Testimony Of Samuel K. Wasser
To The U.S. House of Representatives
Committee On Natural Resources,
Subcommittee on Insular Affairs, Oceans and Wildlife
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Madam Chairman and members of the Committee, thank you for providing me with the opportunity to address the important subject of the Global Wildlife Conservation, Coordination and Enhancement Act of 2009.

My name is Samuel K Wasser. I am the Director of the Center for Conservation Biology and hold an endowed chair in Conservation Biology in the Department of Biology at the University of Washington.

I have a Ph.D. in animal behavior and have conducted national and international wildlife research for more than 30 years.

The Global Wildlife Conservation, Coordination and Enhancement Act of 2009, hereafter termed the ACT, calls for capacity building to improve management in biodiverse countries, partnerships between government and non-government entities, outreach and more.

My testimony addresses issues of direct relevance to the ACT: The need for reliable information on the sources and impacts of human disturbances to insure effective decision making by wildlife authorities in the US and abroad. Filling that void requires identifying the location, form and magnitude of the disturbances facing wildlife. These, in turn, require reliable estimates of population sizes of multiple species, how species use their environment, how disturbance impacts that use, and the associated impacts of disturbance on morbidity and mortality.

My Center has pioneered the development of a number of genetic and physiological tools to cost-effectively assess the sources and extent of human disturbances on wildlife at a global scale. We are applying them to problems ranging from identifying poaching hot spots to determining impacts of oil exploration, toxin exposure, loss of prey and ecotourism on wildlife over very large landscapes. We apply these methods to species as diverse as African elephants, pocket mice, Northern Spotted owls, jaguar and whales. The methods we pioneered are now being used by scientists around the world and includes collaborations with the US Fish and Wildlife Service, the US Forest Service, the US Geological Service and the Bureau of Land Management, wildlife authorities in Cameroon, Kenya, Zambia, Uganda, Malawi, Hong Kong and Taiwan, and inter-governmental organizations including the Interpol Working Group on Wildlife Crime and the Africa-based Lusaka Agreement Task Force. We also have collaborations with several non-government organizations as well as members of industry. This work touches on many of the priority issues in the ACT and is thus, by example, a strong endorsement of what the ACT proposes.

The Problem:
As populations, economies, and demands for more resources grow, so do the footprints of humans and the number of disturbances that occur concurrently. Addressing these problems requires tools that can localize and distinguish between co-occurring disturbances over large geographic scales in order to maximize effectiveness of mitigation efforts.

The problem is particularly acute in developing nations. These countries often possess the greatest biodiversity; yet, they lack funds to manage them, let alone to thoroughly investigate the causes of the problems that need to be addressed. Poaching, roads, logging, opening habitat for oil exploration, land conversion for agriculture, unrestrained tourism, unregulated use of herbicides and pesticides, excessive hunting quotas, and use of fire to clear farm or ranch land are just a handful of the pressures countries are inflicting on their wildlife.

The Global Wildlife Conservation, Coordination and Enhancement Act of 2009 aims to help developing countries meet their conservation needs through capacity building and collaborations between government and non-government entities. These efforts are extremely timely; a better understanding of the system makes mitigation more efficient thereby reducing costs to already financially strained budgets.

The problem is compounded by demands for wildlife products, from ornaments, to traditional medicines, timber and fuels placed on these biodiverse countries by industrialized economies. Developing countries with high biodiversity are often enticed to meet these demands, since sale of their natural resources can be a relatively easy source of hard currency. Much of these sales are unregulated if not illegal; in many such cases, government officials, but not the governments themselves, are the ones that profit. The country and the environment are the big losers in these instances. Politically unstable countries are especially likely to fall victim since hard currency is vital to the purchase of weapons and ammunition necessary for these regimes to stay in power.

As the ACT acknowledges, reliable information and effective education are among the greatest defenses of these practices. If we know where wildlife are being exploited, as well as the magnitude and forms of human impacts, we are in a better position to make the right management and enforcement decisions, as well as to inform the public about what is transpiring. The latter is important because it is among the most expeditious means of encouraging change.

