

**NARRATIVE REPORT
WILDLIFE CONSERVATION SOCIETY – GLOBAL AVIAN INFLUENZA
NETWORK FOR SURVEILLANCE (GAINS)**

**Leader Award #: LAG-A-00-99-00047-00
Cooperative Agreement #: GHS-A-00-06-0005**

**Highlights from GAINS Objectives: Quarter 8 – Months 20-22/24
Activities January 1-March 31, 2008**

Executive Summary

Through the GAINS project, the Wildlife Conservation Society (WCS) and collaborating partners monitor the occurrence of highly pathogenic avian influenza in wild birds across the globe. Please refer to **Appendix I** for a table summarizing recent activities and GAINS project partners listed by country. Through GAINS, WCS and its partners have collected tens of thousands of samples for H5N1 analysis, and census data from more than 105 million bird observations are being made available via an open access database and mapping system (<http://www.GAINS.org>). The GAINS project has also trained over 1000 individuals worldwide in wild bird handling, sampling, and data collection related to controlling the spread of H5N1 highly pathogenic avian influenza (HPAI).

Highlights from this quarter include:

- 1) disease surveillance in wild birds destined for Cambodian restaurants,
- 2) collaboration with the Indonesian government to protect wild birds from trade activities that threaten the emergence and spread of infectious disease,
- 3) development of maps emphasizing wild bird species potentially at risk of transmitting avian influenza,
- 4) ongoing and novel geospatial visualization, analysis and modeling of avian influenza epidemiological factors.
- 5) a GAINS-sponsored, international meeting focusing on the importance and logistics of sharing data on emerging infectious diseases, with a focus on avian influenza. Attendees included FAO, GAINS subawardee University of New Hampshire, Centers for Disease Control (CDC), representatives of the European Union, Wetlands International, the Canadian Cooperative Wildlife Health Center, USGS, and others.

Table of Contents

EXECUTIVE SUMMARY	1
INTRODUCTION	4
ASIA AND THE NEAR EAST	4
MONGOLIA	5
<i>Waterfowl migration studies to determine risk of wild birds spreading AI</i>	<i>6</i>
<i>Education and training</i>	<i>6</i>
<i>Completion of longitudinal surveys at Erhel Nuur</i>	<i>7</i>
RUSSIA AND KAZAKHSTAN	7
CAMBODIA	8
<i>Highlights of bird counts, wild bird field sampling and reconnaissance of new sampling sites</i>	<i>8</i>
<i>Merit bird trade surveillance</i>	<i>11</i>
<i>Monitoring AI in wild birds trapped and traded for human consumption</i>	<i>13</i>
VIETNAM AND LAOS PDR	17
<i>Market trade surveillance</i>	<i>18</i>
INDIA	21
<i>Surveillance</i>	<i>21</i>
<i>Bird population counts in key wetland sites for migratory birds</i>	<i>24</i>
<i>Strengthening of the Asian-Pacific Working Group on Migratory Waterbirds and Avian Influenza</i>	<i>24</i>
INDONESIA	25
<i>Surveillance</i>	<i>25</i>
<i>Collaborations, outreach and education</i>	<i>27</i>
AFGHANISTAN	28
SOUTH KOREA	28
EASTERN EUROPE/EURASIA	29
UKRAINE	29
LATIN AMERICA AND THE CARIBBEAN	29
ARGENTINA AND THE FALKLAND ISLANDS	29
<i>Surveillance</i>	<i>30</i>
<i>Other training and outreach activities</i>	<i>30</i>
BOLIVIA	31
BRAZIL	31
COLOMBIA	32
COSTA RICA	33
PERU	33
CARIBBEAN REGION	34
ST. MARTIN	35
ANGUILLA	35
ANTIGUA	35
ST. KITTS	35
TRINIDAD	36
AFRICA	36
SOUTHERN AFRICA (SOUTH AFRICA, ZIMBABWE, MOZAMBIQUE, BOTSWANA)	36
MOZAMBIQUE	37
ZIMBABWE	37
TANZANIA	37
NIGERIA	38
EGYPT	39
SUDAN	39
REPUBLIC OF CONGO	41

CROSS-CUTTING PROJECTS AND ACTIVITIES.....	42
MAPPING NEOTROPICAL BIRD MIGRATIONS AND DISTRIBUTIONS	42
PREDICTING AI OUTBREAKS GLOBALLY WITH GAINS.ORG (UNIVERSITY OF NEW HAMPSHIRE)	43
GAINS INTERNATIONAL “DATA SUMMIT” MEETING, NEW YORK CITY, JANUARY 13-17	44
EXPERIMENTS TO IMPROVE AVIAN INFLUENZA DIAGNOSTICS SPECIFICALLY FOR FIELD SURVEILLANCE (UNIVERSITY OF GEORGIA).....	45
CENTRALIZING DATA FLOWS FROM THE INTERNATIONAL WATERBIRD CENSUS (IWC).....	45
WCS LEADERSHIP IN INTERNATIONAL MEETINGS RELATING TO GAINS PROJECT PRIORITIES	46
GAINS TECHNOLOGY	46
IMPROVING STANDARDS COMPLIANCE	46
NEW WISDOM MAP EXPLORER (VERSION 3.0) BETA	47
COMPLETION OF FEEDER 1.0.....	48
APPENDIX I. GAINS COUNTRIES AND PARTNERS.....	49
APPENDIX II. SCREENSHOT FROM GOOGLE ANALYTICS ILLUSTRATING 8TH QUARTER ACTIVITY GAINS.ORG SITE UTILIZATION.	53
APPENDIX III. TRANSLATION OF MONGOLIAN GAINS FACTSHEET	53
APPENDIX IV. EXAMPLE OF FACTSHEET FROM WETLANDS INTERNATIONAL SOUTH AMERICA FOR A NEOTROPICAL SPECIES	53

Introduction

Since 1989, when WCS Field Veterinarians pioneered work of this kind in the conservation health arena, WCS has used a collaborative approach to address the complexities of maintaining ecosystem health. The United States Agency for International Development and the Centers for Disease Control and Prevention, among others described below, provided funding to WCS to administer the wild bird Global Avian Influenza Network for Surveillance (GAINS) program starting in 2006. GAINS is a smart and targeted investment in the US government's fight against highly pathogenic H5N1 avian influenza, since wild birds can serve as sentinels for the early detection of the virus' presence. WCS partners with US-based and international organizations, including governments, NGO's and universities, to work together to improve our understanding of the dynamics of avian influenza, and to evaluate disease risks for people, wildlife, and domestic animals. This network of partners united under the GAINS project will help collect timely and pertinent information that will help combat the threats posed by highly pathogenic avian influenza to both humans and animals. Across the globe, field surveillance for HPAI in wild birds is underway. One of the primary purposes of GAINS is to share international disease information through an interactive, publicly accessible web-based database, which has already been made available online at www.GAINS.org. GAINS surveillance includes systematic monitoring of wild birds along major global flyways, with information on over 105,000,000 birds now entered into the mapping and database systems.

Asia and the Near East

WCS continues to leverage its seed funding from USAID to increase the scope and impact of GAINS AI surveillance work. WCS institutional collaborations for GAINS work in Asia include the private sector (Cargill Inc., the largest distributor of meat and poultry products in the US) and US and international agencies such as the United Nations Food and Agriculture Organization (FAO), and the National Institutes of Health (NIH) via the University of Los Angeles Center for Rapid Influenza Surveillance and Research (CRISAR) and University of Minnesota Center of Excellence for Influenza Research and Surveillance (MCEIRS) programs. These funding partnerships inaugurated new WCS contracts and collaborations for GAINS with top research institutions and laboratories in the US and abroad, including University of California Davis, the Center for Tropical Disease in Los Angeles, the University of Minnesota, and a host of foreign laboratories that contribute in-kind services and materials). Leveraged funds for the 5 largest funding partnerships for GAINS in Asia, for work in Indonesia, Laos PDR, Cambodia and Mongolia, total more than 1.5 million.

All data collected through these partnerships are incorporated into the growing GAINS database (an update on www.GAINS.org is provided in the Cross-Cutting Activities section of this report). Specifics of these and many other regional and local partnerships with researchers, universities and NGOs are also mentioned in individual country sections.

Dr. Martin Gilbert, Associate Director for Asia of WCS Global Health Programs, continues to oversee and coordinate GAINS project activities in Asia via frequent trips from his base in Mongolia to other locations in Asia where AI surveillance is underway, WCS headquarters, and university research partners in the USA.

In this report, samples collected under a funding contract or partnership with an institution other than USAID are indicated as such. When no contract or partnership is indicated, this means that samples were collected with support from original funding from USAID for the GAINS project, or a combination of USAID/CDC and WCS support.

Mongolia

Results of AI surveillance activities in Mongolia this quarter include:

- 1,038 tested samples from 517 Mongolian wild birds (2007 field season) were incorporated into the GAINS database, as part of the WCS collaboration with University of California, Davis through the NIH-CRISAR partnership. No samples tested positive for avian influenza H5 RNA gene segments, confirming that none of the birds sampled were carrying H5N1 (or any other H5 subtype), and that there is no evidence that these birds posed any direct risk to people or poultry.
- However, 22 of the aforementioned Mongolian birds were found positive for Influenza A, with low levels of virus detected in an additional 26 samples. Virus isolation on these samples is now being conducted at the United States Department of Agriculture (USDA) Southeast Poultry Research Laboratory. Certain subtypes (H5 and H7) of low pathogenic avian influenza (LPAI) viruses can evolve into highly pathogenic avian influenza (HPAI). Additionally, AI viruses can evolve rapidly by incorporating gene segments from other types of AI viruses, through recombination.
- Mongolian serum samples were analyzed by Dr. Justin Brown and his associates at the University of Georgia (UGA) as part of a trial of a new ELISA test being developed for improved sensitivity for finding influenza A antibodies in wild birds. The new test is a valuable innovation that will help us identify wild birds that have been exposed to influenza viruses in the past but have recovered. However, the test may not be effective for all species, and this research is helping to answer these questions. For example, PCR testing detected positives among a group of Mongolian great cormorants, but the ELISA did not find influenza A antibodies among the same group. (More details on the study by UGA and the Southeastern Cooperative Wildlife Disease Study appear in the section on Cross-cutting Activities of this report.)

- Influenza A antibodies were found in a significant proportion of Mongolian wild bird serum samples (particularly ruddy shelduck, *Tadorna ferruginea*, common goldeneye, *Bucephala clangula*, bar-headed geese, *Anser indicus*, bean geese, *Anser fabalis*, swan geese, *Anser cygnoides*, Bewick's swan, *Cygnus columbianus*, whooper swan, *Cygnus cygnus*, white-winged scoter, *Melanitta deglandi*, and black-headed gull, *Larus ridibundus*, samples) collected during the 2006-7 field seasons with this new ELISA test. Seroprevalence rates as high as 38% were found in bean geese in the 2007 samples.

Waterfowl migration studies to determine risk of wild birds spreading AI

Bird migration studies continue to be a key focus in the GAINS project, to elucidate poorly understood regional flyways and thus help predict the movements and potential spread of AI or other pathogens. In Quarter 7 we reported that USAID support for WCS' GAINS activities enabled the first documentation of Mongolian bar-headed geese migrations between northern Mongolia and central/southern India. Four out of fifty bar-headed geese marked in Mongolia's Darkhad valley in July 2007 were sighted in India, having migrated over the Himalayas 4,500 km from the capture site.

In Quarter 8, our waterfowl tracking activities and their potential implications made international news. Thanks in part to information posted via internet by volunteer birdwatchers regarding the birds' movements across the Indian states of Karnataka and Maharashtra, three articles were published on the marked geese:

- 29 January, New York Times "Thousands of Miles From Home and Possibly Carrying Avian Flu" by Donald G. McNeil Jr.
http://www.nytimes.com/2008/01/29/science/29gees.html?_r=1&oref=slogin
- 14 February, The Hindu newspaper, "Do the winged visitors harbour bird flu virus?" by Gopal N. Raj, Science Correspondent
<http://www.thehindu.com/2008/02/14/stories/2008021455371100.htm>
- 10 February, Statesman, "The suspect" by Saswato Das
<http://thestatesman.net/page.arcview.php?clid=30&id=217998&usrss=1>

Education and training

- A detailed report of findings of Mongolian 2006 avian influenza surveys was distributed in hard copy to Mongolian stakeholders and project partners, and is also available on www.GAINS.org in English and Mongolian.
- Materials on AI surveillance activities by WCS and its partners and the philosophy behind the GAINS project have been translated into Mongolian.
- Dr. Phil Round, ornithologist with the NGO Wetlands Trust based in Bangkok, Thailand will lend his expertise with bird-marking programs and participate in a training workshop in Mongolia next quarter, in preparation for a Mongolian bird

marking and migration study to be implemented by local stakeholders with support from WCS staff and other partners in the GAINS project.

- Dr Amanda Fine of WCS Mongolia continues to brief the national USAID Mission on avian influenza surveillance results and plans for 2008 at monthly Chief of Party and USAID contractors meetings, chaired in Ulaanbaatar, and attended by the US Ambassador and USAID's Chief of Party, Barry Primm.

Completion of longitudinal surveys at Erhel Nuur

Thirteen surveys have been conducted at Ehrhel Nuur (the site of two of the three outbreaks of highly pathogenic H5N1 that have occurred in Mongolia) throughout the migratory season from spring thaw until autumn freeze. Surveys included counts of live water birds, mortality surveys and data on variation in water quality that directly affect the persistence of influenza viruses in the environment. The surveys showed that persistence of virus in water would have been greatest early in the season (mid-April to early May) when temperatures were lowest and melting ice reduced the salinity of the lake. This period coincided with the timing of the 2006 outbreak, although the role of indirect transmission of the virus (i.e., through the environment) is unknown. Numbers and diversity of birds were greatest during July and early August (when ~15,000 birds were counted on the lake) which may explain the timing of the outbreak in July-August 2005. Sequential counts helped determine which birds were moving during these high-risk periods, with increasing numbers of common goldeneye (*Bucephala clangula*) and ruddy shelduck (*Tadorna ferruginea*) in July suggesting that these species may warrant closer attention as possible carriers of high path H5N1 to the site. In contrast, swans and geese are flightless at this time and so are unlikely to have been involved in the July 2005 outbreak.

Russia and Kazakhstan

- 355 cloacal samples have been collected from water birds in the Novosibirsk region of Russia in recent months through WCS' partnership with Wetlands International. All samples were analyzed at Russian institutes, and more than half of them were completed by January 2008. Preliminary results indicate that no high pathogen viruses were found, but 3 of the birds were found positive for low pathogenic avian influenza. Results and a more detailed account will be communicated in the next quarterly report.
- Dr. Todd Katzner of the National Aviary and Andrei Gavrilov of the Kazakhstan Institute of Zoology, continue assessing the presence of AI in birds in Kazakhstan, and creating local capacity to carry out the research. Field work has been conducted throughout the winter and early spring, and local laboratories have begun analyzing samples. Results are pending. Field sampling will continue this spring.

- Dr. Kristine Smith (Assistant Director, WCS Global Health Programs) is working to coordinate a joint effort of FAO, the National Aviary, United States Geological Service, and Wetlands International, to place additional satellite transmitters on migratory waterfowl in Kazakhstan this spring. This represents a continuation of previous efforts by WCS staff and partners in the GAINS project to aid in the understanding of the role (if any) of wild bird migration in avian influenza (H5N1) outbreaks.

