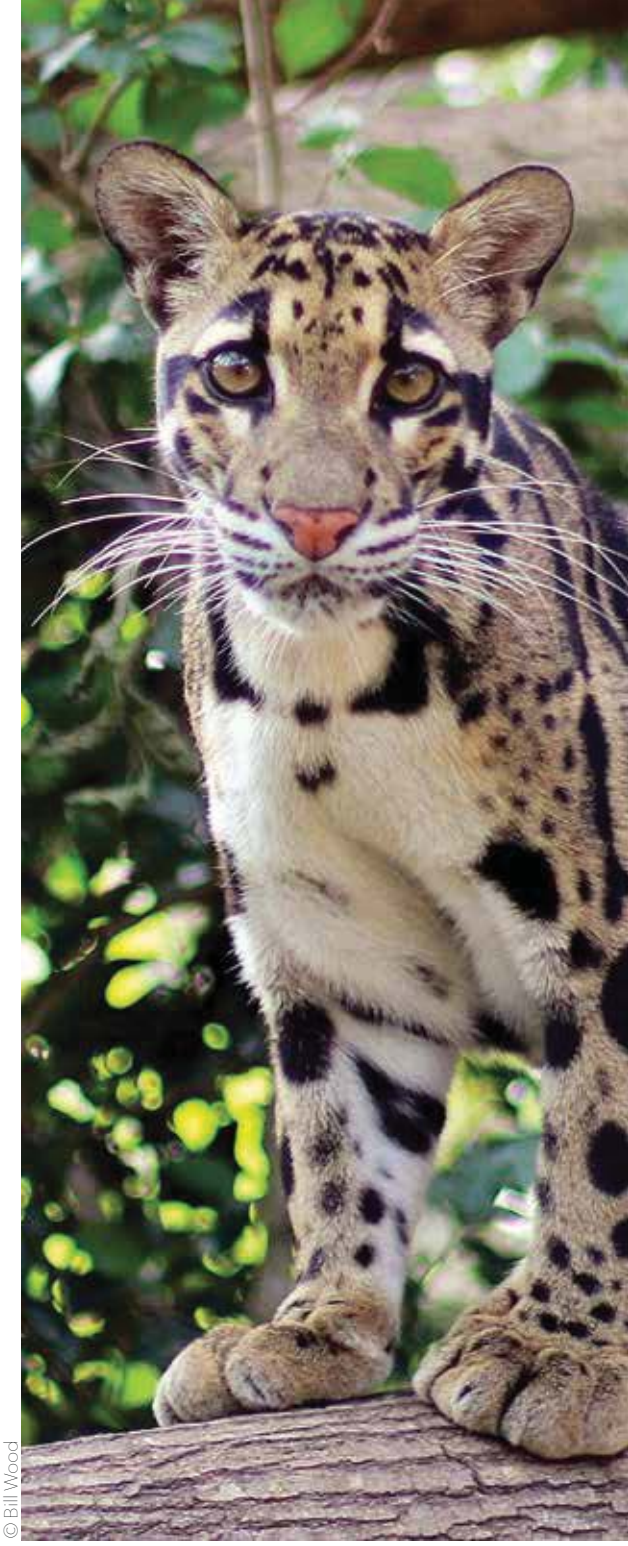
CLOUDED LEOPARD

COMING BACK

BY CATHIE GANDEL

It's two o'clock in the morning

in Thailand and just outside the Khao Kheow Open Zoo in Chonburi about 55 miles from Bangkok, Bill Wood and Pichat Mareepitak are sitting silently in the dark. They are monitoring CCTV cameras trained on an enclosure housing a pair of clouded leopards. The male, PiPi, a rescued wild cat is being introduced to his date, Pai, a "local" girl, hand-reared at Khao Kheow. Wood and Mareepitak hope the animals will mate, but so far all is quiet inside the tall, heavily wooded enclosure. In fact, PiPi hasn't even come down from his nest board. And there is a lot riding on his sex life. As a rescued wild cat, his genes can help revive a species that is extremely elusive in the wild and has had rare and sporadic success with breeding in managed care.



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The two men are part of the Clouded Leopard Consortium (CLC), a partnership of the Thailand Zoological Parks Organization (ZPO); the Khao Kheow Open Zoo; the Nashville Zoo in Nashville, Tenn.; the Smithsonian National Zoo in Washington, D.C.; the Smithsonian Conservation Biology Institute in Front Royal, Va.; the Point Defiance Zoo & Aquarium in Tacoma, Wash.; and the Clouded Leopard Species Survival Plan®.

As project manager and lead keeper respectively, Wood and Mareepitak work with other team members to carry out the CLC's mission. The Consortium was founded in 2002 as a way to produce unrelated offspring to ensure a sustainable population in managed care. "Back in the nineties, there was such extensive inbreeding that literally every cat was related to each other," said Rick Schwartz, president and chief executive officer of the Nashville Zoo and one of the original organizers of the Consortium. And there was high rate of cub mortality.