Some of the most valuable tools for providing critical information to managers are coming from advancements in genomics, bioinfomatics and medicine. DNA analysis has had major impacts on law enforcement, helping to convict the guilty, free the innocent, identify the victim or find their places of origin. Medical diagnostics have similarly grown, allowing physicians to acquire a comprehensive health profile of a patient from a single blood sample. We have developed similar tools to acquire such information from wildlife, cost-effectively, without adding more disturbances to wildlife in the process.

Our Approach:
My center has pioneered methods to acquire DNA, stress, nutrition and reproductive hormones from feces. We are also perfecting methods to acquire toxins and immunoglobulins from feces. Obtaining this information from feces has several advantages. Feces contain an enormous amount of physiological information since it is a principle route for elimination of DNA, hormones and other physiological products from the body. Feces is also the most accessible wildlife product in nature and can be acquired without disturbing wildlife in any way. The only remaining challenge is finding it.

To address this, my center pioneered methods to train detection dogs to find scat/feces, performing much like narcotics detection dogs locating drugs. Our dogs are able to locate scat with high reliability from up to 18 species at once, over very large remote areas. We even have dogs that detect feces from baleen and toothed whales that is floating on the water surface; dogs ride on the bow of a boat, detecting whale fecal samples at distances greater than a nautical mile away.

The information we are able to obtain from these noninvasively collected samples is remarkable and unprecedented. The methods are relative inexpensive and becoming cheaper and less complicated all the time. The use and application of these tools for capacity building are considerable, as are the opportunities for partnerships between government and non-government organizations.

The following detailed examples illustrate the utility and breadth of these methods for wildlife conservation and their fit with the priorities of the ACT.

My first example comes from Africa, where our tools have transformed the fight to contain the illegal ivory trade.

Combating Illegal Trade in African Elephant Ivory:
We used DNA to track the source and modus operandi of those in the illegal ivory trade across Africa. These tools have proven particularly useful to authorities policing this trade.

The Problem:
Demand from high paying industrialized nations has caused the price of ivory to increase 9-fold in the past five years. Although profit is high, prosecution risk and punishment is disappointingly low; wildlife crimes are low priority compared to weapons, drugs, murder, rape and terrorism. Organized crime syndicates are now driving this trade, taking full advantage of this high profit, low risk enterprise. Liberalization of laws promoting global trade have compounded the problem. Close to 1 million containers are shipped daily with the potential to transport large volumes of contraband, and customs is able to inspect < 1 % of them.

Another problem stems from underestimation of this trade. Population size and hence mortality estimates from many nations are unreliable, in part because of Africa's vast remoteness, but also because some countries providing these estimates may have conflicts of interest. Extrapolating from seizure rates, we estimate that elephant mortality rates are currently in excess of 10% annually from poaching. The significance of this loss cannot be overestimated. Elephants evolved to have enormous impacts on habitat structure. They are the single most important source of seed dispersal for large trees and thus their loss will surely have significant impacts on the carbon-capturing potential of central African forests. Their loss will also negatively impact ecotourism, one of the most reliable sources of hard currency for many African nations.

Our Approach:

We collaborate with Interpol, USFWS and African and Asian authorities, using DNA to determine the origin of large ivory seizures that bear the signature of organized crime. We simultaneously identify the responsible countries, and how poachers/dealers are getting the ivory out of source countries.

DNA acquired from elephant feces is used to map the frequencies of multiple genes across Africa. We assembled this map over the past 10 years with the help of scientists, governments and managers across Africa, and the generous support of the USFWS African Elephant Conservation Fund. We acquire the same DNA markers from seized ivory. Matching the genes in ivory to the multi-locus gene frequency map enables us to determine the ivory's origin(s) with considerable precision, and hence the major poaching hot spots in Africa.