Cambodia

WCS staff working on GAINS efforts in Cambodia are now considered to be the most experienced in the country. WCS staff in Cambodia and their partners from other institutions, led by Dr. Robert Thomson (WCS), have made impressive progress and are working to coordinate AI surveillance for activities funded by USAID, the NIH-CRISAR program with University of California-Davis (UCD), and a WCS collaboration with FAO for joint field work and laboratory analysis. High volumes of samples are now being analyzed for AI, including:

- 5,200 samples collected in Quarters 6, 7 and 8 as part of NIH-CRISAR funded surveillance were shipped for laboratory testing to UCD for screening by PCR. Duplicates of 4,500 of these samples were also shipped to the OIE Reference Laboratory in Padova, Italy, for virus isolation. Results are pending.
- 2,776 new wild bird samples were collected in duplicate in Quarter 8 from Cambodian wild habitats, markets and villages, and the merit bird trade. These samples originated from 9 provinces throughout the country..
- 1251 samples were collected through Quarters 7 and 8 under the joint WCS/FAO field surveillance project and are being tested at the National Veterinary Research Institute (892 of the samples, from 446 birds of 34 species, were collected in Quarter 8). The first 226 samples processed were negative for highly pathogenic AI. The remaining 1,025 samples will be submitted and tested in Quarter 9, and additional samples will be collected.
- 1,756 samples were collected from 890 birds of 80 species for analysis through the GAINS/NIH-CRISAR project.
- 128 samples of 11 species were collected from dead merit birds from merit bird markets in Phnom Penh.

Highlights of bird counts, wild bird field sampling and reconnaissance of new sampling sites.

- Over 40,000 birds were counted this quarter during field activities and site assessments, to be added to the www.GAINS.org open database. This information is crucial in providing epidemiologically robust “denominators” for data analysis and overall disease information.
- Site assessments took place in 8 provinces in Cambodia. WCS staff members Zephné Bernitz and Chea Sokha visited Kang Trang town in Kampong Cham province, the site of a previous AI outbreak in domestic birds; next quarter they will sample there to ascertain whether virus is present in wild waterbirds.
- Two visits were made to assess the Koh Thom site in Kandal province. First, Zephné Bernitz and fellow team member Yim Saksang visited the site to conduct a Sarus Crane and general waterbird count. Next, WCS staff member Mr. Sem Tharin was joined by a foreign birdwatcher for waterbird counts and to assess this potentially important wetland site for bird trapping. Sampling trips are being planned to this site later in the dry season.
- Zephné Bernitz, Dav Sokunthea and Chea Ngeth of WCS assessed several sites, including the site of the previous AI outbreaks in Kampong Cham province. Despite the presence of good numbers of waterbirds at some sites, none were deemed suitable for bird trapping at this time of year. Future visits during periods of lower water levels are being considered.
- Dr. Craig Symes, an experienced bird ringer with research experience in South Africa, is the new bird bander for the GAINS project in Cambodia, replacing Dr. Zephné Bernitz when her contract ended at the end of Quarter 7. WCS also hired a new Project Assistant, Chhin Sophea, to assist wild bird trapping teams. Sophea has a double bachelors degree in Biology and Information Systems Management.
- 38 birds of 16 species were sampled and ringed during a monthly visit to Phnom Tamao, Takeo Province. Bird samples, including a Shikra (*Accipiter badius*), Greater Coucal (*Centropus sinensis*) and Red Junglefowl (*Gallus gallus*) will be analyzed under the WCS/NIH partnership.



Photo 1. WCS field team releases 3 Blackcollared Starlings after sampling and banding. Takeo Province, Cambodia

- 23 additional birds were sampled and ringed later at the same site with WCS staff member Tom Evans, visiting British ringers, and Khmer staff, who were exposed to ringing techniques and skills of GAINS' Cambodian ringers. Both trips produced new species for the Cambodian ringing list and new species for Phnom Tamao forest (now at 95 species) to be shared with reserve management.
- 8,999 live birds were counted at Prey Phdau, Battambang, for the Asian Waterfowl Census (AWC). Various egret species were by far the most common. A later count led by WCS staff and its partners at Prey Phdau produced 6,604 egrets (majority Cattle Egret (*Bubulcus ibis*), with fewer Little Egret (*Egretta garzetta*) and Intermediate Egret (*Mesophoyx intermedia*), and 181 Little Cormorant (*Phalacrocorax niger*).
- WCS staff and partners visited trappers and captured birds in Sankasey village, Battambang province, as part of the WCS/NIH partnership. They also visited the WCS Sarus Crane reserve twice in January under the WCS partnerships with NIH and FAO. The team assisted with the AWC bird count performed by WCS reserve guides at Ang Trapaeng Thmor wetland, where tens of thousands of birds were observed. The team also conducted a census of the egret roost near the village (6,351 egret individuals counted).

- Hundreds of local villagers residing in the Sarus Crane reserve wetland area attended afternoon meetings held by WCS staff. The village elder requested villagers' co-operation during the field visits, and WCS staff explained their activities and educated the public about AI.
- WCS staff and their partners made bird trapping trips to Koky beach, Kandal, as part of the WCS/NIH partnership. Despite the severe disturbance of sand mining of beaches, this site has breeding colonies of Little Ringed Plover (*Charadrius dubius*) and Small Pratincole (*Glareola lactea*); however, birds were far fewer than during in a 2007 visit. In keeping with standard protocols for the GAINS project in Cambodia, the team met with local village and commune chiefs to ask permission to work at the site and educate them on methods and objectives of AI surveillance in wild birds. These introductory meetings create invaluable support for GAINS and preempt misunderstandings by local villagers. The latter are often arrested for catching wild birds.

Merit bird trade surveillance

WCS staff along with local Cambodian authorities and surveillance partners funded by NIH and FAO comprise the only systematic large-scale effort to understand the disease risks and other human and wildlife impacts of the growing “merit bird” trade in the country. Merit bird trade refers to a practice in which members of the public buy wild-caught birds from trappers to release in temple rituals. The largest trade in merit birds remains focused in the capital city, Phnom Penh, but the practice is gaining popularity in other provinces. WCS staff and GAINS project partners routinely sample birds from the three towns hosting regular merit bird release markets: Phnom Penh, Battambang and Siem Reap. The Phnom Penh market is by far the largest, but the two smaller markets grow steadily, both in numbers of sellers and consumer demand. Highlights include:

- 128 dead merit birds sampled from sellers at Wat Phnom and Riverside shrines (Phnom Penh) by Mr. Suon Sorvandar and other members of the GAINS Cambodia team, along with staff of the National Veterinary Research Institute (NaVRI). All samples were submitted to NaVRI and tested negative for HPAI.
- 92 additional samples from dead and live merit birds from sellers at the same shrines were collected under the WCS/NIH partnership for testing at UCD. 11 birds of large merit trade species were sampled from the merit bird traders in Siem Reap, the largest tourism center in Cambodia.
- The research team later visited the Slor Kram temple there and sampled several mynah birds being sold. Mynahs may be an important lead in understanding risk of zoonotic disease transmission. They have close contact with people and domestic animals (being common in Cambodian rural villages where domestic fowl are raised, and also often kept as pets), and thus may act as a “bridge” in transmitting disease between these two groups.

- WCS staff and their GAINS project partners, led by Mr. Sem Tharin, sampled 20 small passerines from the newly established Dambong Kragnoun merit bird market in Battambang. Six peaceful doves were also sampled at the site under the WCS/NIH partnership.
- WCS staff in Cambodia experimented with an innovative, simple and relatively low cost strategy for monitoring movements of live passerine birds in the merit bird trade, and finding out what happens to them after release. Using invisible (ultra-violet) ink, the team will mark and later detect individual birds or cohorts in the merit bird trade. Visible marking of merit birds diminishes the value or makes the birds unsuitable for merit release, making invisible ink the best option. Ten weavers were experimentally marked with two UV inks in different areas of the body and monitored frequently to determine how long inks would be detectable on the birds. The experiment revealed that in these conditions, ink will be detectable for up to two months after marking.



Monitoring AI in wild birds trapped and traded for human consumption

Approximately 900 large water birds in the wild water bird trade were sampled over a 6 month period in the Tuol Krasang area of Kandal province. Trappers at this site provide unique insight into the devastating numbers of large waterbirds that can be trapped and sold as food in a small community. During 40 visits made, the trappers averaged about 22 large water birds per day; extrapolated over a 6 month period their catch would reach 4000 water birds, using live heron and egret decoy birds to lure in more individuals. This quarter, visits to trappers and middlemen as part of the WCS/NIH partnership revealed that the trade is waning at the onset of the dry season. 127 birds were sampled in January, mostly Chinese/Javan Pond Herons (*Ardeola bacchus/speciosa*), crane and rail species were also sampled as well as a single Brahminy Kite (photo 16), and 14 birds were sampled in February of the same species composition.

Wild bird trade in Battambang markets, which WCS staff have identified as quickly growing and important for monitoring, did not initially decrease as expected in January. Large numbers of wild birds were sold daily despite the onset of the dry season and regular raids by Wildlife Protection Office. The Cambodia team regularly visits 4 markets in the town, and 133 birds were sampled during January as part of the WCS/NIH partnership. The WCS/FAO team, in collaboration with two Battambang Provincial Animal Health Officers, also sampled the markets extensively (204 birds). The migrant Baillon's crane (*Porzana pusilla*) was the most common species in market trade (166 sampled).

The trade in Battambang markets did drop significantly in February, and visits in March indicated that market trade in wild waterbirds for food had essentially ceased; however, they were replaced by other wild birds, such as doves (*Streptopelia spp.*) and mynas (*Acridotheres spp.*) being sold for food. These species also commonly feature in the merit bird trade and likely face severe pressure from trapping to supply both trades.

Close relationships with restaurant owners at Ang Kamping Pouy enable WCS staff and partners in the GAINS project to regularly collect samples to be analyzed under the WCS/NIH partnership. Lesser Whistling Duck (*Dendrocygna javanica*) and Cotton Pygmy Goose (*Nettapus coromandelianus*) have become commonly available for food. Due to the high priority status of these species for AI surveillance, the team sought contact with trappers who supply the restaurants, which made many more Anseriformes available for sampling.



Photo 2. Sampling Lesser Whistling Ducks destined for food at a restaurant. Battambang, Cambodia

February appears to be the height of the duck trapping season for restaurants, in particular, lesser whistling ducks (150 sampled). As in markets of Battambang, wild birds available for sampling included non-water species (35, mostly red collared doves *Streptopelia tranquebarica*).

Existing trapper networks in the Ang Kamping Pouy area led the Cambodia team to form new networks south of Battambang town in Sala Trav village. WCS staff visited trappers as part of the WCS/NIH partnership and were allowed to sample decoy birds used for trapping. Decoys are kept for up to 10 years, and the team had not previously encountered the decoy species. They sampled a black-headed ibis (*Threskiornis melanocephalus*), 3 Asian openbills (*Anastomus oscitans*) and a white-breasted waterhen (*Amaurornis phoenicurus*).

- WCS staff member Chor Kima Shalen visited two markets in Pouy Pet town, Banteay Meanchey Province, near the Thai border to assess the sale of wild birds as part of the WCS/NIH partnership. According to local information the trade remains relatively small but regular at both markets in Pouy Pet.
- 133 birds were sampled in Svay Rieng province in Cambodia's south, near the Vietnamese border. Mr. Sem Tharin led the WCS/FAO team there, where they

confirmed reports of significant wild bird trade. Mr. Tharin was joined by two Provincial Animal Health Officers (PAHOs) employed to assist and receive training in wild bird identification and sampling. Participation by local PAHOs has been very successful, and eventually these staff will carry out the activities with very limited supervision. The team returned in February to markets and trappers in Svay Rieng to sample waders caught for food markets and to investigate local trapping methods. Thirty-five (35) wild birds were sampled on the first trip in January, 65 birds of various species in February (many of them long-distance Charadriiformes), and 33 birds in March. Wild birds appear to be sold throughout the dry season.



Photo 3. Kentish Plovers are tied in bundles for sale as food. Svay Rieng, Cambodia.

- 48 wild ducks were sampled thanks to cooperation of a restaurant, including lesser whistling ducks (*Dendrocygna javanica*), and several others in town markets of Siem Reap. As part of the WCS/NIH partnership, the team visited to investigate future sampling of wild birds in markets. They met with market policeman and several sellers, as well as Mr. Dani Jump, who has been monitoring Siem Reap markets for several years. He indicated that local market trade increases from February to April.
- Markets in Kampong Cham town were revisited to check for wild birds, under the WCS/NIH partnership. Few were being sold and those found had already been precooked by sellers, rendering them unsuitable for sampling. Trappers were inactive at this time due to the full moon and because it was rice harvest season.
- Mr. Sem Tharin led the WCS/FAO team for market visits in Pousat town, Pousat Province. No birds were found in the markets; wild bird trade for food appears to be less common here. Contact was maintained with the local authorities, which are enthusiastic about participating in wild bird AI surveillance.
- The team became aware of a trade in black-crowned night heron (*Nycticorax nycticorax*) chicks at Preaek Kmeng village south-east of Phnom Penh. Chicks are harvested from nests soon after hatching and are kept in small enclosures or

artificial heronries near homes in the local village. Chicks imprint on the house and soon forage in the village similar to chickens. Follow-ups on this sampling opportunity will be made under the WCS/NIH.



Photo 4. Black-crowned Night Herons harvested from their nests are raised as free-range livestock. Kandal, Cambodia

Vietnam and Laos PDR

This quarter WCS became an official subcontractor to University of Minnesota (UMN) through the NIH–NIAID MCEIRS program. The partnership enhances GAINS AI surveillance in Vietnam and Laos PDR, and enables analysis of AI samples collected in those countries with a laboratory partner at Chulalongkorn University in Thailand.

Dr. Martin Gilbert and new WCS staff member and Field Veterinarian Dr. Joost Philippa, (supported by Cargill, Inc.) began coordinating implementation of AI surveillance in the Mekong Delta under the WCS/FAO collaboration. They are also seeking cooperation with the Department of Animal Health (DAH). Dr. Philippa leads wild bird avian influenza surveillance activities in Vietnam (see also his activities based in Indonesia in this report). He relies on assistance from ornithologist Dr. Mikhail Markovets, an experienced Russian ornithologist recruited through the WCS/FAO collaboration, and other WCS staff in the region.



Photo 5. Dr. Phillipa takes a blood sample.

Coordinating GAINS surveillance work in Vietnam is challenging due to the high workload and responsibilities of in-country partners (Vietnamese authorities responsible for national surveillance of AI in poultry and domestic ducks during outbreaks of H5N1) and because the wild shorebird and market surveillance fieldwork that WCS and its partners is establishing is without precedent in Vietnam. Close coordination with authorities like veterinarian Dr. Long (DAH, Hanoi) ensures that work progresses steadily during this ramping-up period. Highlights in Quarter 8 include:

- 74 free-ranging migratory shorebirds of 23 species were caught and sampled in the coastal communes of Thoi Thuan and Bao Thuan, in the Mekong Delta (southern Vietnam) Ben Tre Province. The sites are frequented by migratory birds, listed as Important Bird Areas (IBA) by Birdlife International, and identified by WCS staff as prime sites for surveillance of H5N1 in wild birds in Vietnam. Surveillance targeting migratory shorebirds congregating at nocturnal high tide roosts was less successful than anticipated due to high levels of disturbance by shell-fish collectors and poor weather conditions; captures were therefore conducted in salt fields, mudflats and mangroves with large concentrations of waders at night and less human disturbance. Analysis is pending.
- 38 Eurasian tree sparrows (*Passer montanus*) were ringed and sampled to determine prevalence of AI in Binh Dai, a town in Ben Tre province where two outbreaks of H5N1 virus were reported in 2005. Eurasian tree sparrows are ubiquitous in Vietnam, and they frequent high human density areas like towns and villages, and especially markets. In addition, several HPAI H5N1 viruses have been isolated from Eurasian tree sparrows in China and elsewhere in Asia, and given their close association with people and domestic poultry, Eurasian tree sparrows are a key species for surveillance. Results are pending.

