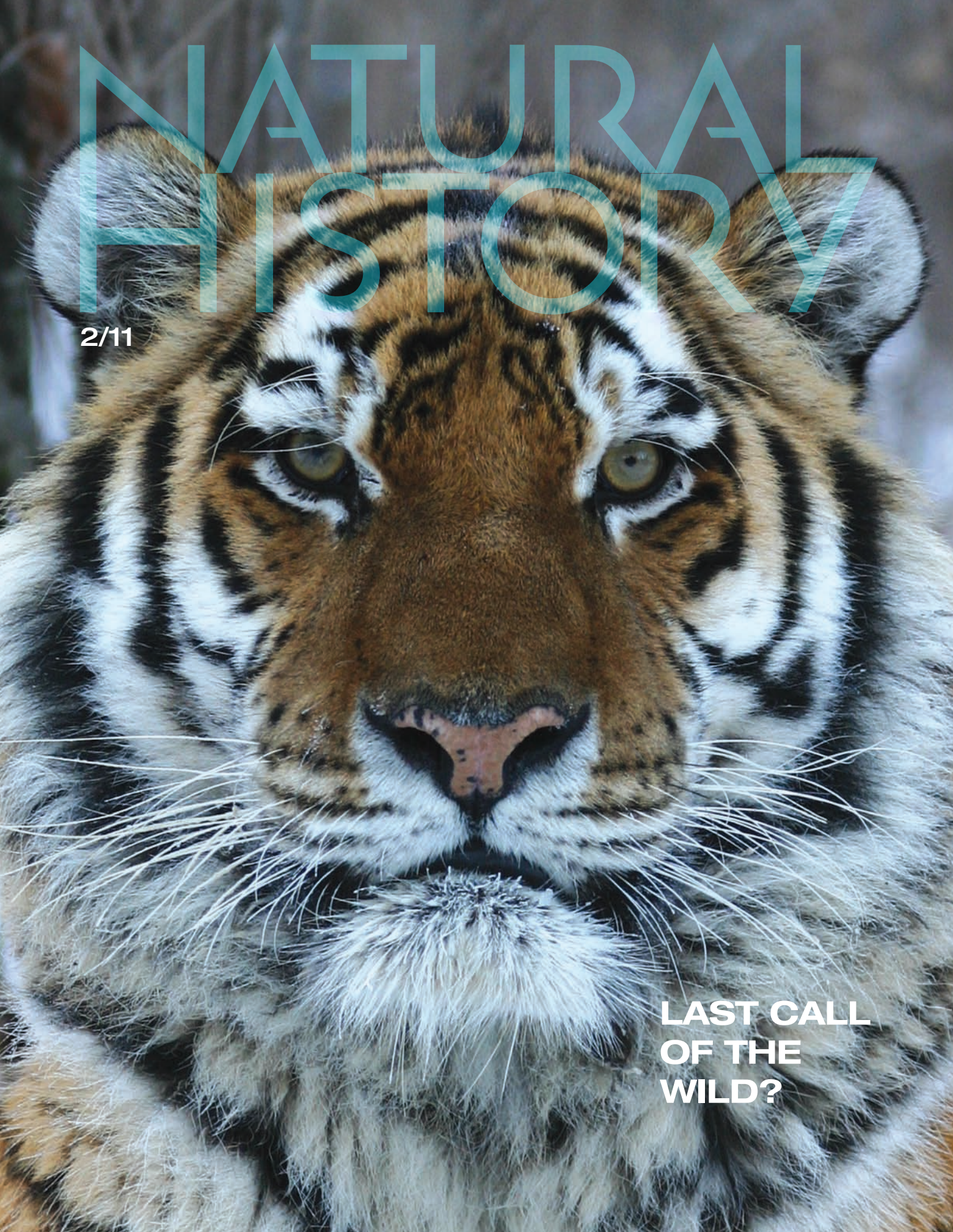
NATURAL HISTORY

2/11



LAST CALL OF THE WILD?