We conclusively identified Zambia and Tanzania as two of the largest source countries in this illegal trade. The Zambia seizure was shipped from Malawi to Singapore in 2002. The seizure weighted 6.5 tons and included 531 large tusks plus 42,000 ivory signature seals (often called chops or hankos). This was the largest seizure since the 1989 ivory ban and second largest on record. Zambia unsuccessfully petitioned CITES[1] that same year to diminish the conservation status of their elephants, which would have allowed them to partake in subsequent CITES sanctioned ivory sales. Three year later, another 6 tons of ivory was seized in the Philippines, shipped from Zambia. We were unable to analyze that shipment because it was subsequently stolen from the warehouse where customs had it stored.

A similar case occurred in 2006; Tanzania shipped 11 tons of ivory to Hong Kong, Taiwan and Japan within a two-month period. This was the largest single string of seizures on record, making the perpetrator among the largest illegal ivory dealers in Africa. We showed that the ivory was primarily poached in southern Tanzania, spilling into the northern tip of Mozambique. Like Zambia, Tanzania petitioned CITES to diminish the conservation status of their elephants that same year, but subsequently

[1] CITES, the Convention on International Trade in Endangered Species, is an agreement under UNEP that determines the international conservation status and trade rules surrounding wildlife, worldwide.

withdrew the petition owing to public pressure. Then, in March 2009, it happened again. Vietnam seized 6.2 tons of ivory shipped from Tanzania. Two months later, the Philippines seized 3.5 tons of ivory shipped from Tanzania. Two additional seizures were recently seized in Kenya, also believed to have originated from Tanzania. Meanwhile, this month Zambia declared that they will once again petition CITES next year to diminish the conservation status of their elephants, announcing that two other elephant range states will follow suit. Several sources have indicated these two other countries to be Tanzania and Mozambique. These findings illustrate the need to expose countries in denial of their illegal trade, and to hold them accountable. Education is vital to any hope of pressuring them to take action to fight these crimes.

These cases all share a number of features. The large ivory seizures resulted from poachers hammering the same populations repeatedly, in contrats to the common belief that dealers were assembling large shipments of contraband ivory by cherry-picking from stocks across Africa. In the case of Zambia, poachers/dealer smuggled the ivory into a neighboring country (Malawi) for shipment to Asia. This is a risk reduction strategy, making it difficult for apprehended poachers to identify the dealers. We identified a similar strategy in our investigation of a seizure of forest elephant ivory made in Hong Kong. In 2006, four tons of ivory were seized in Hong Kong in a container, shipped from Cameroon. X-ray revealed the container behind a false wall in the back of the container. Ivory chips were also recovered in two other containers with false walls, returning to Cameroon with used tires for resale from Hong Kong. We found that all of this ivory was poached in southern Gabon, but shipped from Cameroon. Traditional investigatory methods that rely on shipping documents could not have confirmed that.

We contend that source countries are in the best position to control this burgeoning illegal trade, which is also consistent with priorities of the ACT. Local empowerment is vital. Our methods are helping source countries achieve these objectives by providing tools that can focus their limited law enforcement resources on key poaching areas. Focusing on source countries also helps prevent products from entering the international market where they are logistically and economically nearly impossible to trace, and may be the only way to keep wildlife from being killed in the first place. At the same time, we are exposing source countries that are underestimating the extent of their illegal trade, and identifying strategies employed by large, organized ivory dealers.

Educating the Public:

The illegal ivory trade is an area where public opinion and hence education clearly matter, highlighting another objective of the ACT. The 1989 ivory ban was implemented by CITES, largely because extensive education campaigns created enormous public pressure to stop the slaughter of 700,000 elephants in less than 10 years. Public pressure was so great that it virtually eliminated demand, stopping the trade almost overnight. Unfortunately, the public stopped paying attention several years later, believing the problem to be solved. Demand rose again while pressure to enforce the ban subsided. The ivory trade issue soon became the most contentious issue in CITES, and this has severely impacted the objectivity of decision making on this issue. Meanwhile, a higher percentage of remaining elephants are now being killed than at any other time in history.