Market trade surveillance

WCS staff along with its partners in the GAINS project continued to create a formal wild bird market sampling program, with Vietnamese authorities. They conducted a rapid assessment of local trade in wild birds at rural marketplaces, quantifying the volume of trade and identifying main trading locations where opportunities are created for transmission of zoonotic pathogens between wild and domestic species. Preliminary surveys in 2006 and 2007 indicated that wild waterbirds are caught in greatest numbers for local food markets throughout the Mekong region during the wet and early dry season (May to January), and that the assemblage of birds for sale can change rapidly in response to enforcement and control in the wake of local HPAI outbreaks. Highlights in Quarter 8 included:

- 33 markets in 11 provinces were visited by Nguyen Hoai Bao and Nguyen Phuc Bao Hoa (Vietnam National University of Natural Sciences, Ho Chi Minh City [HCMC]) in the Mekong delta, where markets or street vendors were reported to sell wild birds.

- 442 samples from 13 species were collected at markets in Dong Thap province. Mr. Nguyen Van Hung, vice-director of Tram Chim National Park and Forest Protection Department (FPD) officer provided lodging at the park office/tourist information centre, and accompanied the team on its market visits. The most commonly sold species was the cinnamon bitttern (*Ixobrychus cinnamomeus*). The location was chosen because it would give an excellent opportunity to compare prevalence of AI and other infectious diseases in wild birds in the National Park with those in markets (both would have been taken from the same source). Mr. Hung is very interested in collaborating with market work around the park, and will facilitate work inside and around the park on future visits.
- Good working relationships with authorities and local vendors and mutual respect remain essential to this market surveillance program. Local Sub-Department of Animal Health and District Veterinary Services officials accompanied the team to every market during sampling this quarter, assisted with sampling, and were paid a daily stipend for their work. Sampled birds were not confiscated, in keeping with agreements with vendors. The team worked in the midst of very brisk market business, as vendors continue selling during sample collection, and birds slated to be sampled are sometimes sold before sampling can be accomplished; within a few hours, market stalls are completely re-stocked with a new set of birds for sale.
- Members of the microbiology division of the Oxford University Research Unit at the Hospital for Tropical Diseases, HCMC, are interested in collaborating to investigate the prevalence of zoonotic pathogens in Vietnamese markets. A detailed proposal will be sent to them. Menno de Jong of the virology division, who has been involved with the investigation of the H5N1 outbreak in civets in Cuc Phuong National Park, also wishes to collaborate on virologic aspects.
- Dr. Long (Director) and Dr. Vu (of RAHO, Regional Animal Health Office, the veterinary reference lab in HCMC), received all virological samples, to be tested by RT-PCR.
- Mr. Nguyen Hoai Bao, Vietnam National University of Natural Sciences, HCMC, participated in market surveys, and served as interpreter in the field. He is very interested in future projects, and hopes to involve his students in surveillance for disease in free-ranging birds by observing bird concentrations in capture areas, finding new capture sites, and working with WCS staff in the field as training.

An important part of understanding the movement of AI globally is investigating its movement between birds and other animals; markets are prime places for such zoonotic transmissions to occur. The potential for emerging zoonoses in wild animal markets was vividly illustrated during the 2002-3 outbreak of SARS (Severe Acute Respiratory Syndrome) coronavirus in Guangdong, China, where the virus passed from bats to civets and several other carnivore species and subsequently to people involved in the animal trade. More recently, there have been two outbreaks of HPAI H5N1 among Owston's Palm Civets at a small Carnivore Center in Cuc Phong National Park, Vietnam.

For these reasons, WCS is pursuing relevant collaborations to understand such critical connections in Vietnam. Dr. Leanne Clark, a veterinarian and Master's student at the University of Sydney involved in small carnivore and pangolin conservation programs at Cuc Phuong National Park, wishes to collaborate in surveillance for antibodies against viral and bacterial pathogens in civets in the animal trade. Further collaborations were explored with Erasmus University, Rotterdam, the Netherlands, with researchers willing to conduct serology and virus isolations, or PCR diagnostics, with participation by Drs. T. Kuiken and A. Osterhaus. Contacts were made regarding civet serology and future virus isolation from civets in Vietnamese markets for H5N1 and SARS.

Drs. Thomas Dietsch and Thomas Smith of UCLA Center for Tropical Research have completed field work for their evaluation of disease transmission pathways and host reservoirs for H5N1 avian influenza in domestic and wild bird communities of Vietnam.

- 889 birds from 60 species were sampled, including 200 domestic ducks and 689 wild birds. Most sampling was conducted in Nam Dinh province, focusing on migratory and resident wild birds near villages and compounds and in surrounding natural and agricultural habitat at Xuan Thuy National Park and Nghia Hung. With support from Nam Dinh Department of Animal Health, the team also sampled domestic ducks from flocks in each study site. From each sampled bird, cloacal and tracheal swabs were stored in guanidine, to be analyzed using special methods pioneered by the UCLA Center for Tropical Research (further details of the method appear below). During Quarter 9, samples will be exported to Los Angeles for analysis.
- Dr. Dietsch and the sampling team, at the request of the National Centre for Veterinary Diagnosis (NCVD) in Vietnam, also responded to confirmed positive cases of H5N1 avian influenza in Owston's palm civets at the Small Carnivore Rescue Center (SCRC) in the Cuc Phuong National Park. The team captured and sampled birds at the SCRC compound inside the park, as well as in the nearby Botanical Garden, and in natural forest habitat. Sample analysis is pending.

WCS partnerships with institutions like the UCLA Center for Tropical Research not only serve to help monitor avian influenza globally, they also promote the development of improved science and technological capacity for monitoring of AI and other infectious diseases in general. UCLA is pioneering a new technology for testing deactivated virus in samples stored in guanidine hydrochloride (to preserve the viral RNA until analysis). Virus RNA is broken up into small fragments, and the only way to test for the presence of AI and its subtypes is the technology that UCLA CTR is currently optimizing – called High Resolution Melting (HRM) Quantitative PCR (QPCR), which requires a special QPCR machine. UCLA Center for Tropical Research laboratory has developed new protocols to maximize analytical effectiveness for this storage medium.

Other collaborations for next quarter include:

- Thinh Vu, a Vietnamese PhD student at Colorado State University, will contribute data to the GAINS database from his AI surveillance work in northern Vietnam during summer 2008. WCS staff are exploring with Dr. Kate Huyvaert, his supervisor, possibilities for testing filter-feeding mollusks for AI and submitting samples to Chulalongkorn (Thailand) for analysis under the WCS/NIH-MCEIRS partnership.

India

This year long project jointly implemented by Wetlands International (WI) South Asia and Bombay Natural History Society (BNHS) for WCS was completed at the end of Quarter 8. Objectives were to conduct AI surveillance with wild birds, to enhance veterinary staff capacity to handle wild birds, to detect and respond to outbreaks, and to understand transmission of avian influenza strains in migratory and resident wild bird species.

Surveillance

- 308 samples of 24 species were collected in total for this subaward and sent to the High Security Animal Disease Laboratory (HSADL) in Bhopal between January 2007 and March 2008 from Chilika Lake. Of these, 216 samples from 22 species were collected during the 2007-2008 which included 25 sick birds of 6 species.
- 106 individuals of 22 species were sampled from Nandur Madhmeswar. Over 25% of these samples were garganey (*Anas querquedula*) and common teal (*Anas crecca*). All sampled individuals were ringed and released.
- Besides the regular study sites, samples were also collected from avian influenza outbreak areas in Manipur and West Bengal States. Two Highly Pathogenic Avian Influenza (HPAI) outbreaks were reported in July 2007 from Manipur and in January 2008 in West Bengal. July is the lean period for migratory birds in India whereas January is the peak period for wintering birds. In both times, the AI was confirmed from poultry. During both outbreaks, the BNHS team visited those areas to collect samples. In Manipur, wild birds were sampled from the surrounding area of the outbreak zone (5 km away) and from Manipur Zoological Garden (MZG). Sampling was also carried out in the Loktak Lake area, 50 km from the reported outbreak zone. A total of 50 samples of 11 species were collected in Manipur.
- In West Bengal, outbreaks were reported from 13 districts, but sampling had to be restricted to only four districts. The samples were collected from Ballavpur Wildlife Sanctuary and Bakreshwar Dam from Birbhum district; Purbasthali in Burdwan district; Ahiron in Nadia-Murshidabad district, and Kulik & Balurghat in North Dinajpur district respectively. In total 168 birds of 44 species were

sampled and ringed. Samples collected from Chilka and Nandur-Madhmeshwar were sent to the High Security Animal Disease Laboratory (HSADL), Bhopal, and samples collected from the high risk areas were directly taken to the laboratory by the BNHS veterinarian. Final results are pending.

The India team made regular visits to local bird trapping families in communities in the southeast coast (Tamil Nadu) of India, to monitor the trade in wild waterbirds, although sampling was not conducted.

Training

Training

Two highly successful training courses were held during January and February 2008 at Chilika, and Nandur-Madhmeshwar/Gangapur. The training programme at Chilika was timely, since an outbreak of highly pathogenic avian influenza in domestic poultry was reported in West Bengal, a neighboring state.



Photo 6. Training at Nandur Nasik

- 19 participants representing Departments of Wildlife/Forests and Veterinary Svs. from Orissa, West Bengal, Chattisgarh and Andhra Pradesh were trained during the Chilika Training Workshop, held at the Wetland Research and Training Center of the Chilika Development Authority (CDA), Chandraput. Training aimed at understanding complex interactions between wild and domestic birds in the spread of the virus and emphasized the importance of coordinated actions by the

veterinarians and wildlife agencies. Dr. Taej Mundkur, Deputy Wildlife Coordinator for Avian Influenza (FAO) participated as a trainer. The course emphasized hands-on practice in capturing, sampling and surveying wild birds imparting knowledge on epidemiology; developing criteria for AI surveillance in wild bird; and early detection and control of highly pathogenic AI (H5N1) in poultry in Maharashtra.

- 818 birds of 12 species were ringed at Chilika.
- 43 participants from 7 states (Maharashtra M.P., Kerala, Karnataka, Kolkata, Chattisghar, Goa) participated in the course at Nandur-Madmeshwar/ Gangapur, along with Mr. Sayam Uddin Chowdhury and Dr. Sajahan Sarder from Nature Conservation Committee, Bangladesh. Dr. C.L. Trisal, Director of Wetlands International - South Asia, delivered the welcome address. Mr. Mohan, Conservator of Forests, Government of Maharashtra emphasized that the state had faced an AI outbreak in February 2006 without the benefit of a formal training program like this; he sent 20 forest officials from his state to receive training at the workshop.



Bird population counts in key wetland sites for migratory birds

- Regular fortnightly bird population monitoring was carried out at Chilika Lake from January-May 2007 and November-December 2007. Monthly surveys were carried out from August to October.
- 124 species were recorded in Chilika. Among the ducks, northern pintail (*Anas acuta*) was predominant followed by the gadwall (*Anas strepera*).
- >5000 brahminy shelduck and 1200 bar-headed geese were also recorded during different periods of the year 2007.
- The over 820,000 individuals recorded during the Asian Waterbird Count on 12 January 2007 was the maximum waterbirds number observed in Chilika Lake.
- Regular monthly field population monitoring activities were carried out at Nandur-Madhmeswar from January to December 2007. A total of 78 bird species were recorded.
- Monthly population monitoring was carried out in the Karaivetty Waterbird Sanctuary from January 2007 onwards. A total of 153 bird species were recorded at Karaivetty during the surveys. Garganey (*Anas querquedula*) was the most common species among all ducks, and northern pintail (*Anas acuta*) and northern shoveller (*Anas clypeata*) were common duck species. A record of 1,500 bar-headed geese were recorded in February.
- Bird mortality at Chilika was significantly lower during 2007–08 season as compared to the previous two seasons. The death rate had declined over 80% compared to 2005-06. However, samples from 25 sick birds of 6 species were collected and sent to the HSADL laboratory for testing for H5N1.
- A comprehensive manual on bird identification, bird population monitoring and AI surveillance that the team prepared is expected to be ready for printing shortly.

Strengthening of the Asian-Pacific Working Group on Migratory Waterbirds and Avian Influenza

The Working Group consists of representatives from major flyway countries and partner agencies (linking with the East Asian-Australasian Flyway Partnership and the Central Asian Flyway Action Plan). It provides a forum and framework for establishing flyway-wide coordinated color marking protocols for higher risk species/groups and surveillance of selected species. The Group works with the established frameworks of the African-Eurasian Waterbird Agreement and American Flyways to build alliances with partner agencies in areas of flyway and species overlaps. Specific activities include the creation of a website on banding, color marking and satellite tracking of waterbirds in the Asia-Pacific region (www.wetlands.tekdi.net). The site has been updated with responses and

information from key contacts and experts in the region. Regular email group discussions have been held and updates of information on HPAI outbreaks in the region and relevant literature have been shared.

WCS and its subawardee in India remain in close partnership with Dr. Sanjay Upadhyay (USAID), Dr. Mohinder Oberoi (FAO-India), and Dr. Scott Newman (FAO-Rome).

Indonesia

Cargill Inc. enabled WCS to fortify AI field surveillance capacity by providing funds to hire new field veterinarian Dr. Joost Philippa. Dr. Darin Collins will pass leadership responsibilities for GAINS activities in Indonesia to Dr. Philippa next quarter. From his base in Bogor, Indonesia, Dr. Philippa will develop a program focused on AI and other zoonotic and economically significant pathogens in the wildlife trade in Indonesia and Vietnam. He began to strategize for Indonesia activities during a visit to West Java in February with Dr. Martin Gilbert, Angela Yang, Drs. Darin Collins and Zulfi Arsan, and other WCS staff. Dr. Philippa has worked with the AI sampling team in the field and will receive further training and orientation through May 2008. Dr. Arsan and Mr. Iwan Londo Febrianto continue as key team members for GAINS activities in Indonesia.

Surveillance

- AI surveillance resulted in important sightings new to science, including the rare Nordmann's greenshanks (*Tringa guttifer*); 3 of the 7 sighted birds were sampled for AI monitoring. The team also recorded, for the first time in Sumatra, "white-faced plover" and black-headed gull (*Larus ridibundus*); DNA samples collected from the white-faced plover samples will be used to verify the species.
- 444 birds of 19 species of migratory shorebirds were sampled in Jambi, Sumatra, near Berbak National Park. Local village support for work with migrating birds continues to be high and local participation in all field activities makes it possible to sample in this remote location with extreme weather conditions, including high tides and winds.
- Waders continue to be flagged using the AWSG (Australian Waterbird Study Group) protocol.

Zoonotic disease caused by unrestricted translocation of animals to and from wildlife markets is a problem worldwide. Surveillance of the wild bird trade continues to expand in Indonesia. Highlights for this quarter include:

- Analysis of 158 samples collected from wandering whistling ducks in East Kalimantan during Quarter 6 found 4 samples to be positive for avian influenza type A subtype H5, but negative for N1 using RT-PCR. No live virus was

detected on virus isolation. Analysis was done by the Ministry of Agriculture, Directorate General of Livestock Services, Disease Investigation Center Banjarbaru in South Kalimantan.

