

RUSSIA'S TOUGH TIGERS

by Howard Youth

Walk the streets of the bustling Russian Far East port city of Vladivostok and you will see them all over. On the city's coat of arms. On vodka bottle labels. On the logo of a local investment company called Tiger Securities. In September, visit the city's central square and you may stumble upon thousands of Russians celebrating International Tiger Day, a conservation-oriented event held there since 2000.

In this city, the striking, striped tiger is more than an eye-catching symbol. Vladivostok is the gateway to vast landscapes that shelter one of the world's most robust remaining tiger populations—that of the Amur, or Siberian, tiger (*Panthera tigris altaica*).

In the mid-1800s, when Vladivostok was founded as a city and Russian naval outpost, an estimated 100,000 tigers lived from eastern

Turkey to Java. Members of the world's largest cat species basically had the run of a vast and fairly continuous chunk of Asian forest habitat from India east through parts of China and north to coastal southeast Russia.

But 150-plus years later, the situation is very different. Of nine recognized tiger subspecies that once existed, just six remain. The last wild tigers of Bali (*P. t. balica*) vanished in the 1940s, the Caspian tiger (*P. t. virgata*) has been gone since the 1970s, and the Javan subspecies (*P. t. sondaica*) was proclaimed extinct in the 1980s. Today, no tigers survive west of India. Following years of unregulated and widespread shooting and trapping, overhunting of their prey, and habitat loss, the world's wild tiger population stands at fewer than 5,000 cats living in widely scattered, mostly small populations.



Amur tigers share their habitat with boreal predators such as brown bears and wolves, as well as Amur leopards and other predators more typical to Asia. These animals and hundreds of bird species benefit from Amur tiger conservation efforts.

In a July 2007 *BioScience* article entitled “The Fate of Wild Tigers,” a team of conservation biologists wrote: “Tigers now occupy seven percent of their historical range, and in the past decade the area occupied by tigers has decreased by as much as 41 percent, according to some estimates.” One of the authors is John Seidensticker, who heads the Smithsonian National Zoo’s Conservation Ecology Center and is chairman of the Save the Tiger Fund Council, an advisory body that approves grants administered by the Save the Tiger Fund. While it may seem that the world is becoming far too crowded for tigers, Seidensticker points to a silver lining. “There are bright spots,” he says, “and Russia is a bright spot for tigers.”

As the Amur tiger’s situation illustrates, there is always hope. But, although there are still wilderness areas that can support tigers, even Amur tigers cannot survive without the help of their human neighbors.

Siberian No More

In school, in books, and in documentaries, we learn that lions live on African savannas and tigers live in Asian jungles. But, as they say, the devil is in the details. Not all lions reside in Africa; about 350 inhabit India’s Gir Forest. And while all tigers live in Asia, not all live in tropical rainforests. Like many other wild cats, the tiger is a habitat generalist, a predator with habitat preferences that defy generalization. Sumatran tigers (*P. t. sumatrae*), the smallest

tiger subspecies, live in lush, moist tropical rainforest, but Bengal tigers (*P. t. tigris*) often live in more open, seasonally dry forests interspersed with large grassy areas. And Amur tigers, the northernmost and among the largest tigers, live in temperate forests frequently blanketed in snow during winter months.

The Amur tiger was long known as the Siberian tiger, but that name was misleading. Siberia is a vast region east of the Ural Mountains, but tigers live farther east, in the lower part of a long coastal area called the Russian Far East. Russia’s tigers and the handful in neighboring China and perhaps North Korea are now called Amur tigers because they live in the Amur River basin. The *BioScience* authors call this area “the most intact and extensive tiger landscape in the species’ entire range.”

Like all tigers, the Amur tiger is solitary and territorial. It wanders through habitats ranging from lowlands to mountain forests of Korean pine (*Pinus koraiensis*) and Mongolian oak (*Quercus mongolica*), which provide a bounty of fallen pine cones and acorns that fatten red deer (*Cervus elaphus*) and wild boar (*Sus scrofa*), the Amur tiger’s primary prey. Biologists call the tiger a keystone species because it has a strong influence on other animals and plants in its ecosystem, especially deer and boar. From a conservation perspective, it is also called an umbrella species because when its ecological needs are met, so are those of myriad other living things that share its landscapes.

Amur tigers live with wildlife from boreal forests and from other parts of Asia, says Wildlife Conservation Society biologist Dale

Miquelle, who lives in Russia and has been studying tigers there for 15 years. "Nowhere else in the world do tigers need to defend their kills from boreal predators such as wolves, brown bears, wolverines, and lynx, while at the same time coexisting with carnivores more common to Asia, such as the leopard and Himalayan black bear." All of these mammals and many others benefit from the protection of Amur tiger habitat, as do hundreds of bird species.

