURG	S.AFRICA	CHRIS	2008FR	F	Alive	15Y,2M,16D	WILD	WILD
361	AUGSBURG	HLUHLUWE	BABY	2008FQ	F	Alive	49Y,2M,16D	WILD	WILD
2087	AYWAILLE	S.AFRICA	Amélie	120129	F	Alive	13Y,9M,2D	WILD	WILD
2088	AYWAILLE	S.AFRICA	Lucy.	120130	F	Alive	12Y,9M,2D	WILD	WILD
1595	AYWAILLE	HODENHAGN	HEINI	150009	M	Alive	13Y,6M,17D	491	494
1363	BANDHOLM	S.AFRICA	Bodil	CESI03	F	Alive	22Y,9M,8D	WILD	WILD
2224	BANDHOLM	BORAS	Jamala	CESI08	F	Alive	5Y,5M,13D	1233	1338
1466	BANDHOLM	MARWELL	Shaka	CESI07	M	Alive	16Y,2M,17D	828	856
1484	BARCELONA	S.AFRICA	PEDRO	8556	M	Alive	49Y,2M,16D	WILD	WILD
1048	BEAUVAL	HILVARENB	Smoske	M0234	M	Alive	25Y,6M,9D	221	225
1463	BEAUVAL	THABAZIMB	Mafunyane	M01313	F	Alive	18Y,10M,6D	WILD	WILD
1307	BEAUVAL	South Africa	Satara	00049	F	Alive	22Y,1M,16D	WILD	WILD
T117	BEAUVAL	BEAUVAL		M02765	M	Dead	0Y,0M,0D	1048	1463
2006	BEWDLEY	BLAIRDRUM	Ailsa	1093	F	Alive	10Y,2M,25D	1475	1473
1647	BEWDLEY	LISIEUX Z	Keyah	1058	F	Alive	11Y,5M,9D	WILD	1561
1174	BEWDLEY	HLUHLUWE	Trixie	1174	F	Alive	26Y,2M,16D	WILD	WILD
2217	BEWDLEY	BEWDLEY	Ekozu	1553	M	Alive	3Y,11M,21D	1583	2006
1062	BEWDLEY	Kwazulu-	MTUBA	1062	F	Alive	27Y,8M,16D	WILD	WILD

		Natal, South Africa							
1583	BEWDLEY	BEWDLEY	BARNOLD	R9	M	Alive	14Y,5M,25D	1060	1175
2250	BEWDLEY	BEWDLEY	Fahari	1690	F	Alive	2Y,6M,9D	1583	1647
2750	BEWDLEY	BEWDLEY	Granville	1822	M	Alive	1Y,5M,21D	1583	2006
1571	BIOPARCVA	S.AFRICA	NOMBULA	V07207	F	Alive	16Y,2M,16D	WILD	WILD
1486	BIOPARCVA	RIOLEORES	CIRILO	V07018	M	Alive	28Y,3M,16D	1487	1488
1475	BLAIRDRUM	S.AFRICA	Graham	BD21	M	Alive	20Y,1M,16D	WILD	WILD
1445	BLAIRDRUM	South Africa	TSWANE	BD859	F	Alive	19Y,8M,16D	WILD	WILD
2231	BLAIRDRUM	BLAIRDRUM	Bonnie	BD908	F	Alive	3Y,5M,19D	1475	1473
1473	BLAIRDRUM	S.AFRICA	Dorothy	BD19	F	Alive	20Y,1M,16D	WILD	WILD
2110	BOISSIERE	S.AFRICA	SWANIE	HRB003	F	Alive	14Y,8M,15D	WILD	WILD
1606	BOISSIERE	GIVSKUD	MAX	HRB001	M	Alive	13Y,3M,5D	221	1251
2109	BOISSIERE	S.AFRICA	HACUNA	HRB002	F	Alive	14Y,8M,15D	WILD	WILD
2756	BOISSIERE	BOISSIERE	Yamba	HRB007	F	Alive	1Y,3M,13D	1606	2109
2755	BOISSIERE	BOISSIERE	Wakati	HRB006	M	Alive	1Y,5M,21D	1606	2110
1338	BORAS	WHIPSNADÉ	ZINZI	EN0005	F	Alive	19Y,10M,16	1011	329
1233	BORAS	MARWELL	BHASELA	EN0007	M	Alive	21Y,1M,9D	828	856
2228	BORAS	BORAS	Bishara	EN0013	F	Dead	1Y,5M,23D	1233	1479
1479	BORAS	UMFOLOZI	MASHIKISHI	EN0011	F	Alive	18Y,8M,16D	WILD	1478
2757	BORAS	BORAS	NAFASI	EN0014	M	Alive	1Y,4M,3D	1233	1479
1154	BRATISLAV	Namibia	ADA	M551	F	Alive	35Y,6M,12D	WILD	WILD
669	BRATISLAV	MUNSTER	NIKO	D041202	M	Dead	37Y,8M,1D	340	403
1049	BUDAPEST	RAMAT GAN	Zafriel	100865	M	Alive	29Y,1M,20D	MUL T2	241
902	BUDAPEST	Kwazulu- Natal, South Africa	LULU	000215	F	Alive	39Y,8M,16D	WILD	WILD
1610	BUDAPEST	BUDAPEST	Natalia	100111	F	Alive	13Y,1M,23D	578	902
2262	BURFORD	BURFORD	Belle	MM2204	F	Alive	2Y,5M,15D	1591	2002
2002	BURFORD	S.AFRICA	Nancy	MM1402	F	Alive	13Y,8M,16D	WILD	WILD
2003	BURFORD	S.AFRICA	Ruby	MM1401	F	Alive	13Y,8M,16D	WILD	WILD
2251	BURFORD	BURFORD	Alan	MM2199	M	Alive	2Y,6M,4D	1591	2003
1591	BURFORD	KNOWSLEY	KIFARU	MM1323	M	Alive	13Y,10M,21	829	1026
T115	BURFORD	BURFORD	Stella	MM2353	F	Alive	0Y,6M,10D	1591	2003
2206	BURSA ZOO	SALZBURG	Amadou	BGR02	M	Alive	4Y,11M,13D	1446	2000
2209	BURSA ZOO	SALZBURG	Tayo	BGR01	M	Alive	4Y,6M,12D	1446	1999
2212	BURSA ZOO	BEAUVAL	Hawii	BGR03	M	Alive	4Y,3M,14D	1048	1307
305	BUSSOLENG	UMFOLOZI	BUJUKO	CSS002	M	Alive	52Y,8M,16D	WILD	WILD
676	BUSSOLENG	KNOXVILLE	BENNO	CSS003	M	Alive	38Y,2M,17D	618	620
1572	CABARCENO	S.AFRICA	MAYAYI	RI-8	F	Alive	16Y,2M,16D	WILD	WILD
2156	CABARCENO	CABARCENO	COSME	RI-7	M	Alive	6Y,5M,20D	865	1501
1501	CABARCENO	GIVSKUD	ZOLA	RI-6	F	Alive	15Y,2M,6D	221	1251
988	CABARCENO	HODENHAGN	UNA/NORA	RI-2	F	Alive	27Y,4M,26D	491	915
865	CABARCENO	USTI	SAGAN	RI-1	M	Alive	33Y,3M,28D	111	114
2103	CAMBRON	S.AFRICA	Eleonor	9325	F	Alive	11Y,8M,16D	WILD	WILD
1424	CAMBRON	WHIPSNADÉ	JOBY	10421	M	Alive	18Y,3M,24D	1011	489
2101	CAMBRON	S.AFRICA	Madiba	9323	F	Alive	11Y,8M,16D	WILD	WILD
T119	CAMBRON	CAMBRON	Zimba	8636	M	Alive	0Y,3M,21D	1424	2101
T120	CAMBRON	CAMBRON	Sena	8642	F	Alive	0Y,3M,14D	1424	2103