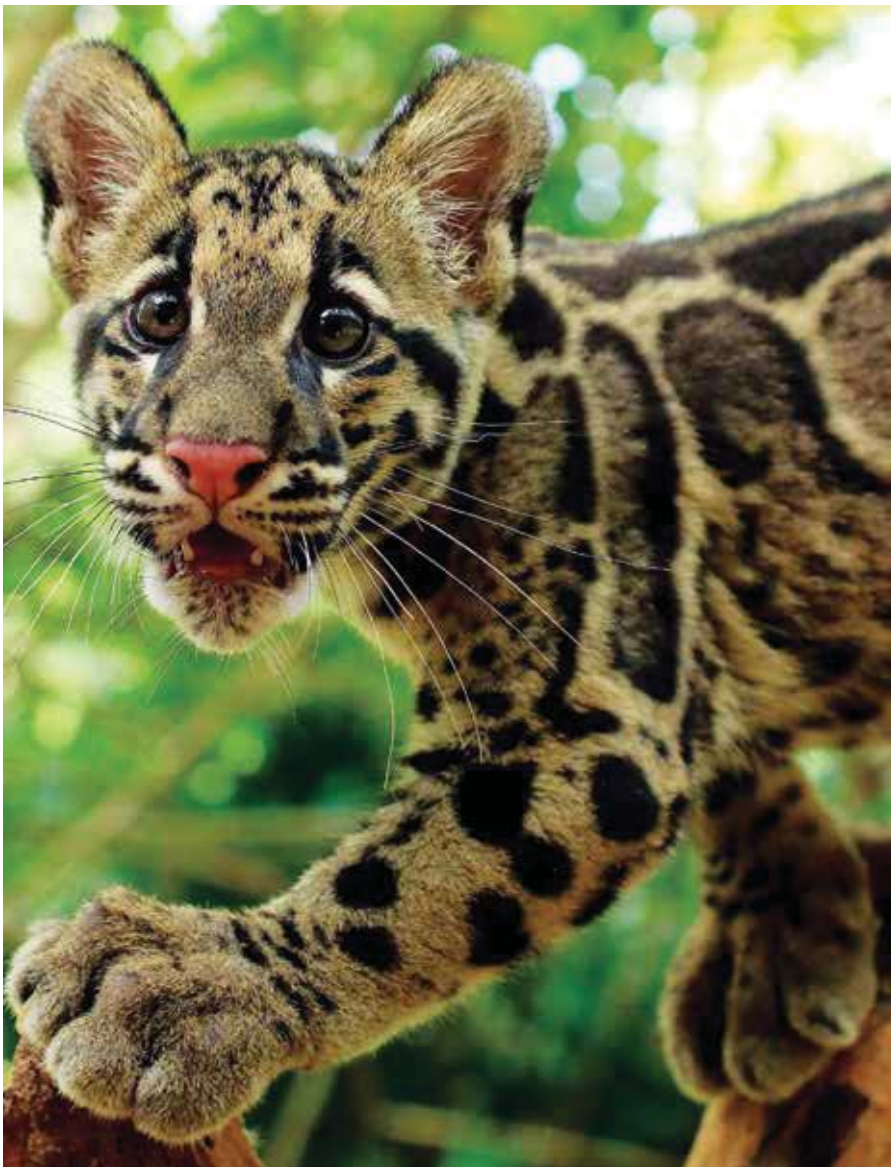
The situation in the wild wasn't much better. The *in situ* clouded leopard population—whose range extends from Nepal to Borneo in Southern Asia—was deteriorating, largely due to poaching and loss of habitat. It is considered a vulnerable and endangered species. Because of this, the U.S. Fish and Wildlife Service (USFWS) would not allow imports. Cubs bred in managed care were the solution, but "the whole premise behind creating the Consortium was that there was no facility in range countries producing *ex situ* bred offspring," said Schwartz.

To halt the inbreeding, a moratorium was placed on natural breeding in the 1990s, so scientists and researchers turned to artificial insemination (AI). Much of the reproductive success today stems from the work the late Dr. JoGayle Howard did in the 1990s. Howard, a world-renowned scientist at the Smithsonian National Zoo and dedicated to studying the clouded leopard, was the first person to do a successful AI on a clouded leopard at the Nashville Zoo in 1992. "Then for 23 years, despite numerous attempts, no successful births occurred," said Schwartz. Finally in 2015, two cubs were born at the Khao Kheow Zoo. In March 2017, another giant step thanks to a collaboration between the Nashville Zoo and the Smithsonian National Zoo and Conservation Biology Institute: the first birth of a clouded leopard cub came from AI using frozen-thawed sperm.

