



Wolverine EEP expands to North America

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Joint efforts of AZA¹ and EAZA² to maintain a healthy population of wolverines

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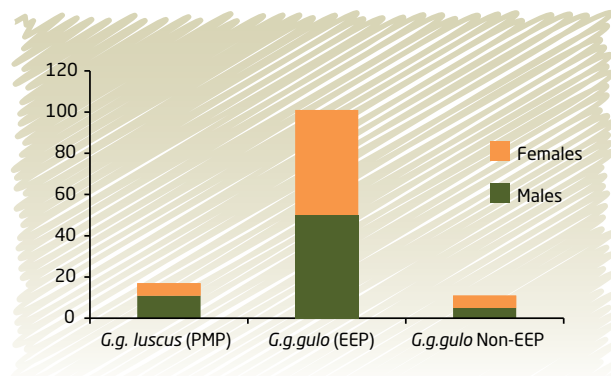
Two-thousand-and-fourteen was a productive year in the EEP programme with 14 transfers taking place between the participating zoos. As a result of export activities, three new institutions joined the programme which now has 41 participants.

Due to modest breeding results with the North American subspecies *Gulo g. luscus*, the managed population in the New World has shown a slow decline. Reproductive success has been low, with a few females producing most of the offspring and since 1980, only ten percent of the females in North America have reproduced (Ness 2014). Almost fifty percent of the living *G.g. luscus* are full siblings representing 80% of the ageing breeding stock in North America. The captive population of *Gulo g. luscus*

comprised only 11.6 animals (Figure 1) in 2014 and is without influx of new founders beyond reviving (Ness 2014).

Given a high level of dedication from the holding institutions and the strong and growing EEP population, the breeding programme in North America partnered with the EEP 2013 to form a combined breeding programme between the two regions (Blomqvist 2014). As a result of discussion with the AZA Small Carnivore TAG wolverine coordinator and the EEP, it was concluded that North American institutions have reached a situation where they have to phase out the remaining *G.g. luscus* population and switch to the nominate form which is maintained in Europe. As long as *G. g. luscus* still remain in

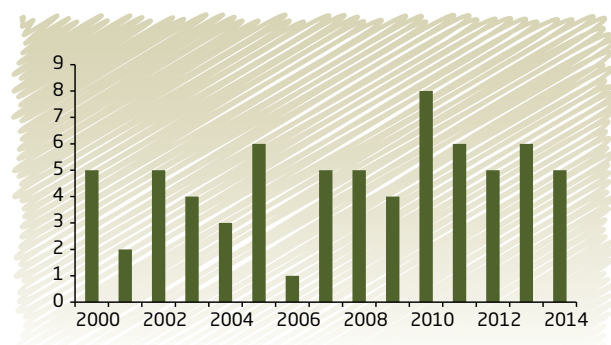
Figure 1. Number of wolverines kept in Europe and North America 2014.



North American institutions, the two subspecies will be housed separately and not allowed to hybridize. Zoos in Europe maintain only the nominate form of wolverines of which all animals are of known origin. No specimen of the America subspecies are recommended to be imported to Europe.

Minnesota Zoo who is responsible for coordinating the AZA wolverine programme stood for the first imports of Eurasian wolverines from Europe in 2013 when a young pair from Hunnebostrand and Kolmården were imported to the States (Blomqvist 2014). In 2014, the transatlantic imports continued when Columbus Zoo in Ohio and Saint Felicien Zoo in Canada got young animals from Borås, Calviac and Kristiansand. The three zoos in North America have therefore joined the EEP programme (Table 1) and two additional institutions, Alaska Wildlife Conservation Center and Alaska Zoo in Anchorage, have reserved young kits from Europe to be imported in 2015.

Figure 2. Number of wolverine litters born in EEP.



