

Dvůr Králové Zoo and WAZA-branded Rhino Conservation Projects

Dana Holečková – Director, Dvůr Králové Zoo

Preface

Founded in 1946, Dvůr Králové Zoo has been specialising in keeping and breeding African wildlife. Throughout the 1970s, the zoo imported a number of mammal and bird species within several expeditions, fundamental for unique collections established later. Dvůr Králové Zoo is the world's most successful breeder of giraffes, a number of antelope and zebra species and African wild dogs, as well as black rhinoceroses that were successfully reproduced in the fifth generation in captivity for the first time around the world, plus is the only captive institution where northern white rhinos have been born and raised in captivity successfully. The zoo has returned over 100 Cape buffalos, several dozens of roan antelopes and multiple sable antelopes, scimitar-horned oryxes and addaxes back to the wild within the recent 20 years. With 48 (17.31) rhinos of three species and four subspecies, Dvůr Králové follows San Diego Wild Animal Park in terms of numbers of rhinos held and bred in captivity. With a total of seven rhinos relocated to Africa under two projects within a single year, which is a record number in terms of zoo community involvement in rhino conservation, Dvůr Králové has been striving to fulfil one of the key missions of members of the World Association of Zoos and Aquariums in a very pro-active manner.

In 2009, Tanzania and Kenya became target countries within two rhino conservation operations completed by Dvůr Králové branded as WAZA conservation projects.

Reintroduction of the eastern black rhino (*Diceros bicornis michaeli*) to Mkomazi, Tanzania, WAZA Conservation Project No 080013

The development of the black rhino population in the wild: brief summary

In 1900, there ranged several hundred thousand black rhinos (*Diceros bicornis*) in Africa. Within 22 years (1970 to 1992), 96% of wild population of this species was extirpated, particularly as a result of poaching (see Figure 1 and Table 1 for more details). Of the four subspecies, one

(*D. b. longipes*) was exterminated by 2006 (see Table 2), while the eastern black rhino (*D. b. michaeli*), occurring only in Kenya and Tanzania, became the most vulnerable form. While Kenya was home to 20,000 rhinos still in 1970, in the 1980s the numbers dropped to less than 350 individuals (Table 3). Tanzania had in 1995 a mere 32 animals, which in fact involved two localities – the Ngorongoro crater and Serengeti National Park (Table 4).

In Kenya, first fenced rhino conservation areas were founded in the late 20 century, which subsequently became strongholds of the species and inspiration for Tony Fitzjohn's idea to restore the population of the black rhino in northern Tanzania in the Mkomazi Reserve.

Figure 1: Development of the wild black rhino population since 1960

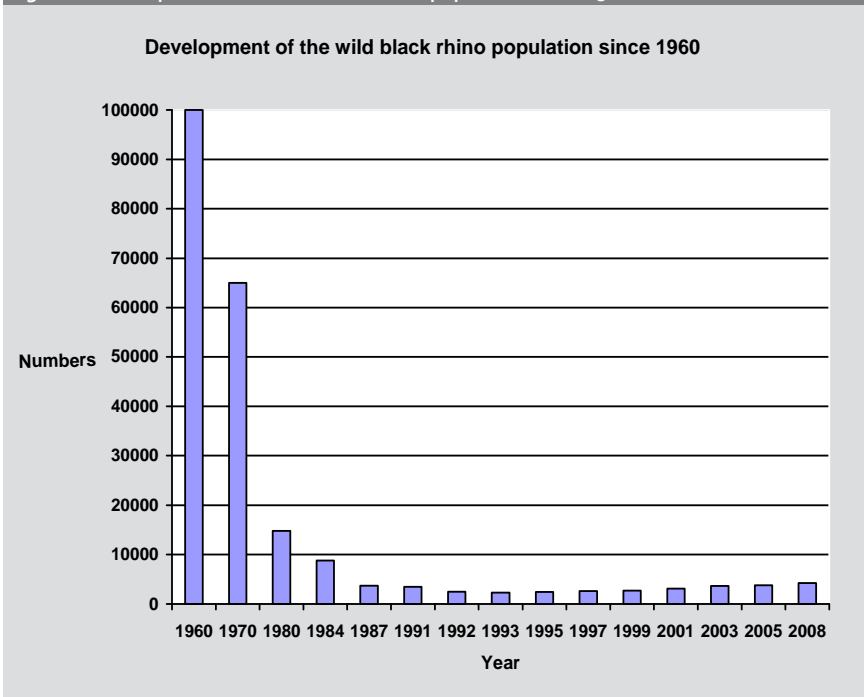


Table 1: Development of the black rhino population in the wild

Year	1800	1900	1960	1970	1980	1984	1987	1991	1992	1993	1995	1997	1999	2001	2003	2005	2007
Numbers	Over 1 million	Several hundred thousands	Over 100,000	65,000	14,785	8,800	3,665	3,450	2,475	2,300	2,410	2,600	2,700	3,100	3,610	3,750	4,230

Table 2: Development of the black rhino population in the wild, 1984–2008

Species (subspecies) / Year	1984	1993	1997	1999	2001	2003	2005	2007
South-western (<i>D. b. bicornis</i>)	737	560	740	740	943	1,310	1,221	1,550
Eastern (<i>D. b. michaeli</i>)	490	500	485	485	498	520	639	700
South-central (<i>D. b. minor</i>)	1,467	1,300	1,365	1,365	1,651	1,770	1,866	1,995
Western (<i>D. b. longipes</i>)	About 10	40	10	About 10	8	5	0 ?	0
Black rhinoceros (<i>Diceros bicornis</i>)	2,704	2,400	2,600	2,700	3,100	3,610	3,726	4,240

Table 3: Development of the black rhino population in Kenya since 1968

Year	1968	1970	1977	1980	1984	1987	1991	1992	1995	1997	2002	2003	2005	2007	2008
Numbers	11,000	2,500	1,800	1,500	550	381	398	414	420	424	430	437	539	577	609

Table 4: Development of the black rhino population in Tanzania since 1970

Year	1970	1980	1984	1987	1991	1992	1995	1997	1999	2001	2003	2005	2007
Numbers	10,000	3,795	3,130	275	185 ?	127	32	46	47	49	66	101	123