Last of the Forest Guardians

Little more than 3,000 tigers are left in the wild. Will an international effort give them a future?

STORY BY CHERYL LYN DYBAS
PHOTOGRAPHS BY JOHN GOODRICH

I imagine a tiger. . . .
[H]e'll move through the forest and his days
leaving his traces on the mud banks
of a river whose name he doesn't know
(in his world there are no names or past
or future, only the certainty of now).

—*Jorge Luis Borges,* The Other Tiger,
translation by Cheli Durán

Tanya and Galia, guardians of the forest, once roamed the coniferous woodlands of the Russian Far East. Under cover of spruce, pine, and birch, the two tigresses stalked sika deer and other prey. They met their ends in those same dark, boreal woods.

Tanya and Galia were Siberian, or more properly, Amur tigers (the subspecies *Panthera tigris altaica)*. They were also sisters. On June 1, 2010, Galia, the last radio-collared study animal of the long-running Siberian Tiger Project, was shot in the Russian Far East village of Terney because of the danger she posed to local citizens. Galia had abandoned a three-week-old litter of cubs and wandered into Terney looking for a meal. All attempts to scare her away failed.

"This abnormal behavior suggests disease, maybe neurological," says biologist Dale G. Miquelle of the Wildlife Conservation Society (WCS), Director of WCS Russia, which oversees the Siberian Tiger Project. Galia was the fourth Amur tiger in the project to die in the past year of natural causes, or of conflict with humans when the tiger unnaturally lost its fear of people.

Scientists initially suspected the cause might have been canine distemper, a viral illness diagnosed in other Amur tigers and common in Russia in domestic cats and dogs. That disease is a source of great concern: "An epidemic sweeping through the region could wipe out this tiger population," says Miquelle. But Galia's behavior did not fully conform to symptoms of distemper. Laboratory tests to identify an infectious agent are still pending.

Galia's sister Tanya was felled not by disease, but by poachers on a road between Terney and another Russian village, Plastun. On November 20, 2007, Miquelle and his colleagues heard only silence from Tanya's radio collar. Four days earlier, the tigress had lazed in the sun in front of a camera trap, a research camera designed to record the motions of large wild animals. In her last picture, Tanya peacefully looked out to the Sea of Japan, perhaps for the final time.

The sisters' fates reflect the plight of tigers everywhere. Tigers were once found in forests and other dense vegetation throughout Asia, from the Caucasus and the Caspian Sea to Siberia and Indonesia. In the past century, however, the number of wild tigers worldwide has plummeted from more than 100,000 to little more than 3,000. More tigers now live in captivity, an estimated 13,000. Less than one in ten of those are purebreds in managed collections; the majority are of unknown or mixed subspecies. Yet the managed Amur tiger population, many of whose founders were taken into captivity in the 1930s or earlier, has greater genetic diversity than the remaining wild population of the subspecies.

As the Chinese Year of the Tiger drew to a close on February 2, 2011, the species' range was less than 7 percent of its former extent [*see map on page 27*]. Of the nine recognized tiger subspecies, only five still survive in the wild: the Amur/Siberian, Bengal, Indochinese, Malayan, and Sumatran. The Bali, Caspian, and Javan are extinct, and the South China tiger is "functionally extinct"—surviving only in zoos.

A young male Amur, or Siberian, tiger patrols the edge of a forest on the Russian coast of the Sea of Japan, in the Sikhote-Alin Biosphere Reserve. In this combined image, the forest has tiger eyes.

Tanya. And Lena, Natasha, Katya, Nelya, Olga. Their names alone tell little of their lives. But in death they join the ranks of dozens of Amur tigers killed by poachers.

"Poaching, infectious diseases, prey depletion, and habitat loss from logging have taken down Amur tigers,"

Lyuti is the resident tiger of the Utyos Wildlife Rehabilitation Center in the Russian Far East. A wild-born Amur tiger, he was found as a cub in the mid-1990s and brought to the late Vladimir Kruglov, who trapped tigers before it became illegal. Kruglov took care of the cub, and that soon led to his establishing the center.

says Miquelle. The picture across Asia is much the same for other tiger subspecies.