2005	CHESINGTN	ARNHEM	Dozer	WR01	M	Alive	9Y,11M,11D	1025	1340
2037	CHESINGTN	BEAUVAL	KANTY	WR03	M	Alive	10Y,4M,5D	1048	1307
2059	CHESINGTN	LISBON	GYASI	WR02	M	Alive	9Y,3M,10D	1013	1570
2157	CHORZOW	KOLMARDEN	NAMBI	4148	F	Alive	6Y,4M,28D	1183	1478
1023	CHORZOW	CHORZOW	ZULUS	2215	M	Alive	26Y,2M,9D	200	211
1413	CHORZOW	CHORZOW	HOPE	2670	F	Alive	18Y,5M,1D	200	211
211	CHORZOW	UMFOLOZI	FAITH	1583	F	Dead	48Y,6M,14D	WILD	WILD
607	COLCHESTR	UMFOLOZI	FLOSSY	185	F	Dead	48Y,3M,10D	WILD	WILD
1457	COLCHESTR	South Africa	Emily	BLL279	F	Alive	20Y,2M,16D	WILD	WILD
1360	COLCHESTR	S.AFRICA	Otto	CLL705	M	Alive	22Y,4M,17D	WILD	WILD
2150	COLCHESTR	BURFORD	Astrid	DLL1300	F	Alive	6Y,8M,16D	1591	2002
1584	COLCHESTR	KNOWSLEY	Binta	DLL2077	F	Alive	14Y,4M,0D	829	1120
2067	COPENHAGE	BORAS	ZURI	CER006	F	Alive	8Y,4M,1D	1233	1338
1361	COPENHAGE	S.AFRICA	Kurt	CER004	M	Dead	23Y,2M,11D	WILD	WILD
2255	COPENHAGE	COPENHAGE	Berg	CER008	M	Alive	2Y,5M,1D	1361	1542
1542	COPENHAGE	S.AFRICA	MINNA	CER002	F	Alive	23Y,8M,16D	WILD	WILD
2257	COPENHAGE	COPENHAGE	Alfred	CER009	M	Alive	2Y,2M,14D	1361	2067
2075	COULANGE	S.AFRICA	BENNY	CSS9	M	Alive	15Y,8M,16D	WILD	WILD
1460	COULANGE	S.AFRICA	TALA	CSS10	F	Alive	20Y,9M,16D	WILD	WILD
1410	COULANGE	BEWDLEY	LUCY	CSS12	F	Alive	18Y,1M,19D	1060	1174
2074	COULANGE	KRUGER	HEKAW	CSS8	F	Alive	15Y,8M,16D	WILD	WILD
2073	COULANGE	S.AFRICA	YORUBA	CSS7	F	Alive	12Y,8M,16D	WILD	WILD
2258	COULANGE	COULANGE	ARANKA	CSS15	F	Alive	2Y,1M,16D	2075	2074
2239	COULANGE	COULANGE	TIMBO	CSS14	M	Alive	3Y,0M,12D	2075	1460
403	DORTMUND	UMFOLOZI	Natala	081008	F	Alive	50Y,5M,16D	WILD	WILD
1627	DORTMUND	S.AFRICA	Jasira	081010	F	Alive	14Y,5M,16D	WILD	WILD
1581	DORTMUND	ERFURT	Amari	081011	M	Alive	14Y,9M,6D	627	1208
1659	DORTMUND	S.AFRICA	Shakina	081009	F	Alive	14Y,5M,16D	WILD	WILD
859	DUBLIN	SOFIAZOO	Reni	A0M089	F	Alive	33Y,5M,23D	89	103
330	DUBLIN	WHIPNADE	SAM	77M034	M	Dead	42Y,2M,24D	70	105
1552	DUBLIN	KRUGER	Chaka	A4M041	M	Alive	19Y,3M,16D	WILD	WILD
2256	DUBLIN	DUBLIN	Tadala	A17M67	M	Alive	2Y,4M,5D	1552	1688
1688	DUBLIN	SO LAKES	Nyala	A12M40	F	Alive	11Y,9M,16D	1173	1461
1555	DUBLIN	UMFOLOZI	Ashanti	A4M043	F	Alive	19Y,3M,16D	WILD	WILD
1558	DUBLIN	UMFOLOZI	Zanta	A4M042	F	Alive	18Y,9M,16D	WILD	WILD
T128	DUBLIN	DUBLIN		A18M65	F	Dead	0Y,0M,0D	1552	1555
1284	DUISBURG	LISIEUX Z	KIFAROU	6762	M	Alive	20Y,1M,1D	257	989
1043	DVURKRALV	HODENHAGN	JESSICA	117022	F	Alive	26Y,2M,6D	491	496
371	DVURKRALV	UMFOLOZI	Natal 001	NHN N	M	Dead	46Y,3M,1D	WILD	WILD
2248	DVURKRALV	BEAUVAL	Gaya	Und	F	Alive	3Y,3M,28D	1048	1463
1208	DVURKRALV	SABLE RAN	TEMBA	117024	F	Alive	22Y,8M,16D	1253	1254
1464	DVURKRALV	KRUGERSDO	Jabulani	117025	F	Alive	18Y,11M,16	WILD	WILD
2102	DVURKRALV	S.AFRICA	Pamir	117023	M	Alive	11Y,8M,16D	WILD	WILD
2198	EMMEN	HILVARENB	Elena	508012	F	Alive	5Y,2M,19D	1165	1203
812	EMMEN	MUNSTER	Emily	508011	F	Alive	35Y,2M,12D	340	403
2004	EMMEN	HILVARENB	Zahra	508009	F	Alive	10Y,3M,25D	1165	1203
1645	EMMEN	KNOWSLEY	Gus	508010	M	Alive	11Y,7M,18D	829	1026
1578	ERFURT	HODENHAGN	Marcita	4703	F	Alive	15Y,2M,10D	491	496
1207	ERFURT	SABLE RAN	NUMBI	534	F	Alive	23Y,11M,16	1253	1257



D									
1029	ERFURT	USTI	Dino	4297	M	Alive	26Y,3M,7D	111	114
2770	ERFURT	ERFURT	Kiano	5005	M	Alive	1Y,2M,17D	1029	1578
2220	ESTEPONA	CAMBRON	Sethemba Vasta	RINO01	M	Alive	3Y,11M,24D	2102	2103
2229	ESTEPONA	HODENHAGN	Akono	RINO03	M	Alive	3Y,6M,10D	1004	1220
2240	ESTEPONA	HODENHAGN	Tayo	RINO02	M	Alive	3Y,0M,14D	1004	1697
1575	GELSNKRKN	Undetermined	Tamu	203002	F	Alive	16Y,5M,1D	WILD	WILD
1489	GELSNKRKN	ERFURT	RIMBO	203004	M	Alive	15Y,5M,20D	627	1207
1576	GELSNKRKN	S.AFRICA	Cera	203003	F	Alive	15Y,5M,16D	WILD	WILD
1617	GIVSKUD	ERFURT	Samia	CERS07	F	Alive	12Y,2M,11D	627	1207
652	GIVSKUD	LONGLEAT	SOPHIE	100002	F	Alive	38Y,6M,21D	117	120
1212	GIVSKUD	EDINBURGH	OTZEE	CERS08	M	Alive	21Y,9M,3D	139	97
2254	GIVSKUD	GIVSKUD	Savannah	CERS10	F	Alive	2Y,6M,2D	1393	1616
1251	GIVSKUD	WHIPNADE	INGER	CERS03	F	Alive	20Y,6M,7D	1011	489
1616	GIVSKUD	BLAIRDRUM	Mazumba	CERS09	F	Alive	12Y,6M,21D	1475	1473
2168	HILVARENB	ARNHEM	Tank	M14164	M	Alive	5Y,7M,23D	1025	1340
964	HILVARENB	HILVARENB	YVONNE	M90042	F	Alive	29Y,3M,16D	221	224
835	HILVARENB	HILVARENB	KARLIJN	M85307	F	Alive	34Y,4M,20D	221	224
938	HILVARENB	HILVARENB	ANSJE	M88046	F	Alive	31Y,5M,0D	221	225
2200	HILVARENB	COPENHAGE	Pilan	M15132	M	Dead	4Y,8M,0D	1361	1542
2199	HILVARENB	COULANGE	SHANGO	M14167	M	Alive	5Y,3M,16D	2075	2074
2196	HILVARENB	SCHMIDING	Django	M14166	M	Alive	5Y,4M,4D	1490	1686
2203	HILVARENB	HILVARENB	Sofie	M15024	F	Alive	5Y,0M,16D	1165	1616
1203	HILVARENB	HILVARENB	DOUNIA	M98062	F	Alive	21Y,6M,19D	76	225
1393	HILVARENB	ERFURT	LIMPOPO	M01135	M	Alive	18Y,3M,11D	627	1207
2241	HILVARENB	HILVARENB		M17028	F	Dead	0Y,0M,1D	1393	938
2125	HODENHAGN	HODENHAGN	Makena	CESI012	F	Alive	7Y,0M,10D	1004	1697
494	HODENHAGN	UMFOLOZI	Doris	CESI004	F	Dead	50Y,0M,4D	WILD	WILD
990	HODENHAGN	SD-WAP	Kusini	CESI055	M	Alive	27Y,10M,2D	187	157
1697	HODENHAGN	Undetermined	Uzuri	CESI009	F	Alive	14Y,8M,15D	WILD	WILD
1220	HODENHAGN	HODENHAGN	Claudia	CESI007	F	Alive	21Y,5M,20D	491	494
1696	HODENHAGN	S.AFRICA	Kianga	CESI008	F	Alive	15Y,8M,16D	WILD	WILD
1004	HODENHAGN	HODENHAGN	Sato	CESI005	M	Alive	26Y,6M,4D	491	494
2234	HODENHAGN	HODENHAGN	Moana	CESI057	F	Alive	3Y,2M,20D	1004	1696
945	JERUSALEM	RAMAT GAN	Carmi	869	M	Alive	30Y,9M,24D	497	641
487	JERUSALEM	RAMAT GAN	Shalom	1678	M	Alive	41Y,5M,18D	244	240
2197	KERKRADE	BOISSIERE	Wazi	M14029	F	Alive	5Y,2M,27D	1606	2110
2162	KERKRADE	DORTMUND	Abebi	M14107	F	Alive	5Y,10M,25D	1581	1659
2012	KERKRADE	HILVARENB	Thabo	M11659	M	Alive	8Y,11M,15D	1165	1047
1125	KESSINGLA	HODENHAGN	NORMA	M1388	F	Alive	23Y,5M,1D	491	496
1689	KESSINGLA	SO LAKES	ZIMBA	M2034	M	Alive	11Y,6M,6D	1173	1460
829	KESSINGLA	KNOWSLEY	BUDWEISE	M1262	M	Alive	34Y,6M,21D	355	352
1175	KESSINGLA	HLUHLUWE	TOOTSIE	M2033	F	Alive	27Y,4M,16D	WILD	WILD
2094	KESSINGLA	KNOWSLEY	NJIRI	M1919	F	Alive	7Y,4M,10D	1119	1120
2041	KNOWSLEY	KNOWSLEY	Jaseera	757	F	Alive	9Y,2M,5D	829	1026
1026	KNOWSLEY	EDINBURGH	Meru	18	F	Alive	25Y,8M,16D	139	97
1120	KNOWSLEY	Kwazulu-Natal, South	Piglet	15	F	Alive	30Y,2M,16D	WILD	WILD

