A curious ocelot passes by a camera trap in Ecuador's Yasuní National Park.

A Wild Ride

IT projects that aim to protect at-risk species must navigate the world's most unpredictable terrain—and sidestep potential pitfalls.

BY SANDRA SWANSON

PHOTO BY STEVE WINTER/NATIONAL GEOGRAPHIC CREATIVE

Something wild is happening with conservation IT projects. Sensors, big data and drones are helping global not-for-profit organizations track populations and identify threats to some of the world's most endangered animals. These ambitious projects aim to stop ruthless poachers and preserve dwindling habitats—all in an attempt to save at-risk species from extinction.

And the need for high-tech help is urgent. The earth's wild vertebrae population was more than halved between 1970 and 2010, according to a 2014 report by global wildlife preservation group World Wide Fund for Nature, also known as WWF. And an estimated 41 percent of amphibian species and 26 percent of mammal species are threatened by extinction, according to 2015 data published by the International Union for Conservation of Nature based in Gland, Switzerland.

The goals of IT conservation projects range from protecting elephants and rhinoceroses in Africa to preserving bumblebees and sea turtles in North America. And the risks these projects face are just as varied. Whether they're battling natural forces, corruption or uncooperative animals, project managers must fall back on the fundamentals.

"Conservation projects need to apply project management methodologies, because the unpredictable scenario is very much a part of [these] projects," says Elena Bulmer, PMP, biodiversity project coordinator for environmental organization Worldwatch Institute Europe, headquartered in Copenhagen, Denmark.

AGAINST THE ELEMENTS

Given the unpredictable nature of conservation fieldwork, extensive testing is the first step for any project run by Panthera, a New York, New York, USA-based organization that uses cameras to track the population of tigers and other wild cats around the world. So far, the organization has deployed more than 9,500 cameras—some of which need to operate glitch-free in the wild for as long as five years, says Chris Cline, Panthera's chief technologist, New York, New York, USA.

