WCS saves wildlife and wild places worldwide through science, conservation action, education, and inspiring people to value nature.

WCS envisions a world where wildlife thrives in healthy lands and seas, valued by societies that embrace and benefit from the diversity and integrity of life on earth.

WCS was the first conservation organization with a dedicated team of wildlife veterinarians and other health professionals deployed around the world.

Our Health Programs Progress Report provides updates and insights on core health contributions to conservation. Together, we are securing a future for wildlife and wild places.
# Table of Contents

2017 PROGRAM HIGHLIGHTS ........................................... 4

NEW ONE WORLD – ONE HEALTH™ PROGRAM WEBSITE .......................... 5

RESPONDING TO WILDLIFE CONFISCATIONS .................................. 6

AFRICAN GREY PARROTS .................................................................. 6

CUTTING-EDGE CONSERVATION .................................................. 7

E-DNA ......................................................................................... 7
ON THE GO TESTS TO FIGHT ILLEGAL WILDLIFE TRADE ......................... 8
RADIO-TELEMETRY TRANSMITTERS FOR PYGMY HOGS ........................... 8
DEFORESTATION AND DISEASE DYNAMICS .................................... 10

DISEASE SURVEILLANCE AND RAPID RESPONSE .............................. 11

MONGOLIAN SAIGA OUTBREAK RESPONSE ........................................ 11
AVIAN INFLUENZA SURVEILLANCE IN COLOMBIA ............................... 12
EBOLA: SAFE SURVEILLANCE IN THE CONGO .................................. 13
WHITE-NOSE SYNDROME IN THE WESTERN UNITED STATES .................. 14
ZOOONOTIC DISEASE RISKS OF WILDLIFE TRADE ............................... 14
SUSTAINABLE SURVEILLANCE NETWORKS IN CAMBODIA AND LAOS 15

SPECIES CONSERVATION ............................................................. 16

SEA TURTLE HEALTH SURVEYS .................................................. 16
GRAND CAYMAN IGUANA ................................................................ 17
RETURNING KULAN TO THE KAZAKH STEPPE .................................... 18
TRANSBOUNDARY DISEASES IN AFGHANISTAN .................................. 19
SOUTHERN RIVER TERRAPIN HEALTH SCREENING ............................. 20
YANGTZE GIANT SOFTSHELL TURTLE ............................................. 21

HIGHLIGHTS FROM NEW YORK .................................................... 22

EXOTIC PHYSICAL THERAPY ...................................................... 22
OCEAN WONDERS SHARK! .......................................................... 23
LONG TERM COMMON LOON MONITORING ..................................... 24
LOCAL WHALE STRANDING AND NECROPSY SUPPORT .......................... 25
DIAGNOSTIC DEVELOPMENTS .................................................... 25

TRAINING FUTURE WILDLIFE HEALTH PROFESSIONALS .................... 26

WILDLIFE PATHOLOGY ................................................................... 26
MONGOLIA VETERINARY AND RANGER TRAINING .............................. 27
AMPHIBIAN HEALTH ...................................................................... 27
TIGER CONFLICT WORKSHOP IN CHINA ........................................... 28
2017 PROGRAM HIGHLIGHTS

**TRAINING**
- 40 Chinese national park and animal health officials trained in human-tiger conflict management
- 6 Congolese trained in African grey parrot triage and rehabilitation
- Colombian veterinarians trained in diagnosis of chytrid fungus and ranavirus
- 16 international veterinary students trained in wildlife sampling & surveillance
- Over 25 Southeast Asian & 20 Mongolian wildlife and animal health professionals trained in wildlife pathology

**DISEASE SURVEILLANCE AND OUTBREAK RESPONSE**
- Western United States White Nose Syndrome: 1,179 bats sampled
- Republic of Congo ecology of ebola investigation: 169 bats sampled
- Colombia avian influenza surveillance: 81 wild birds sampled & released
- Mongolia: 9 juvenile and 49 adult saiga samples tested during a mortality investigation; 10 saiga collared for further monitoring