Africa									
2222	KNOWSLEY	COULANGE	Bayami	WR02	F	Alive	3Y,8M,15D	2075	2073
1121	KNOWSLEY	Kwazulu-Natal South Africa	Winnie	16	F	Alive	30Y,2M,16D	WILD	WILD
1119	KNOWSLEY	Kwazulu- Natal, South Africa	Shaka	14	M	Alive	27Y,6M,28D	WILD	WILD
2216	KNOWSLEY	AUGSBURG	Keeva	WR01	F	Alive	4Y,0M,28D	1526	1625
1709	KNOWSLEY	MADRID Z	Pembe	1500	M	Alive	10Y,10M,17	250	1416
2264	KNOWSLEY	KNOWSLEY	Jabari	14141	M	Dead	1Y,5M,21D	1119	1026
1478	KOLMARDEN	UMFOLOZI	IMFOLOZI	8977	F	Alive	29Y,2M,16D	WILD	WILD
1171	KOLMARDEN	WHIPNADE	NAMAKULA	12012	F	Alive	23Y,1M,11D	1011	962
1183	KOLMARDEN	EMMEN	Banyari	10002	M	Alive	22Y,0M,19D	343	907
2758	KOLMARDEN	KOLMARDEN	AMI	13666	F	Alive	1Y,5M,11D	1183	1478
796	LA PALMYR	HILVARENB	Chris	231	M	Alive	35Y,11M,23	221	224
2111	LA PALMYR	SCHMIDING	NALA	8101	F	Alive	7Y,4M,25D	1490	1685
767	LA PALMYR	HILVARENB	NOELLE	229	F	Alive	37Y,2M,21D	221	225
927	LE VIGEN	JACKSONVL	JOEY	MC8001	M	Alive	31Y,11M,25	390	533
1515	LESNA	WHIPNADE	KASHKA	212220	M	Alive	14Y,9M,8D	1011	654
1559	LESNA	South Africa	ZANTA	206219	F	Alive	16Y,8M,16D	WILD	WILD
1560	LESNA	South Africa	NAJA	206220	F	Alive	15Y,8M,16D	WILD	WILD
2161	LILLE ZO	BOISSIERE	MAPENZI	3237	M	Alive	6Y,1M,22D	1606	2109
2148	LILLE ZO	MUNSTER	ENO	3236	M	Alive	6Y,9M,23D	974	1474
1569	LISBON	THABA MAN		10247	F	Alive	18Y,2M,16D	WILD	WILD
1568	LISBON	THABA MAN		10246	M	Alive	18Y,2M,16D	WILD	WILD
1013	LISBON	KRUGER	Globani	1431	M	Alive	34Y,2M,16D	WILD	WILD
2164	LISBON	LISBON	ANDILE	11794	F	Alive	5Y,10M,13D	1013	1570
1550	LISIEUX Z	S.AFRICA	Sutu	M07151	F	Alive	18Y,8M,16D	WILD	WILD
1425	LISIEUX Z	WHIPNADE	BETH	M16038	F	Alive	18Y,3M,6D	1011	962
1010	LISIEUX Z	WHIPNADE	CHRIS	M94007	M	Alive	27Y,4M,1D	89	329
1444	LISIEUX Z	South Africa	MANZI	M18108	F	Alive	20Y,2M,16D	WILD	WILD
258	LISIEUX Z	UMFOLOZI	ROSIE	M95025	F	Dead	47Y,6M,19D	WILD	WILD
2235	LISIEUX Z	SO LAKES	Mosi	M18109	F	Alive	3Y,2M,21D	1173	1444
2759	LISIEUX Z	LISIEUX Z	KWANZA	M18182	F	Alive	1Y,3M,14D	1010	1425
1545	LONGLEAT	HLUHLUWE	Marashi	RW103	F	Alive	21Y,2M,16D	WILD	WILD
1551	LONGLEAT	HLUHLUWE	Razina	RW102	F	Alive	20Y,2M,16D	WILD	WILD
1695	LONGLEAT	MUNSTER	EBUN	RW879	F	Alive	10Y,5M,26D	974	967
1544	LONGLEAT	HLUHLUWE	harry	RW101	M	Alive	20Y,8M,16D	WILD	WILD
2237	LYMPNE	COLCHESTR	Kifaru	Und	M	Alive	3Y,1M,12D	1360	1457
2226	LYMPNE	DUBLIN	Zuko	P21941	M	Alive	3Y,6M,21D	1552	1555
1414	MADRID Z	South Africa	BENNI	RB7	M	Alive	22Y,2M,16D	WILD	WILD
251	MADRID Z	UMFOLOZI		RB2	F	Dead	47Y,7M,14D	WILD	WILD
1416	MADRID Z	Undetermined	MARINA	RB5	F	Alive	21Y,11M,16	WILD	WILD
2194	MALTON	BLAIRDRUM	Bruce	2492	M	Alive	5Y,5M,5D	1475	1473
2167	MALTON	COLCHESTR	Mabaso	2489	M	Alive	5Y,8M,6D	1360	1458
1694	MANOR HS	COLCHESTR	ZAMBA	SWR001	M	Alive	10Y,5M,13D	88	1458
1996	MANOR HS	ERFURT	JAMBO G5	SWR002	M	Alive	10Y,4M,17D	627	1207
2007	MANOR HS	DUBLIN	ZUBERI	SWR003	M	Alive	9Y,3M,7D	1552	1555
868	MARWELL	WHIPNADE	TRACY	1167	F	Alive	33Y,7M,2D	89	329



