

Wildlife Tracks®

A PUBLICATION OF THE HUMANE SOCIETY OF THE UNITED STATES AND THE HSUS WILDLIFE LAND TRUST

Volume 8, Number 4, Fall, 2004



Conservation Medicine

Tackling the Root Causes of Emerging Infectious Diseases and Seeking Practical Solutions

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West Nile virus was first detected in North America in the summer of 1999, in New York City, when a dead crow with the disease was found at the Bronx Zoo. Within three months, WNV had spread to Connecticut and New Jersey, killing tens of thousands of birds, and it has continued to spread across the continent.

Because of their vulnerability to environmental change, amphibians are often viewed as good indicators of environmental health, revealing the initial effects of en-



In Australia, Indonesia, and Papua New Guinea, individuals of the green tree frog species have been found to be sick with the chytrid fungus, a previously unknown disease. Outbreaks of the disease have coincided with increasingly significant population declines and extinctions in amphibians inhabiting relatively pristine habitats.

vironmental degradation. Over the past 50 years, frog populations have experienced die-offs and declines globally. Some of the drops in frog populations can be attributed to deforestation, others to the draining of wetlands, and still others to the effects of pollution. In the late 1980s, however, scientists began to notice increasingly significant population declines and extinctions in amphibians inhabiting relatively pristine habitats. Researchers later discovered that these events coincided with outbreaks of a previously unknown disease, chytridiomycosis, which is caused by a fungal pathogen, *Batrachochytrium dendrobatidis*.¹ This disease has been implicated, for example, as the proximate cause of extinction of the golden toad of Costa Rica (*Bufo perigrines*) and two species of Australian gastric brooding frogs (*Rheobatrachus silus* and *R. vitellinus*).

Nobody knows with certainty when, where, and why this pathogen first

emerged. Most likely the disease has existed in some amphibian populations for many years until recent habitat alterations (e.g., habitat fragmentation, species introductions, climate change, etc.) led to opportunistic infections of new hosts. Another theory suggests that the pathogen piggy-backed on the international trade in wildlife as food and pets across international boundaries, allowing the fungus to spread to naïve populations. Recent studies have shown that the bullfrog (*Rana catesbiana*), which is transported interna-

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Letter from the Editor

Wildlife Tracks Mission and Goals:

Over 5,000 wildlife and habitat protection organizations nationwide are working to stop the rapid disappearance of wildlife and the destruction of their habitat. *Wildlife Tracks* combines the power of information, the power of networking and the power of people to strengthen local, state and national grassroots movements to preserve and restore wildlife and the ecosystems they need for their survival.

Goals:

- To expedite the exchange of experience and information between wildlife and habitat organizations, while increasing the efficiency and effectiveness of their efforts.
- To empower the grassroots by sharing the successful efforts to preserve wildlife and ecosystems and to inspire them to expand their vision and strategy to achieve long-term solutions.
- To assist in building responsible and credible organizations by providing information and guidance.

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One of the things we humans do best—changing our environment to make our lives easier—can have serious consequences for animal welfare and conservation, even if unintentional.

Urban development and the conversion of land to agricultural uses destroys habitat, but it also brings humans and domestic animals into contact with wildlife. Species already imperiled by habitat loss can be further jeopardized when close proximity to humans, domestic animals, or captive wildlife results in the transmission of novel diseases to wildlife. Human encroachment into wildlife habitat can also trigger the emergence of new infectious diseases in human populations.

International travel by humans, and international trade in wild and domestic animals and plants, can result in the introduction of exotic plants and animals, as well as the disease organisms they may carry. This can jeopardize native wildlife populations with possible exposure to a novel disease; it also has the potential to threaten human health. When there is profit to be gained from the international trade in wildlife—i.e., where wild animals or their parts are sold for food, medicine, exhibition, or as part of the pet trade—such activities often result in over-exploitation of wildlife populations, as well as the inhumane treatment of the wild animals held in captivity or transported.

In this issue of *Wildlife Tracks*, Adam Roberts, executive director of the Animal Welfare Institute, illuminates the global trade in bears and their parts—primarily their gall bladders and bile—for medicinal purposes. Media coverage of recent undercover investigations by U.S. federal and state wildlife and law enforcement authorities exposed a shocking under-



ground world of poaching and illegal trade in American black bears. But this trafficking is not restricted to the U.S. or to black bears; it has a global reach, threatening populations of many bear species world-wide and even resulting in bear “farming,” in which captive bears are “milked” for their bile.

The international trade in wildlife is not the only way in which human alterations to the environment can affect the conservation and welfare of wildlife. Lisa Schloegel and Peter Daszak from the Wildlife Trust’s Consortium for Conservation Medicine provide a cautionary tale of the role of human-induced ecosystem alterations on the emergence and spread of diseases in wildlife and in humans. The resulting disease outbreaks, such as SARS or West Nile virus, are clearly a threat to human health; now, however, there is increasing awareness that such emerging diseases can threaten the viability of wildlife populations and the integrity of ecosystems.

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Look for in Future Issues

Live-Trapping and Relocating “Nuisance” Wildlife:
Exploring the Pros and Cons

Protecting Wildlife in Your Own Backyard

Gopher Tortoise Conservation

Current Coyote Issues





There have been no recorded cases of transmission of brucellosis—a disease originally transmitted to bison from livestock—from wild bison back into livestock; however, the perceived risk has led to conservation concerns for bison.

tionally for both the food and wildlife pet trades, has all the characteristics of a carrier of this disease: It is capable of being infected with the pathogen but suffers only minimal effects itself.

Deforestation, species introductions, chemical pollution, globalization, and climate change—all of these human-induced ecosystem alterations threaten the survival of wildlife populations. But when such ecosystem alterations also result in pathogen pollution (the movement of pathogens or hosts to new locations), additional ecological disturbance can occur due to the potentially devastating impacts on wildlife health.

