

by Aaron Nicholas,  
Andrew Dunn,  
and Dirck Byler

# Conserving the Most Endangered Gorilla

Great apes capture our imagination in part because of their remarkable similarity to humans. In habitats spanning the equatorial areas of West and Central Africa, as well as Southeast

Asia, apes serve as flagship species for complex ecosystems that support a wide array of animals and plants. All of these highly intelligent, charismatic ape species face a combination of threats: habitat

destruction, hunting, disease, and conflict with people. The U.S. Fish and Wildlife Service's Great Ape Conservation Fund (WWB-GACF), part of the *Wildlife Without Borders* program, supports projects to address these threats. At the same time, the fund helps to build the human and institutional capacity necessary to improve the status of ape populations worldwide.

---

**Nyango is the name given to the only Cross River gorilla in captivity. To date, only a handful of images exist of this incredibly elusive animal in the wild. The Cross River gorilla has sought refuge from humans in the most rugged and inaccessible highlands that form the headwaters of the Cross River.**

Research supported by WWB-GACF has yielded exciting advances in our understanding of apes, including evidence of sophisticated tool use techniques by chimpanzees, dietary needs and habitat preferences, protocols to prevent disease and limit transmission, improved law enforcement, and trans-boundary ranger-based monitoring systems. It has worked with partners in nearly all 22 of the countries in which apes are found.

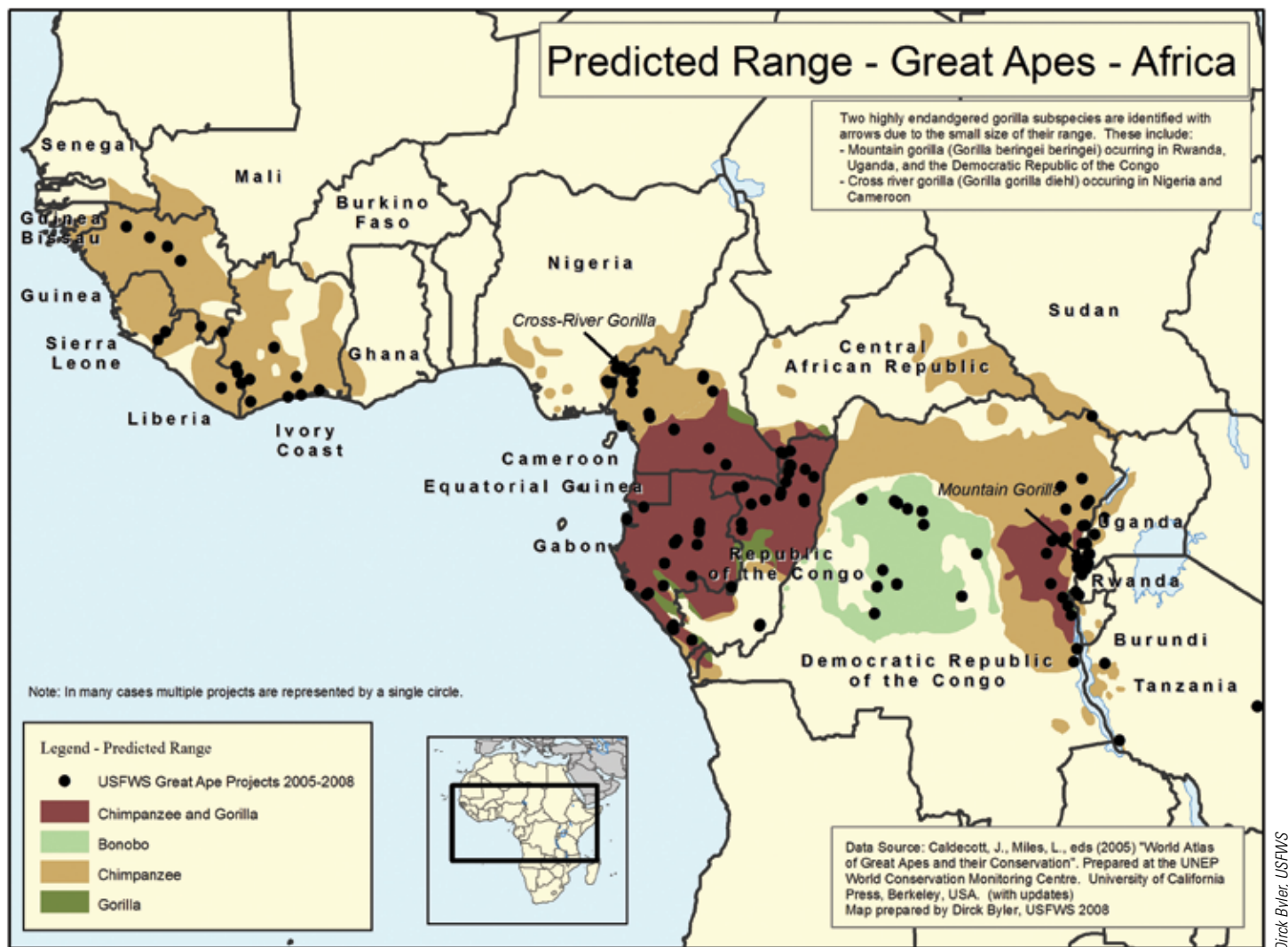
One of Africa's emblematic great apes is the gorilla. Four subspecies are acknowledged today: the Eastern lowland gorilla, mountain gorilla, Western lowland gorilla, and Cross River gorilla (the most western and northern form). The Cross River gorilla (*Gorilla gorilla diehli*) is the most critically endangered subspecies. With a population less than half of its better known cousin, the mountain gorilla (*Gorilla beringei beringei*), it is perhaps surprising that the plight of the Cross River gorilla is not more widely known.

## Back from the Brink

Inhabiting a remote corner of West Africa that straddles the border of



Nicky Lankester, Limbe Wildlife Centre



USFWS Great Apes Conservation Fund projects and species distribution.

Nigeria and Cameroon, the Cross River gorilla was once largely neglected by conservationists. Many believed it was likely extinct (Cousins, 1978) until its rediscovery in the early 1980s (Oates 1999). In recent years, our understanding of the Cross River gorilla has benefited from systematic surveys and field studies of its ecological and behavioral characteristics. The bad news is that we now believe fewer than 300 Cross River gorillas remain, distributed in about 12 discrete mountain refuges across a landscape the size of Connecticut. Based on the small population, its fragmentation across a large landscape, and the threats posed by habitat destruction and hunting, the Cross River gorilla is recognized by the International Union for the Conservation of Nature (IUCN) as "critically endangered."

### Challenges to conservation

The challenge we face is how to develop an effective conservation strategy for a highly fragmented, slowly reproducing population of great apes distributed across two countries in a region containing some of the highest human population densities in Africa. At the local level, hunting of gorillas to fuel the region's bushmeat trade and the continuing erosion of habitat connectivity remain the greatest obstacles to conservation.

Although the number of Cross River gorillas has declined rapidly in the past hundred years or so, probably because of the introduction of hunting with firearms, the outlook is far from bleak. Carefully planned, painstaking research over the last few years provides renewed hope and direction for conservation. After conservationists and researchers raised aware-

ness about the bushmeat problem, the hunting of Cross River gorillas dropped to a low level, but it is still a potential threat, as are wire-snare traps set for other animals.

As recently as 2005, conservationists were unsure if the geographic division of the population had already weakened the genetic pool. No information on the viability of apparently isolated groups of gorillas was available. However, recent work by Dr. Richard Bergl of the North Carolina Zoo revealed encouraging findings (Bergl and Vigilant, 2006) on gorilla genetics. Based on DNA analyses of material collected from gorilla feces, he found that the Cross River population showed clear evidence of genetic sub-division into three main groups. Evidence from the 71 gorillas he studied confirmed that individuals continue to move among



**Despite the fact that national laws prevent the hunting of great apes in both Cameroon and Nigeria, hunting of gorillas still poses an immediate threat to their survival. These skulls were confiscated from hunters in Cameroon during survey work.**

certain sites. Overall, the genetic diversity of the Cross River gorilla population is comparable to two mountain gorilla populations in the Virunga Mountains and Bwindi National Park. Even more encouraging is the fact that Cross River gorillas have much more viable habitat available than their mountain kin to the east, so there is potential for population recovery.

Since 2004, with support from WWB-GACF, the Wildlife Conservation Society has undertaken numerous field surveys to complete the picture of Cross River gorilla distribution. Based on spatial models developed by Bergl that predict gorilla distribution and connectivity, the results from these surveys have been encouraging. Gorilla sign has been found in numerous locations between previously

known sites, confirming that connectivity remains.

#### **Working together to solve the puzzle**

Since the development of a Regional Action Plan for the Conservation of the Cross River Gorilla (Oates et al. 2007), work has been rapid. Today, many key Cross River gorilla sites are under some form of formal or community-based protection, although the effectiveness varies. In 2008, support from the Great Ape Conservation Fund helped the Cameroon government create two new protected areas – the Kagwene Gorilla Sanctuary and Takamanda National Park – that will benefit roughly one-quarter of all known Cross River gorillas. Additionally, with support from WWB-GACF and the Arcus Foundation, the Wildlife Conservation

Society launched a trans-boundary management program that brings government staff from Cameroon and Nigeria together to characterize, prioritize, and protect the habitat corridors linking key Cross River gorilla sites. The WWB-GACF has identified the Cross River gorilla's range as a priority landscape, and it plans to intensify efforts to engage local stakeholders in gorilla protection. It will also increase training opportunities for wildlife conservation staff in government and local organizations.

For the first time in decades, we believe there is real hope for the Cross River gorilla.

#### **Literature Cited**

- Bergl, R.A. and Vigilant, L. 2007. Genetic analysis reveals population structure and recent migration within the highly fragmented range of the Cross River gorilla (*Gorilla gorilla diehli*). *Molecular Ecology* 16: 501-516.
- Cousins, D. 1978. Gorillas – A Survey. *Oryx* 14: 254-258.
- Harcourt, A.H., Stewart, K.J. and Inahoro, I. 1989. Gorilla Quest in Nigeria. *Oryx* 23:7-13.
- Groves, J.L. 2001. Gorillas of Takamanda, Mone and Mbulu forest, Cameroon. *Gorilla Journal* 22: 27-29.
- Oates, J. F. 1999. *Myth and Reality in the Rainforest*. University of California Press: Berkeley.
- Oates, J., et.al. 2007. Regional Action Plan for the Conservation of the Cross River Gorilla (*Gorilla gorilla diehli*). IUCN/SSC Primate Specialist Group and Conservation International, Arlington, VA, USA.