856	MARWELL	EDINBURGH	SULA	1083	F	Alive	33Y,6M,5D	139	97
2130	MARWELL	DUBLIN	Jabari	9620	M	Alive	6Y,10M,20D	1552	1555
2128	MARWELL	COLCHESTR	Pembe	9719	F	Alive	6Y,11M,4D	1360	1457
2213	MONTPELLI	KNOWSLEY	Nomvula	M18126	F	Alive	4Y,2M,15D	1119	1026
1306	MONTPELLI	South Africa	MLANE	M13007	F	Alive	22Y,1M,16D	WILD	WILD
2039	MONTPELLI	KNOWSLEY	TROY	M17031	M	Alive	9Y,3M,17D	829	1120
1474	MUNSTER	S.AFRICA	JANE	24320	F	Alive	19Y,7M,16D	WILD	WILD
854	MUNSTER	MUNSTER	VICKY	20230	F	Alive	33Y,2M,23D	340	403
974	MUNSTER	WHIPNADE	HARRY	21180	M	Alive	29Y,2M,18D	89	329
2768	MUNSTER	MUNSTER		25001013	F	Dead	0Y,0M,0D	974	1474
2242	MUNSTER	MUNSTER	Amiri	2500550	M	Alive	2Y,9M,26D	974	1474
2667	MYSORE	SINGAPORE	Vita	M01536	F	Alive	4Y,4M,15D	1341	1098
2253	MYSORE	SINGAPORE	Oban	M01537	M	Alive	2Y,6M,11D	1341	1098
2147	NORFOLK	SINGAPORE	Zina	217058	F	Alive	6Y,10M,19D	1341	1098
2160	NORFOLK	SINGAPORE	Bora	217057	F	Alive	6Y,2M,23D	1341	1097
2016	NYIREGYHA	KOLMARDEN	JALA	M01221	F	Alive	10Y,3M,21D	1183	1478
1556	NYIREGYHA	MAFUNYANE	SAKILE	M00412	F	Alive	18Y,10M,16	WILD	WILD
1540	NYIREGYHA	S.AFRICA	CURT	M01105	M	Alive	22Y,8M,16D	WILD	WILD
2771	NYIREGYHA	NYIREGYHA		M13667	M	Dead	0Y,0M,0D	1540	1556
1628	OSNABRUCK	HODENHAGN	Amelie	2313	F	Alive	13Y,2M,0D	1004	1220
1447	OSNABRUCK	HODENHAGN	Frieda-Lea	2156	F	Alive	17Y,2M,17D	491	494
1165	OSNABRUCK	CABARCENO	Miguelin	3753	M	Alive	22Y,5M,17D	404	988
2068	PARIS ZOO	BEAUVAL	Wami	ZB4390	M	Alive	8Y,5M,1D	1048	1307
2080	PARIS ZOO	BLAIRDRUM	Angus	ZB4674	M	Alive	8Y,3M,22D	1475	1473
1462	PEAUGRES	POZNAN	Duma	1587	F	Alive	16Y,3M,27D	1029	931
847	PEAUGRES	UMFOLOZI	TOMBI	1387	F	Alive	40Y,8M,16D	WILD	WILD
1438	PEAUGRES	KNOWSLEY	SAMSON	1555	M	Alive	18Y,5M,26D	829	1120
1596	PEAUGRES	ARNHEM	KARA	2404	F	Alive	13Y,6M,4D	532	1340
2001	PEAUGRES	WEENEN	MALIA	2250	F	Alive	13Y,2M,16D	WILD	1999
2261	PEAUGRES	PEAUGRES	Malabar	3137	M	Alive	1Y,10M,10D	1438	1462
2774	PEAUGRES	PEAUGRES	BASILE	3289	M	Alive	0Y,11M,2D	1438	2001
1574	PELISSANE	S.AFRICA	Lekuru	HRH904	M	Alive	16Y,0M,16D	WILD	WILD
1684	PELISSANE	THABA MAN	BELA	HRH703	F	Alive	16Y,8M,16D	WILD	WILD
1683	PELISSANE	THABA MAN	WANZA	HRH603	F	Alive	16Y,8M,16D	WILD	WILD
888	PLAISANCE	CHORZOW	BULDO	325	M	Alive	33Y,6M,14D	200	211
1392	PLAISANCE	South Africa	MARGARET	326	F	Alive	38Y,2M,16D	WILD	WILD
931	POZNAN	PRET LICH	DYNIA	MK0615	F	Alive	32Y,9M,17D	405	406
627	POZNAN	MEMPHIS	KIWU	MK1701	M	Dead	37Y,5M,13D	40	397
184	PT ST PER	UMFOLOZI	SANA	P05-0375	F	Dead	55Y,6M,4D	WILD	WILD
2089	PT ST PER	PEAUGRES	Goliath	15-CS007	M	Alive	7Y,5M,28D	1438	1462
505	PT ST PER	UMFOLOZI	Jambo	P07-1169	M	Alive	45Y,2M,16D	WILD	WILD
2202	PT ST PER	HODENHAGN	Dinari	CS008	M	Alive	6Y,6M,23D	1004	1220
2105	QUINTASI	KNOWSLEY	NONU	3137	M	Alive	7Y,2M,26D	1119	1026
2095	QUINTASI	KNOWSLEY	THABO	3138	M	Alive	7Y,4M,8D	1119	1121
2078	QUINTASI	HILVARENB	SAM G6	3162	M	Alive	8Y,4M,2D	1165	1203
2225	RAMAT GAN	RAMAT GAN	Tupac	203811	M	Alive	3Y,6M,27D	497	1083
2210	RAMAT GAN	RAMAT GAN	Kipenzi	203739	F	Alive	4Y,6M,22D	497	2086
949	RAMAT GAN	RAMAT GAN	Maia	900017	F	Alive	29Y,10M,10	MUL T2	242

2086	RAMAT GAN	S.AFRICA	Keren Peles	203270	F	Alive	12Y,4M,16D	WILD	WILD
641	RAMAT GAN	RAMAT GAN	CARNAVELL	810026	F	Alive	39Y,0M,19D	MUL T2	242
2056	RAMAT GAN	PRET LICH	Rihanna	203355	F	Alive	9Y,10M,22D	999	585
1630	RAMAT GAN	RAMAT GAN	Tibor	202614	M	Dead	9Y,5M,13D	497	1083
242	RAMAT GAN	UMFOLOZI	Mazal	730019	F	Alive	49Y,2M,16D	WILD	WILD
497	RAMAT GAN	RAMAT GAN	Atari	790010	M	Alive	40Y,7M,20D	MUL T2	241
2749	RAMAT GAN	RAMAT GAN	Kamili	204012	F	Alive	1Y,2M,17D	497	2086
2773	RAMAT GAN	RAMAT GAN	Rainy-Rafiki	204046	F	Alive	0Y,11M,24D	497	2056
2215	ROMA	AUGSBURG	KIBO	6816	M	Alive	4Y,1M,11D	1526	1626
2219	ROMA	ARNHEM	Thomas	6813	M	Alive	3Y,9M,17D	1025	1340
913	ROSTOV	RAMAT GAN	Zeon	_____	M		30Y,1M,11D	MUL T3	241
2083	ROSTOV	RAMAT GAN	Terkel	_____	M		5Y,5M,13D	497	1083
2000	SALZBURG	SPIONKOP	TAMU	S937	F	Alive	14Y,2M,16D	WILD	WILD
1999	SALZBURG	WEENEN	YETI	S936	F	Alive	20Y,9M,16D	WILD	WILD
773	SALZBURG	SD-WAP	KIFARU	793	F	Alive	37Y,4M,22D	52	159
1446	SALZBURG	HODENHAGN	Athos	S1700	M	Alive	17Y,4M,26D	491	496
1490	SCHMIDING	HILVARENB	BRUTUS G3	930994	M	Alive	15Y,6M,19D	76	225
2093	SCHMIDING	LA PALMYR	RENETTE	16076	F	Alive	7Y,4M,9D	796	767
1686	SCHMIDING	S.AFRICA	Nina	930978	F	Alive	15Y,2M,16D	WILD	WILD
1685	SCHMIDING	S.AFRICA	Niki	930977	F	Alive	16Y,2M,16D	WILD	WILD
T118	SCHMIDING	SCHMIDING	Taio	190080	M	Alive	0Y,4M,26D	1490	1685
T116	SCHMIDING	SCHMIDING	Nio	190070	M	Alive	0Y,5M,17D	1490	1686
1543	SCHWERIN	S.AFRICA	KAREN	003007	F	Alive	16Y,8M,16D	WILD	1542
1687	SCHWERIN	S.AFRICA	CLARA	003005	F	Alive	14Y,2M,16D	WILD	WILD
1652	SCHWERIN	KNOWSLEY	KIMBA	003008	M	Alive	11Y,3M,13D	829	1120
2245	SHARJAHBR	S.AFRICA		WR003	M	Alive	6Y,2M,16D	WILD	WILD
2244	SHARJAHBR	S.AFRICA		WR002	F	Alive	6Y,2M,16D	WILD	WILD
2246	SHARJAHBR	S.AFRICA		WR004	F	Alive	6Y,2M,16D	WILD	WILD
2243	SHARJAHBR	S.AFRICA		WR001	M	Alive	7Y,2M,16D	WILD	WILD
2247	SHARJAHBR	S.AFRICA		WR005	F	Alive	5Y,2M,16D	WILD	WILD
2124	SHOU SHAN	TAIPEI	XI CHI	Und	M	Alive	7Y,1M,15D	2123	1139
2227	SIGEAN	SIGEAN	Pyros	16-113	M	Alive	3Y,5M,28D	2038	2036
2038	SIGEAN	MAFUNYANE	08-Edgar	06-017	M	Alive	14Y,2M,16D	WILD	WILD
2159	SIGEAN	SIGEAN	12-Martha	13-089	F	Alive	6Y,3M,26D	1295	2042
2091	SIGEAN	SIGEAN	11-Lima	12-090	F	Alive	7Y,5M,9D	1295	2036
1295	SIGEAN	South Africa	05-Elmer	98-011	M	Alive	22Y,2M,16D	WILD	WILD
1296	SIGEAN	South Africa	07-Margot	98-012	F	Alive	22Y,2M,16D	WILD	WILD
929	SIGEAN	SD-WAP	04-Uzima	88-002	F	Alive	31Y,7M,13D	420	159
2760	SIGEAN	SIGEAN		18-166	M	Alive	1Y,6M,13D	2038	2091
2266	SINGAPORE	SINGAPORE	Baako	G16081	M	Alive	1Y,9M,10D	1341	2265
2674	SINGAPORE	SINGAPORE	Maha	G16184	F	Alive	1Y,6M,27D	1341	1097
1098	SINGAPORE	WILD	Donsa	G1876	F	Alive	34Y,8M,15D	WILD	WILD
2265	SINGAPORE	BESTER	Nana	G14040	F	Alive	7Y,5M,16D	WILD	WILD
1097	SINGAPORE	WILD	Shova	G1875	F	Alive	35Y,8M,16D	WILD	WILD
T121	SINGAPORE	SINGAPORE	Dalia	G17415	F	Alive	0Y,2M,27D	1341	1098
2669	SINGAPORE	SINGAPORE	Asha	G14655	F	Alive	4Y,0M,11D	1341	1097
2107	SINGAPORE	SINGAPORE	Jumaane	G12824	M	Alive	7Y,11M,7D	1341	1097