Emerging Infectious Diseases

Emerging infectious diseases (EIDs) are diseases that have recently increased in prevalence or geographic range, have moved into new host populations, have been recently discovered, or are caused by newly evolved pathogens. The seriousness of this threat to wildlife, as well as to humans, has been made apparent by the recent emergence of Severe Acute Respiratory Syndrome (SARS), monkey pox, West Nile virus (WNV), and other diseases. As humans venture into previously undisturbed habitats, cut down forests, transport wildlife, and travel across great distances, this threat is amplified. The result is an alarming number of newly discovered EIDs, some causing human mortality on a global scale (e.g., HIV/AIDS, drug resis-

tant tuberculosis), and others emerging locally (e.g., Ebola, Hantavirus) without known therapies, cures, or vaccines. Despite enormous interest in EIDs that directly affect people, scientists have only recently begun to show that wildlife also suffers from EIDs. This follows a number of high profile outbreaks of wildlife diseases—such as amphibian chytridiomycosis—causing population declines or even contributing to extinctions. In January 1996, the last individual of a Polynesian tree snail (*Partula turgida*) died in a lab in the London Zoo. Once an inhabitant of the Society Islands, this species began to decline after a predatory snail (*Euglandina rosea*) was introduced for biocontrol purposes. Pathological examinations of the last individuals, however, revealed that death of the last population was the result of infection by a microsporidian parasite (*Steinhausia sp.*).

To date, the loss of *P. turgida* is the only proven case of extinction by infection (albeit in captivity); however, EIDs are suspected in a number of other extinctions. For example, although introduced pathogens are thought to be the proximate cause of the extinctions of many of the original endemic Hawaiian birds and some other species, definitive proof has not been, and may never be, obtained. Es-

tablishing such proof may continue to prove elusive, because it requires data on population biology, as well as on the health and pathology of at least one individual of the last remnant group. Some evidence suggests that chytridiomycosis led to the extinction of the sharp-snouted day frog (*Taudactylus acutirostris*) in Australia. Analysis of one of the last known individuals of this species revealed infection by the chytrid fungus. In 2001, the status of the sharp-snouted day frog was assessed and subsequently listed as critically endangered on the IUCN (World Conservation Union) Red List of Threatened Species. This assessment is conservative; its status is likely to change to extinct within the next ten years.

Potential Causes of Pathogen Emergence and Spread

Potential Causes of Pathogen Emergence and Spread

Approximately 75% of emerging human diseases are zoonoses, meaning that they are infectious to both humans and animals. In particular, zoonotic EID pathogens often emerge when they spread from an animal reservoir—in which pathogens live and multiply but rarely or never result in illness or mortality—to another host that is susceptible to the disease. This

makes it difficult to predict which wildlife pathogens will emerge next. In some cases, pathogens move from wildlife to humans, and then evolve to become serious global infections—such as HIV/AIDs. In almost all cases, the emergence of these zoonoses is a result of human-mediated alterations to natural ecosystem processes.

Understanding EIDs requires an understanding of the environmental changes that cause them to emerge and spread—changes in human behavior; travel of humans, wildlife, and domestic livestock around the



Increased intensification of pig farming adjacent to fruit bat colonies, along with other human-caused factors, may have contributed to the emergence of Nipah virus.



Research has shown that the disappearance of African wild dogs from the Serengeti that occurred in 1991 was caused by the transference of canine distemper and rabies in domestic dogs of that area to wild dogs.

world; agriculture and livestock production; and encroachment of human communities into wildlife habitat. The causal pathway by which these environmental changes may affect wildlife health, human health, and aspects of disease ecology (e.g., species extinctions and increased transmission of pathogens to humans) is under current investigation, but case studies can illustrate the close correlation between human-induced ecosystem changes and disease emergence.

Live Animal Markets and SARS

The recent outbreak of SARS has been traced back to markets that deal in diverse wild mammals, birds, and reptiles for food. Molecular evidence suggests that masked palm civets (“civet cats”) present at these markets were infected by the virus that caused SARS in humans, although many experts believe there may be an additional wildlife reservoir. Locating that reservoir could give scientists insight into the reasons behind the emergence of this disease and could have important implications for preventing future outbreaks.

Nipah Virus: At the Interface Between Farming and Wildlife Habitat

Nineteen ninety-eight marked the emergence of the Nipah virus in Malaysia. This lethal virus, first identified in pigs

and pig farmers, killed 100 people in a single outbreak and led the Malaysian government to cull 1.1 million pigs in an effort to stop the epidemic. Researchers later discovered that fruit bats are the reservoirs for this disease.² The virus was transmitted from infected fruit bats to pigs, which acted as “amplifier” hosts for the disease, increasing the transmission and prevalence of the virus. Infected pigs developed a barking cough, at which time the virus became an airborne pathogen that was then transmitted to humans. The emergence of Nipah virus may have

been triggered by any number of anthropogenic or other changes, such as human encroachment into fruit bat habitat (i.e., intensification of pig farming adjacent to fruit bat colonies), climatic factors, forest fires and drought, or land-use change.

Climate Change

Recent research indicates that global climate change may be another contributing factor in the emergence and/or movement of diseases. Climate-induced changes in temperature, rainfall, and humidity may alter the dynamics of host-pathogen ecology for many emerging diseases. For example, increased water temperature can have negative consequences for two species of commensal chaetogasters inhabiting the mantles of aquatic snails. Research has shown that these commensals act as predators, attacking and ingesting the infective stages of parasites attempting to infect a snail host. With an increase in temperature, the chaetogasters abandon the snail and die, resulting in an increase in the rate of parasitism on the snails.³

For vector-borne pathogens (i.e., those transmitted from one host to another via an insect or other animal) such as dengue, malaria, Lyme disease, and West Nile virus, temperature increases may increase the development rate of the pathogen, the

number of generations per annum, and the pathogen’s transmission rate; it may also enhance winter survival of pathogens or modify host susceptibility to infection. As northern latitudes warm, winter survival and the upward movement of carrier hosts or vectors (e.g., the northward movement of ticks carrying Lyme disease) may push EIDs into new regions.

