Link to PREDICT-1 final report: https://ohi.vetmed.ucdavis.edu/sites/g/files/dgvnsk5251/files/files/page/predict-final-report-lo.pdf

USAID
FROM THE AMERICAN PEOPLE

(b)(6)
Wildlife Health Center
School of Veterinary Medicine
University of California Davis, CA 95616

Reference: USAID Avian and Pandemic Influenza and Zoonotic Disease Program
PREDICT

Subject: Cooperative Agreement No. GHN-A-00-09-00010-00

Dear (b)(6)

Pursuant to the authority contained in the Foreign Assistance Act of 1961, as amended, the U.S. Agency for International Development (USAID) hereby awards to the University of California, Davis (UC Davis), hereinafter referred to as the "Recipient", the sum of **$75,000,000** to provide support for a program in Avian and Pandemic Influenza and Zoonotic Disease as described in the Schedule of this award and in Attachment B, entitled "Program Description."

This Cooperative Agreement is effective and obligation is made as of the date of this letter and shall apply to expenditures made by the Recipient in furtherance of program objectives during the period beginning with the effective date **September 30, 2009 and ending September 29, 2014.** USAID will not be liable for reimbursing the Recipient for any costs in excess of the obligated amount.

This Cooperative Agreement is made to the Recipient, UC Davis, on condition that the funds will be administered in accordance with the terms and conditions as set forth in Attachment A (the Schedule), Attachment B (the Program Description), and Attachment C (the Standard Provisions), all of which have been agreed to by your organization.

Please sign the original and all enclosed copies of this letter to acknowledge your receipt of the Cooperative Agreement, and return the original and all but one copy to the Agreement Officer.

Sincerely yours,
(b)(6)

Attachments:
A. Schedule
B. Program Description
C. Standard Provisions

ACKNOWLEDGED: (b)(6)

BY: (b)(6)

TITLE:

DATE: September 29, 2009

(b)(6)

A. GENERAL

1. Appropriation:	
2. Amount Obligated this Action:	$11,000,000
3. Total Estimated USAID Amount:	$75,000,000
4. Total Obligated USAID Amount:	$11,000,000
5. Cost-Sharing Amount (Non-Federal):	$0
6. Activity Title:	PREDICT
7. USAID Technical Office:	
8. Tax I.D. Number:	GH/HIDN/API
9. DUNS No.:	04-712-0084
10. LOC Number:	(b)(4)

B. SPECIFIC

1. Budget Fiscal Year:	2009
2. Operating Unit:	GH/HIDN/API
3. Strategic Objective:	A11
4. Team/Division:	API
5. Benefiting Geo Area:	997
6. EBFY:	2010
7. Fund:	GHC-AI-SUP
8. Distribution:	936-4002
9. SOC	4100201
10. Amount:	$11,000,000

C. PAYMENT OFFICE

USAID
M/FM/CMP-LOC
Rm. 7.07.104A RRB
1300 Pennsylvania Avenue, NW
Washington, DC 20523

TABLE OF CONTENTS

Attachment A SCHEDULE

A.1 PURPOSE OF COOPERATIVE AGREEMENT

The purpose of this Cooperative Agreement is to provide support for the program described in Attachment 2 to this Cooperative Agreement entitled "Program Description."

A.2 PERIOD OF COOPERATIVE AGREEMENT

1. The effective date of this Cooperative Agreement is **September 30, 2009.** The estimated completion date of this Cooperative Agreement is **September 29, 2014**.

2. Funds obligated hereunder are available for program expenditures for the estimated period **September 30, 2009 to September 29, 2014.**

A.3 AMOUNT OF COOPERATIVE AGREEMENT AND PAYMENT

1. The total estimated amount of this Cooperative Agreement for the period shown in A.2.1 above is $75,000,000.

2. USAID hereby obligates the amount of $11,000,000 for program expenditures during the period set forth in A.2.2 above and as shown in the Budget below. The Recipient will be given written notice by the Agreement Officer if additional funds will be added. USAID is not obligated to reimburse the Recipient for the expenditure of amounts in excess of the total obligated amount.

3. Payment will be made to the Recipient by Letter of Credit in accordance with procedures set forth in 22 CFR 226

A.4 COOPERATIVE AGREEMENT BUDGET

The following is the Agreement Budget, including local cost financing items, if authorized. Revisions to this budget shall be made in accordance with 22 CFR 226.

TOTAL BUDGET

Cost Element	**Cost in USD**
Direct Costs: Indirect Costs:	(b)(4)
TOTAL:	**$ 75,000,000**

A.5 REPORTING AND EVALUATION

1. **Financial Reporting**

In accordance with 22 CFR 226.52, the SF 269 and SF 272 will be required on a quarterly basis. The recipient shall submit these forms in the following manner:

(1) The SF 272 and 272a (if necessary) must be submitted via electronic format to the U.S. Department of Health and Human Services (http://www.dpm.psc.gov). A copy of this form shall also be submitted at the same time to the Agreement Officer and the Agreement Officer's Technical Representative.

(2) The SF 269 or 269a (as appropriate) shall be submitted to the Agreement Officers' Technical Representative with one copy to the Agreement Officer

(3) In accordance with 22 CFR 226.70-72, the original and two copies of all final financial reports shall be submitted to M/FM, the Agreement Officer (if requested) and the AOTR. The electronic version of the final SF 272 or 272a shall be submitted to HHS in accordance with paragraph (1) above.

(4) The Recipient must provide financial data every 6 months in accordance with the information required of the USAID API Unit Budget and Monitoring Evaluation Database (AIMEBA) including planned, obligated and expenditure data.

2. **Program Reporting**

The Recipient shall submit reports to the USAID AOTR as described below. The exact format for preparation of and timing for, submission of all reports will be determined in collaboration with the AOTR.

a. ***Implementation plan.*** Within 30 days following Agreement award, the Recipient will submit an annual implementation plan that outlines the geographic focus and type of activities planned with corresponding timelines and benchmarks. This implementation plan will also cover all sub-agreements that may be developed under this cooperative agreement.

b. ***Monitoring and Evaluation Plan***. Within 30 days following Agreement award, the Recipient will submit a Monitoring and Evaluation Plan that provides indicators and outcomes as well as a process for incorporating both lessons learned and results from relevant data analysis.

c. ***Quarterly Performance Reports***. The Recipient will submit Quarterly Performance Reports to the AOTR to document major actions taken during the reporting period. These reports are due to the AOTR no later than the 10th working day after the end of the quarter and will also include activities carried out by any sub-agreements. The reports should cover all activities proposed in the Annual Implementation plan and be congruent with the Monitoring and Evaluation Plan. The Quarterly Report should be submitted electronically, in PDF format, via e-mail

attachment, addressed to the AOTR. The Quarterly Report will include at minimum the following information:

i. Summary of activities and achievements in the reporting period;

ii. Update on resolution of issues raised in previous reports;

iii. Anticipated activities/plan for the next quarter

iv. Progress toward results; and

v. Financial reports including accrued expenditures against budget elements, pipeline, funds remaining and planned expenditures (on original financial report will also be submitted to the USAID/Controller's office on a quarterly basis). The financial report should be consistent with the requirements of the AI data tracking system (AIMEBA).

d. ***Data Updates/Reports.*** This activity will be collecting and analyzing a wide range of data that is relevant not only to the implementation of this project, but also to national and/or regional surveillance and response systems, international organizations such as the OIE, FAO, and WHO, and the international donor community. Therefore, information dissemination is a key element of this activity.

`A report of key data findings, analysis, and recommendations resulting from Project activities (collected in the Project's Database and/or Information Dissemination System) may be requested by the AOTR on a monthly basis. The specific contents of these reports will be agreed upon with the AOTR after award of the Agreement; however, it is anticipated that the following information will be required: wildlife surveillance activities, specimen collection and chain-of-custody data; diagnostic test results, animal population survey data/migratory patterns, disease outbreak and investigation reports, situational awareness analyses, and linkages to gene sequencing data.

3. **Final Report**

The Recipient shall submit the original and one copy to M/FM, the Agreement Officer (if requested), and the AOTR and one copy, in electronic (preferred) or paper form of final documents to one of the following: (a) Via E-mail: docsubmit@dec.cdie.org ; (b) Via U.S. Postal Service: Development Experience Clearinghouse, 8403 Colesville Road, Suite 210 Silver Spring, MD 20910, USA; (c) Via Fax: (301) 588-7787; or (d) Online:

http://www.dec.org/index.cfm?fuseaction=docSubmit.home.

Guidelines for the final reports will be provided by the AOTR.

A.6 INDIRECT COST RATE

Pending establishment of revised provisional or final indirect cost rates, allowable indirect costs shall be reimbursed on the basis of the following negotiated provisional or predetermined rates and the appropriate bases:

(b)(4)

1/Base of Application: Modified total direct costs, consisting of all salaries and wages, fringe benefits, materials and supplies, services, travel, and subgrants and subcontracts up to the first $25,000 of each subgrant and subcontract (regardless of the period covered by the subgrant or subcontract). Equipment, capital expenditures, charges for patient care and tuition remission, rental costs, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of $25,000 shall be excluded from modified total direct cost.
Type of Rate: Predetermined
Period: 07/01/09 – 06/30/11

2/Base of Application: Modified total direct costs, consisting of all salaries and wages, fringe benefits, materials and supplies, services, travel, and subgrants and subcontracts up to the first $25,000 of each subgrant and subcontract (regardless of the period covered by the subgrant or subcontract). Equipment, capital expenditures, charges for patient care and tuition remission, rental costs, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of $25,000 shall be excluded from modified total direct cost.
Type of Rate: Predetermined
Period: 07/01/11 – 06/30/12

3/Base of Application: Modified total direct costs, consisting of all salaries and wages, fringe benefits, materials and supplies, services, travel, and subgrants and subcontracts up to the first $25,000 of each subgrant and subcontract (regardless of the period covered by the subgrant or subcontract). Equipment, capital expenditures, charges for patient care and tuition remission, rental costs, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of $25,000 shall be excluded from modified total direct cost.
Type of Rate: Predetermined
Period: 07/01/12 – 06/30/13

4/Base of Application: Modified total direct costs, consisting of all salaries and wages, fringe benefits, materials and supplies, services, travel, and subgrants and subcontracts up to the first $25,000 of each subgrant and subcontract (regardless of the period covered by the subgrant or subcontract). Equipment, capital expenditures, charges for patient care and tuition remission, rental costs, scholarships, and fellowships as well as the portion of each subgrant and subcontract in excess of $25,000 shall be excluded from modified total direct cost.
Type of Rate: Predetermined
Period: 07/01/13 – 06/30/15

A.7 TITLE TO PROPERTY

Title of property financed under this award shall vest in the Recipient subject to the requirements of 22 CFR 226.30 through 37, until such time as USAID issues disposition instructions.

A.8 AUTHORIZED GEOGRAPHIC CODE

The authorized geographic code for procurement of goods and services under this award is 935. The authorized geographic code for procurement of commodities is 935.

A.9 COST SHARING

There is no requirement for Cost Sharing under this Award. However, Cost Sharing is encouraged and is subject to the requirements of 22 CFR 226.23.

A.10 SUBSTANTIAL INVOLVEMENT

Substantial involvement during the implementation of this Agreement shall be limited to approval of the elements listed below:

1. Approval of all annual implementation plans, budgets, and all modifications which describe the specific activities to be carried out under the Agreement and sub-agreements, and progress reports;

2. Approval of key personnel and any changes;

3. Approval of Monitoring and Evaluation Plans; USAID involvement of monitoring progress toward achievement of the Objective and Expected Results during the course of the Agreements and in monitoring financial expenditures;

4. Collaboration or joint participation of USAID with the Recipient in accomplishing specific elements in the program description; where there are specific elements in the Program Description for which USAID's technical knowledge would benefit the Recipient's successful accomplishment of stated program objectives, to include:

   a. Concurrence on the substantive provisions of sub-awards, including implementation plans, monitoring and evaluation plans, budgets, timelines, personnel, reporting (programmatic and financial), and any modifications.

   b. Collaborative involvement in the selection of advisor committee members, and when relevant, USAID may participate as a member of this type of committee.

   c. USAID will be involved in the substantive direction/re-direction of inter-relationships with other projects and organizations as described in sections C and D of the RFA

5. As appropriate, other monitoring as described in 22 CFR 226.

A.11 PROGRAM INCOME

The Recipient shall account for Program Income in accordance with 22 CFR 226.24 (or the Standard Provision entitled Program Income for non-U.S. organizations). Program Income earned under this award shall be added to the project.

A.12 SPECIAL PROVISIONS

A.12.1 USAID DISABILITY POLICY (DEC 2004)

(a) The objectives of the USAID Disability Policy are (1) to enhance the attainment of United States foreign assistance program goals by promoting the participation and equalization of opportunities of individuals with disabilities in USAID policy, country and sector strategies, activity designs and implementation; (2) to increase awareness of issues of people with disabilities both within USAID programs and in host countries; (3) to engage other U.S. government agencies, host country counterparts, governments, implementing organizations and other donors in fostering a climate of nondiscrimination against people with disabilities; and (4) to support international advocacy for people with disabilities. The full text of the policy paper can be found at the following website: http://www.usaid.gov/about_usaid/disability/.

(b) USAID therefore requires that the recipient not discriminate against people with disabilities in the implementation of USAID funded programs and that it make every effort to comply with the objectives of the USAID Disability Policy in performing the program under this grant or cooperative agreement. To that end and to the extent it can accomplish this goal within the scope of the program objectives, the recipient should demonstrate a comprehensive and consistent approach for including men, women and children with disabilities.

A.12.2 EXECUTIVE ORDER ON TERRORISM FINANCING (FEB 2002)

The Contractor/Recipient is reminded that U.S. Executive Orders and U.S. law prohibits transactions with, and the provision of resources and support to, individuals and organizations associated with terrorism. It is the responsibility of the contractor/recipient to ensure compliance with these Executive Orders and laws. This provision must be included in all subcontracts/subawards issued under this contract/agreement.

A.12.3 FOREIGN GOVERNMENT DELEGATIONS TO INTERNATIONAL CONFERENCES (JAN 2002)

Funds in this [agreement, amendment] may not be used to finance the travel, per diem, hotel expenses, meals, conference fees or other conference costs for any member of a foreign government's delegation to an international conference sponsored by a public international organization, except as provided in ADS Mandatory Reference "Guidance on Funding Foreign Government Delegations to International Conferences" or as approved by the AO.

A.12.4 COUNTRY-BY-COUNTRY BREAKDOWN OF EXPENDITURES

Recipient shall list each country included in the program and the total amount expended for each country under the award for the reporting period in the "Remarks" block on the "Financial Status Report" SF 269 or SF 269A, or on a separate sheet of paper with the "Request for Advance or Reimbursement" SF 270.

A.12.5 Non-Federal Audits

In accordance with 22 C.F.R. Part 226.26 Recipients and subrecipients are subject to the audit requirements contained in the Single Audit Act Amendments of 1996 (31 U.S.C. 7501–7507) and revised OMB Circular A–133, “Audits of States, Local Governments, and Non-Profit Organizations.” Recipients and subrecipients must use an independent, non-Federal auditor or audit organization which meets the general standards specified in generally accepted government auditing standards (GAGAS) to fulfill these requirements.

-End of Schedule-

Attachment B

PROGRAM DESCRIPTION

The Recipient's proposal entitled "PREDICT" (Attachment B) January 23, 2008 is incorporated and is made part of this award.

EXECUTIVE SUMMARY

Our surveillance vision for PREDICT is responsive to the fact that zoonotic pathogens, such as influenza and SARS, account for the majority of emerging infectious diseases in people and that > 75% of these emerging zoonoses are the result of wildlife-origin pathogens. Nowhere in the world are the health impacts from emerging diseases of wildlife more important than in developing countries, where livelihoods are dependent on natural resources. The interconnectedness of human, animal, and environmental health is at the heart of the One Health approach, which involves action at the key interfaces where zoonotic pathogen transmission and disease emergence are at their peak. The PREDICT "One Health" team, under the leadership of the University of California, Davis, is an integral collaboration of the most highly experienced and active groups, who have joined together to implement a shared vision: developing global capacity to anticipate and prevent the emerging infections of the future. This will be accomplished by monitoring and identifying pathogens at "hot" animal-human interfaces, using these data to develop new predictive "hotspot" models which will be tested in the field, and building capacity with our local collaborators by providing training and access to new technologies in communications, information management, sample collection and handling, and pathogen identification.

The One Health partners have established firm working relationships on the ground in the included 23 hotspot countries plus Mexico. Our team includes the world-class **UC Davis School of Veterinary Medicine**, with its demonstrated leadership in program development and management, as well as education and research in zoonotic disease, wildlife epidemiology, pathogen pollution, and ecosystem health; the **Wildlife Conservation Society**, with its ongoing programs to monitor wildlife diseases worldwide and GAINS database, which was designed to identify the movements of wild avian species for influenza and other viruses; **Wildlife Trust**, the first group to identify bats as the reservoir of SARS-like coronaviruses and to define hotspots of disease; **Global Viral Forecasting, Inc.**, which has made seminal discoveries on the roles of nonhuman primate hunting and food handling in moving animal pathogens to humans; the **Smithsonian Institution**, with its National Zoo, whose scientists are among the founders of the field of conservation biology; ProMED-mail, HealthMap, Google, and Veratect, who continue to develop new paradigms for early warning and information sharing; the disease modeling and analytical skills of Drs. Dobson, Woolhouse, and Grenfell; and novel-pathogen discovery by such leading-edge investigators as Dr. Ian Lipkin.

The team has five main objectives, corresponding to those delineated in the PREDICT RFA:

- **Objective 1: Assess capacity and develop plans for the implementation of wildlife surveillance support.** We will develop a standardized capacity-assessment process and evaluation tool; organize country and regional assessment teams, including local stakeholders; make the results available to stakeholders, other USAID initiatives (especially PREPARE, IDENTIFY, and RESPOND), and WHO, OIE, FAO, and others; evaluate capacity changes as the project proceeds; and use modeling to adaptively target surveillance activities where they will be most constructive. Capacity assessments, tailored to the special needs of countries and regions, will include the current state of wildlife surveillance activities; laboratory capabilities nationally and regionally; linkages or interagency efforts across ministries and/or departments; human resource availability; communication and data management platforms; animal and human disease reporting systems; and legal, policy, cultural and logistical challenges. The assessments will be used for planning, capacity building, and designing our training programs and surveillance activities.

- **Objective 2: Develop models of disease risk and spread.** The PREDICT modeling team brings together the originators of the emerging diseases hotspots model and some of the world's finest minds in mathematical forecasting. Surveillance data will be combined and analyzed by our modeling team, with other available disease, geospatial, ecological, and population data, in order to greatly increase the resolution and precision of the hotspots. The models will be tested on the ground and used to target expanded surveillance. An ultimate goal will be a "global, emerging infectious disease vulnerability map," which can be used to predict where and how new pandemics are most likely to arise, and can help inform strategies for targeted prevention.
- **Objective 3: Implement a "SMART" (Strategic, Measurable, Adaptive, Responsive, and Targeted) wildlife surveillance strategy to identify and target high-risk wildlife in the regions most vulnerable to zoonotic disease emergence.** Previous work by our team has identified emerging-disease hotspots (where human contact with wild animals drives the emergence of zoonoses that will threaten global health in this century) and key risk factors. In each region, we will build on ongoing surveillance activities to identify high-priority pathogens, including retroviruses, orthomyxoviruses (influenza), coronaviruses (SARS-like viruses), henipaviruses, and filoviruses (Ebola and Marburg). Active, opportunistic (hunter-harvested wild animals for human consumption), and syndromic surveillance (animal deaths or obvious severe illnesses, reports of possibly zoonotic human disease outbreaks) will all be employed, as appropriate to the situation. In collaboration with local stakeholders, the PREDICT team will develop best practice protocols based on field experience, and will build capacity for local sampling and diagnostic testing to permit rapid outbreak detection and forecasting. Novel pathogen discovery will initially take place in state-of-the-art laboratories (e.g., Ian Lipkin, Center for Infection & Immunity). As foreign capacity increases, we intend to transfer appropriate technology to local partners (Objective 4).
- **Objective 4: Introduce new technologies where they are appropriate and sustainable.** These will include technologies for pathogen identification and discovery (including Mass Tag PCR, microarray, and other state-of-the-art techniques), communications (e.g., cellphone SMS messaging), wildlife tracking, and information systems for specimen collection and handling, and date reporting.
- **Objective 5: Improve the flow and handling of information, specimens, and samples resulting from surveillance activities.** We intend to develop the first comprehensive, global, open-access wildlife disease surveillance data management and distribution system, initially building on the GAINS database. Tools to track samples and results and to manage the necessarily large sets of field data will also be developed and implemented locally. Local stakeholders will receive training and equipment for sample collection, handling, and shipment; both local stakeholders and policymakers will receive training in understanding surveillance. Surveillance and lab data will be shared with local stakeholders and with other USAID programs (e.g., IDENTIFY and RESPOND).

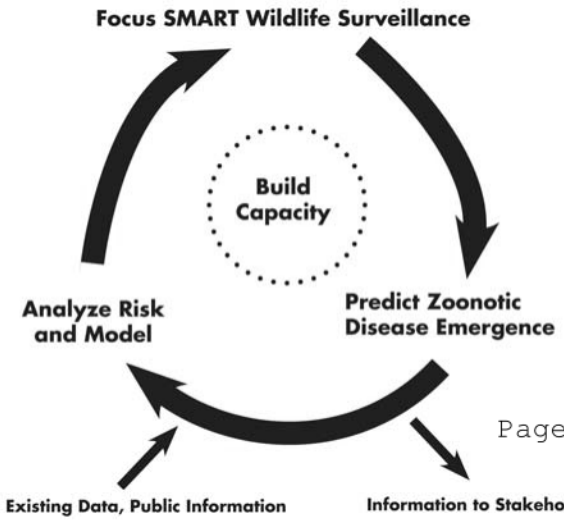


Figure 1. Overview of the responsive and adaptive strategy of the PREDICT One Health team's SMART Surveillance for identification and mitigation of zoonotic disease emergence from wildlife.

The senior management team will include (b)(6) (b)(6), who will work with the scientific Supervising Coordinators for each of the objectives and local Country Coordinators, with assistance from a lean administrative staff. The Executive Board (the lead from each organization on the team, plus the key personnel) will provide oversight, and an expert Technical Advisory Committee (b)(6) (b)(6) and an appointee by USAID) will provide external input, monitoring, and evaluation.

The team has been active in EID (emerging infectious disease) surveillance from the beginning. We look forward to this unparalleled opportunity to develop new capabilities and paradigms.

1. PREDICT ONE HEALTH TEAM TECHNICAL APPROACH

a. VISION: SMART (Strategic Measurable Adaptable Responsive Targeted) Surveillance

In order to predict, respond to, and prevent the emergence of novel infectious diseases in humans, we must work "upstream," at their source. Explosive human population growth and environmental changes have resulted in increased numbers of people living in close contact with animals. Unfortunately, the resulting increased contact, together with changes in land use, have altered the inherent ecological balance between pathogens and their human and animal hosts. Our SMART surveillance vision for PREDICT is responsive to the fact that zoonotic pathogens, such as influenza and SARS, account for the majority of emerging infectious diseases in people, and that more than three quarters of these emerging zoonoses are the result of wildlife-origin pathogens. Nowhere in the world are the health impacts from emerging diseases of wildlife more important than in developing countries, where daily workloads and livelihoods are highly dependent on natural resources. The interconnectedness of human, animal, and environmental health is at the heart of the One Health approach, an increasingly important prism through which governments, NGOs, and practitioners view public health. The PREDICT One Health team assembled by the University of California, Davis is an integral collaboration of the most highly experienced and active groups who have joined together to implement our shared vision. The team not only has decades of experience studying emerging zoonotic diseases, but is actively building capacity and is engaged on the ground in the regions and with the diseases targeted by USAID for the PREDICT initiative. The team has a proven track record in surveillance of wildlife and emerging infectious diseases, risk modeling of emerging infections, pathogen diagnosis and discovery, and capacity building. Our strategy of SMART surveillance is designed to detect novel diseases with pandemic potential early, which will give health professionals the best opportunity to prevent emergence. It also targets important sentinel species at active human interfaces in hotspot regions to improve on the efficiencies of previous surveillance efforts, in which hundreds of thousands of samples were collected and analyzed to find the sometimes very rare pathogens of interest. Our vision is to creatively and efficiently expand on lessons learned in order to assess local capacity, increase the value of infectious disease modeling, implement targeted and adaptive wildlife disease surveillance systems, develop and deliver new technologies to improve efforts close to the source, and use cutting-edge information management and communication tools to bring the world closer to realizing an integrated, global approach to emerging zoonotic diseases. This vision is supported by our experience with building a broad coalition of partners to develop the global capacity to monitor diseases at the animal-human interface and develop a risk-based approach to concentrate these efforts in surveillance, prevention, and response at the most critical points for disease emergence from wildlife, such as areas rich in biodiversity that are subject to increased anthropogenic disturbance and migratory pathways of animals and people. We will focus on hot interfaces of human–wildlife contact, for example hunting and butchering of wildlife and dwindling water sources in rural and peri-urban areas.

Our PREDICT team includes: the **Wildlife Conservation Society**, which created **Global Avian Influenza Network for Surveillance (GAINS)** to identify the movements of wild avian species for influenza and other viruses, launched the **One World, One Health ™** initiative, and maintains programs to monitor wildlife and wildlife diseases worldwide; the **Wildlife Trust**, was the first group to identify bats as the source of SARS-like coronaviruses, defined **hotspots** of disease, and created the **Consortium for Conservation Medicine;** the **Global Viral Forecasting, Inc.,** which has made seminal discoveries on the roles of nonhuman primate hunting and food handling (particularly through the African "bushmeat" trade) in the movement of pathogens to humans; the **Smithsonian Institution**, which is the world's largest museum

complex and research organization – composed of 19 museums, 9 research centers, and the National Zoo – and whose scientists are among the founders of the field of conservation biology; **ProMED-mail, HealthMap, Google, and Veratect**, who are continuing to develop new paradigms for early warning to change the way the world shares information on emerging diseases; the disease **modeling and analytical skills** of experts such as (b)(6) (Princeton University); **novel pathogen discovery** by leading-edge investigators such as (b)(6) (b)(6) (Columbia Center for Infection & Immunity); and the **University of California, Davis**, a global leader in veterinary medicine and epidemiology with decades of experience successfully managing large federal government grants, and the world's foremost academic institution in the One Health field with top-tier wildlife, zoonotic disease, and ecology research, and extensive experience training the next generation of both animal and human health care workers. Our (b)(6) originated the concept of emerging viruses and developed the unifying framework of factors responsible for emergence; he was founding Chair of ProMED and its internet reporting and discussion network, ProMED-mail.

(b)(6)

Collectively, our team has an extensive and successful history of identifying and predicting the sources of emerging infections in animals, a long history of successful collaborations, a proven track record of coordinating and managing large interdisciplinary projects, and has established partnerships with local governments and local collaborators in all the areas targeted in the PREDICT RFA. Building on this framework, we are confident we can effectively assess local and regional capabilities; develop powerful predictive modeling tools; establish and broaden wildlife disease surveillance systems, while adding innovative technologies to improve their efficiency; and capture the best of the rapidly developing world of information management to facilitate the real-time sharing of findings, tracking of activities and efforts, and connecting stakeholders at all levels to reduce the impact of emerging diseases.

b. TECHNICAL APPROACH

The PREDICT One Health team is made up of leading experts from the fields of wildlife health, disease surveillance, zoonotic pathogen emergence, and epidemiology and diagnostics training and capacity building. The Technical Approach detailed below is organized by the objectives enumerated in the PREDICT RFA, and the cross-cutting themes are addressed within each objective, especially those of Programmatic Focus, Building on Existing Platforms, Coordination, and Technical Leadership. Additional critical information on these themes is presented in the Staff and Organization and Management sections that follow. Integration with the other arms of the USAID Avian and Pandemic Influenza and Zoonotic Disease Program will be crucial, especially IDENTIFY and RESPOND. If selected, our team would enthusiastically support the opportunity to participate in the assessment and selection of laboratories to be included in the IDENTIFY laboratory capacity-building program. We believe the inclusion of the PREDICT team in that process will greatly benefit the overall outcome of both programmatic arms and the sustainability of pathogen surveillance in the hotspot regions. Our approach to the cross-cutting themes of Capacity Building and Training and Gender Considerations are further detailed at the end of the objective-based approaches. The core partners of the University of California, Davis (UC Davis), Wildlife Conservation Society (WCS), Wildlife Trust (WT), Global Viral Forecasting, Inc. (GVFI), Smithsonian Institution (SI), and our established in-country partners are fully integrated into each collaborative objective (see Organizational Chart and Management Plan for more details). Even on-the-ground surveillance is collaborative, with coordinators managed by one of the core partners, as shown in the Organizational Chart. A detailed metric for tracking progress on all objectives can be found in Annex F.

Objective 1: ***Assess existing capacity and develop implementation plans for wildlife surveillance support***

SMART surveillance is a visionary strategy designed for early detection of novel diseases with pandemic potential to give health professionals the best opportunity to prevent emergence. Successful intervention requires detection of the pathogen at the earliest stage possible. In the simplest terms, SMART surveillance is about using the best available knowledge to determine where on the planet and in what species we should look for the next pathogen of pandemic potential. Our team members have been successfully assessing local and regional capacity and collaboratively planning and implementing wildlife and zoonotic disease surveillance systems in Africa, Asia, and South America for decades, most recently with USAID-supported capacity assessments and capacity-building programs for emerging zoonotic diseases, such as Stamping Out Pandemic and Avian Influenza (STOP AI) and GAINS. Under the PREDICT initiative, we propose to increase the global capability for detecting emerging known and novel diseases of zoonotic origin in wild animals while building capacity towards improved technical and operational knowledge, resources, leadership, and surveillance and training systems within the countries and regions of interest. To most effectively target USAID-supported efforts and allow for other organizations and agencies to efficiently contribute, the following comprehensive and standardized capacity assessment process will be employed:

1. We will develop a standardized Capacity Assessment Protocol (PREDICT-CAP) by which we can evaluate the quantity and quality of existing wildlife surveillance components and systems. PREDICT-CAP will be based on the World Organization for Animal Health Tool for the Evaluation of Performance of Veterinary Services (OIE PVS Tool), the Biosecurity Capacity Assessment Tool of the Food and Agriculture Organization (FAO), the Centers for Disease Control and Prevention's (CDC) Morbidity and Mortality Weekly Report Updated Guidelines for Evaluating Public Health Surveillance Systems, and the Protocol for the Assessment of National Communicable Disease Surveillance and Response Systems, as well as the Health Metrics Network's Framework and Standards for Country Health Information Systems, from the World Health Organization (WHO). While many aspects of current assessment tools can be used for PREDICT activities, we will modify the methods for estimating key parameters, such as surveillance sensitivity and positive and negative predictive value, which are based on data that are unknown for wild animal populations.
2. Organize country and regional assessment teams composed of local experts/stakeholders, and external experts where needed, to implement PREDICT-CAP. Assessments will include a) the current state of wildlife surveillance activities; b) current laboratory capabilities nationally and regionally; c) linkages or interagency efforts across ministries and departments; d) human resource availability; e) communication and data management platforms; f) animal and human disease reporting systems; and g) legal, policy, cultural, and logistical challenges.
3. Synthesize findings and report capacity by country and region, identifying critical gaps based on PREDICT-CAP, and highlight practical opportunities for targeting resources to enhance and/or expand wildlife disease surveillance that is linked to the various stakeholders and interested parties.
4. Convene stakeholder meetings at country and regional levels to review and finalize assessments with input from key partners and experts to develop a common shared vision and an action plan for capacity building and implementing wildlife disease-surveillance activities.
5. Share PREDICT-CAP findings and recommendations with USAID PREPARE, IDENTIFY, and RESPOND, and organizations such as WHO, FAO, United Nations Environment Program, United Nations Development Program, World Bank, and OIE.

6. Detect changes in wildlife surveillance capacity annually and adapt capacity-building plans in coordination with other USAID initiatives, such as IDENTIFY and RESPOND.
7. Improve the probability of emerging-disease detection in our surveillance activities (Objectives 2-5) on an ongoing basis by using simulation modeling to compare global epidemic intelligence-based detection of emerging zoonotic diseases in humans, our models of disease emergence, and findings from our surveillance activities underway in each country to ensure that our surveillance system is SMART.

Our proposed PREDICT-CAP will be tailored to the special needs of countries and regions with respect to geographic, ecologic, taxonomic, cultural, political, and sustainability aspects of conducting wildlife disease surveillance programs. It will be developed with input from stakeholders in each of the targeted countries gathered via workshops organized and led by Country Coordinators. Once the PREDICT-CAP tool is optimized (in year one), Country Coordinators will conduct a second stakeholder workshop to gather the current capacity information, followed by Expert Capacity Assessment site visits in specific countries, where required, at the end of year one and beginning of year two. The Country Coordinators will re-apply the PREDICT-CAP tool through workshops annually to monitor and evaluate wildlife surveillance capacity development so that the PREDICT program can be actively and adaptively managed. Our practical, boots-on-the-ground approach will seek significant input and engagement from people who work locally on these issues, in addition to the outside experts traditionally used by governments. Evaluation of current capabilities will specifically consider any existing ability to detect known, as well as novel, pathogens in order to develop a SMART surveillance strategy at the interfaces of animal and human populations where zoonotic diseases are most likely to emerge. Our geographic focus for PREDICT reflects the geographic expertise of our partners: the Amazon Basin, the Congo Basin and neighboring Rift Valley, the Gangetic Plain, and Southeast Asia – areas where key wildlife host species have significant interaction with domestic animals and high-density human populations. This effort will engage our regional and in-country counterparts, and will lead to significant, sustainable improvements in each country's ability to conduct wildlife disease surveillance and to recognize and predict the spread of pathogens emerging from wildlife populations.

Objective 2: ***Develop models of disease risk and spread***

The PREDICT modeling team brings together the originators of the emerging diseases hotspots model with some of the world's finest minds in mathematical forecasting (b)(6) (b)(6)) to:

- *Refine and significantly improve our emerging diseases hotspots approach in order to correct for reporting bias and use projections of future changes to the drivers of disease emergence, and upgrade with new data, including that of our SMART surveillance;*
- *Use a new approach to develop sub-regional maps of ecological hotspots for disease emergence in each PREDICT region and fuse these analyses with an unprecedented dataset on local and global travel and trade to produce a Global Vulnerability Map that highlights regions connected to the hotspots;*
- *Use taxonomic analyses of hosts and pathogen groups to measure the global diversity of unknown pathogens in wildlife for key pathogen groups, and identify host species to target for surveillance with the highest potential diversity of unknown pathogens; and*
- *Use matrix models to work out the spillover capacity and potential for sustained person to person transmission (pandemic potential) of each region, sub-region, and major city.*

Our analyses will be used to direct future surveillance efforts and identify emerging drivers, pathogens, and areas of needed research. They will feed into the information management, capacity building, and technology teams of PREDICT and provide products such

as online, freely-available maps of likely viral diversity, hotspots, and global vulnerability to outbreaks.

We have split the process of zoonotic emergence into 3 stages (Fig. 1), and designed predictive models for each. By fusing these approaches around measures of risk and R_0, we will build **a unifying predictive model for the zoonotic and pandemic potential of each region**.

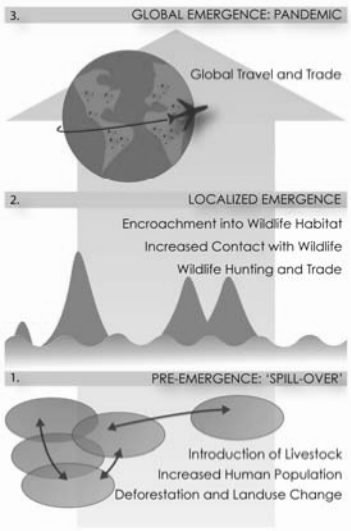


Figure 2. Three phases of disease emergence. ***Stage 1 (bottom)*** is a pre- emergence phase, where anthropogenic changes (e.g., encroachment, deforestation) cause animal populations to come into contact with humans and allow for cross species transmission of their pathogens. ***Stage 2 (middle)*** involves the spillover of animal pathogens to humans. In some cases (low amplitude green line), this leads to small clusters of cases, and the infection dies out. In others (orange spikes), sustained human-to-human transmission occurs. ***Stage 3 (top)*** is pandemic emergence, where pathogens are able to exploit human travel and trade networks to emerge across international and regional boundaries. Our team has produced new techniques to analyze and model each stage of this process**. Our One Health PREDICT team will unify these approaches to predict the zoonotic and pandemic potential of each region and identify sub-regional hotspots of emergence.**

Table 1: Summary of our modeling strategy.

Stage of Emergence (Fig. 1)	Modeling component	Questions	Approach	Products
Pre-emergence (stage 1)	**Emerging Infectious Disease (EID) Hotspots (Geography, Ecology)**	• Risk of spillover? • What areas are undersampled? • What are the spatial drivers of emergence? • Can we target specific ecological niches for emergence? • How will water restrictions and climate change affect disease emergence?	Spatial and temporal general linear models	• Refined global hotspot maps (Obj. 5) • Sub-regional hotspot maps (Obj. 5) • Better surveillance targeting (Obj. 3)
Pre-emergence (stage 1)	**EID Hotspots (Taxonomy)**	• High-risk wildlife species • Diversity of unknown pathogens	Spatial and temporal general linear models	• Better surveillance targeting (Obj. 3) • Better diagnostic targeting (Obj. 4)

Spillover (stage 2)	**Modeling disease dynamics at human-wildlife interfaces**	• Wildlife trade and pathogen virulence • How will international travel and trade spread emerging pathogens?	Individual-based and SEIR models	• Targeting of surveillance (Obj. 3) • Identification of EID risk control points (RESPOND)
Localized emergence (stage 2); Pandemic spread (stage 3)	**Matrix MP3 Project**	• Determining vulnerability of a region • Pandemic potential of a region	Matrix-based population simulation	• Refined hotspot maps (Obj. 3, 5) • Global emerging infectious disease vulnerability map (Obj. 5)

1) EID Hotspots version 2.0: *Targeting surveillance*

The PREDICT modeling team will radically update the original emerging disease hotspots model. We will use new, global, gridded datasets of the drivers of disease emergence; future projections for these factors; and better measures to account for reporting bias and sub-regional data on disease outbreaks, resulting in far more rigorous regional hotspot maps, which we will use to refine surveillance targets identified in Objective 3. This feedback process will begin in the first year of the award, with each new map and model informing surveillance, and surveillance results feeding back into models, throughout the project period.

A) Refining the Datasets: We will use the best available global datasets on disease emergence, including:

i) *Parasites, pathogens:* We will expand the Global Mammal Parasite Databases to become a Global Wildlife Parasites and Pathogen Database. This database includes over 20,000 data points on the geographic distribution and >20 traits of all parasites and pathogens of primates, carnivores, ungulates, and humans. We will expand this to include rodents, birds, and bats, which are abundant and widespread taxa implicated in the emergence of avian influenza, SARS, flaviviruses, Ebola, hantaviruses, and others.

ii) *Hosts:* We will use global datasets for wildlife species richness; subnational livestock distribution datasets for sheep, goat, small ruminant, pig, poultry, and bovids from the FAO; CIESIN's Gridded Population Map of the World v.3; and the Global Rural-Urban Mapping Project.

iii) *Drivers of disease emergence:* We will employ bioclimatic envelope modeling techniques, including Genetic Algorithm for Rule-set Prediction (GARP) and Maximum Entropy, to estimate changes in host distribution with future climate change under Intergovernmental Panel on Climate Change projections using: The IMAGE model, with projections on a 0.5 degree grid, to the year 2100 of human population; urbanization; gross domestic product (GDP); land cover and livestock density; additional socioeconomic drivers, such as spatial delineation of urban extents; subnational measures of poverty rates and political conflict; subnational measures of human population age structure; road networks; and subnational measures of human migration.

iv) *Reporting bias:* We will reduce reporting bias using: global distribution of internet servers; global distribution of short message service–capable cell phones; spatial databases of travel time and connectivity; data on medical and scientific capacity, including hospitals and laboratories; global distribution of media outlets; global indices for level of establishment of public health surveillance infrastructure (hospitals/PhDs/MDs/nurses) per capita GDP spent on healthcare.

v) *Sub-regional disease outbreak information:* To turn our coarser global analysis into one that will produce fine-scale, sub-regional maps, we will use detailed information about outbreaks within countries. To do this in countries with limited or no public health reporting infrastructure but with the highest risk for emerging diseases, we will use Healthmap.org's internet-based automated disease outbreak detection and geographic location assignment (multilingual feeds from verified WHO outbreak reports, expert-curated ProMED accounts, media news stories of disease activity, etc., see Objective 5).

B) Geographical hotspots: We have built models for each stage of emergence (Fig. 1). We will use these to **determine the probability of cross-species transmission from wildlife and livestock to humans**, including vector-borne diseases, and subsequent spread between humans in any given area X which can be expressed as:

Pr(Transmission to humans and emergence) $\propto \sum_{i=1}^{W_X}\sum_{j=1}^{P_{i,X}} \beta_{i,H} S_{H,j} R_{0,j}^{H,H}$ *or* $\sum_{k=1}^{L_X}\sum_{l=1}^{P_{k,X}} \beta_{k,H} S_{H,l} R_{0,l}^{H,H}$

where W_X and L_X are the number of mammalian wildlife and mammalian livestock species, respectively, in area X; $P_{i,X}$ and $P_{k,X}$ are the number of pathogens carried by each wildlife and livestock species in area X; $\beta_{i,H}$ and $\beta_{k,H}$ are the infectious contact rate between humans, *H*, and infectious wildlife species *i;* and infectious livestock species *k*, and $S_{H,j}$ and $S_{H,l}$ are the susceptibility of humans to wildlife pathogen *j* and livestock pathogen *l* (the probability that a human will become infected with pathogen *j* or *l* given contact with infectious wildlife or livestock). The probability of each cross-species transmission event becoming an epidemic depends critically on the reproductive ratio of pathogen *j* in humans, $R_{0,j}^{H,H}$. The complexity in pathogen transmission is captured in the infectious contact rate parameters, β. Between wildlife and humans, these can be expressed as $\beta_{i,H} = N_i H I_{i,j} f(N_i, H)$,where N_i is the density of wildlife species *i*, H is the density of humans, $I_{i,j}$ is the prevalence of infection of pathogen *j* in wildlife species *i*, and $f(N_i,H)$ is the relationship between the density of wildlife species *i*, humans, and the contact rate. This last term, $f(N_i,H)$, may be invariant, $b_{i,H}$, or decrease with host density, $b_{i,H}/N_i$, and or diversity $b_{i,H}/\sum sN_i$, (where s is relative susceptibility of each host species), depending on the mode of parasite transmission (density vs. frequency dependent) and the diversity and abundance of other host species in the vicinity. The potential for pandemic spread of zoonotic pathogens, once established in human populations, is described below. We will build on these equations to **determine spatial drivers of zoonotic emerging infectious diseases, i.e., factors that make wildlife and livestock pathogens more likely to infect humans.** We will specifically **model the emergence of vector-borne diseases** by including additional expressions for typical host specificity and other parameters for a pathogen group; vector biology and climatology; and expressions that reflect each environmental, demographic, or behavioral driver and their impact on pathogen traits. We will generate grids of the presence/absence of a novel EID event and, using logistic regression models, explicitly account for host density.

To account for the inevitable lack of information on contact rate and R_0 for a novel pathogen in humans, we will rank the typical contact between humans and the pathogen's likely animal hosts (e.g., Are they used as bushmeat, pets? Do they frequent peri-urban regions? Are they used in industrial or backyard farms?). Finally, to find correlates of R_0 in humans, we will include additive categorical variables for parasite taxa and transmission type. We will test for spatial autocorrelation using Moran's *I*, and use autoregressive models to account for spatial autocorrelation between adjacent localities, using established methods and tools in ArcGIS and generalized linear models in SAS. We will first conduct one set of analyses using current values of drivers because for some drivers we only have one spatially explicit dataset (wildlife pathogen distributions); although there is clearly some spatio-temporal variability, the map at a single

time-point captures much of the spatial variability. We will then conduct a series of analyses for each decade incorporating spatio-temporal analysis in the drivers.

C) Ecological hotspots: Implicit in these analyses is our strategy to link the large-scale analyses we have previously published with the drivers of landscape-scale disease spread. For example, we will investigate how high biodiversity enhances the risk of disease emergence on a large scale, and examine hypotheses on how altered biodiversity, peri-urban wildlife, livestock farming, and water restriction enhances the risk of emergence within landscapes. We use field data from SMART surveillance activities to parameterize our models. We will also use ecological niche modeling (ENM) — a powerful approach to understand the environmental and ecological correlates of pathogen (or host) distribution across the landscape. We will use known pathogen-occurrence data from previous outbreaks and field data from SMART surveillance to parameterize GARP and MaxEnt models of pathogen and host distribution. While ENM may not capture all the complexities of multi-host and vector-borne disease dynamics, overlaying data from multiple pathogens and multiple vertebrate hosts will allow us to develop a more refined map of disease risk within hotspots and identify regions in which to target on-the-ground disease surveillance.