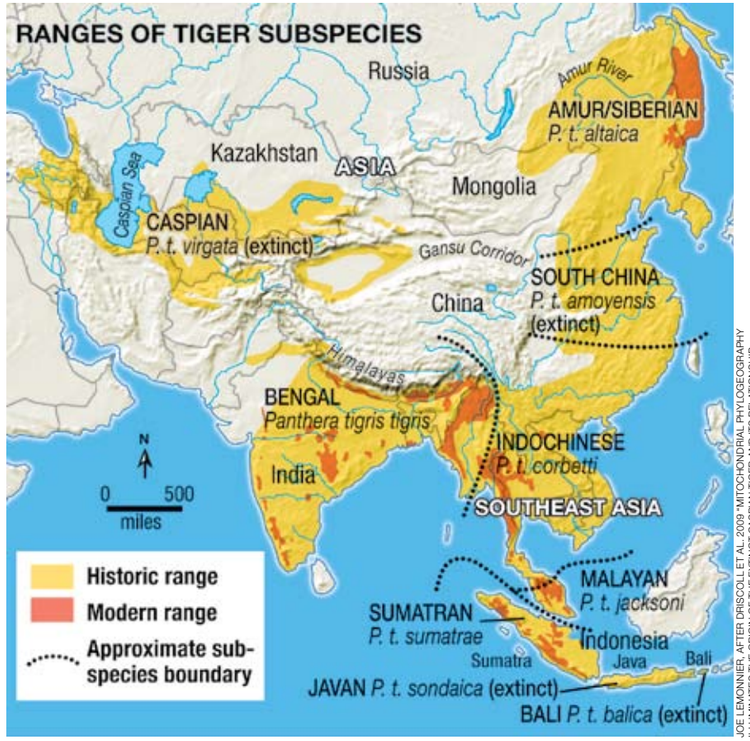
Official estimates of Amur tiger numbers in Russia come from full surveys conducted once every ten years; the last such all-Russia survey was in 2005 and found fewer than 500 tigers. A yearly monitoring program of sixteen Russian tiger locations gives a limited snapshot between full surveys. In 2005, the expert assessment was that 115 adult tigers inhabited those sixteen sites. In 2009, the assessment was reduced to 56.

John Seidensticker, a tiger biologist at the Smithsonian National Zoo in Washington, D.C., and chair of the Save the Tiger Fund, which supports the annual monitoring project, hopes it will "warn of coming dangers for tigers—in time to allow us to correct them."

Some 500,000 square miles of suitable tiger habitat remain across Asia. Except in the Russian Far East, however, tiger populations are restricted to small pockets, largely in protected areas, according to biologist Joe Walston of WCS and his colleagues. The team recently conducted a study of forty-two sites where tigers are still found (so-called source sites); the results were published in the journal *PLoS Biology* in September 2010. It's believed that those last tiger strongholds have the potential to repopulate larger landscapes. Protecting those sites, the researchers say, is essential.

To address the global tiger decline, thirteen countries thought to have tigers—known as tiger range states—sent high-level emissaries to a meeting late last year in Saint Petersburg. Hosted by Russian Prime Minister Vladimir Putin, the International Tiger Conservation Forum took place November 21-24, 2010. Representatives from Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Nepal, Russia, Thailand, and Vietnam outlined a Global Tiger Recovery Program and signed a Declaration on Tiger Conservation (the "St. Petersburg Declaration"). Mindful of what they called an obligation to future generations, they wrote that "we must act now" and "strive to double the number of tigers across their range by 2022."

In an accompanying document, *Global Tiger Recovery Program (2010–2022),* the signatories recommend such efforts as protecting and enhancing tiger habitats; eradicating poaching and the illegal trade in tiger parts used in traditional Chinese medicine; working with local communities to gain wider conservation participation; using modern and innovative scientific methods worldwide; increasing domestic funding sources; involving international financial and law-enforcement institutions such as the World Bank and Interpol; and building public awareness by celebrating Global Tiger Day on July 29 each year.