Table 5: Black rhinos born and aborted in Dvůr Králové

DK	Sex	Name	Conceived	Birth	Dam	Sire	Comments
1	F	Elvira DK 1	20 Jul 1976	2 Oct 1977	Elsa	Ken	
2	F	Sali DK 2	15 Apr 1977	5 Jul 1978	Sabi	Ken	
3	M	Jimm DK 3	6 Dec 1977	18 Mar 1979	Jimmi	King	
4	M	Eli DK 4	20 Feb 1983	15 May 1984	Elvira	Isis	
5	F	Jessi DK 5	4 Aug 1983	8 Dec 1984	Jimmi	Isis	
6	M	Sado DK 6	21 Apr 1985	26 Aug 1986	Sali	Isis	
7	M	Jos DK 7	13 Feb 1988	21 May 1989	Jimmi	Isis	28 kg
8	F	Sany DK 8	28 Jun 1988	1 Oct 1989	Sali	Isis	
9	F	Eimi DK 9	29 May 1989	24 Aug 1990	Elvira	Isis	
10	M	Jacob DK 10	8 Apr 1990	23 Jun 1991	Jessi	Eli	
11	M	Jasper DK 11	11 Jun 1990	13 Sep 1991	Jimmi	Isis	
12	F	Sara DK 12	22 Nov 1990	24 Feb 1992	Sali	Jimm	
13	F	Etna DK 13	21 Sep 1991	8 Dec 1992	Elvira	Jimm	
14	F	Jaga DK 14	1 Sep 1991	14 Dec 1992	Jarca	Jimm	26 kg on day 2
15	F	-- DK 15	8 Feb 1993	11 Apr 1994	Jimmi	Mabu	stillborn, 24 kg
16	M	Sauron DK 16	16 Jul 1993	26 Oct 1994	Sali	Cody	48 kg on day 3
17	F	Jiddah DK 17	17 Aug 1993	15 Nov 1994	Jessi	Mabu	37 kg
18	M	Jonas DK 18	2 Sep 1994	4 Dec 1995	Jarca	Cody	died - hand-reared
19	F	Elba DK 19	23 May 1995	5 Aug 1996	Eimi	Cody	
20	F	Musso DK 20	25 May 1996	20 Aug 1997	Sali	Jimm	
21	F	Jola DK 21	1 Jul 1996	25 Oct 1997	Jessi	Mabu	
22	F	Jane Lee DK 22	4 Oct 1996 (?)	24 Jan 1998	Jimmi	Isis	
23	F	Salome DK 23	13 Oct 1998	25 Jan 2000	Sali	Jimm	
24	M	Jeremy DK 24	16 Sep 1999	21 Dec 2000	Jessi	Jimm	
25	F	-- DK 25	10 Jun 2001	24 Aug 2002	Eimi	Sauron	stillborn, 33 kg
26	F	Ema-Elsa DK 26	4 Aug 2001	2 Nov 2002	Elba	Jimm	
27	F	Deborah DK 27	5 Jun 2003	11 Nov 2004	Jiddah	Jimm	
28	F	Maisha DK 28	20 Sep 2004	21 Dec 2005	Musso	Isis	
29	M	Jamie DK 29	6 Oct 2004	2 Jan 2006	Jessi	Sauron	
30	F	Etoasha DK 30	17 Jun 2005	4 Sep 2006	Elba	Jimm	
31	M	Jabu DK 31	7 Oct 2005	1 Feb 2007	Jola	Isis	
32	M	-- DK 32	25 Aug 2006	22 Sep 2007	Jane Lee	Mweru	aborted on day 393, 29 kg
33	M	Dzanty DK 33	10 Aug 2006	24 Nov 2007	Jiddah	Jimm	
34	F	Eva DK 34	26 Jul 2008	8 Dec 2009	Elba	Baringo	
35	F	Jasmina DK 35	3 Sep 2008	13 Dec 2009	Jessi	Baringo	
36	F	Just Era DK 36	8 Jun 2009	21 Sep 2010	Jola	Mweru	

Total 36 (13.23) calves of which 32 (11.21) were reared.

Brief history of the eastern black rhino stock at Dvůr Králové Zoo

The Dvůr Králové black rhino breeding history began with wild-caught juvenile animals coming from Kenya in 1971, with first ten (4.6) animals imported from Tsavo National Park, from which a pair was supplied to Florida (USA) one year after. In 1974, additional trio (1.2) was imported from Kenya; in the same year, 4 (2.2) animals left to Wrocław (Poland), Zürich (Switzerland) and Lešná Zoo in Moravia (CZ). 23 (10.13) individuals became involved in reproduction. A total number of rhinos born for the entire holding period reached 36 (13.22) animals, of which three (2.1) were born dead and 32 (11.21) calves reared successfully, which represents 97% rate of success of all live-born animals. During the most recent 10 months, three females were born, the last of which in September 2010. See more details in Table 5.

The Mkomazi black rhino project

As major rhino holders in Europe and in the world, Dvůr Králové were contacted as early as 2003 by Tony Fitzjohn, the African wildlife conservationist and manager of the northern Tanzania's Mkomazi Game Reserve, who was then searching for animals for his eastern black rhino reintroduction project. Located in north-eastern Tanzania, Mkomazi is a natural area of 3,270 square kilometres. A part of the Tsavo ecosystem, it connects to Kenyan Tsavo West National Park. As Dvůr Králové animals contain genes of their ancestors that were largely exterminated by poachers, they are very important for the populations in the wild.

Tony Fitzjohn is a friend and colleague of famed conservationist George Adamson. Manager of the George Adamson Wildlife Preservation Trust, he has been dedicated to the wildlife conservation in East Africa, namely to the critically endangered African wild dog and black rhino. Supported by donors, Tony built facilities in the Mkomazi Game Reserve where he has been breeding and releasing African wild dogs (*Lycaon pictus*) since the early 1990s. In addition, he initiated the process of preparation for reintroduction of the eastern subspecies of the black rhinoceros (*Diceros bicornis michaeli*) into the reserve by building the infrastructure within the reserve including fencing for the rhino area that covers 45 sq km. He obtained first two rhino pairs through importing from South Africa's Addo National Park as early as 1997, which was followed by bringing additional two pairs in 2001. All the four cows have already bred in Mkomazi, with a total of five calves born; the most recent rhinos were born in February 2009 and July 2009, respectively.

In Mkomazi, the rhino area is protected by an electrified fence (New Zealand type) powered by solar cells and guarded by armed patrols on 24-hour basis; the fence is alarmed so any invading is made known very quickly. There are logged strips around the facility to prevent potential fires to spread.

The local black rhino management programme has been arranged under the auspices of the George Adamson African Wildlife Preservation Trust and supported by diverse charities and other kinds of wildlife conservation organisations, including Suzuki Rhino Club, Save the Rhino, TUSK Trust and Swordspoint etc.

Unfortunately, the Addo National Park rhino population is inbred as it had only 4 founders meaning that all the rhinos imported to Mkomazi are related to each other as well, so adding unrelated individuals was highly desirable. Therefore, Tony Fitzjohn paid a visit to Dvůr Králové as early as 2003 in searching for suitable animals. In October 2007, Dvůr Králové personnel in cooperation with Back to Africa, a charity represented by its managing director Hamish Currie, visited Tony Fitzjohn who at the same time re-confirmed that Mkomazi was interested in animals from Dvůr Králové. A memorandum of understanding was signed on the site and the project preparation phase started. In June 2008, a meeting took place in Cape Town, where translocation of 2 males and 1 female born at Dvůr Králové Zoo to Mkomazi was agreed. In the autumn 2008, the Mkomazi black rhino reintroduction plan was endorsed by the EAZA Black Rhino EEP and an application was sent to the World Association of Zoos and Aquariums to include the programme within their branded projects, which was accepted and the initiative was assigned project number 080013. In the late 2008, Mkomazi Game Reserve was declared national park within TANAPA framework, as it became a third locality in Tanzania with ranging eastern subspecies of the black rhino, despite some 150 to 250 rhinos Mkomazi hosted back in 1968 that were however poached with only four individuals recorded in 1974. The last wild rhino was observed in Mkomazi in 1985.