D) Identifying wildlife species to target for surveillance: We can use our refined EID hotspots 2.0 database to identify which groups of wildlife are the most important reservoirs of emerging zoonoses in humans and are therefore most likely to yield the next pandemic. Modeling efforts will directly inform surveillance teams on where to set up field sites in a country, which species to target for surveillance and pathogen discovery, and the level of surveillance needed to detect disease emergence.

We will use a novel population genetics approach to guide surveillance activities. In bats, our recent work shows that the population genetic structure (F_{ST}; related to migratory capacity and mixing of populations) and species population size significantly correlate with the diversity of pathogens. It is logical that **wildlife species with low levels of population mixing *and* large colony sizes will harbor the greatest diversity of novel pathogens**. While these species are less likely to transport pathogens long distances, encroachment and hunting will be a risk factor for pandemic emergence. We will collect population genetic data during surveillance activities and species-specific population biology information (social structure, migratory and foraging behavior) from the literature for all key wildlife species in the targeted regions. We will use Pearson product moment correlation statistics to identify significant predictors of known viral diversity. Generalized linear models (GLM) will be constructed to evaluate the significance of combined sets of predictors. We will then use our GLM model to estimate pathogen diversity (with confidence intervals) in as-of-yet unsampled species for which some basic aspects of their biology are known. For those species with completely unknown biology, we will map traits for known species and use a Bayesian framework for testing phylogeny-trait associations (BaTS v.0.9). Estimates of as-of-yet unknown pathogen diversity will be generated, both directly from the GLM and as inferred by phylogenetic analysis of related taxa, for ~300 species per group. These estimates and confidence limits will be mapped onto GIS layers of wildlife species distribution and included in spatial logistic regressions for our hotspot analysis. **Those species with the highest projected diversity will be targeted for pathogen discovery, and those which overlap significantly with the fine-scale disease hotspots will be targeted for our SMART surveillance.** We will particularly focus on high-risk species where they have high population density and are mixing with large populations of humans and livestock, presenting opportunities for increased viral load and risk of spillover.

E) Locating as-yet undiscovered wildlife pathogens and their virulence: We will use the Global Wildlife Parasite Database to create digital spatial distributions of parasites and range maps for known animal pathogens. To identify the likely diversity of a group of pathogens, we will build a phylogenetic tree for all known pathogens in the group. We will calculate the value at the phylogenetic node of species in a clade and adjust the value using the trait data and fitted relationships for that species. We will ensure consistent quality of the parasite/pathogen databases by including the method of detection (e.g., isolation, detection of host antibodies, or PCR) and the types of tissues sampled (e.g., skin, blood, feces, saliva) as covariates in our analyses. We will then use GAP analysis to identify areas that have been under-sampled for pathogens relative to the distribution of host species and the degree of research effort devoted to different countries. This will give us a measure of the unknown biodiversity of a given group of pathogens, but it is difficult to predict their virulence. We will move toward this by using our EID database and weighting the GAP analysis by the known "evolvability" of pathogens in each taxonomic group (e.g., host specificity of known pathogens, average mutation rates, presence of receptor binding sites in human cell lines).

2) Modeling Pathogen Dynamics and Spread Via the Wildlife Trade and International Travel and Trade

Identifying regions of high spill-over risk is only half of our strategy to understand pandemic risk. We will also develop a strategy to model the pathways pathogens spread out of hotspot regions, via global air travel, international trade in goods, and the wildlife trade. We will examine the direction of these pathways, the way they disrupt the normal ecological and evolutionary equilibria of animals, and the commensal and pathogenic organisms they carry. We will test two key questions:

A) How does international travel and the wildlife trade alter the spreading dynamics of new zoonotic diseases globally? Our PREDICT team has unprecedented access to data on the international wildlife trade — we have collected information on every single shipment of wildlife into the USA for the last 10 years — and unparalleled information on the volume of bushmeat harvested in Africa and Southeast Asia. We will use these as measures to analyze intra-regional and international capacity for spread of known zoonotic diseases. We will do this by running our logistic regressions from the EID Hotspots 2.0 project including international and subregional wildlife trade data, bringing in further data from IUCN TRAFFIC and the literature. This will give us maps of not only where a new disease will emerge, but also its most likely first port of call!

B) Does the wildlife trade for food and pets increase the prevalence, transmissibility, and virulence of pathogens? We will build a simple, individual-based model for pathogen dynamics parameterized with data from SARS-like coronaviruses in bats and avian influenza in birds. We will use data on the diversity and volume of trade in wildlife at sites where we have ongoing surveillance activities. We will run simulations of different market settings and differently connected networks to examine whether the wildlife trade increases the prevalence of these pathogens and, therefore, the likelihood of spillover to people. We will then use individual-based modeling to analyze the evolution of virulence. Two sets of models will be constructed to simulate transmission and infection in free-ranging and trade populations of wildlife. Each model will consist of a demographic submodel and an infection submodel. The number of contacts will be a function of wild animal population abundance, habitat configuration, etc. We will examine the role of both wildlife and human super-spreaders in disease emergence.

3) Matrix Models to Predict Pandemic Potential: The MATRIX MP3 Project

We will develop a novel approach to determine the **pandemic potential** of a region. The aim is to measure the capacity of a region to sustain spillover, human-to-human transmission,

and a buildup of cases that will then lead to pandemic spread — the underlying "R_0" of a region (R_0 is the capacity of a pathogen to cause secondary cases, and expand its population during an outbreak). We will do this using a matrix model standardized for a group of typical diseases, but parameterized with the individual region's data on wildlife hosts, demography, livestock populations, and other driver information. This will allow us to run "what if?" scenarios that assess what would happen if, for example, an Ebola-like disease emerged in the Amazon basin, or a Nipah virus-like disease emerged in the Congo Basin. How many cases would they cause? What response and control measures would be needed to quell the outbreaks? This information will be incorporated into our online data platform (see Objective 5) so that it can be easily accessed by RESPOND teams.

Matrix models assume that we can divide the host population, or populations, into discrete classes, and that we can compare the rates of transmission from one class to any other class of host. To achieve this, we will create a model of pathogen dynamics within each class, species, or group and arrange these together as a "next generation" matrix, each element of which consists of the product of the rate of transmission from one host class to another (e.g., wildlife to livestock, livestock to people). Expressions for R_0 are obtained by deriving an analytical or numerical expression for the spectral radius (dominant eigenvalue) of this matrix. We have used this approach to model the dynamics of Nipah virus spillover from bats to pigs to people in Malaysia. Initially, we assume that all of the different components of transmission from individuals of host species 'j' to host species 'i' can be captured by a single transmission parameter, β_{ij}. This allows us to construct a matrix of transmission values termed a WAIFW matrix, **W**ho **A**cquires **I**nfection **F**rom **W**hom. In the case of a simple three-species system, this matrix takes the form:

$$W = \begin{pmatrix} \beta_{i,i} & \beta_{j,i} & \beta_{k,i} \\ \beta_{i,j} & \beta_{j,j} & \beta_{k,j} \\ \beta_{i,k} & \beta_{j,k} & \beta_{k,k} \end{pmatrix}$$

$$R = \begin{pmatrix} \frac{\beta_{i,i} p_{i,i}}{(\alpha_i + \mu_i + b_i)} & \frac{\beta_{j,i} p_{j,i}}{(\alpha_i + \mu_i + b_i)} & \frac{\beta_{ki} p_{k,i}}{(\alpha_i + \mu_i + b_i)} \\ \frac{\beta_{i,j} p_{i,j}}{(\alpha_j + \mu_j + b_j)} & \frac{\beta_{j,j} p_{j,j}}{(\alpha_j + \mu_j + b_j)} & \frac{\beta_{k,i} p_{k,i}}{(\alpha_j + \mu_j + b_j)} \\ \frac{\beta_{i,k} p_{i,k}}{(\alpha_k + \mu_k + b_k)} & \frac{\beta_{j,k} p_{jk}}{(\alpha_k + \mu_k + b_k)} & \frac{\beta_{kk} p_{kk}}{(\alpha_k + \mu_k + b_k)} \end{pmatrix}$$

We can then modify this matrix and produce an estimate of the basic reproductive rate of the pathogen, R_0 (2nd equation above). In the simplest case, the potential for disease outbreaks will be determined by the magnitude of R_0. Where transmission between species is density dependent, increasing the number of hosts will always increase R_0. This will not necessarily be the case for frequency-dependent transmission, particularly where some hosts act as "dead-ends" for the pathogen. Under these circumstances, increases in the diversity of potential host species may reduce R_0 and the potential for an epidemic outbreak. The dominant eigenvalue of the matrix will describe, essentially, the Pandemic Potential of a region, or its effective R_0.

In this study, we will parameterize these models with data on key pathogens from each region (see Objective 3): Nipah virus, Chikungunya virus (Gangetic plain); SARS-like coronavirus (China); Ebola Sudan, Ebola Zaire, and SIV-HIV (Africa); and arenaviruses (e.g., Machupo, Sabia, Guaranito) and hantaviruses (Amazon region). We will then parameterize the model with population dynamic data for typical bats, rodents, primates, birds, and other reservoir hosts from each of the regions within the PREDICT study. This process will give us a new way to **measure the risk of pathogen emergence in each region** and provide specific data for our early-warning system should a new, potentially zoonotic pathogen be discovered.

4) Modeling risk of spread: the Global EID Vulnerability Map

Finally, once we have all of this information about a region, we will analyze the likelihood that a given pathogen would be able to breakout and become truly pandemic (cross-continental

transmission), creating our "Vulnerability Map." We will use three sets of data: ten years of information from Freedom of Information Act requests to the US Fish and Wildlife Service on the global trade in wildlife; trade data from FAO; and data from the International Air Transport Association to scrutinize travel routes, jet capacity, and connections between all major airports. Our team will examine trade routes, export and import statistics, travel, and the wildlife trade to determine how these factors increase the risk of a disease spreading from a hotspot region into the USA and other major population centers globally. We will use these databases in our mathematical framework to estimate the number of humans living in and traveling from high-risk areas to susceptible destinations, and use the population density of the destination as a correlate of R_0 at the destination. For grid cells that do not have an airport, we will estimate their global connectivity using a combination of road and sea travel time. We will test our predictions of this model using the >40 pathogens in the EID database that have spread beyond the outbreak country, by assessing the match between predicted and observed countries to which the pathogen spread, and, where available, the relative size of the outbreak in each destination, as well as the contribution of each variate to prediction accuracy. We will use the best-fitting model to predict the locations where emerging diseases are likely to first become epidemic and areas that are most likely to become infected by travelers from hotspot pandemic sources.

Objective 3: ***Implement a SMART wildlife surveillance strategy***

We will **develop the first-ever Strategic, Measurable, Adaptive, Responsive, Targeted (SMART) Surveillance system to target high-risk wildlife** in the regions most vulnerable to zoonotic disease emergence. Previous work conducted by our PREDICT team has identified emerging disease hotspots where human contact with wild animals drives the emergence of zoonoses that will threaten global health in this century (see Partner and Past Performance sections below). Critical interfaces promoting zoonotic diseases of wildlife origin occur where diverse pools of wildlife pathogens come into direct and sustained contact with humans or their domestic animals. Efforts to recognize and control zoonotic disease are well underway in resource-rich countries, but, prior to this USAID Program, fewer scientific resources to identify emerging infectious disease have been allocated to countries where pathogens are most likely to emerge. Our team has identified the key risk factors contributing to the rise in EID events, and we have broad expertise in conducting infectious disease surveillance in wild animals in all of the key hotspot regions prioritized by USAID. These hotspots are biodiverse, have anthropogenic pressures on shared resources, and a range of zoonotic pathogens at interfaces with high potential to cause epidemics in humans. Our SMART surveillance system is designed to detect disease outbreaks and forecast events that may lead to disease emergence, identify key drivers of zoonotic disease emergence, and establish a sustainable, global early-warning system that will develop capacity to identify infectious disease threats of animal origin in countries most at risk of disease emergence. The surveillance system proposed here will not only greatly advance our understanding of EID events in these regions, but will enable the development of sustainable wild animal disease surveillance and preventive strategies to curb future pandemics.

Specifically, our SMART Surveillance strategy will:

- *Build on existing surveillance activities in key regions to promote a comprehensive, standardized, sustainable framework for detection and monitoring of zoonotic pathogen emergence;*
- *Detect known zoonotic and novel pathogens circulating in free-ranging wildlife, and track the movement of animals, animal products, and their pathogens in markets and trade;*
- *Collect data on the wild animal, anthropogenic, and environmental drivers associated with disease emergence at critical wildlife, domestic animal, and human interfaces to*

forecast disease occurrence, guide future surveillance strategies, and inform on necessary interventions to protect public health; and

- *Implement an efficient and adaptive surveillance strategy designed to be sustainable and to detect rare events; this strategy should be capable of ramping up whenever anomalies are detected to closely monitor movement and spillover of zoonotic pathogens (in coordination with RESPOND).*

1) Surveillance Activities

Our team will build on disease surveillance activities and partnerships across the hotspot regions to initiate a SMART surveillance system that will efficiently collect baseline data on sensitive wildlife taxa at the most high-risk human–animal interfaces and respond to anomalies with enhanced surveillance. The etiologic agents targeted in this proposal (Table 1) are high-priority pathogens that are most likely to threaten public health. Surveillance activities include:

A) Opportunistic surveillance sampling of hunter-harvested wild animals destined for human consumption, the wildlife trade, and wildlife markets. Hunting and butchering, carcass preparation, the wild animal trade, and wet markets place people in direct and sustained contact with wild animals and their pathogens, creating an exceptionally high probability of disease transmission. Surveillance efforts will be facilitated by collaborations with hunters, traders in markets, and wildlife enforcement authorities in each of the hotspot regions. Where zoonotic pathogens are detected in traded animals, we will trace these pathogens to their source wild populations. We will also sample dogs used for hunting wildlife and vectors that move adeptly across the wild animal-human interface.

B) Syndromic surveillance based on triggers that signal a high potential for zoonotic pathogen outbreaks, including wild animal morbidity and mortality events with likely pathogen spillover into secondary hosts, and reports of zoonotic disease events in humans and domestic animals (online epidemic intelligence, see Objective 5 below). Animal mortality monitoring networks will be developed to build capacity in indigenous communities by initiating broad-scale dead-animal surveillance in select urban and forested regions in collaboration with hunters, traders, logging workers, mining companies, park staff, and researchers that utilize low-cost mobile communication technology to obtain reports of animal die-offs (see Objective 4). As reports are received, Country Coordinators will assess outbreak potential in conjunction with the Surveillance Coordinators and modeling team, and consider the need for enhanced surveillance or outbreak investigation. Enhanced surveillance will focus on known and new zoonotic pathogen detection, and we will work alongside government and international authorities and human and veterinary response teams trained in biosafety to measure spread to humans, identify wild animal reservoirs, and obtain epidemiological data on wild and domestic animal involvement and ecological parameters that can be used for risk analysis and modeling.

C) Active surveillance of free-ranging wildlife at the highest risk interfaces where anthropogenic activities, landscape change, and incursion of domestic animals will promote the emergence of zoonotic pathogens. Active surveillance through capture and sampling of wild animals (and their vectors where appropriate) will establish baseline data on known zoonotic pathogens and novel pathogens circulating at the highest risk ecological zones, particularly those identified by modeling efforts in Objective 2.

Table 2. Principal target pathogen groups, wildlife hosts, and sampling strategy.

Pathogens	Animal targets	Surveillance activity
retroviruses	nonhuman primates	opportunistic sampling of hunted wildlife, active

(spumavirus, T-cell lymphtropic viruses, lentiviruses)		sampling of free-ranging wildlife, community-based human surveillance of high risk populations to detect early spread
orthomyxoviruses (influenza)	birds, suids, carnivores, nonhuman primates	active sampling of free-ranging live birds and opportunistic sampling of hunted birds, syndromic surveillance of mortality events
coronaviruses (SARS-like viruses)	bats, carnivores, small mammals, nonhuman primates	opportunistic sampling of hunted wildlife, active sampling of free-ranging live bats and small mammals
paramyxoviruses (henipaviruses)	bats, suids, nonhuman primates	opportunistic sampling of hunted bats, active sampling of free-ranging live bats
filoviruses (Ebola and Marburg virus)	bats (reservoir), other forest mammals including nonhuman primates (spill-over)	opportunistic sampling of hunted/traded wildlife, syndromic surveillance of wildlife mortality events, active sampling of free-ranging live bats
arenaviruses (lassavirus, Lujo virus)	rodents, small mammals	active sampling of free-ranging small mammals
lyssaviruses (rabies and rabies-like viruses)	bats, carnivores, insectivores	opportunistic sampling of hunted bats, active sampling of free-ranging live bats, insectivores, and carnivores
flaviviruses (JEV, Chikungunya, West Nile virus, yellow fever virus)	bats, birds, suids, nonhuman primates	active sampling of free-ranging live birds, bats, suids, nonhuman primates, and syndromic surveillance during mortality events
bunyaviruses (hantavirus, Rift Valley Fever)	rodents, ungulate, bats, nonhuman primates	active sampling of free-ranging and traded rodents, other wildlife
bacteria (anthrax, Tb, brucella, leptospira, and certain antibiotic resistant bacteria) and protozoa	ungulates, nonhuman primates	active sampling of free-ranging live wildlife and opportunistic sampling of hunted/traded wildlife and the environment
pathogen discovery	nonhuman primates, rodents, bats, birds	selective advanced diagnostics for specimens suspected of carrying novel pathogens

Our **SMART Surveillance strategy** in each hotspot region will:

- Build on existing programs to target sentinel wildlife taxa in regions with a disproportionately high number of zoonotic pathogens that have potential to cause epidemics in at-risk human populations;
- Use **written standards and best practice protocols** that can be adaptively managed to ensure collection of high-quality samples (such as whole blood, dried blood on filter-paper, serum, tissues, and swabs), safe and humane capture of wild animals, and standardized collection of field data (species, age, sex, GPS location, date, sample type, and outbreak indices) so that data can be compared across regions for rapid disease forecasting;
- Integrate sample and field data, as well as local data on human, domestic animal, and environmental factors (habitat and climactic conditions, resource availability, biodiversity trends, and domestic animal and human encroachment) into the first-ever **global, open-access online information-sharing platform for wildlife pathogens** (see Objective 5) to allow countries to monitor risk factors related to zoonotic disease emergence and spread, and to disseminate information to stakeholders and the public;

- **Optimize local diagnostic testing capabilities** for target pathogens by ensuring proper sample storage through cold-chain technology, availability of reagents, and evaluation of diagnostic tests for sensitivity and specificity, using either maximum likelihood or Bayesian analytical techniques to ensure surveillance efforts produce prevalence estimates with a quantifiable level of confidence;
- Test samples on a "real-time" basis to permit **outbreak detection and forecasting of public health threats, and to establish an adaptive sampling strategy** that can deliver enhanced surveillance when unusual patterns are observed and that can accommodate surveillance at new hotspots through in-depth modeling and risk analyses (Objective 2);
- Ensure proper **spatial and temporal distribution** of routine sample collection and **appropriate sample size** for all surveillance activities, while accounting for expected pathogen prevalence, heterogeneity of disease risk, and clustering or correlation of samples in wild animal subpopulations;
- Respond to regular **evaluations of surveillance methodology, efficacy, and in-country policy support** (Objective 1), so that we can adjust our active, opportunistic, and syndromic surveillance activities for the most efficient and effective early detection of emerging zoonotic pathogens in wild animals;
- Assess **human behaviors related to disease emergence** through standardized questionnaires and surveillance protocols that will obtain data on human exposure to wildlife, high-risk behaviors, techniques used to handle wildlife and wildlife products, economic conditions, and resource availability, while carefully considering gender-based roles and cultural practices;
- Intensify field data collection in very high-risk emerging disease situations and outbreaks to collect information on wild animal distribution, movements, migration, connectivity, and contact with domestic animals and humans to better understand pathogen dynamics, ecological drivers of pathogen emergence, and **wild animal systems involved in disease emergence**;
- Enhance surveillance at **ecological hotspots with multiple high-risk interfaces**, such as large-scale farming operations near wildlands or watering holes utilized by a range of wild animals, domestic animals, and humans;
- Deploy active protocols to sample people who hunt and butcher wild animals and to characterize pathogen strains **that have spilled over into human populations**;
- Focus surveillance activities on the range of known **zoonotic pathogens** with high potential to cause devastating effects on global health, yet their origin, epidemiology, distribution and wild animal reservoir hosts remain largely unknown; and
- Discover **novel zoonotic viruses** using state-of-the-art novel pathogen discovery techniques (Objective 4) by sampling peri-urban rodent, carnivore, avian, primate, and bat species from each hotspot region.

2) <u>Geographic Focus</u>

Surveillance activities will focus on 23 key countries in the USAID high-priority regions, as well as Mexico (see Organizational Chart and Partner Table below). Our team has long-term local presence and well-established partnerships with local public health, veterinary, environmental, and wildlife agencies in these countries, where disease emergence is most likely. Through ongoing training and surveillance activities, we have developed cultural and regional sensitivity and unparalleled understanding of current capacity. We will now extend our partnerships to create a cooperative, standardized, cross-regional surveillance system for identification, monitoring, and prediction of emergent infectious diseases that threaten public health.

Our SMART Surveillance strategy will not only target ecological hotspots within the USAID high-priority regions, but it will be highly responsive to new data on hotspots and human- and animal-related triggers for targeted enhanced surveillance. Our PREDICT team has already engaged stakeholders to support surveillance activities in all high-priority regions. Initial surveillance activities will focus upon:

- Southeast Asia (including southern China): densely populated tropical zones with extensive habitat modification and a flourishing wildlife trade, and unprecedented level of contact across the wildlife, livestock and human interfaces; proven rich grounds for emerging zoonotic pathogens including SARS coronavirus, Nipah virus, highly pathogenic H5N1 avian influenza, and Ebola Reston.
- Gangetic Plain: wet markets in India; pteropid bat colonies and birds migrating through the region, where outbreaks of avian influenza (H5N1) and Nipah virus have been recently documented.
- Congo Basin and Rift Valley: areas where humans living at high densities contact wildlife through the massive bushmeat harvest which has enabled filoviruses, such as Marburg virus and Ebola virus, and retroviruses, such as HIV, to emerge into human populations, and where wildlife, livestock, and pastoralists commonly use shared water resources.
- Amazon Basin (and Mexico): global travel destinations with areas of deforestation and indigenous communities that rely heavily on bushmeat for food, and in which the contact among wildlife, domestic animals, and people is most intense – where hantavirus, bat rabies, and yellow fever tend to recur; includes possible new hotspot for disease emergence, as evidenced by the recent H1N1 pandemic.

Objective 4: ***Introduce new technologies where they are appropriate and sustainable***

Key to our success is the intelligent application of technology that facilitates disease surveillance in developing regions and specific countries. First, we will develop an evidence-based understanding of the capacity to support wildlife surveillance (Objective 1). Assessing available systems in these regions and determining new technologies that might successfully be deployed will be an important part of this process, as technology will inevitably play a crucial role in overcoming barriers to the implementation of a successful and SMART wildlife surveillance system.

Technological advances have impacted a broad range of disciplines that necessarily overlap in disease surveillance, especially in regard to identifying and monitoring for agents that represent potential zoonotic threats before they enter into the human population. Such advances include tools that enable us to: 1) gather intelligence on wildlife populations, 2) collect biological specimens, and 3) conduct sophisticated laboratory analyses to rapidly advance pathogen detection. Our team members have, over the course of decades and in diverse regions throughout the globe, pioneered the use of these technologies to explore the human/animal interface of disease emergence — experience that will be invaluable in developing capacity in the PREDICT effort. We will leverage this expertise to determine the appropriateness of available technologies. Combined with the modeling approaches highlighted in Objective 2, and the aim to improve the management of information (Objective 5), these technologies will serve to significantly extend the SMART Surveillance capacity in hotspot regions.

1) Wildlife Tracking and Intelligence-Gathering Technology

One of the challenges of working within resource-limited settings is the lack of infrastructure to support systems necessary for wildlife surveillance. Communication networks that allow for the rapid dissemination of information are often unreliable, or even nonexistent. By establishing partnerships with organizations such as FrontlineSMS, NetHope, and MobileActive.org — entities with expertise in this arena — we will enable technologies to **facilitate rapid communication in support of disease surveillance** in our target regions.

For instance, a major advancement in information technology has been the application of tools to send and receive data via **Short Message Service (SMS)** using cost-effective handheld devices. Our One Health team has extensive experience in the use of SMS-based systems to collect real-time field data in support of ongoing research efforts. This experience includes the use of FrontlineSMS:Medic, a comprehensive rapid communication system for the support of health-care delivery and disease surveillance in the most rural and remote regions of the developing world. This system is easily adaptable for use in the surveillance of wildlife in regions without the infrastructure to support other communication methods. We are currently piloting this technology in the Congo Basin to monitor animal die-offs in remote regions that may be precursor events to human outbreaks of emerging infectious disease. By giving a low-cost phone to individuals in a position to witness such events (hunters, game scouts) and training them to text message when an *en masse* animal die-off is encountered, SMART Surveillance activities may be directed in a cost-effective manner. Personnel at a central location can be automatically notified of an animal die-off by keywords sent via SMS, which will decrease the communication lag often associated with outbreaks, and can request additional information as needed. If this technology is paired with a camera phone, an individual can also send images of animal mortalities for identification of species involved and diagnosis of clinical manifestations important to trigger **syndromic surveillance** (Objective 3). Additionally, location data embedded in the transmission itself, via **GPS-enabled smartphones**, can pinpoint events, which may then be mapped geographically. Importantly, real-time data, collected using this method, or others like it, may be used to parameterize models (Objective 2) or be compiled with other data to inform the decision-making process in predicting outbreaks (Objective 5).

Where outbreaks of diseases repeatedly occur in focused geographic areas with microchiropteran bats (as in SARS-like coronavirus situation), we will develop a catalog of microchiropteran species present prior to and during outbreaks in order to target surveillance. Ongoing surveys of microchiropteran bats using **echolocation detection and recording devices** will be conducted using local assistants, who will need only limited training. Ultrasonic echolocation clicks made by bats while navigating are unique to species, and digital recordings of these clicks can be easily made on self-contained portable units. The recordings can be quickly transferred by email to an expert who, with reference to libraries of recordings, can identify species present. Our team members have been developing this technique as a means of measuring bat abundance based on call frequency. Such an approach could also be used to identify areas for surveillance of a target bat species and has the advantage of permitting safe, semi-remote collection of data by assistants during outbreaks in high-risk areas prior to the arrival of expert teams.

Lightweight satellite telemetry devices, platform terminal transmitters (PTTs), will be used to track the movements of small migratory animals. Satellite telemetry technology has dramatically advanced, particularly with the development of lightweight and solar-powered PTTs that weigh as little as 12 grams. Though expensive, satellite tracking has the advantage of facilitating tracking remotely over great distances. The system uses the National Oceanic and Atmospheric Administration's polar orbiting environmental satellites (POES) and the

EUMETSAT and MetOp satellites to determine and report the location of the wildlife transmitter. Using this method, the movement of fruit bats has been recently linked to Ebola and Nipah virus transmission, and tracking the movements of identified sentinel species may serve as an important trigger for preventive actions.

Wildlife movement (origin or recent habitat use history) may be tracked by **analyzing tissues for isotopic composition**. Ratios of stable isotopes of naturally occurring elements (e.g., C, N, H, O, Sr) vary across landscapes in systematic and predictable ways and often at continental scales. Stable isotopes in the local environment are incorporated into plants during nutrient uptake and passed through local food chains. Thus, the isotopic composition of animal tissues (i.e., blood, hair, feathers) at higher trophic levels reflects recent variation in diet and habitat use. The resulting geographic variation in stable isotope ratios then provides the basis for determining the geographic origins of migratory populations across seasons and space. Isotopic markers are independent of genetic (e.g., meiosis) processes and have great potential for identifying the source area from which an individual may have come.

Wildlife movement will also be tracked using tissues obtained for **population genetic analyses**. Genetic inference of animal movement and population connectivity is advantageous due to low cost per individual, non-invasive sampling (e.g., dung, hair, or feathers), and, thus, facilitation of collection and analysis of large sample sizes. Novel and powerful genetic tests allow populations of origin to be determined with confidence, and first-generation migrants to be detected. Our experienced team will use these genetic data to parameterize models with wildlife contact rates and population connectivity. Moreover, our previous analyses found that bat species with higher levels of population genetic structure harbor a greater diversity of known viruses. Genetic data may be valuable in predicting viral richness among wildife taxa (Objective 2). Genetic samples can also be used in conjunction with existing DNA “barcoding” databases (e.g., GenBank and Consortium for the Barcode of Life) to accurately identify the wildlife species involved in disease outbreaks.

2) Wildlife Capture, Restraint, and Specimen Collection

Conducting disease surveillance on free-ranging wildlife presents several challenges not present with domestic livestock: namely the difficulty of getting close to a wild, often dangerous, animal to collect biological samples. To combat this obstacle, we will adapt anesthetic dart-gun systems, such as the Telinject system, to collect **tissue biopsies from wild, free-ranging animals** — a method pioneered by PREDICT team members. In other cases, appropriate anesthetic agents can be used to provide safe chemical restraint for sample collection using **specialized drug-delivery systems**, such as Dan-Inject, Pneu-dart, and Paxarms. We have extensive experience using and instructing individuals in the use of effective chemical anesthetics, such as alpha-2 adrenergics (including medetomidine and xylazine), carfentanil, and the newer tiafentanil. Our One Health veterinary field teams will also use portable gas anesthesia in remote settings for safe and reversible wildlife restraint where appropriate, as with bats.

Importantly, the PREDICT team will also employ existing technologies in novel ways to support SMART Surveillance activities. These technologies may be simple “low-tech” solutions, like the application of filter paper (e.g., **Dried Blood Spot Cards**) technology to collect samples from the field. The primary advantage of this technique is that it does not require cold chain, a key consideration when sampling in remote locations or field sites. Samples can be shipped at ambient temperature, relieving the high costs and training requirements of dangerous goods training, specialized packaging, and heavy secondary shipping material (dry ice). Because the specimens are transported in a dried state, they also pose much less of a biohazard risk during

handling. This technique has been extensively tested by PREDICT partners to sample large numbers of wild animals in remote areas. By providing instructions and filter papers to hunters, wet market workers, and other people working at the human–animal interface, tens of thousand of specimens have been archived, in some cases representing the most comprehensive collections of wildlife samples available within viral hotpot regions. Although there are limitations to filter papers, they have proven very successful for the identification of both known and novel disease agents; filter paper specimens resulted in the discovery and sequence analysis of the full-length genome of a novel and highly divergent STLV-3 from hunted nonhuman primates in central Africa and novel malaria species from bats in Southeast Asia. Our PREDICT team also has extensive experience tracking samples in resource-limited settings, including barcode labeling, manual tracking systems, and other electronic tracking systems (see Objective 5).

3) Pathogen Detection and Discovery Technology

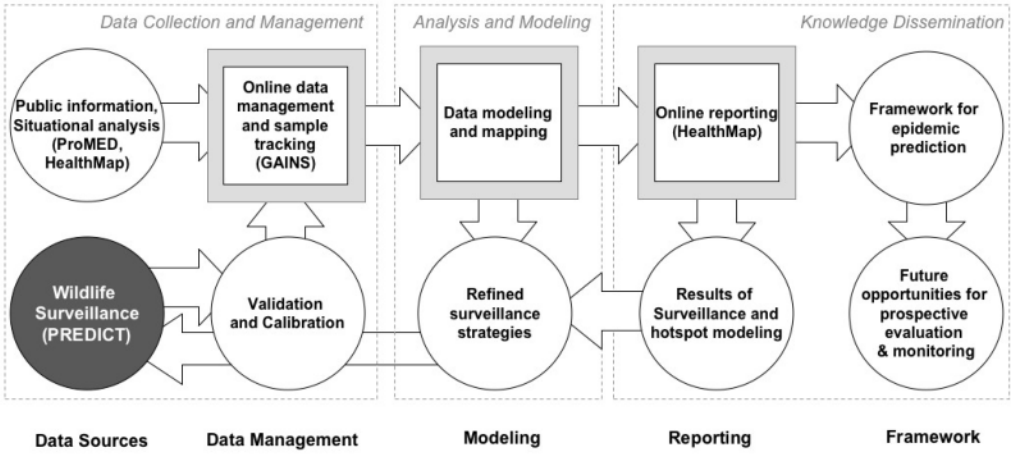
Building capacity to detect disease-causing agents in wildlife samples collected in the targeted regions and countries will be an important measure of the ultimate success of PREDICT. Our expert team will employ developing technologies for known and novel pathogen discovery. Resource-limited settings often present unique barriers to the analysis of biological specimens. Not least among these barriers are the logistical challenges of collecting specimens in remote areas and transporting them to laboratories in regions where roads are either in poor condition or are nonexistent, and the maintenance of a reliable cold chain is difficult at best. With these considerations in mind, a priority of the PREDICT team will be to identify and deploy proven **"field-adaptable" analytic tools** in settings that simply do not support the transportation of biological materials to central laboratory testing sites. Implementing such technologies will eliminate the logistically complicated need to transport specimens from the field, and will alleviate the demand on centralized laboratories to process samples. Moreover, transfer of these technologies and associated training will build the local capacity necessary for pathogen detection in these resource-poor countries. Through established collaborations, including those with the private sector, PREDICT team members have unique access to critical reagents and safety-tested, field-deployable, laboratory diagnostics that are NOT commercially available, including **ELISA, real-time PCR assays, and rapid point-of-care diagnostics** for zoonotic pathogens, including RNA retroviruses (e.g., HIV), corona viruses (e.g., SARS), filoviruses (e.g., Ebola and Marburg), and Nipah virus. We have already field-tested these tools, and we will continue to evaluate and validate these and other field diagnostic tools.

Our experts, including (b)(6), lead the field of pathogen identification and discovery using **state-of-the-art molecular techniques**. In cases where samples collected from a wildlife outbreak are negative for known agents by conventional methods, we will use advanced diagnostics to identify pathogens. The first step in the discovery process is **MassTag PCR**, an inexpensive high-throughput system for the detection of a broad range of pathogens. The next step is the use of **DNA microarrays**, including those that probe for all known vertebrate virus families. Finally, we will use **high-throughput sequencing (HTS)** to enable pathogen discovery of undefined pathogens. PREDICT scientists have extensive experience with HTS, and have already identified many previously uncharacterized viruses using this technique. A challenge in using HTS methods is that these analyses generate a large amount of nucleotide sequence data. It will be critical to build capacity in target regions to meet the bioinformatics challenges associated with managing these and other large data sets. Our team members will build this capacity by providing training in **analytical bioinformatics** and **phylogenetic analyses**.

Objective 5: ***Improve the flow and handling of information, specimens and samples***

We will improve the access to accurate, comprehensive, and timely surveillance data critical to predicting and responding to emerging diseases of wildlife origin. Information must be readily accessible and flow seamlessly across institutional, disciplinary, and international boundaries. Likewise, archived samples from a particular species and region must be properly maintained, easily identified, and readily available for further analyses in order to confirm a pathogen's role in an emerging disease outbreak. We will build on our Information Management team's demonstrated strengths and experience, which includes ProMED, Healthmap, GAINS, Google, Veratect, and other public and private partnerships, to produce **the first, comprehensive, open-access, wildlife disease surveillance data management and distribution system with global reach.** For ease of conceptualization, we divide information flow into three compartments (Figure 3); however, we recognize that information flow will be dynamic and the boundaries among these categories will be fluid. The first and third compartments (covering data collection, management, and dissemination) are elaborated here, while the second is described in Objective 2.

Figure 3. Proposed data and information flow for PREDICT activities.



Compartment #1 - Data Collection and Management: Collection and integration of standardized data from wildlife surveillance and public information sources is a key goal of this project. We will develop protocols and conduct training to ensure that standardized surveillance data is collected and recorded by all PREDICT partners. Surveillance data alone may be insufficient to detect novel events, and publicly available information (ProMED and Healthmap) on emerging diseases will be collected, geo-referenced, and integrated with surveillance data. We will use multidimensional data warehouse and data mining approaches for data quality control and validation, imputation of missing values, and feedback reports to project partners (Validation and Calibration stage; Figure 3). Data will be integrated and managed within the open-access GAINS system, and provided to the modeling team (Objective 2) and local project partners. Developed with funding from USAID and CDC to track avian influenza in wild birds, GAINS is a collection of open- and closed-source applications that provide mechanisms for input, management, and visualization of data. This flexible system will be expanded to manage information on samples to facilitate sharing and use in retrospective studies. We have extensive experience in sample tracking in resource-limited settings, and are working with information technology experts from various institutions and organizations to develop a state-of-the-art sample repository and tracking database that will be remotely accessible by all authorized staff or collaborators all over the world. We will deploy optimal sample tracking systems, including barcode labeling, manual tracking system, and in-house and commercial electronic tracking systems, in countries to support SMART Surveillance of emerging pathogens. Wherever possible and cost efficient, tools will be developed under an open-source license to facilitate

sustainability, third-party development, and usage. Locally appropriate policies on data ownership, governance, and release will be developed in collaboration with host-country officials, partners, and USAID.

Compartment #2 – Analysis and Modeling: Raw data collected from the field must be quickly analyzed, summarized, and then presented in a form useful to stakeholders and partners (described fully in Objective 2). In the operational setting, we will convert results and predictions into advisories and warnings for senior decision-makers in international, national, provincial, and local governments and non-governmental organizations involved in outbreak response and risk communication to the public.

Compartment #3 – Knowledge Dissemination: Dissemination of data, analyses, and predictions to animal and human health practitioners and policymakers is key to interrupting the emergence of zoonotic diseases from wildlife into humans. We have identified an unprecedented opportunity to create a new framework that leverages an existing surveillance platform (Healthmap) for modeling and dissemination of surveillance data on emerging diseases. We plan to develop new methods for dissemination of alerts that include user information control and tiered access to detailed information. Guided by experts from our multilingual international Information Management team and technical advisors (see Management and Evaluation for description of Technical Advisory Committee), we will conduct comprehensive user testing, usability studies, and behavior analysis. Critical to our success and establishment of policy to support wildlife surveillance capacity will be the creation of communication loops to directly feed back information and results to stakeholders, and the development of online forums to build a connected community of animal and human health workers for informal exchange of expertise, experiences, and information. In the area of data visualization (mapping), we will move beyond the map view to allow the user to display disease information, including search results, in a variety of graphical formats. For example, we plan to develop an interactive timeline view to present a richer perspective of how sequences of reports occur in different outbreaks. We will also build tools to organize data across different dimensions and allow users to tailor the view according to what they may find to be most important or relevant. Training materials will be developed to instruct host-country nationals on the use of the system. This effort will provide a new, comprehensive picture of emerging disease risks at a global scale.

Bulletins on emerging disease situation alerts will be distributed to in-country officials on an as-needed basis, and quarterly reports will be provided to local, regional, and national ministry staff and officials. PREDICT staff will assist with policy and protocol development for disease notification by liaising with WHO, OIE, and FAO counterparts and country authorities, and by holding annual meetings with key stakeholders. Political sensitivities surround the release and dissemination of disease data. Appropriate policies that respect host country policies and procedures on data release and ownership will be developed in conjunction with stakeholders; the PREDICT team has many years of experience managing this issue. Data dissemination tools will be integrated with RESPOND to allow synergy across these USAID arms. In-country PREDICT staff will train local officials in the interpretation of surveillance and modeling results, and will serve as a primary resource for interpretation of animal and human health information in order to improve policy decisions made by ministries and other stakeholders, including providing advice on policies and sustainable technologies surrounding disease notification.

Expected Long-Term Benefits of Our Information Management System

Our online platform for information management will develop the framework for a sustainable, global, early-warning system for the detection and prediction of emerging diseases that threaten human health. This system will significantly improve the identification, management, and, ultimately, prevention of zoonotic disease emergence by:

- *Providing tools to track samples and results, and manage large amounts of field data;*
- *Ensuring stakeholder access to data on surveillance activities, and timely feedback on results and interpretation of findings;*
- *Establishing online systems for visualization and communication of disease risk through interactive maps, alerts, bulletins, and online forums; and*
- *Increasing access to information and knowledge on the risk and occurrence of zoonotic disease threats of wildlife origin across the global health community.*

The platform outlined here will allow human and animal health practitioners unprecedented access to the data necessary to manage risks of disease emergence. The "intellectual" added value of the results of risk analysis and modeling — the visualization tools — combined with the “real-world” experience and commentary of the health professionals on our team will provide the guidance and recommendations critically needed to predict, detect, monitor, and ameliorate zoonotic disease emergence.

Cross Cutting Themes in PREDICT activities

Our PREDICT team has the highest level of expertise in zoonotic pathogens, risk modeling, wildlife surveillance, and information management in the world (see Staff resumes and biosketches and Partners section below). We have **demonstrated technical leadership** and evidence of success coordinating large programs with many stakeholders, implementing **global wildlife surveillance systems**, and **maintaining highly productive partnerships** in the developed and developing world. With a few notable exceptions, national surveillance programs in hotspot regions either do not exist or have not had the capacity to address the substantial infectious disease risks posed by contact with wildlife. By involving government and non-governmental partners in surveillance, risk assessment, and information management activities, this project will increase awareness and provide stakeholders in targeted countries practical skills that will promote a comprehensive, standardized, sustainable framework for monitoring and preventing the emergence of zoonotic pathogens. Our PREDICT activities will emphasize long-term policy interventions to ultimately minimize zoonotic disease emergence risks. Our team has a proven track record of building sustainable capacity in wildlife surveillance in the USAID hotspot regions, and has served USAID through both the GAINS and STOP AI Programs. Our new, PREDICT SMART Surveillance program will greatly advance the ability of countries in hotspot regions to develop significant and sustainable improvements in wildlife surveillance capacity for the prevention of zoonotic disease emergence.

We will **build global capacity** to detect and monitor emerging zoonotic disease by investing our resources in hotspot country training, technology transfer, and expansion of sustainable infrastructure for wildlife surveillance, emerging pathogen detection, disease forecasting, sample tracking, laboratory methods, novel technology use and development, and information management. Capacity in wildlife surveillance has been significantly improved in recent years with USAID-led initiatives and partnerships developed to monitor and prevent the spread of highly pathogenic H5N1 avian influenza. In fact, members of our PREDICT team have led many of these initiatives and objectives in collaboration with USAID (see Past Performance

section below). We plan to build on these programs and other established platforms and to work directly with WHO, FAO, and OIE to expand existing laboratory networks and diagnostic capacity in hotspot regions. Through close coordination with USAID awardees for initiatives, such as PREPARE and IDENTIFY, the PREDICT team will greatly enhance local laboratory diagnostic testing capacity in regions that can support state-of-the-art technologies aimed at detecting both known and unknown disease agents. These more advanced technologies will first be oriented regionally and training will be expanded to ensure sustained capacity through training Centers of Excellence, so that they may serve as models for further expansion into other countries. The PREDICT team has used the complete range of diagnostic testing applications (state-of-the-art molecular and serologic tests) to screen for pathogens in humans and animals all over the world. The PREDICT team plans to intimately link our efforts with those of IDENTIFY and RESPOND to improve the efficiency and sustainability of wildlife surveillance and emerging pathogen detection through increased awareness at all levels, establishment of local experts, development of career paths in ministries and NGOs, and increased mechanisms for informed policy making.

Stakeholder involvement and development of a broad training program that includes local health workers in all aspects of PREDICT activities are the best ways to ensure long-term sustainability of this program, create shared understanding of disease risks posed by anthropogenic activities, and develop local policies to support wildlife surveillance activities and, ultimately, prevent disease emergence. To build this local capacity, our training programs will be designed to complement those of RESPOND. We will integrate training opportunities at all levels of our PREDICT program through specific partnerships with governments, universities, targeted agencies and ministries, and appropriate NGOs across all regions. In particular, we expect to partner with existing field epidemiology training and public health programs, such as the African Field Epidemiology Network in Uganda, and International Group for Epidemiology and Response in Southeast Asia.

PREDICT training programs and modules will be standardized across all regions to the extent possible in order to ensure a complement of capacities across the sites, and to ensure that samples and data collected by trainees in different sites are comparable for analysis. **Gender roles and cultural standards** will be considered carefully with respect to their influence on risk of exposure to wildlife pathogens and the subsequent spread of zoonotic diseases. Our PREDICT team members have identified specific gender-influenced risk factors for zoonotic disease in rural and peri-urban African settings and will investigate corresponding risk factors in other hotspot regions. We will balance training and capacity-building efforts, with special consideration given to ensuring the full participation of willing women and underrepresented minorities. Our team is comprised of men and women from all regions, and women and minorities occupy key positions in all levels of our organizational structure. We will, therefore, also lead by example, providing positive, professional role models and a safe and comfortable environment for learning. All team members and trainees will be prepared to conduct gender and culturally sensitive surveillance activities and outbreak investigations so that critical information is not missed.