Main events in 2014

Table 1 summarizes the main events in the Wolverine EEP in 2014. The European region has had consistent reproductive success in the 21st century with an average of 4.7 litters born per year (Figure 2). There were five litters born in 2014, down one from last year with a total of ten kits (2.8), all of which survived. One of the breeding pairs, studbook # 328 and studbook # 338 in Novosibirsk Zoo bred for the first time whereas the other four pairs were proven breeders.

No animals left the programme but three males and three adult females died and two females managed to escape from Moscow and Orsa, resulting in an overall increase in the captive population from 99 (51.48) animals in 2013 to 101 (50.51) living wolverines in 2014; the captive population now exceeds 100 animals for the first time. The annual fluctuations in the EEP in the 21st century are illustrated in Figure 3 showing a modest but increasing trend. The age and sex distribution of the current

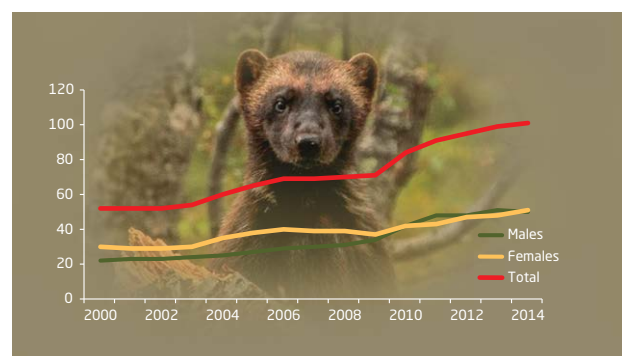
population is shown in Figure 4 and Table 2 presents a summary of all wolverines included in the European population.

In addition to the intensively managed stock in Europe, there are 5.6 animals kept in six Eurasian facilities. These zoos cooperate at a studbook level (Table 1) but unfortunately do not participate in the EEP. None of the wolverines maintained outside the EEP have bred during the last year and as the population is getting older, it will most likely be phased out before 2020.

Breeding age and life expectancy

European studbook data indicate that in captivity a few animals start to reproduce at the age of two years although the average age when wolverines start to reproduce is higher with a mean age of 4.6 years for males and 4.11 years for females. Females are retired from breeding after 12 years while the corresponding age for males is two years later, but this can vary by the condition

Figure 3. Census of EEP population 2000-2014.



of animals. The oldest known age of a captive-bred male to sire offspring is 13.11 years and 15.2 years for a female to deliver a litter. Maximum longevity for captive-born animals of known age in the European collection is 18.2 years for males and 19.2 years for females. This is, however, not the biological maximum age for wolverines but reflects only the animals included in the European dataset. The average lifespan for wild wolverines is unknown, although it is unlikely that wild animals will survive for more than 15 years. It is important to mention, that the values in the higher age classes are prone to distortion - a wolverine that reaches the age of +13 years (Figure 5) represents a high portion of the total number of animals in that age class. If this animal manages to breed at that late age, it gives a distorted view of what animals of that age are capable of. As a result, the chances of reproduction in age classes higher than 13 years becomes highly inflated and does not show a realistic expectation for animals within the population. It is instead only a result of having a

Figure 4. Age and sex distribution of wolverine EEP population. 1.1.2015.

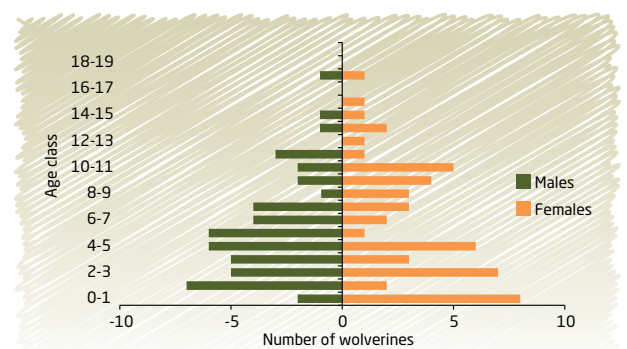
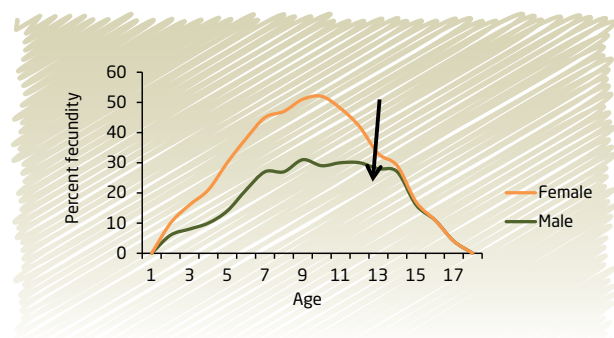