- 23 samples were collected as part of a new collaboration with Tegal Alur Wildlife Rescue Center. This Ministry of Forestry managed facility in Jakarta, located near the Soekarno-Hatta International Airport, holds confiscated wildlife from the illegal trade. GAINS staff sampled psittacines, raptors and hornbills originating from sites near Jakarta; the psittacines were being illegally moved from Ambon, East Indonesia. WCS staff continue to provide expert advice on health and husbandry to all facilities that participate.
- 80 samples were collected as part of a new collaboration with Cikananga Rescue Center, a Ministry of Forestry managed facility near Sukabumi, West Java. Sampled species included raptors, psittacines, green peafowl and hornbills confiscated from the illegal wildlife trade in Jakarta, Tangerang and West Java. Mr. Erwin Wilianto from Gadog accompanied the team during sampling. Work with this center is important because in 2005 the collection included animals which tested positive for H5 by PCR analysis. Wild birds here are annually vaccinated using a commercially available domestic chicken vaccine for H5N1 called Legok Isolate (local) killed vaccine.



Photo 7. Taking Sample from an Eagle at Rescue Center

- 169 samples were collected from wandering whistling ducks (*Dendrocygna arcuata*) in East Kalimantan by Dr. Arsan (20 from the Kota Bangun, 27 from the Amuntai wild duck farming operation and 122 from new acquisitions by the same Kota Bangun trader). Dr. Arsan traveled from the local Kota Bangun village site to where the birds are being net-caught by hunters using the traditional method of using decoy ducks “to call” free-ranging ducks. Local staff from the Samarinda-based local NGO group, Borneo Ecology and Biodiversity Conservation (BEBSIC), assisted Dr. Arsan. Samples were submitted to the Banjarbaru Disease Investigation Center (DIC) for analysis.
- Dr. Collins met to discuss collaborations with Dr. Wita Wahyu Widayandani, Executive Director, Pusat Penyelamatan Satwa, Wild Animal Rescue Center (Bali) and Dr. Gusti Ngurah Mahardika, Director, Animal Biomedical and Molecular Biology Laboratory, regarding AI surveillance of captive birds from Bali and other wildlife trade related samples.

Collaborations, outreach and education

- Environmental awareness education programs have been established at Cemara village by WCS staff who sample migratory shorebirds at the coastline in Jambi, Sumatra. Forty-four (44) children from grades 1-9 participated. After the December 2007 program, village children reported that they had stopped hunting all wild birds and that they had seen the orange and black leg flags which the WCS GAINS uses to identify sampled shorebirds. GAINS staff educational activities included story telling for grades 1-3, birdwatching, behavioral studies and record keeping for grades 4-6, and English language lessons for grades 7-9.
- Dr. Collins met to discuss collaborations with Dr. Bayu Wirayudha, Director, Friends of the National Park Foundation and Jennifer Croes, Marketing Director, Begawan Giri Foundation to evaluate future collaborations. They discussed efforts involving AI surveillance of the Bali mynah (*Leucospa rothschildi*) captive breeding and release program shared by these two organizations.
- WCS staff attended a stakeholder’s meeting with other participants in a working group for the proposed Indonesia Bird Banding Scheme. LIPI (Indonesian Institute of Science and Research) representatives coordinate the framework for an Indonesian Bird Banding Scheme. The team will implement Indonesian bands on field caught birds, as well as flags endorsed by the Australian Waterbird Study Group (AWSG).
- Dr. Collins was invited by the Indonesian Veterinary Medical Association to serve on the Scientific Advisory Committee of the Indonesian Zoo and Wildlife Veterinary Association, which addresses conservation and emerging wildlife disease issues among other issues.

- WCS staff members Mr. Iwan Londo Febrianto and Ms. Noni Fransisca described GAINS field activities in Sumatra and Java in a report to *The Tattler* quarterly newsletter, read by 500 people in 27 countries, published by the AWSG.
- Dr. Elizabeth Bennett (WCS Hunting and Wildlife Trade Program) visited Dr. Collins in Sumatra with WCS Lampung staff member, Edward Rahadian (formerly of the Indonesian Ministry of Forestry). They visited the Pramuka Bird Market in Jakarta, where bird species sold included the white-rumped shama (*Copsychus malabaricus*), long-tailed shrike (*Lanius shach*), black-winged starling (*Sturnus melanopterus*) and Asian pied starling (*Sturnus contra*). This market is a barometer for trade in endangered wild species and the largest bird market in Indonesia, with more than 300 traders in a three story complex in East Jakarta. WCS staff in Indonesia collaborate with the Indonesian government agency responsible for CITES protected species to reduce the risk of introducing emerging infectious diseases such as AI into new locations.

Afghanistan

Dr. Stephane Ostrowski (WCS), in partnership with FAO and the Naval Medical Research Unit in Cairo, Egypt, continues to provide wild bird surveillance data, capacity building of local scientists, and education to the public regarding disease risks of avian influenza and other zoonotics at the wildlife/livestock/human interface. During Quarter 8:

- Dr. Ostrowski met in Kabul with the task force for avian influenza control, coordinating WCS staff and the Ministry of Agriculture, as well as donors (USAID, the World Bank and the United Nations). The team responsible for GAINS activities presented results of wild bird surveillance in four sites: Bande-e Amir, Bamiyan province (October 2006), Dasht-e Nawar, Ghazni province (July/August 2007), Kol-e Hashamat Khan, Kabul (ongoing) and northern wetlands, Kunduz and Takhar provinces (December 07). Surveillance included ornithological surveys and social surveys about the poultry/wild bird interface. Results from questionnaires administered to local residents are pending.
- Dr. Ostrowski and other GAINS project participants sampled birds at Band-e Amir and Dasht-e Nawar. Results for AI in the Dasht-e Nawar samples were negative, and approval is pending from the Ministry of Agriculture to upload results to the www.GAINS.org open database.

South Korea

In late April 2008, Drs. Kristine Smith, Steve Zack and Joe Liebezeit (WCS) traveled to South Korea to sample wild migratory shorebirds during the ongoing poultry HPAI H5N1 outbreaks. The team worked in collaboration with the Ministry of Environment to sample shorebirds in the Saemangeum region, adjacent to the current outbreak areas in poultry. Samples were sent to the Ministry of Agriculture laboratory (NVQRS), where they will be immediately analyzed.

Eastern Europe/Eurasia

Ukraine

Over 4200 samples have been collected during seven field trips to wetland sites within the Ukraine by GAINS partner Wetlands International Black Sea Program. One last field trip will take place during the upcoming quarter, and remaining results from samples being analysed at the Friedrich-Loeffler-Institute for Animal Health in Germany are expected. Preliminary tests for Influenza A have been negative for all samples.

Latin America and the Caribbean

Dr. Marcela Uhart, Associate Director for Latin America for WCS Global Health Programs and leader of GAINS activities for Latin America, now oversees 23 PIs and WCS staff in their AI surveillance, collaboration and training activities. With her in-country teams, she facilitates more than 20 collaborative relationships with governments and other research partners to implement AI surveillance and preparedness planning and training in Latin America.

Work by WCS staff and GAINS project partners in Latin America includes the ongoing tasks of preparing data collected from all over the region for uploading to the GAINS web-based database. Dr. Uhart also continues to seek relationships with local and regional organizations that collect information on AI in wild birds in order to encourage them to contribute their own surveillance data to the GAINS database. WCS is seeking ways to make it easier for these organizations to participate, possibly by helping them transfer data to the GAINS format used for uploading information.

In the coming months, Dr. Uhart aims to continue AI surveillance and capacity building activities throughout South America, focusing on Colombia, Ecuador, Bolivia, Paraguay, Uruguay, Costa Rica, Chile, Argentina and Bolivia.

Argentina and the Falkland Islands

Surveillance

Over 500 samples were collected from wild birds in Quarter 8, including:

- 226 wild ducks of 6 species including the fulvous tree duck (*Dendrocygna bicolor*), white-faced tree duck (*Dendrocygna viduata*), silver teal (*Anas versicolor*), rosy-billed pochard (*Netta peposaca*), Brazilian duck (*Amazonetta brasiliensis*), and ringed teal (*Calloneta leucophrys*) sampled in Santa Fe Province wetlands by Drs. Hebe Ferreyra, Marcelo Romano, Virginia Rago and assistants.
- 90 Magellanic penguins (*Spheniscus magellanicus*) sampled during several field trips made by Drs. Uhart, Rago and R. Cook (WCS) at Cabo Dos Bahias, San Lorenzo and Punta Tombo colonies in Patagonia.
- 54 terns sampled by L. Mauco (Universidad de Mar del Plata) and rangers from Fundacion Vida Silvestre Argentina (43 *Sterna hirundo*, 5 *Sterna sandvicensis*, 1 *Sterna trudeaui*, and 4 *Sterna maxima*) at Punta Rasa Reserve, Buenos Aires.
- All cloacal and tracheal swabs collected in Argentina have been sent to the laboratory at INTA Castelar (National Institute of Agriculture), the reference laboratory in Argentina for AI surveillance in wild birds, for RT-PCR analysis.
- 132 seabirds sampled at Steeple Jason, Falkland Islands by Dr. Uhart and Dr. Flavio Quintana (WCS), Nic Huin, Jim Robins, Sarah Brennan (Falklands Conservation) and Dr. Zoe Luxton (Falkland Island Government, Dept. of Agriculture). Samples from 50 adult non-breeding black-browed albatross (*Dyomedea melanophrys*), 10 adult and 32 fledgling rockhopper penguins (*Eudyptes chrysocome*), and 44 adult gentoo penguins (*Pygoscelis papua*) are being analyzed at the National Veterinary Service Laboratory, Ames, Iowa, USA.
- In addition, 3 satellite transmitters were deployed on adult breeding black browed albatross to test the utility of these tracking devices on this species (2 have been recovered thus far). WCS staff in Argentina hope these instruments will enable tracking of the animals at sea, as well as elucidate their interactions with other birds and human waste while feeding (i.e. from fishing vessels and their long lines). Albatross are legendary for long-distance migrations and between breeding and foraging may connect such distant points on the globe as the Falkland Islands, New Zealand, Australia, and northern Brazil.

Other training and outreach activities

- Two veterinarians (Judit Dopazo, Veterinary School of Tandil, and Andrea Chirife, Veterinary School of Buenos Aires) and one student (Dario Manzoli, Veterinary School of Esperanza) received training this quarter from Drs. Ferreyra, Romano and Rago as part of ongoing training of recently graduated veterinarians and students during GAINS sample collecting missions.
- Dr. Marull has maintained continuous training activities via lectures and follow-up email discussion forums for 25 veterinary students from Buenos Aires University.
- Dr. Uhart participated in the Argentina Ornithological meeting in March, where she presented a poster on “*Avian Influenza Surveillance in Argentina*” (with data from samples collected in 2006 and 2007), and an oral presentation on “*GAINS: an innovative, participatory and high-flying initiative.*”
- Drs. Beldomenico and Uhart submitted an article entitled “*Ecoepidemiology of Avian Influenza,*” to the peer-reviewed journal *Revista FAVE – Ciencias Veterinarias*, to help address the lack of any current literature review on the subject in Spanish.
- Dr. Uhart’s article “*Avian Flu, trapping the mysterious virus*” was published in *Naturaleza y Conservación*, the magazine of the Argentina Ornithological Association (local partner of Birdlife International). The article describes the disease and GAINS activities worldwide, and clarifies the role of wild birds in AI epidemiology.

Bolivia

Drs. Sixto Angulo and Rodolfo Nallar are awaiting permits from the Ministry of Biodiversity for AI surveillance in Bolivia, and sampling will take place in Quarter 9.

In January, WCS staff in Bolivia staff helped train the National Livestock Health Service (SENASAG) staff in the use of Global Positioning Systems (GPS). This training will complement the work to be done with domestic avian censuses carried out by SENASAG in the province of La Paz. Results of the census will be available next quarter for uploading to the GAINS database, to help determine high risk areas for AI and other avian diseases.

Brazil

GAINS continues its discussions with the Brazilian Environment and Natural Resource agency (IBAMA) to be able to include their data from past national-level AI surveillance in the GAINS database, and to develop plans for joint field work in the future.

In order to strengthen partnerships with authorities in Brazil, Dr. Flavia Miranda met with Mr. Onildo Marins in Brasilia, Instituto Chico Mendes and IBAMA (Ministry of Environment) and Dr. Jorge Caetano (Ministry of Agriculture), as well as representatives of the Brazilian Committee for the Preparation of the Contingence Plan for Pandemic

Influenza (Ministerial order N° 36, of 12/22/03). Dr. Miranda also visited Mr. Ernani Pilla (USAID/ Brazil) to initiate a partnership with GAINS and update him on current activities.

Colombia

Biologists Carlos A. Saavedra and Padu Franco continue to consolidate inter-institutional collaborations and finalize institutional agreements with national and local environmental authorities and other organizations. They are building capacity for a country-wide AI surveillance program to include censuses, wild bird captures and sampling, diagnostics and AI monitoring workshops in wetlands of the Cauca River valley and the Pacific coast of Colombia. Partners now in final phases of signing agreements to participate in GAINS activities and who have made substantial financial commitments to AI surveillance include:

- Regional Environmental Authorities of the Cauca Valley (CVC), for a joint project in four sites in the province. CVC secured funds for 2 years (US\$70,000) and WCS staff created the methods, workplan and budget. WCS will develop the National AI Pandemic Plan and train government personnel in surveillance, the role of wild birds in AI maintenance and dispersal, wild bird ecology, census, capture and sampling techniques.
- Ministry of Environment, Housing and Territorial Development (MAVDT), for a national program to train Regional Environmental Authorities (CARs), and monitor AI in selected sites. The Ministry will contribute US \$22,000 to pay three professionals (veterinarians and biologists) to conduct workshops and field activities beginning next quarter. The arrangement includes participation by CEISA-ICA (the reference diagnostic lab of the ICA) in the training, focusing on AI virology and diagnosis, and transfer samples to their labs for PCR analysis (free of charge or at very low cost).

This quarter WCS staff in Colombia also made two informal agreements to facilitate in-country analysis of samples to be collected in the field:

- Genetic Bank and Molecular Lab of the Alexander von Humboldt Institute (IAvH) of the ICA, Calidris, to store collected samples until they are sent for analysis to that lab
- The laboratory of CEISA-ICA. Moreover, the National Parks agency expressed interest in developing joint monitoring efforts within national parks.

Next quarter, the Colombia team will seek agreements with NGOs and regional institutions to enhance the public and private sector AI surveillance network and contribute to field and training activities. They are in discussions with:

- The National Network of Birdwatchers (RNOA) for participation in the project with the Ministry
- The NGO KOTSALA (Llanos Orientales, Department of Meta) and GAICA (department of Nariño)
- Universidad de los Llanos (Meta) and Universidad de Nariño (Nariño) to support monitoring and capacity building
- Additional regional laboratories, such as the International Center for Training and Medical Research (CIDEIM) and Universidad del Valle.

Costa Rica

Dr. Uhart is reviewing a proposal for AI surveillance of wild birds from Dr. Mario Baldi, Tropical Disease Research Program, Veterinary School, Universidad Nacional de Costa Rica, and government partner National Animal Health Service (SENASA), Agriculture Ministry. Outcomes of discussions will be reported in Quarter 9.

Peru

This quarter the GAINS Peru team completed 15 months of AI surveillance to detect and characterize AI viruses circulating in migratory and other wild birds in the country. Sites included Pantanos de Villa, a Wildlife Natural Refuge in the urban center of Lima; Albuferas de Medio Mundo, a wetland 175 km north of Lima and close to commercial poultry farms (providing opportunities to evaluate potential risk of disease transmission between wild and domestic birds); and Paracas, a Natural Reserve in Ica representing high aquatic bird biodiversity. A fourth site, Laguna El Paraiso near Albuferas, was dropped from the study because the personal safety of researchers there was uncertain.