The **PREDICT Training** program — in the form of short-courses, as well as on-the-job, community, and student field training — will build long-term sustainability of SMART Surveillance activities. Long-term field training will include topics such as safe and humane live animal capture, sample collection, handling and storage of pathogens and diagnostic samples, disease detection and investigation, field diagnostics, and data analysis and interpretation. Training in the use of the field techniques, including sampling and mobile diagnostics and new

technologies (Objective 4), will be emphasized in each region. Best practices and high standards will be followed to ensure human and animal safety in all training activities, including:

- ***On-the-Job Field-Training Program-*** Many of the PREDICT surveillance tasks are specialized, such as wildlife capture and necropsy and associated high-quality sample collection. On-the-job field training will provide the specific, hands-on training important for developing proficiency in surveillance-related field skills. Participants that gain academic, curriculum-based training through PREDICT and RESPOND will be embedded in PREDICT surveillance teams to guarantee experiential training. The PREDICT partners will train surveillance staff while implementing many of the surveillance activities and programs, increasing efficiency of training while implementing surveillance.
- ***Short-Course Training***- We will partner with local Field Epidemiology Training Programs (FETPs), university-based continuing education training programs, and ministry in-house training programs to conduct training to support the implementation of PREDICT SMART Surveillance. In-country short-course training will include orientation to wildlife/livestock/human disease interactions; active, opportunistic, and syndromic wildlife surveillance techniques; and suspected outbreak reporting. Short-courses will involve interactive exercises and field practicals. Where appropriate, we will also coordinate with RESPOND to implement short-course trainings or add appropriate topics to RESPOND degree training. The short-course trainings will be tailored to specific trainee audiences (e.g., ministry-level officials, local communities) and care will be taken to choose appropriate trainees, maintain gender balance, and ensure core competencies are attained. We will schedule on-the-job field training to immediately follow short-courses.
- ***Graduate Student Field Training*** - Graduate students from universities in target regions will be recruited to conduct their research in association with the SMART surveillance activities, including collection and analysis of animal capture and observation data, evaluation of diagnostic data, epidemiology, data analysis, and modeling of disease risk. Each student will be supervised by a professor at the local university and a surveillance technical team member. This graduate student program will increase the involvement of local educational institutions, and produce competent technicians and professionals available for surveillance research teams in the regions.
- ***Special Skills Development*** - In some regions and countries there may be a lack of qualified people to conduct some of the highly technical surveillance-related tasks, such as pathology on wild animals and infectious disease epidemiology. As needed, we will coordinate with the RESPOND team to build capacity in required disciplines for effective and sustainable wildlife surveillance. Skills development may include providing internship-type training outside of the hotspot regions for talented and dedicated individuals who are guaranteed to return to their country of origin.
- ***Community Training and Outreach*** - We will hold short-term training sessions with local communities living in high-risk wildlife interfaces to introduce them to the concept and concerns surrounding emerging infectious diseases. Topics covered will include appropriate sanitary measures, food safety, biosafety, and reporting of wild animal die-offs.
- ***Short-Course Curricula Design*** - We will assemble a curriculum-development team of technical experts and adult education specialists — including experts from hotspot regions — to design and develop the zoonotic disease-surveillance training modules, training videos, and field manuals to support specific surveillance activities. Our team will develop basic training modules that contain standardized information and protocols

relevant to all regions of world, but the modules will be flexible enough to meet local training needs, socio-economic conditions, varied requirements of diverse surveillance tasks and settings, and regionally relevant disease priorities. The team will also evaluate training results and make curriculum adjustments and updates as needed. All partner organizations responsible for in-country surveillance will be involved and have budgeted training into their subcontracts.

- ***Training Management System*** - We will establish a system for tracking individual learning achievements of core competencies and special skills among all persons trained in short courses and in the field under the PREDICT SMART Surveillance program. A skills achievement card, with a checklist of competencies, will be completed for all trainees.

c. MONITORING AND EVALUATION

The PREDICT team has designed a monitoring and evaluation plan to streamline the establishment of a global early-warning system that detects, tracks, and predicts the emergence of new infectious diseases that could pose a major threat to human health, including monitoring wildlife in their natural habitats, investigating market trade of wildlife and other hot human–wildlife interfaces, surveying wildlife products and foods, and characterizing the risks associated with bushmeat. Our One Health partners have combined relevant USAID agency indicators with those identified through our extensive wildlife surveillance and emerging-disease experience in the target countries to create project indicators that will quantitatively demonstrate how the proposed workplan will contribute to the PREDICT goals through the five objectives and cross cutting themes. We designed these activities and indicators to be focused on programmatic outcomes and impact. A detailed metric of success measures, as well as evaluation time-lines (described quarterly, semi-annually, and annually), is provided in Annex F.

We will evaluate our surveillance activities by adapting models, such as the “Updated Guidelines for Evaluating Public Health Surveillance Systems,” developed by the CDC, to address the challenges associated with monitoring wildlife and identifying new diseases, as outlined in our Capacity Assessment Protocol (Objective 1). We will gather local and external knowledge to develop the capacity-assessment tool and will conduct initial and repeated capacity assessments through this instrument to ensure ongoing development in the hotspot countries and adaptive management of the SMART Surveillance Program. Annual PREDICT meetings in the hotspot regions will allow Supervising Coordinators of all objectives to come together with the Country Coordinators and the Senior Management Team for open communications and ongoing improvement of the PREDICT Program. Leaders of PREPARE, IDENTIFY, RESPOND, and PREVENT will also be invited to participate, as well as key USAID staff. Site visits by the Senior Management Team will also be conducted as necessary to keep PREDICT on track. All of our monitoring and evaluation data will be provided to USAID evaluation systems, such as the Avian Influenza Monitoring, Evaluation and Budget Analysis (AIMEBA) system or other system as directed by the Agreement Officer’s Technical Representative (AOTR). During the first 30 days of project implementation, PREDICT key personnel will work with USAID to further refine the proposed Monitoring and Evaluation Plan.

In addition to any evaluations prescribed or provided by USAID or other US Government agencies, we have established a two-tiered evaluation system consisting of a Technical Advisory Committee (TAC) and an executive board (EB). The proposed Technical Advisory Committee (PREDICT-TAC) members were selected because they provide a range of interdisciplinary experience and knowledge across the entire spectrum of emerging disease issues facing humans, domestic animals, and wildlife. The PREDICT-TAC will meet quarterly by

teleconference and in-person at the Annual Meeting. The Executive Board (PREDICT-EB) is comprised of the legally accountable lead implementation organizations. Qualifications and past experience for our PREDICT-EB are shown in the Past Performance section, as well as in their *curricula vitae* and biosketches (Annex A and B). The PREDICT-EB will meet by teleconference at least monthly for the first six months and as needed thereafter, but not less frequently than quarterly.

The proposed PREDICT Technical Advisory Committee (PREDICT-TAC) will be composed of:

- (b)(6)
- Member to be appointed by USAID.

The proposed PREDICT Executive Board (PREDICT-EB) will be composed of:

- (b)(6)

2. STAFF

a. KEY STAFF (see Organizational Chart below and Annex A for Resumes, References and Signed Letters of Commitment, including proposed effort and available start date):

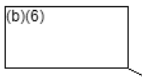
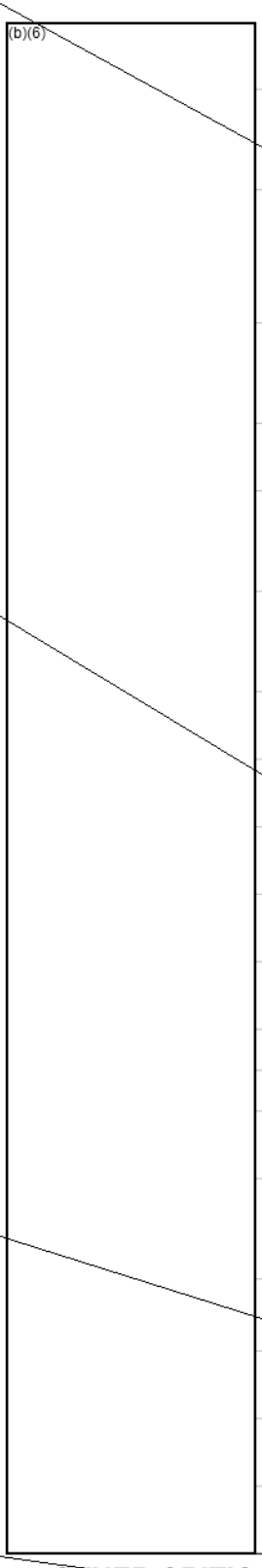
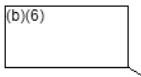
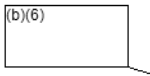
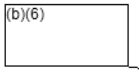
(b)(6)

(b)(6)

b. OTHER STAFF: The PREDICT team is made up of world-class wildlife surveillance experts from the core partner organizations described in Organization and Management section below. The team will be managed by the Director and will operate across institutions much like the Incident Command System, with which all of our team members are familiar. Subcontracts to core partners will provide salary support for positions at the percent time documented below, and will be managed through the UC Davis-based administrative core. All staff positions supervising activities described in the objectives are included in the organizational chart in the next section and are detailed in the Supervising Coordinators section of the table below. Country Coordinators who have been pre-determined are also named. Finally, the remaining staff critical to the success of the PREDICT program are detailed in the Other Critical Staff section of the table.

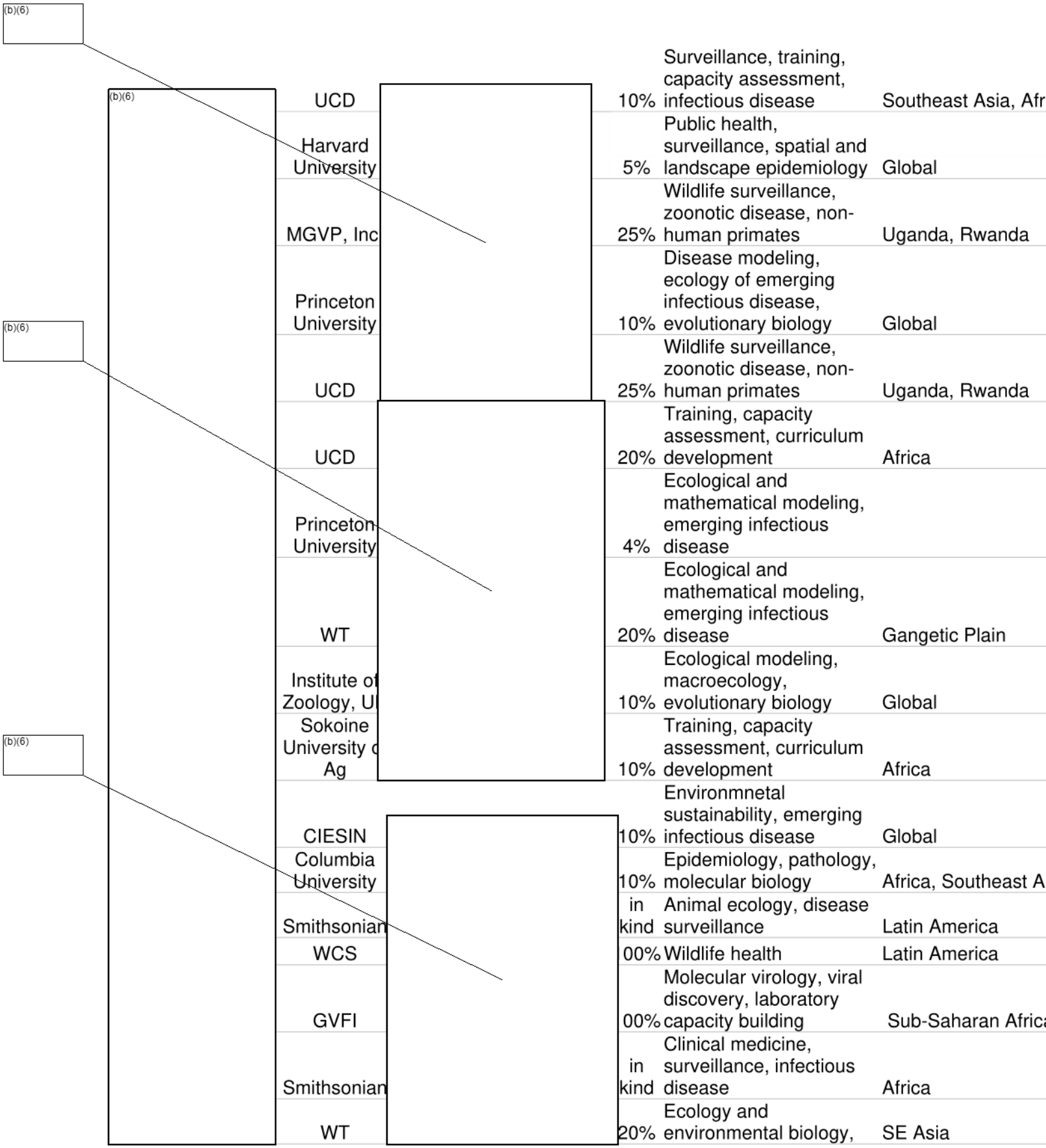
Table 3. Other Staff (see Annex B for biosketches)

Name	Organization	Position	% Time	Areas of Expertise	Geographic Regio of Experience
SUPERVISING COORDINATORS					
(b)(6)	UCD		50%	Capacity assessment, training, infectious disease epidemiology	Africa, South Ameri
	WT		17%	Emerging infectious diseases, conservation medicine, disease modeling	Global
	GVFI		75%	Molecular biology, laboratory capacity building, protocol development	Congo Basin
	GVFI		75%	Molecular virology, laboratory capacity buildlng, biosafety training	Sub-Saharan Africa
	WCS		55%	Wildlife health, emerging disease surveillance and reporting, database management	Africa, Asia
(b)(6)	UCD		50%	Training, curriculum development	Africa, South Ameri
	WT		25%	Wildlife surveillance, conservation medicine, wildlife health	Amazon Basin, Mexico, Southeast Asia
	WT		25%	Wildlife health, public health, emerging zoonotic disease	Gangetic Plain, Chi
	WCS		70%	Wildlife health, disease surveillance	Amazon Basin, Cor Basin, Gangetic Pla
	GVFI		50%	Virology, epidemiology, capacity building, surveillance	Africa, Southeast A
(b)(6)	UCD		50%	Wildlife epidemiology, zoonotic disease surveillance	Africa, Latin Americ
COUNTRY COORDINATORS					
(b)(6)	WT		80%	Conservation medicine, ecology, environmental biology, zoology	Brazil
	WT		80%	Veterinary medicine, epidemiology, wildlife ecology	Colombia

WT		80%	Emerging infectious disease surveillance, avian influenza specialist	Venezuela
WT		80%	Veterinary pathology, epidemiology, surveillance	Mexico
WT		80%	Ecology of emerging zoonoses, veterinary epidemiology, Nipah virus specialist	Bangladesh
WT		80%	Conservation biology, zoology, capacity building, training	India
WT		80%	Zoonotic disease epidemiology	Malaysia
WT		80%	Population and environmental ecology, chiroptology	China
WT		80%	Molecular diagnostics, zoonotic disease epidemiology	Thailand
WCS		80%	Wildlife health	Africa
WCS		100%	Wildlife health	Latin America, Asia Europe
WCS		50%	Wildlife health and disease ecology	Equador, Latin America, Caribbean
WCS		80%	Wildlfie epidemiology	Peru, Latin America
WCS		80%	Wildlife health	Cambodia, Asia, Africa
WCS		80%	Wildlife health	Laos PDR, Asia
WCS		80%	Wildlife health	Southeast Asia, Afr
WCS		80%	Wildlife health	Indonesia, Asia, Europe
GVFI		80%	Field epidemiology, zoonotic disease surveillance	Democratic Republi of Congo
GVFI		85%	Surveillance, training, capacity assessment	Gabon, Congo Basi
UCD		100%	Surveillance, training, capacity assessment	Uganda
UCD		100%	Surveillance, training, capacity assessment	Rwanda
UCD		100%	Surveillance, training, capacity assessment	Africa

OTHER CRITICAL STAFF	Current Position			
WT		20%	Mathematical modeling, ecology	Australasia, Americ

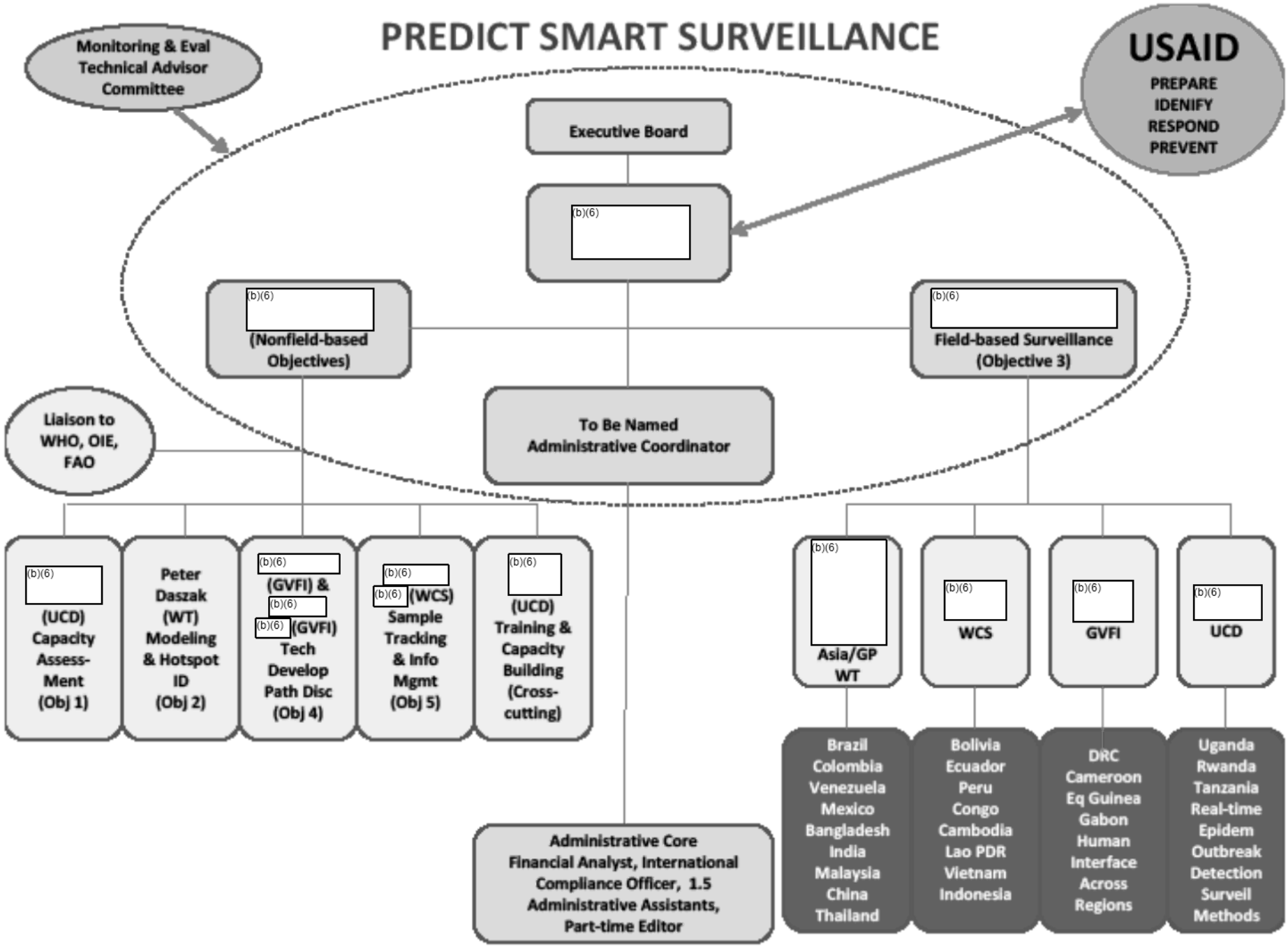

(b)(6)
(b)(6)
(b)(6)
(b)(6)
UCD
10%
Surveillance, training, capacity assessment, infectious disease
Southeast Asia, Afr
Harvard University
5%
Public health, surveillance, spatial and landscape epidemiology
Global
MGVP, Inc
25%
Wildlife surveillance, zoonotic disease, non-human primates
Uganda, Rwanda
Princeton University
10%
Disease modeling, ecology of emerging infectious disease, evolutionary biology
Global
UCD
25%
Wildlife surveillance, zoonotic disease, non-human primates
Uganda, Rwanda
UCD
20%
Training, capacity assessment, curriculum development
Africa
Princeton University
4%
Ecological and mathematical modeling, emerging infectious disease
WT
20%
Ecological and mathematical modeling, emerging infectious disease
Gangetic Plain
Institute of Zoology, U
10%
Ecological modeling, macroecology, evolutionary biology
Global
Sokoine University of Ag
10%
Training, capacity assessment, curriculum development
Africa
CIESIN
10%
Environmnetal sustainability, emerging infectious disease
Global
Columbia University
10%
Epidemiology, pathology, molecular biology
Africa, Southeast A
Smithsonian
in kind
Animal ecology, disease surveillance
Latin America
WCS
00%
Wildlife health
Latin America
GVFI
00%
Molecular virology, viral discovery, laboratory capacity building
Sub-Saharan Africa
Smithsonian
in kind
Clinical medicine, surveillance, infectious disease
Africa
WT
20%
Ecology and environmental biology,
SE Asia

(b)(6)

(b)(6)

(b)(6)

			biogeography, molecular ecology	
WCS		100%	Wildlife health	Africa
WCS		5%	Information and communication technology	Africa, Europe
MGVP, Inc.		50%	Non-human primate medicine, wildlife health, surveillance	Rwanda, Uganda
WCS		40%	Wildlife health	Africa
UCLA		20%	Field epidemiology, zoonotic disease surveillance	Congo Basin
Smithsonian		70%	Training, clinical wildlife medicine	Latin America, Chin Namibia
GVFI		25%	Medical and applied anthropology, surveillance, capacity building	Sub-Saharan Africa
UCD		30%	Training, capacity assessment	Global
UCD		50%	Training, capacity assessment, molecular biology	Africa
WT		20%	Disease modeling and ecology	Bangladesh, Americ
University o Edinburgh		4%	Mathematical modeling,emerging infectious disease	Africa


PREDICT SMART SURVEILLANCE
Monitoring & Eval Technical Advisor Committee
USAID
PREPARE
IDENIFY
RESPOND
PREVENT
Executive Board
(b)(6)
(b)(6)
(Nonfield-based Objectives)
(b)(6)
Field-based Surveillance (Objective 3)
Liaison to WHO, OIE, FAO
To Be Named Administrative Coordinator
(b)(6)
(UCD) Capacity Assess-Ment (Obj 1)
Peter Daszak (WT) Modeling & Hotspot ID (Obj 2)
(b)(6)
(GVFI) &
(b)(6)
(b)(6) (GVFI) Tech Develop Path Disc (Obj 4)
(b)(6)
(b)(6) (WCS) Sample Tracking & Info Mgmt (Obj 5)
(b)(6)
(UCD) Training & Capacity Building (Cross-cutting)
(b)(6)
Asia/GP WT
(b)(6)
WCS
(b)(6)
GVFI
(b)(6)
UCD
Brazil
Colombia
Venezuela
Mexico
Bangladesh
India
Malaysia
China
Thailand
Bolivia
Ecuador
Peru
Congo
Cambodia
Lao PDR
Vietnam
Indonesia
DRC
Cameroon
Eq Guinea
Gabon
Human Interface Across Regions
Uganda
Rwanda
Tanzania
Real-time Epidem Outbreak Detection Surveil Methods
Administrative Core
Financial Analyst, International Compliance Officer, 1.5 Administrative Assistants, Part-time Editor

b. MANAGEMENT PLAN

The PREDICT team is a functionally collaborative and fully integrated working group that benefits from the experience of world leaders in wildlife surveillance and epidemiology. Building upon existing personnel resources from UC Davis, Wildlife Conservation Society (WCS), Wildlife Trust (WT), Global Viral Forecasting, Inc. (GVFI), the Smithsonian Institution, and other global health leaders, the *Director* will facilitate the efficient accomplishment of all PREDICT objectives through the organizational structure (Org Chart) depicted above. The development of this application has allowed the team to test the function and feasibility of this working group by holding task and deliverables-oriented conference calls approximately three times per week, as well as multiple in-person team-building and visioning meetings. These activities have provided the proof of concept of the working team, and have allowed for the designation of responsibilities along lines of expertise and global infrastructure. In addition, all team members have experience with the Incident Command System, used for managing emergencies and outbreaks, and are therefore very familiar with and respectful of working within a chain-of-command structure that encompasses multiple institutional affiliations.

The Director will benefit from the guidance of an *Executive Board*, consisting of the most senior representative of UC Davis, WCS, WT and GVFI, to ensure integration and coordination of activities. Each member of the Executive Board has full current knowledge of the activities of their organization, and has authority to make commitments on behalf of his/her organization. The Director will serve *ex officio*. The Executive Board will hold regular conference calls (monthly for the first year, with frequency to be adjusted as needed) to review activities, identify programmatic gaps, determine progress toward objectives, and coordinate capacity-building and training plans. To respond to emergencies or unforeseen needs, additional conference calls can be convened by the Director. In addition to regular conference calls, there will be an annual face to face meeting of all the partners and country leads for the purpose of information sharing and coordination.

As discussed in the Monitoring and Evaluation section, above, external guidance will be provided by a *Technical Advisory Committee*. This group of distinguished scientists will review progress and plans, and advise on priorities and strategic focus. In addition to their technical expertise, all have extensive experience in leadership and management of large agencies, projects, or programs with operations in developing countries. We will also benefit from the committee's knowledge, experience and extensive contacts, which will facilitate achieving the objectives of the project. We will adaptively manage the project, and will be flexible and responsive to the recommendations of the Committee or Executive Board in order to ensure meeting objectives.

Day-to-day management of the project and progress toward objectives will be the overall responsibility of the *Director*, with assistance from the administrative staff. In addition to the management and coordination of program vision, direction, and functional successes, the Director is responsible for the administration and integration of the entire program. To guarantee fiscal responsibility and responsiveness to the needs of the program, the director will review and approve budgets to ensure they are appropriate to the work proposed, consistent with applicable rules and guidelines, and commit sufficient effort for project participants. The Director will conduct periodic reviews with the Administrative Coordinator to assess ongoing budgetary needs and will call and lead meetings with the Senior Management Team (Director, Deputy Director, Senior Technical Officer and Administrative Coordinator), Supervising Coordinators (Objective Leaders), Executive Board, and the Technical Advisory Committee to assess the

program's productivity and accomplishments with respect to its goals. He will request and conduct site visits as needed. The Director will be the point of contact for communications with USAID and coordination with other agencies and Directors of PREPARE, IDENTIFY, RESPOND and PREVENT. In addition to his academic experience, the Director was in federal service at DARPA for over 4 years, during which he represented his agency on numerous occasions.

The *Deputy Director* will assist the Director in all programmatic and fiscal management areas and will also be responsible for oversight and facilitation of the capacity assessment, modeling and hotspot identification, technology development and pathogen discovery, sample tracking and information management, and training. This oversight will include monitoring the performance of each of the *Supervising Coordinators*, tracking progress on all objectives, ensuring compliance with quarterly reporting requirements, and managing subcontracts to reflect the changing needs of the overall PREDICT program. Individuals within the PREDICT team will also report liaison activities with (b)(6) (b)(6), (b)(6) (b)(6), and FAO (Peter Daszak) to the Deputy Director to ensure central integration and feedback to the leaders of the objectives and integration with the IDENTIFY and RESPOND programs. In the event of a vacancy or extended absence of the Director, the Deputy Director will serve as Interim Director until a suitable replacement is named.

The *Senior Technical Officer* will also report to the Director and will be primarily responsible for the wildlife surveillance activities in the hotspot countries. He will manage the SMART Surveillance program, including the development and implementation of standardized protocols, approval of procurement of necessary equipment and supplies, tracking of deployed resources and identification, and mitigation of barriers to the development of sustainable wildlife surveillance. The Senior Technical Officer will monitor the performance of each of the *Surveillance Coordinators*, and the *Country Coordinators* under their supervision. Surveillance activities have been divided among the PREDICT partners according to geographical and disciplinary expertise, including: wildlife sampling in each country (divided among the four relevant PREDICT core partner organizations); human health monitoring at hot interfaces (led by GVFI); and real-time epidemiological analysis for outbreak detection, as well as evaluation and optimization of surveillance methods (led by UC Davis). For organizational streamlining, each core PREDICT partner organization has a *Surveillance Coordinator*, who reports to the Senior Technical Officer as shown in the organizational chart. Each *Country Coordinator* will report to the designated Surveillance Coordinator responsible for that country, and will dedicate 80%-100% time to USAID PREDICT work. The duties of the Country Coordinators include:

- Plan and coordinate local wildlife surveillance activities and ensure that written standardized protocols are implemented;
- Supervise and coordinate field teams conducting wildlife surveillance, ensuring appropriate sample collection, handling, transport and tracking from collection to the laboratory;
- Coordinate and organize in-country capacity assessment, trainings and meetings with ministry officials, local partners, and trainees to disseminate information and improve interpretation of surveillance data;
- Facilitate field equipment and supply acquisition and distribution;
- Communicate with laboratory personnel to ensure readiness to receive samples, sample tracking, and delivering data into the GAINS database;
- Manage field and sample data entry, including quality assurance;
- Identify, recruit, and track in-country wildlife surveillance trainees;

- Produce and disseminate reports, as required, that document country surveillance activities and findings;
- Assess development of field team capacity for sustainable surveillance and response to wildlife outbreaks;
- Liaise with local governments and stakeholders to improve detection wildlife disease outbreaks; and
- Liaise with local RESPOND and IDENTIFY personnel to assist with zoonotic disease outbreak identification and response, as well as ensure efficiency of cross-cutting training activities.

The Director, Deputy Director, and Senior Technical Officer constitute the senior leadership of the project. They will be in frequent communication with each other, and will meet in person at least quarterly and close to daily by email, video conferencing, and telephone. Normally, the headquarters would be in a single location. However, roughly half of the core partners are located in New York (WCS, WT) or the east coast (Smithsonian Institution), with the other half in Northern California (UC Davis, GVFI). To facilitate communications with all partners, the Director will be located in New York and the Deputy Director in Davis. In addition to quarterly meetings, the Director will spend extended periods of time in Davis (anticipated to be at least two out of every eight weeks). An Administrative Assistant in each location will provide clerical and logistical support and will facilitate communications between the California and New York offices. Because of the distributed global program structure, video conferencing and other, internet-based modern communication strategies will be critical to ensuring efficiencies in operational and financial management. Because in-person meetings are key to initial success, they will be more heavily employed in the first year of the program; travel and training costs will be reduced, as possible, over the life of the project as communication modalities are tested and put into operations. Reducing currently budgeted travel costs as appropriate will allow the PREDICT team to maximize the impact derived from the funds and will likely allow funds to be transferred into diagnostic support for SMART surveillance, costs that were previously understood to be supported through IDENTIFY.

Because of the complexity of a project that involves several partners working in over 23 countries, and a budget of $75 million, some specialized administrative staff will be required for implementation. The staffing plan is based on our previous experience administering international programs and our knowledge that excellent surveillance through a distributed management structure requires adequate staffing and diligent supervision to guarantee success. We will adaptively manage the PREDICT program to ensure that staffing and staff placement is appropriate to the level of project activities. During periods of low field activity, staff time will be used for other essential functions, such as meetings with Country Coordinators, site visits, classroom training, data entry, analyses, evaluation and responsive planning. Therefore, the core administrative staff will serve the needs of coordination, reporting, communications, logistics, data gathering and surge capacity for program participants. The administrative staff will be under the supervision of the *Administrative Coordinator***,** who will report to the Director. In addition to supervising the administrative staff, the Administrative Coordinator will assist with centrally hired personnel (preparing job descriptions, recruitment, and placement); facilitate project communications; organize project meetings (venue, agenda, logistics); coordinate project reports and publications; and arrange for temporary “surge capacity” support for program participants, when needed, during periods of unexpectedly high activity. The scope and complexity of the project will impose greater reporting and monitoring requirements than most programs. In order to assure fulfillment of these requirements, the staff will include one *Financial Officer* (Contract and Logistics) and one *International Compliance Officer*. The financial analyst

will process the domestic and international subcontracts, monitor the budget, and provide financial reporting to USAID, as required, including uploading of planned, obligated, and expenditure data into the USAID API Unit Budget and Monitoring Evaluation Database (AIMEBA). The Compliance Officer will monitor and assure compliance with USAID requirements, all applicable US and host-country laws and regulations, and environmental and occupational health and safety requirements. In addition, the Compliance Officer will strive to identify areas for cost reduction in order to maximize the opportunities for increased capacity-building impact derived from PREDICT funds.

c. Organizational Capacity and Partners

The PREDICT One Health Team for SMART Surveillance is a coordinated and collaborative group of core organizations with complementary missions and established programs and partners in the targeted hotspot host countries. The core US-based partners of the University of California, Davis (UC Davis), Wildlife Conservation Society (WCS), Wildlife Trust (WT), Global Viral Forecasting, Inc. (GVFI), and the Smithsonian Institution (SI) have decades-long established collaborations, including current joint programs in Highly Pathogenic Avian Influenza Surveillance through GAINS, STOP AI, and NIH-NIAID Centers of Excellence for Influenza Research and Surveillance (CEIRS). The Director will lead the team as a UC Davis affiliate, and effective administration will be accomplished by the experienced team at the UC Davis School of Veterinary Medicine's Wildlife Health Center. The PREDICT-EB, representing the legally accountable lead implementation organizations, each administering more than 10% of the overall PREDICT budget, will support the Senior Management Team in the implementation of PREDICT, ensuring smooth and effective operational functions. This support is critical, as PREDICT will operate through a distributed structure with individual personnel directly reporting to others not always from their own institutions. This structure is feasible and efficient, and is based on the proven model of the Incident Command System that was designed to manage emergency operations, such as deadly epidemics. Subcontracts will be administered through UC Davis to the core partners (see Annex E for letters of commitment attesting to legal relationships of partners). In turn, core partners will subcontract to in-country partners for implementation of SMART Surveillance. Additional subawards will be managed through the core partners to engage experts in modeling, technology development, pathogen identification, and information management. The complementary arms of the USAID Avian and Pandemic Influenza and Zoonotic Disease Program will be engaged in capacity assessment and development, training, and outreach activities, as will other US governmental (USDA, USFWS, CDC, DTRA, etc.) and international health management organizations (WHO, FAO, OIE). In fact, we anticipate that the PREDICT in-country partners will likely overlap in participation with these organizations and agencies, as well as with the USAID Missions. Descriptions of the core partners follow in text, and other subcontracted and collaborating partners are listed in the table below, which describes organizational capacity and specifies the managing core partner for each (see Annex E for select letters of support from collaborating partners).

UC DAVIS SCHOOL OF VETERINARY MEDICINE: As one of the best veterinary schools in the world, and the leading one in preventive medicine and wildlife health, UC Davis has tremendous research and training capacity in the fields of epidemiology, surveillance, zoonotic diseases, diagnostics, wildlife pathogens and conservation, food safety, disease prevention, and outbreak response. The School has trained more than 800 veterinarians in advanced epidemiology (MPVM) from 75 countries, including hotspot regions in Africa, Latin America, and Asia designated as hotspots. The UC Davis Wildlife Health Center (WHC), the proposed administrative home for PREDICT, leads the STOP-AI Avian Flu School training program and conducts avian influenza surveillance in migratory birds for NIH-NIAID CEIRS. It is dedicated to

balancing the needs of people, wildlife, and the environment, and has demonstrated capacity in the management of large, collaborative national and international programs with diverse partnership. For example, the WHC developed and manages California's Oiled Wildlife Care Network, a $2 million per year emergency response system with 30 participating organizations and five overseeing natural resource management agencies. In addition, the center manages One Health zoonotic disease programs, projects, and staff ranging from remote island systems in the Pacific Northwest to mountain and savannah systems in Africa's Congo Basin and Rift Valley. With a platform that recognizes that the health of domestic animals, wildlife, and people are inextricably linked to the ecosystem and natural resources on which all depend, the WHC finds creative solutions to health problems and livelihood challenges in resource-limited settings.

WILDLIFE CONSERVATION SOCIETY (WCS): WCS has decades of experience leading international wildlife conservation projects and field staff around the globe, notably in Africa, Asia, North America, and Latin America. WCS' Global Health Program (GHP), with over 100 staff around the world, has over two decades of wildlife health experience, including zoonotic disease research, on the ground capacity building, and projects relating to sustainable livelihoods and development. WCS GHP manages the Global Avian Influenza Network for Surveillance (GAINS) program, conducting surveillance in wild bird populations and facilitating open sharing of disease information across several regions of the world. WCS GHP also initiated the Great Ape Health Project in Central Africa, working to secure the health of threatened great apes while investigating the driving forces in deadly Ebola outbreaks that kill both great apes and humans. WCS GHP works with partners such as NIH, Republic of Congo Ministry of Health, CIRMF, and UNICEF to create a communication chain between the public and animal health sectors during potential outbreak situations. WCS is a leader of the Animal and Human Health for the Environment and Development (AHEAD) Program. The AHEAD network is an initiative of the veterinary specialist group of the International Union for Conservation of Nature, WCS, and other partners in recognition of the importance of animal health to both conservation and development interests. WCS launched One World, One Health™ (OWOH) to promote an international and interdisciplinary strategy for combating threats to the health of life on Earth. The OWOH initiative encourages health experts and other disciplines from around the world to discuss and share information regarding the movements of diseases among humans, domestic animals, and wildlife.

THE WILDLIFE TRUST (WT): Wildlife Trust is an international organization of scientists dedicated to the conservation of biodiversity and the protection of human and animal health. WT works in 15 countries in Central and South America, the Caribbean, Africa, and Asia, and includes research and training activities for people and wildlife to share ecosystems for their mutual survival. WT strengths include innovations in research, education, and training and its accessibility to international conservation partners, as well as a record of long-term, grassroots involvement. WT has been instrumental in revealing the impact of emerging diseases of terrestrial and marine wildlife populations. WT scientists understand the whole process of studying and responding to wildlife diseases, emerging infectious disease, and zoonotic diseases, from field surveillance to laboratory diagnostics, and from predicting outbreaks to responding to epidemics in wildlife populations. WT personnel have extensive experience in collection, handling, transport, and proper storage of wildlife specimens. In addition, WT trains scientists in-country to perform the latest diagnostic tests and molecular, bacteriological, and virological techniques including RT-PCR, microarray, MassTag PCR, and high-throughput pyrosequencing. As a think-tank institution, WT combines field studies, cutting-edge laboratory diagnostics, and mathematical modeling (e.g., identifying hotspots) as part of pathogen discovery, in-field applied training with select agents, and newly emerging zoonotic diseases, including SARS, Nipah virus, Hanta virus, West Nile virus, Chikungunya virus, and Pandemic

Influenza A virus (H5N1 and H1N1). The strategies of the field of conservation medicine developed at Wildlife Trust include: 1) long-term monitoring of disease spread, 2) health assessments, 3) interventions to protect species at risk, and 4) particularly minimizing the threat of catastrophic outbreaks.

GLOBAL VIRAL FORECASTING, INC. (GVFI): As a member of the World Health Organization's Global Outbreak and Response Network (GOARN), Global Viral Forecasting, Inc. is actively investigating the process by which novel viruses enter into the human population from animals and go on to become pandemics. The team works to control viruses that have only recently emerged, and has shown that exposure to wild and domestic animals leads to continuous spillovers of novel agents into humans. Through ongoing monitoring of humans who are extensively exposed to known disease reservoir species, GVFI has created a pilot for the first global early warning system to prevent novel pandemics. By coupling this innovative surveillance in field sites throughout the world with a consortium of top laboratories, including a network of Biosafety Level-3 and 4 (BSL-3,4) containment laboratories located in the US, Africa, and elsewhere, GVFI is able to detect, characterize, and respond to the diversity of viruses and other agents that move from animals into human populations, providing basic insights into how new diseases enter humans and improving our ability to decrease the frequency of such events. GVFI staff have been engaged in outbreak response efforts of high-consequence pathogens, including Lassa and Ebola, and, through its network of partners, GVFI has vital access to non-commercially available diagnostic reagents and support. GVFI also has a proven track record of laboratory and personnel development in resource-poor settings in Africa and Asia.

THE SMITHSONIAN INSTITUTION (SI): The Smithsonian Institution was chartered in 1846 for the increase and diffusion of knowledge. This educational and research Institution contains 19 museums, a zoo, and 9 research centers. Currently, SI has long-term research operations throughout the US and the world (e.g., Chile, Belize, Jamaica, Panama, Bolivia, Peru, Kenya, Guyana, Gabon, Burma, Thailand, China, etc.), and has just agreed to a multi-million dollar partnership with the World Bank to work in 13 Tiger range countries across Russia and Asia. SI hosts several large international science networks, including Center for Tropical Forest Science, Consortium for the Barcode of Life (www.barcoding.si.edu), Biodiversity Heritage Library (www.biodiversitylibrary.org), and Encyclopedia of Life (www.eol.org), and will be the mid-Atlantic hub for NSF's National Ecological Observatory Network (NEON) Program. All are multiple million dollar per year programs involving complex communications, collaborations, logistics and planning. SI works in close partnership with multiple government agencies, including hosting some 100 federal staff within Smithsonian facilities (USDA, NOAA, DOD, USGS, FAA, EPA). Some of these partnerships have been in place since the 1880s.

