

Amur tigers on 'genetic brink'

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The world's largest cat, the Amur tiger, is down to an effective wild population of fewer than 35 individuals, new research has found.

Although up to 500 of the big cats actually survive in the wild, the effective population is a measure of their genetic diversity.

That in turn is a good predictor of the Amur tiger's chances of survival.

The results come from the most complete genetic survey yet of wild Amur tigers, the rarest subspecies of tiger.

At the start of the 20th Century, nine subspecies of tiger existed, with a total world population of more than 100,000 individuals.

Human impacts have since caused the extinction of three subspecies, the Javan tiger, Bali tiger and Caspian tiger, and world tiger numbers could now have fallen to fewer than 3000.

The Amur tiger, or Siberian tiger as it is also known, is the largest subspecies which once lived across a large portion of northern China, the Korean peninsula, and the southernmost regions of far east Russia. The Amur tiger most likely derived from the Caspian tiger, recent research has shown.

What is remarkable about the Amur tiger is how much lower the effective population size is than the census size

Biologist Michael Russello

During the early 20th century, the Amur tiger too was almost driven to extinction, as expanding human settlements, habitat loss and poaching wiped out this biggest of cats from over 90% of its range.

By the 1940s just 20 to 30 individuals survived in the wild.

Since then, a ban on hunting and a remarkable conservation effort have slowly helped the Amur tiger recover. Today, up to 500 are thought to survive in the wild, while 421 cats are kept in captivity.

However, the genetic health of the tiger hasn't improved, according to a new analysis published in Molecular Ecology.

Little variation

Michael Russello and Philippe Henry of the University of British Columbia, in Kelowna, Canada led a team drawn from universities in Canada, Japan and the US in a bid to analyse the genetic profiles of the remaining wild Amur tigers.

They sampled nuclear DNA found within the scat samples of an estimated 95 individuals found throughout the Amur tiger's range, likely constituting up to 20% of the remaining population.

The study sampled the amount of variation within the DNA from more tigers, across a broader geographic, than any previous research.

"Although the census population size of Amur tigers is closer to 500 individuals, the population is behaving as if it were the size of 27 to 35 individuals," says Russello.

That's the lowest genetic diversity ever recorded for a population of wild tigers.

The effective population of any group of animals will be lower than the number that actually exist, due to factors such as non-breeding individuals or a skewed sex ratio.

"However, what is remarkable about the Amur tiger is how much lower the effective population size is than the census size," says Russello.

Population split

Another important finding to emerge from the study is that the remaining Amur tigers are segregated into two populations that rarely intermingle.

The majority of Amur tigers live among the slopes of the Russian Sikhote-Alin Mountains, with 20 or fewer living separately in Southwest Primorye in Russia.

The two groups are separated by a corridor of development between Vladivostok and Ussurisk, and the genetic analysis showed that perhaps just three tigers had managed to cross the divide, reducing the effective size of the wild population further.

"There is little sharing of genes across the development corridor, suggesting that these two populations are fairly discrete," says Russello.

"In actuality, it seems that Amur tigers are residing in two, fairly independent populations on either side of the development corridor between Vladivostok and Ussurisk, further lowering the effective size for each from 26 to 28 for Sikhote-Alin and 2.8 to 11 for Southwest Primorye."

That means more work needs to be done to open up this barrier segregating the tigers.

If that doesn't happen, then it's likely that the Southwest Primorye population will continue to dwindle. That could also kill off the prospect of reintroducing Amur tigers to China, as those in Southwest Primorye are living closest to their former Chinese range.

Captive resource

The news is not all bad for the Amur tiger, however.

Russello and Henry's team also analysed the nuclear and mitochondrial DNA of 20 captive Amur tigers, to see if they retained any unique genetic features since lost by the wild tigers.

"There are gene variants found in captivity that no longer persist in the wild," says Russello, which suggests that the captive program has done a good job of preserving the genetic diversity of the subspecies.

"Now that it is known which individuals possess which gene variants, managers will be able to selectively breed to help preserve the unique and rare gene variants," says Russello.

"The implication is that this variation may be used to re-infuse the wild population sometime in the future if reintroduction strategies are deemed warranted."

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