1341	SINGAPORE	South Africa	Hoepel	G7185	M	Alive	32Y,1M,5D	WILD	WILD
1064	SO LAKES	HILVARENB	HUUBKE	CSS001	M	Alive	24Y,2M,1D	221	224
2233	SO LAKES	SO LAKES	Spud	CSS010	M	Alive	3Y,5M,16D	1173	1461
1461	SO LAKES	S.AFRICA	Ntombi	CSS004	F	Alive	20Y,9M,16D	WILD	WILD
1173	SO LAKES	WHIPSSNADE	MUZUNGU	CSS002	M	Alive	22Y,11M,9D	1011	329
2263	SO LAKES	SO LAKES	Zahra	CSS012	F	Alive	2Y,4M,7D	1173	1644
1644	SO LAKES	DUBLIN	Zukiswa	CSS008	F	Alive	11Y,9M,18D	1552	1555
800	SOFIAZOO	WHIPSSNADE	M'GAMBO	100264	M	Alive	35Y,5M,23D	89	103
1221	TABERNAS	HODENHAGN	Heinz	TAM0038	M	Alive	21Y,4M,12D	491	496
1406	TABERNAS	ARNHEM	Iris	TM0591	F	Alive	17Y,11M,27	532	230
983	TAIPEI	South Africa	SHI-NI	1900	F	Alive	37Y,8M,1D	WILD	WILD
985	TAIPEI	TAIPEI	SHI WHEI	1902	F	Alive	32Y,8M,18D	WILD	982
2123	TAIPEI	LEOFOO	XI WANG	7036	M	Alive	18Y,11M,3D	WILD	UND
982	TAIPEI	Undetermined	SHI-MIN	1898	F	Alive	39Y,9M,27D	WILD	WILD
1139	TAIPEI	LEOFOO	Xi Chun	6720	F	Alive	23Y,4M,21D	601	602
986	TAIPEI	Undetermined	SHI-SHI	1899	F	Alive	37Y,8M,28D	WILD	WILD
2096	THOIRY	HILVARENB	Bruno	B5018	M	Alive	7Y,3M,11D	1165	1616
504	THOIRY	WHIPSSNADE	GRACIE	B3076	F	Dead	39Y,5M,19D	89	104
2204	THOIRY	PEAUGRES	Unesco	B8033	M	Alive	5Y,0M,6D	1438	1462
2090	THOIRY	ARNHEM	Vince	B5017	M	Dead	4Y,5M,13D	1025	1340
209	USTI	UMFOLOZI	ZAMBA	930021	F	Dead	49Y,6M,21D	WILD	WILD
2021	VALBREMBO	HODENHAGN	GERALDINE	GERALDI	F	Alive	10Y,6M,17D	1004	1220
1648	VALBREMBO	BUDAPEST	I. Pancho	PANCHO	M	Alive	11Y,4M,24D	88	902
2081	VALBREMBO	HODENHAGN	Etana	LARA	F	Alive	9Y,0M,25D	1004	1697
1691	VESZPREM	HODENHAGN	Naruna	175004	F	Alive	11Y,3M,24D	MUL T6	1280
1047	VESZPREM	WHIPSSNADE	Makoubu	175006	F	Alive	25Y,3M,21D	89	329
1525	VESZPREM	WHIPSSNADE	RAFIKA	175005	M	Alive	14Y,7M,9D	1011	962
534	VESZPREM	SD-WAP	Pablo	175001	M	Alive	42Y,6M,15D	52	159
1280	VESZPREM	HODENHAGN	Rebecca	175003	F	Alive	20Y,2M,7D	491	1043
962	WHIPSSNADE	EDINBURGH	MIKUMI	L1833	F	Alive	29Y,5M,22D	139	97
1362	WHIPSSNADE	S.AFRICA	Berta	7253	F	Alive	21Y,9M,1D	WILD	WILD
489	WHIPSSNADE	WHIPSSNADE	NOWANA	L396	F	Dead	39Y,7M,1D	70	102
1011	WHIPSSNADE	UMFOLOZI	NSISWA	L1741	M	Alive	31Y,4M,17D	WILD	WILD
654	WHIPSSNADE	WHIPSSNADE	CLARA	L397	F	Alive	38Y,5M,5D	MUL T4	105
1609	WHIPSSNADE	ERFURT	Tuli	3706	F	Alive	13Y,2M,2D	627	1208
1713	WOBURNLTD	S.AFRICA	Mkuzi	RS07	F	Alive	14Y,8M,16D	WILD	WILD
1009	WOBURNLTD	HILVARENB	Mirijam	RS09	F	Alive	27Y,5M,9D	221	224
1714	WOBURNLTD	S.AFRICA	Mtubatuba	RS08	F	Dead	13Y,1M,20D	WILD	WILD
1352	WOBURNLTD	EDINBURGH	Kei	RS010	M	Alive	19Y,4M,26D	139	97
2205	ZOOMTORIN	BURFORD	Ian	RI002	M	Alive	4Y,11M,19D	1591	2003
2208	ZOOMTORIN	BURFORD	John	RI003	M	Alive	4Y,6M,27D	1591	2002
1083	ZURICH	UMFOLOZI	Tanda	B92056	F	Alive	26Y,5M,7D	WILD	WILD
2169	ZURICH	RAMAT GAN	Teshi	B92057	F	Alive	5Y,7M,5D	497	1083
2236	ZURICH	RAMAT GAN	Rami	B92055	M	Alive	3Y,1M,20D	497	2056
2765	ZURICH	RAMAT GAN	Talatini	B92058	F	Alive	1Y,7M,3D	497	1083

## 5.2 Births during 2018 – 2019

Stb #	Birth Location	Current Location	House Name	Current Local ID	Sex	Status	Age	Sire	Dam
2260	AL AIN	AL AIN	SUDAN	B1804003	M	Alive	1Y,11M,17D	2097	2052
2249	ARNHEM	ARNHEM	Wiesje	7649	F	Alive	2Y,7M,8D	1025	1480
2259	ARNHEM	ARNHEM	Naomi	8159	F	Alive	2Y,0M,17D	1025	1340
T114	ARNHEM	ARNHEM	Diederik	9523	M	Alive	0Y,7M,3D	1025	1480
T117	BEAUVAL	BEAUVAL		M02765	M	Dead	0Y,0M,0D	1048	1463
2250	BEWDLEY	BEWDLEY	Fahari	1690	F	Alive	2Y,6M,10D	1583	1647
2750	BEWDLEY	BEWDLEY	Granville	1822	M	Alive	1Y,5M,22D	1583	2006
2756	BOISSIERE	BOISSIERE	Yamba	HRB007	F	Alive	1Y,3M,14D	1606	2109
2755	BOISSIERE	BOISSIERE	Wakati	HRB006	M	Alive	1Y,5M,22D	1606	2110
2757	BORAS	BORAS	NAFASI	EN0014	M	Alive	1Y,4M,4D	1233	1479
2262	BURFORD	BURFORD	Belle	MM2204	F	Alive	2Y,5M,16D	1591	2002
2251	BURFORD	BURFORD	Alan	MM2199	M	Alive	2Y,6M,5D	1591	2003
T115	BURFORD	BURFORD	Stella	MM2353	F	Alive	0Y,6M,11D	1591	2003
T119	CAMBRON	CAMBRON	Zimba	8636	M	Alive	0Y,3M,22D	1424	2101
T120	CAMBRON	CAMBRON	Sena	8642	F	Alive	0Y,3M,15D	1424	2103
2255	COPENHAGE	COPENHAGE	Berg	CER008	M	Alive	2Y,5M,2D	1361	1542
2257	COPENHAGE	COPENHAGE	Alfred	CER009	M	Alive	2Y,2M,15D	1361	2067
2258	COULANGE	COULANGE	ARANKA	CSS15	F	Alive	2Y,1M,17D	2075	2074
2239	COULANGE	COULANGE	TIMBO	CSS14	M	Alive	3Y,0M,13D	2075	1460
2256	DUBLIN	DUBLIN	Tadala	A17M67	M	Alive	2Y,4M,6D	1552	1688
T128	DUBLIN	DUBLIN		A18M65	F	Dead	0Y,0M,0D	1552	1555
2770	ERFURT	ERFURT	Kiano	5005	M	Alive	1Y,2M,18D	1029	1578
2240	HODENHAGN	ESTEPONA	Tayo	RINO02	M	Alive	3Y,0M,15D	1004	1697
2254	GIVSKUD	GIVSKUD	Savannah	CERS10	F	Alive	2Y,6M,3D	1393	1616
2241	HILVARENB	HILVARENB		M17028	F	Dead	0Y,0M,1D	1393	938
2264	KNOWSLEY	KNOWSLEY	Jabari	14141	M	Dead	1Y,5M,21D	1119	1026
2758	KOLMARDEN	KOLMARDEN	AMI	13666	F	Alive	1Y,5M,12D	1183	1478
2759	LISIEUX Z	LISIEUX Z	KWANZA	M18182	F	Alive	1Y,3M,15D	1010	1425
2237	COLCHESTR	LYMPNE	Kifaru	P21955	M	Alive	3Y,1M,13D	1360	1457
2768	MUNSTER	MUNSTER		25001013	F	Dead	0Y,0M,0D	974	1474
2242	MUNSTER	MUNSTER	Amiri	2500550	M	Alive	2Y,9M,27D	974	1474
2253	SINGAPORE	MYSORE	Oban	M01537	M	Alive	2Y,6M,12D	1341	1098
2771	NYIREGYHA	NYIREGYHA		M13667	M	Dead	0Y,0M,0D	1540	1556
2261	PEAUGRES	PEAUGRES	Malabar	3137	M	Alive	1Y,10M,11D	1438	1462
2774	PEAUGRES	PEAUGRES	BASILE	3289	M	Alive	0Y,11M,3D	1438	2001
2749	RAMAT GAN	RAMAT GAN	Kamili	204012	F	Alive	1Y,2M,18D	497	2086
2773	RAMAT GAN	RAMAT GAN	Rainy-Rafiki	204046	F	Alive	0Y,11M,25D	497	2056
T118	SCHMIDING	SCHMIDING	Taio	190080	M	Alive	0Y,4M,27D	1490	1685
T116	SCHMIDING	SCHMIDING	Nio	190070	M	Alive	0Y,5M,18D	1490	1686
2760	SIGEAN	SIGEAN		18-166	M	Alive	1Y,6M,14D	2038	2091
2266	SINGAPORE	SINGAPORE	Baako	G16081	M	Alive	1Y,9M,11D	1341	2265
2674	SINGAPORE	SINGAPORE	Maha	G16184	F	Alive	1Y,6M,28D	1341	1097
T121	SINGAPORE	SINGAPORE	Dalia	G17415	F	Alive	0Y,2M,28D	1341	1098
2263	SO LAKES	SO LAKES	Zahra	CSS012	F	Alive	2Y,4M,8D	1173	1644