Table 4. Partner Organizations

PARTNER ORGANIZATION	COUNTRY	ORGANIZATION CAPACITY MANAGING PARTNER	
AMAZON BASIN			
WCS do Brazil	Brazil	Manage and coordinate WCS activities in Brazil	WCS
Departamento de Medicina Veterinaria of Universidade Federal Rural de Pernambuco	Brazil	Conduct wildife surveillance, investigate outbreaks of emerging zoonotic disease	WT
Instituto Chico Mendes da Conservacao de Biodiversidade, Ministry	Brazil	Provide permits for sampling of wildlife and access to confiscated animals, set up surveillance networks, apply policy interventions (branch of IBAMA)	WCS

of Environment

IBAMA, Brazilian Institute of Environment and Renewable Natural Resources	Brazil	Provide permits for sampling of wildlife, facilitate collaboration with Inst. Chico Mendes, apply policy interventions	WCS
Pasteur Institute	Brazil	Conduct diagnostics, training, and outbreak investigation	WCS
FIOCRUZ (Instituto Oswaldo Cruz)	Brazil	Conduct wildlife surveillance with medical and veterinary personnel, provide emerging disease outbreak investigation (BSL-3 lab), host epidemiological training courses	WT/W CS
University Federal de Minas Gerais	Brazil	Zooonotic disease diagnostics, build local capacity for wildlife surveillance and training.	WT
University of Amazonas	Brazil	Conduct sample collection and disease surveillance, build capacity	WCS
University of Sao Paulo	Brazil	Conduct laboratory diagnostics (BSL3 facility), training and outbreak investigations	WT/W CS
Center of Primate Conservation	Brazil	Conduct sample collection and disease surveillance	WCS
Ministry of Health - MS	Brazil	Assist with building wildlife disease surveillance network, conduct outbreak investigation (humans and wildlife), make policy recommendations	WCS
Piagaçu Institute - Amazônia	Brazil	Conduct sample collection and disease surveillance, builds capacity	WCS
Brasilian Assoc. of wildlife veterinarians	Brazil	Conduct sample collection and disease surveillance, builds capacity	WCS
Instituto de Pesquisas Ecologicas	Brazil	Conduct training in wildlife surveillance, ecology, and outbreak investigation, host leadership courses and taring to build capacity	WT
Instituto Brasileiro para Medicina da Conservacao	Brazil	Train veterinarians, epidemiologists and ecologists working on wildlife disease and build capacity in epidemiology; diagnostics, and outbreak investigation for wildlife	WT
Ministry of Agriculture, Veterinary Service	Brazil	Aid in the establishing wildlife disease surveillance and outbreak investigation capacity, apply policy interventions	WCS
Universidade Bello Horizonte	Brazil	Build capacity for training and emerging disease detection, conduct surveillance and outbreak investigation, conduct laboratory diagnostics, liase with municipal health departments, and ministries of the environment, agriculture, and health	WT
Instituto Brasileiro para Medicina da Conservacao-TRIADE	Brazil	Conduct wildlife disease surveillance, train in field activities and epidemiology, conduct research, aid in development of policy to support sustainable development	WT
Universidade Estadual Paulista, Jaboticabal	Brazil	Train graduate students in handling, restraint and anesthesia of wildlife, hold short-term training courses, conduct diagnostic and outbreak investigation	WT/W CS
Biota	Bolivia	Provide the logistics and land access for wildlife disease outbreak investigation, monitor wildlife die-offs, conduct wildlife disease surevillance, collect samples	WT/W CS
Universidad Mayor de San Simón, Cochabamba	Bolivia	Train veterinarians in wildlife identification and trapping techniques, outbreak investigation, and disease	WT/W CS

		surveillance	
SENASAG- Agricultural Health National Service	Bolivia	Aid in the establishment of wildlife disease surveillance, disease outbreak investigation, apply policy interventions	WCS
Universidad Mayor de San Andres, Institute of Ecology	Bolivia	Build capacity, make policy recommendations	WCS
Panamerican Health Organization	Bolivia	Assist with establishment of wildlife disease surveillance network, conduct disease outbreak investigation (humans and wildlife), make policy recommendations	WCS
Ministry of Environment and Water- Viceministry of Biodiversity, Environment and Climate Change	Bolivia	Provide permits for sampling of wildlife, provide confiscated animals, aid in establishment of surveillance networks, apply policy interventions	WCS
Takana Indigenous Council-CIPTA	Bolivia	Provide animals for sampling, maintain wildlife hunting records, collect samples and wildlife disease surveillance	WCS
Lecos Apolo, Lecos Larecaja indigenous organizations	Bolivia	Provide animals for sampling, maintain wildlife hunting records, collect samples and wildlife disease surveillance	WCS
National Parks Service	Bolivia	Provide permits for sampling of wildlife, provide confiscated animals, aid in establishment of surveillance networks, apply policy interventions	WCS
Fundacion Noel Kempff Mercado	Bolivia	Provide access to confiscated animals for disease surveillance, conduct surveillance	WCS
Universidad Publica de El Alto	Bolivia	Build capacity, make policy recommendations	WCS
LIDIVECO	Bolivia	Conduct laboratory diagnostics, training, disease surveillance and outbreak investigation	WCS
Instituto Nacional de Salud de Colombia	Columbia	Conduct clinical diagnosis, laboratory diagnostics, training, disease surveillance, outbreak investigation, and reporting	WT
Centro de Primatologia Araguatos	Colombia	Develop quarantine protocols, conduct outbreak investigations and training, ensure policy intervention	WT
Fundacion Universitaria san Martin	Colombia	Develop quarantine protocols, conduct outbreak investigations and training	WT
Veterinary service SESA	Ecuador	Aid in the establishment of surveillance netoworks, disease surveillance and outbreak invetigation, diagnostics, applying policy interventions	WCS
UICN-Sur /Traffic	Ecuador	Provide access to confiscated animals for disease surveillance, aid in establishment of surveillance network	WCS
Fundación Zoológica de Quito	Ecuador	Build capacity, conduct disease and outbreak surveillance in wildlife	WCS
Federación de Comunas Unión de Nativos de la Amazonía Ecuatoriana	Ecuador	Provide animals for sampling, maintaining wildlife hunting records, collect samples, aid in establishment of wildlife disease surveillance network	WCS
Federación de Organizaciones Campesinas de Orellana	Ecuador	Provide animals for sampling, maintaining wildlife hunting records, collect samples, aid in establishment of wildlife disease surveillance network	WCS
Indigenous communities (Waorani, Quichua)	Ecuador	Provide animals for sampling, maintaining wildlife hunting records, collect samples, aid in establishment of wildlife	WCS

		disease surveillance network	
University San Francisco de Quito	Ecuador	Build capacity, conduct disease and outbreak surveillance (in humans and wildlife)	WCS
Universidad Central	Ecuador	Conduct diagnostics, training, disease surveillance and outbreak investigation (humans and wildlife)	WCS
Ministry of Environment	Ecuador	Provide permits for sampling of wildlife (in the wild and in trade), provide confiscated animals, aid in establishment of surveillance netoworks, apply policy interventions	WCS
Veterinary Service SENASA	Peru	Aid in the establishment of surveillance networks, conduct disease surveillance and outbreak invetigation, conduct laboratory diagnostics, apply policy interventions	WCS
Institute of Public Health	Peru	Aid in the establishment of surveillance networks, conduct disease surveillance and outbreak invetigation (humans and widlife) diagnostics, apply policy interventions	WCS
University of San Marcos	Peru	Conduct disease surveillance, outbreak investigation, laboratory diagnostics, training	WCS
Universidad de la Amazonia Peruana, Iquitos	Peru	Conduct disease surveillance, outbreak investigation, laboratory diagnostics, training	WCS
Universidad Privada, Iquitos	Peru	Conduct disease surveillance, outbreak investigation, laboratory diagnostics, training	WCS
Naval Medical Research Center Detachment	Peru	Conduct disease surveillance, outbreak investigation, laboratory diagnostics, training	WCS
INRENA, Ministry of Environment	Peru	Provide permits for sampling of wildlife, provide confiscated animals, aid in surveillance networks, apply policy interventions	WCS
Gobierno Regional de Loreto	Peru	Provide permits for sampling of wildlife, provide confiscated animals, aid in surveillance networks, apply policy interventions	WCS
Instituto de Investigaciones de la Amazonia Peruana, Iquitos- LBGM	Peru	Conduct wildlife surveillance, outbreak investigation, participation in research activities, conduct laboratory diagnostics	WT/W CS
Servicio Nacional de Areas Protegidas	Peru	Provide permits for sampling wildlife in protected areas, aid in the establishment of surveillance networks, apply policy interventions	WCS
Comité de Gestión del Area de Conservación Regional / Reserva Comunal Tamshiyacu Tahuayo	Peru	Provide animals for sampling, maintain wildlife hunting records, collect samples, aid in establishment of wildlife disease surveillance network	WCS
Comité de Gestión de la Reserva Nacional Pacaya Samiria	Peru	Provide animals for sampling, maintain wildlife hunting records, collect samples, aid in establishment of wildlife disease surveillance network	WCS
Universidad es la Autónoma de Barcelona (Departamento de Anatomía y Sanidad Animal)	Peru	Conduct disease surveillance and outbreak investigation, diagnostics,and training	WCS

PROVITA	Venezuela	Train veterinarians, epidemiologists, public health officials in wildlife surveillance and outbreak investigation	WT
Instituto Venezolano de Investigaciones Cientificas	Venezuela	Conduct training, assist with policy interventions	WT
IPN-CIIDIR; Universidad de Chihuahua	Mexico	Coordinate national H5N1 HPAI monitoring and training, conduct training and surveillance	WT
Mexico-United States Commission for the Prevention of Foot and Mouth Disease and Other Exotic Animal Diseases	Mexico	Conduct emerging animal disease surveillance and outbreak investigation, develop training on emergency plans and programs, disseminate public information	WT
Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional	Mexico	Coordinate national H5N1 HPAI monitoring and training	WT
BIOCONCIENCIA	Mexico	Assist with pathogen surveillance in sentinel wildlife species, build capacity for training, promote conservation policy	WT
CONGO BASIN & RIFT VALLEY			
Centre International de Recherches Medicales de Franceville	Congo	Conduct Ebola research and diagnostics	WCS
Ministry of Health	Congo	Conduct human disease outbreak response, ensure public health education	WCS
National Public Health Laboratory	Congo	House Ebola PCR diagnostic laboratory	WCS
National Institutes of Health	Congo	Conduct Ebola research and diagnostics	WCS
Ministry of Agriculture	Congo	Conduct sample collection, disease surveillance, and capacity building	WCS
General Direction of Scientific and Technical Research	Congo	Providing permits for sampling of wildlife outside protected areas, providing permits for shipping of diagnostic samples	WCS
Ministry of Forest Economy	Congo	Providing permits for sampling of wildlife in protected areas, aiding in the establishment of surveillance networks, applying policy interventions	WCS
Direction of Wildlife and Protected Areas	Congo	Providing permits for shipment of diagnostic samples	WCS
University of Yaounde	Cameroon	Provide training to biologists, chemists and biochemists, and health professionals, build capacity in zoonotic disease surveillance	GVFI
University of Buea	Cameroon	Provide training to science specialists and public health professionals including medical doctors, nurses and laboratory technologists	GVFI
Ministry of Public Health Cameroon	Cameroon	Coordinate responses to emerging diseases and integrate efforts	GVFI
Ministry of Forestry and Wildlife	Cameroon	Conservation and sustainable management for extensive network of protected area	GVFI

Care and Health Program	Cameroon	Build capacity for research, provide managerial/administrative support to complex health research projects including logistical, financial, human resources, and political support	GVFI
Ministry of Defense	Cameroon	Implement emerging infectious disease prevention and research activities for military and general population in Cameroon	GVFI
Ministry of Scientific Research and Innovation	Cameroon	Conduct research programs in medical disciplines to improve health	GVFI
School of Veterinary Medicene of the University of Ngaoundere	Cameroon	Offer veterinary medical training, build capacity in zoonotic disease investigations	GVFI
Kinshasa School of Public Health	DRC	Training for epidemiological and public health staff, supervising surveillance activities	GVFI
Institut Congolais pour la Conservation de la Nature	DRC	Ensure protection of the environment, aids in the prevention of animal disease, provides permission for research on animals	GVFI
Ministry of Health	DRC	Coordinate all activities related to health, disease surveillance, and outbreak response, develop policy on health issues	GVFI
Ministry of Environment	DRC	Provide permits for any activities on animals and flora.	GVFI
Institut National de Recherche Biomedical (INRB National Lab)	DRC	Conduct laboratory diagnostic testing, sample archiving, and training in laboratory techniques, aid in wildlife surveillance	GVFI
Universite de Lubumbashi	DRC	Provide training for veterinary staff, conduct research on animal diseases, coordinate outbreak investigation and repsonse	GVFI
Universite Pedagogique Nationale	DRC	Provide training for veterinary staff, conduct research on animal diseases	GVFI
Universite Catholique du Graben	DRC	Provide training for veterinary staff, conduct research on animal diseases	GVFI
Ministry of External Relations (International Affairs and United Development Service)	Equatorial Guinea	Facilitate the integration into regional public health efforts, mainitain interface with policy makers and key science partners	GVFI
Centre International de Recherches Medicales de Franceville	Gabon	Conduct laboratory diagnostics (BSL-3/4 laboratory facilities) and investigate outbreaks in humans and wildlife, especialy for filoviruses in the Congo Basin	GVFI
Universite Omar Bongo	Gabon	Conduct training at the BS, Masters, and PhD level in the biological sciences	GVFI
National Institute for Communicable Diseases	South Africa	Provide extensive training in epidemiology, and serve as the infectious disease reference laboratory for the African continent (BSL-3 and BSL-4 laboratories, Special Pathogens Unit)	GVFI
Institut des Sciences Agricoles et d'Elevage	Rwanda	Provide training in animal health, health policy, and natural resource policy	UCD
Mountain Gorilla Veterinary Project, Inc.	Rwanda Uganda	Conduct surveillance for emerging pathogens in wild nonhuman primates, sentinel wildlife, and humans, provide necessary permits form all jurisdictional ministries and	UCD

		organizations	
Makerere University Faculty of Veterinary Medicine	Uganda	Provide training in animal health and health policy, build capacity in training and research for wildlife surveillance activities, conduct laboratory diagnostic testing	UCD
Uganda Wildlife Authority	Uganda	Manage protected areas, develop sustainable policies for wildlife and local communities, provide permits for surveillance activities, apply policy to support surveillance activities	UCD
Sokoine University of Agriculture	Tanzania	Build capacity assessment, implement wildlife surveillance, coordinate training activities, conduct laboratory diagnostics (internationally recognized veterinary school)	UCD
Muhimbili University of Health and Alllied Sciences	Tanzania	Interface with ministries of health, provide training in human health and infectious dieases (the premier medical school and school of public health in the region)	UCD
Tanzania Central Veterinary Lab.	Tanzania	Build capacity in diagnostic testing and surveillance	UCD
Veterinary Investigation Center-Iringa	Tanzania	Build capacity in wildlife surveillance	UCD
National Institute for Medical Research	Tanzania	Build capacity for public health research on emerging infectious disease, conduct training of human and animal health workers	UCD
Tanzanian Wildlife Research Institute	Tanzania	Provide permits for wildlife surveillance activities, consult on wildlife capture and sampling	UCD
Tanzania National Parks	Tanzania	Land access for wildlife surveillance activities, coordinate wildlife captures and training	UCD
GANGETIC PLAIN			
International Centre for Diahrrheal Disease Research, Bangaldesh	Bangladesh	Conduct field epidemiology training, provide full diagnostic laboratory support for wildlife survelillance, aid in coordination and implementation of of wildlife disease surveillance	WT
Chittagong Veterinary and Animal Science University	Bangladesh	Develop epidemiology, diagnostic, and outbreak investigation training for veterinarians and veterinary epidemiologists	WT
Indian Institute of Sciences	India	Conduct laboratory diagnostics (BSL-3 lab), provide training in epidemiology, and outbreak investigation, aid in outbreak investiagtion with medical and veterinary personnel	WT
Asian Nature Conservation Foundation	India	Build capacity in emerging disease research, train professionals in surveillance activities, support policy for surveillance activities	WT
SOUTHEAST ASIA			
Welcome Trust Mahosot Hospital - Oxford University	Vietnam Indonesia Lao PDR	Conduct surveillance for human outbreaks, train in outbreak investigation, epidemiology and laboratory diagnostics	WT/ GVFI WCS
Department of Animal Health	Vietnam	Principal national agency responsible for coordination of veterinary diagnostics and outbreak investigation	WCS
Forest Protection Department	Vietnam	Principal agency responsible for wildlife protection, including wild animal confiscation	WCS

Vietnam National University of Natural Sciences, HCMC (UNS)	Vietnam	Academic curricula includes ecology and field biology components	WCS
Institute of Ecology and Biological Resources	Vietnam	Aid in wildlife surveillance activities (especially for Nipah virus), implement research on emerging diseases	WT
Primate Center of the Institut Pertanian Bogor	Indonesia	Conduct non-human primate disease detection and laboratory diagnostics	WCS
Research Institute for Veterinary Science, Bogor	Indonesia	Conduct surveillance for outbreaks in animals, train veterinary epidemiologists and wildlife specialists in disease detection and laboratory diagnostics	WT
Department of Forest Protection and Nature Conservation	Indonesia	Academic curricula includes ecology and field biology components	WCS
Forestry faculty, Agricultural University Bogor	Indonesia	Academic curricula includes ecology and field biology components	WCS
Veterinary faculty, Agricultural University Bogor	Indonesia	Academic curricula includes veterinary training	WCS
Disease Investigation Centre Wates, Yogyakarta and Banjarbaru	Indonesia	National network laboratories performing veterinary diagnostics and outbreak investigation	WCS
PEKA Indonesia	Indonesia	Build capacity for training Indonesian scientists and students, conduct wildlife surveillance and outbreak investigation	WCS
National Animal Health Center	Lao PDR	Conduct outbreak investigation (principal national veterinary diagnostic laboratory)	WCS
Vientiane Capital City Forest Office	Lao PDR	Aid in wildlife surveillance activities (agency responsible for wildlife protection, including wild animal confiscation)	WCS
Department of Veterinary Services (Ministry of Agriculture)	Malaysia	Implement animal outbreak investigations, develop veterinary field training, host courses for disease detection, conduct laboratory diagnostics (BSL 3 lab for animal pathogens including emerging zoonoses like Nipah virus and HPAI)	WT
UNIMAS (Sarawak)	Malaysia	Conduct diagnostic testing, train in laboratory diagnostic testing, wildlife surveillance and outbreak investigation	WT
Ministry of Health	Malaysia	Conduct public health surveillance, disease reporting, and investigation, develop and implement short courses, field epidemiology training, communicate with UNGOs.	WT
Department of Wildlife and National Parks	Malaysia	Aid in building field and laboratory diagnostic capacity	WT
National Public Health Laboratory	Malaysia	Conduct diagnostic testing and outbreak investigation, train in wildlife surveillance and field sample collection, communicate test results to surveillance teams and UNGOs	WT
Queensland Primary Industries and Fisheries Animal Biosecurity	Malaysia Indonesia	Conduct research and aid in surveillance activities	WT
Ministry of Health, Sabah	Malaysia	Conduct zoonotic pathogen surveillance, provide training	WT

		courses, collaborate on zoonotic disease emergence network research program	
Australian Biosecurity-CRC	China	Monitor, collect and analyze biosecurity data, build capacity through training	WT
Australian Animal Health Lab	China	Laboratory diagnostics (OIE international collaborating centre for emerging disease)	WT
East China Normal University, Joint Institute for Wildlife Zoonoses	China	Investigate of animal disease outbreaks, develop and implement veterinary field training,aid in research, conduct laboratory diagnostics (with BSL-3 and animal facilities)	WT
Center for Disease Control and Prevention of Guangdong Province	China	Implement training, conduct laboratory diagnostics (with BSL-3, WHO Collaborative Center), aid in public health policy to mitigate zoonotic disease emergence	WT/ GVFI
Guangdong Entomological Institute	China	Conduct outbreak investigations, develop and implement veterinary field training for outbreak response, conduct laboratory diagnostics (with BSL-3 facility)	WT
Wuhan Institute of Virology	China	Conduct training and laboratory diagnostics (with BSL-3 containment, high throughput lab), aid in infectious disease outbreak investigation with national public health agency	WT
Guangdong Entomological Institute	China	Conduct wildlife disease surveillance and research with field and laboratory teams	WT
WHO Collaborating Centre for Research and Training on Viral Zoonoses Chulalongkorn University Hospital Bangkok	Thailand	Conduct wildlife disease surveillance and laboratory diagnostics, maintain connections to ministries of health and agriculture	WT
CRITICAL OBJECTIVE PARTNER			
Harvard Children's Hospital (Healthmap.org)	USA	Expand Healthmap.org to act as principle online public source of PREDICT surveillance data, information on disease outbreaks, online visualization of data and risk analysis	WCS
Yale School of Medicine	USA	Implement data quality and assurance systems, use multidimensional data warehouse and data mining approaches for data validation, provide reports to project partners	WCS
International Society for Infectious Diseases (ProMED)	USA	Develop ProMED-wildlife list, staff additional wildlife specialist moderators from hotspot areas to improve recognition of zoonotic diseases, provide risk analysis and context for reports and automated data gathering systems such as HealthMap.	WCS
Veratect Corporation	USA	Provide situational analysis on ongoing disease surveillance and outbreak events	WCS
Frontline SMS Medic	USA	Provide new technology to aid wildlife surveillance activities and outbreak investigation	GVFI WCS
Google.org	USA	Build capacity to collect, manage, visualize, integrate, and disseminate information on global emerging infectious disease, aid in development of open source online platform	WCS / GVFI
Columbia University, Center for Infection and	USA	Aid in pathogen identification and discovery (host to WHO Collaborating Centre for Diagnostics in Zoonotic and	WT

Immunity		Emerging Infectious Diseases, with BSL-3 facility)	
Center for Predictive Medicine for Biodefense and Emerging Infectious Disease, University of Louisville	USA	Offer diagnostic resources available at BSL 2 and 3 biocontainment laboratory for pathogen identification and discovery	GVF

ATTACHMENT C STANDARD PROVISIONS

STANDARD PROVISIONS FOR U.S., NONGOVERNMENTAL ORGANIZATIONS

I. MANDATORY STANDARD PROVISIONS FOR U.S. NONGOVERNMENTAL RECIPIENTS

1. APPLICABILITY OF 22 CFR PART 226 (May 2005)
2. INELIGIBLE COUNTRIES (MAY 1986)
3. NONDISCRIMINATION (MAY 1986)
4. NONLIABILITY (NOVEMBER 1985)
5. AMENDMENT (NOVEMBER 1985)
6. NOTICES (NOVEMBER 1985)
7. SUBAGREEMENTS (June 1999)
8. OMB APPROVAL UNDER THE PAPERWORK REDUCTION ACT (December 2003)
9. USAID ELIGIBILITY RULES FOR GOODS AND SERVICES (April 1998)
10. DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS (January 2004)
11. DRUG-FREE WORKPLACE (January 2004)
12. EQUAL PROTECTION OF THE LAWS FOR FAITH-BASED AND COMMUNITY ORGANIZATIONS (February 2004)
13. IMPLEMENTATION OF E.O. 13224 -- EXECUTIVE ORDER ON TERRORIST FINANCING (March 2002)
14. MARKING UNDER USAID-FUNDED ASSISTANCE INSTRUMENTS (December 2005)
15. REGULATIONS GOVERNING EMPLOYEES (AUGUST 1992)
16. CONVERSION OF UNITED STATES DOLLARS TO LOCAL CURRENCY (NOVEMBER 1985)
17. USE OF POUCH FACILITIES (AUGUST 1992)
18. INTERNATIONAL AIR TRAVEL AND TRANSPORTATION (JUNE 1999)
19. OCEAN SHIPMENT OF GOODS (JUNE 1999)
20. LOCAL PROCUREMENT (April 1998)
21. VOLUNTARY POPULATION PLANNING ACTIVITIES – MANDATORY REQUIREMENTS (MAY 2006)

II. REQUIRED AS APPLICABLE STANDARD PROVISIONS FOR U.S., NONGOVERNMENTAL RECIPIENTS

1. NEGOTIATED INDIRECT COST RATES - PREDETERMINED (April 1998)
2. PUBLICATIONS AND MEDIA RELEASES (MARCH 2006)
3. PARTICIPANT TRAINING (April 1998)
4. PROTECTION OF THE INDIVIDUAL AS A RESEARCH SUBJECT (April 1998)
5. CARE OF LABORATORY ANIMALS (MARCH 2004)
6. TITLE TO AND CARE OF PROPERTY (COOPERATING COUNTRY TITLE) NOVEMBER 1985).
7. PUBLIC NOTICES (MARCH 2004)

8. PROHIBITION OF ASSISTANCE TO DRUG TRAFFICKERS (JUNE 1999)
9. INVESTMENT PROMOTION (NOVEMBER 2003)
10. REPORTING OF FOREIGN TAXES (March 2006)
11. FOREIGN GOVERNMENT DELEGATIONS TO INTERNATIONAL CONFERENCES (January 2002)
12. USAID DISABILITY POLICY - ASSISTANCE (DECEMBER 2004)
13. STANDARDS FOR ACCESSIBILITY FOR THE DISABLED IN USAID ASSISTANCE AWARDS INVOLVING CONSTRUCTION (September 2004)

I. MANDATORY STANDARD PROVISIONS FOR U.S. NONGOVERNMENTAL RECIPIENTS

1. APPLICABILITY OF 22 CFR PART 226 (May 2005)

a. All provisions of 22 CFR Part 226 and all Standard Provisions attached to this agreement are applicable to the recipient and to subrecipients which meet the definition of "Recipient" in Part 226, unless a section specifically excludes a subrecipient from coverage. The recipient shall assure that subrecipients have copies of all the attached standard provisions.
b. For any subawards made with Non-US subrecipients the Recipient shall include the applicable "Standard Provisions for Non-US Nongovernmental Grantees." Recipients are required to ensure compliance with monitoring procedures in accordance with OMB Circular A-133.

[END OF PROVISION]

2. INELIGIBLE COUNTRIES (MAY 1986)

Unless otherwise approved by the USAID Agreement Officer, funds will only be expended for assistance to countries eligible for assistance under the Foreign Assistance Act of 1961, as amended, or under acts appropriating funds for foreign assistance.

[END OF PROVISION]

3. NONDISCRIMINATION (MAY 1986)

(This provision is applicable when work under the grant is performed in the U.S. or when employees are recruited in the U.S.)
No U.S. citizen or legal resident shall be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity funded by this award on the basis of race, color, national origin, age, handicap, or sex.

[END OF PROVISION]

4. NONLIABILITY (NOVEMBER 1985)

USAID does not assume liability for any third party claims for damages arising out of this award.

[END OF PROVISION]

5. AMENDMENT (NOVEMBER 1985)

The award may be amended by formal modifications to the basic award document or by means of an exchange of letters between the Agreement Officer and an appropriate official of the recipient.

[END OF PROVISION]

6. NOTICES (NOVEMBER 1985)

Any notice given by USAID or the recipient shall be sufficient only if in writing and delivered in person, mailed, or cabled as follows:

- To the USAID Agreement Officer, at the address specified in the award.
- To recipient, at recipient's address shown in the award or to such other address designated within the award

Notices shall be effective when delivered in accordance with this provision, or on the effective date of the notice, whichever is later.

[END OF PROVISION]

7. SUBAGREEMENTS (June 1999)

Subrecipients, subawardees, and contractors have no relationship with USAID under the terms of this agreement. All required USAID approvals must be directed through the recipient to USAID.

[END OF PROVISION]

(December 2003)

Information collection requirements imposed by this grant are covered by OMB approval number 0412-0510; the current expiration date is 04/30/2005. The Standard Provisions containing the requirement and an estimate of the public reporting burden (including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information) are:

Standard Provision Burden Estimate	
Air Travel and Transportation	1 (hour)
Ocean Shipment of Goods	.5
Patent Rights	.5
Publications	.5
Negotiated Indirect Cost Rates - (Predetermined and Provisional)	1
Voluntary Population Planning	.5
Protection of the Individual as a Research Subject	1

22 CFR 226 Burden Estimate	
22 CFR 226.40-.49 Procurement of Goods and Services	1
22 CFR 226.30 - Property Standards	.36 1.5

Comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, may be sent to the

Office of Procurement
Policy Division (M/OP/P)
U.S. Agency for International Development
Washington, DC 20523-7801

and to the

Office of Management and Budget
Paperwork Reduction Project (0412-0510)
Washington, D.C 20503.

[END OF PROVISION]

8. CARE OF LABORATORY ANIMALS (MARCH 2004)

APPLICABILITY: This provision is applicable when laboratory animals are involved in research performed in the U.S. and financed by the award.

CARE OF LABORATORY ANIMALS (MARCH 2004)

a. Before undertaking performance of any grant involving the use of laboratory animals, the recipient shall register with the Secretary of Agriculture of the United States in accordance with Section 6, Public Law 89-544, Laboratory Animal Welfare Act, August 24, 1966, as amended by Public Law 91-579, Animal Welfare Act of 1970, December 24, 1970. The recipient shall furnish evidence of such registration to the Agreement Officer.

b. The recipient shall acquire animals used in research under this award only from dealers licensed by the Secretary of Agriculture, or from exempted sources in accordance with the Public Laws enumerated in (a) above.

c. In the care of any live animals used or intended for use in the performance of this grant, the recipient shall adhere to the principles enunciated in the Guide for Care and Use of Laboratory Animals prepared by the Institute of Laboratory Animals Resources, National Academy of Sciences - National Research Council, and in the United States Department of Agriculture's (USDA) regulations and standards issued under the Public Laws enumerated in a. above. In case of conflict between standards, the higher standard shall be used. The recipient's reports on portions of the award in which animals were used shall contain a certificate stating that the animals were cared for in accordance with the principles enunciated in the Guide for Care and Use of Laboratory Animals prepared by the Institute of Laboratory Animal Resources, NAS-NRC, and/or in the regulations and standards as promulgated by the Agricultural Research Service, USDA, pursuant to the Laboratory Animal Welfare Act of 24 August 1966, as amended (P.L. 89-544 and P.L. 91-579). NOTE: The recipient may request registration of the recipient's facility and a current listing of licensed dealers from the Regional Office of the Animal and Plant Health Inspection Service (APHIS), USDA, for the region in which the recipient's research facility is located. The location of the appropriate APHIS Regional Office as well as information concerning this program may be obtained by contacting the Senior Staff Office, Animal Care Staff, USDA/APHIS, 4700 River Road Unit 84, Riverdale, MD 20737-1234 and at **http://www.aphis.usda.gov/ac/**.

[END OF PROVISION]

9. USAID ELIGIBILITY RULES FOR GOODS AND SERVICES (April 1998)

(This provision is not applicable to goods or services which the recipient provides with private funds as part of a cost-sharing requirement, or with Program Income generated under the award.)

a. Ineligible and Restricted Goods and Services: USAID's policy on ineligible and restricted goods and services is contained in ADS Chapter 312.

(1) Ineligible Goods and Services. Under no circumstances shall the recipient procure any of the following under this award:

(i) Military equipment,
(ii) Surveillance equipment,
(iii) Commodities and services for support of police or other law enforcement activities,
(iv) Abortion equipment and services,
(v) Luxury goods and gambling equipment, or
(vi) Weather modification equipment.

(2) Ineligible Suppliers. Funds provided under this award shall not be used to procure any goods or services furnished by any firms or individuals whose name appears on the "Lists of Parties Excluded from Federal Procurement and Nonprocurement Programs." USAID will provide the recipient with a copy of these lists upon request.

(3) Restricted Goods. The recipient shall not procure any of the following goods and services without the prior approval of the Agreement Officer:

(i) Agricultural commodities,
(ii) Motor vehicles,
(iii) Pharmaceuticals,
(iv) Pesticides,
(v) Used equipment,
(vi) U.S. Government-owned excess property, or
(vii) Fertilizer.

Prior approval will be deemed to have been met when:

(i) the item is of U.S. source/origin;
(ii) the item has been identified and incorporated in the program description or schedule of the award (initial or revisions), or amendments to the award; and
(iii) the costs related to the item are incorporated in the approved budget of the award.

Where the item has not been incorporated into the award as described above, a separate written authorization from the Agreement Officer must be provided before the item is procured.

b. Source and Nationality: The eligibility rules for goods and services based on source and nationality are divided into two categories. One applies when the total procurement element during the life of the award is over $250,000, and the other applies when the total procurement element during the life of the award is not over $250,000, or the award is

funded under the Development Fund for Africa (DFA) regardless of the amount. The total procurement element includes procurement of all goods (e.g., equipment, materials, supplies) and services. Guidance on the eligibility of specific goods or services may be obtained from the Agreement Officer. USAID policies and definitions on source, origin and nationality are contained in 22 CFR Part 228, Rules on Source, Origin and Nationality for Commodities and Services Financed by the Agency for International Development, which is incorporated into this Award in its entirety.

(1) For DFA funded awards or when the total procurement element during the life of this award is valued at $250,000 or less, the following rules apply:

(i) The authorized source for procurement of all goods and services to be reimbursed under the award is USAID Geographic Code 935, "Special Free World," and such goods and services must meet the source, origin and nationality requirements set forth in 22 CFR Part 228 in accordance with the following order of preference:

(A) The United States (USAID Geographic Code 000),

(B) The Cooperating Country,

(C) USAID Geographic Code 941, and

(D) USAID Geographic Code 935.

(ii) Application of order of preference: When the recipient procures goods and services from other than U.S. sources, under the order of preference in paragraph (b)(1)(i) above, the recipient shall document its files to justify each such instance. The documentation shall set forth the circumstances surrounding the procurement and shall be based on one or more of the following reasons, which will be set forth in the grantee's documentation:

(A) The procurement was of an emergency nature, which would not allow for the delay attendant to soliciting U.S. sources,

(B) The price differential for procurement from U.S. sources exceeded by 50% or more the delivered price from the non-U.S. source,

(C) Compelling local political considerations precluded consideration of U.S. sources,

(D) The goods or services were not available from U.S. sources, or

(E) Procurement of locally available goods and services, as opposed to procurement of U.S. goods and services, would best promote the objectives of the Foreign Assistance program under the award.

(2) When the total procurement element exceeds $250,000 (unless funded by DFA), the following applies: Except as may be specifically approved or directed in advance by the Agreement Officer, all goods and services financed with U.S. dollars, which will be reimbursed under this award must meet the source, origin and nationality requirements set forth in 22 CFR Part 228 for the authorized geographic code specified in the schedule of this award. If none is specified, the authorized source is Code 000, the United States.

c. Printed or Audio-Visual Teaching Materials: If the effective use of printed or audio-visual teaching materials depends upon their being in the local language and if such materials are intended for technical assistance projects or activities financed by USAID in whole or in part and if other funds including U.S.-owned or U.S.-controlled local currencies are not readily available to finance the procurement of such materials, local language versions may be procured from the following sources, in order of preference:

(1) The United States (USAID Geographic Code 000),

(2) The Cooperating Country,

(3) "Selected Free World" countries (USAID Geographic

Code 941), and
(4) "Special Free World" countries (USAID Geographic Code 899).

d. If USAID determines that the recipient has procured any of these goods or services under this award contrary to the requirements of this provision, and has received payment for such purposes, the Agreement Officer may require the recipient to refund the entire amount of the purchase.
This provision must be included in all subagreements which include procurement of goods or services which total over $5,000.

[END OF PROVISION]

10. DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS (January 2004)

a. The recipient agrees to notify the Agreement Officer immediately upon learning that it or any of its principals:

(1) Are presently excluded or disqualified from covered transactions by any Federal department or agency;
(2) Have been convicted within the preceding three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, receiving stolen property, making false claims, or obstruction of justice; commission of any other offense indicating a lack of business integrity or business honesty that seriously and directly affects your present responsibility;
(3) Are presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b); and
(4) Have had one or more public transactions (Federal, State, or local) terminated for cause or default within the preceding three years.

b. The recipient agrees that, unless authorized by the Agreement Officer, it will not knowingly enter into any subagreements or contracts under this grant with a person or entity that is included on the Excluded Parties List System (http://epls.arnet.gov). The recipient further agrees to include the following provision in any subagreements or contracts entered into under this award:
DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION (DECEMBER 2003)
The recipient/contractor certifies that neither it nor its principals is presently excluded or disqualified from participation in this transaction by any Federal department or agency.

c. The policies and procedures applicable to debarment, suspension, and ineligibility under USAID-financed transactions are set forth in 22 CFR Part 208.

[END OF PROVISION]

11. DRUG-FREE WORKPLACE (January 2004)

a. The recipient agrees that it will publish a drug-free workplace statement and provide a copy to each employee who will be engaged in the performance of any Federal award. The statement must

(1) Tell the employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in its workplace;
(2) Specify the actions the recipient will take against employees for violating that prohibition; and
(3) Let each employee know that, as a condition of employment under any award, he or she

(i) Must abide by the terms of the statement, and
(ii) Must notify you in writing if he or she is convicted for a violation of a criminal drug statute occurring in the workplace, and must do so no more than five calendar days after the conviction.

b. The recipient agrees that it will establish an ongoing drug-free awareness program to inform employees about

(i) The dangers of drug abuse in the workplace;
(ii) Your policy of maintaining a drug-free workplace;
(iii) Any available drug counseling, rehabilitation and employee assistance programs; and
(iv) The penalties that you may impose upon them for drug abuse violations occurring in the workplace.

c. Without the Agreement Officer's expressed written approval, the policy statement and program must be in place as soon as possible, no later than the 30 days after the effective date of this award or the completion date of this award, whichever occurs first.

d. The recipient agrees to immediately notify the Agreement Officer if an employee is convicted of a drug violation in the workplace. The notification must be in writing, identify the employee's position title, the number of each award on which the employee worked. The notification must be sent to the Agreement Officer within ten calendar days after the recipient learns of the conviction.

e. Within 30 calendar days of learning about an employee's conviction, the recipient must either

(1) Take appropriate personnel action against the employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973 (29 USC 794), as amended, or
(2) Require the employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for these purposes by a Federal, State or local health, law enforcement, or other appropriate agency.

f. The policies and procedures applicable to violations of these requirements are set forth in 22 CFR Part 210.

[END OF PROVISION]

12. EQUAL PROTECTION OF THE LAWS FOR FAITH-BASED AND COMMUNITY ORGANIZATIONS (February 2004)

a. The recipient may not discriminate against any beneficiary or potential beneficiary under this award on the basis of religion or religious belief. Accordingly, in providing services supported in whole or in part by this agreement or in its outreach activities related to such services, the recipient may not discriminate against current or prospective program beneficiaries on the basis of religion, a religious belief, a refusal to hold a religious belief, or a refusal to actively participate in a religious practice;

b. The Federal Government must implement Federal programs in accordance with the Establishment Clause and the Free Exercise Clause of the First Amendment to the Constitution. Therefore, if the recipient engages in inherently religious activities, such as worship, religious instruction, and proselytization, it must offer those services at a different time or location from any programs or services directly funded by this award, and participation by beneficiaries in any such inherently religious activities must be voluntary.

c. If the recipient makes subawards under this agreement, faith-based organizations should be eligible to participate on the same basis as other organizations, and should not be discriminated against on the basis of their religious character or affiliation.

[END OF PROVISION]

13. IMPLEMENTATION OF E.O. 13224 -- EXECUTIVE ORDER ON TERRORIST FINANCING (March 2002)

The Recipient is reminded that U.S. Executive Orders and U.S. law prohibits transactions with, and the provision of resources and support to, individuals and organizations associated with terrorism. It is the legal responsibility of the recipient to ensure compliance with these Executive Orders and laws. This provision must be included in all contracts/subawards issued under this agreement.

[END OF PROVISION]

14. MARKING UNDER USAID-FUNDED ASSISTANCE INSTRUMENTS (December 2005)

(a) Definitions

Commodities mean any material, article, supply, goods or equipment, excluding recipient offices, vehicles, and non-deliverable items for recipient's internal use, in administration of the USAID funded grant, cooperative agreement, or other agreement or subagreement.

Principal Officer means the most senior officer in a USAID Operating Unit in the field, e.g., USAID Mission Director or USAID Representative. For global programs managed from Washington but executed across many countries, such as disaster relief and assistance to

internally displaced persons, humanitarian emergencies or immediate post conflict and political crisis response, the cognizant Principal Officer may be an Office Director, for example, the Directors of USAID/W/Office of Foreign Disaster Assistance and Office of Transition Initiatives. For non-presence countries, the cognizant Principal Officer is the Senior USAID officer in a regional USAID Operating Unit responsible for the non-presence country, or in the absence of such a responsible operating unit, the Principal U.S Diplomatic Officer in the non-presence country exercising delegated authority from USAID.

Programs mean an organized set of activities and allocation of resources directed toward a common purpose, objective, or goal undertaken or proposed by an organization to carry out the responsibilities assigned to it.

Projects include all the marginal costs of inputs (including the proposed investment) technically required to produce a discrete marketable output or a desired result (for example, services from a fully functional water/sewage treatment facility).

Public communications are documents and messages intended for distribution to audiences external to the recipient's organization. They include, but are not limited to, correspondence, publications, studies, reports, audio visual productions, and other informational products; applications, forms, press and promotional materials used in connection with USAID funded programs, projects or activities, including signage and plaques; Web sites/Internet activities; and events such as training courses, conferences, seminars, press conferences and so forth.

Subrecipient means any person or government (including cooperating country government) department, agency, establishment, or for profit or nonprofit organization that receives a USAID subaward, as defined in 22 C.F.R. 226.2.

Technical Assistance means the provision of funds, goods, services, or other foreign assistance, such as loan guarantees or food for work, to developing countries and other USAID recipients, and through such recipients to subrecipients, in direct support of a development objective – as opposed to the internal management of the foreign assistance program.

USAID Identity (Identity) means the official marking for the United States Agency for International Development (USAID), comprised of the USAID logo or seal and new brandmark, with the tagline that clearly communicates that our assistance is "from the American people." The USAID Identity is available on the USAID website at **www.usaid.gov/branding** and USAID provides it without royalty, license, or other fee to recipients of USAID-funded grants, or cooperative agreements, or other assistance awards

(b) Marking of Program Deliverables

(1) All recipients must mark appropriately all overseas programs, projects, activities, public communications, and commodities partially or fully funded by a USAID grant or cooperative agreement or other assistance award or subaward with the USAID Identity, of a size and prominence equivalent to or greater than the recipient's, other donor's, or any other third party's identity or logo.

(2) The Recipient will mark all program, project, or activity sites funded by USAID, including visible infrastructure projects (for example, roads, bridges, buildings) or other programs, projects, or activities that are physical in nature (for example, agriculture, forestry, water management) with the USAID Identity. The Recipient should erect temporary signs or plaques early in the construction or implementation phase. When construction or implementation is complete, the Recipient must install a permanent, durable sign, plaque or other marking.

(3) The Recipient will mark technical assistance, studies, reports, papers, publications, audio-visual productions, public service announcements, Web sites/Internet activities and other promotional, informational, media, or communications products funded by USAID with the USAID Identity.

(4) The Recipient will appropriately mark events financed by USAID, such as training courses, conferences, seminars, exhibitions, fairs, workshops, press conferences and other public activities, with the USAID Identity. Unless directly prohibited and as appropriate to the surroundings, recipients should display additional materials, such as signs and banners, with the USAID Identity. In circumstances in which the USAID Identity cannot be displayed visually, the recipient is encouraged otherwise to acknowledge USAID and the American people's support.

(5) The Recipient will mark all commodities financed by USAID, including commodities or equipment provided under humanitarian assistance or disaster relief programs, and all other equipment, supplies, and other materials funded by USAID, and their export packaging with the USAID Identity.

(6) The Agreement Officer may require the USAID Identity to be larger and more prominent if it is the majority donor, or to require that a cooperating country government's identity be larger and more prominent if circumstances warrant, and as appropriate depending on the audience, program goals, and materials produced.

(7) The Agreement Officer may require marking with the USAID Identity in the event that the recipient does not choose to mark with its own identity or logo.

(8) The Agreement Officer may require a pre-production review of USAID-funded public communications and program materials for compliance with the approved Marking Plan.

(9) Subrecipients. To ensure that the marking requirements "flow down" to subrecipients of subawards, recipients of USAID funded grants and cooperative agreements or other assistance awards will include the USAID-approved marking provision in any USAID funded subaward, as follows:

"As a condition of receipt of this subaward, marking with the USAID Identity of a size and prominence equivalent to or greater than the recipient's, subrecipient's, other donor's or third party's is required. In the event the recipient chooses not to require marking with its own identity or logo by the subrecipient, USAID may, at its discretion, require marking by the subrecipient with the USAID Identity."

(10) Any 'public communications', as defined in 22 C.F.R. 226.2, funded by USAID, in which the content has not been approved by USAID, must contain the following disclaimer:
"This study/report/audio/visual/other information/media product (specify) is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of [insert recipient name] and do not necessarily reflect the views of USAID or the United States Government."

(11) The recipient will provide the Cognizant Technical Officer (CTO) or other USAID personnel designated in the grant or cooperative agreement with two copies of all program

and communications materials produced under the award. In addition, the recipient will submit one electronic or one hard copy of all final documents to USAID's Development Experience Clearinghouse.

(c) Implementation of marking requirements.
(1) When the grant or cooperative agreement contains an approved Marking Plan, the recipient will implement the requirements of this provision following the approved Marking Plan.

(2) When the grant or cooperative agreement does not contain an approved Marking Plan, the recipient will propose and submit a plan for implementing the requirements of this provision within [***Agreement Officer fill-in***] days after the effective date of this provision. The plan will include:

(i) A description of the program deliverables specified in paragraph (b) of this provision that the recipient will produce as a part of the grant or cooperative agreement and which will visibly bear the USAID Identity.
(ii) the type of marking and what materials the applicant uses to mark the program deliverables with the USAID Identity,
(iii) when in the performance period the applicant will mark the program deliverables, and where the applicant will place the marking,

(3) The recipient may request program deliverables not be marked with the USAID Identity by identifying the program deliverables and providing a rationale for not marking these program deliverables. Program deliverables may be exempted from USAID marking requirements when:

(i) USAID marking requirements would compromise the intrinsic independence or neutrality of a program or materials where independence or neutrality is an inherent aspect of the program and materials;
(ii) USAID marking requirements would diminish the credibility of audits, reports, analyses, studies, or policy recommendations whose data or findings must be seen as independent;
(iii) USAID marking requirements would undercut host-country government "ownership" of constitutions, laws, regulations, policies, studies, assessments, reports, publications, surveys or audits, public service announcements, or other communications better positioned as "by" or "from" a cooperating country ministry or government official;
(iv) USAID marking requirements would impair the functionality of an item;
(v) USAID marking requirements would incur substantial costs or be impractical;
(vi) USAID marking requirements would offend local cultural or social norms, or be considered inappropriate;
(vii) USAID marking requirements would conflict with international law.

(4) The proposed plan for implementing the requirements of this provision, including any proposed exemptions, will be negotiated within the time specified by the Agreement Officer after receipt of the proposed plan. Failure to negotiate an approved plan with the time specified by the Agreement Officer may be considered as noncompliance with the requirements is provision.

(d) Waivers.

(1) The recipient may request a waiver of the Marking Plan or of the marking requirements of this provision, in whole or in part, for each program, project, activity, public communication or commodity, or, in exceptional circumstances, for a region or country, when USAID required marking would pose compelling political, safety, or security concerns, or when marking would have an adverse impact in the cooperating country. The recipient will submit the request through the Cognizant Technical Officer. The Principal Officer is responsible for approvals or disapprovals of waiver requests.

(2) The request will describe the compelling political, safety, security concerns, or adverse impact that require a waiver, detail the circumstances and rationale for the waiver, detail the specific requirements to be waived, the specific portion of the Marking Plan to be waived, or specific marking to be waived, and include a description of how program materials will be marked (if at all) if the USAID Identity is removed. The request should also provide a rationale for any use of recipient's own identity/logo or that of a third party on materials that will be subject to the waiver.

(3) Approved waivers are not limited in duration but are subject to Principal Officer review at any time, due to changed circumstances.

(4) Approved waivers "flow down" to recipients of subawards unless specified otherwise. The waiver may also include the removal of USAID markings already affixed, if circumstances warrant.

(5) Determinations regarding waiver requests are subject to appeal to the Principal Officer's cognizant Assistant Administrator. The recipient may appeal by submitting a written request to reconsider the Principal Officer's waiver determination to the cognizant Assistant Administrator.

(e) Non-retroactivity. The requirements of this provision do not apply to any materials, events, or commodities produced prior to January 2, 2006. The requirements of this provision do not apply to program, project, or activity sites funded by USAID, including visible infrastructure projects (for example, roads, bridges, buildings) or other programs, projects, or activities that are physical in nature (for example, agriculture, forestry, water management) where the construction and implementation of these are complete prior to January 2, 2006 and the period of the grant does not extend past January 2, 2006.

[END OF PROVISION]

15. REGULATIONS GOVERNING EMPLOYEES (AUGUST 1992)

(The following applies to the recipient's employees working in the cooperating country under the agreement who are not citizens of the cooperating country.)

a. The recipient's employees shall maintain private status and may not rely on local U.S. Government offices or facilities for support while under this grant.

b. The sale of personal property or automobiles by recipient employees and their dependents in the foreign country to which they are assigned shall be subject to the same limitations and prohibitions which apply to direct-hire USAID personnel employed by the Mission, including the rules contained in 22 CFR Part 136, except as this may conflict with host government regulations.

c. Other than work to be performed under this award for which an employee is assigned by the recipient, no employee of the recipient shall engage directly or indirectly, either in the individual's own name or in the name or through an agency of another person, in any business, profession, or occupation in the foreign countries to which the individual is assigned, nor shall the individual make loans or investments to or in any business, profession or occupation in the foreign countries to which the individual is assigned.

d. The recipient's employees, while in a foreign country, are expected to show respect for its conventions, customs, and institutions, to abide by its applicable laws and regulations, and not to interfere in its internal political affairs.

e. In the event the conduct of any recipient employee is not in accordance with the preceding paragraphs, the recipient's chief of party shall consult with the USAID Mission Director and the employee involved and shall recommend to the recipient a course of action with regard to such employee.

f. The parties recognize the rights of the U.S. Ambassador to direct the removal from a country of any U.S. citizen or the discharge from this grant award of any third country national when, in the discretion of the Ambassador, the interests of the United States so require.

g. If it is determined, either under (e) or (f) above, that the services of such employee should be terminated, the recipient shall use its best efforts to cause the return of such employee to the United States, or point of origin, as appropriate.