---

*Aaron Nicholas is Director of the Wildlife Conservation Society's Takamanda-Mone Landscape Project in Cameroon. Andrew Dunn is the Nigeria Coordinator for the Wildlife Conservation Society. Dirck Byler is the program officer for the U.S. Fish and Wildlife Service's Great Ape Conservation Fund and Wildlife Without Borders-Africa.*

# Elephant Damage, DNA, and Dung

by Dr. Michelle Gadd

When Teddy Roosevelt was President, as many as 10 million elephants roamed sub-Saharan Africa. By 1989, however, fewer than 500,000 elephants remained in a tiny fraction of their former range. That year, countries party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) voted to list elephants as an Appendix I species, curtailing unregulated commerce in ivory. Also in 1989, the U.S. Congress passed the African

Elephant Conservation Act and established the African Elephant Conservation Fund, which is administered by the U.S. Fish and Wildlife Service (FWS).

African elephant numbers have recovered in some countries, but are declining in others due to poaching, habitat loss, and conflicts with people. Today, an estimated 600,000 elephants remain in Africa. In western Africa, elephants are severely imperiled, surviving only in small populations within isolated habitat remnants.

Forest elephants (*Loxodonta cyclotis*) in central Africa continue to lose ground to logging and poaching for their ivory and meat. By contrast, some populations of savannah elephants (*Loxodonta africana*) in southern Africa are steadily increasing within confined protected areas, but they lack the space to migrate or shift their range in response to needs for food and water. In some parts of eastern Africa, elephants still occur outside of protected areas, but throughout the continent, con-

A group of male African elephants in the study area.



Patrick Chiyo/Duke University

Conflict between elephants and local people is on the rise, particularly as more land is converted to agriculture.

From 2004 to 2008, the *Wildlife Without Borders*-African Elephant Conservation Fund (WWB-AFECF) provided \$6.5 million to 137 projects, leveraging over \$16 million in matching funds from other donors. More conservationists from Africa and elsewhere seek funds from the FWS for work in Africa every year, but we are able to support only about one-third of the requests. However, the conservation dollar goes a long way in Africa, and each year our grantees achieve amazing success with relatively little money. The WWB-AFECF prioritizes projects that address illegal hunting, illegal trade, protected area management, capacity building within range states, community-based conservation, and reducing human-elephant conflicts.

### The problem

Like any clever animal, elephants are attracted to free, tasty food. Ripening crops make an easy and nutritious meal, but unwanted forays lead to conflict between farmers and elephants. A single elephant can eat a family's entire annual harvest in one night. Farmers often resort to chasing or shooting at elephants entering their fields, which too often has tragic results for both. Numerous people are killed each year attempting to defend their harvest, and vast numbers of elephants are killed while "raiding" a crop or in retaliation for raiding by other elephants.

Communities are desperately seeking solutions to prevent or minimize losses of crops to elephants and other wildlife. In order to do this, they need to understand how crop-raiding occurs. Is the problem limited to certain "problem elephants" or "rogues," or will all elephants with acute senses be tempted to invade fields and eat what they can?

### What one FWS grantee is doing to help

Patrick Chiyo, a Ugandan graduate student working with Dr. Susan Alberts



Jenny Tung/Duke University

**Although it may not be the side of wildlife research commonly seen in nature documentaries, Patrick Chiyo's studies of elephant dung are yielding valuable genetic information about which individuals are raiding crops. The findings may lead to management practices that will allow elephants and people to coexist.**

at Duke University, had an idea that would help answer these questions. In recent years, technology has improved to the point that we can extract DNA from dung. From the dung left behind by crop-raiding elephants, we can easily determine the sex of the raider and distinguish one individual from another.

In 2006, Chiyo received a grant from the WWB-AFECF to study crop raiding around Amboseli National Park in southern Kenya. When elephants entered farm fields, he followed and sampled the dung left behind by the trespassers. He chose Amboseli not only because agriculture is encroaching upon elephant range at an alarming rate there, but because he could collaborate with the Amboseli Elephant Research Project, the longest running study of savannah elephants on earth. This collaboration allowed him to interpret crop raiding behavior and other individual characteristics already known by AERP researchers. This way, he could determine how such risky behavior

begins and whether it is more common in related individuals or is influenced by other life history traits and social characteristics (age, sex, dominance, group size).

After completing his doctoral dissertation at Duke University, Chiyo hopes to return to his home country to put his knowledge and experience to work. Thus far, his study has already revealed crucial insights. Testing the dung left at 274 crop raiding events, he proved that crop raiding was strongly linked to the offender's sex—all of the incursions were by males!

Some researchers had hoped human-elephant conflict could be reduced by placing GPS collars on the individuals that raid crops, then using real-time data to anticipate and prevent future raiding events when those animals approach farming areas. On the other hand, managers hoped that collaring matriarchs (adult females that lead their groups of related females and offspring)

to get a handle on large herds. However, Chiyo's results indicate that collaring matriarchs or family groups is unlikely to solve the problem; crop raiders are overwhelmingly males, which are by and large solitary creatures. The explanation may be that females are more cautious than males, and the fear of encountering people may exceed the pay-off of a high calorie snack.

Among Chiyo's other important findings are that crop-raiding males are larger for their age than non-raiders, half of the male population at Amboseli raided crops at least once during the study, and some individuals are repeat offenders. With these insights, we now have a better idea about the extent of the problem and which management interventions may or

may not work. We look forward to other new questions and approaches suggested by the study, with the hope that we can find successful ways for elephants and people to coexist.

---

*Dr. Michelle Gadd, an Africa program officer in the FWS Division of International Conservation, can be reached at [michelle\\_gadd@fws.gov](mailto:michelle_gadd@fws.gov).*

For more information on the African Elephant Conservation Fund, visit: [www.fws.gov/international/DIC/species/afe/african\\_elephant.html](http://www.fws.gov/international/DIC/species/afe/african_elephant.html)

**Amboseli Elephant Research Project staff identifying individuals in the wild.**



Patrick Chiyo/Duke University

by Ira Seligman



# Ramsar and the Ugly Duckling of Ecosystems

Not so long ago, many people considered wetlands nothing but disease-ridden swamps, unsightly and devoid of any ecological or aesthetic value. As a result, wetlands were often drained, filled, or otherwise modified to accommodate development. In the last 30 years, however, the important roles they play in healthy environmental systems have become better known. Not only do wetlands act as a natural groundwater filter and a defense against floods, they are also the most biologically rich of all ecosystems.

As recognition grew about the significance of wetlands, a movement to devise a multi-national agreement for their conservation emerged. In 1962, a conference led by the International Union for the Conservation of Nature (IUCN) and other organizations made the first international attempt to conserve wetlands, primarily as a means to protect waterfowl habitat. It later became clear that their primary habitats, wetlands, were at greater risk. In 1971, an agreement called the Convention on Wetlands of International importance was signed by 18 nations in Ramsar, Iran.

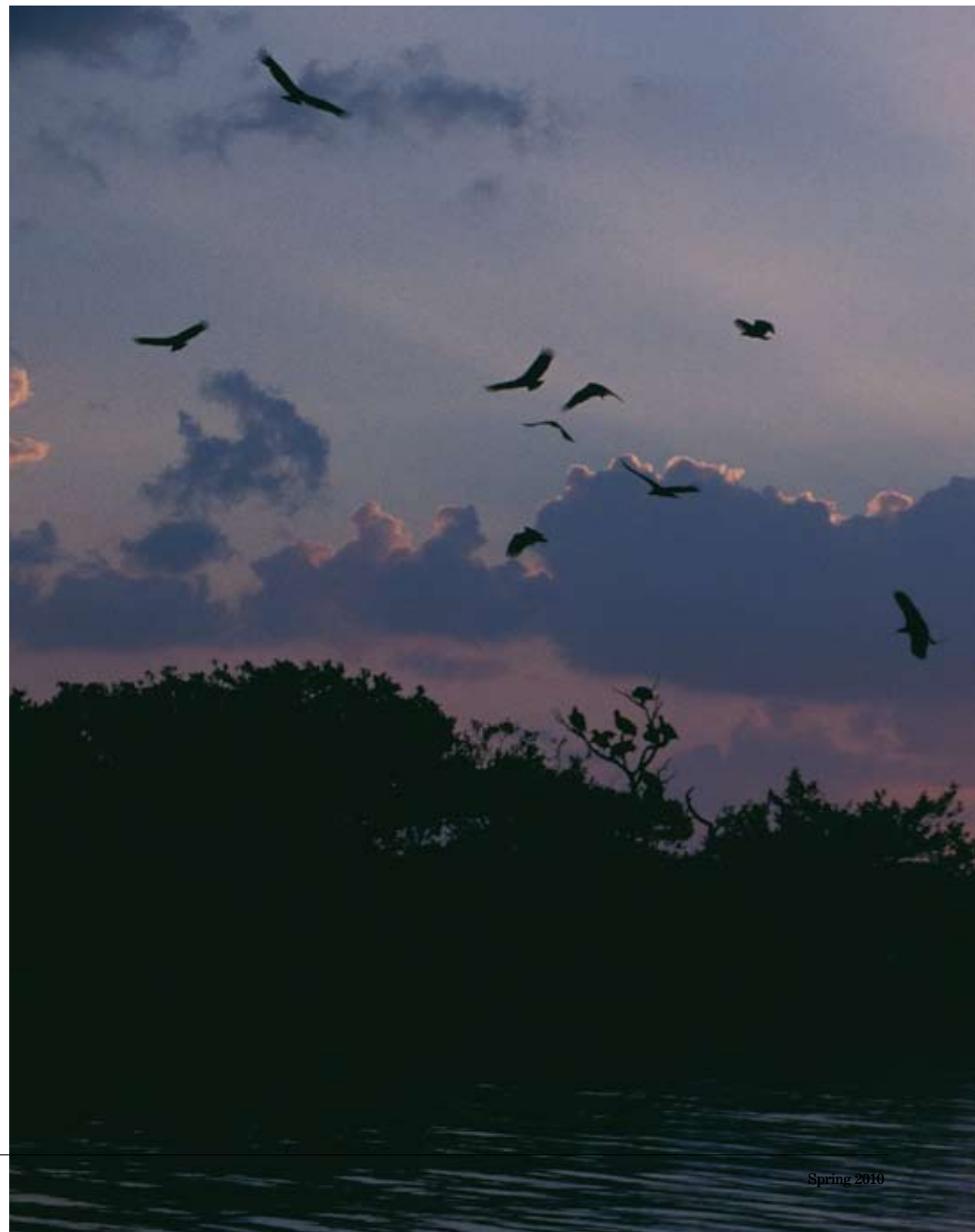
Under the agreement, popularly known as the Ramsar Convention, signatory countries must designate at least one “wetland of international importance,” also known as a Ramsar site. They are also expected to ensure the “effective management” of all designated Ramsar sites within their boundaries and practice their “wise use” through “national land-use planning, appropriate policies and legislation, management actions, and public education.” Currently, 159

countries have a total of almost 1,900 Ramsar Sites.