Translocation and adaptation to living in the bush

As the process of constructing the fencing and a six-section boma inside the area allocated for Dvůr Králové rhinos was underway in Mkomazi, Dvůr Králové were making crates for the rhino transport, 500 kg each, and the young rhinos were trained for the transport. In April, Tony Fitzjohn visited the zoo once again and the transport preparation was discussed and agreed in details. From April on, the rhinos were getting familiar with their new keepers and trained for closing within a confined area, which imitated staying in the crate. In addition, handling imitating administration of sedatives was trained. Aside from the Czech keepers, the rhinos were attended by Berry White, a specialist keeper to stay with the rhinos in Mkomazi for several months, and rhino veterinarian Dr Pete Morkel, who was in charge of transport arrangements and sedation of animals both throughout and after the transport. Berry has had work experience as rhino head keeper in Port Lympne for seven years. Having moved several hundred black rhinos, Pete Morkel is a specialist dedicated to conservation and translocation of these animals. In addition, he managed the translocation of the rhinos from South Africa's Addo National Park to Mkomazi. Both these experts, accompanied by Jan Zdarek, Dvůr Králové rhino keeper, were attending the rhinos all over their journey that began on 27 May.

The move was started by placing the animals weighing 850 to 1,100 kg into their crates. Afterwards, they were transported in trucks from Dvůr Králové nad Labem to Amsterdam over the distance of thousand kilometres. To make sure the animals are not exposed to overheating and traffic jams on highways, the transport took place at night. With many Dutch press people present (the transport was funded by the Suzuki Dutch general importer via Suzuki Rhino Club), the crates weighing 1.5 tons were loaded on pallets and into the airplane that took off for its 7,000 km long flight around 9 pm. The Martinair plane landed at the Kilimanjaro

Airport, Tanzania, at 8.30 am. Once in Tanzania, the rhinos were transferred in trucks to Mkomazi National Park almost 200 km far away.

The young rhino triplet included a nearly 5-year-old female Deborah (DK 27), a 3–5-year-old male Jamie (DK 29) and a 2.5-year-old male Jabu (DK 31). While Jamie is already a generation 4 in captivity, Deborah and Jabu even represent a generation five.

No animal can be released into the wild immediately once translocated to a new area. The rhinos were going to slowly adapt to their boma, with subsequent enlargement of the area by natural enclosures. The boma consists of six sections, 15 by 15 m each, with two sections available for each rhino and is located in the area with ranging wild rhinos that arrive at night.

Gradual shift to a different diet is also inevitable, so the animals were accompanied with feedstuffs brought from Dvůr Králové plus were given food supplied by the George Adamson Wildlife Preservation Trust directly to Mkomazi, like alfalfa hay, chestnuts, carrots and sweet potatoes. First two weeks the rhinos were attended by their zoo keeper Jan Zdarek who was later replaced by Berry White. By the end of the week 1, female Deborah was introduced to male Jabu as this pair had been already used to spend several hours together in the zoo enclosure as well.

In the week 2 (9 and 10 June), all rhinos were anaesthetised and notches were cut in their ears to make later identification possible. They were also fitted with horn-implanted transmitters. The treatment as such including the anaesthetisation was carried out by Dr Pete Morkel.

At the break of week 3 and 4, the rhinos were gradually accustomed to the New Zealand type electrified fence, which encloses the entire area for rhinos, and released from the boma to a natural area of approximately 45 × 40 m.

The next phase involved releasing Jamie and Deborah into a large natural enclosure (800 m × 400 m, i.e. 320,000 sq m), while Jabu was allowed into

the enclosure of 120,000 sq m (400 m × 300 m). Deborah is now sexually mature and has periodical oestrus. Attempts of mating this female by male Jamie were underway back in Dvůr Králové in summer 2008, although the male was still very young. In Mkomazi, the first attempt was observed on 26 June, which was one month after the arrival of the rhinos.

As of the autumn 2009, with rainy season starting in Mkomazi, the entire area went green and the rhinos from the Czech Republic stopped showing interest in extra food. Any attempts to find the animals were only successful using transmitters that were renewed in all the three rhinos by Pete Morkel in March 2010.

The main rhino sanctuary was extended by a further 5 sq km in order to prepare for a growing population. This was a massive undertaking in that it took over 2 years to put in the 9 km fence. With enough separation areas, this new part made a small amount of breeding management possible. In the near future, decisions are to be taken on further actions and possible transfers of other rhinos, including any putting Suzi – a Mkomazi-born young female – together with Jamie a Deborah.

The existing Mkomazi black rhino population contains 13 (5.8) individuals, with female Charlie now expected to be pregnant. An overview of black rhinos reintroduced and their progeny in Mkomazi is provided in the Table 6.

Acknowledgments

Dvůr Králové has partnered with the following institutions to implement the project: Mkomazi National Park, Back to Africa, Suzuki Rhino Club, The George Adamson Wildlife Preservation Trust, Ministry of Environment of the Czech Republic, Severočeské doly, European Wildlife Conservation Foundation, Natura Viva, Save the Rhino International & Tusk Trust.

Last but not least, thanks must go to other rhino captive breeders as:

- The Czech rhino triplet originates from a founder stock of 11 animals imported by diverse zoos from East Africa
- Jabu's grandfather is Mabu born 1979 in Magdeburg, Germany
- Deborah's great-grandfather is Isis/Bubba born 1975 in Cincinnati, USA
- Jamie's grandfather is Cody born 1975 in Taronga Sydney, Australia

Table 6: Overview of the Mkomazi black rhino reintroduction project prior to 31 December 2009

# Name	Sex	Birth	Arrival in Mkomazi & previous location	Sire/Dam	Death	Comments
1/1/MK/0 Jonah	M	Addo NP, RSA	1997 Addo NP, SA	Wild-born		1st breeding male
2/2/MK/0 James	M	Addo NP, SA	1997 Addo NP, SA	Wild-born		
3/3/MK/0 Rose	F	Addo NP, SA	1997 Addo NP, SA	Wild-born		1st breeding female
4/4/MK/0 Charlie	F	Addo NP, SA	1997 Addo NP, SA	Wild-born		2nd breeding female
5/5/MK/0 Elvis	M	Addo NP, SA	2001 Addo NP, SA	Wild-born	March 2006 Mkomazi	Killed by Jonah and James
6/6/MK/0 Badger	M	Addo NP, SA	2001 Addo NP, SA	Wild-born	6.2.2004 Mkomazi	Paralysis; CNS problems
7/7/MK/0 Lee	F	Addo NP, SA	2001 Addo NP, SA	Wild-born		4th breeding female
8/8/MK/0 Marina	F	Addo NP, SA	2001 Addo NP, SA	Wild-born		3rd breeding female
9/0/MK/1 Suzi MK 1	F	May 2005 Mkomazi NP	Bred in Mkomazi	Rose/Jonah		To be paired with Jabu
10/0/MK/2 Hashim MK 2	M	May 2006 Mkomazi NP	Bred in Mkomazi	Charlie/Jonah	March 2008 Mkomazi	Bitten to death by a snake
11/0/MK/3 Billy MK 3	M	May 2007 Mkomazi NP	Bred in Mkomazi	Marina/Jonah		
12/0/MK/4 Daisy MK 4	F	February 2009 Mkomazi NP	Bred in Mkomazi	Rose/Jonah		
13/0/MK/1 Deborah DK 27	F	11 Nov 2004 Dvur Kralove Zoo	29 May 2009 Dvur Kralove	Jiddah DK 5 / Jimm DK 3		Paired with Jamie
14/9/MK/0 Jamie DK 29	M	2 Jan 2006 Dvur Kralove Zoo	29 May 2009 Dvur Kralove	Jessi DK 5 / Sauron DK16		Paired with Deborah
15/0/MK/1 Jabu DK 31	M	1 Feb 2007 Dvur Kralove Zoo	29 May 2009 Dvur Kralove	Jola DK 21 / Isis		To be paired with Suzi
16/0/MK/5 Maggie MK 5	F	July 2009 Mkomazi NP	Bred in Mkomazi	Lee/Jonah		