Within the Amur River basin, 95 percent of tigers inhabit the Sikhote-Alin mountain range, which runs north-south for about 620 miles at latitudes similar to those between northern California and Vancouver. The mountains rise from sea level and most peaks are no higher than 4,000 feet. "The mountain range is rather narrow valleys with pretty steep ridges," says Seidensticker. "It kind of reminds you of ridge-and-valley Appalachia, but the forest type is more like Vermont."

Inside the Sikhote-Alin range, Amur tigers enjoy a fairly contiguous forest habitat containing the Sikhote-Alin Zapovednik—Russia's largest protected area for tigers—and two new national parks. Outside the Sikhote-Alin range, however, Amur tigers live in much more fragmented habitat. Settlements and farmland block tigers from encountering others of their kind, leading to limited mate choices and potentially compromised genetic variability. The most isolated areas sit just west of Vladivostok along Russia's borders with China and North Korea. There, perhaps ten to 15 Amur tigers survive, as well as the critically endangered Amur leopard (*P. pardus orientalis*).

From these patchy border habitats, some Amur tigers move into large forest tracts in northeast China, and possibly even into North Korea. Such border crossing makes recovery of tigers in these countries possible, despite the fact that illegal trade in tiger bones and body parts for traditional Chinese medicine is one of the primary threats to the species' existence across Asia.

Recovery, One Striped Cat at a Time

Despite its extensive wilderness, the Russian Far East almost lost its tigers halfway through the 20th century. They survive today thanks to Russian scientists' and the Russian government's efforts, in collaboration with international organizations, to study and restore their populations. In the late 1800s, more than 1,000 tigers likely inhabited the region's mountain forests, foothills, and lowlands. The population declined sharply from the early 1900s through the 1930s, as more Russians moved into the area. As happened in the U.S. West, many well-armed settlers shot at any large animal they came across. While much of the hunting of deer and boar was for subsistence, many people hunted these animals as well as tigers and leopards for sport, a tradition that continues today. Fear also led to the killing of tigers.

In 1940, Lev Kuplanov, a young Russian biologist who was killed three years later by poachers, led the first intensive survey of Amur tigers, which concluded that only 20 to 30 Amur tigers remained. The Russian government finally responded in 1947, banning tiger hunting and limiting the number of cubs that could be captured by animal traders. Research, including tracking and census work, has continued ever since.

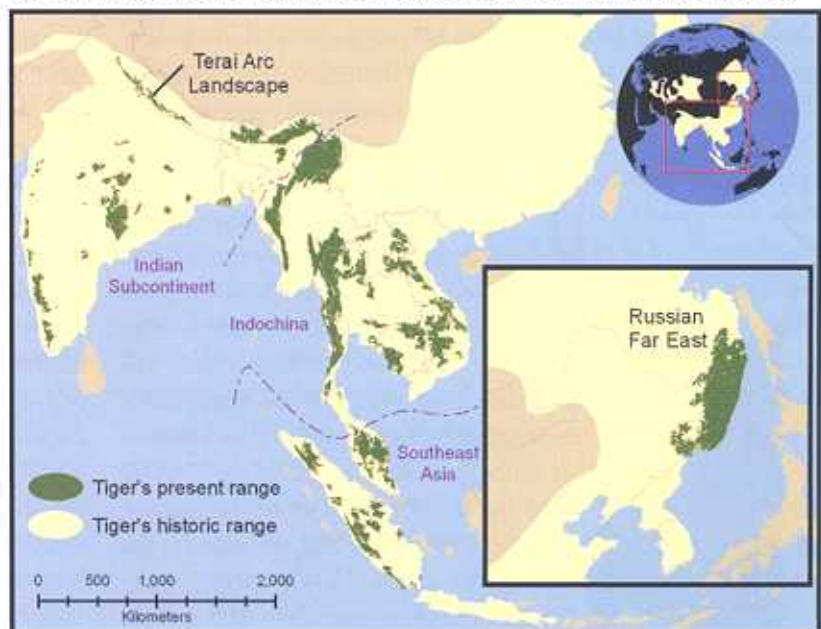
The tiger population started to grow immediately, albeit slowly. By 1990, there may have been more than 500 individuals as tigers once again spread out in the forests of the southern Russian Far East.

But poaching increased after the fall of the Soviet Union in 1991, due to the loosening of regulations and people's economic desperation. Between 1992 and 1994, an estimated 40 to 60 tigers were trapped or shot each year, their bones and skins taken to China for sale.