In the United States, the U.S. Fish and Wildlife Service is the administrative authority for the Ramsar Convention. Twenty-seven Ramsar sites have been

listed in the U.S., including at least 10 sites within the past decade.

Not only does the Ramsar Convention raise awareness of the importance of wetlands, it also allows non-profit organizations, government agencies,



and local citizens to join in conservation efforts. Nowhere is this more apparent than at the Corkscrew Swamp Sanctuary in Collier and Lee counties near Naples, Florida. Unlike most Ramsar sites, the Corkscrew Swamp Sanctuary is privately owned and managed. The National Audubon Society purchased the site in 1954 to protect one of the largest remaining bald cypress (*Taxodium distichum*) forests in North America. In light of recent, large-scale development in southern Florida, the Sanctuary, now managed by Audubon of Florida, has become an

invaluable preserve for Florida's dwindling natural ecosystems.

Indeed, the sanctuary is host to a number of endangered plants and animals, including such notable endangered species as the Florida panther (*Puma concolor coryi*) and the wood stork (*Mycteria americana*). It also provides habitat for the extremely rare and popular American ghost orchid (*Dendrophylax lindenii*), a species introduced into popular culture by the book, *The Orchid Thief*, and a related film, *Adaptation*. As a result, the Sanctuary has become a thriving eco-

tourist destination attracting more than 100,000 visitors annually.

But this success brings a number of challenges. For example, once visitors surpassed 100,000 annually, Florida state law required the Sanctuary to build a sewage system. This posed a unique opportunity: instead of constructing an on-site treatment facility, Audubon of Florida elected to take a novel approach, constructing a "Living Machine." Through the construction of artificial marshes, the Living Machine uses the natural filtering capabilities of wetlands to cleanse and restore its water supply. Not only does the Living Machine provide clean water; it also provides a meaningful opportunity for public education on the ecological value of wetlands.

In managing Corkscrew Swamp Sanctuary, Audubon of Florida must also face external challenges. While the area is largely protected from development because of a variety of state and federal laws, including the Endangered Species Act, the Sanctuary's managers must deal with the destructive potential of invasive plants, including Australian melaleuca (*Melaleuca quinquenervia*), Old-World climbing fern (*Lygodium microphyllum*), Brazilian pepper (*Schinus terebinthifolius*), and water hyacinth (*Eichhornia crassipes*). While these are some of the more insidious invasive species, it is by no means an exhaustive list.

In recent decades, the public perception of wetlands has shifted dramatically. Once considered ecological wastelands, wetlands are now recognized for the important environmental services they provide. Conservation efforts promoted by the Ramsar Convention continue to raise public awareness, as illustrated by the success of Corkscrew Swamp Sanctuary.

---

*Ira Seligman is a third year law student at Pace University in New York, and interned for the U.S. Fish and Wildlife Service's Division of International Conservation in the summer of 2009, working on the Ramsar Convention.*

---

**Pelican Island National Wildlife Refuge in Florida, the first federal bird sanctuary and one of the U.S. Ramsar sites, provides habitat for a wide variety of wildlife, including endangered species.**



© Ryan Hagerly



by Dr. Meenakshi Nagendran

# Conservation for Human and Ecological Health

**G**lobal climate change, invasive species, emerging infectious diseases... the list of ecological and human health issues that cut across global boundaries continues to grow. What does this mean

for biodiversity? These stressors make the conservation of biological diversity an increasingly difficult challenge.

Protected areas around the world, including national parks and sanctuar-

---

Amphibians like the Panamanian golden frog are in severe trouble due to both disease and the effects of climate change.



Tim Vickers

ies, are very important for absorbing and storing carbon dioxide, one of the primary global warming gases. These areas are also crucially important centers of biological diversity. Conserving biodiversity must therefore be an important part of climate change discussions at both the national and international levels. In addition to maintaining the integrity of existing protected areas, restoration of connectivity between these areas is needed to allow wildlife to migrate. This is especially important to prevent the isolation of gene pools. Populations with low genetic diversity may have a harder time attempting to adapt to climate change.

Ebola, tuberculosis, rabies, influenza (H5N1, H1N1), foot-and-mouth disease, and brucellosis are just a few diseases having a devastating impact on wildlife populations. Many of the disease-causing pathogens are highly contagious and capable of jumping among species, even between humans and wildlife. An ever increasing human population contributes to a breakdown of the human-wildlife interface, with increasing loss of wildlife habitat and very little buffer between humans and wildlife. Because of increased interaction with people and their domestic animals, wildlife populations are at greater risk from disease than in years past.

The health of wildlife and humans is inextricably connected to the health of the local environment. When the quality of the environment declines, the quality of life for those who depend upon it is diminished. For instance, the clear-cutting of tropical forests can be linked directly to malaria outbreaks. After intensive logging, water begins to pool in areas once covered by trees, while the absence of shade causes local temperatures to rise. Wildlife populations once present in the forest decrease, while Anopheles mosquitoes begin to thrive under the new wetter and warmer conditions. Sickness due to malaria then becomes all too common among local human communities.

The good news is that the impact of diseases such as malaria can be man-



**Etty Rahmawati teaches students about the links in the chain that lead from deforestation to increased malaria in the villages around Gunung Palung National Park in Indonesia.**

Teod Ullrich (teodulrich.com)

aged, in part, through the promotion of sustainable resource use. This strategy nearly always benefits both people and wildlife. In 2007, for example, Health in Harmony, a not-for-profit organization in southwestern Borneo, began providing high-quality health care to communities around Gunung Palung National Park while reducing incidents of illegal logging around the park's periphery. With support from the U.S. Fish and Wildlife Service's *Wildlife Without Borders* program, Health in Harmony gives voluntary incentives (including discounted health services and access to a mobile clinic) to those communities that protect the park from illegal logging. As a result, the quality of life has improved for both people and the orangutans of Gunung Palung.

With the emerging threats from global climate change, the need for an interdisciplinary approach like the one Health in Harmony has taken becomes even greater. Disease-causing pathogens will expand their range to areas that previously were inhospitable to their survival. Global climate change is also causing significant changes in the availability of food and water, further affecting animals and humans due to changes in

their immune systems, exposing them to a greater risk of infections. In addition, increased storm activity frequently results in disease outbreaks. There are no easy solutions to these problems, but the need to address them is great.

To improve the health of people, livestock, and ecosystems, many people need to be at the table: veterinarians, doctors, public health practitioners, wildlife ecologists, restoration ecologists, land-use planners, community leaders, and policy makers. Now more than ever, there is an urgent need to take an interdisciplinary approach to problem solving.

The *Wildlife Without Borders* global program seeks to address this need through new partnerships and new approaches to conservation.

For information on partnership opportunities, contact us at [internationalconservation@fws.gov](mailto:internationalconservation@fws.gov).

---

*Dr. Meenakshi Nagendran, a wildlife biologist and program officer for the Asian Elephant Conservation Fund in the FWS Division of International Conservation, can be reached at [meenakshi\\_nagendran@fws.gov](mailto:meenakshi_nagendran@fws.gov).*

by Belinda Stewart-Cox

# Making Enemies into Allies

**F**our years ago, my colleague Jittin Ritthirat and I turned our attention to a little known, woefully neglected wildlife sanctuary called Salakpra, which lies a few kilometers south of the better known UNESCO world heritage site Huai Kha Khaeng, my original “home” in Thailand. I’d not heard of Salakpra until I wrote the world heritage nomination for its more famous neighbor, but I discovered how integral both sites are to Thailand’s largest, most biologi-

cally diverse tract of protected forest, now known as the Western Forest Conservation Complex or WEFCON.

## Salakpra as symbol

Salakpra was the first wildlife sanctuary in Thailand, and is now one of its most distressed. A little over 20 kilometers (about 32 miles) from the provincial capital of Kanchanaburi, it lost some of its best land in the 1970s to the roads, reservoir, and settlements spawned by a

hydroelectric dam. The project blocked the routes of Asian elephants (*Elephas maximus*) across the river and squeezed 150 to 200 of them into a narrow forest peninsula. As a result, Salakpra became a hotspot of human-elephant conflict. The sanctuary harbors around 10 percent of Thailand’s beleaguered wild elephants – icons of king, country, and Lord Ganesh, the Hindu god of wisdom and success.

When asked why I “switched from the plum to the pudding,” I point out that

---

A group of wild Indian elephants visits Tha Kradan waterhole. ECN/ZSL





ECN researcher Gip takes a GPS reading, accompanied by a forest ranger on the northern corridor survey. ECN/ZSL

Salakpra was once the pride of Thailand's protected area system but, after years of mismanagement, apathy, and neglect, it is now the shame. Plums turn into pudding if not preserved. Conserving Salakpra in the face of human-elephant conflict requires a huge commitment, collaboration, and sustained effort. Salakpra matters to the local people because it provides the ecosystem services on which their well-being and livelihoods depend, and because it is – or could be – a source of empowerment and pride.

### Elephant adversaries

When we began this project in late 2005, wild elephants were the enemies of farmers and forest users. Elephants

raided crops constantly, we were told, causing immense financial damage and risking local lives. People told us they were sick of wildlife organizations, researchers, and government officials collecting information, telling them what they should or shouldn't do, then disappearing. "It's easy for you people," they said with some justification, "you don't have to live with the problem or its impacts."

It's true, we don't. We can walk away whenever we like, but we chose not to.

We adopted five policies from the outset. First, understand the problem. Second, recruit people locally if possible. Third, work collaboratively in collecting data and solving problems. Fourth,

commit to tackling this issue for as long as it takes to facilitate solutions and make ourselves redundant. Fifth, share everything we learn with local and national stakeholders.