Explanatory notes: 11/0/MK/1: 11 – A running historical Mkomazi NP individual number
0 – A running number of import to Mkomazi NP
MK – Mkomazi NP acronym
3 – A running number of birth in Mkomazi NP

Last Chance to Survive – Northern White Rhino Conservation Project

WAZA Conservation Project
No 080013

Project partners

Dvůr Králové has implemented the project in partnership with the following institutions:

Fauna & Flora International

www.fauna-flora.org

FFI protects threatened species and ecosystems worldwide, choosing solutions that are sustainable, based on sound science and take account of human needs. Operating in more than 40 countries worldwide – mainly in the developing world – FFI saves species from extinction and habitats from destruction, while improving the livelihoods of local people. Founded in 1903, FFI is the world's longest established international conservation body and a registered charity.

Ol Pejeta Conservancy

www.olpejetaconservancy.org

The Ol Pejeta Conservancy occupies approximately 360 square kilometres of African savannah within the Laikipia District of Kenya and incorporates the Sweetwaters Chimpanzee Sanctuary. Laikipia carries large and growing wildlife populations and is home to almost 50% of Kenya's black rhino population. The Ol Pejeta Conservancy works to conserve wildlife, provide a sanctuary for great apes and to generate income through wildlife tourism and complementary enterprise for reinvestment in conservation and community development.

Lewa Wildlife Conservancy

www.lewa.org

Founded in 1995, the Lewa Wildlife Conservancy spans 62,000 acres and serves as catalyst for conservation across northern Kenya. Lewa holds over 10% of Kenya's black rhino population and the world's single largest population of Grevy's zebra. Through the protection and

management of endangered species, the initiation and support of community conservation and development programmes, and the education of neighbouring areas in the value of wildlife, Lewa has become Kenya's leading model for wildlife conservation on private land, leading destination for low impact conservation tourism, and leading catalyst for conservation, and its direct benefits for communities, across the region.

Back to Africa

www.backtoafrica.co.za

As the name of this non-profit conservation organisation founded in 1999 suggests, Back to Africa relocates rare and endangered African wildlife species from zoological institutions, thus providing a link between conservation programmes in the wild and captive breeders of African animals. Back to Africa have been Dvůr Králové Zoo partners since established, with return of sable antelopes into South Africa being their first joint project, followed by reintroduction of roan antelopes to Swaziland and black rhinos to Tanzania.

Kenya Wildlife Service

www.kws.org

A state corporation charged with the responsibility of conserving and managing wildlife resources within and outside protected areas in collaboration with stakeholders, Kenya Wildlife Service's goal is to work with others to conserve, protect and sustainably manage wildlife resources. The community wildlife program of KWS in collaboration with others encourages biodiversity conservation by communities living on land essential to wildlife, such as wildlife corridors and dispersal lands outside parks and reserves. The premise is that "if people benefit from wildlife and other natural resources, then they will take care of these resources."

Brief history of the white rhino population in the wild

The two white rhino subspecies met vastly different fates over the past 100 years. The southern white rhinoceros (*Ceratotherium simum simum*) was described in 1817, while for the northern white rhino subspecies (*Ceratotherium simum cottoni*) the same occurred only in 1908. About 100 years ago, when the southern form was almost eradicated, the northern form was locally common and abundant in savannas and sparse forest steppes in five Central African countries: Uganda, Sudan, Chad, Central African Republic and the Congo.

In the 1960s, the northern subspecies was still more common with some 2,250 animals than the southern form, with the latter consisting of just a single population in South Africa. Since then, the southern white rhino population grew and the subspecies was propagated to other regions, while for the northern form, there lived in 1984 the last remaining 15 animals in Garamba National Park, Zaire (now the Democratic Republic of the Congo). Just because of these rhinos, the park was declared a World Cultural Heritage Site, with protection of the rhinoceroses supported by the International Rhino Foundation (IRF), USA, in particular. Despite a slight increase to 31 individuals in 1995, there was gradual decline in the population due to civil wars and poaching.

Thanks to international efforts, it was agreed in 2004 that some 10 remaining northern white rhinos would be caught and relocated into the Ol Pejeta Conservancy, Kenya, where bomas were developed to accommodate the animals following the potential transport. Unfortunately, this never took place.

Table 7: The numbers of the white rhinoceros in the wild

	1920	1960	1970	1981	1984	1993	1999	2003	2005	2008
Southern form	110?	1500	2000	3150	3920	5700	8440	11320	14543	17480
Northern form	3000	2250	700	100	17	31	25	10	4	4?
Total	3110	3750	2700	3250	3937	5731	8465	11330	14550	17484