Public education is once again needed to overcome these issues. Our center is doing our part by publishing our findings of this renewed illegal trade in high quality refereed journals, accompanied by press releases. We are simultaneously publishing this work in respected lay journals with broad exposure, such as *Scientific American*. This is an area where scientists can play a unique collaborative role with government. Unlike government employees, scientists are encouraged to publish their work. Our publication in *Scientific American* this month encouraged a member of the Tanzanian parliamentarian to call for a full investigation of Tanzania's ivory trade, new counts of elephant numbers will soon be conducted in southern Tanzania that include independent observers and last week 6 Tanzanian businessmen were apprehended and charged with smuggling 11 tons of ivory as well as 11 counts of conspiracy, unlawful hunting, exporting concealed and undeclared items and making false documents.

Our forensics methods can also be applied to other illegal wildlife trades, currently a $5-20 billion/yr annual industry causing tremendous loss of biodiversity. Among these, the illegal timber trade is probably most serious. In some countries (e.g., Tanzania and DRC) estimates suggest that nearly 100% of international timber sales are illegal. The trade is thus totally unregulated, the government receives no revenue form this illegal trade and some of our most important remaining forests for carbon capture are being destroyed in the process. Forensics tools such as these that can help localize these trades are vital.

As a final note, lack of financial support has been the biggest obstacle to our work. USFWS generously provides us $50-75K per year from the $1 million annually appropriated by congress to the African Elephant Conservation Fund. However, USFWS support covers only a fraction of our costs. Source countries either cannot afford to pay for these analyses or have no desire to see this work conducted. Seizing countries appear to consider this trade too low priority to contribute funds for DNA analyses. Despite these constraints, we try not to let funding be an obstacle; otherwise the seizing countries would never turn over the ivory for analysis. I accordingly hope that the ACT will be able to increase support for this work in the future.

Monitoring Impacts of Anthropogenic Disturbance:
Our Center has taken a similar noninvasive approach to monitoring impacts of habitat loss and human disturbances with equal impact.

The Problem:
Impacts of habitat loss and human disturbance present yet another suite of challenges that have proven difficult to address in developed and developing countries, despite the considerable pressures they place on wildlife. Scientists strive to address these problems by acquiring reliable mortality rates in relation to these pressures. However, this approach has proven problematic. Such pressures rarely kill the animal directly. Rather, they increase their probability of dying, and this takes time. Many other events can occur in the interim, complicating such linkages. Mortality rates also require accurate population estimates. These are difficult to acquire, often being extrapolated from expensive telemetry studies that track only a small number of animals at great cost, while

bearing limited representativeness to the entire population. Moreover, radiocollaring procedures are highly invasive, increasing mortality risk from the capture procedures.

A second problem stems from the fact that disturbances rarely occur in isolation; where there is one disturbance there are typically many. Without knowing which disturbance is having the impact, it becomes impossible to know what and how to mitigate. The impacts of mitigation are equally difficult to monitor. Long time intervals may elapse at considerable expense before the effects of these mitigations become known. Sometimes they cause more harm than good.

Our Approach:

Our Center has developed noninvasive genetic and physiological measures obtained from wildlife feces to help developed and developing nations quantify human impacts and guide their mitigation. One of our greatest strengths stems from tools we developed to comprehensively sample large parts of the landscape. Detection dogs locate large numbers of fecal samples from multiple species over considerable distances. Using dogs for sample detection also has very low associated bias. Detection dogs are selected for their highly obsessive play drive. This obsessive play drive makes their sampling less biased than nearly any other available method. Since the dog's primary motivation is to get its ball, which occurs whenever the dog finds a sample from the correct species, the dog will not bias its search by the animal's sex, social status or capture history. That means all individuals of the target species have an equal chance of being detected. No other method can make that promise. The dogs also find the samples where they lie, whereas most other methods lure the animal to the sample collection location.

