

Development of the genetic relatedness in the Scandinavian wolf population after the Swedish quota hunts in 2010 and 2011.

An internal report to the Swedish Government

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The present Scandinavian wolf population was founded by three immigrating wolves between 1983 and 1991. By 2010 it had grown to approximately 270 wolves (Wabakken et al. 2010). In 2008 another two foreign dispersing wolves entered the breeding population increasing the number of founders to five. All breeding wolves in the population are DNA-typed, from samples of tissue (from retrieved dead wolves), blood (wolves anesthetized during research) and feces (found during snow tracking), and a complete pedigree has been constructed (Liberg et al. 2005). From this pedigree, inbreeding coefficients (F) and kinship coefficients (R) can be calculated.

To measure genetic effects of the quota hunt, introduced by the Swedish government in January 2010, and repeated in January 2011, we calculated mean kinship coefficients before and after the two hunts. Kinship coefficients are preferable to inbreeding coefficients when measuring genetic effects for the future (Mills 2007). We measured the change of kinship coefficients in two ways. In Figure 1 we show the development of mean kinship coefficients within single age classes, from the time of foundation of the population until breeding season 2010 (after the first quota hunt in January 2010). Before 2001 there were strong random fluctuations in kinship coefficients because number of animals in each age class was small. After 2001 the means coefficient stabilized around 0,60, but in 2008 it decreased slightly after the first breeding of the two immigrants. In 2010, after the first quota hunt, it decreased further, because now also offspring of the new immigrants had started to breed, and immigrants and their offspring were protected from hunting.

The second measurement of kinship coefficient change concerned all living wolves at the time of measurement (Table 1). Also here the coefficient has been falling after the two hunts, and the levels are very similar to the measurements built on single cohorts. It also turns out that kinship coefficients among the shot wolves have been higher than in the population.

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Conclusion

The two types of measurements gave very similar levels of kinship in the population and for both the mean kinship coefficient decreased after the quota hunting, but the differences were small. As the measurements are not samples, but measurements of the whole population it is neither possible nor meaningful to calculate statistical significance levels. There is thus a true reduction in mean kinship after the hunts, but it is small. However, we expect this reduction to continue, at least the next few years, even if also the hunting continues, on the condition that immigrants and their offspring also will continue to be protected. The reason is that more offspring from the two new immigrants, with their low kinship coefficients, will come into breeding. As they will be protected, they will get a wider representation in the population. There were three immigrant offspring breeding in 2010, and in the last winter another seven have formed pairs and are expected to have bred this spring. However, in a longer perspective, there will be needed more immigrants, otherwise the mean kinship and following inbreeding will start increasing again.

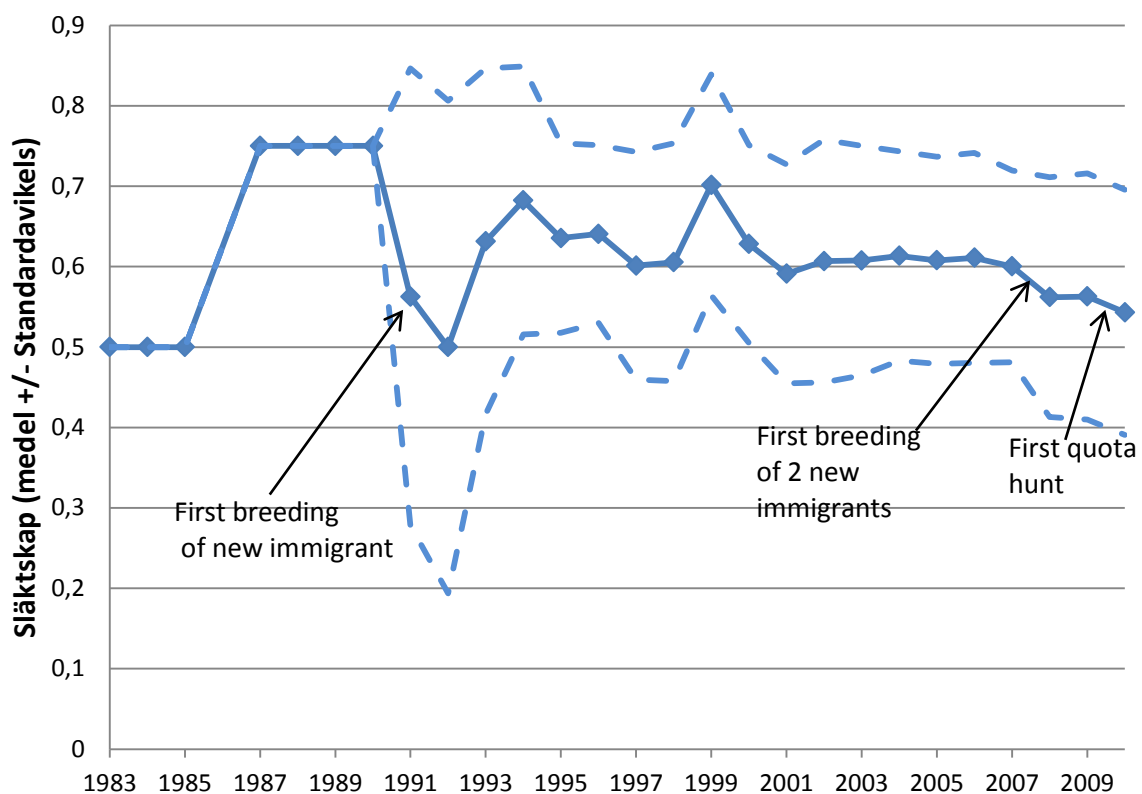


Figure 1. Development of the mean kinship coefficient within single cohorts (age classes). The birth years of each cohort are shown in the x-axis. The central bold line shows the mean coefficient, the stippled lines give the standard deviation. The first sharp decline in 1991 is caused by the third immigrant started to breeding. The strongly fluctuating pattern between 1993 and 2001 is mainly caused by random effects because during those early years there were rather few litters in each cohort (1-5).

Table 1. Mean kinship coefficient (R) in the entire living population at three times, and among the shot animals in the quota hunts in 2010 and 2011.

	31st Dec 2009	Quota hunt Jan 2010	31st Dec 2010	Quota hunt Jan 2011	1st Feb 2011
Mean R in population	0,540		0,529		0,527
Mean R among shot wolves		0,563		0,561	

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