

# Rhino genome results: Frozen Zoo collection has same diversity as living population

January 26 2017

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Genetic Resources Banked in the Frozen Zoo Hold Key to Recovery for Critically Endangered Northern White Rhinoceros

A study by San Diego Zoo Global reveals that the prospects for recovery of the critically endangered northern white rhinoceros—of which only three individuals remain—will reside with the genetic resources that have been banked at San Diego Zoo Global's Frozen Zoo. Frozen cell cultures housed here from nine northern [white rhinos](#) contain genetic variation that is missing in surviving individuals of this subspecies of rhinoceros, which is now extinct in the wild.

Tate Tunstall, Ph.D., a postdoctoral fellow at the San Diego Zoo Institute for Conservation Research—home to the Frozen Zoo—presented new genomic data at the Plant and Animal Genome Meeting (PAG XXV) in San Diego on Jan. 17, 2017, to evaluate the extent of genetic diversity in the Frozen Zoo cell cultures with that of the related subspecies, the southern white rhinoceros.

"It would appear that the levels of genetic diversity of the northern white rhinoceros population represented by the viable cells banked in the Frozen Zoo is comparable to that of the southern white rhinoceros, which was able to recover from a severe genetic bottleneck," stated Tunstall.

Tunstall presented the complete genome sequences of four southern white rhinos and nine northern white rhinos. Genome-wide levels of

genetic diversity and inbreeding in both southern and northern white rhinos were examined, in the hope of aiding future efforts toward [genetic](#) rescue and assisted reproduction. The recent population history and demography of these two white rhino populations also were examined, and potential regions under selection were identified in the northern white rhino suggesting local adaptation in this population. This may be the first example of a prospective analysis to determine whether sufficient [genetic diversity](#) exists for population recovery of any endangered animal. The southern white rhino experienced a severe population decline due to overhunting in the early years of the 20th century. Through careful conservation management, the subspecies recovered from a low of an estimated 30 to 100 individuals to a population in excess of 18,000 individuals.

Of the five recognized rhinoceros species, the northern white rhino, the Javan rhino and the Sumatran rhino are listed as critically endangered; the black rhino is listed as vulnerable; and only one—the southern white rhino—is listed as near threatened on the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species.

Provided by Zoological Society of San Diego

Citation: Rhino genome results: Frozen Zoo collection has same diversity as living population (2017, January 26) retrieved 26 April 2024 from <https://phys.org/news/2017-01-rhino-genome-results-frozen-zoo.html>

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