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THE POWER OF PARKS

Pandas Get to Know Their Wild Side

The Chinese know how to breed the popular bears. Now they're releasing them into the wild, where the animals and their habitat face risks.

Ye Ye, a 16-year-old giant panda, lounges in a wild enclosure at a conservation center in Wolong Nature Reserve. Her name, whose characters represent Japan and China, celebrates the friendship between the two nations. Ye Ye's cub Hua Yan (Pretty Girl) is being trained for release into the wild.

By **Jennifer S. Holland**
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Tune in to *Panda Babies: Mission Critical* on August 28 at 8 p.m. ET on Nat Geo WILD to follow their development at three breeding centers.

I crouch down low in the grass to get a closer look at the animal lurching toward me. She's about four months old, the size of a soccer ball, slightly bug-eyed, and no doubt soft and fragrant as a puppy. The urge to scoop her up and squeeze her is overwhelming.

That adorability is one reason the giant panda is an international sensation as well as a cultural icon, an economic gold mine, and a source of national pride in China—the only country in which these Asian bears still survive. Now the whole world is watching China's dogged attempt to keep pandas on the map—which in some ways has been an unprecedented success.

Like many endangered species, giant pandas have declined as a growing human population has grabbed wild lands for human uses. That problem hasn't gone away since the species was labeled endangered in 1990. But the Chinese have spent the past quarter century perfecting breeding methods and building a captive population hundreds strong—and leveraging it to bring in millions of tourist dollars.

It's one thing to raise animals in captivity before adoring crowds and another to ensure a species' survival in nature. Whatever comes next in this bear's conservation may decide whether the giant panda becomes a relic behind bars or roams free in the wild.

Zhang Hemin—“Papa Panda” to his staff—poses with cubs born in 2015 at Bifengxia Panda Base. “Some local people say giant pandas have magic powers,” says Zhang, who directs many of China’s panda conservation efforts. “To me, they simply represent beauty and peace.”

Giant pandas are masters of adaptation. “We humans are used to changing the environment to suit our needs,” says Zhang Hemin, director of the China Conservation and Research Center for the Giant Panda, which oversees three panda bases: Bifengxia, Dujiangyan, and Wolong. “The difference is that pandas changed themselves to suit the environment.”

Time and necessity have fine-tuned pandas to thrive in a very specific habitat. Still built like their carnivorous kin, these bears—and they are true bears, according to their DNA—have the canine teeth to tear flesh and the enzymes to digest meat. Because of gaps in the fossil record, exactly when

they diverged from other bears isn't clear. A jaw from Spain puts an early panda relative at 11.6 million years old, while DNA evidence suggests 18 million. And bones from a cave in China indicate giant pandas as we know them are at least two million years old.

The exact timing and reason for pandas going vegetarian is debated, but those eons of adaptations leave modern pandas with some unique tools, including flat molars for crushing and a thumblike appendage, an extension of the wrist bone, helpful for handling bamboo. Interestingly, they lack any special gut microbes to break down the bamboo that has become 99 percent of their food—one reason they are relatively low-energy animals. To derive enough nutrients, pandas eat 20 to 40 pounds of plant material a day.

Is a panda cub fooled by a panda suit? That's the hope at Wolong's Hetaoping center, where captive-bred bears training for life in the wild are kept relatively sheltered from

human contact, even during a rare hands-on checkup.

To satisfy their love for particular flora that grows best beneath big, old trees with hidey-holes for stashing cubs, pandas can't live just anywhere. But that specialization is now working against them. The species used to range across southern and eastern China and northern Myanmar and Vietnam. Now they're found in patchy mountain habitat only in China, in perhaps one percent of their historic range.

How many wild pandas are out there? Researchers have been trying to count them since the 1970s, when it is thought there were roughly 2,500 animals. That dropped dramatically in the 1980s, in part because of a periodic natural die-off of bamboo. (Normally pandas can survive such natural ecological events by shifting to more fruitful habitat, but if there's nowhere to move, they'll starve.)

The Chinese government's most recent survey, from 2014, reported 1,864 in the wild, 17 percent more than in 2003. But Marc Brody, a National Geographic grantee who founded the conservation nonprofit Panda Mountain, warns that it's tough to trust any specific figures. "We may just be getting better at counting pandas," he says. Also, it's difficult to compare numbers across the decades because ranges and survey methods have varied; today they include DNA analysis of panda poo.