DNA in these samples is analyzed to confirm the species, sex and individual identity of the animal. This allows DNA measures to be employed in field designs that can reliably estimate population size in vast, highly remote areas. The distribution of samples also reflects the species' distribution over the landscape, allowing us to determine precisely what features are attracting or repelling individuals over time. Stress, reproductive, and nutrition hormones, as well as other procedures in the same samples are similarly tied to the landscape features, allowing us to physiologically partition disturbance impacts.

We have shown that DNA collected by dogs greatly enhance the accessibility and cost-effectiveness of the genetic and physiological measures. DNA samples collected using dogs provide more reliable population size estimates (i.e., have lower associated error), as well as more reliable data on the disturbance of species across their habitat, because the dogs covered a greater area and the probability of sample detection is higher. Data are thus more representative of the population as a whole because a greater variety of individuals and areas are sampled. Large number of samples collected over multiple time periods, also provides more reliable associations to temporal and physical disturbances, particularly those that change over time (e.g., changes in human resource use across the season). These highly informative sampling methods are very straight forward, and versatile enough to be used on virtually any combination of species, in nearly any type of habitat.

This makes these methods ideally suited to assist management decisions by authorities in developing countries.

We are using these methods on a wide variety of species and habitats, including pocket mice, northern spotted owl, fisher, grizzly bears and Mexican wolves in North America, tigers in Cambodia, maned wolves, cougar, jaguar, giant-ant eater and giant armadillo in the hot dry Brazilian Cerrado, caribou, moose and wolf in the frozen oil sands of Alberta, right whales and killer whales in the eastern and western US. They can even be used to locate rare plant species over vast remote wilderness areas.

The following four examples show the breadth of these methods in terms of species, habitat, climate and questions addressed.

Impacts of Oil Sands Exploration on Caribou, Moose and Wolf:
One of the most timely applications of our methods is monitoring impacts of oil development in the oilsands of NE Alberta on threatened caribou, moose and their primary predator, the wolf. The oilsands have abundant oil reserves, but its heavy black viscous oil, termed bitumen, is expensive to extract and must be rigorously treated to convert it into an upgraded crude oil. Current oil prices per barrel have recently made it cost-effective for companies to extract and process the bitumen. SAGD (steam assisted gravity drainage) is the most common method used to extract this oil. Seismic and delineation drilling determine where and how much oil is present. Steam is then used to heat and move the material through underground veins to an extraction area. These operations must occur in the winter, when the ground is frozen and are strictly controlled by the Alberta government due to the sensitive nature of boreal forest. Thus, the habitat goes from remote wilderness most of the year to a booming town in winter and then back to wilderness as soon as the snow begins to melt.

The Problem:
We are working in collaboration with the Chipewyan Prairie Dene First Nation, StatoilHydro Canada and the Alberta provincial government to monitor impacts of the oil exploration on the caribou, moose and wolf living on oil sands lease areas in NE Alberta. The study began four years ago, at the onset of oil exploration in the area, and plans to continue for 10 years through the oil extraction process.

The caribou, moose and wolf are monitored because their large size and ranging behavior make them likely to be impacted by oil development activities. The caribou is a species of particular concern because it is threatened in Alberta. The moose offers a good comparison species because it is similar in size but differs in microhabitat and social structure. The moose is also a primary prey species of the Chippewa Prarie Dene First Nation. The caribou is a prey species of secondary importance to the Dene. The wolf is the primary non-human predator of the moose and caribou.

Our Approach:
The comprehensive sampling provided by the dog teams allows us to simultaneously monitor: How population size changes for each species across years; what factors in the

environment each species is attracted to, or avoiding; and how the stress, nutritional status and reproduction of each species vary over space (relative to distance from key resources and anthropogenic disturbances) and time (relative to intensity of extraction activities within and between years). The study also includes a low exposure control area where little or no oil extraction is occurring.

This year, four dog teams searched a 3,000 km^2 area, two feet deep in snow, four times in just 10 weeks, and collected 1800 samples from these species.