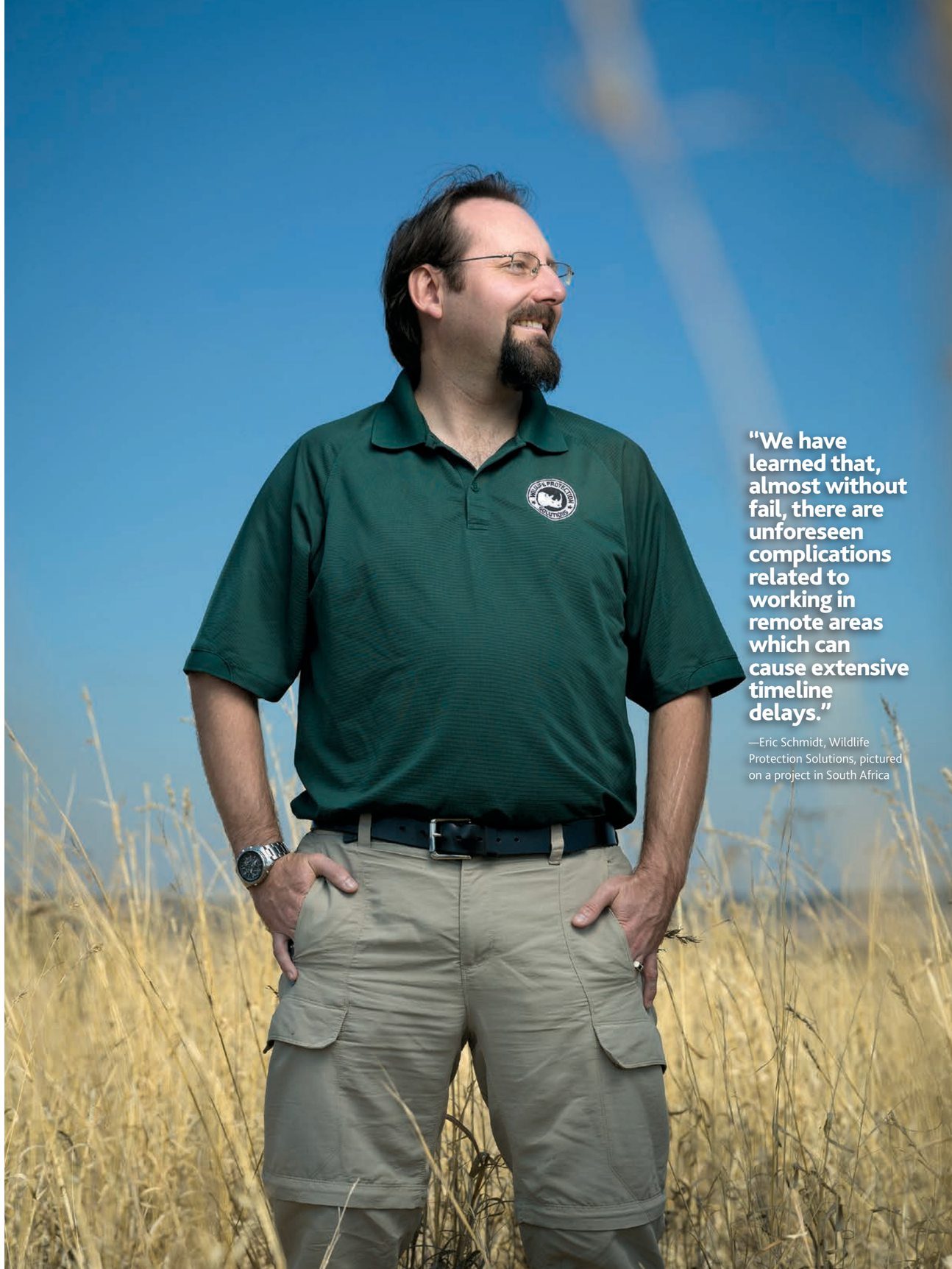

PHOTO BY QUINTIN MILLS

A camera trap captures a photo of a snow leopard in Tajikistan. Left, a snow leopard looks back at a camera trap in Soujia, China.

PHOTO BY SHAN SHUI/COURTESY OF PANTHERA

PHOTO BY S. KACHEL/COURTESY OF PANTHERA

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—Chris Cline, Panthera, New York, New York, USA

Camera performance can be affected by heat, humidity or moisture, depending on the location, Mr. Cline says. So his team puts cameras through submersion testing to help ensure the equipment will withstand extended exposure. In some tests, cameras are sprayed with water four times a day, for 30 days, in an enclosed compartment. And a heat lamp warms the compartment several times each day to create humidity.

"It's an accelerated reliability test—it might represent about two years in the field in harsh environments," Mr. Cline says. "Weatherproofness is important—especially in places like Nicaragua and Malaysia—because you need to prevent moisture from getting inside and ruining electronics."

Whether they're caused by climate conditions or operator error, gear glitches and breakdowns can seriously impact budgets, timelines and overall project success, says Ms. Bulmer. Likewise, the testing required to make sure the equipment will hold up under adverse conditions "involves considerable trial and error, which may, in turn, use up time in the project schedule," she says.

"There is always some risk involved here. If [technology devices] don't work, then the information gathered from these projects will be limited and the outcome will not be assured," she says.

Unreliable infrastructure in remote locations also poses significant project risks, says Eric Schmidt, executive director, Wildlife Protection Solutions (WPS), Denver, Colorado, USA. For instance, a project to deploy Internet-connected cameras to deter rhino poaching in South Africa took an extra month, in part because flooding closed all roads to the project site for a week—and the team had to replace camera cables after baboons chewed through them.

The team also had to resolve problems created by South Africa's energy infrastructure. For example, WPS chose to use solar panels to power its research facility to avoid being impacted by the power outages the local electricity company schedules every month, Mr. Schmidt says. However, the team also had to install a backup generator several months into the project after learning that malfunctioning inverters, which convert DC to AC electric current, occasionally knocked out solar power.

"We have learned that, almost without fail, there are unforeseen complications related to working in remote areas which can cause extensive timeline delays," he says.

LEARNING TO FLY

Once the equipment is in the field, preservation projects need adept operators behind the scenes. So project managers must make sure team members are comfortable with tech tools from the start. Building training into the budget and schedule has helped multinational organization Conservation Drones to keep its animal-monitoring projects on track.

For example, the organization's ongoing project in Indonesia's Northern

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—Elena Bulmer, PMP, Worldwatch Institute Europe, Copenhagen, Denmark

A drone captures an image of two rhinos in the water in Nepal's Chitwan National Park.

PHOTO COURTESY OF CONSERVATION DRONES

"We learned that it is much more effective to train a small group of English-speaking people and for them to train the others—rather than doing it for everyone at once."

—Lian Pin Koh, Conservation Drones, Adelaide, Australia

Sumatra rain forest uses drones to capture high-resolution surveillance photos that help the team estimate the local orangutan population. This initiative, which began in February 2012, takes about half as much money and time as the traditional method—walking the forest with heavy equipment and binoculars, says Lian Pin Koh, founding director, Conservation Drones, Adelaide, Australia.

Yet Mr. Koh says the organization is still learning how to best train team members to use the drones, which capture much sharper images than conventional aerial photography and can scan the periphery of a forest for poachers. "When we first started conducting training classes for local conservation groups, we tried to do too much too soon," he says.