**WILDLIFE RESCUE, REHABILITATION & RELEASE**
- Cambodia: 43 southern river terrapins examined in pre-release health screenings
- Republic of Congo: over 891 African grey parrots triaged in our rehabilitation centers
- 9 kulan released in Kazakhstan
NEW ONE WORLD – ONE HEALTH™ PROGRAM WEBSITE

The WCS Health Programs have launched a new website where you can learn more about our global initiatives, training opportunities and the wild animal species we work with, from the New York zoological parks and aquarium to the arid grasslands in Central Asia, the humid rainforests of the Congo and beyond.

https://oneworldonehealth.wcs.org/
RESPONDING TO WILDLIFE CONFISCATIONS

African Grey Parrots

Valued around the world as pets, illegal trade of African Grey parrots (Psittacus erithacus) has become a lucrative business for Central African poachers and wild populations are being decimated. The WCS Congo program has for some years run a parrot rehabilitation program and in 2017 oversaw the completion of a new parrot rehabilitation facility at the headquarters of the Nouabale-Ndoki National Park in the northern Republic of Congo (ROC). The new facility can accommodate up to 400 birds and it’s design incorporates the Bronx Zoo Ornithology Department’s advice and the Congo wildlife health team’s knowledge of local field conditions, to enable improved monitoring, veterinary intervention, and provision of treatment to confiscated parrots, all aimed at reducing the mortality of the parrots and returning as many healthy grey parrots as possible back to the forest. A Bronx Zoo husbandry and veterinary team trained local ROC staff on bird capture, handling and medical care with a focus on parrot triage and first-aid to help stabilize their condition on arrival. Detailed protocols were designed to standardize this high-level care for each newly arriving bird. Roughly 1,000 parrots a year come through the centers and now have a much improved chance of making it back to the wild.

Table of Contents

Four African grey parrots fly to freedom when released from the Ngombe facility. J.Paré © WCS
Our E-DNA project uses DNA shed by the animal into the environment to search for one of the world’s rarest turtles: the Yangtze giant softshell turtle (*Rafetus swinhoei*), only four of which are known to exist. Our team is merging two new technologies, not yet commercially available, that include a back-pack device called ANDe™ to capture eDNA (Smith-Root Inc.) and a hand-held DNA detection kit made by Biomeme Inc. We have now shown our methodology is successful at detecting *R. swinhoei*, as well as a variety of other turtle species we have targeted. In the second half of 2017, WCS engaged Biomeme Inc. to manufacture shelf stable kits which are ready to be deployed at our field-testing site at Dong Mo Lake in Vietnam, where one of the last remaining wild *R. swinhoei* is known to exist.
On The Go Tests To Fight Illegal Wildlife Trade

Our DNA Barcoding at the Border project is developing a field-friendly test kit for species identification using genetic material (DNA) that can be extracted from confiscated animal products. Results can confirm the species being illegally traded and be used as evidence in the enforcement of international conservation laws. The use of this kit can disrupt and stop poaching activities along illegal wildlife trafficking routes.

Radio-Telemetry Transmitters For Pygmy Hogs

The pygmy hog (Porcula salvania) is a critically endangered wild suid found only in Assam, India. It is the sole member of the genus Porcula, the rarest of all swine species, and an important indicator of habitat health in the tall grass wetlands that it inhabits. In 1995 the Pygmy Hog Conservation Program (PHCP) was established and through their efforts, pygmy hogs have been successfully bred in captivity, with over 100 individuals released into the wild in Assam. Camera traps have been used to track
outcomes of these releases, but the dense tall grasses of this habitat makes follow-up monitoring challenging. In 2017, WCS joined a team partnering with PHCP colleagues to perform intra-abdominal surgical implantation of novel Very High Frequency (VHF) radiotelemetry transmitters in four pygmy hogs. As hoped, the transmitters have enhanced the opportunity and efficacy of tracking these small and elusive animals since their release and more transmitters are planned for future release candidates.