Figure 5. Fecundity in captive-bred wolverines of known age. Figure based on 282 births events 1970-2014.



small data set and all values for animals older than 13 years, are therefore unreliable.

New holders wanted

The age distribution in Figure 4 shows that nine percent of the wolverines in the current stock are older than 12 years and will soon disappear from the captive stock. At the same time 30% of the animals are younger than three years and will soon enter the breeding potential together with some of the “middle-

aged” breeders that will continue to breed for some years. It is therefore to be expected, that the number of breeding animals in the EEP will increase creating a growing surplus problem in the European programme.

Despite continuous efforts to convince European holders to include wolverines in their collections, the results have been modest with not more than a maximum of one to two new participants each year. During 2014, two European collections, Paris Zoo and Hanstedt, joined the programme. To maintain a healthy population of wolverines for a longer period of time, a population size significantly larger than the present 100 animals is needed. The affiliation of AZA’s wolverine holders to the European breeding programme will therefore support the European efforts to establish a self-sustaining population of wolverines with a large amount of gene diversity retained. A jointly managed population of *Gulo g. gulo* in the two continents will also support the establishment of a future global wolverine studbook under the auspices of WAZA.

References

- Blomqvist, L. (2014):** Development of Wolverine EEP. Nordens Ark Ann. Rep. 2013: 33-35. Nordens Ark Foundation. (also available on EAZA:s SCTAG web pages)
- Ness, T. (2014):** North Americal Regional Studbook Wolverine (*Gulo gulo sp.*), Dec. 2014. Minnesota Zool. Gardens

Table 1. Development of captive wolverines in EEP/Eurasia in 2014. Legend to Table: 1.0 = 1 male, 0.1 = 1 female. New participants marked in *italics*

In EEP: Institution	Status 1.1. 2014	Born	To EEP	From EEP	To Non-EEP	From Non-EEP	Deaths	Status 1.1. 2015
Ahtari/FIN	3.1	0.2	2.0 Hanstedt	-	-	-	-	1.3
Bardu/N	1.1	-	-	-	-	-	1.1	-
Berlin TP/D	1.1	-	-	-	-	-	-	1.1
Borås/S	2.1	1.1	1.0 Columbus	-	-	-	-	-
	-	-	1.0 Hunnebostrand	1.0 Hunnebostrand	-	-	-	2.2
Brno/CZ	1.1	-	-	-	-	-	-	1.1
Burford/UK	1.2	-	0.1 Paris Zoo	-	-	-	-	1.1
Calviac/F	1.2	-	0.1 Columbus	-	-	-	1.0	0.1
Cezallier/F	1.1	-	-	-	-	-	-	1.1
Chomutov/CZ	0.1	-	-	-	-	-	-	0.1
<i>Columbus/USA</i>	-	-	-	0.1 Calviac	-	-	-	-
	-	-	-	1.0 Borås	-	-	-	-
	-	-	1.0 Saint Felicien	1.0 Kristiansand	-	-	-	1.1
Duisburg/D	1.1*	-	-	-	-	-	-	1.1
Eberswalde/D	1.1	-	-	-	-	-	-	1.1
<i>Hanstedt/D</i>	-	-	-	2.0 Ahtari	-	-	-	2.0
Helsinki/FIN	-	-	-	1.0 Kolmården	-	-	-	1.0
Hluboka/CZ	0.1	-	-	1.0 Moscow	-	-	-	1.1
Hunnebostrand/S	3.2	-	1.0 Borås	-	-	-	-	-
	-	-	1.0 Paris Zoo	1.0 Borås	-	-	-	2.2
Järvsö/S	3.2	-	-	-	-	-	-	3.2
Kerkrade/NL	1.1	-	-	-	-	-	-	1.1
Kinguisse/UK	1.1	-	-	-	-	-	0.1	1.0
Kolmården/S	2.1	-	1.0 Helsinki	-	-	-	-	1.1
Kristiansand/N	4.1	-	1.0 Columbus	-	-	-	-	3.1
Lycksele/S	1.2	-	-	1.0 Skåne	-	-	-	2.2
Minnesota/USA	1.1	-	-	-	-	-	-	1.1
Moscow/RUS	7.7	-	1.0 Nikolaev	-	-	-	-	-
	-	-	1.0 Hluboka	-	-	-	1.1**	4.6
Munich/D	1.1	-	-	-	-	-	-	1.1
Namsskogan/N	1.0	-	-	-	-	-	-	1.0