<b>2236</b>	RAMAT GAN	ZURICH	Rami	B92055	M	Alive	3Y,1M,21D	497	2056
<b>2765</b>	RAMAT GAN	ZURICH	Talatini	B92058	F	Alive	1Y,7M,4D	497	1083

### 5.3 Transfers during 2018 – 2019

<b>Stb #</b>	<b>Birth Location</b>	<b>Current Location</b>	<b>House Name</b>	<b>Current Local ID</b>	<b>Sex</b>	<b>Status</b>	<b>Age</b>	<b>Sire</b>	<b>Dam</b>
<b>2077</b>	HAMILTON	AUCKLAND	Jamila	B80490	F	Alive	8Y,0M,12D	1273	1357
<b>1526</b>	WHIPSSNADE	AUGSBURG	Bantu	2014AV	M	Alive	14Y,5M,12D	1011	489
<b>2224</b>	BORAS	BANDHOLM	Jamala	CESI08	F	Alive	5Y,5M,14D	1233	1338
<b>2206</b>	SALZBURG	BURSA ZOO	Amadou	BGR02	M	Alive	4Y,11M,14D	1446	2000
<b>2209</b>	SALZBURG	BURSA ZOO	Tayo	BGR01	M	Alive	4Y,6M,13D	1446	1999
<b>2212</b>	BEAUVAL	BURSA ZOO	Hawii	BGR03	M	Alive	4Y,3M,15D	1048	1307
<b>1424</b>	WHIPSSNADE	CAMBRON	JOBY	10421	M	Alive	18Y,3M,25D	1011	489
<b>2157</b>	KOLMARDEN	CHORZOW	NAMBI	4148	F	Alive	6Y,5M,0D	1183	1478
<b>1360</b>	S.AFRICA	COLCHESTR	Otto	CLL705	M	Alive	22Y,4M,18D	WILD	WILD
<b>1584</b>	KNOWSLEY	COLCHESTR	Binta	DLL2077	F	Alive	14Y,4M,1D	829	1120
<b>1464</b>	KRUGERSDO	DVURKRALV	Jabulani	117025	F	Alive	18Y,11M,17D	WILD	WILD
<b>2198</b>	HILVARENB	EMMEN	Elena	508012	F	Alive	5Y,2M,20D	1165	1203
<b>812</b>	MUNSTER	EMMEN	Emily	508011	F	Alive	35Y,2M,13D	340	403
<b>2220</b>	CAMBRON	ESTEPONA	Sethemba Vasta	RINO01	M	Alive	3Y,11M,25D	2102	2103
<b>2229</b>	HODENHAGN	ESTEPONA	Akono	RINO03	M	Alive	3Y,6M,11D	1004	1220
<b>2240</b>	HODENHAGN	ESTEPONA	Tayo	RINO02	M	Alive	3Y,0M,15D	1004	1697
<b>1616</b>	BLAIRDRUM	GIVSKUD	Mazumba	CERS09	F	Alive	12Y,6M,22D	1475	1473
<b>2168</b>	ARNHEM	HILVARENB	Tank	M14164	M	Alive	5Y,7M,24D	1025	1340
<b>2200</b>	COPENHAGE	HILVARENB	Pilan	M15132	M	Dead	4Y,8M,0D	1361	1542
<b>2199</b>	COULANGE	HILVARENB	SHANGO	M14167	M	Alive	5Y,3M,17D	2075	2074
<b>2196</b>	SCHMIDING	HILVARENB	Django	M14166	M	Alive	5Y,4M,5D	1490	1686
<b>2197</b>	BOISSIERE	KERKRADE	Wazi	M14029	F	Alive	5Y,2M,28D	1606	2110
<b>2162</b>	DORTMUND	KERKRADE	Abebi	M14107	F	Alive	5Y,10M,26D	1581	1659
<b>1689</b>	SO LAKES	KESSINGLA	ZIMBA	M2034	M	Alive	11Y,6M,7D	1173	1460
<b>1175</b>	HLUHLUWE	KESSINGLA	TOOTSIE	M2033	F	Alive	27Y,4M,17D	WILD	WILD
<b>2222</b>	COULANGE	KNOWSLEY	Bayami	WR02	F	Alive	3Y,8M,16D	2075	2073
<b>2216</b>	AUGSBURG	KNOWSLEY	Keeva	WR01	F	Alive	4Y,1M,0D	1526	1625
<b>1709</b>	MADRID Z	KNOWSLEY	Pembe	1500	M	Alive	10Y,10M,18D	250	1416
<b>1444</b>	South Africa	LISIEUX Z	MANZI	M18108	F	Alive	20Y,2M,17D	WILD	WILD
<b>2235</b>	SO LAKES	LISIEUX Z	Mosi	M18109	F	Alive	3Y,2M,22D	1173	1444
<b>2226</b>	DUBLIN	LYMPNE	Zuko	P21941	M	Alive	3Y,6M,22D	1552	1555
<b>1414</b>	South Africa	MADRID Z	BENNI	RB7	M	Alive	22Y,2M,17D	WILD	WILD
<b>2194</b>	BLAIRDRUM	MALTON	Bruce	2492	M	Alive	5Y,5M,6D	1475	1473
<b>2167</b>	COLCHESTR	MALTON	Mabaso	2489	M	Alive	5Y,8M,7D	1360	1458
<b>2213</b>	KNOWSLEY	MONTPELLI	Nomvula	M18126	F	Alive	4Y,2M,16D	1119	1026
<b>2039</b>	KNOWSLEY	MONTPELLI	TROY	M17031	M	Alive	9Y,3M,18D	829	1120
<b>2667</b>	SINGAPORE	MYSORE	Vita	M01536	F	Alive	4Y,4M,16D	1341	1098
<b>2253</b>	SINGAPORE	MYSORE	Oban	M01537	M	Alive	2Y,6M,12D	1341	1098
<b>2147</b>	SINGAPORE	NORFOLK	Zina	217058	F	Alive	6Y,10M,20D	1341	1098
<b>2160</b>	SINGAPORE	NORFOLK	Bora	217057	F	Alive	6Y,2M,24D	1341	1097

<b>2215</b>	AUGSBURG	ROMA	KIBO	6816	M	Alive	4Y,1M,12D	1526	1626
<b>2219</b>	ARNHEM	ROMA	Thomas	6813	M	Alive	3Y,9M,18D	1025	1340
<b>913</b>	RAMAT GAN	ROSTOV	Zeon	_____	M	Und	30Y,1M,11D	MULT3	241
<b>2083</b>	RAMAT GAN	ROSTOV	Terkel	_____	M	Und	5Y,5M,13D	497	1083
<b>2245</b>	S.AFRICA	SHARJAHBR		WR003	M	Alive	6Y,2M,17D	WILD	WILD
<b>2244</b>	S.AFRICA	SHARJAHBR		WR002	F	Alive	6Y,2M,17D	WILD	WILD
<b>2246</b>	S.AFRICA	SHARJAHBR		WR004	F	Alive	6Y,2M,17D	WILD	WILD
<b>2243</b>	S.AFRICA	SHARJAHBR		WR001	M	Alive	7Y,2M,17D	WILD	WILD
<b>2247</b>	S.AFRICA	SHARJAHBR		WR005	F	Alive	5Y,2M,17D	WILD	WILD
<b>2124</b>	TAIPEI	SHOU SHAN	XI CHI	Und	M	Alive	7Y,1M,16D	2123	1139
<b>2204</b>	PEAUGRES	THOIRY	Unesco	B8033	M	Alive	5Y,0M,7D	1438	1462
<b>1648</b>	BUDAPEST	VALBREMBO	I. Pancho	PANCHO	M	Alive	11Y,4M,25D	88	902
<b>1047</b>	WHIPSNADE	VESZPREM	Makoubu	175006	F	Alive	25Y,3M,22D	89	329
<b>1362</b>	S.AFRICA	WHIPSNADE	Berta	7253	F	Alive	21Y,9M,2D	WILD	WILD
<b>2205</b>	BURFORD	ZOOMTORIN	Ian	RI002	M	Alive	4Y,11M,20D	1591	2003
<b>2208</b>	BURFORD	ZOOMTORIN	John	RI003	M	Alive	4Y,6M,28D	1591	2002
<b>1083</b>	UMFOLOZI	ZURICH	Tanda	B92056	F	Alive	26Y,5M,8D	WILD	WILD
<b>2169</b>	RAMAT GAN	ZURICH	Teshi	B92057	F	Alive	5Y,7M,6D	497	1083
<b>2236</b>	RAMAT GAN	ZURICH	Rami	B92055	M	Alive	3Y,1M,21D	497	2056
<b>2765</b>	RAMAT GAN	ZURICH	Talatini	B92058	F	Alive	1Y,7M,4D	497	1083