It is important to note that, while climate change may lead to the emergence of pathogens, it could also lead to the *disappearance* of certain pathogens that normally play a role in regulating the size or density of host populations. In the absence of certain pathogens, the relative size of host populations can increase; this can result, for example, in greater predation on prey species or increased competition over resources with other species.

Pathogen Pollution and Globalization

Analyses suggest that pathogen pollution may account for 60 percent of the emerging diseases of wildlife. It has been linked to outbreaks of elephant herpes virus in zoos; crayfish plague in Europe; avian malaria and pox disease in Hawaii; and West Nile virus in North America. With the continuing globalization of trade in domestic animals and their products, wild animals and their parts (e.g., as pets, food, or for hunting), and contaminated produce and materials, pathogen pollution is likely to become an even more significant burden to human and animal health, environmental health, and the economy in the future.

For example, it is believed that West Nile virus reached North America in 1999, via infected international travelers. Whether the travelers responsible were of the human, avian, or mosquito variety is still unknown. It is clear, however, that the introduction of WNV to the Americas was most likely a result of human activity: the transport of infected humans, birds, or mosquitoes. Since the time of its introduction, WNV has swept across the country at an alarming rate, killing thousands of native birds. Researchers now fear that the virus will spread to the Hawaiian and Galapagos islands. If the virus reaches these remote



A high diversity of species in small areas, such as at this live bird market in China, increases the opportunity for pathogen transmission.

areas, it could be devastating to the avian species inhabiting those islands, many of which are already at risk.

Spill-Over and Spill-Back

Domesticated animals (pets and livestock) and captive wildlife are often reservoirs for disease that can “spill-over” into free-roaming wildlife. Such events could be particularly devastating to endangered species. Small, isolated populations are more vulnerable to the effects of environmental stressors, including disease. For instance, since the 1960s, populations of the African wild dog (*Lycaon pictus*) have experienced significant declines and are now considered endangered. In 1991, wild dogs disappeared from the Serengeti, an event that coincided with outbreaks of canine distemper and rabies in domestic dogs in that area. Researchers have shown that the cause of the disappearance was outbreaks of these two diseases, which jumped to wild dogs from domestic dogs. The current focus of conservationists is to encourage widespread vaccination of pet dogs around wild dog habitat, and they are beginning to win the battle against this wildlife EID.

Of similar concern is the reverse of spill-over: spill-back. For example, brucellosis was most likely introduced into

practically eliminated the threat of serious epidemics of brucellosis in cattle. The disease, however, still persists in some populations of bison, elk, and other wildlife. Ranchers now fear that the disease will be transmitted from the bison to livestock, making the livestock industry in certain states economically unviable. There have been no recorded cases of such transmission in the wild so far, but it is clear that the perceived risk is enough to cause serious conservation concerns for bison.⁴

Conservation Medicine

Our traditional definition of conservation entails the preservation or management of natural lands and their resident plants and animals to prevent exploitation, habitat loss, and species extinctions. Today, scientists are beginning to realize that this definition only scratches the surface of what conservation must become in the 21st century. The reality is that people are destroying ecosystems globally, and the shockwave this destruction creates threatens not only the habitat so vital for species survival and ecosystem integrity, but the *health of all species*: wildlife and plants, as well as humans and domestic animals.

A new field of study has emerged in response to the growing impact of human-induced environmental degradation on disease ecology. Conservation medicine is

wild populations of bison in North America via domestic cattle in the early 1900s. Since that time, a national eradication program in the United States, along with an extensive vaccination program, has

a multidisciplinary science dedicated to understanding how wildlife, human, and ecosystem health are related and to dealing with the threats that diseases pose to ecosystems. An ecological health collaborative, the Consortium for Conservation Medicine (CCM), was created to tackle the root causes of emerging diseases and the global spread of microbes. The CCM is a collaboration among Harvard Medical School’s Center for Health and the Global Environment, Johns Hopkins Bloomberg School of Public Health, Tufts University’s School of Veterinary Medicine, the USGS National Wildlife Health Center, and Wildlife Trust (not associated with The HSUS Wildlife Land Trust). It brings together key experts from the fields of veterinary medicine, public health, and conservation to form think-tank research groups that search for the causes of ecosystem-wide health problems and formulate practical solutions for a healthier planet.

The CCM and its partner institutions are involved in a variety of ongoing research projects. For example, the CCM is currently investigating the factors that led to the emergence of Nipah virus in Malaysia and a closely related virus, Hendra virus, which emerged in Australia. Additional CCM projects include a study on the dynamics of SARS in Asian wildlife, how human and environmental factors affect the prevalence and emergence of WNV, and ground-breaking research to aid in predicting how pathogen pollution might drive future emerging diseases.

Several recent, widely publicized EID outbreaks in humans and in wildlife populations around the world should serve as a wake-up call for public health experts, wildlife disease specialists, and conservationists. It is clear that diseases such as SARS, Nipah virus, and Ebola virus have the potential to cause widespread human suffering and death. However, our increasing awareness of the potential for the devastating effects these and other emerging diseases may have on sensitive wildlife populations must now inspire concentrated and coordinated research and action from multiple fields to inform and

Examples of Emerging Infectious Diseases and Their Effects on Wildlife, Ecosystems, and Human Health⁵