To understand what's happening around Salakpra, we trained village monitors to record crop-raiding information, including economic costs. A year later, they also tested crop-protection methods with farmers who were hit hard by elephants. Using satellite photos, we mapped land use around the sanctuary. At the same time, we conducted a socio-economic survey to compare households that are, and are not, upset by elephants. Then, with help from older residents who knew the valley before it was dammed,



(Top): A patch of forest encroaches on elephant habitat in one of the narrow valleys in the northern corridor.  
 (Bottom): ECN researchers Jittin Ritthirat and Passanan Boontua take a GPS reading during a forest survey.

we mapped the routes that elephants once used to cross the river. Meantime, we surveyed Salakpra to find out how elephants and people use the forest.

### Revising the human/elephant equation

Like the gradual emergence of a jigsaw picture, the pieces of information we gathered revealed a two-sided equation. On one side, elephants do have impacts on people.

Although in this region they seldom injure people, elephants raid their crops. The crop raiding began the year the dam and reservoir inundated the valley. To our surprise, we found that fewer than five percent of households are affected by crop raiding, and that most raids near the sanctuary occurred along the traditional routes elephants took to get water. In other words, the impact of elephants outside the sanctuary is limited in scale and scope.

On the other side of the equation, the story is reversed. Human impacts on elephants and their habitat are widespread and extensive. Local and outside people exploit the forest year-round. Impacts include hunting, logging, cattle-grazing, bamboo cutting, and seasonal foraging of fungi and shoots. There are also human-related dry-season fires that alter the forest and exacerbate crop-raiding. In effect, the problem is a human/human conflict, with elephants caught in the middle, doing what they must to survive.

### Changes in attitudes

As soon as we had information to share, we shared it. In the beginning, farmers were hopeful but skeptical, sometimes even hostile. Two years later, we had to hold five meetings back-to-back to accommodate everyone who wanted to join this problem-solving process. We organized the first national workshop on human/elephant conflicts, allowing elephant researchers, community leaders, and project participants from around Thailand came to share information and discuss solutions.

The change in attitude among villagers and local leaders is notable. People no



Members of a community women's group meet to plan alternative livelihoods. ECN/ZSL

longer blame elephants, and they are less hostile to Salakpra. Information, collaboration, and commitment are the reasons for this change of heart. They engender understanding, a sense of inclusion, and feelings of trust, faith and “can do.”

#### Facilitating action

Our aim now is to reduce the human pressure on elephants and their habitat while also reducing the elephant pressure on farmers. Around Salakpra, we are helping forest users develop occupations that do not depend on forest products and training them in forest restoration techniques. Inside the forest, we are helping Salakpra improve its system of protection, and the wildlife habitat corridor plan we proposed is now part of the government's agenda.

The U.S. Fish & Wildlife Service's *Wildlife Without Borders* Asian Elephant Conservation Fund (WWB-ASECF) has been a key aid to these efforts. First, it allowed us to implement the habitat corridor survey. More recently it helped us start the Salakpra Elephant Ecosystem Conservation Alliance, which enables villagers to develop alternative livelihoods and help restore their ecosystem. It is

also funding the training and equipment necessary to improve the sanctuary's patrol system. We think of WWB-ASECF as a firm friend.

We are keen to share our findings and lessons learned with other communities and conservation areas in Kanchanaburi, WEFKOM, Thailand, and other countries in Asia. It takes time, energy and commitment to tackle human/elephant conflicts, but if we can restore the pride of Salakpra and turn its antagonists into friends, we will achieve something worth emulating.

---

*Belinda Stewart-Cox is with the Elephant Conservation Network in Kanchanaburi, Thailand. Since 2005, the Elephant Conservation Network has been supported by the Zoological Society of London, which oversees their FWS grants.*

by Sarah Gannon-Nagle

# Jewels of the Rainforest

In late spring of 2008, a small contingent of biologists and policy makers from Washington, D.C., including three representatives of the U.S. Fish and Wildlife Service (FWS), made its way to the rainforests of Costa Rica, intent on visiting some of the country's smallest but most potent residents. They were in pursuit of a frog, but not any ordinary species – the search was for brilliantly colored poison dart frogs, named for the toxins they secrete through their skin. Known as the jewels of the rainforest, what these tiny frogs lack in stature (most are about the size of a quarter), they more than make up for in color.

Poison dart frogs, members of the family Dendrobatidae, have long been used by humans. The indigenous peoples of Latin America learned centuries ago that rolling a dart or arrow tip over a live frog's skin creates a coating of toxins that can paralyze any animal, making it easier to hunt. While scientists still seek answers to questions about the biochemistry of poison dart frogs, apparently the frogs accumulate toxins based on their diet of termites, ants, and other invertebrates. Chemicals contained in the microfauna eaten by the frogs are excreted through their vibrant skins.

Recently, toxins isolated from poison dart frog skin samples have been found to have valuable medicinal uses. Toxins produced by the phantasmal poison dart frog (*Epipedobates tricolor*), a species native to Ecuador, enabled researchers to develop a synthetic compound that shows promise as a pain killer more effective than morphine, but non-addictive. In another example, the skin of the strawberry poison dart frog (*Oophaga pumilio*) contains compounds that have



Poison dart frogs occur in a rainbow of colors.

Yuri Huta © Finding Species

been reproduced in the laboratory for use as a cardiac stimulant. It is one of seven poison dart frog species that can be found in the tropical forests of Costa Rica.

Poison dart frogs and other amphibians have declined in numbers and range because of habitat loss, climate change, pollution, and disease. Forest habitat in Costa Rica was disappearing at an alarming rate until the 1970s, when a growing environmental awareness led the country to establish a network of

conservation lands. Today, approximately 25 percent of Costa Rica lies within a world-renowned system of protected that contains more than 30 national parks and wildlife refuges. The rich habitats now conserved include nesting beaches for leatherback sea turtles, high-elevation havens for birds such as the resplendent quetzal, corridors for migratory species like the jaguar and Baird's tapir, and sanctuaries for reptiles and amphibians,

including green iguanas and poison dart frogs.

It is partly for this reason that the FWS delegation from the Wildlife Without Borders - Latin America and Caribbean (WWB-LAC) regional programs visited Costa Rica: the hope for a glimpse of Latin America's incredible biodiversity, including an opportunity to see poison dart frogs. But the delegation also had a broader conservation mission: to help Washington policy makers better understand Latin America's biodiversity and the region's successful strategies for protecting it.

In 2001, we began taking up to 15 U.S. policy makers to Costa Rica each year for a week-long, intensive course focused on tropical ecology and conservation policy. It has come to be known as the "U.S. Decision Makers Course," and has historically been jointly facilitated by the FWS and various conservation partner organizations including the Organization for Tropical Studies and the International Conservation Caucus Foundation. The course allows decision makers to experi-

ence first-hand the conservation impacts of the policies they create. In addition, it is designed to expand their appreciation for the importance of capacity building among natural resource managers throughout the Latin America and Caribbean region.

The course itself becomes a migration of sorts as participants travel among protected areas throughout Costa Rica. Along the way, they acquire knowledge about the goods and services provided by various tropical ecosystems. For example, last year's participants toured the mangrove estuary at the mouth of the Terraba River in southern Costa Rica. Local scientists and guides pointed out the different mangrove species, illustrating how they buffer communities against intense storms while the underwater roots serve as a nursery for fish that are important to the regional economy. Guest lectures by leading conservationists in the region explain some of Costa Rica's greatest conservation successes: its national climate change strategy, its innovative approach to managing wildlife ref-

uges as public-private partnerships with local landowners, voluntary conservation incentive programs that dramatically increase forest cover, and the implications of U.S. trade policies in tropical countries.

The course is one of several projects aimed at capacity building and knowledge exchange as part of WWB-LAC. While there are other projects that the program supports, it is unique in that it is the only ongoing WWB-LAC initiative that focuses on a U.S.-based audience. To learn more about the program, visit the FWS Division of International Conservation's website at [http://www.fws.gov/international/DIC/dic\\_home.html](http://www.fws.gov/international/DIC/dic_home.html). For more information about the course, e-mail [WWB\\_LAC@fws.gov](mailto:WWB_LAC@fws.gov).

---

*Sarah Gannon-Nagle, the outreach coordinator for the Branch of Latin America and the Caribbean, FWS Division of International Conservation, can be reached at [sarah\\_gannonnagle@fws.gov](mailto:sarah_gannonnagle@fws.gov).*

Participants in the 2008 course visited protected areas in Costa Rica.



Photo provided by Kristina Alexander



by Christina J. Greenwood and  
Ishtiaq Uddin Ahmad

# The Tigers of Bangladesh

**W**ith more than 150 million people crowded into a country the size of Iowa, Bangladesh is one of the most densely populated nations on Earth. It is also home to one of the largest and most dense remaining wild populations of tigers (*Panthera tigris*).

Bangladesh lies in a vast fertile delta plain fed by three of the largest rivers in

the world, the Ganges, the Brahmaputra, and the Meghna. Where these great rivers and their tributaries approach the Bay of Bengal, human habitation comes to an abrupt stop. Here the Sundarbans forms the largest mangrove forest on Earth and one of the last great wildernesses in Asia. This 10,000 km<sup>2</sup> (3,900 mile<sup>2</sup>) jungle is spread across a great

swath of Bangladesh and India, with the 6,000 km<sup>2</sup> (2,300 miles<sup>2</sup>) in Bangladesh representing nearly half of the country's remaining forest. The maze of muddy islands that make up the Sundarbans are vegetated by trees specially adapted to survive in the saline environment. This mosaic of terrestrial and aquatic habitats is presided over by the most famous

---

**Spotting the elusive Sundarbans tiger on land is a challenge. The mangrove vegetation is thick and the forest floor muddy interspersed with pointed aerial roots. Most glimpses are of a tiger swimming between banks while moving about its territory.**



© Elisabeth Fahmi, Mansur and Rubaiyat Mansur Mowgi

inhabitant of the Sundarbans, and the country's national animal, the Bengal tiger (*P. t. tigris*).