Results to date show how the abundance, distribution, stress and nutritional status of these three species are impacted by the presence of high- versus low-use oil exploration roads, in conjunction with the natural and anthropogenic habitat features they cross. We are already identifying ways to reduce impacts of oil exploration on wildlife through better road management. Results also suggest that practices other than wolf removal may offer the best solution to saving threatened caribou in these areas over the long-term.

Results have been so effective that other companies operating in the oilsands are now asking to be included in our monitoring program.

Causes of Decline of the Southern Resident Killer Whales of Puget Sound:
The Problem:
The southern resident killer whale population in Puget Sound declined by 20% in the 1990's and eventually led NOAA to declare them an endangered population under the Endangered Species Act in December 2005. At least three hypotheses have been advanced to explain their decline: ecotourism, loss of prey and excessive toxin loads of PCBs and PBDEs. Each hypothesis has been advanced by NOAA, the public and scientific sectors, in heated fashion, creating enormous pressure on NOAA to mitigate. But, where should they focus their mitigation?

Our Approach:
We are using our methods to separate the relative impacts of ecotourism, prey and toxin load in an effort to determine what pressure(s) is most urgent to mitigate. NOAA is analyzing the DNA from our samples for individual killer whale identities as well as the identities of their prey types. We are analyzing stress, nutrition and reproductive hormones, as well as toxin loads, all from the same samples in relation to temporal changes in boat traffic and salmon abundance.

Dogs ride on the bow of a boat and detect scat at distances > 1 mile away. Stress and nutrition hormones from these samples have already shown that lack of their primary prey, Chinook salmon, is the single biggest cause of their decline. Thus, recovering salmon should be the single biggest effort in attempts to recover this species. The diet impact may be significantly magnified by release of toxins stored in fat reserves, increasingly metabolized during starvation. (Methods already exist to measures these toxins in dolphin scat and will soon be optimized for killer whales.) In fact, cleaning up toxins at the same time as recovering the salmon could result in more rapid killer whale

recovery/unit effort. Ecotourism may also play a role in acute stress, mandating best practices during ecotourism.

The fact that these scat methods enabled us to learn all this from an animal that spends >90% of its time under water is testimony to the remarkable power of this technique.

Wide Ranging Mammals in the Brazilian Cerrado:

Increasing agricultural expansion and land use is having severe impacts on persistence of wide ranging species. Mortality of such species disproportionately occurs outside of nature reserves that are intended to protect them. The Cerrado habitat of Brazil comprises the world's most diverse tropical savanna and is home to hundreds of species found nowhere else in the world. This habitat also comprises one of the world's most threatened regions as land is being rapidly converted for agriculture production of soybean and sugar cane for biofuels.

The Problem:

The government responded to the high rate of land conversion by mandating that private landholders set aside 20-30% (depending on the State) of their farmland as natural habitat. However, some landholders purchased this set-aside land outside their farms instead of maintaining natural habitat within their farmland.

The Approach:

We used our methods to assess differential impacts of these different land use practices on movement of wide-ranging wildlife species across the landscape by examining how the type of land mosaic best promotes or reduces presence of maned wolves, puma, jaguar, giant armadillo, giant anteater and tapir.

Results indicated that natural islands in a sea of agriculture are critical to allow these wide ranging species continued movement through converted habitat. This is vital since protected areas are too small in number and size to sustain all of these species.

Dogs readily located scat from the study species across the landscape. All species were found inside and outside of Emas National Park (ENP). However, the jaguar was almost entirely restricted to forest habitat, the majority of which lies outside the park. The jaguar is accordingly at greatest risk from isolation from habitat fragmentation. The maned wolf, puma, giant anteater and tapir made extensive use of the landscape mosaic surrounding the park, although the vast majority of scats were concentrated in or very near patches of natural habitat.