Disease and/or Pathogen	Effects	Emergence and/or Spread
<p>BRUCELLOSIS Caused by any of several strains of the bacterium, <i>Brucella</i>. The strain found in bison and cattle in the United States is <i>Brucella abortus</i>.</p>	<p>Wildlife Health: Many wild mammals worldwide are susceptible to brucellosis, including ungulates. Brucellosis is usually not fatal in adult mammals but can cause reproductive dysfunctions such as spontaneous abortions. It is not clear whether brucellosis is adversely affecting the viability of infected wildlife populations. Attempts to eradicate the disease may have an impact on conservation that goes well beyond that of the disease itself.</p>	<p><i>B. abortus</i> was most likely introduced to the United States with the importation of infected European cattle, which later came into contact with wildlife resulting in a “spill-over” event.</p> <p>Human exposures to brucellosis generally occur when people come into contact with tissues of infected livestock (e.g. at slaughterhouses or laboratories) or ingest unpasteurized dairy products from infected animals.</p>
<p>CHYTRIDIOMYCOSIS Caused by the fungus <i>Batrachochytrium dendrobatidis</i>.</p>	<p>Wildlife Health: Evidence suggests that chytridiomycosis caused the extinction of the sharp-snouted day frog in Australia and probably contributed to the extinction of the golden toad in Costa Rica and two species of gastric brooding frogs in Australia.</p>	<p>First identified in 1998, chytridiomycosis was associated with amphibian mass mortality events and population declines in Panama and Australia. The disease has since been reported in North America, South America, Africa, and Europe. International trade in wildlife, such as the bullfrog, may have contributed to the spread of this disease.</p>
<p>EBOLA HEMORRHAGIC FEVER Ebola is caused by infection with one of several strains of the Ebola virus, which belongs to the Filoviridae family of viruses.</p>	<p>Human Health: Ebola is often fatal in humans. The 2000–01 outbreak in Uganda sickened 425 people, more than 50% of whom died. The 2001–02 outbreak in Gabon and the Republic of the Congo sickened 122 people, nearly 80% of whom died.</p> <p>Wildlife Health: Often fatal in non-human primates, Ebola has contributed to the rapid decline of gorilla and chimpanzee populations in western Africa. A 2002 outbreak in the Rep. of the Congo resulted in the deaths of about 50% of the 1,200 gorillas found in a protected sanctuary between two infected villages. The regions most affected by Ebola are home to 80% of the world’s remaining gorillas and most chimpanzees.</p>	<p>Ebola virus was first isolated in the Democratic Republic of the Congo. The Ebola virus is thought to have originated from the African continent. Though the natural reservoir of the disease is unknown, the first human infection in an outbreak probably follows human contact with an infected animal. Researchers are still looking for possible triggers—such as human encroachment into ape habitat—that may bring apes into greater contact with the virus.</p>
<p>MONKEYPOX Caused by the monkeypox virus, which belongs to the orthopoxvirus group of viruses.</p>	<p>Human Health: In the 2003 United States outbreak, 37 confirmed cases of monkeypox in humans in 6 states were reported. No human deaths were reported from the U.S. outbreak. In rural areas of central and west Africa, mortality ranges from 1% to 10%.</p> <p>Wildlife Health: Some scientists feared that infected pet prairie dogs might be released into the wild, potentially resulting in disease transmission to wild prairie dogs and other wildlife. To date, there are no reports that this has occurred.</p>	<p>Monkeypox was isolated for the first time in North America in 2003 when infected African rodents were shipped from Ghana to the United States to be sold as pets. Monkeypox was transmitted to North American prairie dogs—also captured for sale as pets—that were housed nearby. Human contact with infected prairie dogs appears to have been the primary route of transmission to humans.</p>
<p>NIPAH VIRUS ENCEPHALITIS A member of the Paramyxoviridae family.</p>	<p>Human Health: In the 1998–99 Malaysia outbreak, Nipah virus caused encephalitis in 265 people, killing 105.</p> <p>Wildlife Health: The initial outbreak of the virus led to the culling of 1.1 million pigs. Several species of fruit bats are known to carry the virus while exhibiting no adverse effects from infection.</p>	<p>Nipah virus was unrecognized until an outbreak from September 1998 to April 1999 in Malaysia. Encroachment of farming into fruit bat habitat may have triggered the outbreak. Fruit bats appear to have transmitted Nipah to domesticated pigs, which then transmitted the disease to humans.</p>

SEVERE ACUTE RESPIRATORY SYNDROME (SARS) Caused by a coronavirus, known as SARS-associated coronavirus.

Human Health: In the 2003 outbreak, SARS sickened 8,098 people worldwide and resulted in the deaths of 774 people.

Wildlife Health: The Chinese government responded to the outbreak, in part, by ordering the killing of as many as 10,000 captive masked palm civets (or “civet cats”), despite uncertainty among health experts as to the need or effectiveness of this move. The direct effect of the virus itself upon civets or other wildlife is not yet known.

Wild animals, including masked palm civets, raccoon-dogs, and Chinese ferret badgers, held at live animal markets (for sale for human consumption) in southern China were found to have been exposed to SARS or a similar coronavirus. These live animal markets probably played a role in the transmission of SARS to humans.

WEST NILE VIRUS (WNV) Caused by a flavivirus closely related to St. Louis encephalitis.

Human Health: The CDC reports that WNV sickened 9,862 people in the United States and resulted in 264 human deaths in 2003. Infections in humans in the United States have been documented in 40 states and the District of Columbia.

Wildlife Health: Infections in birds (225 wild and captive species to date) and other animals have been reported in 47 states, the District of Columbia, and Puerto Rico. Effects on bird populations are unknown at this time, but WNV may pose a significant risk to threatened and endangered bird species.

WNV was isolated for the first time in the United States (and in the Western Hemisphere) in Nassau County, New York, in August 1999. The virus is thought to have reached North America via infected international travelers (i.e. humans, birds, or mosquitoes). Researchers now fear the virus may spread to the Hawaiian and Galapagos islands in the same way it reached the shores of North America.

drive public policy in the United States and abroad. Time is of the essence in responding to known disease threats and in preparing for the effects, on both human health and wildlife, of as yet undiscovered diseases that are certain to emerge in the near future.

Sources for Additional Information

Website of the Consortium for Conservation Medicine: www.conservationmedicine.org.

Selected Publications

EcoHealth: Conservation Medicine – Human Health – Ecosystem Sustainability

An international, peer-reviewed journal launched in 2004. The journal provides a timely forum for research, policy, and practice that integrates the ecological and health sciences. *EcoHealth* is the merger of the complementary journals *Ecosystem Health and Global Change and Human Health*, and a planned journal of the Consortium for Conservation Medicine. For more information, visit www.ecohealth.net.