First Iranian Wildlife Health Guide

Diseases such as Peste des Petits Ruminants are readily spread from livestock to wildlife and have gravely impacted wildlife across Central Asia, including the recent loss of over half the population of saiga (Saiga tatarica mongolica) in Mongolia. Iran has experienced a number of disease outbreaks in wild ungulates, threatening these often small and isolated populations while also decreasing prey availability for the last remaining Asiatic cheetah (Acinonyx jubatus venaticus), now found only in central Iran. WCS and Iranian scientists collaborated to produce the first-ever Persian-language field guide on major diseases impacting Iran’s wildlife. The book is written by Dr. Iman Memarian, chief
veterinarian at the Tehran Zoo, and describes a range of wildlife diseases, many of which are becoming more common due to increasing numbers of domestic livestock, habitat loss, drought, and a growing human population.

### Deforestation and Disease Dynamics

In Cambodia, the EU-funded Laos Cambodia One Health Network (LACANET) project completed a 2-year study on land-use change and its impact on rodent-borne diseases. This study provides a unique and in-depth look at changes in the environment, pathogens and small mammal communities during deforestation. The research is already uncovering some of the mechanisms linking deforestation to emerging infectious diseases, through modification of distribution and density of wild rodent species versus those living in close proximity with humans, expanding our understanding of the linkages between land-use change, conservation and health.

![Deforestation adjacent to a protected area in Cambodia. Mathieu Pruvot © WCS](image)
DISEASE SURVEILLANCE AND RAPID RESPONSE

Mongolian Saiga Outbreak Response

The WCS Mongolia and health staff responded to a mass Mongolian saiga (Saiga tatrica mongolica) mortality event in the Great Lakes Depression of western Mongolia. Saiga census counts organized by World Wide Fund for Nature (WWF) and WCS across the saiga range in March 2017 found a total population of around 4,961, meaning 54.5% of saiga had died since the January 2017 census that recorded over 10,000 animals. The cause was identified as a livestock virus known as Peste des Petits Ruminants or PPR. The disease was first detected in goats and sheep in the saiga range area in August 2016 and subsequently spilled over into wildlife. A WCS team conducted field missions with the Food and Agriculture Organisation of the United Nations, the
World Organisation for Animal Health and the Mongolian Government, to rapidly assess the situation by collecting samples from dead saiga, conducting necropsies on fresh carcasses, evaluating sick saiga, confirming the PPR diagnosis, and providing recommendations on immediate control measures. Later the Mongolia health team conducted a survey of wild ungulate populations in Western Mongolia and placed collars on and collected samples from adult saiga to determine the recovery and immunity against PPR. Data collected determined where and how the disease was spreading so that interventions, such as additional livestock vaccination, can be targeted to prevent further spread. Mongolian Saiga Calf Monitoring was also initiated to assess the transfer of immunity against PPR from mother to offspring.

WCS is working to design effective control strategies for both livestock and wildlife to eradicate PPR and prevent serious long term socio-economic and biodiversity consequences. Increased investments in saiga and habitat protection are needed to ensure that the remaining saiga population can recover after this devastating setback.

**Avian Influenza Surveillance In Colombia**

WCS veterinarians collected samples from 81 wild birds on Sonso Lake and the Pacific coast of Colombia for avian influenza (AI) surveillance, during the 2017 migratory bird season. This work is part of the implementation of a multi-stakeholder plan for AI surveillance adopted as regulation by the Environmental Ministry of Colombia.
Ebola: Safe Surveillance in the Congo

Ebola viruses are a significant threat to great apes in Africa: infected great apes have mortality rates above 90%. Since 2005, when the last Ebola outbreak occurred in the Republic of Congo (ROC), WCS has used a protocol to safely sample great apes found dead by villagers, rangers, and hunters. This protocol underwent important revisions in consultation with partners at the US National Institutes of Health (NIH) following the 2014 human West African Ebola outbreak that claimed over 11,000 lives. The new protocol was rolled out during WCS-NIH joint trainings in Bomassa in January and March 2017. Training skills were immediately put to use as chimp carcasses were detected and sampled that same month. An immediate benefit of the new approach is our ability to test deactivated samples in country, instead of requiring a lengthy international sample export process, greatly speeding up diagnostics.