[END OF PROVISION]

16. CONVERSION OF UNITED STATES DOLLARS TO LOCAL CURRENCY (NOVEMBER 1985)

(This provision applies when activities are undertaken outside the United States.)

Upon arrival in the Cooperating Country, and from time to time as appropriate, the recipient's chief of party shall consult with the Mission Director who shall provide, in writing, the procedure the recipient and its employees shall follow in the conversion of United States dollars to local currency. This may include, but is not limited to, the conversion of currency through the cognizant United States Disbursing Officer or Mission Controller, as appropriate.

[END OF PROVISION]

17. USE OF POUCH FACILITIES (AUGUST 1992)

(This provision applies when activities are undertaken outside the United States.)

a. Use of diplomatic pouch is controlled by the Department of State. The Department of State has authorized the use of pouch facilities for USAID recipients and their employees as a general policy, as detailed in items (1) through (6) below. However, the final decision

regarding use of pouch facilities rest with the Embassy or USAID Mission. In consideration of the use of pouch facilities, the recipient and its employees agree to indemnify and hold harmless, the Department of State and USAID for loss or damage occurring in pouch transmission:

(1) Recipients and their employees are authorized use of the pouch for transmission and receipt of up to a maximum of .9 kgs per shipment of correspondence and documents needed in the administration of assistance programs.

(2) U.S. citizen employees are authorized use of the pouch for personal mail up to a maximum of .45 kgs per shipment (but see (a)(3) below).

(3) Merchandise, parcels, magazines, or newspapers are not considered to be personal mail for purposes of this standard provision and are not authorized to be sent or received by pouch.

(4) Official and personal mail pursuant to a.1. and 2. above sent by pouch should be addressed as follows:

Name of individual or organization (followed by
letter symbol "G")
City Name of post (USAID/_____)
Agency for International Development
Washington, D.C. 20523-0001

(5) Mail sent via the diplomatic pouch may not be in violation of U.S. Postal laws and may not contain material ineligible for pouch transmission.

(6) Recipient personnel are NOT authorized use of military postal facilities (APO/FPO). This is an Adjutant General's decision based on existing laws and regulations governing military postal facilities and is being enforced worldwide.

b. The recipient shall be responsible for advising its employees of this authorization, these guidelines, and limitations on use of pouch facilities.

c. Specific additional guidance on grantee use of pouch facilities in accordance with this standard provision is available from the Post Communication Center at the Embassy or USAID Mission.

[END OF PROVISION]

18. INTERNATIONAL AIR TRAVEL AND TRANSPORTATION (JUNE 1999)

(This provision is applicable when costs for international travel or transportation will be paid for with USAID funds. This provision is not applicable if the recipient is providing for travel with private funds as part of a cost-sharing requirement, or with Program Income generated under the award.)

a. PRIOR BUDGET APPROVAL

In accordance with OMB Cost Principles, direct charges for foreign travel costs are allowable only when each foreign trip has received prior budget approval. Such approval will be deemed to have been met when:

(1) the trip is identified. Identification is accomplished by providing the following information: the number of trips, the number of individuals per trip, and the destination country(s).
(2) the information noted at (a)(1) above is incorporated in: the proposal, the program description or schedule of the award, the implementation plan (initial or revisions), or amendments to the award; and
(3) the costs related to the travel are incorporated in the approved budget of the award.

The Agreement Officer may approve travel which has not been incorporated in writing as required by paragraph (a)(2). In such case, a copy of the Agreement Officer's approval must be included in the agreement file.

b. NOTIFICATION

(1) As long as prior budget approval has been met in accordance with paragraph (a) above, a separate Notification will not be necessary unless:

(i) the primary purpose of the trip is to work with USAID Mission personnel, or
(ii) the recipient expects significant administrative or substantive programmatic support from the Mission.
Neither the USAID Mission nor the Embassy will require Country Clearance of employees or contractors of USAID Recipients.

(2) Where notification is required in accordance with paragraph (1)(i) or (ii) above, the recipient will observe the following standards:

(i) Send a written notice to the cognizant USAID Technical Office in the Mission. If the recipient's primary point of contact is a Technical Officer in USAID/W, the recipient may send the notice to that person. It will be the responsibility of the USAID/W Technical Officer to forward the notice to the field.
(ii) The notice should be sent as far in advance as possible, but at least 14 calendar days in advance of the proposed travel. This notice may be sent by fax or e-mail. The recipient should retain proof that notification was made.
(iii) The notification shall contain the following information: the award number, the cognizant Technical Officer, the traveler's name (if known), date of arrival, and the purpose of the trip.
(iv) The USAID Mission will respond only if travel has been denied. It will be the responsibility of the Technical Officer in the Mission to contact the recipient within 5 working days of having received the notice if the travel is denied. If the recipient has not received a response within the time frame, the recipient will be considered to have met these standards for notification, and may travel.
(v) If a subrecipient is required to issue a Notification, as per this section, the subrecipient may contact the USAID Technical Officer directly, or the prime may contact USAID on the subrecipient's behalf.

c. SECURITY ISSUES

Recipients are encouraged to obtain the latest Department of State Travel Advisory Notices before travelling. These Notices are available to the general public and may be obtained directly from the State Department, or via Internet.
Where security is a concern in a specific region, recipients may choose to notify the US Embassy of their presence when they have entered the country. This may be especially important for long-term posting.

d. USE OF U.S.-OWNED LOCAL CURRENCY
Travel to certain countries shall, at USAID's option, be funded from U.S.-owned local currency. When USAID intends to exercise this option, USAID will either issue a U.S. Government S.F. 1169, Transportation Request (GTR) which the grantee may exchange for tickets, or issue the tickets directly. Use of such U.S.-owned currencies will constitute a dollar charge to this grant.

e. THE FLY AMERICA ACT
The Fly America Act (49 U.S.C. 40118) requires that all air travel and shipments under this award must be made on U.S. flag air carriers to the extent service by such carriers is available. The Administrator of General Services Administration (GSA) is authorized to issue regulations for purposes of implementation. Those regulations may be found at 41 CFR part 301, and are hereby incorporated by reference into this award.

f. COST PRINCIPLES
The recipient will be reimbursed for travel and the reasonable cost of subsistence, post differentials and other allowances paid to employees in international travel status in accordance with the recipient's applicable cost principles and established policies and practices which are uniformly applied to federally financed and other activities of the grantee.
If the recipient does not have written established policies regarding travel costs, the standard for determining the reasonableness of reimbursement for overseas allowance will be the Standardized Regulations (Government Civilians, Foreign Areas), published by the U.S. Department of State, as from time to time amended. The most current subsistence, post differentials, and other allowances may be obtained from the Agreement Officer.

g. SUBAWARDS.
This provision will be included in all subawards and contracts which require international air travel and transportation under this award.

[END OF PROVISION]

19. OCEAN SHIPMENT OF GOODS (JUNE 1999)

(This provision is applicable for awards and subawards for $100,000 or more and when goods purchased with funds provided under this award are transported to cooperating countries on ocean vessels whether or not award funds are used for the transportation.)

a. At least 50% of the gross tonnage of all goods purchased under this agreement and transported to the cooperating countries shall be made on privately owned U.S. flag commercial ocean vessels, to the extent such vessels are available at fair and reasonable rates for such vessels.

b. At least 50% of the gross freight revenue generated by shipments of goods purchased under this agreement and transported to the cooperating countries on dry cargo liners shall be paid to or for the benefit of privately owned U.S. flag commercial ocean vessels to the extent such vessels are available at fair and reasonable rates for such vessels.

c. When U.S. flag vessels are not available, or their use would result in a significant delay, the grantee may request a determination of non-availability from the USAID Transportation Division, Office of Procurement, Washington, D.C. 20523, giving the basis for the request which will relieve the grantee of the requirement to use U.S. flag vessels for the amount of tonnage included in the determination. Shipments made on non-free world ocean vessels are not reimbursable under this grant.
d. The recipient shall send a copy of each ocean bill of lading, stating all of the carrier's charges including the basis for calculation such as weight or cubic measurement, covering a shipment under this agreement to:

U.S. Department of Transportation,
Maritime Administration, Division of National Cargo,
400 7th Street, S.W.,
Washington, DC 20590, and
U.S. Agency for International Development,
Office of Procurement, Transportation Division
1300 Pennsylvania Avenue, N.W.
Washington, DC 20523-7900

e. Shipments by voluntary nonprofit relief agencies (i.e., PVOs) shall be governed by this standard provision and by USAID Regulation 2, "Overseas Shipments of Supplies by Voluntary Nonprofit Relief Agencies" (22 CFR Part 202).

f. Shipments financed under this grant must meet applicable eligibility requirements set out in 22 CFR 228.21.

[END OF PROVISION]

20. LOCAL PROCUREMENT (April 1998)

(This provision applies when activities are undertaken outside the United States.)

a. Financing local procurement involves the use of appropriated funds to finance the procurement of goods and services supplied by local businesses, dealers or producers, with payment normally being in the currency of the cooperating country.

b. Locally financed procurements must be covered by source and nationality waivers as set forth in 22 CFR 228, Subpart F, except as provided for in mandatory standard provision, "USAID Eligibility Rules for Goods and Services," or when one of the following exceptions applies:

(1) Locally available commodities of U.S. origin, which are otherwise eligible for financing, if the value of the transaction is estimated not to exceed $100,000 exclusive of transportation costs.
(2) Commodities of geographic code 935 origin if the value of the transaction does not exceed the local currency equivalent of $5,000.
(3) Professional Services Contracts estimated not to exceed $250,000.
(4) Construction Services Contracts estimated not to exceed $5,000,000.

(5) Commodities and services available only in the local economy (no specific per transaction value applies to this category). This category includes the following items:

(i) Utilities including fuel for heating and cooking, waste disposal and trash collection;
(ii) Communications - telephone, telex, fax, postal and courier services;
(iii) Rental costs for housing and office space;
(iv) Petroleum, oils and lubricants for operating vehicles and equipment;
(v) Newspapers, periodicals and books published in the cooperating country;
(vi) Other commodities and services and related expenses that, by their nature or as a practical matter, can only be acquired, performed, or incurred in the cooperating country, e.g., vehicle maintenance, hotel accommodations, etc.

c. The coverage on ineligible and restricted goods and services in the mandatory standard provision entitled, "USAID Eligibility Rules for Goods and Services," also apply to local procurement.

This provision will be included in all subagreements where local procurement of goods or services is a supported element.

[END OF PROVISION]

21. VOLUNTARY POPULATION PLANNING ACTIVITIES – MANDATORY REQUIREMENTS (MAY 2006)

Requirements for Voluntary Sterilization Programs

(1) None of the funds made available under this award shall be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any individual to practice sterilization.

Prohibition on Abortion-Related Activities:

(1) No funds made available under this award will be used to finance, support, or be attributed to the following activities:

(i) procurement or distribution of equipment intended to be used for the purpose of inducing abortions as a method of family planning;
(ii) special fees or incentives to any person to coerce or motivate them to have abortions;
(iii) payments to persons to perform abortions or to solicit persons to undergo abortions;
(iv) information, education, training, or communication programs that seek to promote abortion as a method of family planning; and
(v) lobbying for or against abortion. The term “motivate”, as it relates to family planning assistance, shall not be construed to prohibit the provision, consistent with local law, of information or counseling about all pregnancy options.

(2) No funds made available under this award will be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions

or involuntary sterilizations as a means of family planning. Epidemiologic or descriptive research to assess the incidence, extent or consequences of abortions is not precluded.

[END OF PROVISION]

[END OF MANDATORY PROVISIONS]

II. REQUIRED AS APPLICABLE STANDARD PROVISIONS FOR U.S., NONGOVERNMENTAL RECIPIENTS

The following standard provisions are required to be used when applicable. Applicability statements are contained in the parenthetical statement preceding the standard provision. When a standard provision is determined to be applicable in accordance with the applicability statement, the use of such standard provision is mandatory unless a deviation has been approved in accordance with ADS 303.3.4.

1. NEGOTIATED INDIRECT COST RATES - PREDETERMINED (April 1998)

APPLICABILITY: This provision is applicable to educational or nonprofit institutions whose indirect cost rates under this award are on a predetermined basis.

NEGOTIATED INDIRECT COST RATES - PREDETERMINED (April 1998)

a. The allowable indirect costs shall be determined by applying the predetermined indirect cost rates to the bases specified in the schedule of this award.

b. Within the earlier of 30 days after receipt of the A-133 audit report or nine months after the end of the audit period, the recipient shall submit to the cognizant agency for audit the required OMB Circular A-133 audit report, proposed predetermined indirect cost rates, and supporting cost data. If USAID is the cognizant agency or no cognizant agency has been designated, the recipient shall submit four copies of the audit report, the proposed predetermined indirect cost rates, and supporting cost data to the Overhead, Special Costs, and Closeout Branch, Office of Procurement, USAID, Washington DC 20523-7802. The proposed rates shall be based on the recipient's actual cost experience during that fiscal year. Negotiations of predetermined indirect cost rates shall begin soon after receipt of the recipient's proposal.

c. Allowability of costs and acceptability of cost allocation methods shall be determined in accordance with the applicable cost principles.

d. The results of each negotiation shall be set forth in an indirect cost rate agreement signed by both parties. Such agreement is automatically incorporated into this award and shall specify (1) the agreed upon predetermined rates, (2) the bases to which the rates apply, (3) the fiscal year for which the rates apply, and (4) the specific items treated as direct costs. The indirect cost rate agreement shall not change any monetary ceiling, award obligation, or specific cost allowance or disallowance provided for in this award.

e. Pending establishment of predetermined indirect costs rates for any fiscal year, the recipient shall be reimbursed either at the rates fixed for the previous fiscal year or at billing rates acceptable to the USAID Agreement Officer, subject to appropriate adjustment when the final rates for the fiscal year or other period are established.

[END OF PROVISION]

2. PUBLICATIONS AND MEDIA RELEASES (MARCH 2006)

APPLICABILITY: This provision is applicable when publications are financed under the award.

PUBLICATIONS AND MEDIA RELEASES (MARCH 2006)

a. The recipient shall provide the USAID Cognizant Technical Officer one copy of all published works developed under the award with lists of other written work produced

under the award. In addition, the recipient shall submit final documents in electronic format unless no electronic version exists at the following address:

Online (preferred)
http://www.dec.org/submit.cfm
Mailing address:
Document Acquisitions
USAID Development Experience Clearinghouse (DEC)
8403 Colesville Road Suite 210
Silver Spring, MD 20910-6368
Contract Information
Telephone (301) 562-0641
Fax (301) 588-7787
E-mail: **docsubmit@dec.cdie.org**

Electronic documents must consist of only one electronic file that comprises the complete and final equivalent of a hard copy. They may be submitted online (preferred); on 3.5" diskettes, a Zip disk, CD-R, or by e-mail. Electronic documents should be in PDF (Portable Document Format). Submission in other formats is acceptable but discouraged.
Each document submitted should contain essential bibliographic elements, such as 1) descriptive title; 2) author(s) name; 3) award number; 4) sponsoring USAID office; 5) strategic objective; and 6) date of publication;

b. In the event award funds are used to underwrite the cost of publishing, in lieu of the publisher assuming this cost as is the normal practice, any profits or royalties up to the amount of such cost shall be credited to the award unless the schedule of the award has identified the profits or royalties as program income.

c. Except as otherwise provided in the terms and conditions of the award, the author or the recipient is free to copyright any books, publications, or other copyrightable materials developed in the course of or under this award, but USAID reserves a royalty-free nonexclusive and irrevocable right to reproduce, publish, or otherwise use, and to authorize others to use the work for Government purposes.

[END OF PROVISION]

3. PARTICIPANT TRAINING (April 1998)

APPLICABILITY: This provision is applicable when any participant training is financed under the award.

PARTICIPANT TRAINING (April 1998)

a. Definition: A participant is any non-U.S. individual being trained under this award outside of that individual's home country.

b. Application of ADS Chapter 253: Participant training under this award shall comply with the policies established in ADS Chapter 253, Participant Training, except to the extent that specific exceptions to ADS 253 have been provided in this award with the concurrence of the Office of International Training.

c. Orientation: In addition to the mandatory requirements in ADS 253, recipients are strongly encouraged to provide, in collaboration with the Mission training officer, predeparture orientation and orientation in Washington at the Washington International Center. The latter orientation program also provides the opportunity to arrange for home hospitality in Washington and elsewhere in the United States through liaison with the National Council for International Visitors (NCIV). If the Washington orientation is determined not to be feasible, home hospitality can be arranged in most U.S. cities if a request for such is directed to the Agreement Officer, who will transmit the request to NCIV through EGAT/ED/PT.

[END OF PROVISION]

4. PROTECTION OF THE INDIVIDUAL AS A RESEARCH SUBJECT (April 1998)

APPLICABILITY: This provision is applicable when human subjects are involved in research financed by the award.

PROTECTION OF THE INDIVIDUAL AS A RESEARCH SUBJECT (April 1998)

a. Safeguarding the rights and welfare of human subjects involved in research supported by USAID is the responsibility of the organization to which support is awarded. USAID has adopted the Common Federal Policy for the Protection of Human Subjects, Part 225 of Title 22 of the Code of Federal Regulations (the "Policy"). Additional interpretation, procedures, and implementation guidance of the Policy are found in USAID General Notice entitled "Procedures for the Protection of Human Subjects in Research Supported by USAID," issued April 19, 1995, as from time to time amended. USAID's Cognizant Human Subjects Officer (CHSO) in USAID/W has oversight, guidance, and interpretation responsibility for the Policy.

b. Recipient organizations must comply with USAID policy when humans are the subject of research, as defined in 22 CFR 225.102(d), funded by the grant and recipients must provide "assurance", as required by 22 CFR 225.103, that they follow and abide by the procedures in the Policy. See also Section 5 of the April 19, 1995, USAID General Notice which sets forth activities to which the Policy is applicable. The existence of a bona fide, applicable assurance approved by the Department of Health and Human Services (HHS) such as the "multiple project assurance" (MPA) will satisfy this requirement. Alternatively, organizations can provide an acceptable written assurance to USAID as described in 22 CFR 225.103. Such assurances must be determined by the CHSO to be acceptable prior to any applicable research being initiated or conducted under the award. In some limited instances outside the U.S., alternative systems for the protection of human subjects may be used provided they are deemed "at least equivalent" to those outlined in Part 225 (See 22 CFR 225.101[h]). Criteria and procedures for making this determination are described in the General Notice cited in the preceding paragraph.

c. Since the welfare of the research subject is a matter of concern to USAID as well as to the organization, USAID staff consultants and advisory groups may independently review and inspect research and research processes and procedures involving human subjects, and based on such findings, the CHSO may prohibit research which presents unacceptable

hazards or otherwise fails to comply with USAID procedures. Informed consent documents must include the stipulation that the subject's records may be subject to such review.

[END OF PROVISION]

5. CARE OF LABORATORY ANIMALS (MARCH 2004)

APPLICABILITY: This provision is applicable when laboratory animals are involved in research performed in the U.S. and financed by the award.

CARE OF LABORATORY ANIMALS (MARCH 2004)

a. Before undertaking performance of any grant involving the use of laboratory animals, the recipient shall register with the Secretary of Agriculture of the United States in accordance with Section 6, Public Law 89-544, Laboratory Animal Welfare Act, August 24, 1966, as amended by Public Law 91-579, Animal Welfare Act of 1970, December 24, 1970. The recipient shall furnish evidence of such registration to the Agreement Officer.

b. The recipient shall acquire animals used in research under this award only from dealers licensed by the Secretary of Agriculture, or from exempted sources in accordance with the Public Laws enumerated in (a) above.

c. In the care of any live animals used or intended for use in the performance of this grant, the recipient shall adhere to the principles enunciated in the Guide for Care and Use of Laboratory Animals prepared by the Institute of Laboratory Animals Resources, National Academy of Sciences - National Research Council, and in the United States Department of Agriculture's (USDA) regulations and standards issued under the Public Laws enumerated in a. above. In case of conflict between standards, the higher standard shall be used. The recipient's reports on portions of the award in which animals were used shall contain a certificate stating that the animals were cared for in accordance with the principles enunciated in the Guide for Care and Use of Laboratory Animals prepared by the Institute of Laboratory Animal Resources, NAS-NRC, and/or in the regulations and standards as promulgated by the Agricultural Research Service, USDA, pursuant to the Laboratory Animal Welfare Act of 24 August 1966, as amended (P.L. 89-544 and P.L. 91-579). NOTE: The recipient may request registration of the recipient's facility and a current listing of licensed dealers from the Regional Office of the Animal and Plant Health Inspection Service (APHIS), USDA, for the region in which the recipient's research facility is located. The location of the appropriate APHIS Regional Office as well as information concerning this program may be obtained by contacting the Senior Staff Office, Animal Care Staff, USDA/APHIS, 4700 River Road Unit 84, Riverdale, MD 20737-1234 and at **http://www.aphis.usda.gov/ac/**.

[END OF PROVISION]

6. TITLE TO AND CARE OF PROPERTY (COOPERATING COUNTRY TITLE) (NOVEMBER 1985)

APPLICABILITY: This provision is applicable to property titled in the name of the cooperating country or such public or private agency as the cooperating country government may designate.

TITLE TO AND CARE OF PROPERTY (COOPERATING COUNTRY TITLE) (NOVEMBER 1985)

a. Except as modified by the schedule of this grant, title to all equipment, materials and supplies, the cost of which is reimbursable to the recipient by USAID or by the cooperating country, shall at all times be in the name of the cooperating country or such public or private agency as the cooperating country may designate, unless title to specified types or classes of equipment is reserved to USAID under provisions set forth in the schedule of this award. All such property shall be under the custody and control of recipient until the owner of title directs otherwise or completion of work under this award or its termination, at which time custody and control shall be turned over to the owner of title or disposed of in accordance with its instructions. All performance guarantees and warranties obtained from suppliers shall be taken in the name of the title owner.

b. The recipient shall maintain and administer in accordance with sound business practice a program for the maintenance, repair, protection, and preservation of Government property so as to assure its full availability and usefulness for the performance of this grant. The recipient shall take all reasonable steps to comply with all appropriate directions or instructions which the Agreement Officer may prescribe as reasonably necessary for the protection of the Government property.

c. The recipient shall prepare and establish a program, to be approved by the appropriate USAID Mission, for the receipt, use, maintenance, protection, custody and care of equipment, materials and supplies for which it has custodial responsibility, including the establishment of reasonable controls to enforce such program. The recipient shall be guided by the following requirements:

(1) Property Control: The property control system shall include but not be limited to the following:

(i) Identification of each item of cooperating country property acquired or furnished under the award by a serially controlled identification number and by description of item. Each item must be clearly marked "Property of (insert name of cooperating country)."

(ii) The price of each item of property acquired or furnished under this award.

(iii) The location of each item of property acquired or furnished under this award.

(iv) A record of any usable components which are permanently removed from items of cooperating country property as a result of modification or otherwise.

(v) A record of disposition of each item acquired or furnished under the award.

(vi) Date of order and receipt of any item acquired or furnished under the award.

(vii) The official property control records shall be kept in such condition that at any stage of completion of the work under this award, the status of property acquired or furnished under this award may be readily ascertained. A report of current status of all items of property acquired or furnished under the award shall be submitted yearly concurrently with the annual report.

(2) Maintenance Program: The recipient's maintenance program shall be consistent with sound business practice, the terms of the award, and provide for:

(i) disclosure of need for and the performance of preventive maintenance,

(ii) disclosure and reporting of need for capital type rehabilitation, and
(iii) recording of work accomplished under the program:

(A) Preventive maintenance - Preventive maintenance is maintenance generally performed on a regularly scheduled basis to prevent the occurrence of defects and to detect and correct minor defects before they result in serious consequences.

(B) Records of maintenance - The recipient's maintenance program shall provide for records sufficient to disclose the maintenance actions performed and deficiencies discovered as a result of inspections.

(C) A report of status of maintenance of cooperating country property shall be submitted annually concurrently with the annual report.

d. Risk of Loss:

(1) The recipient shall not be liable for any loss of or damage to the cooperating country property, or for expenses incidental to such loss or damage except that the recipient shall be responsible for any such loss or damage (including expenses incidental thereto):

(i) Which results from willful misconduct or lack of good faith on the part of any of the recipient's directors or officers, or on the part of any of its managers, superintendents, or other equivalent representatives, who have supervision or direction of all or substantially all of the recipient's business, or all or substantially all of the recipient's operation at any one plant, laboratory, or separate location in which this award is being performed;

(ii) Which results from a failure on the part of the recipient, due to the willful misconduct or lack of good faith on the part of any of its directors, officers, or other representatives mentioned in (i) above:

(A) to maintain and administer, in accordance with sound business practice, the program for maintenance, repair, protection, and preservation of cooperating country property as required by (i) above, or

(B) to take all reasonable steps to comply with any appropriate written directions of the Agreement Officer under (b) above;

(iii) For which the recipient is otherwise responsible under the express terms designated in the schedule of this award;

(vi) Which results from a risk expressly required to be insured under some other provision of this award, but only to the extent of the insurance so required to be procured and maintained, or to the extent of insurance actually procured and maintained, whichever is greater; or

(v) Which results from a risk which is in fact covered by insurance or for which the grantee is otherwise reimbursed, but only to the extent of such insurance or reimbursement;

(vi) Provided, that, if more than one of the above exceptions shall be applicable in any case, the recipient's liability under any one exception shall not be limited by any other exception.

(2) The recipient shall not be reimbursed for, and shall not include as an item of overhead, the cost of insurance, or any provision for a reserve, covering the risk of loss of or damage to the cooperating country property, except to the extent that USAID may have required the recipient to carry such insurance under any other provision of this award.

(3) Upon the happening of loss or destruction of or damage to the cooperating country property, the recipient shall notify the Agreement Officer thereof, shall take all reasonable steps to protect the cooperating country property from further damage, separate the

damaged and undamaged cooperating country property, put all the cooperating country property in the best possible order, and furnish to the Agreement Officer a statement of:

(i) The lost, destroyed, or damaged cooperating country property;
(ii) The time and origin of the loss, destruction, or damage;
(iii) All known interests in commingled property of which the cooperating country property is a part; and
(iv) The insurance, if any, covering any part of or interest in such commingled property.

(4) The recipient shall make repairs and renovations of the damaged cooperating country property or take such other action as the Agreement Officer directs.

(5) In the event the recipient is indemnified, reimbursed, or otherwise compensated for any loss or destruction of or damage to the cooperating country property, it shall use the proceeds to repair, renovate or replace the cooperating country property involved, or shall credit such proceeds against the cost of the work covered by the award, or shall otherwise reimburse USAID, as directed by the Agreement Officer. The recipient shall do nothing to prejudice USAID's right to recover against third parties for any such loss, destruction, or damage, and upon the request of the Agreement Officer, shall, at the Governments expense, furnish to USAID all reasonable assistance and cooperation (including assistance in the prosecution of suits and the execution of instruments or assignments in favor of the Government) in obtaining recovery.

e. Access: USAID, and any persons designated by it, shall at all reasonable times have access to the premises wherein any cooperating country property is located, for the purpose of inspecting the cooperating country property.

f. Final Accounting and Disposition of Cooperating Country Property: Within 90 days after completion of this award, or at such other date as may be fixed by the Agreement Officer, the recipient shall submit to the Agreement Officer an inventory schedule covering all items of equipment, materials and supplies under the recipient's custody, title to which is in the cooperating country or public or private agency designated by the cooperating country, which have not been consumed in the performance of this award. The recipient shall also indicate what disposition has been made of such property.

g. Communications: All communications issued pursuant to this provision shall be in writing.

[END OF PROVISION]

7. PUBLIC NOTICES (MARCH 2004)

APPLICABILITY: This provision is applicable when the cognizant Activity Manager or SO Team determines that the award is of public interest and requests that the provision be included in the award.

PUBLIC NOTICES (MARCH 2004)

It is USAID's policy to inform the public as fully as possible of its programs and activities. The recipient is encouraged to give public notice of the receipt of this award and, from time

to time, to announce progress and accomplishments. Press releases or other public notices should include a statement substantially as follows:
"The U.S. Agency for International Development administers the U.S. foreign assistance program providing economic and humanitarian assistance in more than 120 countries worldwide."
The recipient may call on USAID's Bureau for Legislative and Public Affairs for advice regarding public notices. The recipient is requested to provide copies of notices or announcements to the cognizant technical officer and to USAID's Bureau for Legislative and Public Affairs as far in advance of release as possible.

[END OF PROVISION]

8. PROHIBITION OF ASSISTANCE TO DRUG TRAFFICKERS (JUNE 1999)

APPLICABILITY: This provision is applicable where performance of the award will take place in "Covered" Countries, as described in ADS 206 (see 206.5.3)

PROHIBITION OF ASSISTANCE TO DRUG TRAFFICKERS (JUNE 1999)

a. USAID reserves the right to terminate assistance to, or take other appropriate measures with respect to, any participant approved by USAID who is found to have been convicted of a narcotics offense or to have been engaged in drug trafficking as defined in 22 CFR Part 140.

b. (1) For any loan over $1000 made under this agreement, the recipient shall insert a clause in the loan agreement stating that the loan is subject to immediate cancellation, acceleration, recall or refund by the recipient if the borrower or a key individual of a borrower is found to have been convicted of a narcotics offense or to have been engaged in drug trafficking as defined in 22 CFR Part 140.
(2) Upon notice by USAID of a determination under section (1) and at USAID's option, the recipient agrees to immediately cancel, accelerate or recall the loan, including refund in full of the outstanding balance. USAID reserves the right to have the loan refund returned to USAID.

c. (1) The recipient agrees not to disburse, or sign documents committing the recipient to disburse, funds to a subrecipient designated by USAID ("Designated Subrecipient") until advised by USAID that: (i) any United States Government review of the Designated Subrecipient and its key individuals has been completed; (ii) any related certifications have been obtained; and (iii) the assistance to the Designated Subrecipient has been approved. Designation means that the subrecipient has been unilaterally selected by USAID as the subrecipient. USAID approval of a subrecipient, selected by another party, or joint selection by USAID and another party is not designation.
(2) The recipient shall insert the following clause, or its substance, in its agreement with the Designated Subrecipient:
"The recipient reserves the right to terminate this [Agreement/Contract] or take other appropriate measures if the [Subrecipient] or a key individual of the [Subrecipient] is found

to have been convicted of a narcotic offense or to have been engaged in drug trafficking as defined in 22 CFR Part 140."

[END OF PROVISION]

9. INVESTMENT PROMOTION (NOVEMBER 2003)

APPLICABILITY: The following clause is required for grants and cooperative agreements when the program includes gray-area activities or investment-related activities where specific activities are not identified at the time of obligation but could be for investment-related activities, as described in ADS 225 (see 225.3.1.8)

INVESTMENT PROMOTION (NOVEMBER 2003)

a. Except as specifically set forth in this award or otherwise authorized by USAID in writing, no funds or other support provided hereunder may be used for any activity that involves investment promotion in a foreign country.

b. In the event the recipient is requested or wishes to provide assistance in the above area or requires clarification from USAID as to whether the activity would be consistent with the limitation set forth above, the recipient must notify the Agreement Officer and provide a detailed description of the proposed activity. The recipient must not proceed with the activity until advised by USAID that it may do so.
c. The recipient must ensure that its employees and sub-recipients and contractors providing investment promotion services hereunder are made aware of the restrictions set forth in this clause and must include this clause in all contracts and other sub-agreements entered into hereunder.

[END OF PROVISION]

10. REPORTING OF FOREIGN TAXES (March 2006)

APPLICABILITY: This provision is applicable to all USAID agreements that obligate or subobligate FY 2003 or later funds except for agreements funded with Operating Expense, Pub. L. 480 funds, or trust funds, or agreements where there will be no commodity transactions in a foreign country over the amount of $500.

REPORTING OF FOREIGN TAXES (March 2006)

a. The recipient must annually submit a report by April 16 of the next year.
b. Contents of Report. The report must contain:
(i) Contractor/recipient name.
(ii) Contact name with phone, fax and email.
(iii) Agreement number(s).
(iv) Amount of foreign taxes assessed by a foreign government [each foreign government must be listed separately] on commodity purchase transactions valued at $500 or more financed with U.S. foreign assistance funds under this agreement during the prior U.S. fiscal year.
(v) Only foreign taxes assessed by the foreign government in the country receiving U.S. assistance is to be reported. Foreign taxes by a third party foreign government are not to be reported. For example, if an assistance program for Lesotho involves

the purchase of commodities in South Africa using foreign assistance funds, any taxes imposed by South Africa would not be reported in the report for Lesotho (or South Africa).
(vi) Any reimbursements received by the Recipient during the period in (iv) regardless of when the foreign tax was assessed and any reimbursements on the taxes reported in (iv) received through March 31.
(vii) Report is required even if the recipient did not pay any taxes during the report period.
(viii) Cumulative reports may be provided if the recipient is implementing more than one program in a foreign country.

c. Definitions. For purposes of this clause:
(i) "Agreement" includes USAID direct and country contracts, grants, cooperative agreements and interagency agreements.
(ii) "Commodity" means any material, article, supply, goods, or equipment.
(iii) "Foreign government" includes any foreign governmental entity.
(iv) "Foreign taxes" means value-added taxes and custom duties assessed by a foreign government on a commodity. It does not include foreign sales taxes.

d. Where. Submit the reports to: [insert address and point of contact at the Embassy, Mission or FM/CMP as appropriate. see b. below] [optional with a copy to]
e. Subagreements. The recipient must include this reporting requirement in all applicable subcontracts, subgrants and other subagreements.

f. For further information see **http://www.state.gov/m/rm/c10443.htm**.

[END OF PROVISION]

11. FOREIGN GOVERNMENT DELEGATIONS TO INTERNATIONAL CONFERENCES (January 2002)

APPLICABILITY: Include this provision in agreements funded from the following accounts:
- *Development Assistance, including assistance for sub-Saharan Africa,*
- *Child Survival and Disease Programs Fund, and*
- *Micro and Small Enterprise Development Program Account.*

FOREIGN GOVERNMENT DELEGATIONS TO INTERNATIONAL CONFERENCES (January 2002)

Funds in this agreement may not be used to finance the travel, per diem, hotel expenses, meals, conference fees or other conference costs for any member of a foreign government's delegation to an international conference sponsored by a public international organization, except as provided in ADS Mandatory Reference "Guidance on Funding Foreign Government Delegations to International Conferences or as approved by the Agreement Officer.

These provisions also must be included in the Standard Provisions of any new grant or cooperative agreement to a public international organization or a U.S. or non-U.S. non-governmental organization financed with FY04 HIV/AIDS funds or modification to an existing grant or cooperative agreement that adds FY04 HIV/AIDS.

[END OF PROVISION]

12. USAID DISABILITY POLICY - ASSISTANCE (DECEMBER 2004)

APPLICABILITY: This provision must be included in Request for Applications (RFAs), and in awards.

USAID DISABILITY POLICY - ASSISTANCE (DECEMBER 2004)

a. The objectives of the USAID Disability Policy are (1) to enhance the attainment of United States foreign assistance program goals by promoting the participation and equalization of opportunities of individuals with disabilities in USAID policy, country and sector strategies, activity designs and implementation; (2) to increase awareness of issues of people with disabilities both within USAID programs and in host countries; (3) to engage other U.S. government agencies, host country counterparts, governments, implementing organizations and other donors in fostering a climate of nondiscrimination against people with disabilities; and (4) to support international advocacy for people with disabilities. The full text of the policy paper can be found at the following website:
http://pdf.dec.org/pdf_docs/PDABQ631.pdf

b. USAID therefore requires that the recipient not discriminate against people with disabilities in the implementation of USAID funded programs and that it make every effort to comply with the objectives of the USAID Disability Policy in performing the program under this grant or cooperative agreement. To that end and to the extent it can accomplish this goal within the scope of the program objectives, the recipient should demonstrate a comprehensive and consistent approach for including men, women and children with disabilities.

[END OF PROVISION]

13. STANDARDS FOR ACCESSIBILITY FOR THE DISABLED IN USAID ASSISTANCE AWARDS INVOLVING CONSTRUCTION (September 2004)

APPLICABILITY: This provision must be included in Request for Applications (RFAs) and in awards involving construction.

STANDARDS FOR ACCESSIBILITY FOR THE DISABLED IN USAID ASSISTANCE AWARDS INVOLVING CONSTRUCTION (September 2004)

a. One of the objectives of the USAID Disability Policy is to engage other U.S. government agencies, host country counterparts, governments, implementing organizations and other donors in fostering a climate of nondiscrimination against people with disabilities. As part of this policy USAID has established standards for any new or renovation construction project funded by USAID to allow access by people with disabilities (PWDs). The full text of the policy paper can be found at the following website:
http://pdf.dec.org/pdf_docs/PDABQ631.pdf.

b. USAID requires the recipient to comply with standards of accessibility for people with disabilities in all structures, buildings or facilities resulting from new or renovation construction or alterations of an existing structure.

c. The recipient will comply with the host country or regional standards for accessibility in construction when such standards result in at least substantially equivalent accessibility and usability as the standard provided in the Americans with Disabilities Act (ADA) of 1990 and the Architectural Barriers Act (ABA) Accessibility Guidelines of July 2004. Where there are no host country or regional standards for universal access or where the host country or regional standards fail to meet the ADA/ABA threshold, the standard prescribed in the ADA and the ABA will be used.

d. New Construction. All new construction will comply with the above standards for accessibility.

e. Alterations. Changes to an existing structure that affect, the usability of the structure will comply with the above standards for accessibility unless the recipient obtains the Agreement Officer's advance approval that compliance is technically infeasible or constitutes an undue burden or both. Compliance is technically infeasible where structural conditions would require removing or altering a load-bearing member that is an essential part of the structural frame or because other existing physical or site constraints prohibit modification or addition of elements, spaces, or features that are in full and strict compliance with the minimum requirements of the standard. Compliance is an undue burden where it entails either a significant difficulty or expense or both.

f. Exceptions. The following construction related activities are excepted from the requirements of paragraphs (a) through (d) above:

(1) Normal maintenance, re-roofing, painting or wall papering, or changes to mechanical or electrical systems are not alterations and the above standards do not apply unless they affect the accessibility of the building or facility; and

(2) Emergency construction (which may entail the provision of plastic sheeting or tents, minor repair and upgrading of existing structures, rebuilding of part of existing structures, or provision of temporary structures) intended to be temporary in nature. A portion of emergency construction assistance may be provided to people with disabilities as part of the process of identifying disaster- and crisis-affected people as "most vulnerable."

[END OF PROVISION]

[END OF STANDARD PROVISIONS]

ATTACHMENT D

PREDICT
USAID Branding Strategy and Marking Plan

University of California, Davis and Sub-awardees (UC Davis)
for
USAID-M-OAA-GH-HSR-09-877
Submitted 16 September 2009

Applicant Contact Information
Contact Person: (b)(6)
Phone Number:
Email Address: (b)(6) @ucdavis.edu

UC Davis will ensure that the PREDICT Project and any sub-grantees under this cooperative agreement follow the branding and marking plan outlined below.

(1) Positioning

Name of Program: PREDICT

Where appropriate the name is accompanied by USAID Graphic Identity, UC Davis Logo, Sub-grantee logos.

(2) Program Communications and Publicity

Primary Audience: Members of the national, state and local governments, community-based leaders, local community members, and civil society organizations where the PREDICT project is active. Focus will be on stakeholders, involving both genders, ranging from local individuals to highest levels of government. Communication materials for these target groups will range from posters to reports, media such as TV, radio, and press presentations. In addition, regular correspondence with multiple units of USAID (including mission offices in countries of operation), appropriate US Government offices (as recommended and approved by the USAID AOTR), and international health organizations with which PREDICT will operate collaboratively (e.g. WHO, OIE, FAO).

Secondary Audience: International community, governments, bi-lateral and multi-laterals donors, international NGOs, and others working on emerging infectious diseases from wildlife sources.

Main Program Message: *Developing a world network for wildlife zoonotic pathogen surveillance to protect human health and minimize threats from pandemic disease.*

Press and Promotional Activities: In all USAID-funded and related activities, the PREDICT Program, our collaborators and sub-grantees will consistently undertake the following steps to highlight USAID's collaboration and support:

a) **TEXTUALLY**: UC Davis and sub-grantees and their partners will include references to USAID support in press releases, websites, and fact sheets relating to PREDICT Program Activities.

b) **VERBALLY:** UC Davis and sub-grantees and their partners will ensure that USAID is publicly credited in speeches, public presentations, training workshops, and community meetings when referencing project activities.

c) **VISUALLY:** The USAID identity will be prominently displayed on all written reports and training and program materials regarding PREDICT activities. The USAID graphic identity will always be equal to or more prominent than the logos of UC Davis, its sub-grantees or implementing partners. UC Davis will provide graphical templates to be used for PREDICT letterhead and for graphic identity blocks on UC Davis and sub-grantee communications and materials in the implementation of PREDICT. These graphical templates will be reviewed and approved by the USAID AOTR and Communications Officer prior to use. In PREDICT regions and countries, activities may be implemented by UC Davis and one or more sub-grantees. Approved graphical templates will be provided to the individual sub-grantees in the instances where using the general template with all sub-grantees represented may be inappropriate. USAID, UC Davis, and sub-grantees will be included as follows: the USAID graphic identity will be prominently displayed, and UC Davis and sub-grantee logos will be displayed to the right or below the USAID graphic identity. English versions of the USAID graphic identity will be used on reports, publications, and materials. Materials produced will be pre-reviewed by the USAID Communications Officer as required. If pre-review is not possible, the communications disclaimer will be placed clearly as outlined in the USAID Branding policy.

d) **IN MEDIA:** the USAID Communications Officer will be notified of all public events, workshops, and activities. USAID will be acknowledged at all media events and reporting on the activities of the project. Media coverage of the work may include local radio, local TV, international TV, film, webcasts and reporting, magazines, and radio.

e) **PHOTOS and STORIES:** USAID and UC Davis jointly-approved press releases and captioned digital photos will be provided at each official media event. Noteworthy or especially interesting stories and photos will be sent to the USAID Communications officer punctually. Materials produced will be pre-reviewed by the USAID Communications Officer as required. If pre-review is not possible, the communications disclaimer will be placed clearly as outlined in the USAID Branding policy.

(3) Acknowledgments

UC Davis and sub-grantees will acknowledge USAID on all publications. UC Davis and sub-grantees will also acknowledge local governments and their ministries as appropriate (i.e. ministries of environment, health, agriculture, wildlife conservation, tourism, etc.) as they collaborate in implementation of the various project activities. In addition, UC Davis and sub-grantees will acknowledge local partners, that may include universities and public or private research institutions, that are instrumental in the local or regional implementation of the PREDICT program. UC Davis and sub-grantees will co-brand jointly-produced materials and activities where appropriate and consistent with USAID and local government requirements.

UC Davis will acknowledge other donors for jointly funded activities and materials.

UC Davis will acknowledge other institutions for jointly-implemented, -funded, and -produced materials as appropriate. Other organizations with whom we have been engaged in selected activities will be acknowledged.

(4) Program Deliverables To Be Marked

Consistent with the detail provided above, UC Davis and its sub-grantees will mark all of the following with the USAID Graphic Identity as described:

a) Public Communications

- ☑ Reports
- ☑ Public Service announcements
- ☑ Promotional Materials
- ☑ Information Products

b) Events

☑ Training workshop materials

c) Commodities

☑ Equipment (non Administrative)
☑ Program Materials (non Administrative)

(5) Presumptive Exception Requests

No exceptions are currently requested; however, we reserve the right to request such exceptions should extraordinary circumstances warrant them.