Table 8: Northern white rhinos kept in captivity prior to 31 December 2009

No	Sex	Stdbk # & name	Born	Date & place of arrival	Death	Comments
1	?	1252 --	1948 Southern Sudan	16 Jan 1949 Khartoum	17 Jan 1949 Khartoum	† Enteritis when 1-2 years old
2	M	15 Paul	1948 Shambe, Sudan	7 Apr 1950 Antwerp	13 Apr 1968	† When 20 years old
3	F	16 Cloe	1948 Shambe, Sudan	7 Apr 1950 Antwerp	7 Aug 1985	† When 37 years old
4	M	19 Ben	1950 Uganda	25 Jul 1955 London 27 Aug 1986 Dvur Kralove	25 Jun 1990 Dvur Kralove	Euthanised for high age when 40 years old
5	F	290 Bebe	1950 Uganda	25 Jul 1955 London	29 May 1964 London	† When 14 years old
6	M	27 Bill	1952 Sudan	4 Sep 1956 Washington 22 Apr 1972 San Diego WAP	2 May 1975 San Diego WAP	† When 23 years old
7	M	28 Lucy	1952 Sudan	4 Sep 1956 Washington 22 Apr 1972 San Diego WAP	15 Mar 1979 San Diego WAP	† When 27 years old
8	F	1123 --	1963 Sudan	1 Apr 1964 Khartoum	2 Aug 1967 Khartoum	† When 4 years old
9	M	54 --	1963 Shambe, Sudan	1 Apr 1964 Khartoum 1 Jan 1965 Riyadh	31 Dec 1965 Riyadh	Euthanised when 22 years old
10	F	55 --	1963 Shambe, Sudan	1 Apr 1964 Khartoum 1 Jan 1965 Riyadh	31 Dec 1985 Riyadh	Euthanised when 22 years old
11	F	75 Joyce	1952 Sudan	28 Jul 1957 St. Louis 7 Aug 1972 San Diego WAP	15 Aug 1974 San Diego WAP	† When 22 years old
12	M	74 Dinka	1952 Sudan	28 Jul 1957 St. Louis 7 Aug 1972 San Diego WAP 29 Jan 1980 San Diego WAP 26 Oct 1972 San Diego WAP	28 Jan 1991 San Diego WAP	† When 39 years old
13	M	347 --	1968 Shambe, Sudan	1 Apr 1970 Khartoum	16 Jan 1978 Khartoum	† When 10 years old
14	F	345 Tofacha	1970 Sudan	1972 Khartoum 1 Jan 1973 Al Ain	12 Sep 1978 Al Ain	† When 8 years old
15	M	348 Angalifu	1972 Shambe, Sudan	1 Mar 1973 Khartoum 12 Aug 1990 San Diego WAP		2008 - probably a non-breeding animal (sperm collected by IZW Berlin)
16	F	351 Nasima	1965 Uganda	1 Jul 1971, Knowsley, Prescott 27 Aug 1977 Dvur Kralove	26 Aug 1992 Dvur Kralove	1st breeding female Collapsed in shock when 27 years old
17	M	373 Saut	1972 Shambe, Sudan	19 Sep 1975 Dvur Kralove 13 Oct 1989 San Diego WAP 15 Jul 1998 Dvur Kralove	14 Aug 2006 Dvur Kralove	1st breeding male 1989-1998: on loan at San Diego WAP † Heart failure - 34 years old
18	M	372 Sudan	1973 Shambe, Sudan	19 Sep 1975 Dvur Kralove 20 December 2009 OI Pejeta, Kenya		2nd breeding male Loaned to Kenya
19	F	375 Nuri	1973 Sudan	19 Sep 1975 Dvur Kralove	4 Jan 1982 Dvur Kralove	Collapsed due to trauma when 9 years old
20	F	377 Nesari	1972 Shambe, Sudan	19 Sep 1975 Dvur Kralove		Uterus tumour - non-breeder
21	F	374 Nola	1974 Shambe, Sudan	19 Sep 1975 Dvur Kralove 13 Oct 1989 San Diego WAP		Loaned to WAP in 1989, where mated in 1995 Found to be a non-breeding animal in 2008 due to atrophic ovaries
22	F	376 Nadi	1972 Shambe, Sudan	19 Sep 1975 Dvur Kralove 13 Oct 1989 San Diego WAP	30 May 2007 San Diego WAP	Loaned to WAP in 1989 † When 37 years old
23	F	476 Nasi DK 2	1977	Reared in Dvur Kralove Nasima / Arthur (Stdbk #355 - Knowsley, England)	20 Jun 2007 Dvur Kralove	Intercrossed animal (NWR x SWR) Mated in Knowsley England
24	M	630 Suni DK 5	1980	Reared in Dvur Kralove 20 December 2009 OI Pejeta, Kenya		Loaned to Kenya
25	F	789 Nabire DK 6	1983	Reared in Dvur Kralove Nasima/Sudan		Uterus tumour found in 2009 - non-breeder
26	F	943 Najin DK 7	1989	Reared in Dvur Kralove Nasima/Sudan 20 December 2009 OI Pejeta, Kenya		Loaned to Kenya
27	F	1122---DK 8	18 Jul 1991 Dvur Kralove	Reared in Dvur Kralove Nasima/Sudan	18 Jul 1991 Dvur Kralove	Aborted on day 296
28	F	1305 Fatu DK 9	29 Jun 1989 Dvur Kralove	Reared in Dvur Kralove Najin DK 7 / Saut 20 December 2009 OI Pejeta, Kenya		First F2 animal in captivity Loaned to Kenya

[M - male, F - female; studbook numbers are assigned collectively to individual white rhinos regardless of the subspecies (bold-highlighted animals are still alive and a property of Dvur Kralove, except for Angalifu, i.e. #15)].

Contrary to the southern white rhino numbers in the wild that have recently bounced to some 19,000 individuals, only a single northern white individual was seen in Garamba in the course of a field survey done in 2007, while none were found there in 2008 and 2009, making this form the rarest rhino in the world, with perhaps a few individuals surviving in southern Sudan (see Table 7).

In 2009, last eight remaining animals were held in captivity. This involved males Sudan (36) and Suni DK 4 (28) and females Nesari (37), Nabire DK 6 (26), Najin DK 7 (20) and Fatu DK 9 (9) at Dvur Králové Zoo and another pair kept at San Diego Wild Animal Park, the USA, with female Nola (37) owned by Dvur Králové and loaned to the USA in 1989, and male Angalifu owned by Khartoum Zoo, Sudan; this rhino was imported to the USA in 1990.

Brief history of the captive northern white rhino stock

The northern white rhino form was rather rare in captivity, as according to the International Studbook information, a mere 22 animals (10 males, 11 females, 1 animal with sex not determined) were imported to zoological parks from the wild in 1948–1975 (see Table 8). Except for the last imported group, this mostly involved pairs that however never reproduced, with captive breeders being the zoos in Antwerp (Belgium), London (the UK), Washington, San Diego and St. Louis (the USA), Riyadh (Saudi Arabia) and Khartoum (Sudan). Khartoum Zoo held 4 individuals over time (2 pairs, including the male Angalifu). Prescott Zoo imported a single female, Nasima, in 1971. This rhino and the pair held at London Zoo, i.e. Ben and Bebe, were wild-caught animals from Uganda, while the remainder of 19 (9.9.1) individuals were of Sudanese origin, of which 12 (7.5) came from the Shambe region. The last of those imports from the wild was carried out in 1975, when Dvur Králové Zoo brought a group of 6 (2.4) rhinos including two males

Table 9: Northern white rhinos born in captivity, i.e. at Dvůr Králové Zoo

#	Sex	Name	Birth	Dam	Sire	Gestation period	Stdbk #/comments
0.	F	Nasi	11 Nov 1977	Nasima	Arthur	?	476 - fathered by SWR, subspecific hybrid, died in 2008
1.	M	Suni	8 Jun 1980	Nasima	Saut	503 days	630
2.	F	Nabire	15 Nov 1983	Nasima	Sudan	485 days	789
3.	F	Najin	11 Jul 1989	Nasima	Sudan	481 days	943
4.	F	-	18 Jul 1991	Nasima	Sudan	Abortion	1122, stillborn
5.	F	Fatu	29 Jun 2000	Najin	Saut	482 days	1305 - captive generation 2

that subsequently reproduced on a repeated basis. Nasima who was imported to the UK, more specifically, to Knowsley Zoo, Prescott, became the only breeding female. Other wild-caught animals never reproduced.