As part of our study of the disease ecology of ebola viruses, WCS and NIH staff conducted a joint sampling mission to track the movement of hammer-headed fruit bats (Hypsipyle monstrosus) in the ROC. Knowledge of how these bats utilize forest resources and move seasonally will help us understand their role as potential ebola virus hosts with downstream impacts on great apes. In addition to collecting swab and blood samples from the bats, Very High Frequency (VHF) radio transmitters (Holohil BD-2, 0.75g) were attached to ten bats. We established that solar-powered collars that can communicate GPS location data over VHF and do not need to be retrieved should work well in the future for tracking this population.
White-Nose Syndrome in the Western United States

White-nose syndrome (WNS) is a fungal growth that alters the physiology and bioenergetics of bat hibernation, and ultimately leads to increased arousal frequency, depletion of fat reserves, and bat death. In just eight years WNS spread into 31 states, from Maine to Washington, and five Canadian provinces. Biologists estimate more than 5.7 million bats of seven different species have succumbed to the disease; the ecological and economic implications of this die-off could be immense. WCS continues to lead a four-year research project to identify species of western bats that may be susceptible to WNS. Bioenergetic measurements that can help predict western bat susceptibility to white-nose syndrome (WNS) are lacking and the study is collecting key bioenergetic information to use it to help inform management and intervention options in the West to help ensure long-term survival of threatened species.

Zoonotic Disease Risks of Wildlife Trade

In Lao People's Democratic Republic (PDR) the EU-funded Laos Cambodia One Health Network (LACANET) project completed a large study investigating the risk of zoonotic disease transmission from bushmeat consumption. Alongside sampling of animals in trade, the WCS health team conducted a series of interviews with wildlife consumers and vendors to better understand the attitudes and practices related to bushmeat trade and consumption. The quantitative information on this practice collected will be integrated into a risk analysis to answer practical questions for both wildlife managers and public health authorities, highlighting links between conservation and health.
Sustainable Surveillance Networks
in Cambodia and Laos

The EU-funded Laos Cambodia One Health Network (LACANET) project has made significant progress in establishing the first surveillance systems for wildlife mortality and diseases in Cambodia and Laos. In Cambodia, the surveillance network now covers over 18 protected areas, including two wildlife rescue centers. In Laos, wildlife health surveillance has been deployed in five provinces, covering the Nam Et Phou Louey and Nam Kading protected areas. The surveillance networks have made possible the investigation of numerous wildlife mortality events, identifying threats to wildlife, some of which are also of great significance for public health. Building on the strength of the LACANET project outcomes, we are now working with the governments of each country on the co-development of sustainable wildlife health surveillance strategies with the Ministries of Agriculture and Forestry and Ministries of Environment.

Training Cambodian Rangers Participating in the Wildlife Disease Surveillance Network.
M. Pruvot © WCS
Sea Turtle Health Surveys

New York-based health staff have provided a health component to WCS Belize sea turtle surveys at Glover’s Reef since 2007. Objectives of these annual surveys include: to determine the absolute abundance of the three turtle species at Glover’s Reef; increase our knowledge of their movement and habitat use; assess their genetic stock; study their growth rates; and build capacity of local stakeholders to collect accurate and standardized data.

This year, 12 sea turtles were located and physical examinations were performed on each sea turtle, with all found to be in good body condition and free of fibropapillomas. Epibiont samples were collected for isotope analysis to determine the region of the ocean where the turtles acquired them, and other samples taken for hematologic, biochemical, contaminant, genetic, molecular, and other tests. Sample processing and partial analysis were conducted at Glover’s Reef, and samples were then imported to the US for additional analysis. Satellite transmitters were attached to the carapace of three sub-adult hawksbill turtles to study long range movement off the Atoll to help better understand their life habits. All turtles were released unharmed at the location of collection.
Grand Cayman Iguana