For example, the team initially offered full-day classes that didn't work well for operational personnel more accustomed to working in the field. "We learned to alternate classroom and practical sessions for better uptake," he says.

The language barrier also created roadblocks. "In many parts of the tropics we work in, English is not a common language," he says. "We learned that it is much more effective to train a small group of English-speaking people and for them to train the others—rather than doing it for everyone at once."

LEADING THE PACK

Technology-based preservation projects also are helping animals in captivity. A subset of those projects aims to re-establish wild populations of endangered species at zoos, such as the California condor, black-footed ferret and red wolf. Yet zoos aren't necessarily eager to learn or embrace new tech tools.

Getting zoos to buy in to a new approach requires the support of their member associations, says Lisa Faust, vice president of conservation and science at Lincoln Park Zoo, Chicago, Illinois, USA. Ms. Faust is project lead for PMCTrack, a software deployment and development initiative that helps zoos determine which animals—often endangered species—are best suited to breed or mate. The three-year, US$623,000 software development project was completed in 2011. The ensuing deployment, which began in 2011, is ongoing. Population Management Center (PMC), a joint venture between Lincoln Park Zoo and the Association of Zoos and Aquariums (AZA), led development and deployment.

While PMCTrack's software was being developed, coordinators reached out to future users at AZA member zoos to see what type of features and functionality they would find most useful. Based on this feedback, PMC created a tool that uses online surveys to gather breeding histories and automatically calculate which animals are most likely to reproduce. This supports conservation efforts by helping organizations create more informed breeding plans.

PMC has offered courses, informational webinars and one-on-one guidance on how program managers at zoos can use the tool in an effort to accelerate adoption. Plus, AZA also has encouraged program leaders at member zoos to use the system, Ms. Faust says.

"We worked to highlight for people how the system could help them get ready for the rest of the work they need to do to manage their populations," she says. "Ultimately, we hope that this leads to maintaining healthy and viable species survival plan populations."

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—Lisa Faust, Lincoln Park Zoo, Chicago, Illinois, USA

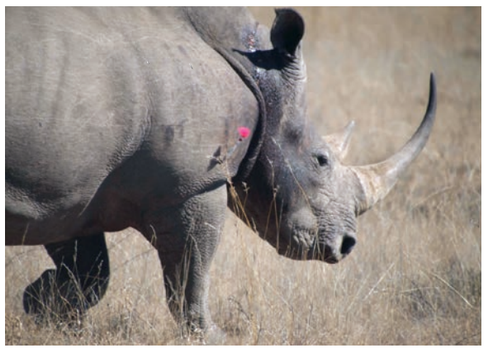
CASE STUDY

Stopping Poachers in Their Tracks

For poachers, a wild rhinoceros isn't a protected species. It's a big paycheck. Some Eastern medicine traditions say rhino horns cure certain ailments, which keeps demand—and prices—high.

A single rhino horn can sell for more than US$250,000 on the black market.

In South Africa, for example, poaching rates increased 20 percent from 2013 to 2014, and conservationists are determined to reverse the trend. That's why Wildlife Protection Solutions (WPS) launched a US$75,000 technology project at a white rhino breeding ranch in South Africa's Limpopo province in January. The initiative uses motion sensors, cameras and a fence-tampering detection system to prevent poaching. It uses a software program that scans images to find potential poachers. If evidence of a suspected poacher is discovered, real-time alerts are sent to the team members' smartphones and computers—both at the ranch and in the U.S. office—which allows the ranch to immediately respond to threats.



WPS conducts a rhino darting and treatment exercise in South Africa.

PHOTOS COURTESY OF WILDLIFE PROTECTION SOLUTIONS

WPS consults end users, such as park rangers, at the start of all technology projects to tap into their knowledge about land uses, field conditions and other location-specific variables. Then, after end users adopt the technology, the organization has follow-up meetings to determine how it could improve the system and better meet the needs of those in the field.

"We are continually refining the technology we are using, modifying our software, and seeking opportunities to share these findings with other stakeholders," says Eric Schmidt, executive director, WPS, Denver, Colorado, USA.

One meeting with the on-site ranch manager quickly yielded an important revelation: Most poachers get help from people who are supposed to protect the rhinos. So WPS reworked its field deployment strategies.

"Our manager began to use the system to question personnel about what they were doing in odd parts of the property at unusual times," Mr. Schmidt says. "The fact that staff know that they are monitored spreads quickly throughout local communities. As the system expands, it complicates and delays poaching plans, along with increasing the risk of being caught."