Brief history of the northern white rhino collection in Dvůr Králové

Dvůr Králové Zoo is the only zoological park in the world where northern white rhinos ever reproduced, with five pure northern white rhinos born including one premature calf, plus a single southern/northern form hybrid, with however female falling pregnant at Knowsley Zoo, Prescott. The first pure northern white rhino was born in 1980, with following animals born in 1983, 1989, 1991 and 2000. For the last calf, Najin DK 7 was the mother, while the remainder was born to Nasima, the wild-caught mother of Najin. More details: see Table 9.

Many years of breeding efforts. Dvůr Králové tested diverse ways to successfully reproduce the northern form, which included their own programmes or activities conducted in cooperation with the international breeding and conservation community:

Research in hormonal cycles was underway in Dvůr Králové from 1984: the females were found to have ceased cycling, and any efforts to change that failed except for Najin. It was found that keeping the animals in a pair situation definitely does not make difference in breeding performance and the same can be applied to managing rhinos as a group. From today's perspective, absence of natural territorial and social behaviour seems to be the cause.

Change in the settings through sending three animals (male Saut and females Nadi and Nola), only 15 and 17 years old, from Dvůr Králové to the Wild Animal Park in San Diego, USA, in 1989. Despite repeated mating, females never fell pregnant.

Stimulation by feeding, light and exposing to other rhinos, changes in the group structure etc. After Saut returned from San Diego to Dvůr Králové in 1998, young female Najin got pregnant, giving birth to its single calf so far, female Fatu DK 9, which is at the same time world's only northern white rhino born in the second generation in captivity.

Assisted reproduction efforts were launched in April 2001, which was also not successful. From 2001 to 2007, a total of 27 anaesthetisations of the animals were carried out by IZW Berlin, including 5 attempts at artificial insemination, however without success.

A sad reality of figures was all what has been ultimately left by the efforts mentioned above, with the entire population consisting of 4 captive-born individuals and 4 born in the wild.

Even the captive southern form population would be subject to a slow process of extinction being there no imports of animals from the wild, since reproduction successes in the white rhino as a species has been rare despite some particular breeding success (San Diego, Whipsnade etc.) and cycle failure or absent cycles exist in the majority of females in captivity.

Conservation actions

Preliminary discussions and arrangements

With both Dvůr Králové females getting older, discussion on potential benefits of relocation of the animals into natural conditions was launched with AfRSG and Back to Africa representatives. The same started at Dvůr Králové Zoo and within the Rhino Committee to the Union of Czech and Slovak Zoos, with the move subsequently recommended by the latter. In December 2007, a meeting of the African Rhino Specialist Group (AfRSG) to the IUCN was held in South Africa, discussing the offer of Dvůr Králové to supply the last fertile animals held in captivity within a potential conservation project; at the same time, suitable locations were selected, with Kenyan OI Pejeta being the best option and other two sites in South Africa considered.

In early 2008, results of examination of hormonal derivatives from Najin and Fatu faeces confirmed the females were not pregnant following the most recent artificial insemination. Therefore, the zoo decided to visit the potential destination, OI Pejeta in Kenya, which was assumed to be the site for relocated animals from Garamba back in 2004. The visit however could not take place due to post-election civil unrests in Kenya.

In June 2008, another location was visited – this time it was De Beers' Rooipoort Reserve, Kimberley, South Africa. As the site was found particularly suitable, conditions of potential partnership were agreed, including the one requiring that the ownership of the animals would remain with Dvůr Králové Zoo.

In August 2008, the conservation of the northern white rhino was also encouraged by UNESCO at this organisation's meeting in Quebec, Canada, calling on the Czech Government to support the Dvůr Králové conservation project.

Scientific planning workshop

In the meantime, preparations were underway for an international meeting of rhino experts invited to Dvůr Králové Zoo, with the meeting date set to 3 September 2008. Invitations were sent to representatives of the following organisations: Dvůr Králové Zoo, European Association of Zoos and Aquaria, EAZA Rhino TAG, African Rhino Specialist Group (AfRSG) to the IUCN, Back to Africa, IZW Berlin, Veterinary University Vienna, International Rhino Foundation, World Association of Zoos and Aquariums, Ministry of Environment of the CR, Union of Czech and Slovak Zoological Gardens, Parliament of the Czech Republic / Committee for Environment, Natural Science Faculty of the Charles University, Prague and Frankfurt Zoo.

The objective of the meeting was to set the best way forward to save the northern white rhino. Representatives of Dvůr Králové Zoo, AfRSG, IZW, the White Rhino EEP and Veterinary University Vienna informed the participants through their presentations about historical data as well as the existing status of the white rhino in captive and wild situations, which in particular included the breeding record of rhinos in Dvůr Králové, research on captive white rhino cycles, situation of populations in the wild and in captivity for both subspecies, etc.

Subsequently, a draft action plan developed by Dvůr Králové Zoo was discussed at an expert level, including input documents and presentations, with particular actions presented one by one and subjected to diverse aspects.

At this meeting, the specialists came to a conclusion that any recent efforts in captivity have failed to result in sufficient reproduction performance and that there was no time for any further attempts in captive situation, as biological time windows of the animals were closing too fast. Dvůr Králové's rhino group was recognised and evidenced to be the only world's herd able to breed, with 2 or maybe 3 cows and 2 bulls being potential breeders. Consensus was reached in that moving these animals into the natural setting would potentially encourage natural social and territorial behaviour, essential for the remaining females to breed on a regular basis.

DRC's Garamba National Park was still assumed to contain three remaining wild rhinos, which might considerably increase the chances of the northern form to survive provided any such animals were found and integrated with captive rhinos, as evidenced through genetic modelling developed by ISIS and AfRSG specialists.

A place fully secure and free of poachers and predators was a prerequisite for any move of the animals from captivity to the wild. A consensus was reached in that if sufficient numbers are achieved within 20-30 years, then a part of such population could be relocated to countries of former range, provided secure and suitable areas are found there.

Because the former range of the subspecies did not contain any safe location, the Rooipoort Reserve of De Beers in the Northern Cape Province, South Africa, was proposed as a suitable site. De Beers have been supporters of conservation projects for one hundred years, with ranches reproducing many species of South Africa's native wildlife, which can be very well evidenced through granting the WWF-Lonmin Award for conservation to Nicky and Strilli Oppenheimers to recognise the funding of conservation projects contributed by De Beers and Oppenheimer family.

The only person objecting against the move to Africa was Lars Versteegen, White Rhino EEP coordinator, supporting an idea of repeated attempts at artificial insemination and relocation of the animals to a different zoo, for instance the one that he worked with, i.e. Safari Park Beekse Bergen, where they had achieved a number of southern rhino calves produced.

IZW Berlin were suggesting that artificial insemination efforts should continue until the transport. The remainder of the participants was opting for the move as the only real way forward, generally recommending to try making the females cycle again within the short time window before the transport, by either naturally or through artificial insemination, noting that this should not pose any undue delay of the move.

AfRSG and Back to Africa representatives invited Dvůr Králové to reconsider Ol Pejeta as an option, as the Kenyan post-election situation was already under control. At the same time, everyone was informed on the plans to survey Garamba National Park with the intention to find any last remaining rhinos.