Once numbering in the thousands, the population of the Grand Cayman iguana (*Cyclura lewisi*), found only on Grand Cayman, plummeted to less than 20 wild iguanas by 2002. Since 2001, WCS’s health team has provided veterinary support for the National Trust for the Cayman Islands Blue Iguana Recovery Programme, in conjunction with the Cayman Islands Department of the Environment and IUCN Iguana Specialist Group and over 900 captive bred iguanas have been released to the wild. There had been excellent survival of released animals but in recent years, dog mortalities resulted in the death of many wild adults and a disease outbreak also occurred in both wild and captive iguanas that resulted in sickness and deaths. In 2017, an additional suspected death from the infectious disease meant release of captive animals remained on hold. Construction of a fence around the park to prevent dogs from entering is nearly completed, and we continue to investigate the epidemiology of the novel *Helicobacter* bacteria responsible for the disease outbreak.

A WCS veterinary team from New York examined 91 captive-reared iguanas on Grand Cayman in June. All iguanas were in good to excellent physical condition and releases resumed with newly instituted pre-release quarantine protocols. While we believe all the obstacles can be overcome and resolved in time, the events of the last past few years have delayed the anticipated discontinuation of the breeding program and postponed achievement of the population recovery goals.

Veterinary technician obtaining a blood sample. Paul Calle © WCS
Returning Kulan To The Kazakh Steppe

For the first time in more than a century, Asiatic wild ass or kulan (*Equus hemionus*) are again roaming the central steppes of Kazakhstan. Kulan once ranged across the Middle East and Central Asia—from the Mediterranean to the east of Mongolia. During the last two centuries, their range has been dramatically reduced to less than 3% of their former range.

In October 2017, WCS health staff assisted with the translocation and release of 9 kulan into an acclimatization enclosure within a Kazakh protected area. As part of a pilot project to test methodology and logistics of animal capture, handling, transport, and release, the animals were transported 1,200 km by helicopter from Altyn Emel National Park in the southeast of the country and will be released in early spring: the first step in a multi-year collaborative project to restore large herbivores to this unique steppe habitat.
Wild Camelid Health: The Vicuña

One of the most significant threats facing the vicuña (Vicugna vicugna) is mange caused by the scabies mite. The disease severely impacts the health and even survival of these animals; studies of some vicuña populations have found that approximately 60% of animals have the disease. The health teams in Bolivia and Peru procured initial funding to support local efforts in both countries to increase livelihood resilience and protect biodiversity by addressing the complex interactions between vicuña health, management practices, mining activities, and climate change.

Transboundary Diseases in Afghanistan

The emergence of Peste des Petits Ruminants (PPR) in Central Asia led WCS Afghanistan’s health team to implement a large-scale vaccination campaign of livestock in the Wakhan National Park to help prevent transmission of disease from domestic to wild animals, including the three main wild ungulate species: the Marco Polo sheep (Ovis ammon polii), the urial (Ovis orientalis vignei), and the Siberian ibex (Capra sibirica). The campaign was successfully carried out in October 2017 by local para-veterinarians trained and contracted by WCS: over 8,000 sheep and goats in potential contact with the rare wild urial sheep were vaccinated against PPR. Additionally, 2,159 sheep and goats sharing pastures with Marco Polo sheep in Big Pamir were treated with a systemic anti-parasite treatment to prevent the dissemination of mange to Marco Polo sheep.
The Southern river terrapin (*Batagur affinis edwardmolli*) is a critically endangered Southeast Asian turtle, with less than 700 turtles estimated to exist globally. WCS established a captive rearing and head-start program for this species in Cambodia in 2006 and have since raised more than 250 turtles. Releases to the wild commenced in 2015, with our health staff conducting pre-release examinations and disease screening to ensure that release candidates were in good condition. In the fall of 2017, prior to further scheduled releases, a health team conducted examinations and sampling for health and genetic screening of 43 turtles at the Koh Kong Reptile Conservation Center. Determination of baseline individual animal and population health status and knowledge of any pathogens present are vital when considering risk vs. benefit for reintroduction programs and to determine optimal treatment if health issues occur in the captive population. Overall, turtles were in good health, although some laboratory results suggest suboptimal nutrition that will be corrected through dietary supplements.
Yangtze Giant Softshell Turtle