The tiger is endangered throughout the species' entire range. Fewer than 4,000 tigers of all subspecies remain in the wild, distributed within 14 countries. The mangrove forests and waterways of the Bangladesh Sundarbans support an estimated 300 to 500 wild tigers (Barlow 2009). Tigers in the Russian Far East have home ranges of 400 to 1,000 km<sup>2</sup> (155 to 385 miles<sup>2</sup>), but a Sundarbans tiger requires a tiny 20 km<sup>2</sup> (8 miles<sup>2</sup>). This small territory size indicates that the Sundarbans is good quality tiger habitat with a large prey base. Besides being a haven for tigers, the Sundarbans provides essential ecological services for the whole region and supports millions of local people who collect fish, honey, wood, and other forest products.

In light of the predicted impacts of climate change, the forest's role in storing carbon and serving as a buffer against cyclones and tidal surges makes it crucial to the country's climate change adapta-



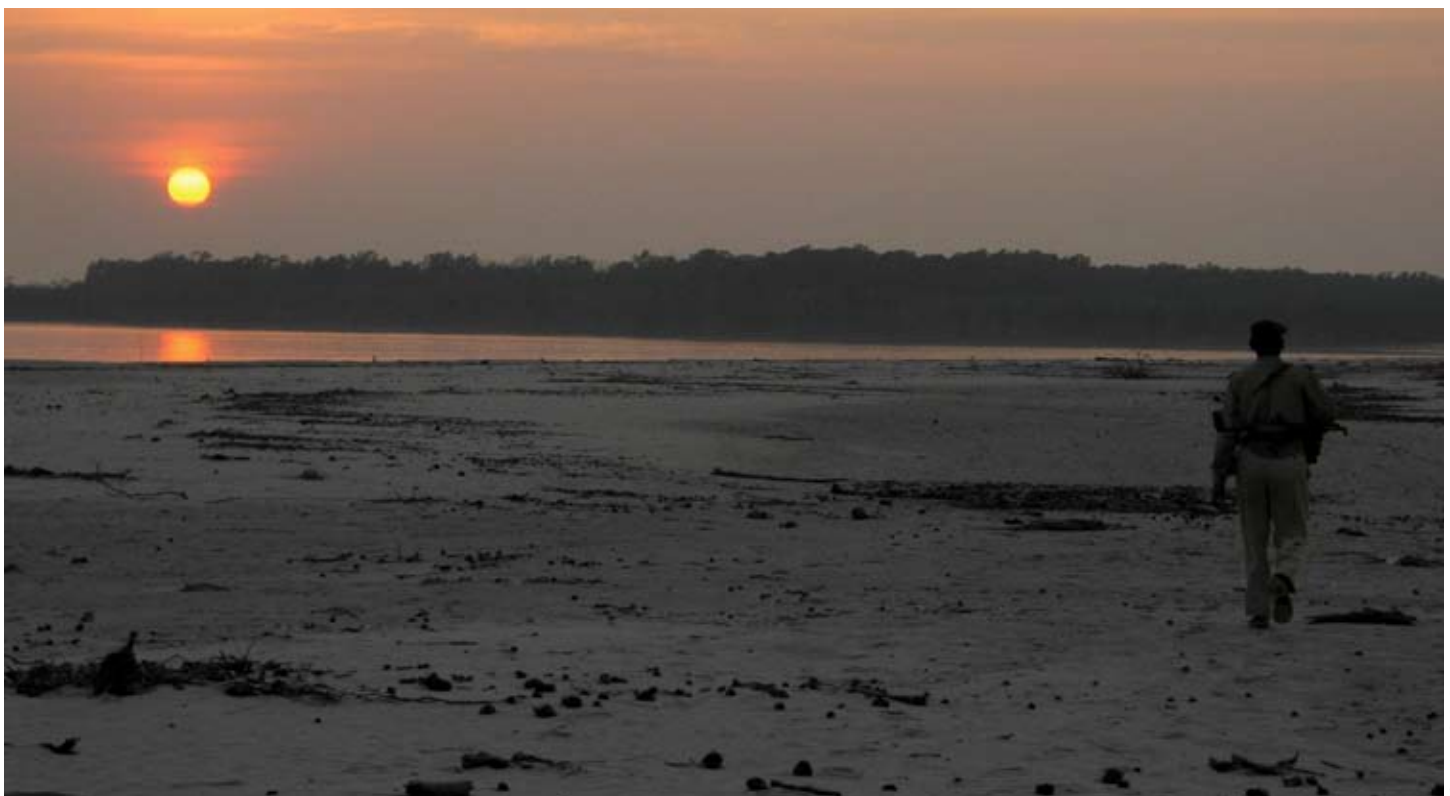
© Adam C. D. Barlow

**Wood extraction feeds both local and industrial needs, with the Sundarbans producing almost half of the total timber and fuel wood for Bangladesh.**

tion strategy. Three Sundarbans wildlife sanctuaries in which no resource extraction is permitted constitute a UNESCO World Heritage Site. Efforts to save the

Sundarbans and its tigers not only benefit a species on the brink, they also focus on conserving a natural asset crucial to the country's future.

**A forest guard on evening patrol along a Sundarbans beach, where the southern edge of the forest meets the Bay of Bengal.**



© Adam C. D. Barlow

But here, as elsewhere in its range, the tiger faces a number of threats. Tigers are directly imperiled by poaching to supply the demand for souvenirs and the traditional Asian medicine market. Bangladesh also suffers the most intense human-carnivore conflict in the world; 50 or more people can be killed by tigers in a year, and tigers are killed in retaliation when they stray into local communities. The tiger's main prey, the spotted deer, is also poached, and the tiger's mangrove habitat is threatened by unsustainable timber extraction and sea-level rise due to climate change. The lack of information and certainty about the impacts of these threats makes it difficult to know how to begin conservation efforts.

To guide tiger conservation efforts over the next eight years, the Forest Department under the Ministry of Environment and Forests recently

drafted the first Bangladesh Tiger Action Plan, with support from the U.S. Fish and Wildlife Service through the *Wildlife Without Borders* Rhinoceros and Tiger Conservation Fund (WWB-RTCF), Wildlife Trust of Bangladesh, Zoological Society of London (ZSL), and University of Minnesota (UMN). The plan describes the threats to tigers in Bangladesh and the challenges to developing a conservation program. It then defines a vision, goals, objectives, and strategy to address these threats and challenges.

Ecological research is key to understanding and addressing the threats to the tiger population. The Bangladesh Forest Department and its partners have prioritized research needs spanning both ecological and socio-economic questions. However, gaining insight into the behavior and resource needs of the elusive tiger is a unique challenge

in these mangrove swamps. Prof. Dave Smith (UMN) and Dr. Adam Barlow (ZSL), together with the Conservator of Forests for Wildlife, Mr. Ishtiaq Uddin Ahmad, have been making great progress in the past few years. In coordination with the Forest Department and with WWB-RTCF funds, the research team has begun to solve some mysteries of the swamp tigers.

The first radio-collared Sundarbans tigers revealed their small home range sizes and the forest's role as a stronghold for the species. Sundarbans tigers were also found to be small in size, with initial data showing females weighing in at just 80 kilograms (about 175 pounds), which is around half the size of a tigress on mainland India or in Nepal. The research team believes the Sundarbans tiger's comparatively small stature may result from the small size of its prey. Physical

---

**Fisherwomen arranging their nets to collect shrimp fry. Thousands of fishermen and women enter the forest on a daily basis in search of forest products.**



examinations show additional signs of evolutionary distinction. Most important for management, the team has developed a robust tiger population monitoring system based on track frequency. The system enables the Forest Department to evaluate the effectiveness of tiger conservation activities.

Guided by the tiger action plan, the Forest Department has engaged the skills of partners to proceed from research to conservation action. The Wildlife Trust of Bangladesh (WTB) recently joined the team. WTB co-founder and CEO Prof. Md. Anwarul Islam, a renowned teacher and conservationist in Bangladesh, is supported by a team of dedicated researchers, students, and volunteers. The team is working with ZSL to develop a national education and community outreach initiative in line with the tiger action plan. The Forest Department is

also collaborating with the European Union, U.S. Agency for International Development, and dependent local communities on initiatives to improve forest protection. A critical aspect is the development of alternative livelihoods for local residents to reduce the pressure on forest resources.

With a holistic action plan in place, and a conservation capacity expanding with each new partner that joins the team, the scene is set for successful tiger conservation in Bangladesh. The Sundarbans tiger now faces its best chance for survival.

#### Literature Cited

Barlow, A.C.D., M.I.U. Ahmed, M. M. Rahman, A. Howlader, A.C. Smith, and J.L. D. Smith. 2008. Linking monitoring and intervention for improved management of tigers in the Sundarbans

of Bangladesh. *Biological Conservation* 141:2031-2040.

Barlow, A.C.D. 2009. Sundarbans tigers: adaptation, population status and conflict management. Ph.D. thesis, University of Minnesota.

---

*Christina J. Greenwood (greenwood.christina@gmail.com), a project management specialist from the Zoological Society of London, is working with the Bangladesh Forest Department and Wildlife Trust of Bangladesh to design the Bangladesh tiger conservation program and coordinate funding and implementation partners. Ishtiaq U. Ahmad, the Conservator of Forests for Wildlife in the Bangladesh Forest Department, is responsible for wildlife conservation across the country and is spear heading the Bangladesh Tiger Action Plan initiative.*



© Christina J. Greenwood

by Dr. Susie Ellis

# Enhancing the Survival of the Javan Rhino

**I**ndonesia, the world's fourth most populous country, ranks first in combined terrestrial and marine biological diversity. Without action, however, much of its natural heritage could soon be lost. Almost 850 species of Indonesian plants and animals are believed to be in danger of extinction. Some, including the Bornean and Sumatran orangutans (*Pongo pygmaeus* and *P. abelii*, respec-

tively), Sumatran tiger (*Panthera tigris sumatrae*), Javan gibbon (*Hylobates moloch*), and Bali mynah (*Leucopsar rothschildi*), are found nowhere else on Earth.

Two of the world's five rhino species live in Indonesia: the Sumatran rhino (*Dicerorhinus sumatrensis*) and the Javan rhino (*Rhinoceros sondaicus*). Both are critically endangered. Fewer

than 55 Javan rhinos are believed to exist in two populations; between 35 and 50 Javan rhinos inhabit Ujung Kulon National Park (UKNP) in West Java, Indonesia, and only three to five live in Vietnam's Cat Tien National Park. Little is known about the demographic or genetic structure of either population.

When Indonesia's Ujung Kulon Peninsula became a national park in

A rare photo of the extremely endangered Javan rhino in the wild.