JOE LEMONNIER, AFTER DRISCOLL ET AL. 2009 "MITOCHONDRIAL PHYLOGEOGRAPHY ILLUMINATES THE ORIGIN OF THE EXTINCT CASPIAN TIGER AND ITS RELATIONSHIP TO THE AMUR TIGER," *PLOS ONE* 4(1): E4125

Along with a decline in tiger numbers, the animals' ranges have shrunk dramatically, compared with their historic extent in the late nineteenth century. In addition, of the nine currently recognized tiger subspecies, three are entirely extinct, and one, the South China subspecies, is extinct in the wild, surviving only in zoos.

Forum delegates called for an investment of some $350 million over the next five years, beyond the domestic financing provided by individual tiger range states. The focus of efforts, the tiger range state ambassadors found, should be on "tiger conservation landscapes"—areas that support tigers, their prey, and a wider biodiversity.

In addition to coniferous woodlands (taiga), tigers occupy a wide variety of habitats, including tropical evergreen forests, deciduous forests, mangrove swamps, thorn forests, and grass jungles. The common factors are some form of dense vegetative cover, sufficient large prey, and access to water. Tigers are adept swimmers and have been recorded easily swimming across rivers. To keep cool, they also spend much of their time during the heat of the day in lakes and ponds.

Tigers reach highest densities where they can regularly prey on a large deer species—such as swamp, rusa, or red deer—or on wild boar. In many cultures people avoid eating pigs, and so are in direct competition with tigers usually only for deer. Bengal and Sumatran tigers generally have a range of between about 4 and 40 square miles, based on sex (males' ranges are larger) and availability of prey. Because of the severity of the climate and low density of prey, the Amur tiger may require a range of 200 to 400 square miles.

An Amur tiger has left tracks in the Sikhote-Alin Reserve; the Sea of Japan is visible in the background.

If there is no habitat to sustain a prey base, however, there can't be tigers. Just before the international forum opened, the Russian government took a step toward protecting entire landscapes and individual sites: it announced a ban on cutting down Korean pines (*Pinus koraiensis*). Rising global demand for the pines for wood for large-scale construction projects and for garden furniture led to a huge increase in logging of the trees in Amur tiger range. The pines' cones are critical food for tiger prey such as wild boar.

"In this Year of the Tiger,

An Amur tigress, killed by a poacher near the Sikhote-Alin Reserve, is inspected in the village of Terney, where the body was transported. The observers are, from left to right: Evgeny Slabi of the Russian State Veterinary Service; Hermann Tretkyakov of Inspection Tiger, a department of the Russian Ministry of Natural Resources; and Nikolai Rybin of the Wildlife Conservation Society. The tigress badly mauled the poacher after he shot her, nearly killing him.

the Russian government has given one of the best gifts to the Amur tiger," says Igor Chestin of the World Wildlife Fund (WWF), CEO of WWF-Russia. "If there's no Korean pine, there will be no Amur tigers."

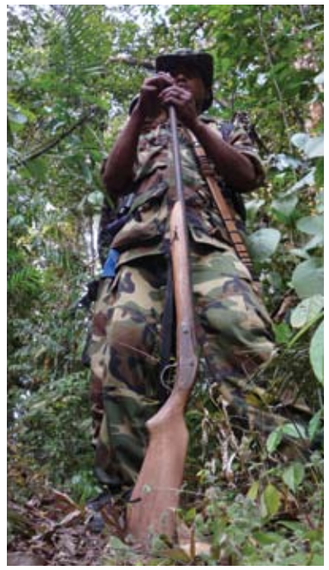
In addition, a recently designated preserve in the taiga forest along Russia's Koppi River should help create enough space for tigers and humans. In late September, the Khabarovsk Krai Administration passed a resolution to protect nearly 150 square miles of the river basin, which provides a home or migration corridor to many large mammals, including brown bears, Manchurian deer, moose—and Amur tigers. "The most valuable section of the Koppi River has been granted protection in perpetuity," says Yuri Kolpak, director of the regional arm for Wildlife Conservation and Protected Areas in Khabarovsk Krai.