When Schwartz and Howard discovered the Khao Kheow Open Zoo in 2002 they hit the jackpot. Khao Kheow is one of five major zoos in Thailand, and all of them had clouded leopards. With the support of the Thai government, representatives from the Consortium visited the zoos, evaluated the cats and brought the best back to Khao Kheow for breeding. Some of these cats were successfully mated, and the cubs were hand-reared. "We've learned that if you raise pairs from different blood lines born about the same time together, they often if not almost always make a very good pair," said Wood. But the cubs need to be paired as soon as possible. "Ideally before six months," he said. This mitigates the potential for violence between males and females. It

also protects cubs from females that may be aggressive toward their offspring. First-time mothers often don't rear their cubs successfully. In fact they have been known to kill and eat their young. "The survival rates are often higher with this species when they are hand reared plus unrelated litters can be raised together to produce viable pairs," said Wood.

On 26 January 2005, four clouded leopards imported from Thailand provided the first new founder genes in 27 years. "We have been able to reduce our Mean Kinship," said Jilian Fazio, Clouded Leopard SSP coordinator and international studbook keeper at Smithsonian's National Zoological Park and Conservation Biology Institute. Before the CLC, the average Mean Kinship—how the population is related to itself—was 0.2438. In 2017 it was 0.1243. To date four pairs have been sent to the three Consortium members. All of the pairs sent to Nashville have successfully mated. "We've locked down the method and methodology and now it's a matter of genetic diversity," said Schwartz.



"Khao Kheow Open Zoo is the breeding center of the Consortium. It has produced over 50 cubs ... Many of the cubs have been imported to the U.S. to bolster genetics of the population here."

Can the CLC be a model for other species? Yes, said Schwartz, "provided certain elements are in place." One of these is a Memorandum of Understanding spelling out the responsibilities of each member of the partnership. Khao Kheow Open Zoo is the breeding center of the Consortium. It has produced over 50 cubs in the last decades, noted Janine Brown, reproductive physiologist and head of the endocrinology laboratory at the Smithsonian Conservation Biology Institute. Many of the cubs have been imported to the U.S. to bolster genetics of the population here.

Funding and staffing are provided by the Nashville Zoo, the Smithsonian National Zoological Park, and the Point Defiance Zoo & Aquarium. The Consortium is staffed by a full time project manager and four local keepers. "At no point has there been no involvement from the AZA facilities," said Fazio and part of that involvement includes training the local staff. Wood noted that "We've got a nice little crew here that really knows the cats well, particularly the two lead keepers."

Expenses are roughly $100,000 a year and include food, supplements, repairing enclosures, the salary of the on-site manager, and partial salaries for local Thai keepers. "In addition to direct financial support, supplemental staffing is another resource provided by the three AZA-affiliated institutions," said Fazio. That means sending a temporary replacement when the project manager is on home leave.

Additional funding has come from facilities both inside and outside the AZA circle that have received pairs of clouded leopards from the Consortium. "We need current and new institutions to increase available spaces, as well as funding from all the clouded leopard facilities to maintain this enormous conservation effort," said Fazio. The Consortium also needs facilities to take on non-breeding individuals to raise awareness for the species.

"What makes this work so well is that we are a partnership, built on long-standing relationships," said Dr. Karen Goodrowe-Beck, general curator at the Point Defiance Zoo & Aquarium. "I think one of the most important things is that we have the Thai side," said Wood. Schwartz agreed: "Quite honestly, with all these critically endangered species, you just can't obtain any founder animals unless you have partners in their indigenous countries," he said. This is a good model, said Fazio, "If there are dedicated institutions willing to collaborate and establish a relationship with a range country where there is greater access to genetically valuable individuals."

Importing animals from the range country depends on completing paperwork and being granted permits, plus having space for the new animals. The paperwork problem may be solved in the future. The Consortium has applied for a multiple entry permit from the USFWS, said Goodrowe-Beck. "If approved, this will allow us to import pairs of cubs more easily from Thailand," she said. "It involves a lot of legwork up front and very committed institutions," she said," but it eases the process and we should be able to import a certain number of animals."

Other species may not face as difficult an import process, said Fazio. "Clouded

leopards are a tricky species," she said. "They are sensitive to transfer and need to be paired at a young age." But if a source population of another felid species is established in a range country, imports might be more flexible. "Other species would not necessarily be time-restricted by age and need not be imported in pairs," she said.

Khao Kheow now has 42 clouded leopards in total (16 males and 26 females), but for all its success, the CLC isn't standing still. "We are not ready to start reintroductions in any way," said Brown, "but we would like to have this as an option for the future." And the Zoo still houses what Wood called "genetic powerhouses." "There are still a large number of paired and genetically valuable clouded leopards in Thailand, as well as cats yet to be paired," he said. Plus hand-rearing is labor intensive, and members of the Consortium are looking at other options, like finding females who are better candidates to raise cubs on their own or raising cubs in a joint effort between the mother and humans.

"We're looking for the best of all possible worlds," said Goodrowe-Beck.

Cathie Gandel is a writer based in Bridgehampton, N.Y.