- 160 wild birds were captured and samples were collected from live and dead birds and from the environment at the three sites (total of 249 samples collected). All samples were sent to NMRC (Naval Medical Research Center Detachment in Lima) laboratories for storage and processing. Complete analysis of results is pending.
- 28 individuals have been trained in transect census techniques, capture with nets, and sampling throughout this surveillance effort: 14 veterinarians and veterinary students, 12 biologists and biology students, 1 physician, 1 zookeeper, and 1 zoo technician. The Universidad Peruana Cayetano Heredia (UPCH) and Naval Medical Research Center Detachment (NMRC) lead the research, with participation from staff of the Servicio Nacional de Sanidad Agraria (SENASA) and the local NGO Grupo de Aves del Peru (GAP), as well as local people (1 biologist from Pantanos de Villa, 4 fishermen from Albuferas and 5 volunteers from Paracas) of the three natural areas.

Drs. Patricia Mendoza and Roberto Elias, collaborators in GAINS activities from local Peruvian universities, and Donald Brightsmith, Schubot Exotic Bird Health Center, Texas A&M University, continue to advance their project to monitor the presence AI in wild bird traffic in Peru. Texas A&M University is now transferring the funds to Peru to implement the plan detailed in the Quarter 7 report, including field sampling as well as the creation of informative brochures about AI and other infectious diseases in the live bird trade to be distributed to market vendors, and work with traders about health risks, disease recognition, disease reporting and disease prevention.

During Quarter 8, Peruvian veterinarian Dr. Mendoza continued preliminary market surveillance, and in the coming quarter all remaining sampling will be conducted. The project will test samples from 300 birds, nearly 200 of which have already been sampled during Dr. Mendoza's preliminary market work. With the trust of live bird sellers gained during prior field work and cooperation of important government and academic institutions, and alliances built with new officers in government agencies (which change frequently), they continue to coordinate closely with all local partners.

Laboratory analysis of samples tested to date indicates all negative results for AI. Samples are being analyzed at several laboratories. The two hundred samples analyzed at the Naval Medical Research Center Detachment (NMRC) – Lima all tested negative. Results for AI from SENASA (National Veterinary Service) and UNMSM (Universidad Nacional Mayor de San Marcos) are pending.

Market visits continued through March in Lima, Iquitos, Pucallpa and Puerto Maldonado. Slight variation was observed this quarter in traded wild species, corresponding to the season.

Caribbean Region

Dr. Adam Brown, Vice-President of the NGO Environmental Protection in the Caribbean (EPIC), led GAINS AI monitoring efforts in high risk areas of the Caribbean. The National Veterinary Service Labs (NVSL) in Ames, Iowa provided sample preservation media and GAINS partner USDA-SEPRL in Georgia provided free analysis. Sampling preference was given to high priority birds (migratory *Anseriformes* and *Charadriiformes*), but also included passerines and potential bridge species. Opportunities for trapping and sampling wild birds were used to train local biologists and veterinarians.

589 waterbirds of 25 species were sampled by Dr. Brown and his team during fieldwork on five islands: St. Martin, Anguilla, Antigua, St. Kitts, and Trinidad. (EPIC applied for but did not receive permits to sample on Barbados and the Dominican Republic.) The team used mist-nets, walk-in traps, swim-in traps, bow-nets, and noose traps, and were supported on each island by staff from governmental veterinary and agricultural offices

as well as members of local non-governmental environmental groups. Highlights of activities include:

- Shorebirds and waders were readily trapped in mist-nets during pre-dawn and post-dusk hours as they flew between nocturnal roost and diurnal foraging areas in groups. Fewer ducks were sampled due to logistical challenges. (The EPIC team's preferred method of capturing ducks -- shooting rocket nets over congregations of the birds -- requires gunpowder, which cannot be transported between Caribbean islands.) All samples were sent to Dr. Erica Spackman at the USDA Southeast Poultry Research Laboratory in Athens, Georgia. Results are pending. Details of field activities appear below.

St. Martin

- 113 birds of 15 species captured at Etang Poisson, Gallion Pond, Orient Pond, Grand Case Pond, Mullet Pond, and the Millennium intertidal zone.

Anguilla

- 104 birds of seven species captured with collaboration from Dr. Valarie Thomas, Chief Veterinary Officer for the Department of Agriculture of Anguilla, and Farah Mokida, head biologist of Anguilla National Trust (ANT). Both received training in trapping and handling of wild birds.
- Local groups that supported efforts were very enthusiastic and expressed great interest in continuing sampling efforts next year.

Antigua

- 114 waterbirds of 10 species captured with collaboration from Dr. Camilo Diaz, a veterinarian with the Veterinary and Livestock Division of Antigua, and members of his staff. Participants received training in trapping and handling of wild birds.
- Dr. Junior Prosper, a biologist with Environmental Awareness Group (EAG), the leading environmental group on the island, also received training and sampled with the team.
- The staff of the Veterinary and Livestock Division of Antigua expressed interest in continuing AI surveillance on Antigua.

St. Kitts

- Permission was provided for trapping by the St. Kitts and Nevis Veterinary Services. The Chief Veterinary Officer, Dr. Tracey Challenger, was very supportive but could not join in the fieldwork due to other commitments.
- 135 waterbirds of six species were captured, all at South Friar's Pond, capitalizing on the birds' movements from nocturnal roost areas to diurnal forage areas. The team observed thousands of shorebirds and waders throughout the island, but few

ducks. No ducks were trapped despite efforts using mist-nets, walk-in traps, and bow-nets.

Trinidad

- The GAINS team worked with Dr. Selene Warren (Trinidad Ministry of Agriculture, Land & Marine Resources) and members of her staff. Support in scouting for potential trap areas was provided by the Trinidad Wildlife Division. Dr. Warren and her staff expressed strong interest in continuing sampling on Trinidad.
- 128 waterbirds of 12 species were trapped at two locations; all the shorebirds were trapped at the Brickfield Shorebird Sanctuary and all the ducks were trapped at the Point a Pierre Wildfowl Trust. The shorebirds that were trapped were captured using mist-nets during both pre-dawn and post-dusk periods, when birds were traveling from the mud-flat foraging areas to the mangrove roost areas. The ducks were all captured using walk-in traps. The ducks at this location, while migratory, are regularly fed during the winter by members of the Wildfowl Trust staff and were easily trapped with walk-in traps. Other than at the Wildfowl Trust, there were very few ducks observed on Trinidad.

Africa

Southern Africa (South Africa, Zimbabwe, Mozambique, Botswana)

Dr. Graeme Cumming of the Percy FitzPatrick Institute of African Ornithology, University of Cape Town, continues to lead GAINS activities in the Southern Africa sub-region. Two full-time technicians will join GAINS in June. The GAINS network of collaborators continues to grow, with more than 10 new people trained in ringing and sampling for AI in wild birds. Highlights for Quarter 8 include:

- Ms. Kimberly Crunkleton of USAID, Pretoria, helped catch and sample birds on several occasions, and a USAID's Megan Fotheringham from Washington DC assisted for several days at Strandfontein.
- Nearly 180 birds were sampled at Strandfontein during two missions. Captures included ~140 Egyptian Geese (*Alopochen aegyptiacus*), color-ringed as part of team member Mduduzi Ndlovu's MSc work. A cannon net was used to boost numbers of red-billed teal (*Anas erythrorhynchos*) sampled from this site. As the intensity of the Cape Doctor (a strong southeasterly wind that makes mist-netting and cannon netting difficult) drops off, and as teal numbers increase, the sample size of smaller ducks will increase at this site.
- 8 Egyptian geese and 7 red-billed teal have been fitted with satellite GPS transmitters, the satellite tracking goal for the Strandfontein site.

- Approximately 40 birds were sampled at the first Barberspan mission of the year, despite heavy rains and the resulting dispersal of ducks. The team plans to attach satellite transmitters to 14 birds at this site.
- WCS Field Veterinarian Dr. Michael Kock will participate in surveys and sample collection in Mozambique or Botswana in Quarter 9, with the Percy FitzPatrick Institute of Ornithology, University of Cape Town.

Mozambique

- Counts were undertaken at 10 sites and traps and mist nets deployed, led by Mr. Mduduzi Ndlovu.
- Approximately 40 birds (mostly waders) were captured but field work had to be terminated early due to high winds and rainfall from a nearby cyclone. The team noted extensive local efforts to catch wild ducks using spring traps. Water levels were relatively high and most birds were foraging beyond the former riparian zone, making it unlikely they would find bait or enter walk-in traps on land. The site is proving costly and difficult and may need to be reconsidered; Dr. Cumming will discuss budget options with WCS staff at GAINS project headquarters in New York to determine alternatives.
- 174 birds captured at the second full sampling trip to Botswana (Lake Ngami) in February, mostly waders, bringing the total samples collected for this site to ~260. Three members of BirdLife Botswana assisted and two were trained in ringing and swabbing procedures.

Zimbabwe

More than 250 birds were captured by the team based in Harare on two missions to study sites, despite political and economic turmoil in the country. In an unusually wet year, trapping was difficult due to continually rising water levels and the need to constantly move traps to keep them on dry land. Mist-netting of red-billed teal (*Anas erythrorhynchos*), white-faced duck (*Dendrocygna viduata*) and waders was successful. Transmitters will be attached to birds in those study sites next quarter.

Data from more than 800 birds sampled in Zimbabwe will be added to the GAINS database in May.

Tanzania

Tanzania Bird Atlas Program, WCS subawardee, is currently focusing on AI surveillance of Marabou stork populations living in proximity to people at Lake Victoria, as well as on

Palaearctic wader populations at Lakes Manyara and Natron, and crows in the capital city of Dar es Salaam.

On April 28th the Prime Minister of Tanzania inaugurated a national “Avian Influenza Awareness Day” in the central park of Dar es Salaam, with speakers including the Director of USAID and demonstrations by Central Veterinary Laboratory staff for sampling techniques and safety in handling suspect birds. Tanzania Bird Atlas Program staff demonstrated wild bird capture and handling and explained reasons for ringing and releasing birds. The Tanzanian staff has the support of Dr. Mlingwa, former Deputy Minister in the Ministry of Livestock Development, a keen ornithologist.

For Marabou work at Lake Victoria, samples were taken from all birds and those in good health were tagged. Staff from the zonal Veterinary Investigation Centre worked with the WCS team in the field and each day blood samples were taken to the lab for separation and freezer storage. Dr. Mkonyi, Regional Director, and Mr. Daniel Mdatele collaborated in fieldwork daily, and Prof. Ara Monadjem and Andrew Bamford shared their experience with Marabou Storks in Swaziland. Problems encountered during sampling at these fish processing garbage dump sites ranged from severe lake storms, to interference by children and adults wishing to catch birds for money using methods that can harm birds, as well as dogs, goats and cows entering traps.

A total of 100 birds will be sampled in Tanzania this year. Attaching transmitters to determine movements of the birds is postponed until next quarter, due to manufacturing delays. All samples are now in Dar es Salaam, with CVL for analysis.

Dr. Baker is negotiating with the Wildlife Division of the Ministry of Natural Resources and Tourism to open crow traps that had been abandoned when the crow population reduction campaign of 2007 ended. Director and personnel changes required the permit process to begin anew. The Tanzania team hoped to have 26 traps fully functioning by next quarter. Cooperation of Mrs. Mwina, Director of Research, and Mr Ngowi of the Anti-poaching Unit has been very valuable.

Nigeria

Dr. Tim Dodman has been coordinating Nigeria surveillance fieldwork subawarded to Wetlands International (WI) in Netherlands, in 2008. WI has made initial visits to Nigeria and Egypt and developed subcontracts with local fieldwork partners. Field surveillance by subcontractors at Dagona Lake, Nigeria began at the end of March. Fieldwork will also be coordinated locally by Dr. Ulf Ottosson, who will:

- Set up an AI sampling program in Nigeria, targeting sites where HPAI H5N2 was found in wild birds in 2007, where waterbirds (especially Anatidae) and other birds that mix with poultry (e.g. sparrows, pigeons, cattle egrets) can be sampled, and sites where wild birds and domestic poultry may have contact near areas of past AI outbreaks.

- Establish and coordinate a field team comprising national and international partners to catch and sample birds and to survey waterbirds at key wetlands.
- Liaise with the National Public Health Laboratory of Luxembourg, which will provide sampling equipment, cover the cost of shipping samples to their laboratory, and analyze them at its own cost. A set of samples will be sent to Vom, Nigeria, for possible export to a NEWFLUBIRD laboratory.
- Ensure fieldwork addresses capacity building of national participants in waterbird identification, census and surveillance.
- Identify and describe areas in Nigeria of potential AI transmission between domestic and wild birds, and report on the conditions of wetlands visited.

Egypt

AI surveillance in Egypt is critical because outbreaks of Highly Pathogenic Avian Influenza (including human fatalities) occurred in Egypt in 2007, and because Egyptian wetlands are located in a strategic position in migratory flyways of waterbirds. Wetlands International is setting up surveillance in Egypt to begin in Quarter 9, with signed subcontracts with Egyptian and international collaborating partners. Fieldwork will be coordinated locally by Dr. Luay El Said Ahmed. The terms, similar to those for Nigeria, include that Dr. El Said Ahmed will:

- Set up an AI sampling program in Egypt that includes suitable wetlands for catching live water birds, sites of potential contact between water birds and poultry, areas close to AI outbreaks in poultry, and water bird colonies/roosts. He will liaise with Dr. André Duivan, ornithologist, on site selection and bird capture.
- Set up and lead a national team, including ornithologists and veterinarians, to work closely with Dr. Duiven to catch and sample birds, and ensure that sampling focuses on water birds and birds that may mix with poultry.
- Liaise closely with Dr. Sasan Fereidouni in sampling protocols, equipment, importing materials and exporting samples to the Friedrich Loeffler Institute.
- Identify and describe areas in Egypt where AI might potentially spread between domestic poultry and wild birds.

Sudan

Several outbreaks of HPAI have occurred in Sudan. A local GAINS team is now being formed and will begin activities by sampling domestic poultry in Juba in Quarter 9. A domestic fowl was detected with H5N1 in 2006, and the Sudanese now seek designation of the zone as “H5N1-free”. The Sudd area in the south is one of the most important wetlands for migratory water birds in the continent, and it forms a major component of planned AI monitoring activities in the country.

Dr. Tim Dodman, Wetlands International, undertook an exploratory mission to Southern Sudan in February 2008 (with support from WCS and its subawardee, Wetlands

International) where he identified opportunities for AI surveillance, and assessed capacity and other logistical needs. He concluded that the Sudan AI surveillance missions should be postponed until the end of 2008, after the palearctic migrant water birds have returned to the region.

Post-conflict Sudan represents both opportunities and challenges for implementing an avian influenza surveillance program. WCS is active on the ground in South Sudan, and its activities will be enhanced by collaboration with Wetlands International. Specific objectives of Dr. Dodmans' visit were to hold a wetland and waterbird training course (jointly sponsored with WCS support through GAINS, along with other institutions); conduct an aerial survey to identify key areas for waterbirds; and plan for AI surveillance activities in the future.