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The illicit international bear parts trade not only puts endangered Asiatic bear species in further danger, but it has put a price on the head of every black bear in America.

It's a Bear Market:

Widespread Exploitation and Inadequate Protections Press Bears Toward an Uncertain Future

By Adam M. Roberts, Executive Director, Animal Welfare Institute

Alaska State Trooper Gary Pacolt, dressed in civilian clothes, dined at the Front Street Café in the rural southwest Alaskan town of Bethel. This is a “damp” community—it is legal to possess alcohol for personal use, but illegal to buy, sell, or trade it. Trooper Pacolt, in town as part of a sting operation to uncover an illegal underground trade in bear gallbladders, noticed Jung Ho Yi also dining, although Yi appeared to be a restaurant employee.

According to court documents, Trooper Pacolt “removed a bear gallbladder from his shirt pocket and asked Yi if he was interested in buying.” Yi apparently knew that Alaska Administrative Code bars the purchase of bear gallbladders, but he mistakenly thought (or feigned ignorance) that bartering two bottles of whiskey for the gallbladder would be okay. Yi also picked up the tab for the trooper’s meal. A month later, Trooper Pacolt traded another gallbladder for three bottles of vodka. Yi was ultimately indicted for violating both state liquor and wildlife laws.

Some 4,000 miles away in the Shenandoah Mountains area of Virginia, the Virginia Department of Game and Inland Fisheries (VDGIF) was concluding its second undercover operation in four

years to investigate the illegal commercialization of bear parts in the region. “Operation VIPER” (Virginia Interagency Effort to Protect Environment Resources), according to Department press statements, “uncovered evidence that whole bears, gall bladders, bear paws, and other bear parts originating in Virginia are being trafficked to Washington, DC, Maryland, West Virginia, North Carolina, New Jersey, New York, and California, as well as overseas. Operation VIPER has established the existence of a direct connection between Virginia and South Korea, and has obtained evidence of links to other foreign countries.” Operation VIPER uncovered nearly 700 state and federal violations perpetrated by more than 100 people.

On the black market, bear parts, particularly the gallbladder and bile, literally are worth their weight in gold and can fetch more than gems or drugs. The illicit international bear parts trade not only puts endangered Asiatic bear species in further danger, but it has put a price on the head of every black bear

in America. The resulting bear poaching could threaten the long-term viability of some states’ resident bear populations. Globally, laws and regulations regarding bear hunting and possession or sale of bear parts vary substantially from species to species, country to country, and even state to state in the United States. This complicates wildlife law enforcement considerably. Poaching (illegal killing of wildlife) is never justified—even

when a wildlife population can withstand certain levels of lawful hunting—and strenuous efforts should always be made to deter this criminal wildlife slaughter. But it is quite clear that because of the financial incentive for bear poaching in particular, greater efforts should be extended nationally and internationally to protect bears from poachers and profiteers.

Wildlife Tracks readers surely will be well versed in the panoply of exploitative uses to which bears are subjected globally. Bears face population threats and individual cruelty as a result of habitat destruction. They are hunted for trophies, their hides are used to adorn living room floors, and their teeth



PERHAPS THE MOST PERSVASIVE ILLEGAL GLOBAL EXPLOITATION—FACING THE VAST MAJORITY OF EXTANT BEAR POPULATIONS—IS THE TRADE IN BEAR GALLBLADDERS AND BILE.

and claws are turned into jewelry. Captive cubs are taught to avoid painful treatment by “dancing” for gawking tourists, or they are forced to fight, de-clawed and de-fanged, to defend themselves against dogs bred and trained to attack. Bears are also incarcerated in zoos or circuses and forced to perform “tricks;” and they are kept as pets in the ever-increasing and dangerous exotic pet trade.

HUNTING FOR GALLS; MILKING FOR BILE

While the legal global trade in bear trophies, meat, skins, teeth and claws, or live animals is widespread, perhaps the most pervasive illegal global exploitation—facing the vast majority of extant bear populations—is the trade in bear gallbladders and bile. The international trade in parts and products of Asiatic black and brown bears is prohibited. However, North American black bear parts can be exported legally from Canada and the United States (even though some individual states prohibit commercialization of bear parts). According to trade data compiled by the United Nations Environment Programme’s World Conservation Monitoring Centre, more than a thousand bear gallbladders were exported legally from Canada between 1997 and 2002, but inexplicably, very few (eight) have left the United States legally with the appropriate export permits, easily attained from the United States Fish and Wildlife Service. This is particularly noteworthy given the thousands of bears poached in the United States specifically for their gallbladders—while some bears may be poached for meat or hides or simply taken illegally out of season, there is little evidence to suggest that the trade in bear gallbladders is not the most significant cause of bear poaching nationwide. With so many bears poached in America, and so few legally exported, it seems evident that there is both heavy domestic demand and a sophisticated intercontinental smuggling network.

Bear gallbladder (and bile) has a long history of use in traditional Asian medicines, first prescribed some three thousand years ago. In the traditional medicine pharmacopoeia, the bear gallbladder is



COURTESY DAVID EASTHAM/WSPA

Bears captured so that their bile can be extracted and sold are incarcerated in small iron cages, which restrict their movement almost completely.

considered a “cold” medicine used to treat “hot” ailments such as fevers, burns, swelling, and sprains. According to the *Handbook of Traditional Tibetan Drugs, Their Nomenclature, Composition, Use and Dosage* by T. J. Tsarong, bear bile in one remedy is used to treat stomach pains and the passing of blood in one’s stool. In another, it is distilled in water and used for eye drops.

The active ingredient in bear bile is ursodeoxycholic acid (UDCA), which is a naturally occurring bile acid found in mammals, including humans, but in larger quantities in certain species of bears. There are synthetic alternatives to bear bile in medicinal prescriptions, and more than fifty herbal alternatives, many of which conform to traditional medicine practices. Increasingly, though, bear gallbladder or bile is found throughout Asia in cosmetic items such as shampoos, tonics, throat lozenges, and hemorrhoid creams. The potential market for medicines and luxury cosmetics containing bear parts is, of course, enormous throughout Asia and Asian communities globally.