A Koppi River Watershed Council will act as a governing body to coordinate sustainable management, antipoaching efforts, and regional development opportunities such as ecotourism and catch-and-release sport fishing. The council is an outgrowth of more than a decade of efforts by international nongovernmental organizations such as the Wild Salmon Center in the United States, Russian regional governments, and local district administration and communities.

Biologist Eric Dinerstein, Vice President for Conservation Science at WWF, argues that in addition to protecting particular sites, large-scale intervention is needed. In a paper published online on January 25, 2011, in the journal *Conservation Letters,* he and his colleagues write that "maintaining population viability and resilience will depend upon a landscape approach to manage tigers as metapopulations." The scientists looked at biomes, or major tiger habitat types, such as dry deciduous forests and subtropical pine forests. They believe that the reserves in twenty priority tiger landscapes can support more than 10,000 tigers.

According to the Global Tiger Recovery Program report, those and other potential tiger conservation landscapes will also benefit humans, locally and globally. They make up significant parts of nine important watersheds, with a total catchment area of more than 2.2 million square miles. Those river systems supply fresh water to 830 million people, as well as hydropower. The ecosystems also may be sources of medicinal plants and sites for community-based tourism.

Compared with nonforested areas, tiger landscapes sequester nearly 3.5 times the amount of carbon. With 17 percent of global carbon dioxide emissions resulting from deforestation, protecting the 500,000 square miles of the world's identified tiger conservation landscapes can help mitigate climate change. Tiger forest habitats also blunt natural hazards such as floods, landslides, droughts, fires, and storms. The effects of the 2007 cyclone Sidor and the 2009 cyclone Aila were largely absorbed by the mangrove islands of the Sundarbans tiger conservation landscape in Bangladesh.



Homemade muzzle-loading rifle, right, was confiscated from a poacher in Hukaung Valley, Myanmar. Opposite page: Village located in the Nam Et-Phou Louey National Protected Area, Laos, is a potential flashpoint of human-tiger conflict. The expansion of grazing areas and human overhunting of the tigers' wild prey may lead tigers to attack livestock, which villagers then defend by killing tigers.

Most of those benefits haven't been assigned a monetary value, however, "so tiger conservation landscapes are significantly undervalued in national and global agendas," states the report.