Alain Compost

1980, its Javan rhino population numbered about 63 animals. Since that time, researchers have conducted a rhino census every few years. The park's carrying capacity is believed to have diminished to as few as 70 animals today due to habitat changes and possibly competition with other animals for food (Ramono et al., 2009).

For more than a decade, a consortium including the International Rhino Foundation, Asian Rhino Project, Save the Rhino, World Wildlife Fund, and U.S. Fish and Wildlife Service (through its *Wildlife Without Borders* Rhino and Tiger Conservation Fund) has donated money for Rhino Protection Units (RPUs) in the park. The RPUs are administered by a local organization, Yayasan Badak Indonesia. In each unit, four-person teams patrol an average of 15 days per month, safeguarding rhinos from local threats and helping park authorities respond to encroachment and other problems. Since the program's inception, no poaching has occurred. Even before RPUs were established, however, poaching of Javan rhinos in UKNP was uncommon. This leads conservationists to conclude that the lack of growth in the UKNP population is due to other factors, such as habitat fragmentation and reduced food availability.

UKNP has no buffer zone. As human populations and the demands of villages along the park's eastern boundary have grown, more land has been converted to agriculture and domestic livestock, which sometimes wanders into the park, exposing rhinos to disease risk. Rhino distribution has contracted into the park's core areas.

An overriding problem for the Javan rhino is that there is only one viable population in one location, which makes events such as earthquakes or disease outbreaks a great threat to the species. In 1883, Ujung Kulon was decimated by the eruption of Krakatau. Anak Krakatau ("son of Krakatau") is still active, and the risk of another eruption or earthquake, and a resulting tsunami, loom large.

The Indonesian Rhino Conservation Action Plan (Indonesian Ministry of Forestry, 2007) sets a goal of "creating conditions conducive to, and then actually developing, viable populations of Javan rhinos in the wild." The aim is to expand the wild population in UKNP by about 20 percent and relocate small groups to other areas.

The first step has been to conduct surveys of a few promising relocation sites within the species' historic range in Java to evaluate carrying capacity, adjacent human populations, and other relevant characteristics (Ramono et al., 2007). For a comparative analysis, a small team of researchers applied the same methodology to a survey of known rhino habitat in peninsular UKNP, followed by surveys of potential habitat in adjacent Gunung Honje and Gunung Halimun National Park. Suggested alternative areas in Masigit Kareumbi and Leuweung Sancang were examined using remotely sensed imagery. Other team members conducted socio-economic interviews and assessments in surrounding villages.

Some key steps remain in our effort to ensure the survival of the Javan rhino. One is establishing a Javan rhino research and conservation area inside Gunung Honje, with active management through reforestation, control of slash-and-burn deforestation, and increased patrolling. Another important step is developing education programs in adjacent areas to explain the benefits of rhino conservation. Included in these plans is a conservation extension and interpretive center. The project will study the potential benefits of "rhino tourism," followed by a more comprehensive study of the socio-economic effects of establishing a rhino sanctuary and related infrastructure. It is also important to explore alternative land management approaches that can improve livelihoods linked to active rhino management, including incentives for villagers to support conservation efforts.

On a broader scale, the conservation partners will reexamine existing policy

incentives and legal instruments with a view to improving rhino management. National and international awareness also must be raised, along with the funding necessary to support the expansion of Javan rhino habitat.

While all of this new work is being implemented, the highest priority is maintaining and protecting the current population in Ujung Kulon. As efforts in UKNP move forward, a third site to which Javan rhinos can be translocated and protected will need to be identified.

For more information, please visit [www.rhinos-irf.org](http://www.rhinos-irf.org) or [www.badak.or.id](http://www.badak.or.id).

### Literature Cited

Indonesian Ministry of Forestry (2007). Strategy and Action Plan for the Conservation of Rhinos in Indonesia 2007-2017. Jakarta, Indonesia.

Ramono, W., Isnaini, M. W., M., Sadjudin, H.R., Gunawan, H., Dahlan, E.N., Sectionov, Pairah, Hariyadi, A.R., Syamsudin, M., Talukdar, B.K., and Gillison, A.N. 2009. Report on a Second Habitat Assessment for the Javan Rhinoceros (*Rhinoceros sondaicus sondaicus*) within the Island of Java. International Rhino Foundation, Yulee, FL, USA.

---

*Dr. Ellis is the Executive Director of the International Rhino Foundation.*

by Steven Kohl

# U.S. and Russia Unite for Conservation

Under a broad-ranging cooperative program involving federal and state agencies, zoos, botanical gardens, and research organizations in the United States and Russia, the U.S. Fish and Wildlife Service (FWS) has worked since 1975 with its counterparts in the Russian Federation (former Soviet Union) to conserve imperiled species. Both nations share biological information, conduct field studies, exchange rare animals and plants, reintroduce species into areas of their historical range, and work to boost the genetic diversity of species that are reduced to critically small populations.

The effectiveness of this collaboration, carried out by FWS Region 7 (Alaska), the FWS *Wildlife Without Borders* Russia Regional Program (WWB-Russia), and numerous other programs

under the auspices of the U.S.-Russia Environmental Agreement, is best illustrated through the following examples:

## **Muskox (*Ovibos moschatus*)**

After determining that the historical range of this species included arctic Russia, the FWS arranged for the capture of 40 muskoxen on Nunivak Island, Alaska, for transport to the Taimyr Peninsula and Wrangel Island in Russia. Bolstered with muskoxen from Canada, there are now stable populations of 2,000 in Taimyr and 600 on Wrangel Island.

## **Przewalski's horse (*Equus caballus przewalskii*)**

By 1967, this species, also known as the Mongolian wild horse, had disappeared from its native range, leaving the

world's zoos and conservation centers as its last refuge. In 1982, in an effort to enhance the species' genetic diversity, one male and two females from the New York and San Diego Zoos were exchanged for three animals from the Askania Nova Reserve in Ukraine, home to the former Soviet Union's largest captive herd. Some offspring of the exchanged horses have been reintroduced into the wild in Mongolia.

## **Amur tiger (*Panthera tigris altaica*)**

Though reduced by the mid-1980s to a critical level of only 200 to 300 tigers in the wild, this subspecies reproduces well in captivity. To address the problem of inbreeding in American zoos, three Amur tigers were transferred from the Moscow Zoo to the New York, Omaha, and Indianapolis zoos in 1983. This exchange enhanced the genetic diversity among tigers maintained in captivity. A series of grants from the FWS *Wildlife Without Borders* Rhinoceros and Tiger Conservation Fund to Russian nature reserves and non-governmental organizations for conservation and educational activities has promoted the protection of Amur tigers in the wild. The most recent census numbered the wild population at 400 to 500 individuals.

## **Sturgeon (*Acipenseridae* spp.)**

Responding to concerns about unsustainable fishing to supply the global caviar trade, all of the world's sturgeon species were placed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1998. Attention

---

**Muskoxen were transferred from Nunivak Island, Alaska, to sites in Russia in a successful attempt to establish the species in other parts of its former range.**



USFWS

quickly focused on sturgeon inhabiting the Caspian and Black seas, and the U.S. and Russia began to share information on three species of particular concern (beluga, stellate, and Russian sturgeon). Both governments began to discuss problems associated with overfishing and poaching, monitor trade in caviar and other sturgeon products, determine the genuine or counterfeit status of product labels, perform genetic analyses of caviar shipment contents, and cooperate in criminal investigations. In 2004, the FWS listed the beluga sturgeon under the Endangered Species Act as threatened, and Russia placed restrictions on export of sturgeon caviar products in 2005. Both countries will continue to work on sturgeon conservation.

### Endangered plants

During more than 30 field expeditions in both countries from 1976 to 1991, American and Russian botanists collected seeds and propagules (vegetative parts of a plant, such as a bud or other offshoot, from which a new individual may develop) of nearly 3,000 rare and endangered native floral specimens for experimental cultivation. This project should result in a more secure future for identical or closely-related species that grow in both North America and Eurasia, including coniferous and deciduous trees, perennial plants, irises, and tulips.

### Aleutian Canada goose (*Branta canadensis leucopareia*)

This subspecies, which once populated not only the Aleutian Islands in the U.S. but also the Kuril Islands (stretching from Kamchatka to Sakhalin in Russia), has been reintroduced into Russian parts of its historical range. One of the Endangered Species Act's success stories, the Aleutian Canada goose was delisted after its recovery in the U.S. Under a program that began in 1992 with the transfer of 19 captive geese to a breeding facility in Kamchatka, there is now a population of more than 100 birds in the Kuril Islands. Recent sightings have come from as far south as Japan.



Mehgan Murphy/Smithsonian's National Zoo

A female Przewalski's horse born at the Smithsonian's National Zoo Conservation and Research Center in Front Royal, Virginia.

### Saiga antelope (*Saiga tatarica*)

Saiga abundance in Kalmykia (Russia) and Central Asia has declined by 97 percent since the early 1990s, due mainly to poaching for the animal's horns and meat. In an attempt to reverse this dramatic decline, the U.S. and Russia are collaborating on ecological and veterinary field studies. Since 2005, WWB-Russia also has provided nearly \$50,000 in grants to erect border signs and strengthen ranger patrols in protected areas occupied by saiga. The funds are helping to outfit a conservation education center for local communities.

### Polar bear (*Ursus maritimus*)

In 2000, the U.S. and Russia signed an Agreement on the Conservation and Management of the Alaska-Chukotka Polar Bear Population. The agreement defines the role of national governments and native communities in maintaining sustainable numbers of this threatened species. The U.S.-Russia Polar Bear Commission met in 2009 to establish a scientific working group. It will monitor the approximately 2,000 polar bears in

this population and recommend annual limits for subsistence use.

In each of these cases, cooperation between the FWS and counterpart agencies in Russia, in partnership with a host of non-governmental organizations, has helped to ensure a free flow of information and promote efforts to protect imperiled fauna and flora.