In a misguided effort to meet public demand and reduce further decline of the wild Asiatic black bear (in China specifically), the Chinese government has advocated bear “farming” for two decades now.

Other countries in the region, such as Viet Nam, Laos, and Cambodia, have smaller bear farming industries. More than 7,000 bears are thought to languish in bear farms in China according to groups such as the World Society for the Protection of Animals (WSPA) and Animals Asia.

Bears are incarcerated in small iron cages, which restrict their movement almost completely. Usually, a steel catheter is inserted into the gallbladder and used to extract the bile. Some bears are forced to wear an iron corset to prevent movement during (painful) bile extraction. Bears in these barren enclosures receive little or no veterinary care; have numerous open wounds, not only to the abdomen from the bile extraction, but to their heads and bodies from rubbing against the cage bars; and engage in stereotypic behaviors indicative of their suffering. When they are too old to produce sufficient quantities of bile, they are killed for the whole gallbladder, and their paws are sold to restaurants that serve bear paw soup. WSPA investigators have been told that bear paws may be cut off if customers request a fresh paw.

Notwithstanding the unacceptable cruelty involved in bear farming, there is no evidence whatsoever that bear farming has reduced the pressure on wild bear popu-

lations. In fact, a ready supply of bear gallbladder and bile products has most likely stimulated market demand, placing more, not less, pressure on wild populations. Additionally, wild bear parts are popularly considered to be more valuable than farmed products, putting global emphasis on poaching.

AMERICAN MARKET AND LEGAL LOOPHOLES EXPLOITED

As evidenced by the sting operations in Alaska and Virginia, described in the opening of this article, the illegal bear parts trade has come to America. Further, the sale of bear parts in the United States occurs nationwide; similar illegal bear parts busts are known to have occurred in many other states, including Arizona, California, Maryland, Minnesota, New Jersey, Oregon, Pennsylvania, and Washington. With a robust national bear population (an estimated 350,000 black bears, one-third of them in Alaska), Asian communities in major cities nationwide, and an elaborate underground wildlife trade, the United States offers supply, demand, and remarkable opportunity for those wanting to profit by commercializing bear parts.

From coast to coast across America, bear carcasses have been found with the gallbladders removed (and sometimes the paws lopped off). There is also significant evidence of attempts to smuggle bear gallbladders and bear bile into the country to supply domestic demand—in this case, American demand for the parts of more endangered bear species such as black or brown bears in Asia, which can fetch higher prices on the domestic market. Smugglers have been apprehended at airports in the western United States (Los Angeles and Anchorage, for instance) attempting to smuggle wild bear gallbladders from Russia or bear bile from caged bears in China.

A 2002 report by the WSPA, *The Bear Bile Business*, reveals the findings of an investigation into the (illegal) sale of Chinese bear bile and gall products in the United States, specifically, San Francisco, Chicago, Washington, DC, and New York.

The study found that in these cities, 91% of the 32 traditional Chinese medicine shops surveyed sold some form of bear part or derivative including manufactured bile medicines, farmed bile powder, or intact galls. Hemorrhoid pills sold for between \$1.30 and \$4.00; bile crystal powder sold in San Francisco for \$50 a bottle; and intact bear galls sold for \$129 in San Francisco (claimed to be from a wild bear in China), \$50 in Chicago, and \$350 in Washington, DC.

Part of the difficulty in regulating the bear parts trade in the United States (and worldwide) is that different species have different levels of protection. Even within the United States, individual states have different laws regarding commercialization of bear parts and products, based on the species of bear and where it is found. Bear gallbladders from different species are visually indistinguishable, facilitating the fraudulent sale of bear parts and complicating prosecution. For example, highly endangered Asiatic bear species can be killed and the parts sold in Asia or any other country; if the traffickers are apprehended, they pass off the parts as being from legally hunted North American bears. The U.S. Fish & Wildlife Service's National Fish and Wildlife Forensics Laboratory in Ashland, Oregon has made great strides in forensically analyzing gallbladders or derivatives to determine whether or not they contain bear (sometimes, pig gallbladders are deceptively sold as bear galls). However, this technology is not readily and cheaply available to law enforcement officials in most countries. Further, there are limitations in the ability of this technology to identify the actual state from which a bear part or product may have originated.

Similarly, in the United States, bear gall-



COURTESY DWG ESTHAR/WSPA

In operating theaters such as this one, a steel catheter is inserted into the bear's gallbladder and used to extract their bile.

bladders from illegally killed bears can be sold in one state, simply by fraudulently claiming them to be from bears legally killed elsewhere. From state to state, regulatory discrepancies make enforcement difficult. Only five states allow the unfettered commercialization of bear parts (Idaho, Maine, New York, Vermont, and Wyoming). Three states, not having resident bear populations, have no specific regulations regarding such trade (Hawaii, Illinois, and Iowa).

The remaining 42 states

either prohibit the trade completely, or, for fewer than ten of them, allow the trade in bear parts *provided that the bear was taken in another state*. This creates an enforcement nightmare for wildlife officials and prosecutors who must prove the origin of a bear part in question. The gallbladder from a bear in Idaho would be visually indistinguishable from the gallbladder of a bear from Oregon.

Some state statutes are unambiguous. For instance, in Colorado, it is simply illegal to “sell, trade, barter or offer to sell, trade or barter bear gall bladders or edible portions of bears.” Maine, on the other hand, prohibits the buying, selling, or bartering of bears, but has a specific exception allowing trade in the bear's head, teeth, gall bladder, claws, and hide. West Virginia once was the sixth state to allow full commercialization of bear parts, but as a result of region-wide poaching, amended its state law in 1999 to allow only the hide, head, and skull of a legally killed black bears to be sold. Gallbladders used to be included in that state's list of parts available for sale legally.