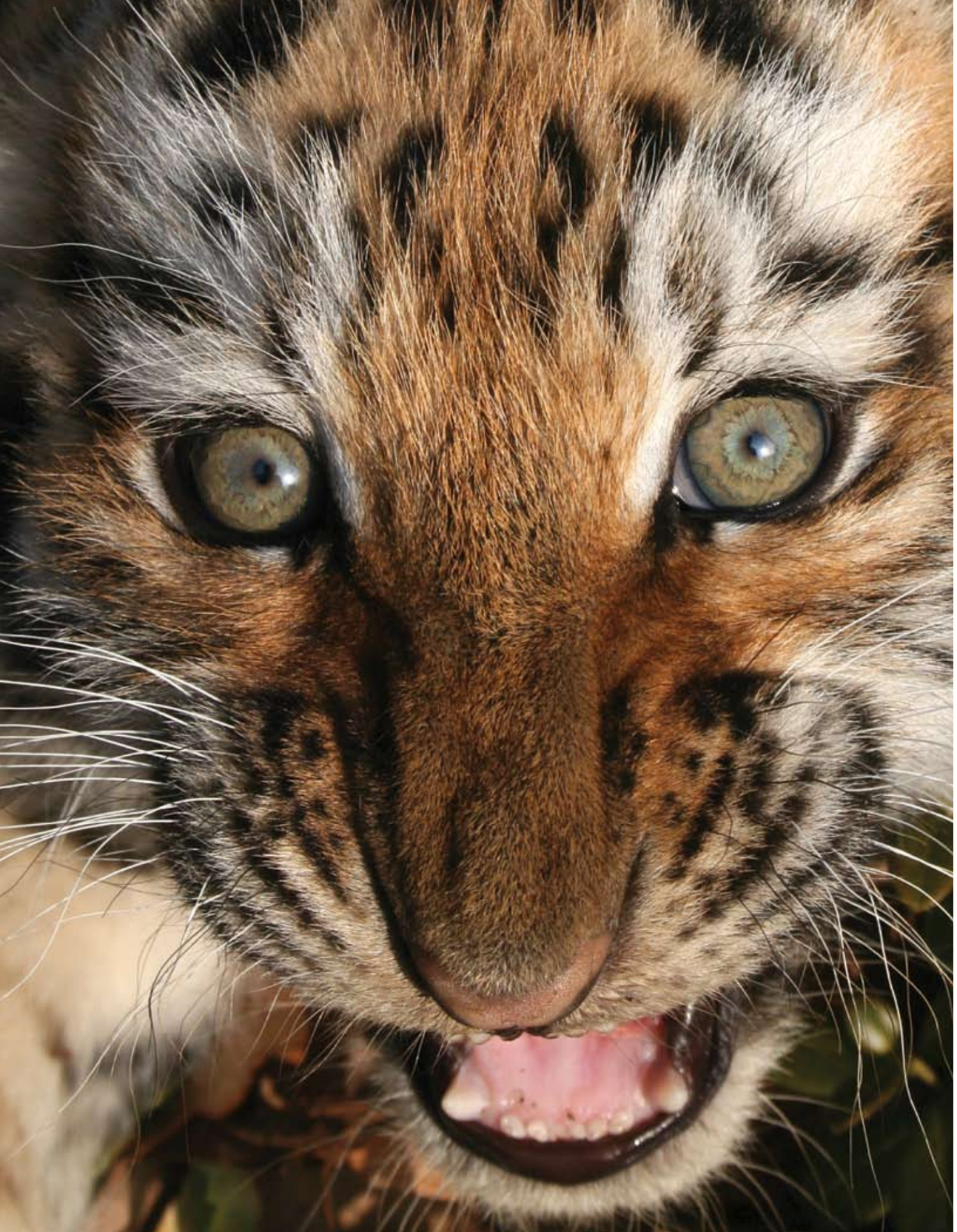
Cooperation that extends from international to local levels, says Miquelle, is at the heart of the future for Amur and other tiger subspecies. Through partnerships that cross "tiger borders," there's even hope on the horizon for what was deemed impossible: returning to life tigers long gone.

The Caspian tiger (*Panthera tigris virgata*) once hunted Bukhara deer and wild boar along thicketed watercourses called *tugai* that flow through the otherwise vast, arid deserts of countries such as Kazakhstan and Tajikistan. In the early twentieth century, however, the Russian government instructed its army to exterminate all tigers as part of an agricultural conversion project across Central Asia. Farmers moved in, clearing tugai and planting cotton and other crops.

In 1947, Russia banned hunting of the Caspian tiger's relative, the Amur tiger. But the edict came too late for the Caspian tiger, says Carlos A. Driscoll, a biologist at the U.S. National Cancer Institute's Laboratory of Genomic Diversity in Frederick, Maryland. Although the date of the subspecies' demise is still debated, the final wild Caspian tiger may have been killed in 1970 in Turkey.

The eyes of the Caspian tiger may be forever closed. But a relative close enough to be its shadow might again rustle through tugai. Driscoll and other scientists analyzed mitochondrial DNA (mtDNA) in samples from Caspian tigers preserved in museums in Azerbaijan, Kazakhstan, and Russia, and compared it with that of Amur tigers, publishing their results in the journal *PLoS ONE* in January 2009. The two tigers, it turned out, have almost identical mtDNA sequences, differing by only a single nucleotide, or letter of the genetic code. Moreover, the Caspian tiger possesses the nucleotide shared by other tiger subspecies, whereas that of the Amur tiger is derivative.