In 1995, then-Russian Prime Minister Viktor Chernomyrdin signed a decree calling for the development of a national strategy for tiger conservation. Anti-poaching efforts and education programs increased, thanks in good part to assistance from Russian and overseas nongovernmental organizations (NGOs), as well as governmental agencies from other countries. Also in 1995, Miquelle and his colleagues led an extensive survey of tiger habitat, funded in part by the U. S. Agency for International Development (USAID). The survey estimated the country's tiger population at between 430 and 470 animals.

In a habitat protection plan presented in the 1999 book *Riding the Tiger: Tiger Conservation in Human-dominated Landscapes*, Miquelle and his colleagues wrote that about 60,000 square miles—an area larger than that of nearby North Korea—remained as tiger habitat in the Russian Far East. The authors wrote: "We defined the goal of this habitat protection plan as protection

This map shows how dramatically the tiger's range has shrunk, particularly in the last 150 years. The inset shows historic and present Amur tiger habitat.



of all existing tiger habitat, i.e. no further loss of Amur tiger habitat should occur."

Miquelle and his colleagues concluded that only seven percent of remaining tiger habitat fell within declared reserves and wildlife refuges and that "even under the most optimistic habitat protection plan, no more than 16 percent of tiger habitat would be strictly protected." Nonetheless, this plan stimulated efforts to create a protected areas network, which was eventually brought into existence via support from the Save the Tiger Fund and a large grant from the Global Environmental Fund. Today, the percentage of protected tiger land may be up to ten or 12 percent, although no recent calculations are available.

So far, the new century has dawned with a healthy Amur tiger population with bright prospects. A 2005 tiger survey yielded an estimate of between 430 and 502 individuals, the good news being that even if numbers hadn't increased much in the ten years since the last census, they hadn't declined as they have almost everywhere else in the tiger's range. And in 2007, important steps were taken to secure two key areas: The Russian government created the 315-square-mile Zov Tigra ("Roar of the Tiger") National Park and the 245-square-mile Udege Legend National Park. These parks had been in the works for well over a decade. Both will protect Amur tiger habitat while fostering a growing ecotourism industry.

And there are signs that tiger numbers are increasing in nearby China, where some protection measures are going into place. In 2001, the Chinese government created the Hunchun Tiger-Leopard Reserve, protecting a sliver of habitat along the Russian border as a "beachhead" for tigers and leopards dispersing from Russia.

Miquelle and other conservationists believe that managing tigers outside of declared protected areas must be a priority. To do so, important tiger core areas need to be stitched together via designated wildlife corridors and large swaths of land used not only for conservation but also for compatible forestry and other activities. "Carving out additional large tracts of land specifically to protect tigers is unlikely in the present economic boom times of Russia. Therefore, it is essential that ways be found to mix tiger conservation and wise use of forest lands for sustenance of the local people," says Miquelle.

In Russia, funds for conservation programs are often very limited, but conservationists there have received strong support from overseas NGOs, including the Save the Tiger Fund, the World Wildlife Fund (WWF), and the Wildlife Conservation Society, as well as from agencies of other governments, including USAID and the U.S. Department of the Interior. Between 1998 and 2002, according to the *BioScience* article, NGOs spent, on average, a total of more than \$1.5 million



Red deer are among Amur tigers' and hunters' favorite prey.



Half of all Amur tiger cubs die before they turn one.

each year on Amur tiger conservation efforts, which included park management, anti-poaching efforts, law enforcement, training for Russian staff, and education programs.

Anti-poaching patrols have helped reduce illegal hunting, although humans continue to be tigers' main threat to survival. Miquelle and his colleagues have radiocollared and monitored more than 50 Amur tigers since 1992. This work helped them piece together one of the clearest pictures of how these tigers live, including details on Amur tiger social structure, land use, diet, reproduction, and causes of mortality. They found out, for example, that more than 80 percent of tiger mortality in Russia comes at the hands of humans, and that while tigers produce on average 2.4 cubs every 21 months, half die before reaching one year old. Many cubs die because poachers kill their mothers.

This monitoring work also provides a sobering picture of just how many tigers fit into the landscape. All adult tigers are territorial, and there is little overlap between females' home ranges. A resident female Amur tiger requires about 155 square miles to successfully raise cubs, so the roughly 1,545 square-mile Sikhote-Alin Zapovednik—the size of Rhode Island—harbors just ten tigresses. The home range of a male usually overlaps that of one to several females and is about three times as large—about 465 square miles—and six to nine males have been reported in Sikhote-Alin Zapovednik in the past few years, but they're probably not all resident males.