At Bifengxia, bears mate under keepers' watch—a far cry from the privacy they have in the wild. The panda base's operators are finding ways to allow for natural reproductive behaviors such as scent marking, mate choice, and male competition.

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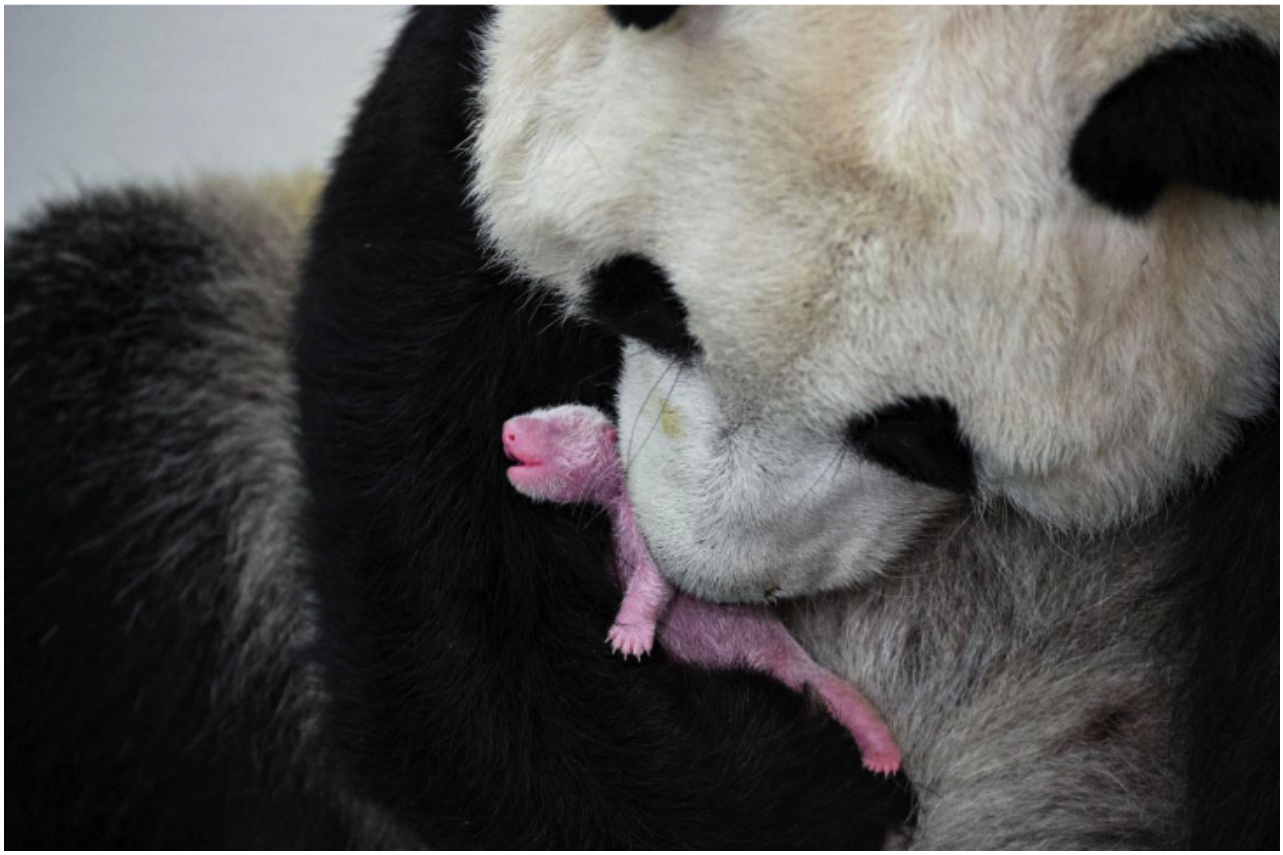
>
> **William McShea** | Smithsonian ecologist

In the meantime, the Chinese are furiously breeding their iconic bear in captivity. The early years (until the late 1990s) saw a lot of failed attempts, both at breeding and at keeping cubs alive. And genetic diversity—which supports helpful adaptations and can protect a population from extinction—was a low priority.

With assistance from abroad, the Chinese turned things around. David Wildt, of the Smithsonian's Conservation Biology Institute, was part of the

international team that first worked with Chinese scientists on panda biology and husbandry. “Pretty soon they had piles of baby pandas,” he says. “In a sense we trained ourselves right out of a job.” Now “pandas are one of the most genetically diverse animals in captivity,” says Wildt’s colleague, geneticist Jonathan Ballou, who developed the algorithm that the Chinese now apply to breeding decisions.