The giant armadillo (IUCN Vulnerable) also showed a clear preference for open habitats in this region. However, we found no evidence of burrow digging or scat samples from armadillos in croplands or pasture further than 100 meters from natural habitat. This is particularly important since open habitats are nearly non-existent outside protected areas in this region.

Hopefully, these results will help convince the Brazilian government to tighten mandates, assuring that set-aside land remains inside farmland for the benefit of these incredible species.

Northern Spotted Owls in the Pacific Northwest

The Northern spotted owl (NSO), *Strix occidentalis caurina*, is the flagship threatened species of the Pacific Northwest. Federally listed under the Endangered Species Act in 1990, the NSO continues to decline at a rate of about 7% throughout its range.

The Problem:

Habitat loss from logging and land conversion have historically contributed the greatest threats to this species. This prompted authorities to establish Spotted Owl Special Emphasis Areas (SOSEAs) that cannot be logged as long as NSO are shown to have occupied them within the past 3 years. Timber sales also are required to establish that the land is free of spotted owls before any sales go through.

Then, a new problem arose that complicated these regulations. The barred owl (BO)—a close relative of the NSO that is twice its size, as well as a competitor and a predator—expanded its range into the west coast from the northeast US, occupying a huge portion of the spotted owl's range. Some managers argue that the impact of the BO range expansion on NSOs is so great that future timber concessions may no longer affect NSO persistence. That question has yet to be answered.

Regardless, managers are now faced with a different problem:
The primary means of establishing NSO presence, as a prelude to timber sales or harvesting SOSEAs, is conducted by vocal surveys; NSO indicate their presence by their vocal response to simulated territorial calls given by observers. However, NSO are becoming increasing unresponsive to these calls when BOs are present, apparently fearing attack by BOs if they vocally announce their location. If the primary means of detecting NSO is no longer reliable, how can these surveys be used to enforce current regulations re: timber sales and preservation of SOSEAs?

Our Approach:

To address these problems, we trained detection dogs to locate NSO by their pellets and feces, without requiring an owl vocal response. In the springs of 2008 and 2009 detection dogs located spotted owls by the scent of their pellets and feces. They detected 17/18 known owl pairs in 2008. In 2009, they detected owls in 12 out of 18 sites surveyed; no owls were detected by any method, including vocal surveys in the remaining 6 sites. These methods can be used to simultaneously survey for BOs with pellets and/or feces identified to the species level by DNA, enabling this method to also be used to more readily address overall impacts of BO on NSOs. Discussions have already begun with USFWS that could employ this method more broadly.

Concluding Remarks:

Effective global conservation requires reliable information on the sources and magnitudes of human and natural impacts on the environment. Such information is limited in

developed countries, and even more so in developing countries. The ACT recognizes this by its objectives of increasing the flow of information required to make sound management decisions, as well as by the importance it places on educating the public to be better environmental stewards. The approach pioneered by our center exemplifies the importance of these priorities, as outlined in the ACT.

We partner with government and non-government entities to provide highly accessible, noninvasive genetic and physiological tools to aid global conservation, addressing questions such as the extent, distribution and strategies behind the illegal wildlife trade, and the impacts of human and natural disturbances on wildlife health.

We developed novel tools to acquire this information cost-effectively, over large remote areas, without adding disturbance to wildlife. And, results are helping inform developed and developing nations how best to address global conservation issues of paramount importance to our planet's well-being.

We strive to publish our work in high quality, peer-reviewed journals with accompanying press releases, as well as in respected magazines aimed at the educated general public. This approach appears to be working, judging by the near monthly appearance of our work in the national or international media. It also fills an important void as this route of information transfer is relatively uncommon in the government sector.

The objectives of the Global Wildlife Conservation, Coordination and Enhancement Act of 2009 are particularly important in these hard economic times, when priorities are easily shifted elsewhere. We hope the ACT will encourage our efforts as well as those of others, and look forward to the opportunity to work with our representatives and managers on these important issues.

Respectfully submitted,

Samuel K. Wasser, Ph.D.