Efforts have been made over the past decade in the United States Congress to bring uniformity to the legal framework that governs the commercialization of bear gallbladders or bile. The Bear Pro-

tection Act, most recently introduced in the 107th Congress by Senator Mitch McConnell (R-KY) and Congressman Elton Gallegly (R-CA), had terrific bipartisan support. The legislation would have simply prohibited



GLOBAL ATTENTION TO A GLOBAL PROBLEM

Protecting bears from the trade in their parts requires global cooperation.

the importation, exportation, and interstate trade of bear viscera and items, products, or substances containing, or labeled or advertised as containing, bear viscera.

The legislation, narrowly crafted to deal exclusively with the trade in bear viscera, would have made it clear that the United States would not participate in the trade in bear parts or provide cover for those around the world who wish to profit by such exploitation. Violators would have been subject to criminal penalties of up to a year in prison and civil penalties of up to \$25,000 per violation.

House Resources Committee Chairman, Don Young (R-AK), a strident opponent of the bill (and most animal protection measures) prevented any action from being taken, despite the House bill amassing 191 bipartisan cosponsors. In the Senate, with 51 cosponsors and the bill having been passed in the previous Congress, a successful effort was made to attach the Bear Protection Act as an amendment to the Senate Agriculture, Conservation, and Rural Enhancement Act, known as the "Farm Bill." But during the Conference, where the House and Senate bills are melded, the Bear Protection Act was stripped through pressure from Congressman Young. Congressman Young's opposition was all the more confusing since Alaska already prohibits the commercialization of bear parts, yet still has bear poaching and illegal trade. This suggests the usefulness of a national policy on the matter, one that would reinforce state enforcement efforts.

Although the bill was not reintroduced in the 108th Congress (2003-2004), animal advocates and conservationists are hopeful that we will have another chance to end America's role in this exploitative and unsustainable wildlife trade in 2005.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the United Nations Treaty responsible for regulating the global trade in wildlife, has spoken unequivocally on the dangers of the ongoing trade in bear parts.

In 1997, in Zimbabwe, a resolution was passed unanimously on the Conservation of and Trade in Bears. The Resolution (Conf.10.8), notes "that the continued illegal trade in parts and derivatives of bear species undermines the effectiveness of the Convention and that if CITES Parties and States not-party do not take action to eliminate such trade, poaching may cause declines of wild bears that could lead to the extirpation of certain populations or even species."

The Resolution further "URGES all Parties, particularly bear range and consuming countries, to take immediate action in order to demonstrably reduce the illegal trade in bear parts and derivatives by the 13th meeting of the Conference of the Parties, by: a) confirming, adopting or improving their national legislation to control the import and export of bear parts and derivatives, ensuring that the penalties for violations are sufficient to deter illegal trade." The Bear Protection Act would have enabled the United States to uphold this obligation to adopt or improve national legislation to control the bear parts trade.

The United States, of course, is not alone in needing to do more to stop the trade in bear parts and derivatives. Bear poaching, for instance, appears to remain problematic in the former Soviet state of Georgia, and Georgia has not provided the CITES Secretariat with information about its legislation and efforts to control the bear parts trade. Cambodia, also neg-

ligent in sharing important information about restrictions on commercialization of bear parts, remains a nation of serious concern in Southeast Asia, maintaining bear farms to supply the markets in Viet Nam and China, and witnessing bear poaching in the wild.

A number of countries, including Indonesia, Malaysia, the Republic of Korea, and Singapore, remain in need of stricter domestic controls on the trade in bear parts. WSPA investigations found that nearly 63% of drug stores surveyed in eight large Indonesian cities sold medicines containing bear bile, often reportedly imported (illegally) from China. In Malaysia, the percentage was 78%.

The Republic of Korea remains one of the most prominent destinations for illegal bear parts shipments in the world. There have been some positive developments in detecting illegal bear shipments through the use of sniffer dogs, a program implemented by a nongovernmental organization, Animals Asia, in cooperation with the Korean Customs Department. In two years, Detective Dog Simba has uncovered well over 100 shipments of illegal wildlife contraband. The problem is that few of these discoveries result in prosecution by Korean authorities.

Additionally, Viet Nam should be considered a country in need of special international attention. The government of Viet Nam itself has recognized that bear farming has "adversely affected wild populations" in the country. A report prepared by the Animal Welfare Institute, WSPA, Japan Wildlife Conservation Society, Animals Asia, and Environmental Investigation Agency for CITES notes that many bear farms continue to operate in Viet Nam, outside of government control. With few bears left in the country, live bears for farms come from China, Laos, and Cambodia, despite the CITES prohibition on international commercial trade in these Asiatic bears.

While the CITES Secretariat has recognized in recent documents that "illicit trade in live bears and in bear parts and derivatives continues," there is little

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Books



Crimes Against Nature, by Robert F. Kennedy, Jr. and John Moyers, details the Bush administration's undermining of environmental protections for air, water, public lands, and wildlife, as well as public health, national security, and democracy in favor of private profit and personal power. The administration's methods of effecting these rollbacks are revealed, including deception, suppression of scientific data, intimidation of enforcement officials and other civil servants, and doublespeak. HC, 256 pp. \$21.95. www.harpercollins.com.

International Directory of Institutions Active in Environmental Law, published by IUCN Environmental Law Centre in cooperation with the International Council of Environmental Law (ICEL), provides contact information for all institutions that are active in environmental law. The directory is complemented by CEL Members Portal, the IUCN-UNEP Judicial Portal and an extensive links page, accessible through the IUCN-ELP website, along with the CEL Directory. For further information visit www.iucn.org.

Alien Species and Evolution: The Evolutionary Ecology of Exotic Plants, Animals, Microbes, and Interacting Native Species, by George W. Cox, reviews and synthesizes emerging information on the evolutionary changes that occur in plants, animals, and microbial organisms when they colonize new geographical areas, and on the evolutionary responses of the native species with which alien species interact. With examples from all parts of the world and all major ecosystem types, the author offers insight into the patterns of evolution that are likely to result from the massive introduction of species to new geographic regions. PB 400 pp., \$40.00. Island Press, 800-282-1302, mention code 2ASE. www.islandpress.org/alienspecies/book.html.