The Ministry of Environment, Wildlife Conservation and Tourism (MEWCT), the agency responsible for environmental issues and biodiversity, invited WI to partner for wetlands conservation in South Sudan. Sudanese partners indicated significant needs for training and capacity building, and they hope to develop a wetlands program including research and inventory, especially for the Sudd river. Establishing a wetlands baseline in post-conflict South Sudan is important. Dr. Dodman reports an urgent need to engage with the expanding oil sector, which constitutes a major threat to natural resources and related livelihoods in the Sudd and its wetlands.



Photo 8: Dr. Dodman met Director General of Veterinary Services, Dr. Agol Malak Kwai, and his team to plan GAINS activities. The local team is very enthusiastic to participate in the field; like others in the MEWCT, they have not been permitted to do so during the prolonged civil war. (Photo by T. Dodman).



Photo 9: Dr. Aldo Gwake, wildlife veterinarian, will coordinate AI surveillance missions in Quarter 9. (Photo by T. Dodman.)

Dr. Isaac Aleardo Paul (FAO) offered the use of FAO's freezers for storage of samples in the forthcoming GAINS mission for wild bird surveillance. Potential for other partnerships for WI in South Sudan include national NGOs and the universities of Juba and the Upper Nile, in Malakal, and the John Garang Institute of Science and Technology in Bor, established with support from the Free International University of Moldova.

WCS and WI wish to help support the fledgling national African Waterbird Census network, which will conduct training and bird surveys in July and have potential to greatly advance GAINS project objectives. Such surveys provide opportunities for engaging government staff and others, building capacity, and eventually contributing information to the GAINS database.

Republic of Congo

Wild Bird Mortality Surveys will resume in July in Mont Fouari Faunal Reserve. WCS's Mr. Jérôme Mokongo Ikonga led an ornithological study of the Mont Fouari Faunal Reserve (Mount Mavoungou Hunting Zone) and the Nyanga Nord Faunal Reserve (Nyanga Sud Hunting Zone) in southwestern Republic of Congo. The objective was to estimate existing avifauna populations and understand pressures facing avian species and their environment. The region is fairly dry, with seasonal rivers, fairly permanent ponds/swamps, and diverse avifauna. The team identified 150 species of 30 families,

based on direct observation and calls. The major threats in this economically poor region are hunting and season brush fires. The study was carried out during the long rainy season. Because of the variability of avifaunal presence in the region, Mr. Mokongo recommended that the study be repeated during the dry season (June–October).

WCS’ Dr. Ken Cameron met the new Centers for Disease Control and Prevention (CDC) team for the Democratic Republic of Congo during a “Team America” meeting at the U.S. Embassy in Brazzaville. The new team replaces the team headed by Dr. Karen Hawkins Reed, and is heavily focused on avian influenza. In Quarter 9, Dr. Cameron will meet with the team in Kinshasa regarding collaboration on AI surveillance activities.

Dr. Cameron met with WCS Congo Research Coordinator for Northern Congo, Dr. Hannah Thomas, who has been involved in avian capture and sampling in South Africa; she will assist Dr. Cameron in choosing experienced candidates for capture and sampling work in the coming year.

Cross-Cutting Projects and Activities

Mapping Neotropical bird migrations and distributions

Daniel E. Blanco, South America Program Leader of Wetlands International, reports the completion of the GAINS subaward project to map waterbird distribution and migratory routes in the Neotropics. This project compiles, updates and makes available information on migratory waterbirds in the Neotropics, and contributes to the GAINS database by increasing knowledge about Neotropical waterbird distribution and migrations. Specifically, the project: 1) provides information on the ecology of wild birds to facilitate understanding of potential global movement of AI; and 2) helps develop an open and transparent database incorporating AI testing results, migratory flyway information, mapping capabilities, and links to other important AI resources.

Results for this project exceeded expectations of the original subaward contract. WI provided maps and information for 25 species, when only 23 were committed to in the original proposal. The project successfully developed selection criteria for indicator water bird species, and prioritized higher risk species for mapping. This included preparing a dataset with the Neotropical Waterbird Census 1990-2006 data, and compiling additional information on water bird distribution and numbers from other sources.

Standardizing and validating data was a long process. Once that was completed, the team compiled existing information on migrations of the 25 water bird species, used in the interpretation of the mapped data and in preparation of flyways and migration route layers or “shapes” (in GIS compatible file format for use with mapping tools). Finally, for each species the team developed 3 maps showing abundance, seasonality, distribution and migration of key South American birds, and a two-page “factsheet” (in PDF format)

giving natural history and noteworthy information for each species, to complement the maps.

Deliverables included a narrative describing how maps were created, references for their interpretation, and complete references for all sources used. WI South America is also providing the mapped data in “shapes” format for use in the GAINS Map Explorer, including species distribution, species abundance by season, and key sites. WCS and WI South America are discussing other distribution venues for this unique and high-quality data set.

Data compiled for the 25 water bird species totals 17,343 records, including 8,558 NWC data and 8,785 records from other sources. WI South America produced 75 maps based on field data for 25 water bird species with a potential role as AI vectors. The data (displayed in the maps) notably increase the global knowledge base of water bird distribution and migration in South America.

Predicting AI outbreaks globally with GAINS.org (University of New Hampshire)

WCS subawardee for the GAINS project, University of New Hampshire (UNH), has begun its work integrating satellite and ground-based data products to support geospatial visualization, analysis and modeling of avian influenza. Professor Xiangming Xiao, Institute for the Study of Earth, Oceans and Space at UNH, is helping advance the GAINS project objective to predict “hot spots” and timing associated with outbreaks and movements of highly pathogenic AI (H5N1). To enhance the visualization and analysis of the rich field-based data sets available on www.GAINS.org (including locations of AI viral strains, wild bird distributions and migration patterns) Dr. Xiao is creating a mapping system that puts the data into geospatial context by linking site-specific data with raster-based satellite images and geospatial databases, and combines in-situ data with raster-based environmental data for epidemiological modeling and prediction.

The Global Land Remote Sensing Group at UNH has developed data tools and products to characterize the ecological and biophysical dynamics of land surface at global scales and moderate spatial resolution (0.5-1km). These include vegetation seasonality, cropping intensity, paddy rice coverage, snow cover, land surface temperature, frost conditions, and gross primary production -- derived primarily from Moderate Resolution Imaging Spectroradiometer (MODIS) images -- and these have been shown to be useful for studying the ecology of and risk factors associated with HPAI.

Specific objectives of this subaward are (1) to link and integrate in situ geospatial databases from GAINS and MODIS-derived data products from UNH; (2) to organize geospatial data sets and conduct geospatial data analysis and modeling of HPAI H5N1 in Africa together with the research group led by Dr. A. Townsend Peterson at University of Kansas, another new WCS subawardee through GAINS, whose activities will be reported in Quarter 9.

Dr. Bobby Braswell and Mr. Justin Fisk (UNH) attended the Avian Influenza Database Meeting hosted by WCS in January (see description below in this section), and presented existing and planned web-based tools, both received positively. Between sessions, the IT teams of WCS and UNH got to know one another in person, and discussed tools for appending remote sensing based observations and products to existing database records of bird outbreak data in a geospatial context. These meetings resulted in completed code which will accept tabular format data that include spatial coordinates, and yield additional columns of remote sensing-based data products (e.g., land surface temperature, vegetation activity, crop seasonal stage).

The UNH team has created a Global Geo-Referenced Field Photo Library (<http://remotesensing.unh.edu/photo-browser/>). GPS-based geo-referenced field photos provide useful information about field sites, and are particularly informative for the WCS fieldwork. UNH has provided a GPS camera system to one of the WCS field teams to test and give feedback on the strengths and weaknesses of the system (<http://www.geospatialexperts.com/>). They also developed a website to host GPS-based geo-referenced field photos (<http://remotesensing.unh.edu/photo-browser/>). This website allows users to upload field photos, to query field photo databases in several ways (e.g., keywords, geographical boxes, land cover types, timing), and to download field photos for their own use. The web site thus opens a door for sharing and analysis of field photos.

Mr. Tunrayo Alabi, GIS database manager at the International Institute of Tropical Agriculture (IITA), Nigeria, worked with Dr. Xiao at UNH for 3 months in 2007 with the support of NASA. He works on land cover classification using MODIS data. Now with the support from WCS through GAINS, UNH collaborates with Mr. Alabi for further development of a GIS-based database of land cover and land use, paddy rice, wetlands and climate in Africa.

To map and visualize avian influenza outbreaks, the team has developed a number of schemes for converting tabular data, or data uploaded from the web into interactive web maps. They use primarily open source tools (e.g., MapServer, OpenLayers, PostGIS), but the maps can also be exported to formats for browsing on Google Earth. A prototype is available at <http://remotesensing-dev.sr.unh.edu/test/birdflu.html>.

GAINS International “Data Summit” Meeting, New York City, January 13-17

GAINS sponsored a large international meeting jointly with FAO, focusing on the importance and logistics of sharing data on emerging infectious diseases, with a focus on avian influenza. Attendees included FAO, GAINS subawardee University of New Hampshire, Centers for Disease Control (CDC), representatives of the European Union, Wetlands International, the Canadian Cooperative Wildlife Health Center, USGS, and others. Detailed outputs from the meeting are being prepared and will be included in the next Quarterly report.

*Experiments to improve avian influenza diagnostics specifically for field surveillance
(University of Georgia)*

WCS subawardee, University of Georgia, is conducting two studies to evaluate new improved techniques for AI diagnosis in wild birds. One technique is exploring the use of easily stored filter papers as a means of preserving sample swabs for PCR analysis. Preliminary results suggest this mode of storage is only 60-70 percent effective at aiding diagnosis. However, this technique is highly cost-effective. The other technique is the new ELISA for detecting antibodies in serum, previously mentioned in this report (see highlights from Mongolia). Preliminary results for this technique are promising.

Centralizing data flows from the International Waterbird Census (IWC)

The IWC is a global program for counting water birds at “wintering” sites, coordinated by Wetlands International. Over 30 million birds are counted annually in over 12,000 sites globally, covering Europe, Africa, most of Asia, and large parts of Latin America. Counting largely occurs through a volunteer network. Water bird data are stored in the IWC database, a decentralised database managed in four regions. The main database with the longest running data set is for Western Palearctic and South West Asia (WPSWA). Other regional databases exist for Africa, Asia, and the Neotropics. All these databases use the same data format, but require a uniform data management system. Until now, lack of capacity and resources for effective coordination have resulted in highly uneven data quality.

Using the GAINS framework, a new centralized web-based system for data storage and management of the IWC is being introduced to overcome the lack of standards and quality issues in the existing databases.

Flyway maps (GIS polygons) have been finalized for 91 wader species and these maps will be incorporated in the GAINS data storage platform. Georeference work is ongoing and is about 80% completed. A method for tackling the inconsistencies of data quality (zero's versus missing values) is being developed.

IWCs have been successfully coordinated this quarter, and count data will start to come in during the remainder of 2008; however, for some countries it will take up to 2 years for data to arrive.

The team working on the African database, based in Dakar, has made good progress with the retrieval of missing coordinates. This process has been completed for almost 80% of sites in West and Central Africa. As soon as this process has been completed, they will start to input bird data for the period 2006-07. Thereafter, the data “cleaning” operation

(typographical errors, etc.) in the African water bird database will commence. The AfWC census for 2008 was successfully coordinated and data generated will arrive later in 2008.

WCS leadership in international meetings relating to GAINS project priorities

Dr. Kristine Smith attended the “Victims and Vectors” meeting in January held by the United States Geological Service (USGS) in West Virginia, co-sponsored by the Chinese Academy of Sciences, United Nations Food and Agriculture Organization (FAO), University of New Hampshire (UNH), and United States Fish and Wildlife Service (USFWS). Dr. Smith presented the GAINS database and ran a workshop on the importance of more fluid data sharing among institutions studying highly infectious diseases to enhance our capacity to track and control them.

In February, Dr. Smith served as co-chair with Dr. Diarmid Campbell of the World Health Organization (WHO) for the Emerging Infectious Diseases workshop at the second international conference for the Co-Operation on Health and Biodiversity (COHAB), attended by high-ranking representatives of the United Nations Environment Programme, Convention on Biological Diversity, UN Development Programme, UN Educational, Scientific, and Cultural Organization, UN Food and Agriculture Organization, in addition to many influential environmental NGOs and the Intergovernmental Panel on Climate Change, Bioversity International, and the ProAct Network. Dr. David Nabarro, United Nations Development Programme, spoke on lessons learned from the Highly Pathogenic Avian Influenza H5N1 virus situation to date.

Dr. Martin Gilbert participated in the joint WCS/TRAFFIC meeting on “Monitoring covert wildlife markets: methods workshop, held in Khao Yai, Thailand in February. The meeting’s purpose was to: (1) take stock of current practice in wildlife market research and analysis; and (2) initiate a framework to promote scientifically robust, replicable methods in the monitoring of covert wildlife markets globally. The outcome of the meeting will be a handbook entitled “Monitoring markets from source to consumer” that will be prepared by meeting participants by late 2008.

GAINS Technology

Highlights of GAINS technological advances during this quarter include:

Improving Standards Compliance

GAINS is moving forward in improving accessibility and standards compliance for its public web presence. The milestone on this path has been to achieve XHTML 1.0 transitional compliance for approximately half of our public pages.

The importance of standards compliance can be highlighted through the following

reasons:

- Philosophical - promoting equality of access to the web for those with disabilities.
- Legal - meet requirements of the American's with Disabilities Act, Section 508
- Economical - reduce maintenance costs and effort (browsers are moving towards a more standardized implementation, and cleaner code is easier to maintain)
- Marketing - increasing target audience
- Performance – cleaner/more precise code means better performance)

New WISDOM Map Explorer (version 3.0) Beta

We are pleased to announce the public beta of our new Map Explorer (version 3.0). With improved access to external data sources, improved data export options, new collaboration tools, addition of satellite imagery and other features, MapExplorer 3.0 allows greater usability and functionality for GAINS.org users.



Figure 1. Screenshot of WISDOM Map Explorer 3.0

Completion of FEEDER 1.0

FEEDER (Field Entry and Export of Data for Epidemiological Research) is a desktop application to facilitate efficient and accurate data entry by staff in the field. This application integrates seamlessly with the data import process and improves the WISDOM system's responsiveness and robustness. FEEDER (version 1.0) is now complete, and we are implementing rollout to our field staff.