Blind, nearly hairless, squeaky, and 1/900 the size of its mother, a newborn panda is as needy as it gets. But it won’t be for long: The panda is among the fastest growing mammals, increasing from around four ounces to four pounds in its first month.

Three-month-old cubs nap in the panda nursery at Bifengxia. A panda mother that bears twins usually fails to give them equal attention. Keepers reduce the load by regularly swapping cubs in and out—making sure each gets both human and panda-mom care.

Much of the action happens at Bifengxia Panda Base, or BFX, where I had my close-up with cubs. Visitors here can see adult bears in outdoor yards—hunched over broad bellies, chomping messily on long bamboo stalks from enormous piles delivered several times a day.

Up a hill from these exhibits lies the staff-only building where bears in the breeding program reside. Enclosures are concrete with iron-barred doors; each opens to an outdoor pen. Typically there is a female panda in each, eating or sleeping, sometimes with a cub in her arms.

“Even after many years, whenever a panda is pregnant or gives birth here, everyone is so joyful and excited,” Zhang Xin, a rather bearlike veteran keeper, told me. “We look every day at the adults, the babies, how much they are eating, what their poo looks like, if their spirit is good. We just want them to be healthy.”

In this setting, little about panda production is natural. Dropping a male in with a female can even lead to aggression instead of mating. To set the mood, breeders in China have tried “panda porn”—videos of pandas mating—mostly for the encouraging sounds; apples on sticks to tempt males into mounting position; Chinese herbs; and even Viagra and sex toys. Director Zhang Hemin, also known as Papa Panda, recalls an awkward shopping trip to an “adult toy store” in Chengdu. “We told the clerk we needed a female-genital stimulator that had to warm up,” he told me. “Then I had to ask for a receipt to submit to the government for reimbursement.”

Now protocol includes artificial insemination, sometimes with sperm from two males. Part of the challenge is that female pandas are in estrus just once a year for only 24 to 72 hours. Endocrinologists monitor hormones in the urine that can predict ovulation and may inseminate several times within a day or two to boost the chances of implantation.

Then, for months, females keep the keepers guessing. “It’s hard to even know if a panda is pregnant,” says BFX’s director, Zhang Guiquan. “The fetus is so tiny that it’s easy to miss on an ultrasound.” Pandas can have delayed implantation, extremely varied gestation times, random hormone fluctuations, and quiet miscarriages.

This massive captive-breed[redacted]ight suggest that pandas are simply sexually inept. Not so. For millions of years wild bears have done the deed without human intervention, based on natural cycles, scent marking,

mating calls, and complex social relationships that are mostly missing in captivity.

The artificialness of this and other aspects of their lives worries Sarah Bexell of the University of Denver, who worked at another panda breeding center for years: “Bears are so stoic, especially pandas. You really have to freak them out to get a reaction that we’d perceive as stress.” They learn to cope and may seem relaxed, she says, “but if we could sit down and interview them, we’d hear something very different.” Smithsonian ecologist William McShea adds: “What we are asking them to do—basically have sex in a phone booth with a crowd of people watching—has little to do with real panda reproduction.”

Still, the Chinese are getting big results. In 2015, 38 cubs were born in China. (BFX produced 18 of them—its highest number yet.) In the panda kindergarten building at the center of BFX is the immaculate incubator room, where the cubs, when not with mama or a surrogate mother bear, get 24/7 human care. Separating mothers and babies is controversial, but it boosts cub survival when staff can place a weaker or rejected infant with an attentive surrogate.

Visitors outside press their noses and cameras against the incubator room window, *oohing* and *aahing* over five fluff balls in baskets on the floor. Some of the cubs are napping; others are wide-eyed and wiggly, squeaking like dog toys.

Liu Juan, petite and shy behind square-rimmed glasses, is working a 24-hour shift, her second one that week. She has a toddler son who stays at

home with family. “This job is more intense,” she says of mothering the pandas, “but I love being with them.”

Incubating the newborns, bottle-feeding, rocking, burping, responding to their bleats for attention, rubbing bellies to stimulate the gut, weighing and measuring, and keeping toddlers from wandering—“the work is nonstop, a crazy amount,” she says. Her puffy orange slippers *shush* across the floor as she chases an escapee. “My body never recovers. I’ve lost hair from being under so much stress.” There is massive pressure, she says, to keep the cubs alive: “They are so important to China.”