Earth in Mind: On Education, Environment, and the Human Prospect, Tenth Anniversary Edition, by David W. Orr, focuses on the problem of inadequate and misdi-

rected education that alienates people from life, prematurely focuses students upon how to make a living before they know who they are, overemphasizes economic and professional success, separates feeling from intellect and the practical from the theoretical, and deadens the sense of wonder. With a new introduction and essay by the author, the book defines the crisis we face as one of mind, perception, and values. PB, 224 pp. \$19.95. Island Press, 800-282-1302, mention code 2EIM. www.islandpress.org/earthinmind/book.html.

The Western Confluence: A Guide to Governing Natural Resources, by Matthew McKinney and William Harmon, offers strategies for resolving natural resource disputes. Tracing the principles of natural resource governance across the history of western settlement, they offer practical suggestions for resolving current and future disputes by fully integrating the values of interest-based negotiation into existing public decision-making strategies. PB, 256 pp., \$30. Island Press, 800-282-1302, mention code 2TWC. www.islandpress.org/western/book.html.

Marine Reserves: A Guide to Science, Design, and Use, by Jack Sobel and Craig Dahlgren, is the first guidebook on no-take marine reserves. It provides a synthesis of information on the underlying science of no-take marine reserves and examines how reserves can be designed to achieve specific objectives. It also identifies research needed to address gaps in knowledge. PB, 336 pp., \$35. Island Press, 800-282-1302. www.islandpress.org/marinereserves/book.html.

State of the World 2004, the latest edition of Worldwatch Institute's highly respected flagship annual, examines consumer thinking and behaviors and the impact of our consumption choices on the planet and other people. Specific topics include food, water, energy, the psychology of consumption, and an assessment of the potential for cultivating a less consumptive society. PB, \$16.95 + S/H. www.worldwatch.org.

Reports



Techno-Fixing Sea Turtles: How the Bush Administration's Manipulation of Science is Driving the Leatherback Sea Turtle Towards Extinction, published by the Sea Turtle Restoration Project, documents how an admittedly flawed and incomplete report by government scientists has provided the basis to reopen fisheries that are the highest source of adult mortality for leatherbacks. For a copy of the report, go to www.seaturtles.org/pdf/ACF4E.pdf or contact Robert Ovetz, PhD, 415-488-0370, x106.

Citizens' Guide to the Endangered Species Act, published by Earthjustice and the Endangered Species Coalition, is a 56-page color booklet outlining the history of wildlife-preservation efforts in the United States and examining the sections of the ESA that call for citizen participation to ensure that the law is implemented properly. Download a PDF of the report at www.earthjustice.org/policy/rider/display.html?ID=39.

Decision-Makers' Guide to GMO Issues, published by IUCN Environmental Law Programme, provides unbiased background information and a framework for evaluating new evidence concerning the potential ecological impact of the release of genetically modified organisms into the environment, focusing especially on biodiversity, socio-economic impact, and food security. An advance version of the document, available online at www.iucn.org, will soon be replaced by a published version.

Second Nature: Improving Transportation Without Putting Nature Second, published by Defenders of Wildlife and recently named best publication by the Natural Resources Council of America, provides a groundbreaking approach to reduce the impact of roads and highways upon wildlife and habitat, outlining realistic, workable recommendations that factor in growth. Read an online copy of the report at www.defenders.org.



global emphasis on exerting additional effort to stop this destructive trade. A multinational, multidimensional effort is required to ensure that the trade in bear parts does not push already endangered bear species over the brink of extinction or decimate certain bear populations in the United States and Canada. Although the continent-wide black bear population in North America may appear stable, certain individual state populations, such as Connecticut, Kentucky, Florida, Louisiana, and Mississippi, are extremely small and vulnerable. Grizzly populations are still at risk, especially in British Columbia.¹

CONCLUSION AND RECOMMENDATIONS

After the announcement of the results of Operation VIPER, the Virginia Department of Game and Inland Fisheries (VDGIF) issued a statement in which VDGIF Director Bill Woodfin noted, "These ongoing investigations indicate an extensive black market trade that can only be addressed by working closely with all our federal, state, and local partners as well as with wildlife conservation groups committed to protecting our natural resources." Regional, national, and international cooperation is crucial if we are to ensure the long-term viability of all bears.

- The United States Congress should enact the Bear Protection Act in 2005

and provide the U.S. Fish and Wildlife Service with funds to carry out undercover operations in coordination with state game agencies to uncover the poaching and smuggling networks. The United States can set a practical and effective example for the rest of the world on how to protect bears from the trade in gallbladders and bile.

- Outreach and education to traditional medicine communities worldwide must continue. Practitioners need to understand the impact that prescribing bear parts remedies can have on the species and that there are numerous herbal alternatives that can be employed, while still conforming to traditional medical practices.
- CITES Parties must continue to recognize the ongoing threat posed by the international trade in bear parts and urge individual member nations to strengthen their domestic bear protection laws and to emphasize the need to implement strict enforcement against the illegal bear parts trade.

The world stood by idly in the 1970s and 1980s while the continent-wide population of African elephants was cut in half—from an estimated 1.3 million to



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600,000—driven to this perilous state primarily by the international trade in ivory. At the start of the 20th century, roughly 100,000 tigers (of all species) roamed in the wild. A century later, 5,000 or so remain—decimated by the trade in their skins as well as their bones and organs in traditional Asian medicines. Though bears rarely get the same international attention as elephants or tigers, there is now an invaluable opportunity to learn from our historic conservation mistakes and to protect bears from the trade in their parts before it's too late.

(ENDNOTES)

¹ See Strickland, M. and Elliot, W. 2004. "Deciding the Fate of North America's Grizzly Bears." *Wildlife Tracks*, 8(1): 1, 3 - 7.



Wildlife Tracks

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