As a conclusion, the next project steps were identified including actions expected. A summary of meeting presentations and conclusions was incorporated into the Northern White Rhino Conservation Action Plan document. The operation as such was branded by the World Association of Zoos and Aquariums as WAZA Conservation Project No 08017.

Choosing the best site

Follow-up to the workshop above was the meeting of Dvůr Králové Zoo Board in September 2008, where the board members approved the steps proposed under the Action plan, as well as the move of the animals to the reserve in South Africa that had been assessed as 100% secured site.

At the same time, the management method was changed in the northern white rhino at the zoo in order to induce hormonal cycles in females, which involved putting two females together with one male at a time and separating Najin from her daughter Fatu. Female cycles were under monitoring; should any female started cycling, a male was at hand to enable mating.

In January 2009, Hamish Currie of Back to Africa informed on increased poaching in South Africa, suggesting re-considering the Kenyan location (Ol Pejeta) as an option, this being at the same time a recommendation of AfRSG to the IUCN. Based on the information above, the Zoo Board decided to visit Kenya, which took place in February 2009. When visiting Ol Pejeta, the project was discussed and conditions of cooperation approved. The zoo representatives also became familiar with Ol Pejeta operations and reintroduction projects, as well as with rhino management and security situation in Kenya generally and in Ol Pejeta in particular. The meeting participants included representatives of Dvůr Králové Zoo, Czech Parliament's Committee for Environment and Kenya Wildlife Service, as well as managers and other personnel of Ol Pejeta Conservancy, Lewa Wildlife Conservancy, Back to Africa and Fauna & Flora International (FFI).

The Zoo Board requested additional expert opinions on the project and based on these the move of the rhinos to the new location in Kenya was approved. A memorandum of understanding was signed in June, containing the following project objectives:

- To induce normal and periodical breeding in the Dvůr Králové animals that were still able to reproduce, in a secure place in the wild.
- To develop maximum efforts to integrate the captive animals with last remaining northern white rhinos in the wild if any are found. If not, to produce pure northern white rhinos as well as intercrossed offspring to preserve the genes of the northern white rhino, where adding southern white rhino females was recommended to induce normal social and territorial behaviour.

A management committee consisting of representatives of Dvůr Králové Zoo, Ol Pejeta Conservancy, Back to Africa, FFI, Lewa Wildlife Conservancy and Kenya Wildlife Service was established to oversee rhino management and care.

The move was officially supported by the African Rhino Specialist Group to the IUCN, UCSZ and a number of various specialists in the rhino conservation field, Prince William of Wales (a supporter of Ol Pejeta Conservancy), Minister for Environment of the Czech Republic, Czech Ambassador in Kenya, the President of the Czech Committee for UNESCO and many others.

Ol Pejeta Conservancy

Ol Pejeta Conservancy was identified by AfRSG as the best option on the basis of its very good climate and a location close to the former range of the subspecies. A high altitude area, Ol Pejeta lacks issues concerning trypanosomiasis, which can be mortal for rhinos imported from the moderate climate. Kenya neighbours Sudan, where three northern white rhinos were observed in summer 2008 according to reliable evidence. In 2005, Ol Pejeta Conservancy was the site chosen for placing the last surviving animals from Garamba National Park, DRC. Therefore, it is the best place for receiving any potential remaining northern white rhinos from the wild in terms of both climate and politics. The current governmental policy and rhino protection system are comprehensive enough to provide maximum guarantee for security of the animals, with additional fenced and guarded area inside the reserve.

Ol Pejeta represents 25,000 hectares of a habitat located near the original range of the northern white rhino. This institution has experience of rhino reintroduction and contains the largest black rhino population in East Africa counting 81 individuals, plus manages 11 southern white rhinos. Ol Pejeta has a consistent and effective system of patrols to prevent any poaching attempts on the rhino populations.

Available for the northern white rhino are bomas and 400-hectare enclosures surrounded on all sides by a fully electrified fence with monitoring on a 24-hour basis plus strategically located watch-towers. Other security features include horn-implanted transmitters to enable intensive surveillance and monitoring and security patrols formed of 14 men under the supervision of senior management, with additional assistance by the security divisions of the Lewa Wildlife Conservancy and Kenya Wildlife Service. The rhino enclosure is located in the centre of the conservancy, which itself is a fenced area of 61,000 hectares patrolled by a security team of over 80 guards on a 24/7 basis.

Translocation including pre-arrangements and acclimatisation

In cooperation with IZW Berlin, female Nabire was examined in July 2009 and subsequently excluded from the project as a non-breeding animal. Sperm was also collected from male Suni and sent to the Berlin-based sperm bank. Biological samples were taken from all northern white rhinos for future use. All animals to be transported except for Sudan were dehorned from safety reasons.

On Saturday, 19 December 2009 early in the morning, the process of crating and loading got underway in Dvůr Králové. Heaters were installed inside lorries as severe frosts were expected during the day and each crate was fitted up with a tarpaulin covering the ventilation holes so that the animals were kept under a temperature of 16 °C. The animals were accompanied by experienced specialists, including keeper Jan Zdarek and veterinarian Dr Jiri Vahala on behalf of Dvůr Králové Zoo, Berry White and South African veterinarian Dr Pete Morkel, a rhino translocation expert. A national traffic police escort (Traffic Police of the Czech Republic) ensured a smooth passage for the convoy as far as the airport. The aircraft with rhinos took off at 6 pm and landed at the Nairobi airport on 20 December 2009

in the early morning. From Nairobi, the transport continued as far as Ol Pejeta Conservancy by trucks. The rhino convoy reached the place of final destination following 26 hours and the animals were uncrated and entered their bomas on 20 December at 2 pm CET.

The Dvůr Králové Zoo keepers stayed on the site with rhinos five weeks after the translocation, while Berry White spent several months there. Veterinarian Peter Morkel was and will be available to oversee the animals on an ongoing basis as they are getting adapted to living in the bush, which is going to last for one to two years and include training for the electrified fence as well as adapting to natural diet and large enclosures that will be enlarging with time.

As early as January, the rhinos were released in their first natural enclosure. At the end of April, the females were put together with male Sudan and the male and female Najin subsequently transferred into a breeding area of 300 hectares, with southern white female and two calves added to the pair.

Fatu is kept with male Suni in an enclosure of 8 hectares. As faecal examination results and female's behaviour have shown, Fatu has slowly begun to cycle, with first signs of interest in mating recorded in early October 2010.

A journey was taken to southern Sudan in March 2010 and it really seems that there are still a few rhinos alive. The next step planned is to build a large fenced area for Fatu and Suni and additional southern white females. In order to identify the effects that the change in environment might have on the females, monitoring of hormonal activity based on their faeces is still in progress, with samples collected and frozen twice a week as well as earlier at the zoo and then examined at the University of Vienna to determine whether the females cycle and ovulate or not and check for any pregnancy.