Marking Plan

Description of communications, commodities, and program materials	How Labeled	Where Labeled	Exceptions to Labeling
Equipment	USAID identity, UC Davis or sub-grantees identity and inventory number	USAID prominently displayed and UC Davis or sub-grantees to the right or below the USAID graphic identity.	none
Selected Infrastructure	Signs with USAID identity, UC Davis or sub-grantees identities and local government	USAID, UC Davis, and sub-grantees prominently and together	none
Final programmatic report	USAID identity, UC Davis, and sub-grantees identities	USAID upper or lower left and UC Davis and partner graphic identities displayed to the right or below the USAID graphic identity.	none
Specific activity reports	USAID, UC Davis, and sub-grantees	USAID upper or lower left and partner logos displayed to the right or below the USAID graphic identity.	none
Training materials	USAID, UC Davis, and sub-grantees	USAID upper or lower left, and partner logos displayed to the right or below the USAID graphic identity.	none
Project website	USAID identity, UC Davis, and sub-grantees	USAID listed with other partners and donors (i.e. UC Davis and sub-grantees) same size text	none

Budget Table

Item and use	Cost
Banners and signs: USAID, UC Davis, and sub-grantees branded banners with graphic identities to be displayed prominently at all USAID funded meetings, gatherings and presentations.	(b)(4)
Stickers: Branded as described above to be used for marking of equipment.	
Reports and Training Materials: USAID Branding incorporated as specified above.	No additional cost
Website: Inclusion as a Partner and acknowledgement as donor (at no cost).	No additional cost

Marking Plan Submitted By:

(b)(6) 16 September 2009
Date
(b)(6), Wildlife Health Center, School of Veterinary Medicine, University of California, Davis

Marking Plan Approved By (USAID):

_____

Printed Name Signature Date:
Title


USAID
FROM THE AMERICAN PEOPLE


UCDAVIS
VETERINARY MEDICINE
Wildlife Health Center

PREDICT


WILDLIFE
CONSERVATION
SOCIETY


WILDLIFE
TRUST


GVFI
Global Viral Forecasting Initiative


Smithsonian
Institution

USAID | PREDICT
FROM THE AMERICAN PEOPLE

VM Wildlife Health Center, TB 128
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One Shields Avenue
Davis, CA 95616 (USA)
Tel (530) 752-4167 (main number)
Fax (530) 752-3318
www.wildlifehealthcenter.org

ATTACHMENT E

INITIAL ENVIRONMENTAL EXAMINATION

PROGRAM/ACTIVITY DATA:

Program/Activity Number: **RFA # USAID-M-OAA- HSR-GH-09-077**
Country/Region: **Worldwide**
Program Title: **PREDICT**

Functional Area: **Avian and Pandemic Influenza**

Estimated Ceiling: **$75 million**

Program Components and Funding level:

Funding Begin:	**Funding End:**	**Total Amount:**
09/31/09	Est. 9/31/2014	$75 million

IEE Prepared By: (b)(6) (b)(6), Avian and Pandemic Influenza Unit (Global Health)

Current Date: September 2009

IEE Amendment (Y/N): N **If yes, number and date of current IEE:**

IEE Expiration: 9/31/2014 or upon amendment or scope change

ENVIRONMENTAL ACTION RECOMMENDED (check all that apply):
Categorical Exclusion: x Negative Determination: _____
Positive Determination: _____ Deferral: x

ADDITIONAL ELEMENTS:
Negative Determination w/ Conditions: X
Environmental Screening Report Required: X
PVO/NGO: _____

SUMMARY OF FINDINGS:
The scope of this effort falls into 4 main objectives. Those objectives and determination include:

1. Objective I: Assess existing capacity and develop plans for the implementation of wildlife surveillance support.
    a. Categorical Exclusion (22 CFR 216 (c)(2)(xiv): Studies, projects or programs intended to develop the capability of recipient countries to engage in development planning except to the extent designed to result in activities directly affecting the environment (such as construction of facilities etc.)

2. Objective II: Develop models of disease occurrence and spread as well as determining specific areas at high risk.
    a. Categorical Exclusion (22 CFR 216 (c)(2)(iii): Analyses, studies, academic or research workshops and meetings

3. Objective III: Establish a wildlife surveillance capacity in selected countries and regions that targets specific microbial agents

a. Negative determination with conditions:
b. The implementation of the Environmental Mitigation and Monitoring Plan-EMMP as appropriate will be done in consultation with the MEO, REA and BEO.
c. The partner, via the AOTR or manager, will annually (October) submit an Environmental Mitigation and Monitoring Report.

4. Objective IV: Introduce new technologies where they are appropriate and sustainable.
   a. Deferral due to the unknown nature of future technological advances.
   b. As technological advances are considered the partner will institute an independent initial environmental evaluation to recommend a threshold determination and mitigations (via an Environmental Mitigation and Monitoring Plan-EMMP)

5. Objective V: Improve the flow and handling of information, specimens and samples resulting from the surveillance activities.
   a. Categorical Exclusion (22 CFR 216 (c)(2)(xiv): Studies, projects or programs intended to develop the capability of recipient countries to engage in development planning except to the extent designed to result in activities directly affecting the environment (such as construction of facilities etc.)

SUMMARY OF MONITORING AND REPORTING MEASURES

The AOTR of the PREDICT, in consultation with the Bureau Environmental Officers and any Mission Environmental Officer, as appropriate and implementing partners will actively monitor and evaluate whether environmental consequences unforeseen under activities covered by this IEE arise during implementation, and modify or end activities as appropriate. If additional activities are added that are not described in this document, an amended environmental examination must be prepared.

1. The implementing partners of PREDICT will complete an annual environmental mitigation and monitoring report of all activities, using the guidance and forms in section 5 of this document. This activity should be incorporated into pertinent Monitoring and Evaluation Plans, Detailed Implementation Plan (DIP), and annual work plans/reports. The environmental monitoring report should be completed by October of each year, so that the results can be included in the Operational Plan (OP) reporting process to Congress.
2. USAID procurement should include consideration of the offeror's ability to perform the mandatory environmental compliance requirements as envisioned under PREDICT. The Agreements Officer (AO) shall include required environmental compliance and reporting language into the annual Request for Applications, and ensure that appropriate resources (budget), qualified staff, equipment, and reporting procedures are dedicated to this portion of the project.
3. Any sub-agreements or fund transfers from the implementing partners to other organizations must incorporate provisions stipulating:
   a) the completion of an annual environmental monitoring report, and
   b) that activities to be undertaken will be within the scope of the environmental determinations and recommendations of this IEE. This includes assurance that any mitigating measures required for those activities be followed.
4. The AOTR and/or on-site manger of PREDICT will undertake field visits, as possible, and consultations with implementing partners to jointly assess the environmental impacts of ongoing activities, and associated mitigation and monitoring conditions.

5. The implementing partners' Detailed Implementation Plan will identify those activities outlined in this IEE that have potential impacts to the environment and discuss plans for environmental management, mitigation approaches, and monitoring measures. Implementing partners will be required to include Environmental Compliance Monitoring in their project work plan and monitoring and evaluation plan.
6. Based on the process outlined in the Detailed Implementation Plan, the implementing partners' annual reports to USAID will include brief updates on mitigation and monitoring measures being implemented, results of environmental monitoring, and any other major modifications/revisions in the development activities, and mitigation and monitoring procedures.
7. Operating Units will ensure that implementing partners have sufficient capacity to complete the environmental screening process and to implement mitigation and monitoring measures.
8. Implementation will in all cases adhere to applicable host country environmental laws and policies.

APPROVAL OF ENVIRONMENTAL ACTION RECOMMENDED:

Activity Title: PREDICT

The United States Agency for International Development, Global Health Bureau has determined that the proposed effort, as described in the Initial Environmental Evaluation: dated June 2009, is critical to mitigating the emergence of pandemic threats as well as conforms to the requirements established in 22 CFR 216.

CLEARANCE:

(b)(6)

(b)(6)

9/9/09

CONCURRENCE:

(b)(6)

9/9/09

Background and Rationale

Over the past several decades, many previously unknown human infectious diseases have emerged from animal reservoirs, including agents such as human immunodeficiency virus (HIV), Ebola Hemorrhagic Fever virus, Nipah virus, and Hanta virus. In fact, more than three-quarters of new, emerging, or re-emerging human diseases at the beginning of the 21st century have been caused by pathogens originating from animals or animal products[5]. These newly emergent threats, such as the Ebola and Marburg outbreaks in Central Africa[7] or the 2003 outbreak of SARS in East Asia[2], frequently appear suddenly and spread quickly, and after a brief time they often disappear almost as quickly as they appeared. Other newly emergent diseases, such as the HIV virus, have emerged less dramatically and have proven far more robust in their ability to survive and infect over long periods of time.

Multiple factors contribute to the emergence of new zoonotic infectious diseases, particularly the increased interaction between human and animal populations driven by growth in human population, new trends in animal production practices, changing patterns of wildlife populations, human intrusion on new ecosystems, and transborder mobility of humans, animals, food and feed products. A wide variety of animal species, both wild and domesticated, can serve as reservoirs for these pathogens.

While new global markets have created unprecedented economic opportunities and growth, the health risks of our increasingly interconnected world continue to grow. Over the past century, notable reminders of just how vulnerable the world is to the growing risk of emerging zoonotic diseases include the 1918 influenza pandemic, which was caused by an influenza virus that initially jumped from birds to humans and killed over 50 million people[3] globally; HIV, which originated as a simian virus and now infects more than 33 million individuals[4]; and the more recent threats posed by SARS and the HPAI H5N1 virus. Increasingly, all populations are vulnerable to new diseases emerging in other countries; it is in our collective interest to strengthen the capacity of all high-risk countries to prevent the emergence and spread of these new disease threats.

Recent studies suggest that in a global pandemic caused by a virus similar to the one that caused the 1918 pandemic, a quarter of the world's population would be infected and between 51-81 million people would die, with the toll in the United States exceeding 400,000 casualties[5]. Related studies also forecast that the toll on the world's economy would exceed $4 trillion and result in a five percent loss of GDP in the United States[6]. Even

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[5] Kate Jones et al (2008): *Global trends in emerging infectious diseases*: Nature, Vol 451.21

[7] *Ebola and Marbug Hemorrhagic Fevers: African Hemorrhagic Fever* (2008): The Center for Food Security and Public Health, Iowa State University: Update December 19, 2008

[2] David D. Bell (2004): *Public Health Interventions and SARS spread, 2003*: Emerging Infectious Diseases 2004:10(11):1900-6

[3] Jeffery K. Taubenberger and David M. Morens (2006): *1918 Influenza: the Mother of All Pandemics*: Emerging Infectious Diseases: 12(1)

[4] UNAIDS/WHO Global HIV/AIDS on-line database (2009)

[5] Christopher J. Murray et al (2006): *Estimation of Potential Global Pandemic Influenza Mortality on the Basis of Vital Registry Data from the 1918-1920 Pandemic: A Quantitative Analysis*: The Lancet: 368:2211-18

[6] Congressional Business Office (2006): *A Potential Influenza Pandemic: Possible Macroeconomic Effects and Policy Issues*

short-lived outbreaks of recent zoonotic diseases have been devastating; SARS in 2003, for example, cost the economies of East Asia an estimated $50 billion[7]. While no one can predict with any certainty when the next global pandemic will occur, historical records spanning the past 300 years show a cycle of a global pandemics every 30-40 years[8]. Mindful of this threat, having in place capacities for early detection of and rapid response to new emergent disease threats will be central to minimizing their potential impact on our social and economic well-being.

Emerging Infectious Diseases and the Threat Posed by "Zoonotics"

Among the 1,461 pathogens recognized to cause of diseases in humans, nearly 60% are of animal origin[9]. An analysis of the more than 300 infectious diseases that have emerged since 1940[5], shows that more than 65% were caused by zoonotic pathogens. Of these new infectious diseases, nearly three-quarters have emerged from a limited number of agents of wildlife origin, with bats (the Corona virus, responsible for SARS, and the Nipah virus), rodents (Hanta virus) and non-human primates (HIV) serving as the most frequently implicated hosts for spread of new infectious agents to humans.

The other major source of zoonotic pathogens, domestic animals, has been shown to account for approximately 20% of all new zoonotic diseases[5]. Viral pathogens, especially avian RNA viruses like HPAI H5N1, were the principal pathogens identified. Due to their often high rates of nucleotide substitution, poor mutation error-correction ability, and their higher capacity to adapt to new hosts, including humans, they have proven particularly deadly.

While the emergences of new zoonotic infectious diseases are difficult to forecast, a strong enough pattern has been established to instill confidence that the regular appearance of new infectious diseases or syndromes is virtually inevitable. Recent studies have indicated that the number of new zoonotic diseases has been steadily increasing over the past several decades[10]. As such, unless measures are put in place for more effective detection and control of new emerging disease threats, their economic and human toll over the coming decades could prove unprecedented.

"Drivers" of Emergence

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[7] Asia Development Bank (2003): *Assessing the Impact and Cost of SARS in Developing Asia:* Asia Development Outlook 2003 Update, Hong Kong, China, Oxford University Press for the Asia Development Bank

[8] David M. Morens and Anthony S. Fauci (2007): *The 1918 Influenza Pandemic: Insights for the 21st Century:* Journal of Infectious Diseases: 195:1018-1028

[9] E.F. Torrey and R.H. Yolkan (2005): *Beasts on the Earth:* New Brunswick, J.J., Rutgers University Press

[5] Kate Jones et al (2008): *Global trends in emerging infectious diseases:* Nature, Vol 451.21

[10] Woolhouse MEJ, Dye C, eds. (2001*): Population biology of emerging and re-emerging pathogens:* Philosophical Transactions of the Royal Society for Biological Sciences , 2001, 356:981--982

Until recently our understanding of the process of diseases emergence has been poor. Advances in understanding the risk factors for their emergence and the environmental factors that drive them, however, has led to the following observations[11]: the risk for emergence of new zoonotic agents from wildlife depends largely on three factors, (1) the diversity of wildlife microbes in a region (the "zoonotic pool"); (2) the effects of environmental change on the prevalence of pathogens in wild populations; and (3) the frequency of human and domestic animal contact with wildlife reservoirs of potential zoonoses.

The emergence of a successful zoonotic pathogen such as SARS or HIV requires three steps[17]. First the pathogen must be successfully transmitted between a wild reservoir and humans or their domestic animals. Several recently emerging zoonoses have achieved this stage without further transmission, e.g. Hendra virus. Second, the pathogen must be directly transmitted between humans. Finally, the pathogen must move from a local epidemic into the global population. Understanding and predicting the global emergence of pathogens require knowledge of the drivers of each of these steps.

Evidence suggests that many pathogens are transmitted between their animal reservoirs and humans but fail to be transmitted efficiently from human-to-human. However, there is some concern that repeated transmission of nonhuman viruses to humans, such as the H5N1 virus, most of which results in no human-to-human transmission, will increase the diversity of viruses and sequence variants moving into humans[17]. This situation, could in turn, increase the probability of transmission of a pathogen that can successfully replicate, and ultimately increase the ability of a human-adapted virus to emerge. Minimizing the opportunity for repeated transmission of nonhuman viruses to humans will be critical to pre-empting the emergence of new zoonotic pathogens.

One example of how wildlife is increasingly a source of new infections comes from the consumption of "bush meat" in sub-Saharan Africa[12]. In this region, people are increasingly turning to wild animals to meet their nutritional needs, particularly in the face of growing food insecurity. In the Congo Basin, this trend has fueled an increase in outbreaks of zoonotic diseases such as Ebola Hemorrhagic Fever. Ebola, like the HIV virus that causes AIDS, passes into the human population through contact with blood from infected primates, such as gorillas and chimpanzees, as well as other primates like monkeys, which regularly form part of the bush-meat trade. The consumption of bush meat is particularly acute across west and central Africa where there are still large equatorial forests with up to five million tones of bush meat consumed annually. The multi-billion dollar bush meat industry is a key contributor to local economies throughout the developing world. It is also among the most immediate threats to tropical wildlife.

In contrast, the emergence of zoonotic diseases from domesticated animals is predicted by a combination of animal population density, farming practices, human population density and human population growth. The explosion in poultry produced across Asia since the 1970s has been a key factor in the rapid spread of HPAI virus among domesticated animals in recent years. China typifies the dramatic changes in poultry

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[11] Nathan D. Wolfe et al (2005): *Bushmeat Hunting: Deforestation, and Pediction of Zoonotic Disease Emergence*: Emerging Infectious Diseases: Vol 11: 12:18221827

[12] H.E. Eves et al. (2002) : The Bushmeat Crises Taskforce Collaboration Across Sectors and Continents to Address the Bushmeat Crisis: *Communique*, November 2002

production. In 1969, an estimated 500 million poultry were being raised in China to feed a population of 750 million. To meet the growing human population, increased household wealth, and a corresponding rise in demand for animal protein, the number of poultry had risen to 15 billion[13] by 2000. In China, this dramatic increase in poultry farming has taken place largely on non-industrial farms following traditional animal husbandry practices, particularly those involving the informal animal-production sector of "backyard farmers". This sector is largely unregulated and biosecurity is low. High human and poultry population densities, coupled with the employment of poor farming practices, have proven a lethal combination in facilitating the rapid spread of poultry diseases such as HPAI over the past few years, not only in China but also in other countries and regions with similar profiles. As a consequence, new zoonotic threats of domestic animal origin, such as HPAI and the more recent H9N2 avian influenza virus, have arisen with increasing frequency. Given that the demand for animal-based protein is expected to increase by 50% by 2020[14], there is a greater risk for past trends to continue, further fueling conditions for increased emergence of new disease threats.

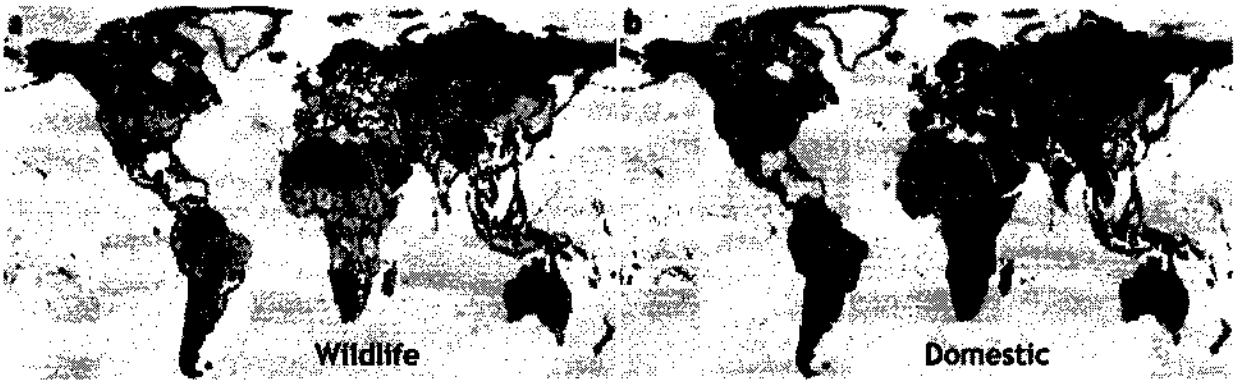
Using Risk-based Forecasting for Early Detection of Rare Events

Even as the risk of new zoonotic diseases is increasing, their emergences remain relatively rare whose occurrences have proven difficult to predict. One of the biggest obstacles to early detection of these diseases is the lack of sufficient, sensitive surveillance capacity geared toward rapid and reliable detection of highly unusual pathogens. Traditional disease-surveillance approaches tend to assume disease risks are relatively homogenous across populations or geographic areas; applying traditional disease surveillance to monitoring for rare events, such as emergent diseases, however, would be exceedingly cost- and infrastructure prohibitive. However, recent advances in the understanding of factors that drive the emergence of zoonotic diseases have led to the development of new risk-based models for forecasting new zoonotic diseases, therefore opening opportunities to bring greater focus to emergent-disease surveillance. The origins of newly emergent diseases have been found to strongly correlate with specific geographic areas, animal hosts, microbial agents, and people.

Geographic "Hot Spots": In a retrospective analysis of outbreaks of new diseases over the past 50 years, the highest risk for new emerging zoonotic pathogens[5] from wildlife were found to be most concentrated in lower-latitude regions of tropical Africa, Asia and Latin America, with high risk foci in eastern China, the Gangetic and Indus River plains of the India sub-continent, Congo Basin, and the neighboring Rift Valley regions of East Africa, the Niger delta of West Africa, and the northwest region of South America (Figure 1a). Wildlife host-species richness was shown to be a significant predictor for the emergence of zoonotic diseases. Significantly, this study showed a substantial risk of wildlife zoonotics originating at lower geographical latitudes where there are very limited surveillance and response capacities.
Figure 1

[13] Food and Agricultural Organization – Livestock production
[14] C. Delgado et al: *Livestock to 2020: the next food revolution*: Food, Agriculture, and Environment Discussion paper 28, Washington D.C.

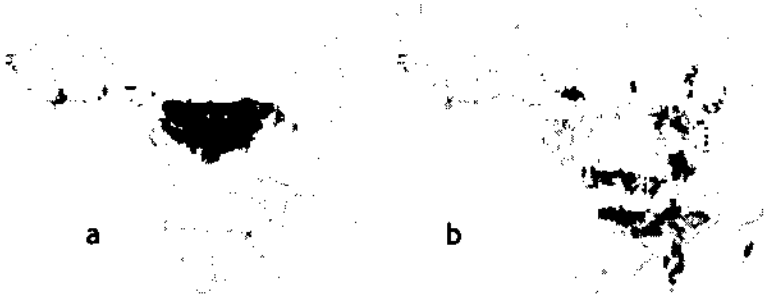
[5] Kate Jones et al (2008): *Global trends in emerging infectious diseases*: Nature, Vol 451.21



In this same study, zoonotic pathogens from domestic animals were found to be highly concentrated in eastern China, the Gangetic plain of the India sub-continent, and along the Nile River in Egypt. Not surprisingly, these are the same areas where the HPAI virus is principally concentrated (Figure 1b).

While retrospective studies can provide important insight into the general distribution of past zoonotic "hot spots", the maps illustrated in figure 1, do not necessarily serve as predictors for where future diseases might emerge. Another study (Figure 2)[15], which used ecologic niche modeling of outbreaks and sporadic cases of filovirus-associated hemorrhagic fever, provides the first large-scale "predictive map" on the most likely geographic and ecologic distributions of Ebola (2a) and Marburg virus (2b). The significance of predictive modeling is that it provides greater insight into where emergent pathogens may be circulating but are undetected; they also highlight geographic areas that may currently be free of a particular pathogen but possess the requisite ecological risk factors to make them highly vulnerable to its introduction. Most importantly, predictive models allow for more strategic focusing of resources for monitoring for the emergence and spread of zoonotic threats.

Figure 2



High-risk host species: There are an estimated 50,000 vertebrate species that are potential reservoirs for viruses, bacteria, and other pathogens that could potentially infect humans[16].

[15] A. Townsend Peterson et al (2004): *Ecological and Geographic Distribution of Filovirus Disease*: Emerging Infectious Diseases" 10 (1)

[16] W. Ian Lipkin (2009): *Microbe Hunting in the 21st Century*: PNAS: Vol 106/1

Very few of these species, however, will ever have the kind of direct or even indirect contact with people or domestic animals that allow for the transfer of animal pathogens to humans, with the "hot spots" representing some of the most remote and least-accessed regions of the earth. Yet, over the past several decades, there has been an almost exponential growth in the frequency of these contacts as new human settlements and roadways increasingly infringe on once-pristine wildlife domains.

The frequency of interaction, therefore, is the critical factor in weighing the risk specific animal hosts pose to transferring potentially dangerous new microbial agents to humans. Animal host-to-human and animal host-to-domestic animal interactions provide ideal circumstances for pathogens that initially affect only animals to evolve first into agents that can cause primary infections in humans through direct animal-to-human contact to agents that can cause limited outbreaks through both human-to-human contact and animal-human contact[17]. The numbers of species that account for the majority of these transfers, however, appear limited; rodents have proved highly adaptive in their ability to spread pathogens to humans, such as Hanta virus through their feces and urine. Conversely, bats have infected people with Nipah virus directly through contaminated fecal droppings and indirectly by infecting pigs who are later consumed by humans. In the case of the Ebola and Marburg viruses, infected non-human primates (which were most likely infected by bats) have been the source of human infections when consumed as bush meat[18].

While other species of wild animals have undoubtedly been involved in either the direct or indirect infection of humans with novel animal pathogens, there is an emerging consensus that it is a limited sub-set of infected wildlife that has frequent interactions with humans that poses the greatest risk for enabling the infection of humans with potentially new and deadly pathogens. This suggests that these "high-risk host species" should be prioritized for monitoring for the emergence and spread of potential microbial threats.

High-Risk microbial agents: Wildlife is a reservoir of an extraordinarily deep and diverse pool of microbial agents. There are an estimated 1 million different viruses, alone, circulating among wildlife of which 99% have yet to be recorded[19]. Even considering such overwhelming diversity, the actual numbers of microbial agents that have been reported to infect humans and cause disease are limited. RNA viruses, such as retro-viruses (AIDS) and influenza A viruses (influenza), Corona viruses (SARS), and Filoviruses (Ebola and Marburg) are examples of families of pathogens that have proven capable of human-to-human transmission. As such, families of viruses with demonstrated capacities to infect humans provide a first, but not exclusive, line for focused monitoring and surveillance. By tracking their movement within and among animal species, including domestic animals and humans, and monitoring for key genetic changes can prove a critical tool for an early identification of emergent threats. As illustrated less than ten years ago by the Corona virus, however, new disease threats can emerge from families of viruses that previously have not been known for posing threats to humans. It will be important to monitor other

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[17] Nathan D. Wolfe et al (2004): *Naturally Acquired Simian Retrovirus Infections n Central African Hunters*: The Lancet: 363:932-937

[18] M.C. Georges-Courbot et al (1997): *Isolation and Phylogenetic Characterization of Ebola Viruses Causing Different Outbreaks in Gabon*: Emerging Infectious Diseases: 1997:3:59-63

[19] W. Ian Lipkin (2009): *Microbe Hunting in the 21st Century*: PNAS: Vol 106/1

microbes circulating within the "high-risk" animal hosts for their ability to diversify their host range or for changes in their epidemiologic profile.

High-Risk populations: Ultimately, the key event in the transfer of a novel animal pathogen is either direct or indirect exposure of an individual to an infected animal host. Individuals and populations with frequent exposure to wild animals or their products, such as hunters and related butchers of wild game, bush meat traders and consumers, as well as those whose economic activities lead to incursions in wild life areas, such as loggers, miners and road builders are at particular risk of infection of new microbial threats[20]. In addition, domestic animals that live in close proximity to wildlife habitats can act as an intermediary source of infection; for example, the infection of domesticated pigs by bats or the hunting/scavenging of wild game by domesticated dogs. It is likely that monitoring of population settlements where human and domestic animals have high levels of exposure to wild animals will provide the earliest insight into events involving the transfer of a new microbial threat from a wild animal host.

Together, these observations about the relationship between "risk" and geographic "hot spots", animal hosts, microbial agents, and vulnerable populations demonstrate that the emergence of new zoonotic diseases strongly correlates with socio-economic, environmental, genetic, biological, and ecological factors. Importantly "risk-based" intervention strategies can be used to provide the basis for a highly cost-effective and strategic allocation of resources to pre-empt or combat the first stages of disease emergence. In effect, risk-based interventions allow the use of knowledge about the heterogeneity of risk to target disease detection to those places, populations, times or situations where risk of disease is greatest and the likelihood of finding it is highest. The result is more efficient use of limited resources in detecting a rare "emergent" event.

Objectives

1. **<u>Objective I</u>: Assess existing capacity and develop plans for the implementation of wildlife surveillance support.**

   The PREDICT project will assess the capability of each country/region to conduct wildlife surveillance and develop a plan of action that identifies the inputs needed from this project to achieve the other objectives described in this RFA.

   This objective should result in a comprehensive understanding of the existing capacity in the countries and regions targeted through this project. It will describe the existing capabilities, their current utility, and any opportunities to use those capabilities for broader surveillance of diseases in wild animals that are of potential public health impact. Close coordination with the organizations that own, support, and/or operate these assets will help to understand the true potential for use in this wild animal surveillance project. Gaps in systems will be identified and options for solutions will be developed and presented. Barriers to implementation of a wild animal surveillance system will be identified and addressed.

2. **<u>Objective II:</u> Develop models of disease occurrence and spread as well as determining specific areas at high risk.**

[20] Nathan D. Wolfe et al (2007): *Origins of Major Human Infectious Diseases*: <u>Nature</u>: Vol 447/17

This objective should produce computational models of disease occurrence and spread that will aid in the development of wild animal surveillance systems and risk-based forecasting for early disease events. Using existing data sets, historical information, scientific publications and other credible, relevant information, these models will identify geographic areas and animal species to target for surveillance activities, identify the factors and conditions most likely to influence the spread of disease from wild animals to domestic animals and/or humans, describe the strengths and weaknesses of differing levels of detection and reporting, and assess the potential impacts (e.g, health, social) of disease and disease control measures.

3. **Objective III: Establish a wildlife surveillance capacity in selected countries and regions that targets specific microbial agents**

   This objective will detect disease outbreaks, forecast early disease events and implement enhanced surveillance during un-forecasted outbreaks. Routine surveillance of disease occurrence and spread in wild animals will be developed and/or improved. The monitoring of the routine surveillance data will help to indicate that an outbreak (a relatively rare event) may occur or is beginning to occur. Also, through modeling and other strategies, countries will also be able to prepare for events (e.g., drought, flood, changes in livestock production, changes in trade, movement of high-density human populations into new areas) that increase the risk for outbreaks. Furthermore, countries will be able to use information from intensified routine surveillance and/or broadened surveillance strategies to detect outbreaks of one or more disease threats and then mount a timely and effective response.

4. **Objective IV: Introduce new technologies where they are appropriate and sustainable.**

   Technological advances have extended the ability to conduct disease surveillance in developing countries. For example, disease reporting can occur through text messaging or SMS. Also, field diagnostic technology can help reduce logistical issues for specimen transport and laboratory backlogs. This project will capitalize on the practical, sustainable application of technology to support and streamline surveillance of targeted microbial agents among wild animals. It will focus on technologies that are proven effective, adaptable to low-resource countries, sustainable and promising for long-term use

5. **Objective V: Improve the flow and handling of information, specimens and samples resulting from the surveillance activities.**

   This objective will develop the policy considerations around notification of emerging diseases and ensure timely, parallel flows of communication through animal and public health sectors so that timely decisions and actions can occur. It will also develop communication and feedback channels to support and strengthen wild animal surveillance systems.

Country and Environmental Information

Locations Affected and Local Environmental Regulations

USAID's PREDICT programs are worldwide and may take place in any of the USAID mission countries or in countries covered by USAID Regional missions. The status of country level policies on environmental reviews varies. Procedures for disposal of waste are often detailed

in national policies for injection safety and in Standard Operating Procedures of laboratories, and are typically based on the WHO Manuals "Laboratory Biosafety Manual, 3rd edition, 2004" and the WHO Manual "Safe Management of Wastes from Health Care Settings." Where there are TB-related activities, countries are implementing the WHO recommended STOP TB strategy.

Evaluation of Project/Program Issues and Possible Environmental Consequences

This section seeks to evaluate possible direct and indirect impacts. Some of the impacts considered in this section are unlikely but are never the less included to provide as much adaptive guidance for future possible actions. This is particularly important as PREDICT is both worldwide and a rapid response mechanism. By providing up front guidance and requesting early environmental involvement the mechanism is both flexible and responsive to environmental conditions. USAID and the implementing partner will incorporate mitigation measures into their program design to offset the potential impacts discussed in this section.

To ensure that the conditions of the IEE are met, any sub project, activity, sub award or grant or regional program implementation will use the Environmental Screening Report and Environmental Mitigation and Monitoring Plan (as required by conditions). The implementing partner will prepare a brief ESR with an EMMP (as required) for BEO review and concurrence prior to implementation. The BEO will coordinate the ESR with the local MEO and REA.

Many of the PREDICT activities do not have direct adverse environmental impacts, as they entail technical assistance, information, education, communication, training, research, community mobilization, planning, management, and outreach activities. These activities are detailed in Table 1.

Certain activities supported by USAID/GH under PREDICT, either directly or indirectly through implementers' required cost share, however, may directly or indirectly affect the environment, or have the potential to do so. Based on the analysis conducted by the AOTR these activities could affect the environment in five ways:

1) Procurement, storage, management and disposal of public health commodities, including pharmaceutical drugs, immunizations and nutritional supplements, laboratory supplies and reagents.
2) Training professional and paraprofessional health care workers in methods that result in the generation and disposal of hazardous or highly hazardous medical waste (e.g., basic and emergency obstetric care techniques, administration of injectables, HIV or TB testing, malaria diagnosis, etc)
3) Small-scale water and sanitation activities.
4) Small-scale rehabilitation of health facilities
5) Response Program planning and implementation

Each of these potential impacts is discussed in detail below, and summarized in Table 2 at the end of this section.

1) Procurement, Storage, Management and Disposal of Public Health Commodities
This activity includes procurement of pharmaceutical drugs and vaccines, family planning products and condoms, personal protective gear, laboratory and medical supplies, and basic medical equipment.

Pharmaceutical drugs are chemicals used for diagnosis, treatment (cure/mitigation), alteration, or prevention of disease, health condition, or structure/function of the human body. Pharmaceuticals including vaccines have specific storage time and temperature requirements, and may expire or lose efficacy before they are able to be used, particularly in remote areas where demand is low and/or infrequent. Pharmaceutical waste may also accumulate due to inadequacies in stock management and distribution, and lack of a routine system of disposal.

The effects of pharmaceuticals in the environment are different from conventional pollutants. Drugs are designed to interact within the body at low concentrations to elicit specific biological effects in humans, and which may also cause biological responses in other organisms. There are many drug classes of concern, including antibiotics, antimicrobials, antidepressants, and estrogenic steroids. Their main pathway into the environment is through household use and excretion, and through the disposal of unused or expired pharmaceuticals.

Effects on aquatic life are a major concern in disposal of pharmaceuticals. A wide range of pharmaceuticals have been discovered in fresh and marine waters globally, and even in small quantities some of these compounds have the potential to cause harm to aquatic life. Exposure risks for aquatic organisms are much larger than those for humans, because aquatic organisms have continual (and multi-generational) exposures, explores to higher concentrations, and possible low-dose effects.

Traditional environmental toxicology focuses on acute effects of concentrated exposures rather than chronic effects of low level exposures. Measured toxicities of some tested pharmaceuticals have shown that acute effect of single substances in the aquatic environment is very unlikely. However, effects of pharmaceuticals may be subtle because they occur in the environment in low concentrations. Some tests with combinations of various pharmaceuticals have revealed stronger effects than expected from the effects measured singly. More research is need on combination effects and chronic studies are needed to assess the environmental risk of drug residues. Certainly pollution prevention (e.g., source elimination or minimization) is preferable to remediation or restoration to minimize both public cost and human/ecological exposure.

Antibiotics and undiluted disinfectants should not be disposed of into the sewage system as they may kill bacteria necessary for the treatment of sewage. Additional health risks related to disposal include burning pharmaceuticals and plastic medical supplies at low temperatures or in open containers results in release of toxic pollutants into the air, and inefficient and insecure sorting and disposal may allow drugs beyond their expiry date to be diverted for resale to the general public. In some countries scavenging in unprotected insecure landfills is a hazard.

The other commodities covered under this activity are not associated with major health risks, including packaging material, and should be disposed of as solid waste.

References for this section include:
http://www.who.int/water_sanitation_health/medicalwaste/pharmaceuticals/en/
Pharmaceuticals In The Environment: Sources, Fate, Effects And Risks (2nd ed). 2004. Klaus Kümmerer, ed (online version).

2) Training professional and paraprofessional workers in methods that result in the exposure to infectious material, and the generation and disposal of hazardous or highly hazardous medical waste

Small-Scale healthcare initiatives, such as rural health posts or clinics, mobile clinics, urban clinics and small hospitals, and community health workers provide important and often critical healthcare services to individuals and communities that would otherwise have little or no access to such services. These health workers working in these underserved contexts are the front line of defense against epidemics such as HIV, TB and a key component of any comprehensive health development program. The medical and health services they provide improve newborn, child and maternal health, prevent disease, cure debilitating illnesses, and alleviate the suffering of the dying.

However, improper handling, storage and disposal of the waste generated in these facilities or activities can spread disease through several mechanisms. Transmission of disease through infectious waste is the greatest and most immediate threat from healthcare waste. If waste is not treated in a way that destroys the pathogenic organisms, dangerous quantities of microscopic disease-causing agents—viruses, bacteria, parasites or fungi—will be present in the waste. These agents can enter the body through punctures and other breaks in the skin, mucous membranes in the mouth, by being inhaled into the lungs, being swallowed, or being transmitted by a vector organism. Those who come in direct contact with the waste are at greatest risk. Examples include healthcare workers, cleaning staff, patients, visitors, waste collectors, disposal site staff, waste pickers, substance abusers and those who knowingly or unknowingly use "recycled" contaminated syringes and needles. Although sharps pose an inherent physical hazard of cuts and punctures, the much greater threat comes from sharps that are also infectious waste. Healthcare workers, waste handlers, waste-pickers, substance abusers and others who handle sharps have become infected with HIV and/or hepatitis B and C viruses through pricks or reuse of syringes/needles.

Contamination of water supply from untreated healthcare waste can also have devastating effects. If infectious stools or bodily fluids are not treated before being disposed of, they can create and extend epidemics. The absence of proper sterilization procedures is believed to have increased the severity and size of cholera epidemics in Africa during the last decade.

Healthcare wastes generally fall into three categories in terms of public health risk and recommended methods of disposal:

- ***General*** healthcare waste, similar or identical to domestic waste, including materials such as packaging or unwanted paper. This waste is generally harmless and needs no special handling; 75–90% of waste generated by healthcare facilities falls into this category, and it can be burned or taken to the landfill without any additional treatment.
- ***Hazardous*** healthcare wastes including infectious waste (except sharps and waste from patients with highly infectious diseases), small quantities of chemicals and pharmaceuticals, and non-recyclable pressurized containers. All blood and body fluids are potentially infectious.
- ***Highly hazardous*** healthcare wastes, which should be given special attention, includes sharps (especially hypodermic needles), highly infectious non-sharp waste such as laboratory supplies, highly infectious physiological fluids, pathological and anatomical waste, stools from cholera patients, and sputum and blood of patients with

highly infectious diseases such as TB and HIV. They also include large quantities of expired or unwanted pharmaceuticals and hazardous chemicals, as well as all radioactive or genotoxic wastes.

If a project's training activities for professional health workers or community health workers involve techniques that would generate and require disposal of hazardous or highly hazardous waste, the Implementing Partners shall be required to include training in or ensure that the training curriculum covers best management practices concerning the proper handling, use, and disposal of medical waste, including blood, sputum, and sharps.

As appropriate, the implementing partners will work with facility, local, regional and/or national officials, to implement and apply appropriate best management practices which incorporate appropriate health and safety measures and environmental safeguards, including proper disposal of medical waste in accordance with international norms as spelled out by the WHO in "WHO's Safe Management of Wastes from Healthcare Activities." National policies and laws should also be considered, though most countries follow WHO Guidelines.

References for this section include:
http://www.who.int/water_sanitation_health/medicalwaste/167to180.pdf
http://www.bchealthguide.org/healthfiles/hfile29.stm
Safe management of wastes from health-care activities, edited by A. Prüss, E. Giroult and P. Rushbrook. Geneva, WHO, 1999,
http://www.who.int/water_sanitation_health/Environmental_sanit/MHCWHanbook.htm. English
EGSSAA Chapter 8, "Healthcare Waste: Generation, Handling, Treatment and Disposal" (http://www.encapafrica.org/EGSSAA/Word_English/medwaste.doc) for additional guidance on proper handling and disposal of medical waste.

Small-Scale Water and Sanitation Activities
All small-scale water and sanitation activities such as the digging of wells or creation of latrines should be conducted with good design and implementation practices and with consideration of protecting human health and the surrounding environment.

Some potential environmental impacts are possible with these interventions, and will depend on the local circumstances, including:

Water Supply
- Improper siting of facilities that damages or destroys natural ecosystems (within wetlands, protected areas, or other sensitive habitats, etc.)
- Depletion or degradation of local or downstream freshwater resources (surface and groundwater)
- Creation of stagnant (standing) water near water points that could create breeding opportunities for water-borne disease vectors
- Natural or human-caused biological or chemical contamination of water sources (surface and groundwater), causing increased human health risks, including:
- High arsenic or other mineral/chemical levels
- Poor management of water points and/or poor design of pipes leading to leakage and contamination of water with fecal matter, solid waste, etc.

Sanitation
- Increased human health risks from contamination of surface water, groundwater, soil, and food by human waste and disease pathogens

- Degradation of surface and groundwater quality and land habitats due to inappropriate siting or construction of latrines or wastewater collection systems, or release of human waste from sanitation facilities
- Defecation around locked or unusable latrines or other sanitation facilities, potentially contaminating surface water and/or shallow groundwater sources, adversely affecting both human and ecosystem health
- Damage to the aesthetics of the sanitation facility site (visual, smell, etc.)

Reference for this section is
Environmental Guidelines for Small-Scale Activities in Africa
http://www.encapafrica.org/EGSSAA/Word_English/watsan.doc

Small-scale Rehabilitation of Health Facilities
Small-scale rehabilitation of health facilities should be conducted considering minimum impact to the physical and social environment surrounding the health facilities, use of appropriate and non-hazardous materials, and appropriate disposal of old or unused materials in the rehabilitation process. Construction of health facilities is beyond the scope of this IEE.

Some potential environmental impacts are possible with these interventions, and will depend on the local circumstances, including:

- Contamination of groundwater and surface water supplies through improper disposal of human and other biological wastes during the rehabilitation period
- Contamination of ground and surface water supplies through improper disposal or handling of toxic materials used in rehabilitation (e.g., solvents, paints, vehicle maintenance fluids (oil, coolant), and diesel fuel)
- Adverse social impacts due to displacement of local inhabitants, influx of outside workers, inequitable distribution of economic benefits of rehabilitation, etc.
- Damage to aesthetics of site/area
- Improper extraction of rehabilitation materials such as wood, stone, gravel, or clay that damages terrestrial ecosystems (e.g., wood may come from relatively intact or natural forests)
- Use of toxic materials during rehabilitation, such as lead paint.

Reference for this section is:
Small Scale Construction chapter of the USAID Environmental Guidelines for Small-Scale Activities in Africa, as the guidelines are appropriate for rehabilitation activities.
http://www.encapafrica.org/EGSSAA/Word_English/construction.doc

Response Planning and Implementation
Response support and technical assistance should be conducted with consideration to the potential environment. Simple measures to manage the potential impacts can be built into the design of any response program and can be planned and implemented regardless of the response activity.

Some potential impacts include:

- Spread of infectious agents from persons or properties used during response efforts
- Destruction of sensitive habitats, short and long term impacts to threatened and endangered species due to untimely or invasive response actions
- Contamination of soil, sediment or groundwater due to the presence of infectious agents, chemicals etc at the response site.

- Contamination of persons, property and environment due to inadequate containment planning and implementation.

Some helpful information about solid waste management in rapid response situations may be found in the Sphere Handbook at
http://www.sphereproject.org/index.php?option=content&task=view&id=27&Itemid=84

Deferral

For those activities that do not have enough information to make a meaningful environmental analysis, a deferral is granted (22 CFR 216 (d)(7). Specifically Objective 4 references future technologies. While it is entirely likely that future technological actions are well within the 22 CFR 216 definitions for operational research, not enough information is available to make that determination. When sufficient information becomes available the implementing partner will submit an initial environmental evaluation with a recommended threshold determination. This must occur no less than 6 months prior to the intended implementation of the technology. No funding for the implementation of the future technology may be used for the procurement, storage, implementation, use, or disposal of that technology.