Appendix I. GAINS Countries and Partners

Partial list of partners contributing funding and in-kind services to GAINS:

1. United States Agency for International Development
2. United States Department of Health and Human Services, Centers for Disease Control and Prevention
3. United States Department of Defense
4. United States Department of Agriculture, South East Regional Poultry Laboratory (SEPRL)
5. United States Department of the Interior, United States Geologic Survey
6. Freidrich Loeffler Institute Germany
7. Texas A & M University
8. Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)
9. U.N. Food and Agriculture Organization
10. Centro de Investigacie Enfermedades Tropicales NMRCO Peru
11. Naval Medical Research Unit – Cairo, Egypt
12. Naval Medical Research Center Detachment – Peru
13. Woodland Park Zoological Gardens
14. Instituto Nacional de Tecnología Agropecuaria (INTA Castelar) –Argentina
15. Centro de Investigación de Enfermedades Tropicales (CIDEIM) – Colombia
16. Instituto Colombiano Agropecuario (ICA) - Colombia
17. Cargill, Inc.
18. National Institute of Health (NIH)
 1. University of California Los Angeles
 2. University of Minnesota
19. Australian Wader Study Group (AWSG)
20. Tanzania Bird Atlas
21. IDEXX via University of Georgia and SEPRL

Country or State	Collaborator(s)	Activities in 2007-2008	Planned Activities
Afghanistan	WCS/DoD-NAMRU/FAO	Ongoing wild bird surveillance and training of local biologists and veterinarians.	Sampling for avian influenza in waterbirds, market wild birds, bridge species
Argentina	WCS/Wetlands Int. Argentina	Ongoing wild bird surveillance and training; course organized by GAINS in Buenos Aires province (Dec 10-14 2007), with financial support from USDA.	Continue wild waterbird surveillance
Bolivia	WCS	GAINS Bolivia requesting permits from the Ministry of Biodiversity for AI surveillance in Bolivia	Wild waterbird/market sampling
Botswana	Percy FitzPatrick Ornithological Institute	Wild bird surveillance including a full sampling mission to Lake Ngami	Surveillance/migratory satellite telemetry
Brazil	FAO/GAINS/CIRAD	GAINS is in discussions with the Brazilian Environment and Natural Resource agency (IBAMA) to gain access to their AI surveillance data/collaborate on future surveillance	Wild bird surveillance
Cambodia	WCS/UCDavis/FAO/AWSG	Surveys and sampling of waterbirds, market wild birds, bridge species.	Surveys and sampling of waterbirds, market wild birds, bridge species.
Cameroon	WCS/UCLA/Birdlife	Sampling of 200 domestic and 700 wild birds of 65 species for avian influenza.	Work complete
Antigua	Environmental Protection in the Caribbean	Sampling over 500 waterbirds from 5 countries, training local biologists	Work complete, results pending
St. Martin			
Anguilla			
Trinidad			
St.Kitts			
Chile	WCS	Trained Vet. Service rep. in FAO/GAINS course in Peru	GAINS is pursuing surveillance activities in Chile for 2008
Colombia	WCS	Near 200 waterbirds and 25 peri-domestic waterfowl sampled. GAINS is helping to create a formal AI monitoring program for wild waterbirds	AI surveillance project for 2008-2009 with CVC for the Valle del Cauca area near Cali
Ecuador	Charles Darwin Research Station	Sampling of various waterfowl for avian influenza; training of biologists.	Work complete, results pending
Egypt	Wetlands International	WI, in collaboration with Nature Conservation Egypt (NCE), for waterbird surveys and training courses.	Continue sampling for avian influenza in waterbirds and bridge species
Falkland Islands	Falklands Conservation/WCS	>300 waterbirds sampled, trained vets and technicians in field, mortality surveillance	Continued mortality surveillance and active sampling of wild birds

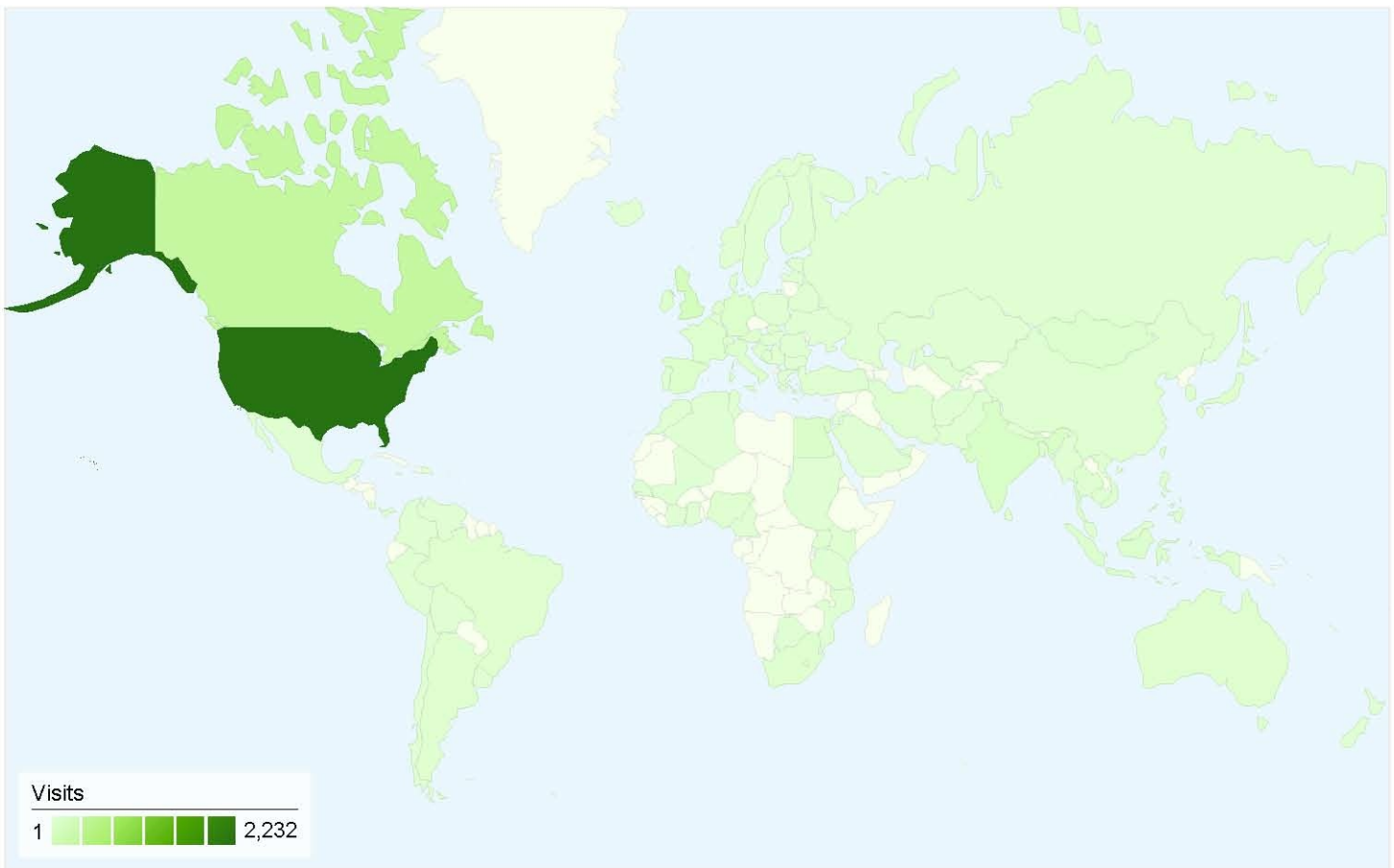
Country or State	Collaborator(s)	Activities in 2007-2008	Planned Activities
Gabon	WCS	Census and mortality surveillance in waterbirds	Census and mortality surveillance in waterbirds
Ghana	Kansas University	Avian influenza sampling	Global risk map analysis via KU
India	Wetlands Int. India	Census and avian influenza sampling of waterbirds, bridge species, four training courses in fall of 2007, spring 2008	Work complete
Indonesia	WCS/Wetlands Int. Indonesia/Cargill/AWSG	Census and avian influenza sampling of market wild birds, waterbirds, bridge species (500 this quarter). Training of gov't staff and ornithology NGO staff	Census and avian influenza sampling of market wild birds, waterbirds, bridge species
Kazakhstan	National Aviary / Wetlands International/ FAO	Census and avian influenza sampling of waterbirds, bridge species, over 600 sampled. 10 satellite transmitters placed.	Census and avian influenza sampling of waterbirds, bridge species. 20-30 more satellite transmitters to monitor movement of wild birds
Laos	NIH/UMN	Funding from NIH via UMN supporting sampling plans	Avian influenza surveillance
Mongolia	WCS/FAO/USGS/NIH/UMN/AWSG	Census and avian influenza sampling of waterbirds, bridge species >4500 samples, leg flagging and neck collar activities	Census and avian influenza sampling of waterbirds, bridge species
Mozambique	Percy FitzPatrick Ornithological Institute	Census and avian influenza sampling of waterbirds, bridge species	Census and avian influenza sampling of waterbirds, bridge species. Satellite - telemetry of waterbirds
Nigeria	WCS/CIRAD/Wetlands	Avian influenza sampling of waterbirds, bridge species. High path H5N2 found	Avian influenza sampling of waterbirds, bridge species
Peru	Cayetano Heredia University/DoD-NMRCD/Texas A&M	Wild bird and market surveillance	Continue waterbird sampling, expand to 2 other wetlands, sampling of markets
Republic of Congo	WCS	Census and mortality surveillance of wild birds	Census and mortality surveillance of wild birds
Russia	Wetlands International/USGS	Waterbirds being sampled for AI	Samples undergoing analysis
South Africa	Percy Fitzpatrick Ornithological Institute	Census and avian influenza sampling of waterbirds, environmental sampling, risk map analysis	Census and avian influenza sampling of waterbirds, bridge species, satellite tagging
South Korea	WCS, FAO, National Agriculture Department, WCS North America	Avian influenza outbreak investigation.	WCS pursuing permits for field surveillance in spring 2008
Sudan	WCS, Wetlands International	Building collaborations	Waterfowl sampling and census
Tanzania	Tanzania Bird Atlas	Census and avian influenza sampling of waterbirds, bridge	Census and sampling of waterbirds, bridge

Country or State	Collaborator(s)	Activities in 2007-2008	Planned Activities
		species, scavenger species	species, satellite transmitters for migrants along Nile-Rift Valley pathway
Ukraine	Wetlands Int.	Avian influenza sampling of waterbirds, 4200 to date	Waterfowl sampling
Vietnam	WCS/Department of Animal Health/Birdlife-Vietnam /FAO/CIRAD/AWSG/Cargill; Colorado State University, UCLA	FAO, Cargill, NIH	Avian influenza sampling of shorebirds, market wild birds, bridge species
Zimbabwe	Percy FitzPatrick Ornithological Institute	Avian influenza sampling of waterbirds, bridge species	Avian influenza sampling of waterbirds, bridge species
CONTRIBUTING WILD BIRD DATA TO GAINS INFORMATION SYSTEM	Organization	Species	Supporting Agencies
Burkina Faso	CIRAD	Anatidae, Waders	FAO
Chad	CIRAD/Wetlands Int.	Anatidae, Doves	FAO
Egypt	CIRAD/Wetlands Int.	Waders, Cormorants, Cattle Egret	FAO
Ethiopia	CIRAD	Anatidae, Waders	FAO
Iran	Wetlands Int.	Anatidae	FAO
Jordan	CIRAD	Waders	FAO
Kazakhstan	CIRAD/Wetlands Int.	Waterbirds	FAO
Kenya	CIRAD/Wetlands Int.	Anatidae, Waders, Flamingo	FAO
Malawi	CIRAD/Wetlands Int.	Anatidae, Waders, Rails	FAO
Mali	CIRAD	Anatidae, Waders, Rails	FAO
Mauritania	CIRAD	Anatidae, Waders, Gulls	FAO
Morocco	CIRAD	Anatidae, Waders	FAO
Niger	CIRAD	Waterbirds	FAO
Nigeria	CIRAD/Wetlands Int.	Waterbirds	FAO/GAINS
Romania	CIRAD	Anatidae, Waders, Sparrows	FAO
Senegal	CIRAD	Anatidae, Waders	FAO
Sudan	CIRAD/Wetlands Int.	Anatidae, Waders	FAO
Tunisia	CIRAD/Wetlands Int.	Anatidae, Waders	FAO
Turkey	Wetlands Int.	Anatidae	FAO/GAINS
Zambia	CIRAD	Anatidae, Waders	FAO

Appendix II. Screenshot from Google Analytics illustrating 8th Quarter Activity GAINS.org site utilization.

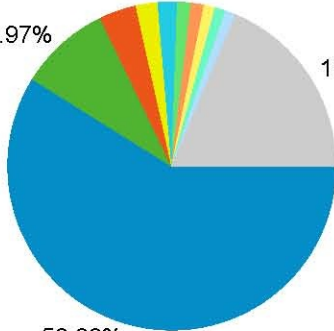
Appendix III. Translation of Mongolian GAINS factsheet

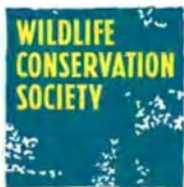
Appendix IV. Example of Factsheet from Wetlands International South America for a neotropical species



3,791 visits came from 103 countries/territories

Site Usage

Visits 3,791 % of Site Total: 100.00%	Pages/Visit 6.18 Site Avg: 6.18 (0.00%)	Avg. Time on Site 00:06:12 Site Avg: 00:06:12 (0.00%)	% New Visits 55.79% Site Avg: 55.55% (0.43%)	Bounce Rate 48.46% Site Avg: 48.46% (0.00%)
Country/Territory	Visits	Visits	Visits	
<div><div></div>United States</div>	2,232	58.88%		
<div><div></div>Canada</div>	340	8.97%		
<div><div></div>United Kingdom</div>	139	3.67%		
<div><div></div>India</div>	81	2.14%		
<div><div></div>Egypt</div>	72	1.90%		
<div><div></div>Germany</div>	51	1.35%		
<div><div></div>Netherlands</div>	49	1.29%		
<div><div></div>Spain</div>	42	1.11%		
<div><div></div>Mongolia</div>	40	1.06%		
<div><div></div>Indonesia</div>	39	1.03%		



COLLABORATORS
& SUPPORTERS



USAID
FROM THE AMERICAN PEOPLE



Зэрлэг шувуудын GAINS Хөтөлбөр:

Дэлхийн Шувууны Томуу Өвчин Тандан Судлах GAINS Хөтөлбөрийн талаар

Өнөө үед далайн хар шуурга дэгдэхэд мэдээлэл солилцсоны улмаас хаана ямар аюул үүсгэж болзошгүй талаар урьдчилан мэдэх болсоны адил нүүдлийн шувуудаар дамжих вирусийн гаралтай халдварт өвчний талаарх мэдээллийг дэлхий нийтээр солилцох шаардлага бий болоод байна.



Одоогоор нийт 90 зүйлийн нүүдлийн ба бусад шувууд шувууны томууны Өндөр Хоруу Чанар (ӨХЧ) бүхий H5N1 дэд хэвшлээр өвчлөн үхэж байна. Зэрлэг Амьтдыг Хамгаалах Нийгэмлэг (WCS) нь АНУ-ын Олон Улсын Хөгжлийн Агентлаг болон Халдварт Өвчин Хянах Төвийн санхүүжилтээр Дэлхийн Шувууны Томуу Өвчин Тандан Судлах Хөтөлбөр (GAINS)-ийг хэрэгжүүлж байна. GAINS хөтөлбөр нь АНУ-ын засгийн газраас хэрэгжүүлж буй шувууны гоц халдварт томуу өвчинтэй тэмцэх, урьдчилан сэргийлэх үйл ажиллагааг явуулж байгаа юм.

GAINS хөтөлбөрийн тандан судалгаа ба хамтын ажиллагааны хүчин чадал

GAINS хөтөлбөр нь одоогоор дэлхийн 28 орны эрдэм шинжилгээний байгууллагуудтай хамтран уг хөтөлбөрийг хэрэгжүүлж байгаа ба цаашид улам өргөжин тэлэх юм. Энэхүү хамтын хөтөлбөр нь олон улсын мэдээллийн сан бий болгосноор хүн төрөлхтөн болон мал амьтдад учирч болох шувууны гоц халдварт томуунаас сэргийлэх, түүнтэй тэмцэхэд шаардлагатай мэдээллийг цаг тухайд нь хүргэхэд чухал үүрэг гүйцэтгэнэ.