Hunters and the Hunted

Red deer and wild boar provide up to 85 percent of the Amur tiger's diet, so the welfare of these ungulates is a life-or-death matter for the cats. Deer and wild boar also are the favored prey of hunters, who have contributed to recent sharp dips in their populations. Many hunters, however, blame the Amur tiger when prey becomes scarce. "It is the top obligate predator in the Russian Far East," says Seidensticker, "and if you ask a Russian hunter, he'll say the tiger is taking away his food." But tigers and hunters can coexist, as long as conservationists and hunters work together to boost the local prey numbers.

Miquelle is working with managers of hunting leases to increase their capacity to manage wildlife and especially to increase prey numbers. Says Miquelle: "Our rationale is that, although hunters view tigers as competitors, if we can help them increase prey numbers, it is a win-win situation—hunters have more opportunities to harvest ungulates for food, and tigers do, too." Measures include improving wildlife habitats to provide more forage and augmenting food during times of scarcity, such as hard winters. The WWF has also worked with about 20 hunting estates on its Ungulate Recovery Program, with noted increases in prey species.

Deer, boar, and tigers, however, may face further challenges from changing climate. In recent years, climatologists noted an increase in the frequency of El Niño events, driven by changes in sea-surface temperatures in the equatorial Pacific that profoundly alter weather in many areas of the world. El Niño events used to occur about once a decade, but now pop up about once every five to seven years. Among other things, these sea-temperature changes apparently affect the southern monsoon, which provides seasonal moisture critical to habitats and agriculture across much of southern Asia. And the southern monsoon's effects can be felt as far north as Amur forests.

Since 2003, University of Maryland faculty research assistant and National Aeronautics and Space Administration fellow Tatiana Loboda has been studying these meteorological phenomena and how they might affect the frequency and intensity of fires in Amur tiger habitat. "There is some indication that summer fires are somehow connected with the Southeast Asian monsoon and possibly El Niño," says Loboda.

Some coniferous trees, such as the longleaf pine (*Pinus palustris*) of the U.S. Southeast, are fire dependent—flames help propagate their seeds while clearing out competing trees. Not so in the Amur region, where fire wipes out spruce, fir, and larch. But for tigers, such burns may not be all bad.

"Summer fires are rare, but when they occur, they are generally very large and very intense," says Loboda. These conflagrations kill almost all plants in their path. When they scorch spruce, fir, and larch, fires clear the way for slow regrowth of different vegetation, including Mongolian oak and other broad-leaved trees that provide a better food source for deer and boar and better tiger habitat.

But Loboda's modeling work indicates that fire frequency may increase with projected climate shifts, a situation that could undo any long-term benefits of sporadic, fire-wrought forest change. "If climate change occurs," says Loboda, "these positive long-term benefits are likely to be taken away, because fires might be much more frequent...and will counterbalance any benefit in terms of long-term vegetation recovery."

Fire also destroys Korean pine, a valued tree that is already becoming rare due to overharvesting. Even where mature trees still stand, pine nuts have become scarce because local people collect these edible seeds and sell them to Chinese and Korean merchants. While this brings in much-needed income, intensive gathering eliminates nuts that provide vital winter nutrition for wild boar, deer, and bear.

Deer- and boar-hunting, mushroom- and plant-collecting, and selective logging are all extractive forest uses that can be compatible with tiger conservation. But one of forestry's by-products is detrimental to tigers: "For tigers, roads are ecological traps," says Seidensticker. Once carved into forests, roads open areas to people other than foresters. "I consider [the road issue] one of the most important issues out here," says Miquelle. "As more and more logging roads



Climate change could counteract the benefits of naturally occurring forest fires for Amur tigers in the Russian Far East.

are built, they provide greater and greater access for both legal and illegal hunting, increased risk of fire, and have lots of additional impacts." Miquelle hopes that soon he and his colleagues will work with logging concessions to close forest roads after trees have been extracted.

For now, though, much of the Amur region remains a frontier where large tracts of wilderness remain. It is a place where tigers can, by and large, live outside the influence of humanity, where they can hunt, find mates, and raise their young with a reasonable chance that they will avoid stepping into the crosshairs of poachers' gun sights. "Russia is one of the only places where tigers haven't recently been in decline," says Seidensticker. "But we're at a stalemate. Things are okay. But things could change." Z

—Contributing editor Howard Youth's recent ZooGoer articles have included features on Florida panthers, birds and insects, and prairie grouse.