The Yangtze giant softshell turtle (*Rafetus swinhoei*) is the most critically endangered turtle in the world, with only four known to exist: two in Vietnam and a breeding pair at the Suzhou Zoo in China. WCS has contributed to the conservation of this species for over ten years, serving a key role in establishing breeding agreements between the Changsha and Suzhou Zoos, the China Zoo Association, and the Turtle Survival Alliance (TSA). Since the pair of Rafetus was brought together in 2008, despite observed breeding behaviour and laying of hundreds of eggs, none have been fertile. A reproductive evaluation determined the male had a penile abnormality preventing normal breeding. Artificial insemination was performed in 2015 and 2016, but did not result in fertile eggs. For the 2017 insemination attempt, a WCS veterinarian led the sedation of the Rafetus pair working with veterinarians from Changsha and Suzhou Zoos, the Department of Reproduction Management of the Leibniz Institute for Zoo and Wildlife Research in Berlin, and the TSA. This year’s sperm sample was the best obtained yet, and for the first time insemination was successfully performed in the oviduct through a cloacal approach, but unfortunately no fertile eggs resulted. With successful natural breeding unlikely, artificial insemination is the last and best hope for this species’ survival.

Artificial insemination of the Yangtze giant softshell turtle. P Calle © WCS
A one-month-old female snow leopard (*Panthera uncia*) at the Bronx Zoo was observed to have serious rear limb muscle abnormalities on emerging from the cubbing den. She had normal use of her forelimbs, but could not bring the rear legs under her body, bear weight, or walk, similar to a condition in dogs called “swimmer puppy syndrome.” The cause is thought to be a musculoskeletal developmental abnormality. The cub's daily care included corrective bandaging, splinting, hobbling, and physical therapy and then reuniting her with her mother at the end the day. The Animal Medical Center’s Tina Santi Flaherty Rehabilitation and Fitness Service, also provided us with expert consultation. The cub responded excellently and after more than 2 months of daily care, had nearly normal function of her legs and could be seen on exhibit at the Bronx Zoo’s Himalayan Highlands exhibit.
For the new Ocean Wonders Shark! Exhibit at the New York Aquarium, all quarantine and acclimation procedures, critical to ensure healthy animals for exhibit, were overseen by the WCS’s Aquatic Health Department. In quarantine, all or a subset of animals receive an intake examination that includes skin scrapings, gill and fecal examinations to identify parasites and bloodwork to assess overall health. Based on results of these examinations a quarantine treatment plan is developed. Any animals that die receive a post mortem examination and histologic review of tissues to evaluate for possible disease issues. In March and April 2017, our health team received, examined, and performed quarantine processes on 43 sharks, 26 rays, and approximately 1,000 fishes. An additional several thousand fish are undergoing quarantine at two off-site facilities which follow protocols developed by WCS veterinarians and are monitored for compliance during multiple site visits illustrating the complexity and collaboration required for quarantine in aquatic settings.
Long Term Common Loon Monitoring

Coal-fired power plants in the Midwest and Northeast produce mercury and acidic emissions that pollute the environment. This smoke contains toxins that rain down on the Northeast as acid rain containing mercury, which is then deposited in the lakes, and through zooplankton up the loon’s food chain including crayfish, amphibians, and fish. Common loons (*Gavia immer*) nest, feed, and raise their young on these lakes, and serve as excellent sentinels for mercury surveillance.

Since 2003, WCS’s veterinarians have provided health support for a long term common loon research program in New York’s Adirondack State Park, investigating the loon’s mercury levels and the effect it has on the bird’s health, reproduction, and immune function. Our veterinarians provide any needed medical treatments or emergency care and collect samples for analysis.