Camouflaged by a bamboo thicket, a [redacted]will spend much of the day surrounded by and munching on its fa[redacted] Bifengxia. Pandas used to eat both meat and plants. At least two million years ago, their diet shifted to bamboo.

Most pandas at BFX will spend their lives in captivity, in China or in zoos abroad. But elsewhere in Sichuan Province, researchers have a much wilder future in mind for baby bears.

Hetaoping, the older panda base within Wolong Nature Reserve, is a series of stone and concrete buildings socked into a valley of the Qionglai Shan mountains. In the late 1970s the Chinese set up a field station on the forested slopes here and, since 1980, have been working with the WWF, the first Western organization to cooperate on pandas with the Chinese government. WWF sent renowned biologist George Schaller to conduct research that became the basis for what we know of pandas today.

Papa Panda—so nicknamed because bears in labor at the centers seem to hold off giving birth until Zhang arrives and because of his devotion to the animals—worked with Schaller in the field. “It was then that I learned to deeply love the panda,” he told me, patting his heart. He had a favorite bear then, a curious female who mangled his teakettle and stole his food one snowy night before taking over his tent. “She wouldn’t go away. She used it for months, coming back each night, leaving me gifts of feces in my bed.”

At the Hetaoping panda center, bears being trained to live in the wild mustn't get used to seeing humans. Even the caretakers who clean the animals' cages wear costumes that make them look (and smell) like pandas.

These days, select cubs are trained for life in the wild at Hetaoping. Keepers wear full-body panda costumes scented with panda urine so that young bears don't get used to humans. A cub here remains with its mother, and over two years, while in her care, he or she is eased toward wildness. After a year or so, the pair is moved to a large, fenced-in habitat up the mountain where the mother can continue coaching her offspring until the youngster is released—if deemed fit for freedom. To qualify, Zhang explained, a young panda must be independent; wary of other animals, including humans; and capable of finding food and shelter unaided. Not all are.

Adequate habitat for the bears' release is also a concern. Since the 1970s the Chinese have gone from 12 panda reserves to 67, making the bears, on paper, the most protected animal on the planet. But many of these reserves are very small, populated by villagers, and cut up by roads, farms, and other human constructions. More than a third of wild pandas live or venture beyond reserves' invisible boundaries anyway, says the Smithsonian's McShea, where habitat may be marginal. Because of the emphasis on regional economic development, "officials may say yes to hydroelectric dams, highways, and mining operations" inside panda habitat with no thought of long-term effects, he says.

Left: Although giant pandas spend most of the day eating and sleeping, they love to climb and play. Here a year-old cub explores the treetops in a Wolong enclosure; if it passes tests to gauge its survival skills and instincts, it may be released into the mountains. Right: Wolong Reserve keepers transport Hua Jiao (Delicate Beauty) for a health check before she finishes "wild training." The habitat also protects red pandas, pheasant, tufted deer, and other species that benefit from giant panda conservation.

On a positive note, "poaching isn't a problem here: Nobody is touching pandas," McShea says. "They're the third rail for poachers." (Hunting pandas was legal in China until the 1960s; now killing one could mean 20 years in prison.)

Other troubles remain, such as livestock grazing in panda habitat. "Horses and pandas both like gentle slopes and bamboo forests; horses also eat bamboo. So the impact of horses on panda conservation is significant," says China West Normal University's Zhang Jindong, who does research in Wolong. In 2012 the local government ordered horses removed from the forests and urged people "to raise yaks and other animals instead," he says. But those animals' presence also spurs pandas to move, he says—"and where can they go?"

A massive earthquake in 2008 killed tens of thousands of people and turned mountain homes to waste. The disaster, which destroyed part of Hetaoping, gave the government fodder to persuade villagers living in bear habitat to move. Officials built a series of lowland villages to house many of the displaced and declared a victory for panda conservation.

Gao Xiaowen poses with the stuffed leopard that Wolong keepers use to train young pandas to fear their biggest wild foe. A cub's reactions to the "predator" and its recorded growls help determine if the bear is prepared to survive on its own.

Some villagers have found work building a new highway that tunnels through mountains between Chengdu and Wolong. Others who gave up their fields and livestock remain jobless. Some refuse to let go of their old life. Li Shufang, a 75-year-old woman I visited in the simple home she shares with relatives, walks several hours a day, up and down the mountain, to tend to pigs and a garden where the family lived before the quake. When I asked how she felt about making way for pandas, she spat back in a local dialect, "Why didn't they move the pandas instead?"