#### 5.4 Deaths during 2015 – 2017

Stb #	Birth Location	Current Location	House Name	Current Local ID	Sex	Status	Age	Sire	Dam
230	UMFOLOZI	ARNHEM	Freya	03559	F	Dead	45Y,7M,19D	WILD	WILD
T117	BEAUVAL	BEAUVAL		M02765	M	Dead	0Y,0M,0D	1048	1463
2228	BORAS	BORAS	Bishara	EN0013	F	Dead	1Y,5M,23D	1233	1479
669	MUNSTER	BRATISLAV	NIKO	D041202	M	Dead	37Y,8M,1D	340	403
211	UMFOLOZI	CHORZOW	FAITH	1583	F	Dead	48Y,6M,14D	WILD	WILD
607	UMFOLOZI	COLCHESTR	FLOSSY	185	F	Dead	48Y,3M,10D	WILD	WILD
1361	S.AFRICA	COPENHAGE	Kurt	CER004	M	Dead	23Y,2M,11D	WILD	WILD
330	WHIPNADE	DUBLIN	SAM	77M034	M	Dead	42Y,2M,24D	70	105
T128	DUBLIN	DUBLIN		A18M65	F	Dead	0Y,0M,0D	1552	1555
371	UMFOLOZI	DVURKRALV	Natal 001	NHN N	M	Dead	46Y,3M,1D	WILD	WILD
2200	COPENHAGE	HILVARENB	Pilan	M15132	M	Dead	4Y,8M,0D	1361	1542
2241	HILVARENB	HILVARENB		M17028	F	Dead	0Y,0M,1D	1393	938
494	UMFOLOZI	HODENHAGN	Doris	CESI004	F	Dead	50Y,0M,4D	WILD	WILD
2264	KNOWSLEY	KNOWSLEY	Jabari	14141	M	Dead	1Y,5M,21D	1119	1026
258	UMFOLOZI	LISIEUX Z	ROSIE	M95025	F	Dead	47Y,6M,19D	WILD	WILD
251	UMFOLOZI	MADRID Z		RB2	F	Dead	47Y,7M,14D	WILD	WILD
2768	MUNSTER	MUNSTER		25001013	F	Dead	0Y,0M,0D	974	1474
2771	NYIREGYHA	NYIREGYHA		M13667	M	Dead	0Y,0M,0D	1540	1556
627	MEMPHIS	POZNAN	KIWU	MK1701	M	Dead	37Y,5M,13D	40	397
184	UMFOLOZI	PT ST PER	SANA	P05-0375	F	Dead	55Y,6M,4D	WILD	WILD
1630	RAMAT GAN	RAMAT GAN	Tibor	202614	M	Dead	9Y,5M,13D	497	1083
504	WHIPNADE	THOIRY	GRACIE	B3076	F	Dead	39Y,5M,19D	89	104
2090	ARNHEM	THOIRY	Vince	B5017	M	Dead	4Y,5M,13D	1025	1340
209	UMFOLOZI	USTI	ZAMBA	930021	F	Dead	49Y,6M,21D	WILD	WILD
489	WHIPNADE	WHIPNADE	NOWANA	L396	F	Dead	39Y,7M,1D	70	102
1714	S.AFRICA	WOBURNLTD	Mtubatuba	RS08	F	Dead	13Y,1M,20D	WILD	WILD

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## Appendix

Appendix 1: Table Mx and Qx for males and females

Appendix 2: Tables (non) breeding females

Appendix 3: Rhino numbers per country

Appendix 1: Table Mx and Qx for males and females

Age (years)	Age-specific mortality				Age-specific fecundity			
	Males		Females		Males		Females	
	Qx	Risk Qx	Qx	Risk Qx	Mx	Risk Mx	Mx	Risk Mx
0	0,191	191,856	0,212	152,105	0	191,856	0	152,105
1	0,034	177,986	0,038	149,375	0	177,986	0	149,375
2	0,026	188,274	0,027	186,885	0	188,274	0	186,885
3	0,026	194,326	0,023	216,899	0	194,326	0	216,899
4	0,01	201,658	0,023	241,186	0	201,658	0,006	241,187
5	0,01	191,74	0,012	251,619	0,003	191,74	0,024	251,62
6	0,006	186,726	0,008	258,833	0,008	186,727	0,03	258,834
7	0,006	179,775	0,008	260,849	0,026	179,779	0,047	260,85
8	0,006	180,378	0,008	261,614	0,033	180,387	0,053	261,615
9	0,006	176,627	0,011	258,803	0,043	176,633	0,053	258,804
10	0,006	172,995	0,016	254,17	0,073	173,007	0,053	254,171
11	0,006	167,526	0,016	245,408	0,073	167,533	0,052	245,409
12	0,006	162,123	0,016	234,556	0,075	162,132	0,046	234,557
13	0,013	157,723	0,01	226,501	0,079	157,729	0,048	226,502
14	0,013	149,948	0,01	212,721	0,08	149,957	0,048	212,721
15	0,007	143,167	0,01	200,422	0,08	143,179	0,048	200,423
16	0,007	137,934	0,011	188,022	0,08	137,944	0,051	188,023
17	0,016	132,537	0,011	180,345	0,083	132,545	0,051	180,346
18	0,016	125,712	0,011	171,058	0,083	125,719	0,051	171,059
19	0,016	120,416	0	163,381	0,091	120,424	0,04	163,381
20	0,008	115,715	0	154,608	0,091	115,724	0,04	154,609
21	0	109,616	0	148,427	0,05	109,625	0,039	148,428
22	0	103,707	0,015	140,468	0,05	103,712	0,033	140,469
23	0,029	100,989	0,015	132,137	0,058	100,999	0,029	132,138
24	0,029	98,047	0,015	130,238	0,067	98,055	0,028	130,239
25	0,029	94,485	0,015	127,296	0,072	94,497	0,028	127,296
26	0,023	88,784	0,015	124,022	0,072	88,794	0,033	124,023
27	0,023	84,427	0,016	120,068	0,072	84,434	0,033	120,069
28	0,023	80,907	0,018	115,644	0,068	80,924	0,032	115,644
29	0,014	77,395	0,018	111,307	0,044	77,397	0,032	111,307
30	0,014	71,6	0,028	104,718	0,04	71,607	0,022	104,718
31	0	67,899	0,056	97,247	0,04	67,904	0,019	97,247
32	0	66,06	0,056	87,63	0,031	66,065	0,019	87,63
33	0,046	63,997	0,053	79,542	0,018	63,998	0,019	79,543
34	0,05	58,315	0,037	73,918	0,018	58,319	0,019	73,918
35	0,054	54,526	0,03	67,825	0,018	54,526	0,015	67,825
36	0,058	49,668	0,03	65,068	0,022	49,671	0,008	65,069
37	0,063	46,655	0,065	58,948	0,022	46,656	0,008	58,948
38	0,068	43,389	0,093	50,058	0,022	43,389	0	50,058
39	0,148	38,422	0,093	41,408	0,018	38,43	0	41,408
40	0,171	29,86	0,093	37,058	0,018	29,861	0	37,058
41	0,184	24,748	0,138	32,581	0	24,748	0	32,581
42	0,184	18,518	0,138	27,359	0	18,518	0	27,359
43	0,143	15,49	0,087	23,614	0	15,49	0	23,614

44	0,143	12,814	0,087	21,877	0	12,814	0	21,877
45	0,182	10,438	0,087	18,784	0	10,438	0	18,784
46	0,182	6,912	0,214	14,474	0	6,912	0	14,474
47	0,2	5	0,214	12,877	0	5	0	12,877
48	0,2	4,923	0,364	8,833	0	4,923	0	8,833
49	0,2	1,351	0,364	4,603	0	1,351	0	4,603
50	0	1	0,333	1,332	0	1	0	1,332
51	0	1	0	1	0	1	0	1
52	0	0,54	0	1	0	0,54	0	1

Age-specific mortality ( $Q_x$ ) stands for the average proportion of animals that are expected to die within a given age class. The lower the value, the greater the average survival through an age class. Risk  $Q_x$  shows the sample size. It contains all animals ever lived in the EEP.

Age-specific fecundity ( $M_x$ ) stands for the average number of same sex offspring produced by a parent within a specific age class. The value can range from 0 to the maximal number of offspring produced by an individual.