Table 1: PREDICT Activities Not Likely To Have An Adverse Effect On The Environment

(activities covered by the following citations in Reg. 216, by subparagraph of 22 CFR 216.2(c) (2): (iii); (xiv) except to the extent the activities directly affect the environment)

Analyses, studies, academic or research workshops and meetings;

Assessing the capability of each region/country to conduct wildlife surveillance

Develop and coordinate a plan of action to achieve the surveillance objectives

Studies, projects or programs intended to develop the capability of recipient countries and organizations to engage in planning

Facilitate participatory sustainable health services planning efforts with the involvement of all stakeholders

Facilitate and provide technical assistance for supply chain management and strategic planning with regard to systems

Develop or strengthen the capacity of governments, NGOs, academic institutions, etc. to collect, process and manage health or other relevant information for decision-making

Carry out advocacy campaigns for policy reform

Investing in People: Health Program Areas	Procurement, Storage, Management and Disposal of Public Health Commodities	Training in methods that could result in generation, and need for disposal of hazardous and highly hazardous medical waste (as defined in Section 3 of this IEE)	Small-Scale Water and Sanitation	Small-Scale Rehabilitation of health facilities	Response Planning and Implementation
Objective 3: surveillance	Lab test kits Pharmaceuticals Personal Protective Equipment Other chemicals USAID will work with manufacturers to minimize packaging, establish efficient distribution systems (to minimize unnecessary chemicals in the environment) and ensure that proper disposal of solid and hazardous waste is proactively arranged	Sensitive habitats could be impacted by rapid response actions Containment of infectious agents Decontamination of persons and property exposed to potentially infectious agents Waste Management	Small scale water treatment for response teams Small scale latrines for response teams USAID will provide guidance and processes to country and regional teams on development, design and operation of any temporary or permanent water and sanitation effort associated with the response program.	Rehabilitate hospitals, clinics, labs or training centers for the purposes of capability building or rapid response team storage, training and implementation. USAID will provide assistance, guidance as appropriate toward the development, design, rehabilitation of temporary or permanent structures needed to support the Objective.	Destruction of critical habitats or jeopardy of threatened and endangered species Spread of infectious agent due to failed or lack of containment and decontamination facilities and procedures Contamination of soil, sediment or groundwater due to failed containment, decontamination, storage and use of chemicals and other hazardous materials and waste

Investing in People: Health Program Areas	**Procurement, Storage, Management and Disposal of Public Health Commodities**	**Training in methods that could result in generation, and need for disposal of hazardous and highly hazardous medical waste (as defined in Section 3 of this IEE)**	**Small-Scale Water and Sanitation**	**Small-Scale Rehabilitation of health facilities**	**Response Planning and Implementation**
					USAID and or its implementing partner will coordinate with country and regional environmental authorities during the development of any response plan or program. USAID or its implementing partner will work with local and regional environmental and natural resource authorities during the implementation of any response action

TABLE 3: CONDITIONS FOR IMPLEMENTATION OF CATEGORIES OF PREDICT ACTIVITIES

Key Elements of Program/Activities	Mitigation Conditions and/or Proactive Interventions
Activities as described in Table 1 of this document: Education, technical assistance, training Studies, projects or programs intended to develop the capability of recipient countries and organizations to engage in development planning	No environmental impacts are expected from these activities. If the topic of these training activities is one that trains health care workers in methods that will generate hazardous or highly hazardous medical waste, HIV and/or TB testing, then the training should include information on safe disposal of the sharps and biological samples generated from this testing. See below for more information on this area. While the above activities are considered to have no impact on the environment, environmental health and quality considerations should be incorporated into all relevant steps along the health care continuum, as part of quality assurance and infection prevention approaches. Implementing partners have an opportunity to include health care waste management messages, and to provide for appropriate disposal facilities in home-based care and community-based situations. Positive messages about personal and household hygiene, sanitation, and proper disposal of potentially harmful materials should also be delivered, as appropriate, along with the standard health care messages.
PREDICT Activities that involve: Procurement, Storage, Management and Disposal of Public Health Commodities	Conditions: Consignees for all pharmaceutical drugs, chemcials and other public health commodities procured under this funding will be advised to store the product according to the information provided on the manufacturer's Materials Safety Data Sheet (MSDS). These are supplied by the manufacturer, and can also be found on the internet by using the active ingredient and MSDS as search terms. If disposal of any of these pharmaceutical drugs is required, due to expiration date or any other reason, the consignee will be advised that the preferred method of disposal is to return to the manufacturer. If this is not possible (for example if the expired or spoiled pharmaceuticals are considered hazardous and as such, if transferred across frontiers, become regulated and subject to the Basel Convention an the transfrontier shipment of hazardous wastes) then follow the guidelines in the WHO document *Guidelines for Safe Disposal of Unwanted Pharmaceuticals During and After Emergencies*, found at www.who.int/water_sanitation_health/medicalwaste/unwantpharm.pdf. At the request of the Mission, subject to available funding, the implementing partner will make all reasonable attempts to facilitate

TABLE 3: CONDITIONS FOR IMPLEMENTATION OF CATEGORIES OF PREDICT ACTIVITIES	
Key Elements of Program/Activities	**Mitigation Conditions and/or Proactive Interventions**
	the disposal of expired drugs under this activity to mitigate the impact of medical waste. Implementing partners will work with the host country as appropriate on aspects of essential medicine supply chain management, including estimating demand, distribution, and storage issues of time and temperature. Commodities that, during use, become hazardous or highly hazardous waste are managed under the conditions in the following section "Activities that involve the collection, safe handling and disposal of hazardous and highly hazardous medical waste" Packaging and disposal of all other public health commodities will be treated using the guidelines provided in Environmental Guidelines for Small-Scale Activities in Africa (EGSSAA) 2nd Edition, Chapter 15: Solid Waste (http://www.encapafrica.org/EGSSAA/Word_English/solidwaste.doc)
PREDICT Activities that involve: Training professional and paraprofessional health care workers in methods that result in the generation and disposal of hazardous or highly hazardous medical waste (as defined in Section 3 of this IEE)	Conditions: For activities entailing training of professional and para-professional health workers in methods that result in the exposure, generation or disposal of hazardous or highly hazardous medical waste, including blood or sputum testing, basic and emergency care techniques, and laboratory support, the implementing partner will include training in or ensure the training curriculum covers procedures to properly handle, label, treat, store, transport and properly dispose of blood, sharps and other medical waste, as applicable, and follows either WHO guidelines, in Environmental Guidelines for Small Scale Activities in Africa Chapter 8, "Healthcare Waste: Generation, Handling, Treatment and Disposal," and is consistent with national policy and procedure for medical waste. Healthcare waste is most appropriately identified by color-coding bags and containers. In addition, the following are well-established practices in the safe handling, storage, and transportation of health-care waste: • Sharps should be collected together (regardless of whether or not they are contaminated), and stored in puncture-proof, impermeable, and tamper-proof containers with fitted covers. If plastic or metal containers are unavailable, then containers made of dense cardboard are

TABLE 3: CONDITIONS FOR IMPLEMENTATION OF CATEGORIES OF PREDICT ACTIVITIES	
Key Elements of Program/Activities	**Mitigation Conditions and/or Proactive Interventions**
	recommended. • Highly infectious waste should be immediately sterilized by autoclaving. • On-site collection of waste should be handled at frequent intervals to avoid accumulation, and an adequate supply of fresh collection bags/containers should be available for replacement. • Waste should be stored in an accessible room with adequate space and protection from sunlight. • In any area that produces hazardous waste - hospital wards, treatment rooms, operating theatres, laboratories, etc., three bins plus a separate sharps container will be needed to separate these types of waste. (If hazardous and highly hazardous waste will be disposed of in the same manner, they should not be collected separately.) • For hazardous waste and highly hazardous waste the use of double packaging, e.g. a plastic bag inside a holder or container is recommended for ease of cleaning. • To make separate collection possible, hospital personnel at all levels, especially nurses, support staff, and cleaners, should be trained to sort the waste they produce. See EGSSAA Chapter 8, "Healthcare Waste: Generation, Handling, Treatment and Disposal" (http://www.encapafrica.org/EGSSAA/Word_English/medwaste.doc) for additional guidance on proper handling and disposal of medical waste. Other important references to consult are "WHO's Safe Management of Wastes from Healthcare Activities" http://www.who.int/water_sanitation_health/medicalwaste/wastemanag/en/
PREDICT Activities that involve: Small-Scale Water and Sanitation	All water supply and water quality assurance activities should be conducted in a manner consistent with the good design and implementation practices described in Environmental Guidelines for Small Scale Activities in Africa, Chapter 16: Water Supply and Sanitation (http://www.encapafrica.org/EGSSAA/Word_English/watsan.doc). For example, microbiological contamination of improved wells can often be prevented by aquifer protection measures and proper well design and maintenance. Separate wells should be used for human consumption and animal watering, or an overflow trough should be constructed well away from the protected water source. Another useful reference to consult for good water quality assurance and sanitation design and implementation principles is the document, "Guidelines for the Development of Small Scale Rural Water Supply and Sanitation Projects in Ethiopia," by Catholic Relief Services and USAID, July 31, 2003 (crs.org/publications/pdf/Wat0604_e/pdf).

TABLE 3: CONDITIONS FOR IMPLEMENTATION OF CATEGORIES OF PREDICT ACTIVITIES	
Key Elements of Program/Activities	**Mitigation Conditions and/or Proactive Interventions**
	Water quality assurance and water testing is essential for determining that the water from a constructed water source is safe to drink and to determine a baseline so that any future degradation can be detected. Among the water quality tests which must be performed are tests for the presence of arsenic, nitrates, nitrites, and coliform bacteria, plus tests for any additional parameters required by the host government. Any USAID-supported activity engaged in the provision of potable water must adhere to Guidance Cable State 98 108651, which requires arsenic testing, and guidance is provided by USAID's Economic Growth, Agriculture and Trade Bureau in the document "Guidelines for Determining the Arsenic Content of Ground Water in USAID-Sponsored Well Programs in Sub-Saharan Africa" (www.usaid.gov/our_work/environment/compliance/ane/tool_shed/**arsenic_guidelines**.doc). Simple and cost-effective sample kits for *E. coli* and fecal coliforms are available through a variety of manufacturers (e.g., 3M Petrifilm, Idexx Colilert or Coliscan Easygel). Initial water quality testing is the responsibility of the program to assure, but when feasible the program should also set in place capacities and responsibilities to provide reasonable assurance that ongoing water quality monitoring occur. The standards for initial and ongoing testing -- types of contaminants for which testing should be conducted, testing methods, testing frequency, and issues such as public access to results -- should follow any applicable USAID guidance, as well as host country laws, regulations and policies. Furthermore, a response protocol should be established in the event that water quality testing detects contamination. An illustrative list of environmentally sound principles for water and sanitation activities includes: • Community mobilization to ensure sustainability of the physical infrastructure • Water sources should be located upgrade from potential sources of pollution, including latrines or toilets. • Water sources are protection from both human and animal contamination. • Ensure latrines are sited far away from shallow wells, cisterns, spring sources and boreholes. Latrine pits will be dug in the unsaturated zone above the water table, and latrine pits are protected against flooding and overflow due to intense rainfall. Establish and train community water and sanitation committees to manage, repair and maintain all water points and the watersheds immediately surrounding the water points, including watering of livestock, and to provide hygiene education to participating communities.

TABLE 3: CONDITIONS FOR IMPLEMENTATION OF CATEGORIES OF PREDICT ACTIVITIES	
Key Elements of Program/Activities	**Mitigation Conditions and/or Proactive Interventions**
	• Training in sanitation and hygiene for health workers, community health and water committees, community area based development groups, and/or municipal water board members. • Ensure community mobilization and public awareness of human health risks associated with water-borne disease vectors. • Relevant local community rules and best practices and procedures of promotion of better environmental health are developed and adhered to. Verification through site visits and photos should be done to assure practices are in accordance with local community rules and "best practices" through community monitoring tools and municipal water board's evaluation system. • Take measures to minimize standing water. • Where water supplies for drinking or washing patients or laundry are upgraded or provided, measures will be taken to ensure that drainage from laundry and bathing facilities does not affect the water supply nor pose threats for transmittal of infectious diseases. • Provision of potable water supplies and/or latrines will follow host country or WHO standards concerning the appropriate separation of wells and latrines and measures to avoid contamination of water sources.
PREDICT Activities that involve: Small-scale rehabilitation of health posts, clinics, laboratories, hospitals or training centers Notes: If rehabilitation includes water supply and/or sanitation, see also "Water Supply	**Conditions:** For the rehabilitation of existing facilities (permanent or temporary), these activities shall be conducted following principles for environmentally sound rehabilitation, such as those as provided in the Small Scale Construction chapter of the USAID Environmental Guidelines for Small-Scale Activities in Africa, as the guidelines are appropriate for rehabilitation activities (http://www.encapafrica.org/EGSSAA/Word_English/construction.doc) An illustrative list of environmentally sound construction principles includes: • As part of the selection/screening for potential sites, the implementer will perform Environmental Due Diligence for proposed sites to ensure that the site is free of environmental concerns including those from off-site sources. • The majority of materials used will be of local origin and will not contain any hazardous materials (e.g., asbestos or lead). • Investigate and use less toxic alternative products. • Excess materials will be recycled wherever possible and disposal of unusable material will be

TABLE 3: CONDITIONS FOR IMPLEMENTATION OF CATEGORIES OF PREDICT ACTIVITIES	
Key Elements of Program/Activities	**Mitigation Conditions and/or Proactive Interventions**
and Sanitation" section above.	done in an environmentally sound manner. • Rehabilitation activities will not require the use of any heavy equipment, or in the unlikely event it does, proper safeguards will be taken to prevent destruction of vegetation and soil erosion (e.g., runoff from the site which may be high in suspended solids or which may cause disruption to local drainage patterns). • No lead-based paint will be used. When (lead-free) paint is used, it will be stored properly so as to avoid accidental spills or consumption by children; empty cans will be disposed of in a environmentally safe manner away from areas where contamination of water sources might occur; and the empty cans will be broken or punctured so that they cannot be reused as drinking or food containers. • For any TB laboratories renovated under this program, provide room(s) with negative pressure to mitigate any cross contamination potential, and provide owner/operators of the renovated facility with written guidelines for proper maintenance of the facility. E&E Specific Conditions: In addition to the above conditions, a site-specific mitigation and monitoring plan approved by the E&E/BEO must be in place prior to the start of renovation or rehabilitation activities.
Response Planning and Implementation	Response support and technical assistance should be conducted with consideration to the potential environment. Simple measures to manage the potential impacts can be built into the design of any response program and can be planned and implemented regardless of the response activity. The implementing partner will coordinate with local environmental experts, officials, NGOs and the MEO to understand the sensitive species and habitats in the region and to design procedures that ensure the protection of those habitats and species. The implementing partner will ensure that all USAID employees or USAID contractors or USAID trained personnel can visually identify any important habitat or species from the target species. This may include using identification cards, have a specialist on site or on call during the response etc.

Monitoring and Reporting

The AOTR or on-site manager (as appropriate) of PREDICT, in consultation with the BEO, REA and/or the MEO (as appropriate), and implementing partner will actively monitor and evaluate whether environmental consequences unforeseen under activities covered by this IEE arise during implementation, and modify or end activities as appropriate. If additional activities are added that are not described in this document, an amended environmental examination must be prepared.

PREDICT will use annual Environmental Mitigation and Monitoring Reports (EMMR) to ensure programmatic compliance with 22 CFR 216 and ADS 204.5.4 by documenting that the conditions specified in this IEE have been met for all activities carried out under PREDICT. The implementing partner of PREDICT will complete the EMMR on all activities by October of each year, using the guidance and forms below.

The EMMR consists of three parts:

- The Environmental Screening Form
- The Mitigation Plan for specific environmental threats carried out by the implementer,
- The Reporting Form

The EMMR should be completed by the implementing partner for PREDICT. The EMMRs are reviewed and approved by the AOTR and the BEO and/or MEO, as appropriate. This activity should be incorporated into pertinent Detailed Implementation Plans (DIP), Monitoring and Evaluation Plans, and annual work plans/reports.

In addition, any sub projects, sub activities, regional actions sub-awards or fund transfers from the implementer or to another sub implementer must incorporate provisions stipulating:

a) the completion of an annual environmental monitoring report, and
b) that activities to be undertaken will be within the scope of the environmental determinations and recommendations of this IEE. This includes assurance that any mitigating measures required for those activities be followed. Further sub projects or activities will be documented via the ESR to document compliance with IEE conditions.

The AOTR or on-site manager of PREDICT will undertake field visits, as possible, and consultations with implementing partners to jointly assess the environmental impacts of ongoing activities, and associated mitigation and monitoring conditions.

The implementing partners' Detailed Implementation Plan will identify those activities outlined in this IEE that have potential impacts to the environment and discuss plans for environmental management, mitigation approaches, and monitoring measures. Implementing partners will be required to include Environmental Compliance Monitoring in their project work plan and monitoring and evaluation plan. Documentation by implementing partners will use the EMMR outlined above.

Based on the process outlined in the Detailed Implementation Plan, the implementers' annual reports to USAID will include a brief update on mitigation and monitoring measures being implemented, results of environmental monitoring, and any other major modifications/revisions in the development activities, and mitigation and monitoring procedures. Documentation by implementing partners will use the EMMR outlined above. Use of photographs will be encouraged.

Operating Units will ensure that implementing partner has sufficient capacity to complete the environmental screening process and to implement mitigation and monitoring measures, and that the activities adhere to applicable host country environmental laws and policies.

PREDICT
Environmental Screening Form

Name of Implementing Organization:_____ Funding Period for this award: FY____-FY____

Geographic location of PREDICT project (country, province, district):_____

Report prepared by:
Name: _____ Date: _____

Indicate which activities your organization plans to implement under the PREDICT.

Table 1: Key Elements of Project/Activities Implemented with no direct impact on the environment Activities such as:		Yes	No
1	• Education, technical assistance, or training • Analysis, program evaluation, workshops, or meetings • Document and information transfers • Programs involving health care, nutrition, or family planning except where directly affecting the environment • Studies, projects, or programs intended to develop the capability of recipient countries and organizations to engage in development planning		

Table 2: Key Elements of Project/Activities Implemented with direct or indirect impacts on the environment **Activities such as:**		Yes	No	% Total Budget
2	Procurement, Storage, Management, and Disposal of Public Health Commodities			
3	Training professional and paraprofessional health care workers in methods that result in the generation and disposal of hazardous or highly hazardous medical waste			
4	Small-Scale Water and Sanitation Activities			
5	Small-Scale Gardening or Farming Activities			
6	Small-Scale Rehabilitation of Health Facilities			
7	Other activities that include physical interventions that have direct or indirect impacts on the environment that are not covered by the above categories			

Provide a brief description of potential environmental threats of any key project activities in the "Yes" column in Table 2.

Category of Activity	Potential environmental threats
Procurement, Storage, Management, and Disposal of Public Health Commodities	
Training professional and paraprofessional health care workers in methods that result in the generation and disposal of hazardous or highly hazardous medical waste	
Small-Scale Water and Sanitation Activities	
Small-Scale Rehabilitation of Health Facilities	
Other activities that include physical interventions that have direct or indirect impacts on the environment that are not covered by the above categories	

Certification

I certify the completeness and the accuracy of the Environmental Screening Form described above. I agree to implement the mitigation measures put forth in the PREDICT Programmatic IEE for those activities noted in the Environmental Screening Form that have potential environmental threats. I agree to include a mitigation plan in the PREDICT Detailed Implementation Plan (DIP) for any

activities with a potential environmental threat (Annex 1) and to submit annual reports on the status of mitigation measures (Annex 2).

_____ _____

Signature Date

_____

Print Name

_____

Organization

_____

BELOW THIS LINE FOR USAID USE ONLY

USAID Central Bureau Clearance of Environmental Screening Form:

Agreement Officer's Technical Representative:_____ Date:_____

Bureau Environmental Officer:_____ Date: _____

Note: If clearance is denied, comments must be provided to applicant.

PREDICT
Environmental Mitigation and Monitoring Report (EMMR)

EMMR Part 2 of 3: Mitigation Plan

Category of ctivity from ection 5 of REDICT IEE	Describe specific environmental threats of your organization's activities (based on analysis in Section 3 of PREDICT IEE)	Description of Mitigation Measures for these activities as required in Section 5 of PREDICT IEE	Who is responsible for monitoring	Monitoring Indicator	Monitoring Method	Frequency of Monitoring
Education, hnical sistance, ining etc.	No environmental impacts anticipated as a result of these activities	Education, technical assistance and training about activities that inherently affect the environment include discussion prevention and mitigation of potential negative environmental effects.		Discussion of environmental impact included in education, technical assistance, training and other materials	Review of materials	Annual
Commodities						
Medical ste		Completion of the Healthcare Waste Management Minimum Program Checklist and Action Plan (Annex 1)				Annual
Small-Scale ıter and nitation						
Program nning and plementation	Spread of infectious agents from persons or properties used during response efforts Destruction of sensitive habitats, short and long term	Use local environmental expertise when in the field Use standard decontamination, and containment procedures, and techniques	Local project officers	Documented communications built into project workplans and other documents Presence and observed use of decontamination, containment and safe storage of infectious and	Visual monitoring	Annual reporting. Site visits commensurate with project risk.

Category of Activity from Section 5 of PREDICT IEE	Describe specific environmental threats of your organization's activities (based on analysis in Section 3 of PREDICT IEE)	Description of Mitigation Measures for these activities as required in Section 5 of PREDICT IEE	Who is responsible for monitoring	Monitoring Indicator	Monitoring Method	Frequency of Monitoring
	impacts to threatened and endangered species due to untimely or invasive response actions Contamination of soil, sediment or groundwater due to the presence of infectious agents, chemicals etc at the response site. Contamination of persons, property and environment due to inadequate containment planning and implementation.			hazardous materials/waste.		

PREDICT
Environmental Mitigation and Monitoring Report (EMMR)

EMMR part 3 of 3: Reporting form

List each Mitigation Measure from column 3 in the EMMR Mitigation Plan (EMMR Part 2 of 3)	Status of Mitigation Measures	List any outstanding issues relating required conditions

PREDICT Year 3, Quarter 4 Report- Executive Summary
August 1- October 31, 2012

USAID'S Emerging Pandemic Threats PREDICT program showed strong progress in laboratory testing capacity building and interpretation of findings, as well as improvements in categorizing high-risk interfaces. To date, approximately 35,000 animals have been sampled, yielding collection of close to 200,000 samples with tens of thousands of diagnostic tests run. The global health workforce has also been expanded and facilitated with approximately 1,500 individuals trained.

This quarter also showed increased engagement in country-level and local indigenous community-level initiatives around disease awareness, disease monitoring and investigation, and capacity building through facility visits with ministry staff, participation in or co-hosting of training sessions with governments and universities, and collaborative planning of projects with partners using PREDICT protocols for disease surveillance. In addition, PREDICT demonstrated strong ongoing collaborations, joint training opportunities, and meetings with in-country EPT partners. PREDICT was frequently called on for expertise in human-animal disease links and outbreak investigations by country governments and intergovernmental organizations (including WHO, OIE, and UNEP), demonstrating our global presence and value to the health and biodiversity communities. Examples of this quarter's achievements include:

Surveillance Activities and Surveillance System Improvements

- Conducted surveillance activities in Bolivia, Brazil, Peru, Mexico, Bangladesh, Cambodia, China, Lao PDR, Malaysia, Indonesia, Thailand, Vietnam, Cameroon, DRC, Gabon, Republic of Congo, Rwanda, Tanzania, and Uganda, and submitted surveillance proposal for permissions in Nepal.
- Launched and trained rangers on Uganda's Animal Mortality Monitoring Program's new cell phone-based surveyor tool (received 212 reports to date).
- In China, signed a new multi-partner agreement with the Guangdong Institute of Public Health for collaboration on two human studies, and confirmed participants for a follow-up study of highly-exposed individuals.
- In Thailand, helped the National Park, Wildlife and Plant Conservation Department develop a wildlife surveillance project using PREDICT protocols.
- Finalized context-specific guides and videos for safe capture, handling, and sampling of East African non-human primates.
- For Project Deep Forest, conducted standardized, comparable sampling in pristine and intermediately-disturbed habitat sites in Uganda, Malaysia, and Brazil.
- Discovered 13 new genotypes of coronaviruses in neotropical bats, helping to demonstrate that CoVs cluster very strongly based on host family.

Laboratory System Improvements and Pathogen Detection and Discovery

- Implemented and/or optimize viral family-level PCR protocols at additional laboratories in Brazil and Mexico, and expanded viral testing in Cameroon, DRC, Vietnam, Bolivia, and Peru.
- Makerere University Walter Reed Project animal virology laboratory became fully operational as PREDICT's regional testing center for east-central Africa.
- Provided training and support for laboratory technicians (PREDICT and government staff), including extensive on-site training at partner laboratories in Vietnam, Lao PDR, DRC, Cameroon, Cambodia, and the U.S..
- Provided equipment for surveillance and laboratory diagnostics to additional labs in DRC, Rwanda, Uganda, and Malaysia.
- Tested mobile biosafety tents used in DRC during the Ebola outbreak and the satellite internet terminal used in an outbreak scenario in Central Africa.
- Selected sample sets from various countries for advanced pathogen detection and discovery, allowing comparison of pathogen discovery efficacy.
- Expanded number of viral genera for testing in most PREDICT laboratories.
- Published discovery of the Bas-Congo virus, associated with a viral hemorrhagic fever death in DRC.

Sample Tracking and Information Management

- In GAINS, improved test result entry and editing functions and workflow processes to ensure data quality, developed a system for ensuring complete datasets for priority data, and refined primary interface and domestic animal reporting options.
- Set up server for Geneious, a bioinformatics software program, which will be used to archive and analyze nucleic acid and protein sequences.

Risk Determination

- Through collaboration with the Extractive Industry Working Group, launched Extractive Industries Infectious Disease Risk Assessment and Management initiative with Chatham House.
- Compiled gridded data for datasets related to extractive industries, refined mammal species richness data, added mapping function for EID events in Sicki (peer review web application), and gathered data characterizing transmission interfaces for spillover events of known zoonotic viruses.
- Piloted household surveys to characterize human-animal contact and anthropogenic activities in Brazil and Uganda.
- Devised key analytical steps and data to link surveillance to EID modeling.

Outbreak Response Capacity Building

- July-August Ebola Virus Disease outbreak in Kibale District, Uganda: Invited by Government to serve on National Task Force on Epidemic Preparedness and Response to develop and implement a National Response Plan and conducted wildlife sampling and household surveys to assess human-wildlife interactions in outbreak area.

- Ebola outbreak response in DRC: collaboration with MoH, PPE provision, technical assistance in planning, served as secretary for the “Laboratory and Research Commission” of national taskforce, and conducted wildlife sample collection in Isiro and surrounding areas.
- Requested by Indonesian government to assist with results analysis as needed following recent publication on Ebolavirus antibodies in orangutans.
- In Peru, provided guidance for planning rodent captures and sampling in areas affected by Plague as requested by government partners, and hosted workshop with Veterinary service (USDA APHIS-sponsored) for 90 government staff and partners on surveillance and outbreak investigation.
- Through the IUCN SSC Wildlife Health Specialist Group, provided wildlife mortality event summaries as requested by WHO and IUCN.
- Through the OIE Working Group on Wildlife Diseases, provided guidance on wildlife health integration for the OIE Performance of Veterinary Services tool.

PREDICT Quarter 1 Year 5 Reporting

GLOBAL – US, Africa, Southeast Asia, Asia & Latin America

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health Highlights**

    a) International, National, or Regional Surveillance System Improvements

    - Updated high-level ministry officials (representing Human Health, Forestry and Wildlife, Livestock, Medical Research, Disease Response, Development, and Tourism) and other One Health partners on PREDICT activities across countries.
    - At PREVENT's request, presented on emerging pandemic threats and PREDICT at a market stakeholder meeting in Lao PDR to discuss developing new guidelines for reducing disease transmission. Proposed changes to the Healthy Market guidelines were presented at the EPT quarterly meeting with government; Director General of the National Emerging Infectious Disease Coordinating Office will follow up on adapting them.
    - In Cameroon, attended a meeting with WHO on One Health.
    - In Tanzania, students from RESPOND OHCEA program at the Veterinary school received field training on biosafety, capture, and handling for surveillance.
    - Formed a partnership with CDC for more intensive and extensive investigation of occupational hazards and surveillance around sugar plantations in Tanzania.
    - In Vietnam, provincial level Department of Animal Health veterinarians and a representative from the epidemiology department of the DAH Regional Animal Health Office 6 joined surveillance efforts in markets.
    - In Democratic Republic of Congo, General Director of INRB (point of contact at MoH) announced PREDICT lab will systematically receive aliquots of all samples collected from suspected human cases of Viral Hemorrhagic Fever (VHF) and other zoonoses under MoH surveillance system.
    - In Cambodia, a Forestry Administration (FA) staff member has been assigned to join the PREDICT team for field surveillance activities to expand collaboration.

- In Indonesia, attended the national coordination meeting on zoonosis control organized by the KomNas Zoonosis Control.
- Held a conference with One Health Bangladesh. WHO, FAO, and the Bangladesh Public Health and Livestock Departments were represented. A PREDICT presentation was given.
- In Indonesia, met with PREVENT regarding coordination of sampling at markets.
- Invited by the Director of Animal Health Services as an expert in a discussion to review Health Requirements for non-human primate importation to Indonesia.
- Presented on PREDICT at The Virology Association's annual meeting in Thailand.
- In Vietnam, co-organized a training to launch sampling at wildlife farms in Dong Nai with RESPOND for rangers and officials (Forest Protection Department), veterinarians and animal health officers (sub-Department of Animal Health), and wildlife farm owners.
- In Cameroon, attended the Ministry of Health national epidemiological surveillance meetings.
- In Malaysia, met with PREVENT, the Department of Occupational Safety and Health, and Sabah Wildlife Department to discuss the Deep Forest Human Contact survey.
- Presented on assessing pathogen risk from bat guano, collaborative activities for zoonoses and, with partners from Thai Department of National Parks, viral infection surveys in *Macaca fascicularis* at the Asia-Pacific Workshop on Multi-Sectoral Collaboration for Zoonoses Prevention and Control in Kathmandu, organized by WHO, FAO and OIE.
- Presented on PREDICT Indonesia activities at the Cross Sectoral Meeting on Diagnostic Laboratory Network in Zoonoses Control, organized by the Ministry of Health.
- Presented on sampling techniques at the National Rabies workshop in Thailand, organized by Department of Diseases Control, Ministry of Public Health.
- Presented on "One Health Surveillance of Nipah Virus in Thailand: A power of Collaboration"; "Viral family surveillance in farmed wildlife"; and "Risk mitigation of wildlife trade in fresh markets (the Healthy Markets Initiative" at the USAID Partners Meeting on Value Chains and Zoonotic Pathogens.
- Presented on laboratory preparation for H7N9 and MERS at EID forum meeting, organized by Thai National Science and Technology Development Agency, Ministry of Science.
- Khmer PREDICT project coordinator presented on SMART wildlife disease surveillance at a One Health workshop held by the Royal University of Phnom Penh in Cambodia.

b) Laboratory System Improvements

- Began testing samples at the newly completed diagnostic lab at Sabah Wildlife Department in Kota Kinabalu, Sabah with PREDICT protocols.
- Began to expand viral family testing to include protocols associated with Universal Control 2 at additional laboratories including at INS laboratory (Peru, even though project funding has ended) and for Flavi and Hanta viruses at Eijkman Institute (Indonesia).
- Continued to provide weekly testing and result interpretation support from US teams to laboratory teams at NAHC (Laos PDR), Makerere University (Uganda), CMDN (Nepal), Sokoine University of Agriculture (Tanzania), GDCDC (China), Eijkman Institute (Indonesia), IPB (Indonesia), INRB (DRC), CIRMF (Gabon), RAHO6 (Vietnam), INS (Peru), and USP (Brazil).
- Continued to provide training and support to laboratory technicians including on performing Hanta and Flavi virus assays, laboratory biosafety and next generation sequencing at Eijkman Institute (Indonesia); two National Animal Health Laboratory (Laos PDR) staff on biosafety, and maintaining cold chain and data entry;
- Two laboratory technicians from NaVRI at Institut Pasteur du Cambodia (Cambodia) receiving weekly training on viral family screening of PREDICT samples with the goal to transfer a portion of viral family screening to NaVRI.
- Provided supplies for laboratory diagnostics, including a new thermocycler at Eijkman Institute (Indonesia) and reagents for sample extraction and testing.
- Prepared training for INRB and MoH staff on biosafety and biosecurity (DRC).
- Continued discussions on implementation of PREDICT protocols with IDENTIFY (FAO) for piloting on samples collected from livestock.
- Continued refining online test result tracking and interpreting viral sequence data in GAINS to streamline reporting of test findings to in-country government, obtaining government approvals for release of data, and movement of data to become available to partners and the public on HealthMap.

Table 1: Labs Receiving Assistance from PREDICT to date

	# of labs targeted for screening with desired viral families	# of labs receiving training in preparation for screening of desired viral families	# of labs that have initiated work that will eventually lead to screening desired viral families (labs with partial capacity)
Africa	**7**	**6**	**5**
Asia / SE Asia	**19**	**19**	**14**
Latin America	**8**	**6**	**6**
Totals	**34**	**31**	**25**

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
    - Compiled and analyzed data from the final rapid tool surveys for Peru and Bolivia that were submitted in association with country level programmatic completion to document change and lessons learned during the PREDICT project lifetime in those countries.
    - Prepared additional rapid tool surveys for roll out to other PREDICT countries as each country nears their 2014 end dates.
    - Revised drafts of two capacity assessment publications that are under coauthor review for submission: one presenting baseline capacity data from 20 PREDICT countries that identifies challenges and opportunities associated with capacity building to strengthen surveillance systems for wildlife in sustainable ways and a second publication to compare stakeholder and country coordinator perspectives to identify awareness and communication gaps that may inform future locally-relevant capacity building efforts.
    - Summarized findings and lessons learned from the local media surveillance (LMS) pilot program in a manuscript that is now under coauthor review. The LMS pilot program was evaluated in six PREDICT countries where health and risk events identified by staff reading non-online local print media sources on a weekly basis was used to extend the reach of media surveillance beyond the digital sources currently captured by HealthMap. Program evaluation surveys were completed by all countries as they finished the 3 month pilot program, and some countries have chosen to continue their LMS program activities.

Table 2: PREDICT Training

Country		# Women	Trainings covered various combinations of the following topics:
Asia:			
Bangladesh	**15**	**1**	Lab techniques in BSL2 lab & lab diagnostics; epidemiology and outbreak investigation; capture and sampling of rodents & bats; sample collection and GAINS system; use of GIS.
Cambodia	**225**	**100**	Core safety, animal capture, & sampling skills and protocols; data collection & management; rodent and primate ID & primate and rodent sampling; PPE use and respirator fit testing. Intro to emerging zoonoses and surveillance in Cambodia.
China	**24**	**10**	Core safety, animal capture & sampling skills and protocols; sample collection, handling, and transport; wildlife restraint & anesthesia; human & animal safety; bat, rodent, and primate sampling; zoonoses of bats & rodents.
India	**18**	**2**	Core safety, animal capture & sampling; laboratory safety protocols; zoonoses; surveillance and sampling protocols; bar-coding and data management; animal necropsies.
Indonesia	**42**	**20**	Modeling behind the PREDICT project; zoonotic diseases of bats and rodents; human and animal safety during capture; laboratory safety & PPE use; sample collection; set up for sampling bats and rodents; respirator fit testing.
Lao PDR	**101**	**22**	Core safety, animal capture, & sampling skills and protocols; data collection; PPE use; bar-coding & data management; animal necropsies; surveillance & sampling; laboratory molecular techniques; respirator fit testing, and cold chain.
Malaysia	**112**	**33**	Core safety protocols; PPE and biosafety, animal capture & sampling skills and protocols; bat and rodent capture, handling & sampling; laboratory skills; packing and shipping samples & cold chain; sampling strategy & data collection; bat, rodent & macaque sampling; collection of trigeminal nerve root ganglia from macaques for Herpes testing; virus extraction; bat & rodent capture; rodent retro-orbital bleed; primate sampling & human and animal safety; PRC & cloning; respirator fit testing.
Nepal	**16**	**5**	Biosafety & PPE, animal capture safety, laboratory safety, data collection procedures, rodent sampling methods.
Philippines	**3**	**1**	Animal capture safety.
Thailand	**153**	**55**	Lab and bioinformatics training; animal capture; laboratory safety; animal sampling protocols; zoonotic diseases; respirator fit testing.
Vietnam	**518**	**132**	Core safety, animal capture & sampling skills and protocols; packing & shipping samples; barcode system; animal pathology; sample collection & data management & use of GAINS; surveillance; filter paper blood spot, sampling; lab diagnostic protocols, virus family level protocols; one health & sampling strategy; sample transport & lab methods; wildlife pathology; First Aid; respirator fit testing. One Health and disease risks of handling wildlife. Bat & rat sampling, Disease management & surveillance, and risk assessment.
Africa:			
Cameroon	**169**	**59**	Core safety, animal capture & sampling skills and protocols; specialized field sampling and laboratory skills; packing & shipping samples to reference lab; PPE use; bushmeat policy and wildlife ethics; extraction, RT-PCR, ELISA and other lab methods; lab systems; immunology and serology; ethics; pan-viral protocols; emergency preparedness and management; outbreak

			response training; bio-risk management; use of satellite phones; molecular biology and conventional PCR; respirator fit testing.
DRC	**21**	**4**	Core safety, animal capture & sampling skills and protocols; specialized field sampling and laboratory skills; RT-PCR, ELISA; administration and reporting; Monkeypox surveillance; sample tracking & GAINS system; ethical issues; blood spot sampling; DNA & RNA extraction from animal samples; respirator fit testing.
Gabon	**6**	**3**	Bushmeat sampling; packing & shipping samples; PPE use and biosafety; lab safety; animal capture; bat & rodent sampling; sampling for AI; animal sample collection; cold chain; lab methods, DNA extraction, PCR; sample prioritization; safe handling of liquid nitrogen; sequencing; virus isolation; RNA & RT-PCR; GAINS system & data management.
Republic of Congo	**13**	**2**	Core safety, PPE and biosafety; safe animal capture, & sampling skills and protocols; bat, rodent, and primate sampling; laboratory safety & skills; data collection; cold chain; protecting human subjects in research; virology laboratory methods; respirator fit testing.
Rwanda	**206**	**25**	Core safety, animal capture & sampling skills and protocols; PPE use and biosafety; bat, rodent, and primate capture, handling, and sampling; zoonoses; ethics and responsibilities; wildlife pathology & necropsy; sample collection & preservation; packing & shipping samples; tracking primates & health monitoring; lab personnel safety; PCR protocols & sample processing; bushmeat handling.
Tanzania	**48**	**11**	Core safety, animal capture & sampling skills and protocols; bat and rodent capture, handling & sampling; data management; laboratory safety; surveillance; information management and GAINS system; wildlife capture & restraint; emergency preparedness; ethics, cultural sensitivity & SHP; pathogen detection; extraction and PCR & protocols; Batcold chain; respirator fit testing.
Uganda	**52**	**10**	Core safety, animal capture & sampling skills and protocols; PPE & biosafety; laboratory safety; packing & shipping samples; bushmeat sampling; cold chain; GPS; Animal Mortality Monitoring Study; bat capture, handling & sampling; PPE & biosafety to handle dead animals.
Latin America:			
Bolivia	**169**	**75**	Core safety, animal capture, laboratory & sampling skills and protocols and zoonotic diseases; bat, rodent, and primate sampling; bushmeat sampling; molecular and parasite diagnostic methods; lab safety and methods; packing and shipping samples; wildlife management and disease management; work ethics, cultural sensitivity & SHP; managing livestock & poultry diseases; detecting zoonoses; sample collection and storage; methods of detecting Salmonella in wildlife; biostatistics; respirator fit testing.
Brazil	**39**	**17**	Core safety, animal capture, handling & sampling skills and protocols; PPE use & biosafety; bat and rodent sampling; bushmeat sampling; packing and shipping samples; cold chain; surveillance, ethics, and responsibilities; primate sampling; respirator fit testing.
Colombia	**54**	**29**	Core safety, animal capture & sampling skills and protocols; lab safety & methods; One Health; Conservation Medicine; GAINS system and data management.
Mexico	**27**	**14**	Core safety, animal capture, handling & sampling skills and protocols; lab safety & methods; PPE use & biosafety; disease modeling; animal care and use protocols; lab diagnostic techniques; respirator fit testing.
Peru	**346**	**162**	Core safety, animal capture & sampling skills and protocols; PPE use & biosafety; surveillance; zoonotic disease risks from wildlife trade and consumption; wildlife regulations, wildlife

			management and disease monitoring; sample collection & storage; species ID & health risks; emergency management of spider bites; safe transport of confiscated animals; respirator fit testing.
Total Trained	**2,377**	**792**	

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Conducted surveillance activities in Brazil, Bangladesh, Cambodia, China, Indonesia, Lao PDR, Malaysia, Nepal, Thailand, Vietnam, Cameroon, DRC, Gabon, Rwanda, Tanzania, and Uganda.
    - Conducted priority taxa surveillance at new sites and interfaces, including bat sampling in villages and sites near gold mining activities in Geita, Tanzania; chimpanzee sampling for the first time around Rwanda's Nyungwe National Park; surveillance of the live rat trade (markets and restaurants) and bat guano farms in the Mekong Delta Region of Vietnam; rodents at additional farms in China; and bat and rodent sampling at Chiang Dao National Park, ChiangMai, Thailand (near Myanmar border).
    - Deep Forest: In Brazil, conducted sampling in pristine area for the wet season, completed dry season surveillance of bat and rodents, and working on local surveys to complement index information from satellite imagery; Finished human contact survey in Uganda; Conducted sampling at intermediate, disturbed, and semi-disturbed sites in Malaysia.
    - Finalizing collaboration with China's Jiangsu CDC to facilitate experimental analysis of archived samples.
    - Conducted scoping visits at six markets in Chinese provinces (Guangdong (2), Guangxi (2), and Yunnan (2)) for AI surveillance and trade surveys.
    - Coordinating with the National Public Health Laboratory regarding testing archived Orang Asli samples in Malaysia.
    - Sampling macaque and urban rodents in Dhakka to complement studies in Kathmandu.
    - Continued the follow-up phase of high risk cohort study (individuals with contact with wild animals or the contacts of sero-positive individuals from the first round of enrollment and testing) and initiated human sample collection from 8 sentinel hospitals in China.
    - In Lao PDR, using a new technique (punch biopsies) to test reliability of sampling liver and lungs without causing external damage to animals for sale in markets.

- Conducted a site characterization survey in Uganda and Rwanda on the human footprint high-risk interfaces and ecology of bats, rodents and primates at surveillance sites.
- Launched wildlife farm surveillance with Vietnam's Department of Forest Protection and Department of Animal Health of Dong Nai Province (province has >1,000 wildlife farms).
- Assisted in sampling of confiscated bushmeat with Sabah Wildlife Department, Malaysia.
- In Cambodia, sampled primates and rodents in an ethnic minority hunting community.
- In Cameroon, malaria-negative febrile human samples were selected for Deep Freeze.

Table 3: PREDICT Global Surveillance Summary by Region, Taxa and Primary Risk Interface in GAINS (to date):

Taxa	# Animals sampled this quarter	# Animals sampled to date	# Animals with at least one final test result	# Animals with at least one test result with interpretation completed	# Animals with at least one test result cleared for release by govt
Africa					
Bats	262	6183	4240	4240	1066
Non-human Primates	18	4769	1710	1710	665
Other Taxa	44	6487	550	550	71
Rodents & Shrews	83	5565	2147	2147	497
Latin America					
Bats	1	3868	2167	2167	848
Non-human Primates	1	798	517	514	0
Other Taxa	2	1431	243	243	0
Rodents & Shrews	1	1895	370	370	13
Southeast Asia					
Bats	563	5253	2765	2747	487
Non-human Primates	26	1136	804	804	0
Other Taxa	16	1175	593	593	51
Rodents & Shrews	703	3123	1545	1545	458
Asia					
Bats	0	7242	1928	1928	1411

Non-human Primates	0	687	111	111	0
Other Taxa	0	541	16	16	0
Rodents & Shrews	136	1646	639	639	0
TOTALS	**1856**	**51799**	**20345**	**20324**	**5567**

- Sub-activity 1.2.2**: Partner with stakeholders in public and livestock health to explore use of PREDICT protocols and practicality/sustainability of One Health surveillance**
  - Continued to develop and refine PREDICT results reporting frameworks as needed in each country with public health, wildlife/environment, and agriculture ministries. In Indonesia, this effort has prompted development of the first national system for reporting wildlife surveillance activities to government ministries.
  - Analyzed country surveys and literature reporting of avian influenza surveillance in wild birds as requested by FAO/OIE OFFLU to inform a more coordinated global system.
  - The PREDICT influenza protocol was used to test a human H7N9 sample from a case confirmed by the Chinese provincial CDC in Guangdong Province.
  - Organized official opening of Malaysia's Wildlife Health, Genetic and Forensic Laboratory (attended by U.S. Ambassador and Sabah Minister of Tourism, Culture and Environment). The Laboratory is BSL-2 certified and will allow for local testing of samples in Sabah.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Procured and/or received equipment and reagents for cloning of PCR amplicons to enhance quality and success of sequencing (Cameroon, Gabon, and DRC).
    - Deep sequencing technology was made available (via other USG funding sources) within in-country labs (Gabon and Indonesia), and PREDICT staff received training to allow potential utilization of this technology in the future.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Q1Y5):**
    - Continued developing guidelines to assess viral sequences and cut-offs to classify as known or novel viruses based on sequence similarity for priority viral families/genera.
    - Performed analysis and interpretation of 1800 sequences detected through the PREDICT project to classify the sequences as known and novel viruses; preparation of result reports

for host-country governments is ongoing.

- Received samples for analysis from Uganda, Brazil, and Malaysia for Deep Forest Project.
- (b)(6) s visiting the Center for Infection and Immunity (Columbia University) from IBMB (Bolivia) for three months for training. He is currently processing samples collected from bats in Bolivia.
- New Publications Accepted: Discovery of HTLV4 reservoir in gorillas in Cameroon, Emerging Microbes and Infections.