Nikolaev/UKR	0.1	-	-	1.0 Moscow	-	-	-	1.1
Novosibirsk/RUS	1.3	0.2	-	-	-	-	0.1	1.4
Opole/POL	1.1	-	-	-	-	-	-	1.1
Orsa/S	1.1	-	-	-	-	-	0.1**	1.0
Osnabruck/D	1.1	-	-	-	-	-	-	1.1
Paris Zoo/F	-	-	-	0.1 Burford 1.0 Hunnebostrand	-	-	-	1.1
Ranua/FIN	1.1	0.2	-	-	-	-	-	1.3
Salzburg/A	1.1	-	-	-	-	-	-	1.1
Skåne/S	2.1	1.1	1.0 Lycksele	-	-	-	-	2.2
Springe/D	1.1	-	-	-	-	-	-	1.1
Saint Felicien/CAN	-	-	-	1.0 Columbus	-	-	-	1.0
Stockholm/S	1.1	-	-	-	-	-	-	1.1
Szeged/HU	1.1	-	-	-	-	-	-	1.1
Usti/CZ	1.1	-	-	-	-	-	-	1.1
Whipsnade/UK	1.1	-	-	-	-	-	-	1.1
In EEP	51.48	2.8	12.2	12.2	-	-	3.5	50.51
(40 institutions)	(99)	(10)	(14)	(14)	(-)	(-)	(8)	(101)
* Earlier informed as 2.1								
** 0.1 escaped								
Non-EEP:								
Institution	Status 1.1.	Born	To EEP	From EEP	Till Non-EEP	To Non-EEP	Deaths	Status 1.1.
	2014							2015
Bielefeld/D	1.1	-	-	-	-	-	-	1.1
Fuerstenwalde/D	1.1	-	-	-	-	-	-	1.1
Izhevsk/RUS	1.1	-	-	-	-	-	-	1.1
Krasnoyarsk/RUS	0.1	-	-	-	-	-	-	0.1
Nizhny Novgorod/RUS	1.1	-	-	-	-	-	-	1.1
Sababurg/D	1.1	-	-	-	-	-	-	1.1
In Non-EEP:	5.6	-	-	-	-	-	-	5.6
(6 institutions)								

Table 2. Wolverine studbook data as of 1.1.2015 (Non-EEP animals included).

	Males	Females	Unknown	Total
Total registered	130	144	34	308
Total wild-caught	21	29	0	50
Total captive-born	109	115	34	258
Alive at 1.1.2015	55	57	0	112
Wild born	2	11	0	13
Captive born	53	46	0	99
Breeding animals				
Total number that have bred	45	49	0	94
Wild-born that have bred	10	14	0	24
Captive-born that have bred	35	35	0	70
Total breeding animals alive	15	17	0	32
Wild born	1	6	0	7
Captive born	14	11	0	25