---

*Steven Kohl, Chief of the Branch of Russia-East Asia in the FWS Division of International Conservation, can be reached at [steven\\_kohl@fws.gov](mailto:steven_kohl@fws.gov).*

For more information on the *Wildlife Without Borders*-Russia program, visit: [www.fws.gov/international/DIC/regional%20programs/russia/russia.html](http://www.fws.gov/international/DIC/regional%20programs/russia/russia.html)



by Sarah Gannon-Nagle

# Building a Voice for Nature in Latin America and the Caribbean

From the high-elevation forests of Central America's Talamanca Mountains to the dry woodlands of Bolivia's Gran Chaco, and from the wild Cerrado savannas of Brazil to the fragile island ecosystems of the West Indies, the complexity and richness of species and habitats found in Latin America and the Caribbean (LAC) make it one of the most environmentally significant regions on the planet. It is home to an estimated 40 percent of the world's biological diversity (United Nations Environment Programme [UNEP], 2003).

The region contains the largest freshwater wetlands and tropical rainforests, as well as one of the world's most important coral reefs, second in size only to the Great Barrier Reef in Australia (USAID, 2005). Its river systems also support remarkable biodiversity; the Amazon River basin alone contains more than 2,500 species of fish, or approximately half of the world's known fish species (UNEP, 2003). In addition, South America has one of the highest concentrations of mammal species in the world (Ceballos & Ehrlich, 2006), such as the giant otter of the Pantanal, the little red brocket deer of the Andes, and the La Plata river dolphin that inhabits the estuaries of the Atlantic coast. Tropical islands, including those made famous by Charles Darwin for their spectacular endemic species, dot the region's oceans.

These incredible resources, upon which people around the globe depend for clean air, regulation of climate systems, and medical discoveries, are increasingly

at risk. Habitat loss in Latin America occurs at an alarming pace; the region has one of the highest deforestation rates in the world. In addition, climate change is causing unprecedented stress on wildlife and ecosystems. Population growth and the consumption of resources are increasing, which in turn is escalating development. A former Secretary of the

Interior, Bruce Babbitt, recently summarized the increasing speed of development in the region: "The construction of infrastructure – dams, roads, pipelines, transmission corridors – is an attempt to do in the space of 10 to 15 years all that has been done in the North American continent in the last 150 years." Without sound conservation planning, it is likely

Silvana Castro presents her master's research on recruitment and succession of a native tree species (*Eremanthus erythropappus*) in the savannas of Brazil.



Sarah Gannon-Nagle/USFWS

that development will occur at a scale that alters the Amazon basin forever.

The need for increased conservation on a regional scale is made more urgent by the fact that the number of natural resources professionals in much of the LAC region is disproportionately small, due in large part to scarce training opportunities. The number of formal conservation education programs in the United States is approximately twice that of Latin America (Rodríguez et al., 2005), yet the U.S. contains an only an estimated 10 percent of the world's biodiversity.

Because of the great need for conservation training, capacity building – the promotion and enhancement of in-country management of wildlife and other natural resources – is a central component of the U.S. Fish and Wildlife Service's *Wildlife Without Borders* Latin America and the Caribbean (WWB-LAC) Regional Program. The program supports a variety of training opportunities throughout the region. Participants include graduate students, managers of protected areas, natural resource professionals, and community leaders. In the past five years, more than 3,000 people in the region have benefitted from conservation programs supported by *Wildlife Without Borders*.

WWB-LAC has a 20-year history of cultivating future conservation leaders. The first partnerships established through WWB-LAC have been with three leading academic institutions in the region: the National University of Costa Rica, the Federal University of Minas Gerais, Brazil, and the University of Córdoba in Argentina. WWB-LAC worked with university to establish wildlife conservation and management programs that are both interdisciplinary and international in scope. While doing so, WWB-LAC has helped more than 400 students gain advanced degrees in conservation. Today, the former students work in 20 countries throughout the region. Many are now professors teaching the next generation of conservation biologists, directors within their



respective wildlife agencies, or conservation program managers for non-profit organizations.

This collaborative effort to train conservation professionals began in 1984 with creation of the International Institute for Wildlife Conservation and Management (or ICOMVIS, its Spanish acronym) at the National Autonomous University of Costa Rica. In a recent interview, the Director of ICOMVIS, Joel Saenz, described the program's inception. "Twenty five years ago, we began working together with the U.S. Fish and Wildlife Service, and wildlife conservation directors of Central America and the Dominican Republic, to create the first graduate program in wildlife conservation and management in Latin America. ICOMVIS was created with the unique idea of training conservation professionals through a program that integrates biological and ecological dimensions with the human dimension." Mr. Saenz brings first-hand experience to his work as the Director of ICOMVIS; he was among the Institute's first recipients of a master's degree in wildlife conservation.

In the fall of 2009, WWB-LAC convened some of the region's leading conservation professionals to identify crucial skills and gaps in current capacity building efforts. Participants at the meeting included the directors of the three university programs supported by WWB-LAC and several of the graduates. Their guidance will become the foundation for creating an innovative new training program, one that will complement

the existing work of WWB-LAC and its partners. Through this initiative, the program will apply lessons learned from the past two decades, and the expertise of some of the region's best conservationists, towards the goal of expanding training opportunities. We believe that cultivating highly effective conservation leaders is the best investment to ensure a future for the region's biodiversity.

For more information about the *Wildlife Without Borders* Latin America and the Caribbean Regional Program, visit our website and view our short video: <http://www.fws.gov/international/DIC/regional%20programs/lac/lac.html>

### Literature cited

Ceballos, G. and P.R. Ehrlich (2006). Global mammal distributions, biodiversity hotspots and conservation. *Proceedings of the National Academy of Sciences (USA)*. 103, 19374.

Rodríguez, J.P, J.A. Simonetti, A. Premoli, & M.A. Marini (2005). Conservation in austral and neotropical America: building scientific capacity equal to the challenges. *Conservation Biology*, 19 (3), 969-972.

United Nations Environment Programme (2003). *Global Environmental Outlook – Latin America and the Caribbean 2003*. Costa Rica. Retrieved from [http://www.unep.org/geo/pdfs/GEO\\_lac2003English.pdf](http://www.unep.org/geo/pdfs/GEO_lac2003English.pdf)

United States Agency for International Development (2005). *USAIDs Biodiversity Conservation Program FY2004*. Washington, DC. Retrieved from [http://www.usaid.gov/our\\_work/environment/biodiversity/pubs/biodiversity\\_119\\_rpt\\_2004.pdf](http://www.usaid.gov/our_work/environment/biodiversity/pubs/biodiversity_119_rpt_2004.pdf)

---

*Sarah Gannon-Nagle, the outreach coordinator for the Branch of Latin America and the Caribbean in the USFWS Division of International Conservation, can be reached at [sarahnag@fws.gov](mailto:sarahnag@fws.gov).*

by Anne St. John



# CITES and Free Trade Agreements

**T**he United States negotiates both bilateral and multilateral free trade agreements (FTAs) with other countries to promote international commerce by reducing tariffs. Currently, 17 such agreements are in effect. In addition to their economic purposes, trade agreements provide an important tool for the U.S. government to promote environmental objectives. All FTAs now include substantive environmental commitments by the signatory parties. These commitments, contained in the FTA environmental chapters, require the parties to improve upon and effectively enforce their environmental laws. FTAs now also include side agreements on environmental cooperation, which contain programs aimed at improving the capacity of the foreign party or parties to fulfill the environmental commitments in the FTA.

The environmental chapters of FTAs typically encourage effective implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and other multinational environmental agreements. CITES is an international treaty aimed at ensuring that international trade in wild animals and plants does not threaten their survival. It took effect in 1975 and now includes 175 member countries.

In the U.S., the Fish and Wildlife Service is responsible for implementing CITES. Our International Affairs Program, which comprises both the International Wildlife Trade and *Wildlife Without Borders* programs, has the lead. The divisions of Management Authority and Scientific Authority handle CITES permitting, policy, and regulatory



Trade in bigleaf mahogany (*Swietenia macrophylla*), a tree species prized for the furniture trade, is regulated by CITES. This lumber awaits entry into the United States at the port of Norfolk, Virginia.

activities, working closely with other federal and state agencies. The Service is increasingly engaging with our federal partners to carry out the environmental aspects of FTAs and side agreements.

Since 2008, the Service has supported extensive work by the Department of the Interior's International Technical Assistance Program (ITAP) to build the capacity of other countries to implement and enforce CITES by provide training and assistance. These capacity-building programs have included work with the six Central American signatories to the 2004 Dominican Republic-Central America-United States Free Trade Agreement (CAFTA-DR): Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua. The Service and ITAP have been working with non-governmental organizations, academic researchers, the CITES

Secretariat, the Central American Commission on Environment and Development (Comisión Centroamericana de Ambiente y Desarrollo), and other agencies to help these countries address the detrimental effects of illegal and unsustainable wildlife trade.

ITAP activities have included training enforcement personnel in inspection of wildlife shipments and related enforcement techniques, legal and regulatory workshops for government officials, field studies to monitor the status of traded species, assistance in preparation for CITES meetings, improving the operations of wildlife rescue centers, and evaluating the adequacy of existing regulations and laws. The Service will continue to provide technical expertise to ITAP and its partner organizations in coming years, and we hope improved enforcement and implementation of CITES in Central

America will alleviate the flow of threatened wildlife into the U.S, while reducing the region's illegal and unsustainable wildlife trade.

The Service has also been extensively involved in work related to the U.S.-Peru Trade Promotion Agreement (PTPA), which took effect February 1, 2009. In addition to the general requirement to effectively implement CITES, the PTPA contains an Annex on Forest Sector Governance that includes measures related to timber species listed under CITES as well as broader forest management and timber extraction issues in Peru. The Service has provided advice to Peru on improving its implementation of CITES and will likely be involved in future capacity-building workshops.

As environmental considerations take an increasingly prominent role in the

negotiation and implementation of free trade agreements, it is likely that CITES will remain an important aspect of future agreements. This situation provides the Service with an important opportunity to continue in its long-standing role as a global CITES leader and help other countries improve their CITES implementation. Our collaborative efforts through CITES, FTAs, and similar agreements will continue to support the goal that no species of wildlife or plant is lost due to international trade.

---

*Anne St. John, a fish and wildlife biologist with the Service's CITES Division of Management Authority, can be reached at [anne\\_stjohn@fws.gov](mailto:anne_stjohn@fws.gov).*

---

**Trade in orchids, like these plants at a nursery in Thailand, is regulated by CITES. Many species are traded legally, but trade in some others is restricted because of the threats posed by illegal collection.**



Anne St. John/USFWS

by Ron Miller, Tim Gatewood,  
and Marty Underwood

# Logging for Apache Trout

Logging and the improvement of trout habitat are not often considered mutually beneficial pursuits, but a recent project on the Fort Apache Indian Reservation in Arizona proved that they can be compatible.