The data generated assists in defining the impacts of mercury on common loons and their offspring and facilitates effective enactment and enforcement of laws to limit environmental mercury released from Midwestern power plants.
Local Whale Stranding and Necropsy Support

Initial responders such as the Atlantic Marine Conservation Society, Riverhead Foundation, Bronx Parks Department, and New York City Police Department often request assistance from WCS in the event of whale strandings: In early April, 2017 a dead humpback whale (*Megaptera novaeangliae*) washed ashore in the Rockaways, and our pathology technician assisted with the necropsy with the cause of death determined to be due to trauma, probably a boat strike; On 23 April, a 4 m long live minke whale (*Balaenoptera bonaerensis*) stranded in the Bronx. Despite attempts to return the whale to deep water, the whale restranded and due to its debilitated condition and poor prognosis, we were asked to assist in euthanizing the whale. Our pathology team assisted with the necropsy and found lesions that indicated a systemic infectious disease as the cause of the debilitation leading to the stranding.

**Diagnostic Developments**

Our laboratory developed a new molecular test for the bacteria *Helicobacter*, responsible for recent deaths of Grand Cayman iguanas (*Cyclura lewisi*). We confirmed that this is a novel never-before-seen pathogenic *Helicobacter sp.* most closely related to other reptilian *Helicobacter sp.*

Our laboratory continues to test and validate a handheld PCR unit for diagnosis of canine distemper virus.
TRAINING FUTURE WILDLIFE HEALTH PROFESSIONALS

Wildlife Pathology

WCS veterinarians led practical, field-based wildlife pathology training workshops in Lao PDR, Mongolia and Vietnam. The goal of the training was to advance the skills of local wildlife health staff, veterinary students and collaborating partners at local wild animal rescue centers and in local governments across Asia so they are better prepared to respond to disease outbreak events, monitor disease threats to wildlife species, access resources for advice and advanced diagnostics when questions cannot be answered locally, and to serve as a critical networking event linking wildlife health staff across Asia with our New York based specialists in wildlife pathology and advanced disease diagnostics. The workshop was led by WCS Head of Pathology and participants included staff from Laos, Cambodia, Vietnam, Myanmar and Mongolia.

Soon after the workshop in Mongolia, Mongolian saiga antelope (Saiga tatarica mongolica) deaths were reported in the field and local responders were able to implement techniques learned at the seminars. The head of the Provincial Veterinary Laboratory, a participant in the WCS-led workshops, was instrumental in teaching and demonstrating necropsy techniques to local veterinarians. This “training of trainers” approach is essential for sustainable dissemination of proficiencies.
Mongolia Veterinary and Ranger Training

WCS veterinarians collaborated with the Food and Agriculture Organization (FAO), the Veterinary and Animal Breeding Agency and the Khovd Province Veterinary Laboratory in August to train local district “soum” rangers and veterinary and animal breeding units in wildlife surveillance, monitoring and sample collection and shipping protocols.

Amphibian health

The amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) and ranaviruses have been implicated in the rapid decline of a number of South American amphibian species across the continent. The WCS Colombia health team conducted a workshop to train veterinarians from the Molecular Laboratory of Corporación Universitaria Lasallista to standardize tests for the diagnosis of the chytrid fungus and ranavirus to prepare for the initiation of surveillance for these diseases in Colombia as per the Amphibian Conservation National Strategy.
As China commits to the recovery of Amur tigers (*Panthera tigris altaica*), the animals are reappearing in places where they had not existed for decades. Cattle depredations and interactions between tigers and people are increasing. Our WCS Russia team has spent over a decade working with the Russian government to address human-tiger conflict. So in March 2017, members of the WCS Russia Program and veterinarians, along with Wildlife Vets International, to lead a workshop addressing such situations in Changchun, Jilin Province. The workshop was focused on Provincial Forestry staff responsible for dealing with these situations on the ground, but attracted over 40 people including a wide range of government officials, veterinarians, and scientists and covered the theory and background on causes and types of conflict, mitigation options, physical capture techniques and safe methods to anesthetize tigers, followed by practical training in tiger capture and anesthesia at a local zoo.
Thank you for helping us save wildlife and wild places around the globe

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