GAINS хөтөлбөр нь 2006 оны зунаас эхний санхүүжилтээ авч дэлхий нийтийг хамарсан тоймтой ажлуудыг хийж эхлээд байна. WCS нь АНУ болон бусад олон улсын төрийн болон төрийн бус байгууллагууд, их дээд сургуулиудын хамтын хүчээр шувууны гоц халдварт томуу өвчний гаралт, тархалтыг нарийвчлан судлах, зэрлэг ан амьтад, хүн, гэрийн тэжээвэр амьтад болон бусад биологийн төрөл зүйлд уг өвчний эрсдэлийн үнэлгээг тогтоох зорилготой юм. WCS-ийн ажилчид USAID, CDC, DHS, DOD, USGS, DOS, WHO, USDA, NIH, FAO зэрэг олон улсын байгууллагууд болон их дээд сургуулиуд, хувийн хэвшлийн байгууллагын мэргэжилтнүүдтэй хамтран дэлхий нийтийг хамарсан шувууны томуу өвчний мэдээллийн санг нэгтгэн боловсронгуй болгох талаар өргөн хүрээтэй, идэвхитэй уулзалт ярилцлагуудыг зохион байгуулсан. WCS нь FAO-тай хамтран Баруун Европ, Латин Америк, Карибийн орнуудад, мөн сүүлд USAID-тэй хийсэн гэрээний дагуу мөн Латин Америкийн орнуудад сургалт хийх, шувуудын мониторингийн судалгаагааг улам өргөжүүлэх ажлуудыг зохион байгуулж байна. GAINS хөтөлбөр нь үйл ажиллагааныхаа эхний жилд буурай хөгжилтэй орнуудын 800 гаруй мэргэжилтнүүдийг сургалтанд хамруулсан бөгөөд WCS-ийн зүгээс дэлхий нийтийг хамарсан өргөн цар хүрээтэй ажил явуулах, зэрлэг шувуудын мониторингийн судалгаанд эрүүл байдлыг ханган ажиллахад мэргэжилтнээр туслах зэрэгт анхааран ажилладаг.

GAINS хөтөлбөр ба хээрийн судалгаа

Афганистанаас Зимбаби хүртэлх орнуудад ӨХЧ бүхий томуу өвчний тандан судалгааны ажил хийгдэж байна. Монгол улсад хэрэгжүүлж буй хээрийн судалгааны арга зүй нь нилээд хэдэн судалгааны цэгүүдийг хамарч байна. Монгол орны хувьд ӨХЧ бүхий шувууны гоц халдварт томуу өвчин нь хоёр жил дараалан зэрлэг шувуудад гарч халуун цэгт тооцогдсон тул уг вирусийн экологийг зэрлэг шувуудад судлахад маш чухал орон юм. 2006 онд WCS-ийн ажилчид Монгол орны газар нутгийг хамарсан 42 цэгээс нийт 3500 дээж цуглуулсан. Мөн АНУ-ын USGS-ийн ажилчидтай хамтран 2006 оны наймдугаар сарын эхээр гангар хунд сансрын дохиолол (FAO ханган нийлүүлснээр) суулгасан бөгөөд уг шувууд нь Хятад, Солонгос болон Оросыг дамжин нүүдэллэсэн нь тандан судалгаагаар тогтоогдсон. Ийм мэдээлэл нь Азийн орнуудаар томуу тархах боломжтой хил хязгаарыг тогтооход тус дөхөм үзүүлэх юм. 2007 оны хээрийн судалгааны ажлаараа зэрлэг шувуудаас ӨХЧ бүхий шувууны гоц халдварт томуу өвчнийг илрүүлэхээр дээж цуглуулж томуу илэрч байсан цэгүүдэд хяналт шинжилгээг үргэлжлүүлэн хийж байна.



Урьдчилан таамаглах ба мэдээлэл солилцоо

Цар тахлаас урьдчилан сэргийлэх эхний алхам бол дэлхий нийтийг хамарсан шувууны томууны хяналт шинжилгээн дээр суурилсан “урьдчилан таамаглах систем” бий болгох явдал юм. Уг хөтөлбөрийн хүрээнд шувууны томууны вирусийн шинэ дэд хэвшил илрүүлж, урьдчилан сэргийлэх вакцин гаргах болон олон улсад шувууны гоц халдварт томуу өвчнөөс урьдчилан сэргийлэх төлөвлөгөө боловсруулах нөхцөл бололцоог бүрдүүлэхэд чиглэгдэнэ. Үүнээс гадна www.gains.org веб хуудсаараа дамжуулан олон улсын хэмжээнд халдварт өвчний талаар мэдээлэл дамжуулах, солилцох үндсэн зорилготой ажиллаж байна. Үүнд дээж авсан газруудын байрлал, нүүдлийн замууд болон биологийн тандалт судалгааны үр дүнг нийтлэсэн. GAINS хөтөлбөр нь шувууны нүүдэл дамжин өнгөрдөг гол газар нутгийг хамарсан хяналт, шинжилгээ хийдэг бөгөөд **одоогоор 100,000,000 гаруй шувуудын** талаарх мэдээлэл, газар зүйн байрлал зэргийг веб хуудсандаа оруулан газрын зураг дээр тэмдэглээд байна. ӨХЧ бүхий шувууны томуу өвчин нь хардварлалт өндөртэй ба зэрлэг шувуудын нүүдэлтэй уялдаатайгаар тархах боломжтой бөгөөд бодит мэдээлэлийг нэгтгэн цуглуулснаар цар тахалын аюулыг таамаглаж болох юм.



Гаршуулсан зэрлэг шувууд, амьтад нь хүн болон гэрийн тэжээмэл амьтдад томуу тараах магадлал өндөртэй учир тэдгээрийг хяналт шинжилгээнд өргөн хамруулах хэрэгтэй. Өндөр Хоруу Чанар бүхий шувууны томуу өвчний тархалтанд шууд нөлөө үзүүлж буй хууль болон хууль бус хөдөө аж ахуйн гаралтай бүтээгдэхүүн болон тэжээмэл, зэрлэг амьтдын худалдааг засгийн газрын хяналтанд байлгах нь чухал шаардлагатай юм.

GAINS ба нийгмийн эрүүл мэнд

Өнөөдөр дэлхий нийтийн анхаарлыг ихээр татах болсон шувууны гоц халдварт томуу өвчин нь Ази, Европ, Дундад Ази болон Африк тивийг хамран илрээд байгаа билээ. 2003 оноос өнөөг хүртэл H5N1 вирусээр өвчилсөн 291 тохиолдолоос 172 нь үхэлд хүрсэн. Уг вирусийн халдварыг хязгаарлах зорилгоор олон зуун мянган тэжээмэл шувууг устгаж байгаа нь хэдэн тэрбум доллараар хэмжигдэх эдийн засгийн хохирол учруулж болзошгүй гэсэн тооцоо гараад байна. Энэхүү вирус нь зэрлэг болон гэрийн тэжээмэл шувууд, хүмүүсийн хооронд дамжин халдварлаж байгаа нь 1918 онд дэлхийн олон оронд халдварт тахлын шинжтэйгээр дэгдэн нийт 40 гаруй сая хүний аминд хүрсэн тахалтай төсөөтэй байдал харагдаж байна.

GAINS-ийн хамгааллын үйл ажиллагаа

ӨХЧ бүхий шувууны томуу өвчин нь зэрлэг шувуудыг хөнөөгөөд зогсохгүй уг өвчний эсрэг авч буй хяналт шинжилгээ нь зарим нэг тодорхой зүйлүүдийн хамгааллын статусыг ч хөндөж байна. Үүний нэг жишээ нь 2005 онд Хятадын Жинхай нууранд гарсан шувууны гоц халдварт томуу өвчний умлаас дэлхийн хэмжээнд Хээрийн галууны (*Anser indicus*) нийт тоо толгойн 5-10% устаж үгүй болсон. Мэргэжлийн байгууллагуудын зүгээс уг өвчнийг хязгаарлах зорилгоор зэрлэг шувуудыг устгаж байгаа нь нэг талаас вирусийн тархалтаас сэргийлж байгаа боловч нөгөө талаас уг үйл ажиллагаанаас дайжсан зэрлэг шувууд өвчний тархалтыг улам дэгдээж болох талтай!

Зэрлэг Амьтдыг Хамгаалах Нийгэмлэг WCS-ийн талаар

WCS нь Мал Эмнэлгийн Хээрийн Судалгааныхаа Хөтөлбөрийг 1989 онд байгуулсан ба экосистемийн эрүүл мэндийг хамгаалахын төлөө хамтын ажиллагааны зарчмыг баримтлан ажилладаг. WCS нь Патагони нутгаас эхлээд Төв Африкийн улсуудад зэрлэг ан амьтан болон хөдөө аж ахуйн салбарын мэргэжилтнүүд, засгийн газрын агентлагууд олон нийтийн эрүүл мэндийн ажилтнуудтай байнга хамтран ажилладаг. Бид зэрлэг ан амьтдын өвчний талаар олж авсан мэдлэг туршлагаа ажиллаж буй орон нутгийнхаа онцлогт тохирсон сургалтын хөтөлбөр боловсруулах, орчин үеийн техник технологи ашиглан эрүүл мэндийн судалгаа явуулах, дээрх асуудлуудад чиглэсэн зөвлөмж гаргах замаар зэрлэг ан амьтад, хүн болон гэрийн тэжээмэл амьтдын хооронд өвчний тархалтыг бууруулах, урьдчилан сэргийлэх чиглэлээр ажиллаж байна.

Дэлгэрэнгүйг www.GAINS.org, www.fieldvet.org, www.wcs.org орж үзнэ үү.



Hudsonian Godwit in South America

Scientific name: *Limosa haemastica*

Family: Scolopacidae

Spanish name: Becasa de mar

Migration: Nearctic migrant

Population estimate: 70,000 ⁽¹⁾

Trend: Decreasing / Stable ⁽¹⁾

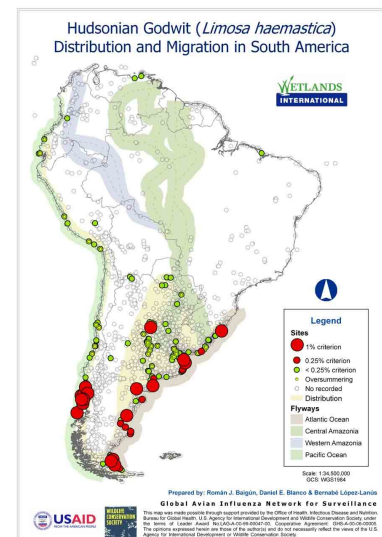
Ramsar Criterion 6 (1% level): 700 ⁽¹⁾

IUCN Conservation status: Not known to have unfavourable conservation status



Distribution and abundances

During the non-breeding season distributed mainly along the Atlantic coast of southern South America, south to Tierra del Fuego and along the Pacific coast of southern Chile. Recorded mainly in coastal areas, but with some records inland for the Pampas of Argentina. Main non-breeding areas located in northern Tierra del Fuego (Bahía San Sebastián and Bahía Lomas) and at Chiloe Island and its surroundings. Considerable numbers also recorded more north at some specific sites along the coast of Argentina, Uruguay and southern Brazil. Some few birds observed in the coasts of central Chile and Peru. Restricted to a few sites during the non-breeding season, most of which host big numbers of birds. Sites reaching the 1% threshold (Ramsar Convention Criterion No. 6) are: Bahía San Sebastián, Bahía Bustamante, Bahía San Antonio, Laguna Mar Chiquita, Bahía Unión-Bahía Anegada and Bahía Samborombón in Argentina; Bahía Lomas, Chiloe Island and its surroundings in Chile and Lagoa do Peixe in Brazil ([link to Abundances map](#)).



[Click on the map to enlarge](#)

Migration and seasonality

Godwits arrive in South America to sites along the Amazon basin by September. Southward migration occurs through inland South America, mainly along the Western Amazonia and Central Amazonia Flyways, arriving to coastal sites in southern Brazil and northern Argentina between September and November, before to continue the migration to the main non-breeding areas in southern Patagonia. Northward migration starts by late February and early March and follows a different route, with stop-over sites at Estuario de Río Gallegos, Bahía San Antonio and Albufera Mar Chiquita in Argentina and Lagoa do Peixe in Brazil. Birds wintering at Chiloe Island may follow a different route. Some non-breeders remain in South America during the austral winter ([link to Seasonality map](#)).

Habitat

Associated to estuarine ecosystems, occurring in tidal mudflats, creeks and pools with “cangrejales” (crab colonies), saltmarshes, coastal lagoons and flooded grasslands. Also in inland wetlands during migration.

(1) Considering together the two different populations identified for North America.

Habits and interactions with human activities

Gregarious, sometimes in flocks of thousands of birds in coastal areas and inland wetlands during migration. Low degree of overlapping with human activities, restricted to some coastal areas close to estuaries.

Bibliography

- Antas, P.T.Z. 1983. Migration of nearctic shorebirds (Charadriidae and Scolopacidae) in Brasil - flyways and their different seasonal use. Wader Study Group Bull. 39: 52-56.
- Bent, A.C. 1962. Life Histories of North American Shore Birds. Part I. Dover Public. INC. New York.
- Canevari, M., P. Canevari, G.R. Carrizo, G. Harris, J. Rodríguez Mata & R. Straneck. 1991. Nueva Guía de las Aves Argentinas. Fundación Acindar. Santiago de Chile. Tome I: 200 pp. and Tome II: 182 pp.
- Canevari, P., G. Castro, M. Sallaberry & L.G. Naranjo. 2001. Guía de los chorlos y playeros de la Región Neotropical. ABC, WWF-US, WA, MBO & Asociación Calidris, Cali, Colombia.
- del Hoyo, J., A. Elliott & J. Sargatal (eds). 1996. Handbook of the Birds of the World. Vol. 3. Hoatzin to Auks. Lynx Ed., Barcelona.
- Fjeldsa, J. & N. Krabbe. 1990. Birds of the High Andes. Zoological Museum, Univ. of Copenhagen, Denmark.
- Hayman, P., J. Marchant & T. Prater. 1986. Shorebirds. Christopher Helm, London.
- Morrison, R. I. G. and R. K. Ross. 1989. Atlas of Nearctic Shorebirds on the Coast of South America. Canadian Wildlife Service Special Publication, Ottawa.
- Nores, M. 1989. Situación y rutas de vuelo de los playeros migratorios en Argentina, en: Taller de campo sobre ambientes acuáticos y técnicas de estudio, captura, marcado y manejo de chorlos migratorios. Fundación Vida Silvestre Argentina y Manomet Bird Observatory.
- Olrog, C.C. 1968. Las aves sudamericanas: Una guía de campo. Tomo I. Universidad Nacional de Tucumán, Fundación - Instituto Miguel Lillo, Tucumán, Argentina.
- Rodríguez Mata, J., F. Erize & M. Rumboll. 2006. Guía de Campo Collins – Aves de Sudamérica: No Passeriformes. Harper Collins Ltd.
- Senner, N.R. 2007. Conservation Plan for the Hudsonian Godwit. Version 1.0. Manomet Center for Conservation Science, Manomet, Massachusetts.
- Wetlands International. 2006. Waterbird Population Estimates – Fourth Edition. Wetlands International, Wageningen, The Netherlands.

Authors: Daniel E. Blanco, Román Baigún & Bernabé López-Lanús

Data compiler: Ignacio Roesler

Photographer: Pablo F. Petracci

Recommended citation: Blanco D.E., R. Baigún & B. López-Lanús. 2008. Hudsonian Godwit in South America factsheet. Wetlands International for the Global Avian Influenza Network for Surveillance / WCS / USAID.



This factsheet and maps were made possible through support provided by the Office of Health, Infectious Disease and Nutrition, Bureau for Global Health, U.S. Agency for International Development and Wildlife Conservation Society, under the terms of Leader Award No.LAG-A-00-99-00047-00, Cooperative Agreement: GHS-A-00-06-00005. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development or Wildlife Conservation Society.