WILD's Black-footed Ferret Background

The black-footed ferret, once thought to be extinct, is now being reintroduced to its natural habitat on the North American plains after an incredible intervention by scientists. Few species have edged so close to extinction as the black-footed ferret and recovered, but through **captive breeding** and **reintroduction**, the species is slowly recovering.

Genetic diversity, the variety of *genetic* differences within a species, is one component of **biodiversity**. Living things contain **genes** in their cells, which are the basic instructions for their physical and behavioral traits. **Genetic diversity** is the variety of heritable characteristics present in a population of the same species. It serves an important role in species survival. For a species to adapt to ever-changing circumstances in their environment, a significant level of genetic variation must be present.

One could say that genetic diversity is a measure of the possible choices of information provided by a gene. For example, a particular gene may determine the color of an animal's fur. Different choices may exist for that gene (i.e. black fur, white fur, brown fur). In each case, the same gene determines fur color. When all or nearly all the members of a population have the same choice of a gene, that population is said to have low genetic diversity at that gene. If many variants exist for a gene, that population has high genetic diversity at that gene. Variety is important. A white-furred animal may be more visible to predators in a dark environment and less likely to survive than a brown or black-furred animal.

If genetic diversity becomes low in a species, that species is increasingly at risk of extinction. It has only one possible choice of information at all or nearly all of its genes -- in other words, all the individuals are nearly identical. If new pressures (such as changes in the environment) occur, a population with high genetic diversity has a greater chance of having some individuals with a genetic makeup that allows them to survive. However, if genetic diversity is very low, the individuals in a population may not have the characteristics needed to cope with the new environmental conditions. Such a population could be wiped out.

Population bottlenecks occur when a population's size is reduced for at least one generation. When the number of individuals in a population decreases, the variety of genes also decreases. Black-footed ferrets are an extreme example of a population bottleneck. Only 18 animals remained when the captive breeding program began. There were 11 males and seven females. To minimize any additional loss of genetic diversity, the captive breeding program for black-footed ferrets has a Species Survival Plan® or SSP®.

The Species Survival Plan® (SSP®) program was developed in 1981 by the Association of Zoos and Aquariums to help ensure the survival of species in zoos, aquariums, and other captive breeding facilities. SSP® programs are developed for animals that are in danger of extinction in the

wild when conservationists believe captive breeding programs may be their only chance to survive. SSP® programs identify population management goals and recommendations to maintain or increase a healthy, genetically diverse, and demographically stable population. A genetically healthy and diverse population has a greater chance of survival in the wild.

The black-footed ferret SSP® has been highly successful. The black- footed ferret captive program maintains a core breeding population of at least 270 adults (90 males, 180 females). Captive breeding populations are currently housed at six locations across the United States and Canada. A studbook, or pedigree record, is maintained for all the animals in the captive breeding program to minimize genetic loss.

Because there were so few animals, frozen semen is stored at the National Zoo's Smithsonian Conservation Biology Institute Black-footed Ferret Genome Resource Bank. In species that have short life spans like the black-footed ferret, the use of cryopreserved, or frozen, sperm extends an individual's reproductive life. The bank's contents help ensure that these males can be represented in future generations. The bank also serves as insurance against catastrophes in the wild populations, such as a disease outbreak.

Through the implementation of the Black-footed Ferret SSP®, captive propagation has been able to maintain 87 percent of the genetic diversity of the Meeteetsee, Wyoming population. Since 1986, more than 7,000 ferret kits have been produced in captivity and over 2,600 kits have been released into the wild. The Black-footed Ferret SSP® has been highly successful. There were 310 kits born in the program in 2010 and the current wild black-footed ferret population is estimated to be around 1,000. Information about kits born and ferrets released each year is listed on www.blackfootedferret.org.