Rhino translocation is costly, particularly between continents, but the fundraising efforts for this translocation do not aim to compete with other recognised rhino conservation priorities. What's more, if the original transport of the northern white rhinos from Sudan to Czechoslovakia had not been done and paid by Dvůr Králové Zoo in 1975, there would be no animals left to save and these rhinos could even never obtain this last chance to survive.

For basic information and facts as well as updates, please visit project micro site: www.northernwhiterhino-lastchance.com

Acknowledgments

In addition to the partners mentioned earlier, a number of supporters and funding institutions must be applauded for their appreciated help.

AfRSG to the IUCN, Kenya Wildlife Service, Kenyan Ministry for Environment, Czech Embassy Kenya, Czech Ministry of Environment, Czech Committee for UNESCO, Environmental Committee of Czech Parliament, IZW Berlin & Vienna University, BBC, National Geographic, Lemuria TV & Czech TV, Matsarol Foundation, Australia; Whitley Animal Protection Trust, Prince Bernhard Fund for Nature, The Chadramohan Family Foundation (Zoomungus World Foundation), Tudor Investments (Paul Tudor Jones), Montague-Panton Charitable Trust, Ministry of Environment, Czech Republic; DHL Supply Chain, The Daphne Sheldrick Wildlife Trust, Natura Viva Dvůr Králové n. L. & Severočeské doly

Special thanks for both projects

- The team of Dvůr Králové Zoo, in particular animal management staff and veterinarians
- Dvůr Králové Zoo Board of Directors & Supervisory Board
- The World Association of Zoos and Aquariums for your support

Conclusion

Dvůr Králové sent to Africa as part of conservation projects seven rhinos within a single year, which would not be possible in a small country in the middle of Europe being there no dedicated partners as well as generations of keepers.

The black rhinos were literally sent to the land of their ancestors, returning into what can be called promised land, i.e. their native habitat, with the belief that the Mother Nature thereby gets what we humans owe to her.

I believe that both sites can provide a permanent home for our rhinos and that any future offspring of these will help Dvůr Králové fulfil the modern zoo mission totally in compliance with the strategy of WAZA. I had the opportunity of testing in person that the animals were translocated to the best possible habitat.

I feel happy that we gave the northern white rhinos their last chance, that they live in conditions that are believed to establish a normal female reproductive behaviour, and that the worldwide interest in this project turned public attention to the protection of the entire taxon.

Even though four last remaining animals may be unable to guarantee survival of a species, promoting conservation as such is something that they can.

References

- HOLECKOVA, D., 2009: Breeding endangered species at Dvůr Králové Zoo, Volume 3: Rhinos. Dvůr Králové Zoo, Dvůr Králové nad Labem.

Biodiversity is Life

Proceedings of the 65th Annual Conference
Technical Congress

18–19 October 2010

Hosted by Kölner Zoo

Table of Contents

Welcoming address by the Host	3	Letting the Cat Out of the Bag: Genetic Effects of <i>Ex situ</i> -Conservation in the European Wildcat (<i>Felis silvestris</i>)	63
Welcome by the Mayor of the City of Köln (Cologne).....	4	India's Initiative in <i>Ex-situ</i> Wildlife Conservation	64
Welcome Address on behalf of the German Federal Minister for the Environment, Nature Conservation and Nuclear Safety	5	"Joined-up Conservation": Addressing Native Species Declines in Western Australia	67
Welcome to the Region	7	Developing Conservation Strategies for the Armenian Viper	70
Welcome Address by the WAZA President.....	9	An Overview and Evaluation of WAZA Conservation Projects.....	72
Keynote Addresses	11	Breeding, Research & Conservation of Tropical Herpetodiversity: Linking <i>ex situ</i> with <i>in situ</i> Approaches.....	73
Saving Biodiversity – Key Messages in the International Year of Biodiversity 2010 and the Roles of WAZA and the UNEP Convention on Migratory Species.....	12	Zoo Personnel Serving an IUCN Specialist Group: An Introduction to the Northeast African Subgroup of the Antelope Specialist Group	78
Biodiversity: Where Zoos Can Make a Difference	16	Zoos' Role in Conserving the Diversity of a Small Taxon – from the Perspective of the Bear Specialist Group	79
Conserving Plant Diversity – the Role of Botanic Gardens and Zoos	19	The Sabah Rhino Project – Captive Breeding, Habitat Protection and Habitat Reforestation	83
WAZA Congress Papers	23	Dysfunctional Zoos & What to Do?	84
The One Curator – One Species Challenge	24	Transportation of CITES-listed Species	91
Re-thinking <i>ex situ</i> vs. <i>in situ</i> Species Conservation	25	How Do You Create A Zoo That Really Contributes Towards Biodiversity Conservation?	93
Defining What It Means to Save a Species – The Species Conservation Program of the Wildlife Conservation Society	30	Troubles in Paradise – Zoo Design for Conservation Education.....	97
Building Sustainable Zoo Populations and Connecting Zoo Populations to Field Conservation, A Report by the AZA Task Force on the Sustainability of Zoo-based Populations: Phase 1.....	32	Biodome – Biomimicry – Biodiversity	99
Chicago Zoological Society's Center for the Science of Animal Welfare.....	36	Zoos and Conservation – the Frankfurt Example.....	102
The ISO's International Workshop Agreement (IWA)	38	Husbandry Success in Zoos: A Constant Aim for Science and Practice	105
Why Not Partner an African Zoo?	41	Where Are We Now? – Trends in Global Grants for Wildlife Conservation.....	106
Public and Private Sector Collaboration to Preserve Biodiversity in Aviculture	42	Project MOSI (Mosquito Onset Surveillance Initiative)	108
The Value of Biodiversity and the Economics of Biodiversity Conservation.....	46	The Conservation Status of the World Zoo's Species	109
Beauval Conservation Program in Djibouti, "Back to Africa"	50	EAZA Conservation Campaigns: What Have We Learned and Where do We Go from Here?	111
Back to Africa and Restorative Conservation, Pursuing the WAZA Conservation Strategy	52	Multiplication Effect Through Partnerships: The Granby Zoo's Experience.....	114
Dvůr Králové Zoo and WAZA-branded Rhino Conservation Projects	53		

Welcoming address by the Host

Theo Pagel, Zoo Director & CEO – Cologne Zoo

Welcome to Cologne!

Dear WAZA members and guests, it is an absolute pleasure for me to welcome you all on behalf of the board of Cologne Zoo and the whole staff to the 65th annual WAZA conference.

This year, in 2010, we celebrate our 150-year anniversary and are proud to host the WAZA meeting for the first time in our long history, to have colleagues from almost 40 countries around the world as guests. We will try our best to make you feel at home in our beautiful Zoo and our city full of culture and life!

Let us together make this conference a successful one with a lot of fruitful workshops, discussions and results. "Biodiversity is Life: the Role of Zoos and Aquariums in Biodiversity Conservation" is our conference topic. We are the experts in keeping and breeding animals, in teaching about the importance of the fauna, of biodiversity in general.

We all should use this meeting to become friends, close partners and take it as a chance to tell the people what we are doing.

I wish you all a fruitful, enjoyable and happy time in Cologne.

Yours



© Ulrike Fox, WAZA

Theo Pagel and Mark Penning at Kölner Dom.