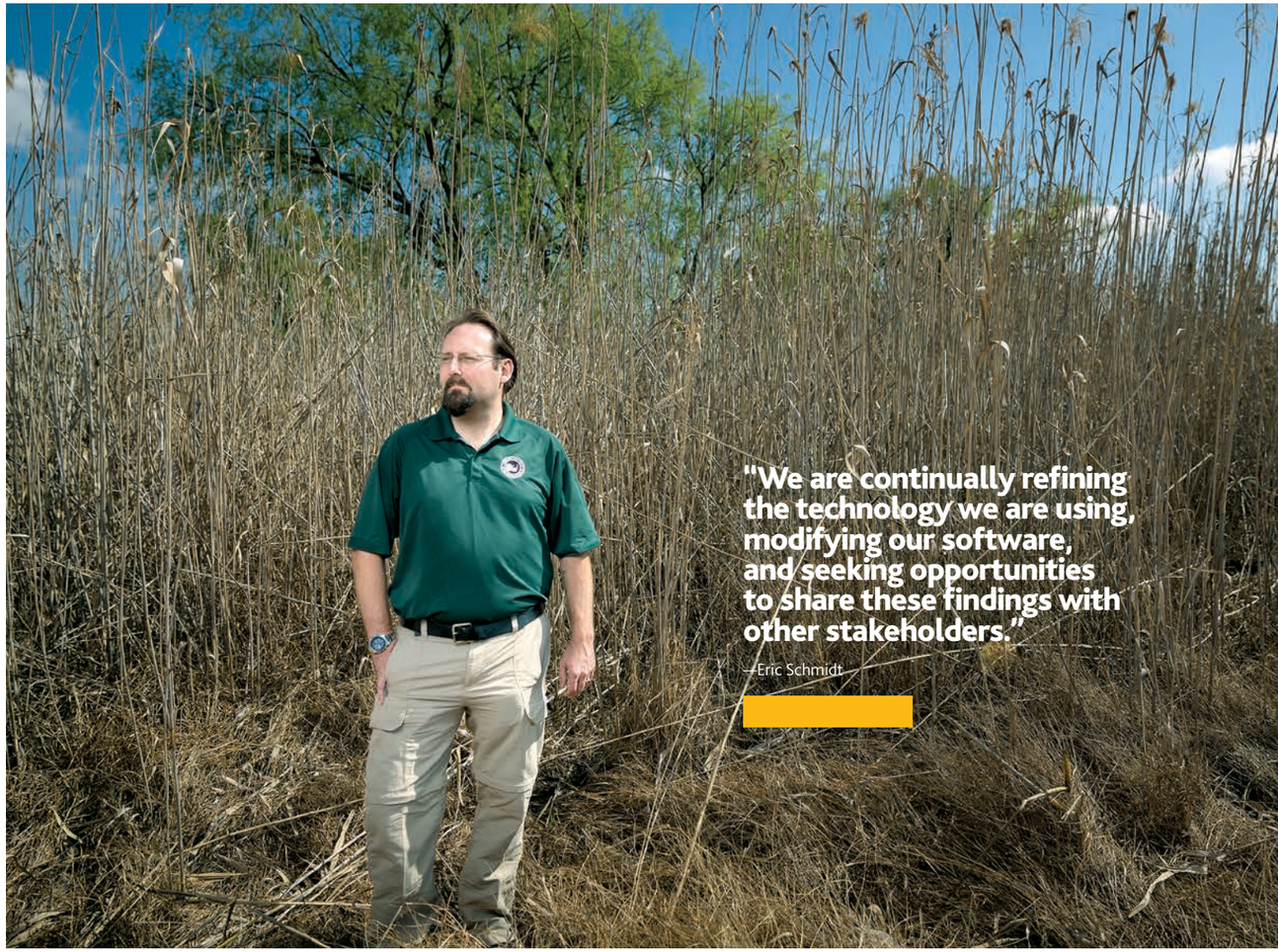


PHOTO BY QUINTIN MILLS

A parallel goal of the South Africa rhino project was to develop best practice examples for other stakeholders in the wildlife conservation community, Mr. Schmidt says. WPS is installing a similar system in two other South African parks this year, and is seeking donors for a US$250,000 technology project in Indonesia to help protect the Sumatran rhino (estimates suggest there are fewer than 300 left in the world). Compared to the South Africa ranch, the team in Indonesia will spend more time mitigating infrastructure risks, such as power and connectivity, prior to launch.

"We are absolutely applying our lessons learned across projects," he says. "There will certainly be new challenges as we adapt the tools from operating in South Africa's bushveld to the rain forests of Sumatra. But the processes and milestones will be mirrored." **PM**