Others I met seemed more content with the "easier" life in the village, though few are currently benefiting directly from pandamania. With a new panda breeding and education center called Gengda in Wolong, "perhaps when the road is complete and tourists start coming, we will make money and feel better about pandas being so important to the government," said a local man. "Right now, to me, a panda is just a bear, nothing special."

To turn the reclaimed land into bear habitat, locals are hired to plant seedlings where forests were diminished by logging or quake damage. The Chinese have focused on quick-growing tree species, whose roots inhibit erosion. But those species don't make good panda habitat: The most nutritious bamboos grow in the understory of old-growth forests, which take decades to mature. The mountainous terrain makes it hard to plant on a large scale—so the landscape remains fragmented, which means the panda populations do too.

In a large forested enclosure of the Wolong Reserve, panda keepers Ma Li and Liu Xiaoqiang listen for radio signals from a collared panda training to be released to the wild. Tracking can tell them how the cub is faring in the rougher terrain up the mountain.

Barney Long, director of species conservation at Global Wildlife Conservation, says that only nine of some 33 panda subpopulations "are really viable," with enough animals to persist long term. Climate change is bound to make this worse: Scientific models warn that in the next 70 years, warming could reduce the remaining giant panda habitat by nearly 60 percent. At least for now, rebuilding, connecting, and protecting habitat may be the best focus for panda conservation. More important than sheer numbers of cubs produced, says Marc Brody, is "the chance to give those young pandas a home."

Sending pandas "home" has had mixed results so far. Of the five animals released since 2006, all wearing tracking collars, three are still out there. Two were found dead, one probably the victim of aggression from wild male pandas. Those losses were "media disasters for China," Wildt says. But each led scientists to "try to think more like a panda, to understand what the bears truly need" and refine training and release protocols, Papa Panda says. At press time, as many as three pandas were being considered for release in July.

Like breeding, rewilding pandas "will take trial and error, time and money," McShea says. "But the Chinese will be successful."

Papa Panda is similarly confident: "The ultimate goal is to release, release, release," he told me. "I've had two important jobs in my life so far. To get pandas breeding, which is now no problem. Now we have to make sure there's good habitat and then put pandas in it."

And once they're running free and ready to mate, like Tao Tao (Little Rascal), a male who has so far survived nearly four years in the wild? "We hope that they like each other, but we can't interfere," says Hetaoping keeper Yang Changjiang. "What comes next will be up to them."

Trained and ready for freedom, Zhang Xiang (The Thoughtful One) takes her first steps into the Liziping Nature Reserve in 2013. She was the first female released since reintroductions began—and judging from her tracking-collar signals, she's doing just fine.

In a training enclosure in Wolong, Ye Ye—a female whose name honors the friendship between Japan and China—appears at the fence looking for a handout. Her cub Hua Yan (Pretty Girl) is nowhere to be seen, and that's a good sign. Independence is key to survival—and the three-year-old cub, her training nearly complete, will soon be released into the wild.

But first, it's another cub's turn. Over four days in mid-November, Hua Jiao (Delicate Beauty) is caught, given a final health check, fitted with a collar, crated, and driven 200 miles to the Liziping Nature Reserve. It has good bear habitat and a small panda population ripe for a new member.

It's a day that's been in the works since the start of this exceptional conservation experiment. Saving pandas is a bear-by-bear process, Hua Jiao's release a small but essential step on a long, rocky path. With five other cubs at Wolong up for release within a few years, panda conservation will doubtless be in the news. Whether for tragedy or triumph, no one can say.

On this November morning, under a bright blue sky, four men lift Hua Jiao's cage from the truck and position it facing the forest. Bamboo-draped barriers conceal spectators and point the way forward. Without fanfare, a keeper unlatches the door. At first the young panda stays put at the back of

the crate, munching bamboo, her last captive meal. After today she'll fend for herself in every way. In a few years she may seek a mate and could add five or more cubs to the population over her lifetime. It's not a game-changing number, but for an endangered species with fewer than 2,000 animals in the wild, every individual counts.

Finally, with some coaxing from the keepers, Hua Jiao emerges, blinking into the light, her paws sinking into the soft soil. And then, without a glance back at her captors and the life she's known thus far, she lopes toward freedom.

Best known for her international news and cultural documentation, **Ami Vitale** has covered many subjects for National Geographic publications, including Kashmir, elephant-human relations, and man-eating lions.