Take into account that when the sample size is below 30 individuals no conclusions can be drawn from the results due to the effect of chance.

*Appendix 2: Tables female (non) breeders*

Tables associated with figure 6

<b>Table 1: Female (non) breeders, 2009</b>				
	n Total	n Male	n Female	% Female*
<b>Total population</b>	250	96	154	-
<b>Breeding</b>	49	17	32	21
<b>Not (yet) breeding, age &lt; 10</b>	90	31	59	38
<b>Not (yet) breeding, age 10 – 20</b>	33	16	17	11
<b>Not (yet) breeding, age &gt; 20</b>	78	32	46	30
<b>Total not (yet) breeding</b>	201	79	122	79

\* Percentage female is calculated compared to the total female population.

<b>Table 2: Female (non) breeders, 2011</b>				
	n Total	n Male	n Female	% Female*
<b>Total population</b>	260	101	159	-
<b>Breeding</b>	55	19	36	23
<b>Not (yet) breeding, age &lt; 10</b>	101	41	60	38
<b>Not (yet) breeding, age 10 – 20</b>	41	16	25	16
<b>Not (yet) breeding, age &gt; 20</b>	63	25	38	24
<b>Total not (yet) breeding</b>	205	82	123	77

\* Percentage female is calculated compared to the total female population.

<b>Table 3: Female (non) breeders, 2014</b>				
	n Total	n Male	n Female	% Female*
<b>Total population</b>	287	114	173	-
<b>Breeding</b>	94	32	62	36
<b>Not (yet) breeding, age &lt; 10</b>	96	46	50	29
<b>Not (yet) breeding, age 10 – 20</b>	51	16	35	20
<b>Not (yet) breeding, age &gt; 20</b>	46	20	26	15
<b>Total not (yet) breeding</b>	193	82	111	64

\* Percentage female is calculated compared to the total female population.

<b>Table 4: Female (non) breeders, 2017</b>				
	n Total	n Male	n Female	% Female*
<b>Total population</b>	310	130	180	-
<b>Breeding</b>	116	39	77	43
<b>Not (yet) breeding, age &lt; 10</b>	103	59	44	24
<b>Not (yet) breeding, age 10 – 20</b>	51	15	36	20
<b>Not (yet) breeding, age &gt; 20</b>	40	17	23	13
<b>Total not (yet) breeding</b>	194	91	103	57

\* Percentage female is calculated compared to the total female population.

**Table 5: Female (non) breeders, 2019**

	n Total	n Male	n Female	% Female*
<b>Total population</b>	335	143	192	-
<b>Breeding</b>	113	42	86	45
<b>Not (yet) breeding, age &lt; 10</b>	113	63	49	26
<b>Not (yet) breeding, age 10 – 20</b>	54	21	33	17
<b>Not (yet) breeding, age &gt; 20</b>	41	17	24	13
<b>Total not (yet) breeding</b>	208	101	106	55

\* Percentage female is calculated compared to the total female population.

Appendix 3: Number of white rhino per country

Country	Facility	M	F	Total
Austria	Krenglbach	3	3	6
	Salzburg zoo	1	3	4
	<b>2 facilities, 10 (4.6)</b>	<b>4</b>	<b>6</b>	<b>10</b>
Belgium	Aywaille	1	2	3
	Cambron	2	3	5
	<b>2 facilities, 8 (3.5)</b>	<b>3</b>	<b>5</b>	<b>8</b>
Bulgaria	Sofia-Zoo	1	0	1
	<b>1 facility, 1 (1.0.0)</b>	<b>1</b>	<b>0</b>	<b>1</b>
Czech Republic	Dvur-Kralove	1	3	4
	Zlin	1	2	3
	<b>2 facilities, 7 (2.5)</b>	<b>2</b>	<b>5</b>	<b>7</b>
Denmark	Bandholm	1	2	3
	Givskud	1	5	6
	Kobenhavn	2	2	4
	<b>3 facilities, 13 (4.9)</b>	<b>4</b>	<b>9</b>	<b>13</b>
France	Amneville	2	5	7
	Beauval	1	3	4
	Boissiere	2	3	5
	Les Mathes	1	2	3
	Le Vigen	1	0	1
	Lille	2	0	2
	Lisieux	1	5	6
	Montpellier	1	2	3
	Paris-Zoo	2	0	2
	Peaugres	3	4	7
	Pelissanne	1	2	3
	Plaisance-Touch	1	1	2
	Port St. Pere	3	0	3
	Sigean	4	4	8
	Thoiry	2	0	2
	<b>15 facilities, 58 (27.31)</b>	<b>27</b>	<b>31</b>	<b>58</b>
Germany	Augsburg	1	3	4
	Dormund	1	3	4
	Duisburg	1	0	1
	Erfurt	2	2	4
	Gelsenkirchen	1	2	3
	Hodenhagen	2	5	7
	Munster	2	2	4
	Osnabruck	1	2	3
	Schwerin	1	2	3
	<b>9 facilities, 33 (12.21)</b>	<b>12</b>	<b>21</b>	<b>33</b>
Greece	Athinai	2	0	2
	<b>1 facility, 3 (3.0.0)</b>	<b>2</b>	<b>0</b>	<b>2</b>

<b>Hungary</b>	Budapest	1	2	3
	Nyiregyhaza	1	2	3
	Veszprem	2	3	5
	<b>3 facilities, 11 (4.7)</b>	<b>4</b>	<b>7</b>	<b>11</b>
<b>Ireland</b>	Dublin	2	4	6
	<b>1 facility, 7 (3.4.0)</b>	<b>2</b>	<b>4</b>	<b>6</b>
<b>Israel</b>	Jerusalem	2	0	2
	Ramat Gan	2	8	10
	<b>2 facilities, 12 (4.8)</b>	<b>4</b>	<b>8</b>	<b>12</b>
<b>Italy</b>	Bussolengo	2	0	2
	Le cornelle	1	2	3
	Roma	2	0	2
	Torino	2	0	2
	<b>4 facilities, 9 (7.2)</b>	<b>7</b>	<b>2</b>	<b>9</b>
<b>Netherlands</b>	Arnhem	2	5	7
	Emmen	1	3	4
	Hilvarenbeek	4	5	9
	Kerkrade	1	2	3
	<b>4 facilities, 23 (8.15)</b>	<b>8</b>	<b>15</b>	<b>23</b>
<b>New Zealand</b>	<i>Auckland</i>	2	1	3
	<b>1 facility, 3 (2.1)</b>	<b>2</b>	<b>1</b>	<b>3</b>
<b>Poland</b>	Katowice	1	2	3
	Poznan	0	1	1
	<b>2 facilities, 4 (1.3)</b>	<b>1</b>	<b>3</b>	<b>4</b>
<b>Portugal</b>	Lisbon	2	2	4
	Avintes	3	0	3
	<b>2 facilities, 7 (5.2)</b>	<b>5</b>	<b>2</b>	<b>7</b>
<b>Singapore</b>	<i>Singapore</i>	3	6	9
	<b>1 facility, 9 (3.6)</b>	<b>3</b>	<b>6</b>	<b>9</b>
<b>Slovakia</b>	Bratislava	0	1	1
	<b>1 facility, 2 (1.1.0)</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>Spain</b>	Barcelona	1	0	1
	Cabarceno	2	3	5
	Estepona	3	0	3
	Madrid	1	1	2
	Tabernas	1	1	2
	Valencia	1	1	2
	<b>6 facilities, 15 (8.7.0)</b>	<b>8</b>	<b>7</b>	<b>15</b>
<b>Sweden</b>	Boras	2	2	4
	Kolmarden	1	3	4
	<b>2 facilities, 8 (3.5)</b>	<b>3</b>	<b>5</b>	<b>8</b>
<b>Switzerland</b>	<i>Zurich</i>	1	3	4
	<b>1 facility, 4 (1.3)</b>	<b>1</b>	<b>3</b>	<b>4</b>
<b>Taiwan</b>	<i>Taipei</i>	1	5	6
	<b>1 facility, 6 (1.5)</b>	<b>1</b>	<b>5</b>	<b>6</b>
	Bursa	3	0	3

<b>Turkey</b>	<b>1 facility, 1 (0.1.0)</b>	<b>3</b>	<b>0</b>	<b>3</b>
<b>UAE</b>	<i>Al-Ain</i>	5	5	10
	<i>Sharjah</i>	2	3	5
	<b>2 facilities 15 (7.8)</b>	<b>7</b>	<b>8</b>	<b>15</b>
<b>United Kingdom</b>	Bewdley	3	5	8
	Blair-Drummond	1	3	4
	Burford	2	4	6
	Chessington	3	0	3
	Colchester	1	3	4
	Dalton-Furness	3	3	6
	Kessingland	2	3	5
	Lympne	2	0	2
	Malton	2	0	2
	Marwell	1	3	4
	Pembrokeshire	3	0	3
	Prescot	2	6	8
	Warminster	1	3	4
	Whipsnade	1	4	5
	Woburn	1	2	3
		<b>15 facilities, 67 (28.39)</b>	<b>28</b>	<b>39</b>
<b>Total</b>	<b>25 Countries, 84 institutions, 335 White Rhinos (143.192)</b>			