The Apache trout (*Oncorhynchus gilae apache*), Arizona's state fish, is a beautiful iridescent golden trout dotted with rounded black spots. It was one of the first fish species listed in 1966 as endangered. At one point, Apache trout were reduced to only 13 pure populations. The historical range of this fish lies within the White Mountains of northeastern Arizona, primarily on the 1.68 million-acre (680,000-hectare) Fort Apache Indian Reservation. The reservation is home to the 15,000-member White Mountain Apache Tribe (WMAT).

By 1975, recovery efforts had progressed enough that the U.S. Fish and Wildlife Service (FWS) was able to reclassify the Apache trout to the less critical category of threatened. Repatriation has increased the number of pure populations to 28.

In 2008, the FWS, in coordination with the WMAT, recognized the need to improve Apache trout habitat in a 2.3-mile (3.7-kilometer) section of Firebox Creek on the reservation's mountainous east side. Firebox Creek contains an original pure-strain population of Apache trout discovered in the 1970s.

Apache trout survived in the headwaters of the creek, where habitat conditions remained favorable, but had disappeared from the lower reaches due to low water flows resulting from a sustained drought and a lack of suitable pool habitat.

Apache trout have a preference for pool habitats containing large woody

debris (logs), debris piles, and undercut banks. Studies have also shown that introductions of such woody debris improves trout habitat by providing more cover and creating additional pools. Woody material also promotes populations of macro-invertebrates (crustaceans, insects, and other small animals without backbones) that are a valuable food source for Apache trout.

Since the project area in Firebox Creek was not naturally accumulating enough large woody debris to provide good Apache trout habitat, the fish were not doing well in that location. Tim Gatewood, a fisheries biologist for the Tribe's Wildlife and Outdoor Recreation Department (WORD), pointed out that "sampling studies showed a decline of Apache trout in the middle Firebox Creek since the early 1990s." With

funding from the FWS Partners for Fish and Wildlife program, WORD initially planned to move old logs to the stream from nearby sources, with the expectation that Apache trout would then move into this reach from upstream areas.

Further investigation and coordination with the Bureau of Indian Affairs (BIA) Fort Apache Agency led to a more feasible and effective plan. Foresters identified a 216-acre (87-ha) ponderosa pine stand that needed thinning to control dwarf mistletoe and reduce an unnatural tree density. Supervisory Forester Ron Miller then wrote a silvicultural prescription designed to improve the health and vigor of the residual pine stand and control dwarf mistletoe while salvaging the lower 10-foot (3-meter) "butt log" of each suitable tree for the trout habitat restoration project.

**An Apache trout momentarily held by fisheries biologist Tim Gatewood displays its iridescent golden color and rounded black spots. The barred eye, unique to this species, can also be seen.**



Ronald Miller

In normal thinning operations, these logs are bucked into smaller pieces and scattered on the forest floor, but here they were reserved for Apache trout habitat. A BIA forest development crew thinned the stand according to the prescription, and then fisheries employees hand-loaded the logs onto a flatbed trailer and transported them to Firebox Creek. Approximately 300 logs in the 10- to 12-inch (25- to 30-centimeter) diameter size were used in the restoration project. They were embedded in locations along the creek for maximum habitat improvement.

Within months of the project, Apache trout were using the pools and cover created by the logs placed in Firebox Creek. All cooperators were delighted that Apache trout benefitted from a thinning project that also improved the Tribe's forest.

This simple but effective example of cooperation and coordination among the White Mountain Apache Tribe, FWS, and BIA paid many dividends. The project improved in-stream habitat for a fish species important to the Tribe, the state, and the federal government, and enhanced



Tim Gatewood

**Crew before off-loading another truck load of the logs harvested for the Apache trout habitat restoration work. Pictured left to right: Shawn Nachu, Ron Miller, Tim Valandra, Joel Colelay, Matt Rustin.**

the ecology of the riparian (streamside) corridor. At the same time, forest health improved and fuel loads for potential fires were reduced. The thinning and restoration work employed Tribal members, and the Tribe was able to once again demonstrate excellent stewardship of its land and wildlife.

The participants of this collaborative effort were pleasantly surprised when they were named recipients of the national Partners in Conservation Award. Secretary of the Interior Ken Salazar presented the award in a May 7, 2009, ceremony at the departmental headquarters in Washington, D.C. The citation reads in part, "In recognition of outstanding conservation achievements attained through collaboration and partnership with others."

It is amazing how far a little cooperation can go!

*Ron Miller, a supervisory forester for the Bureau of Indian Affairs' Fort Apache Agency can be reached at ronald.miller@bia.gov or (928)338-5312. Tim Gatewood, fisheries biologist for the White Mountain Apache Tribe's Wildlife and Outdoor Recreation Division can be reached at tgatewood@umat.nsn.us or (928) 338-4385. Marty Underwood is a former FWS Partners for Fish and Wildlife biologist who now works for the U.S. Army Corps of Engineers. He can be reached at martin.k.underwood@usace.army.mil or (817) 886-1821.*















**Joel, Shawn, and Matt prepare to hand-carry a ponderosa pine log for placement in Firebox Creek.**



Tim Gatewood

# BOX SCORE

Listings and Recovery Plans as of March 25, 2010

GROUP	ENDANGERED		THREATENED		TOTAL LISTINGS	U.S. SPECIES W/ PLANS
	U.S.	FOREIGN	U.S.	FOREIGN		
 MAMMALS	70	256	14	20	360	59
 BIRDS	75	179	15	6	275	85
 REPTILES	13	66	24	16	119	38
 AMPHIBIANS	14	8	11	1	34	17
 FISHES	74	11	65	1	151	102
 SNAILS	24	1	11	0	36	30
 CLAMS	62	2	8	0	72	70
 CRUSTACEANS	19	0	3	0	22	18
 INSECTS	47	4	10	0	61	40
 ARACHNIDS	12	0	0	0	12	12
 CORALS	0	0	2	0	2	0
<b>ANIMAL SUBTOTAL</b>	<b>411</b>	<b>526</b>	<b>163</b>	<b>44</b>	<b>1,143</b>	<b>471</b>
 FLOWERING PLANTS	573	1	146	0	720	636
 CONIFERS	2	0	1	2	5	3
 FERNS AND OTHERS	26	0	2	0	28	28
<b>PLANT SUBTOTAL</b>	<b>600</b>	<b>1</b>	<b>149</b>	<b>2</b>	<b>749</b>	<b>667</b>
<b>GRAND TOTAL</b>	<b>1,011</b>	<b>527</b>	<b>312</b>	<b>46</b>	<b>1,896*</b>	<b>1,138</b>

**TOTAL U.S. ENDANGERED:** 1,011 (411 animals, 600 plants)

**TOTAL U.S. THREATENED:** 312 (163 animals, 149 plants)

**TOTAL U.S. LISTED:** 1,323 (574 animals\*\*, 749 plants)

\* Separate populations of a species listed both as Endangered and Threatened are tallied once, for the endangered population only. Those species are the argali, chimpanzee, leopard, Stellar sea-lion, gray wolf, piping plover, roseate tern, green sea turtle, saltwater crocodile, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

\*\* Eleven U.S. animal species and five foreign species have dual status.

# U.S. FISH & WILDLIFE SERVICE CONTACTS

## WASHINGTON D.C. OFFICE Washington, D.C. 20240

---

Rowan Gould, Acting Director

Gary Frazer, Assistant Director for Endangered Species

Gloria Bell, Deputy Assistant Director of Endangered Species

Jim Serfis, Acting Chief, Division of Partnerships and Outreach

Mary Stefanski, Acting Chief, Office of Program Support

Nicole Alt, Chief, Division of Conservation and Classification

Rick Sayers, Chief, Division of Consultation, HCPs, Recovery, and State Grants

703-358-2171

<http://www.fws.gov/endangered>

## PACIFIC REGION—REGION ONE Eastside Federal Complex, 911 N.E. 11th Ave, Portland OR 97232

---

Hawaii and other Pacific Islands, Idaho, Oregon, Washington, Robyn Thorson, Regional Director

503-231-6118

<http://www.fws.gov/pacific>

## SOUTHWEST REGION—REGION TWO PO. Box 1306, Albuquerque, NM 87103

---

Arizona, New Mexico, Oklahoma, and Texas

Benjamin Tuggle, Regional Director

505-248-6282

<http://www.fws.gov/southwest>

## MIDWEST REGION—REGION THREE Federal Bldg., Ft. Snelling, Twin Cities MN 55111

---

Illinois, Indiana, Iowa, Michigan, Minnesota,  
Missouri, Ohio, and Wisconsin

Thomas O. Melius, Regional Director

612-715-5301

<http://www.fws.gov/midwest>

## SOUTHEAST REGION—REGION FOUR 1875 Century Blvd., Suite 200, Atlanta, GA 30345

---

Alabama, Arkansas, Louisiana, Georgia, Kentucky,  
Mississippi, North Carolina, South Carolina, Florida,  
Tennessee, Puerto Rico, and the U.S. Virgin Islands

Cynthia Dohner, Regional Director

404-679-7086

<http://www.fws.gov/southeast>

## NORTHEAST REGION—REGION FIVE 300 Westgate Center Drive, Hadley, MA 01035

---

Connecticut, Delaware, Maine, Maryland, Massachusetts,  
New Hampshire, New Jersey, New York, Pennsylvania,  
Rhode Island, Vermont, Virginia, and West Virginia

Marvin Moriarty, Regional Director

413-253-8300

<http://www.fws.gov/northeast>

## MOUNTAIN-PRAIRIE REGION—REGION SIX PO. Box 25486, Denver Federal Center, Denver CO 80225

---

Colorado, Kansas, Montana, Nebraska, North  
Dakota, South Dakota, Utah, and Wyoming

Stephen Guertin, Regional Director

303-236-7920

<http://www.fws.gov/mountain-prairie>

## ALASKA REGION—REGION SEVEN 1011 E. Tudor Rd., Anchorage, AK 99503

---

Alaska

Geoff Haskett, Regional Director

907-786-3542

<http://www.fws.gov/alaska>

## PACIFIC SOUTHWEST—REGION EIGHT 2800 Cottage Way, Sacramento, CA 95825

---

California and Nevada

Renne Lohofner, Regional Director

916-414-6464

<http://www.fws.gov/cno>