The finding reveals how tigers made their way across Central Asia. The forebears of all modern tiger subspecies lived in eastern China, and only began to expand their ranges westward toward the end of the last ice age. Several routes had been proposed that could have brought tigers to the Caspian region, including a southern route via the Indian subcontinent south of the Himalayan Plateau; a northern route through the Amur River region and north of the Mongolian steppe; and a middle route that, like the historical Silk Road, passed through the Gansu Corridor [*see map on page 27*]. Driscoll didn't find close molecular links between Caspian and Bengal tigers, or between Cas-



Left: Eight-week-old wild Amur tiger cub near its den in the Sikhote-Alin Reserve. Right: Sergei, a radio-collared study animal of the Wildlife Conservation Society's Siberian Tiger Project, strides through the Sikhote-Alin Reserve.

pian (and thus its close cousin, the Amur) and South China tigers, making the southern and northern routes unlikely.

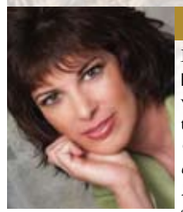
The answer prowled along the Gansu Corridor. Some 10,000 years ago, the ancestors of Caspian tigers used a narrow trail—a funnel not much wider than the dusty, caravan-traveled Silk Road itself—to migrate to the region around the Caspian Sea. From there, tigers colonized Central Asia. Eventually, some returned eastward across southern Siberia, establishing the Russian Far East's Amur tiger population. Tigers likely stopped meeting at that ecological crossroads within the last 200 years, a result of increasing human presence in the region.

The discovery raises the possibility of—and a justification for—repopulating a currently tigerless Central Asia with Amur tigers, according to Ronald Tilson, director of conservation at the Minnesota Zoo in Minneapolis. But it must be attempted in the right habitat. That habitat is tugai. Stretching through Central Asia in long green strands, tugai was once widespread. Now it remains only as fragments along rivers such as the Ili in Kazakhstan and Amu Darya in Uzbekistan. Other extensive tracts of tugai still exist in and around Tigrovaya Balka, a reserve in Tajikistan, and along Kazakhstan's Syr Darya River.

WWF-Russia and WWF-Netherlands recently undertook a feasibility study for such a Caspian (Amur) tiger reintroduction. The Ili River region looks especially promising. The 894-mile-long Ili runs through northwestern China to Kazakhstan, finally flowing into Lake Balkhash. There it forms a large delta with vast tugai wetlands. The delta still has enough healthy tugai to offer cover to good numbers of tiger prey such as wild boar, according to WWF's Dinerstein. "We might be able to save living tigers," he says, "and 'reincarnate' subspecies we thought had vanished forever."

Is it possible—or realistic—to double tiger numbers by 2022, the next Year of the Tiger? That depends not only on maintaining protected areas but also on restoring the tiger's natural range, to offset the risk of losing small populations from factors such as disease. A Global Tiger Recovery Program, the tiger range ambassadors agreed, is "the last best hope" for tigers. "Wild tigers are at a tipping point and action, or inaction, in the coming decade will decide their fate. Action will lead to the tiger's recovery; inaction or mere maintenance of the status quo will lead to its extinction."

Legend holds that when a tiger vanishes into the forest, last to fade from view are its eyes. But if we allow the forest to vanish, what then? We need to look beyond the eyes of the tiger, and into those we see in the mirror.



Ecologist and science journalist **Cheryl Lyn Dybas** has brought her passion for the world's wild things, and for ways to conserve them, to many publications, including *Africa Geographic, BBC Wildlife, BioScience, Canadian Geographic, National Geographic Traveler, National Wildlife,* and *Natural History,* and she is a contributing writer for *Oceanography* magazine. Her research and writing have taken her from the plains of Africa to the Pacific Ocean abyss and brought her into close contact with golden eagles, gray wolves—and deadly biohazard virus labs. She has been a featured speaker on science journalism and conservation biology at many institutions, and serves on committees and boards for several scientific societies, among them the Ecological Society of America and the American Society of Limnology and Oceanography.