Table 4: PREDICT Summary of Presumptive Positive Test Findings (Q1Y5 new results; see additional data in country reports below):

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bats (704 animals, 706 samples - Urine/urogenital swab, Urine, Oral swab, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Adeno, Astro, Boca, Corona, Herpes, Nipah, Paramyxo viruses	Products for sequencing	Interpretation Ongoing	Bangladesh	No
Rodents & Shrews (169 animals, 249 samples - Urine/urogenital swab, Oral swab, Rectal swab)	ICDDR,B	PCR	Hantaviruses	Product for sequencing	Sequencing pending	Bangladesh	No
Bats (487 animals, 627 samples - Oral swab, Rectal swab)	Wuhan Institute of Virology, CAS	RT-PCR	Astro, Corona, Paramyxo viruses	Products for sequencing	Interpretation Ongoing	China	No
Rodents & Shrews (161 animals, 324 samples - Oral swab, Rectal swab)	Wuhan Institute of Virology, CAS	RT-PCR	Astroviruses	Products for sequencing	Interpretation Ongoing	China	No
Human H7N9 Serum (1)	GDCDC	Conventional PCR	Influenza A	Product for sequencing	Sequence confirmation pending	China	No
Non-human Primates (132, Saliva)	UC Davis Wildlife Diagnostic Lab and CMDN	PCR	Corona, Retro – Lenti genus, Simian Foamy, Influenza, Paramyxo, Corona viruses	Products for sequencing	Sequencing ongoing	Nepal	No

Rodents and Shrews (194, Oral and Recta; swabs)	UC Davis Wildlife Diagnostic Lab and CMDN	PCR	Paramyxo, Rhabdo, Influenza, Arena viruses	Products for sequencing	Sequencing ongoing	Nepal	No
Bats (108, Feces and Urine)	UC Davis Wildlife Diagnostic Lab	PCR	Coronaviruses	Products for sequencing	Sequencing ongoing	Nepal	No
Bats (604 animals, 1185 samples - Brain, Feces, Liver, Oral swab, Spleen, Rectal swab, Lung)	Institut Pasteur Cambodia	PCR	Astro, Corona, Filo, Hanta, Lyssa, Paramyxo viruses	Products for sequencing	Interpretation Ongoing	Cambodia	No
Rodents & Shrews (289 animals, 1237 samples - Heart, Urine, Feces, Liver, Oral swab, Spleen, Rectal swab, Kidney, Lung)	Institut Pasteur Cambodia	PCR	Astro, Filo, Hanta viruses	Products for sequencing	Interpretation Ongoing	Cambodia	No
Bats (33 animals, 36 samples - Oral swab, Saliva, Serum, Tissue)	Primate Research Center, Bogor Agricultural University	PCR	Paramyxoviruses	Product for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Indonesia	No
Bats (124 animals, 749 samples - Urine/urogenital swab, Feces, Oral swab, Rectal swab, Red blood cells, Serum)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Arena, Astro, Corona, Filo, Herpes, Paramyxo viruses	Products for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Malaysia	No
Bats (27 animals, 78 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Adeno, Astro, Herpes viruses	Products for sequencing	Interpretation Ongoing	Malaysia	No
Non-human Primates (257 animals, 757 samples - Urine/urogenital swab, Oral swab, Rectal swab)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Alpha, Arena, Astro, Filo, Flavi, Herpes, Paramyxo, Retrovirus - Lentivirus genus, Simian Foamy viruses	Product for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Malaysia	No
Non-human Primates (50 animals, 150 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Herpesviruses	Product for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Malaysia	No

Rodents & Shrews (111 animals, 329 samples - Urine/urogenital swab, Oral swab, Rectal swab, Serum)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Alpha, Astro, Hanta, Paramyxo viruses	Products for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Malaysia	No
Rodents & Shrews (27 animals, 75 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Adeno, Astro viruses	Products for sequencing	Interpretation Ongoing	Malaysia	No
Ungulates (7 animals, 13 samples - Urine/urogenital swab, Oral swab, Rectal swab)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Alpha, Hanta viruses	Products for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Malaysia	No
Other Mammals (12 animals, 39 samples - Urine/urogenital swab, Oral swab, Rectal swab)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Astro, Flavi viruses	Product for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Malaysia	No
Non-human Primates (414 animals, 826 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Diagnostic Lab, Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)	PCR	Corona, Herpes viruses	Product for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Malaysia	No
Non-human Primates (38 animals, 115 samples - Heart, Urine/urogenital swab, Brain, Oral swab, Spleen, Rectal swab, Nerve)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Alpha, Arena, Astro, Boca, Corona, Henipa, Herpes, Seadorna viruses	Product for sequencing	Interpretation Completed, Preparation of Report for Government in Progress	Malaysia	No
Sabah non-human primates pooled throat, rectal urine swab samples from 52 animals	WHGFL	Consensus PCR	Adeno, Arena, Astro Entero, Herpes, Paramyxo, Retro, Seadorna, SFV, Boca, Bunya, Pox Viruses	Product for sequencing	Interpretation Ongoing	Malaysia	No
Non-human Primates (50 animals, 200 samples - Oral swab, Plasma, Rectal swab, Urine)	WHO-CC viral zoonoses, Chulalongkorn University	PCR	Astro, Herpes viruses	Products for sequencing	Interpretation Ongoing	Thailand	No

Bats (193 animals, 212 samples - Feces, Rectal swab)	WHO-CC viral zoonoses, Chulalongkorn University	PCR	Astroviruses	Products for sequencing	Interpretation Ongoing	Thailand	No
Rodents & Shrews (63 animals, 69 samples - Feces, Rectal swab)	WHO-CC viral zoonoses, Chulalongkorn University	PCR	Astroviruses	Products for sequencing	Interpretation Ongoing	Thailand	No
Bats (178 animals, 701 samples - Skin, Urine, Oral swab, Rectal swab, Anal swab, Blood clot, Serum)	Center for Infection and Immunity, Columbia University	PCR	Astro, Corona, Entero viruses	Products for sequencing	Interpretation Ongoing	Brazil	No
Rodents & Shrews (39 animals, 76 samples - Liver, Lung, Serum)	Center for Infection and Immunity, Columbia University	PCR	Astro, Paramyxo viruses	Products for sequencing	Sequencing Pending	Brazil	No
Bats (286 animals, 355 samples - Urine/urogenital swab, Feces, Oral swab, Rectal swab, Blood (whole))	ICB II, University of São Paulo	PCR	Arena,Corona, Flavi, Hanta,Herpes, Henipa viruses	Products for sequencing	Interpretation Ongoing	Brazil	No
Rodents & Shrews (87 animals, 174 samples - Liver, Oral swab, Spleen, Rectal swab)	GVFI Cameroon	PCR	Henipaviruses	Product for sequencing	Sequencing pending	Cameroon	No
Bats (1001 animals, 2057 samples - Blood drop, Liver, Oral swab, Spleen, Rectal swab, Plasma, Serum)	GVFI Cameroon	PCR	Corona, Henipa viruses	Products for sequencing	Interpretation Ongoing	Cameroon	No
Non-human Primates (13 animals, 13 samples - Buffy coat, Plasma)	GVFI Cameroon	PCR	Herpesviruses	Products for sequencing	Interpretation Ongoing	Cameroon	No

Rodents & Shrews (194 animals, 358 samples - Blood drop, Liver, Oral swab, Rectal swab, Spleen)	GVFI PREDICT Lab, Kinshasa	PCR	Corona, Hanta viruses	Products for sequencing	Sequencing Pending	DRC	No
Non-human Primates (568 animals, 604 samples - Blood drop, Buffy coat, Colon, Liver, Lung, Oral swab, Spleen)	GVFI PREDICT Lab, Kinshasa	PCR	Boca, Herpes, Orthopox viruses	Products for sequencing	Interpretation Ongoing	DRC	No
Non-human Primates (20 animals, 20 samples - liver | spleen)	CIRMF	PCR	Arena, Bunya, Flavi, Orbi viruses	Products for sequencing	Sequencing Pending	Gabon	No
Rodents & Shrews (7 animals, 7 samples - liver | spleen)	CIRMF	PCR	Arena, Flavi viruses	Products for sequencing	Sequence Pending	Gabon	No
Carnivores (2 animals, 2 samples - liver | spleen)	CIRMF	PCR	Arena, Flavi, Orbi viruses	Products for sequencing	Sequencing Pending	Gabon	No
Ungulates (34 animals, 34 samples - liver | spleen)	CIRMF	PCR	Arena, Orbi viruses	Products for sequencing	Sequencing Pending	Gabon	No
Non-human Primates (9 animals, 12 samples - Blood clot, Oral swab, Pericardial fluid, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Herpesviruses	Products for sequencing detected for Herpesviruses	The known virus Gorilla lymphocryptovirus 1 (AF250885) in the gammaherpes subfamily found in non-human primates was detected in 9 primates. To date this virus has not been detected in humans and there is no evidence at this time to suggest this virus poses a threat to human health.	Rwanda	Yes

Non-human Primates (10 animals, 15 samples - Blood clot, Buffy coat, Oral swab, Rectal swab, Vaginal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Herpesviruses	Products for sequencing	A new betaherpesvirus was detected in one primate; Strains of the known virus Cercopithecine herpesvirus 12 (AF091052) in the gammaherpes subfamily found in non-human primates.was detected in one primate; Strains of the known virus Gorilla lymphocryptovirus 1 in the gammaherpes subfamily found in non-human primates was detected in three primates; A strain of the known virus Panine herpesvirus 2 (AF480884) in the betaherpesvirus subfamily found in non-human primates was detected in one primate. To date these viruses have not been detected in humans and there is no evidence at this time to suggest this virus poses a threat to human health.	Rwanda	Yes
Bats (117 animals, 1717 specimens) - blood, swabs.	Makerere University Walter Reed Project (MUWRP)	PCR	Adeno, Arena, Paramyxo, Corona, Arena, Filo, Bunya, Rhabdo viruses	Products for sequencing	Sequencing Pending	Rwanda	No

Rodents & Shrews (158 animals, 190 samples - Feces, Oral swab, Rectal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Alpha, Arena, Astro, Bunya, Flavi, Hanta, Influenza, Rhabdo viruses	Products for sequencing	Sequencing Pending	Tanzania	No
Bats (48 animals, 48 samples - Feces, Rectal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Arena, Astro, Bunya, Corona, Filo, Nipah , Paramyxo, Rhabdo viruses	Products for sequencing	Sequencing Pending	Tanzania	No
Bats (48 animals, 48 samples - Feces, Rectal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Paramyxoviruses	Product for sequencing	A new paramyxovirus in bats was detected in one bat. There is no evidence at this time to suggest this virus poses a threat to human health.	Tanzania	Yes
Bats (25 animals, 36 samples - Blood (whole), Blood clot, Oral swab, Rectal swab)	MUWRP	PCR	Adeno, Filo, Flavi, Herpes, Rhabdo viruses	Products for sequencing	Sequence Confirmation Pending at UC Davis Wildlife Diagnostic Lab	Uganda	No
Non-human Primates (47 animals, 141 samples - Blood (whole), Oral swab, Rectal swab)	MUWRP	PCR	Entero, Filo, Flavi, Henipa, Herpes, Paramyxo, Retrovirus - Lentivirus genus	Products for sequencing	Sequence Confirmation Pending at UC Davis Wildlife Diagnostic Lab	Uganda	No
Rodents & Shrews (67 animals, 200 samples - Blood (whole), Oral swab, Rectal swab)	MUWRP	PCR	Corona, Filo, Flavi, Henipa, Herpes, Paramyxo, Rhabdo viruses	Products for sequencing	Sequence Confirmation Pending at UC Davis Wildlife Diagnostic Lab	Uganda	No
Ungulates (17 animals, 28 samples - Blood (whole), Feces)	MUWRP	PCR	Henipa, Influenza, Rhabdo viruses	Products for sequencing	Sequence Confirmation Pending at UC Davis Wildlife Diagnostic Lab	Uganda	No
Bats (54 animals, 110 samples - Brain, Feces, Liver, Lung, Oral swab, Rectal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Arena, Astro, Bunya, Corona, Entero, Flavi, Hanta, Henipa, Herpes, Influenza, Lyssa, Orbi, Paramyxo, Phlebo, Rhabdo, viruses	Products for sequencing	Interpretation Ongoing	Republic of Congo	No

Rodents & Shrews (2 animals, 2 samples - Blood drop, Lung)	UC Davis Wildlife Diagnostic Lab	PCR	Herpesviruses	Products for sequencing	Interpretation completed, Awaiting approval from government to share results.	Republic of Congo	No
Non-human Primates (49 animals, 38 samples – Feces, 12 samples - Liver, Lung)	Center for Infection and Immunity, Columbia University	PCR	Herpesviruses	Products for sequencing	Interpretation completed, Awaiting approval from government to share results.	Republic of Congo	No

- Sub-activity 1.4.1: **Optimize surveillance data management system**
  - Embarked on Project Deep Clean, an increased focus on data quality assurance and control.

- Sub-activity 1.4.2: **Establish global open access to database and procedure for dissemination of knowledge**
  - Implemented release of surveillance data on the PREDICT public website (www.healthmap.org/predict)

- **Activity 1.5 Program Information Dissemination**
  - Sub-activity 1.5.1: **Communication (National and International Meetings)**
    - Participated in meeting with PREVENT/USAID/UC Davis partners to discuss updates on Deep Forest Human Contact surveys, data management and preliminary analyses, DFHC conceptual model, survey overview, variables data products, analysis, and next steps.
    - Presented symposiums on One Health and EcoHealth Alliance's experience with international collaborators and partnerships at the American Society of Tropical Medicine and Hygiene annual meeting.
    - Developed a national plan for wildlife surveillance for the Ministry of Environment and Parks that links to the needs of the Agriculture and Public Health Ministries in Israel; held a one day workshop with nearly 80 stakeholders to obtain input/feedback. PREDICT served as the main model of a One Health system that could be employed.
    - Attended the FAO/OIE Sixth Meeting of the Global Steering Committee of the Global Framework for the Progressive Control of Transboundary Animal Diseases (GF-TADs) initiative (GSC6) as an invited Permanent Observer and presented an update on disease in

wildlife, including H7N9 and coronaviruses.

- Led the annual meeting of the OIE WGWD. The group, in coordination with OIE, established priorities for the upcoming year, including targeting and cost-effectiveness of wildlife disease surveillance. The WGWD provided updates on emerging disease trends of relevance to animal health (including zoonoses), wildlife disease reporting, and avian influenza surveillance systems.
- Highlighted PREDICT approaches in the presentations "Best Practices for Predicting and Preventing Pandemics" and “Using a One Health approach to prevent pandemics and mitigate the effects of emerging infectious diseases” at the American Public Health Association. Also discussed the One Health approach used to model, analyze, understand, and predict the risk of Nipah virus, SARS, avian influenza, and related pathogens at this important public health conference.
- Published invited review on “Global influenza surveillance: advances in technology” (ed. J. Oxford and J. Taubenberger), Future Virology Expert Opinion series.
- Contributed invited review on “"Public Health Disease Surveillance Networks”, in *One Health: People, Animals, and the Environment* (ed. Ronald M. Atlas and Stanley Maloy), ASM Press, in press (2014).
- Reviewed "Public Health Disease Surveillance Networks", *Microbiology Spectrum* (new ASM online journal), 2(1):OH-0002-2012. doi:10.1128/microbiolspec.OH-0002-2012.

- Sub-activity 1.5.2: **Report Preparations**
  - Completed drafts of flyers for more than half of PREDICT countries that will be used to disseminate project activities to stakeholders. Included links to flyers on the PREDICT website for countries for which there are finalized versions.
  - Solicited material for country-specific sections of the final report to stakeholders from regional leads and country coordinators.
  - Continued to compile material for the final report including background information, methodology, project activities, and success stories for each country, including photos and maps showing surveillance sites, partnerships to ensure sustainability, and publications.
  - Contributed material to a web page through the One Health Institute website that includes a description of the project, project countries and partnerships, success stories, and publications.

LOW 2: Risk Determination

- **Activity 2.1: Develop risk filter strategy**
  - Sub-activity 2.1.1: **Refine the conceptual and structural framework for Extractive Industry work:**
    - Continued working with HealthMap on the development of the PathFinder disease identification application; collaborated with the Yale team to draft an article on PathFinder for submission as a "Technology and Tools" piece to Global Health Science and Practice.

  - Sub-activity 2.1.2: **Improve targeted surveillance strategies for influenza:**
    - Developed global distribution maps based on influenza A subtypes and host diversity. These analyses showed that reported subtype diversity was greatest in the United States followed by Canada, Japan, China, and Sweden. In contrast, most countries in Africa and South America had reported less than 5 subtypes each with many of the African countries not reporting any at all. The diversity of hosts from which influenza A had been reported was greatest in the United States followed by China, Thailand, South Korea, and Russia. Similar to subtype diversity, reported host diversity was lowest in many parts of Africa and South America. The observed trends in host and subtype diversity closely mirrored the sampling effort (total number submitted sequences) in each country, highlighting the large sampling and reporting discrepancies throughout the world. Additionally, work is now focusing on Infuenza A evolution rates by ecoregion/epizones to look for more useful measures to help direct surveillance (see progress in bullet below).
    - Drafted a manuscript, "Evolutionary dynamics of influenza A: a global perspective", where we employed a Bayesian evolutionary model, which utilizes the number and temporal distribution of genetic differences among viruses sampled at different times to calculate the nucleotide substitution rates of 14 high-priority influenza subtypes from 32 different countries. Higher evolutionary rates were observed for several subtypes including H5N1, H5N2, and H6N2 in East Asia as compared to North America. This finding suggests that novel pathogenic strains may be more likely to evolve in Asia. However, no single country stood out as an evolutionary "hot spot", with consistently high mutational rates, across all of the subtypes analyzed. Using the same data set we estimated the selection pressures on the haemagglutinin (HA) gene by calculating the numbers of non-synonymous (d_N) and synonymous (d_S) nucleotide substitutions per site (d_N/d_S ratio). The analysis showed that

the HA gene was under the effects of purifying selection (d_N/d_S <1) among all subtypes tested. However, several subtypes including, H3N2, H3N8, and H5N1 did exhibit considerably higher d_N/d_S ratios than others. Several factors including host type (mammal versus avian), recent host switch, and widespread vaccine use, which have all been shown to increase the selective pressures on influenza viruses, may help explain these differences.

- Developed a model that allows us to predict where in the world specific influenza A viruses are likely to occur based on currently known distributions of different HA and NA subtypes. For example, when a strain of concern within a particular subtype such as H7N9 emerges, this model can be used to quickly identify countries where both H7 and N9 subtypes have been reported previously even though the specific combination of H7N9 has not.
- Also drafted a manuscript focusing on wild bird strains of influenza for submission to *PLoS One*, entitled "Sampling strategies and biodiversity of influenza A subtypes in wild birds". Our team examined 11,870 GenBank records to provide a baseline inventory and insight into patterns of global AIV subtype diversity and richness. Further, we conducted an extensive literature review and communicated directly with scientists to accumulate data from 50 non-overlapping studies and over 250,000 birds to assess the status of historic sampling effort. We then built virus subtype sample-based accumulation curves to better estimate sample size targets that capture a specific percentage of virus subtype richness at seven sampling locations. This study identified a sampling methodology that will detect an estimated 75% of circulating virus subtypes from a targeted bird population and outlines future surveillance and research priorities that are needed to explore the influence of host and virus biodiversity on emergence and transmission.

- Sub-activity 2.1.3: **Inform and integrate other relevant agencies**
  - Provided guidance on practices developed through PREDICT to the Chief Veterinarian and Director of Food and Agriculture Security, Office of Health Affairs, Department of Homeland Security. The information will inform a report DHS is preparing on approaches from PREDICT that can be applied to U.S. and Global Health Security efforts.
  - Participated in the NAS Standing Committee on the Department of Defense's Programs to Counter Biological Threats.

- Sub-activity 2.1.4: **Pilot methods to assess occupational disease risk for wildlife health workers**
  - Completed draft survey questionnaire for field workers.
  - Submitted application to IRB at University of Washington to perform worker surveys and potential biological sampling.
  - Completed initial draft of 'Occupational Health Services for Wildlife Surveillance Workers' guidelines for PREDICT on-line manual.

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Sub-activity 2.2.1: **Refine, test and exploit geographical and temporal 'hotspot' models**
    - Completed Deep Forest (DF) wet season sampling in Brazil.
    - Developed theoretical framework of analysis linking biodiversity and disease ecology.
    - Began biodiversity and virodiversity exploratory analysis of Deep Forest data.
    - Implemented Quality Assurance/Quality Control processes on Deep Forest data.
    - Administering surveys at the household level to independent samples of men and women along the disturbance gradient.
    - Deep Forest Human Contact surveys completed for Pristine and Urban sites in Brazil.
    - Began preliminary analyses and data exploration on a subset of the surveys.
    - Deep Forest Human Contact surveys submitted for translation to Bahasa Malaysia.
    - Implemented cross-validation for Hotspots models.
    - Created "time-slice" models allowing temporally match EID events with the closest temporal snapshot of global population, cropland and pasture, and include change in these variables as predictors in the model as a proxy for land-use change.
    - Incorporated multiple sample runs into existing boosted regression tree models to explicitly account for spatial uncertainty in EID event location.
    - Continued compiling and reviewing EID events for Sicki platform.
    - Completed travel analysis of MERS and Influenza A/H7N9.
    - Developed a strategy to implement 'What if Scenarios.'
    - Began literature review and PREDICT data review to inform 'What if' scenarios.
    - Completed 100k+ model runs to predict spillover risk for viruses in mammals using host and virus traits. Best model shows that both host phylogeny and measures of host-human contact are important predictors after controlling for research bias.

- Identified specific viral traits as predictors of phylogenetic host breadth (increased spillover potential) using data from ~600 unique viruses, traits include RNA vs DNA; vector-transmission, and replication in the cytoplasm.
- Specific bat viral diversity models developed to better target surveillance and assess likelihood of finding specific viral family in a given sample type.
- Gathered socio-economic data on the burden of disease outbreaks for individuals, government and industry.
- Began econometric analysis to determine the optimal land area conversion to minimize outbreaks.

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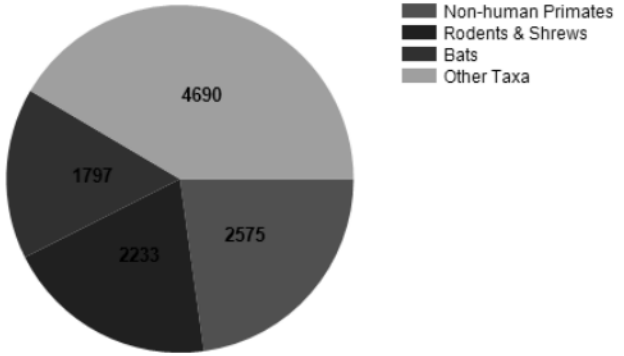
PREDICT Sampling and Testing in Cameroon

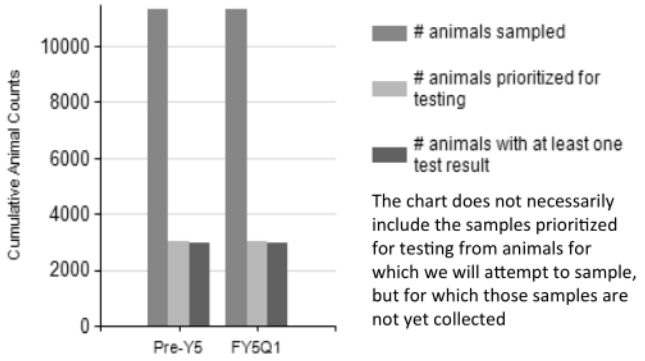
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled

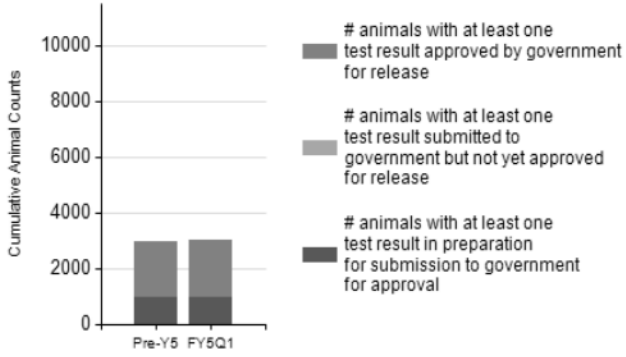


Sampling and Testing Progress



The chart does not necessarily include the samples prioritized for testing from animals for which we will attempt to sample, but for which those samples are not yet collected

Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories for CAMEROON:

- Submitted primate T-lymphotropic virus (PTLV) paper detailing discovery of HTLV4 reservoir in gorillas in Cameroon that was accepted for publication in *Emerging Microbes and Infections*.
- Attended three Cameroon EPT meetings to brief EPT program and government partners on current activities and to coordinate activities.
- Provided logistical support for USAID EPT Africa coordinator (b)(6) and met with her to discuss PREDICT project and EPT management and progress.
- Met with Zoological Society of London staff in Cameroon to discuss collaborating on field activities; communicated with Antwerp Zoo staff in relation to gorilla camera trap surveillance and gorilla oral scarring due to a possible infectious disease.
- Selected site and prepared budget for surveillance in an extractive industry site.
- Finalized list of animals for inclusion in PREDICT testing (allowing for minor additions in Y5Q2) and projected time for completion of analysis.
- Selected 31 malaria-negative febrile human samples for Deep Freeze pathogen discovery project.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	0	1799	1696	1696	1033
Non-human Primates	0	2634	669	669	565
Other Taxa	0	4678	71	71	70
Rodents & Shrews	0	2231	544	544	336
High Risk Interface					
Contact with workers harvesting crops	0	10	10	10	0
Peri-domestic/in or near human dwelling(s)	0	1274	1177	1177	611
For sale in medium market (5-20 vendors)	0	101	0	0	0
For sale in small market (< 5 vendors)	0	50	0	0	0
Hunted	0	8219	803	803	659
Public safety hazard (e.g. threat to humans)	0	17	17	17	0
Sanctuary	0	1097	619	619	522

Wild animal farm	0	1	0	0	0
Zoo	0	1	1	1	0
Contact with tourists/ecotourism	0	182	171	171	58
Contact with domestic animals or humans NOT likely	0	371	163	163	154
Other	0	19	19	19	0
Total	**0**	**11342**	**2980**	**2980**	**2004**

PREDICT Test Findings (Q1Y5):

Number of animals and samples submitted by taxa	Diagnostic lab	Diagnostics method	Pathogen family genus screening or specific virus	Results	Pathogen discovery	Approved by government for release
Rodents & Shrews (87 animals, 174 samples - Liver, Oral swab, Spleen, Rectal swab)	GVFI Cameroon	PCR	Alphaviruses, Arenaviruses, Bunyaviruses, Enteroviruses, Hantaviruses, Henipaviruses, Paramyxoviruses, Seadornaviruses	Product for sequencing detected for Henipaviruses	Sequencing pending	No
Bats (1001 animals, 2057 samples - Blood drop, Liver, Oral swab, Spleen, Rectal swab, Plasma, Serum)	GVFI Cameroon	PCR	Astroviruses, Bunyaviruses, Coronaviruses, Enteroviruses, Henipaviruses, Influenzas, Rhabdoviruses, Seadornaviruses	Product for sequencing detected for Coronaviruses, Henipaviruses	Interpretation Ongoing	No
Non-human Primates (13 animals, 13 samples - Buffy coat, Plasma)	GVFI Cameroon	PCR	Bunyaviruses, Herpesviruses, Influenza viruses	Product for sequencing detected for Herpesviruses	Interpretation Ongoing	No

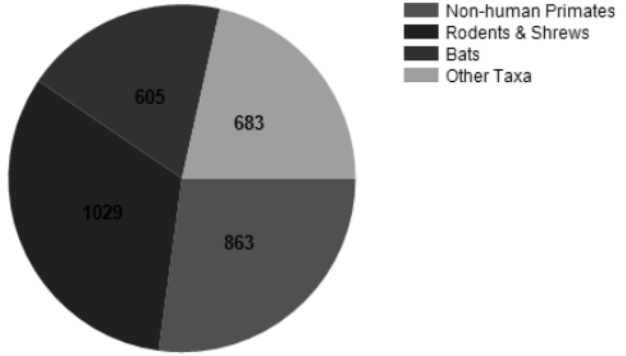
USAID FROM THE AMERICAN PEOPLE | PREDICT

PREDICT Sampling and Testing in Congo, Democratic Republic of

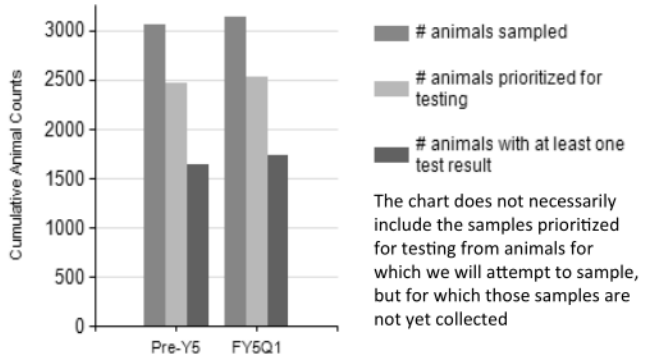
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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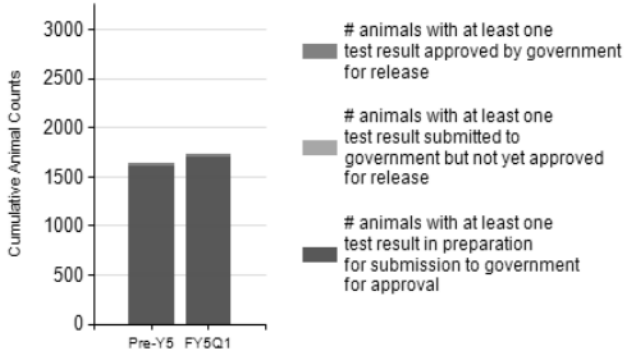
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories DEMOCRATIC REPUBLIC OF CONGO

- Received notification that the PREDICT laboratory protocols are now included into the national disease surveillance system of the Ministry of Health. Going forward, at least one aliquot from all samples collected on suspected zoonoses throughout the country will be reserved for testing with the PREDICT panel.
- Organized a meeting with the scientific and technical staff of the Congolese Institute for the Conservation of Nature (ICCN) for the training of personnel working in parks and reserves on the prevention of zoonotic infections.
- Participated in best practices training with all USG implementing partners held by the Office of the General Inspector.
- Received and tested 7 human samples from suspected cases of VHF: 6 from Isiro and one from Viadana, all in Oriental Province; samples tested negative for all PREDICT protocols.
- Finalized list of animals for inclusion in PREDICT testing (allowing for minor additions in Y5Q2) and projected time for completion of analysis.
- Received a request to prepare the training for INRB and MoH staff on biosafety and biosecurity.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	42	591	490	490	0
Non-human Primates	4	834	656	656	18
Other Taxa	0	682	8	8	0
Rodents & Shrews	25	1010	558	558	0
High Risk Interface					
Contact with workers harvesting crops	0	14	14	14	0
Peri-domestic/in or near human dwelling(s)	34	456	383	383	0
For sale in large market (> 20 vendors)	0	59	39	39	0
For sale in small market (< 5 vendors)	0	6	6	6	0
Hunted	0	2195	996	996	1
Private wildlife collection or pet	1	22	16	16	7
Raiding crops	0	1	0	0	0
Sanctuary	1	102	58	58	3

Temporary holding facility/wildlife trade transport	0	1	0	0	0
Zoo	0	21	21	21	0
Contact with park personnel/intensive wildlife management area	1	8	0	0	0
Contact with tourists/ecotourism	0	120	105	105	7
Other	34	112	74	74	0
Total	**71**	**3117**	**1712**	**1712**	**18**

PREDICT Test Findings (Q1Y5):

# of Animals and Samples Submitted (by Taxa)	Diagnostic Lab	Diagnostics Method	Pathogen family/genus screening/or specific virus	Results	Pathogen Discovery	Approved by Government for Release
Rodents & Shrews (194 animals, 358 samples - Blood drop, Liver, Oral swab, Rectal swab, Spleen)	GVFI PREDICT Lab	PCR	Alpha, Arena, Boca, Corona, Hanta, Herpes, Orthopox, Rhabdo viruses	Products for sequencing detected for Alpha, Arena, Boca, Corona, Hanta viruses	Sequencing pending	No
Non-human Primates (568 animals, 604 samples - Blood drop, Buffy coat, Colon, Liver, Lung, Oral swab, Spleen)	GVFI PREDICT Lab	PCR	Arena, Boca, Herpes, Orthopox viruses	Product for sequencing detected for Arena, Boca, Herpes, Orthopox viruses	Interpretation Ongoing	No
Bats (2 animals, 2 samples - Oral swab)	GVFI PREDICT Lab	PCR	Hantaviruses	Product for sequencing detected	Interpretation Completed	No
Ungulates (4 animals, 4 samples - Blood drop)	GVFI PREDICT Lab	PCR	Herpes, Orthopox viruses	All negative		No

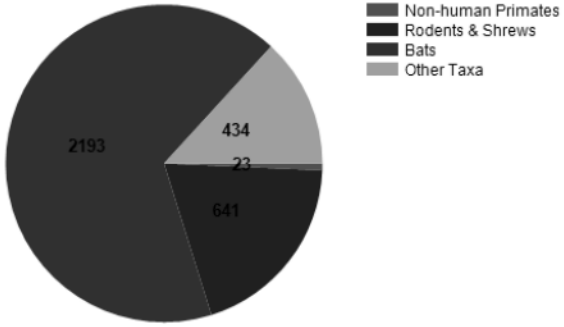
USAID FROM THE AMERICAN PEOPLE | PREDICT

PREDICT Sampling and Testing in Gabon

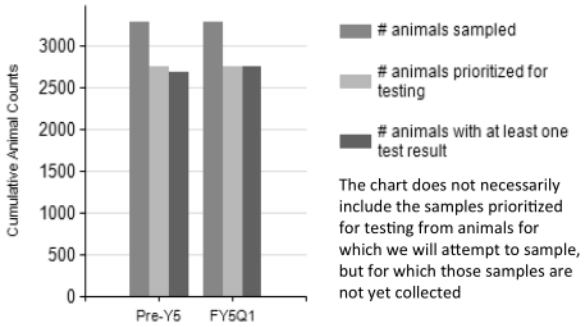
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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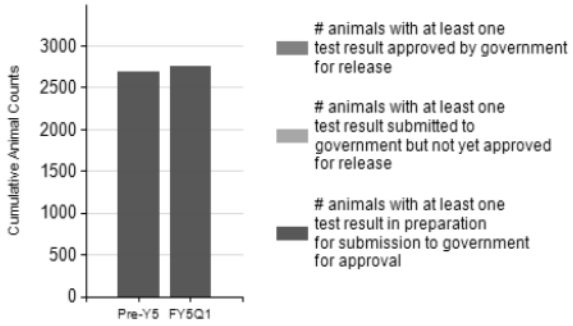
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories for GABON:

- Assisted the Ministry of Health and the Ministry of Water and Forest in data collection from provinces and district health offices, acting as a reference center and providing diagnostic support.
- Selected subset of acute febrile archived human cases with hemorrhagic fever symptoms for inclusion in Deep Freeze project.
- Finalized list of animals for inclusion in PREDICT testing (allowing for minor additions in Y5Q2) and projected time for completion of analysis.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	0	2193	1834	1834	0
Non-human Primates	0	23	23	23	0
Other Taxa	0	434	433	433	0
Rodents & Shrews	0	641	463	463	0
High Risk Interface					
Peri-domestic/in or near human dwelling(s)	0	397	376	376	0
Hunted	0	86	72	72	0
Contact with park personnel/intensive wildlife management area	0	171	31	31	0
Contact with tourists/ecotourism	0	340	340	340	0
Contact with domestic animals or humans NOT likely	0	15	15	15	0
Other	0	2282	1919	1919	0
Total	**0**	**3291**	**2753**	**2753**	**0**

PREDICT Test Findings (Q1Y5):

# of Animals and Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family / genus screening / or specific virus	Results	Pathogen discovery	Approved by Government for release
Non-human Primates (20 animals, 20 samples - liver | spleen)	CIRMF	PCR	Alpha, Arena, Boca, Bunya, Corona, Filo, Flavi, Hanta, Herpes, Orbi, Orthopox, Paramyxo, Parapox, Phlebo viruses	Product for sequencing detected for Arenaviruses, Bunyaviruses, Flaviviruses, Orbiviruses	Sequencing Pending	No
Rodents & Shrews (7 animals, 7 samples - liver | spleen)	CIRMF	PCR	Alpha, Arena, Boca, Bunya, Corona, Filo, Flavi, Hanta, Herpes, Orbi, Orthopox, Paramyxo, Parapox, Phlebo viruses	Product for sequencing detected for Arenaviruses, Flaviviruses	Sequencing Pending	No
Carnivores (2 animals, 2 samples - liver | spleen)	CIRMF	PCR	Alpha, Arena, Boca, Bunya, Corona, Filo, Flavi, Hanta, Herpes, Orbi, Orthopox, Paramyxo, Parapox, Phlebo viruses	Product for sequencing detected for Arenaviruses, Flaviviruses, Orbiviruses	Sequencing Pending	No
Ungulates (34 animals, 34 samples - liver | spleen)	CIRMF	PCR	Alpha, Arena, Boca, Bunya, Corona, Filo, Flavi, Hanta, Herpes, Orbi, Orthopox, Paramyxo, Parapox, Phlebo viruses	Product for sequencing detected for Arenaviruses, Orbiviruses	Sequencing Pending	No
Other Mammals (9 animals, 9 samples - liver | spleen)	CIRMF	PCR	Alpha, Arena, Boca, Bunya, Corona, Filo, Flavi, Hanta, Herpes, Orbi, Orthopox, Paramyxo, Parapox, Phlebo viruses	All negative		No

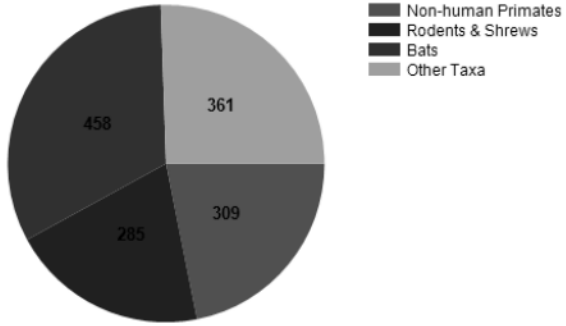
USAID FROM THE AMERICAN PEOPLE | PREDICT

PREDICT Sampling and Testing in Congo, Republic of

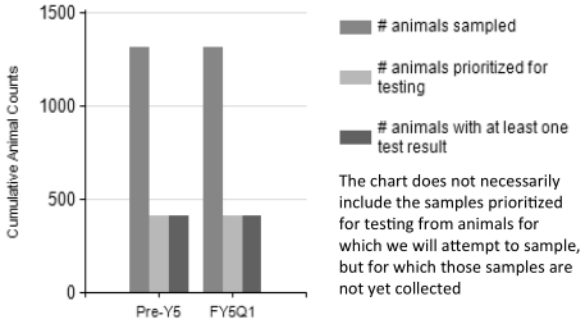
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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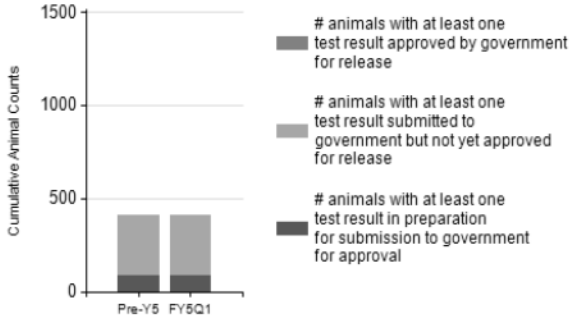
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories for REPUBLIC OF CONGO:

- Traveled to Brazzaville for supervision, review of financial procedures, and administration with local management in preparation for the planned sample field collections (commencing in January 2014).
- Received approval for research permits by the Ministry of Scientific Research and Innovation.
- Received authorization for sample collection in the field by the Ministry of Forestry.
- Established an EPT One Health task force for PREDICT, IDENTIFY, PREVENT, and Congo PREDICT staff, including National Public Health Lab-Ministry of Health, National Veterinary lab, Ministry of Livestock, and a cross section of Military Health authorities who attended recent meetings.
- Held logistics meeting with Cameroon field staff and DRC lab staff to arrange a field trip and discuss mechanisms of technical support for sample collection, shipment, and analysis.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	0	404	77	77	0
Non-human Primates	0	290	191	191	0
Other Taxa	0	360	14	14	0
Rodents & Shrews	0	262	127	127	0
High Risk Interface					
Peri-domestic/in or near human dwelling(s)	0	33	15	15	0
For sale in small market (< 5 vendors)	0	144	8	8	0
Hunted	0	427	77	77	0
Contact with researchers (other than PREDICT staff)	0	42	21	21	0
Contact with domestic animals or humans NOT likely	0	669	288	288	0
Other	0	1	0	0	0

Total	**0**	**1316**	**409**	**409**	**0**

PREDICT Test Findings (Q1Y5):

Number of animals and samples submitted by taxa	Diagnostic lab	Diagnostics method	Pathogen family genus screening or specific virus	Results	Pathogen discovery	Approved by government for release
Bats (54 animals, 110 samples - Brain, Feces, Liver, Lung, Oral swab, Rectal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Arena, Astros, Bunya, Corona, Entero, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Lyssa, Nipah , Orbi, Paramyxo, Phlebo, Rhabdo, Seadorna viruses	Products for sequencing detected for Arena, Astro, Bunya, Corona, Entero, Flavi, Hanta, Henipa, Herpes, Influenza, Lyssa, Orbi, Paramyxo, Phlebo, Rhabdo, viruses	Interpretation Ongoing	No
Rodents & Shrews (2 animals, 2 samples - Blood drop, Lung)	UC Davis Wildlife Diagnostic Lab	PCR	Arena, Astro, Bunya, Corona, Entero, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Lyssa, Nipah, Orbi, Paramyxo, Phlebo, Rhabdo, Seadorna viruses	Product for sequencing detected for Herpesviruses	Interpretation completed, Awaiting approval from government to share results.	No
Non-human Primates (38 animals, 38 samples - Feces)	Center for Infection and Immunity, Columbia University	PCR	Corona, Herpes viruses	Product for sequencing detected for Herpesviruses	Interpretation completed, Awaiting approval from government to share results.	No
Non-human Primates (11 animals, 12 samples - Liver, Lung)	UC Davis Wildlife Diagnostic Lab	PCR	Herpesviruses	Product for sequencing detected for Herpesviruses	Interpretation completed, Awaiting approval from government to share results.	No

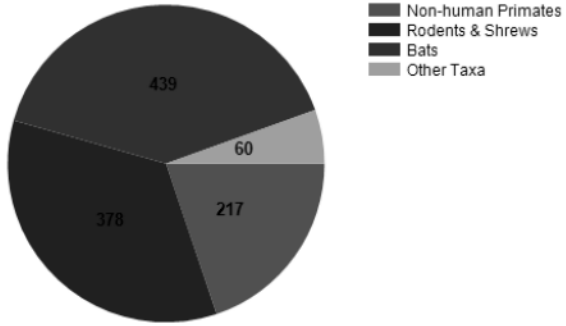
USAID FROM THE AMERICAN PEOPLE | PREDICT

PREDICT Sampling and Testing in Rwanda

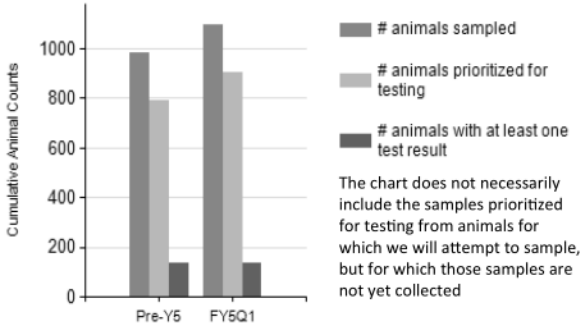
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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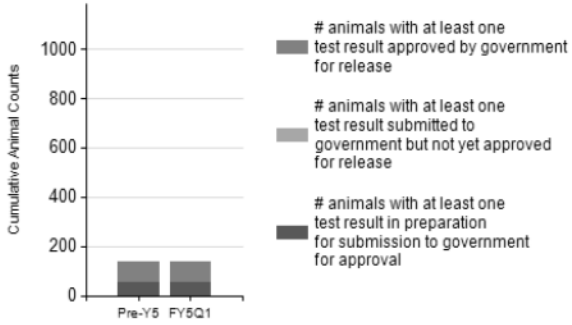
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories for RWANDA:

- Participated in governmental One Health Steering Committee meeting to validate strategic plan for operationalizing One Health across government sectors.
- Met with collaborators at Ministry of Health, Rwanda Development Board (RDB), and RESPOND to discuss findings by RDB of Zika virus-seropositive baboons in Akagera National Park.
- Participated in a One Health consultative meeting at the National University of Rwanda School of Public Health in Kigali.
- Filled surveillance gaps: captured 107 bats from human dwellings and from roosts in urban settings.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	107	404	39	39	0
Non-human Primates	5	197	76	76	60
Other Taxa	0	2	0	0	0
Rodents & Shrews	0	378	0	0	0
High Risk Interface					
Contact with workers harvesting crops	0	25	0	0	0
Peri-domestic/in or near human dwelling(s)	81	283	1	1	1
Hunted	0	18	4	4	4
Private wildlife collection or pet	0	1	1	1	1
Raiding crops	0	12	0	0	0
Sanctuary	1	8	3	3	3
Temporary holding facility/wildlife trade transport	0	17	14	14	14
Contact with park personnel/intensive wildlife management area	1	60	0	0	0
Contact with researchers (other than PREDICT staff)	1	185	0	0	0
Contact with tourists/ecotourism	28	224	92	92	37
Contact with workers in extractive industry	0	4	0	0	0

Other	0	144	0	0	0
Total	**112**	**981**	**115**	**115**	**60**

PREDICT Test Findings (Q1Y5):

Rwanda						
Number of animals and samples submitted by taxa	**Diagnostic lab**	**Diagnostics method**	**Pathogen family genus screening or specific virus**	**Results**	**Pathogen discovery**	**Approved for release**
Non-human Primates (9 animals, 12 samples - Blood clot, Oral swab, Pericardial fluid, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Herpesviruses	Product for sequencing detected for Herpesviruses	The known virus Gorilla lymphocryptovirus 1 (AF250885) in the gammaherpes subfamily found in non-human primates was detected in 9 primates. To date this virus has not been detected in humans and there is no evidence at this time to suggest this virus poses a threat to human health	Yes
Non-human Primates (10 animals, 15 samples - Blood clot, Buffy coat, Oral swab, Rectal swab, Vaginal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Herpesviruses	Product for sequencing detected for Herpesviruses	A new betaherpesvirus was detected in one primate; Strains of the known virus Cercopithecine herpesvirus 12 (AF091052) in the gammaherpes subfamily found in non-human primates.was detected in one primate;Strains of the known virus Gorilla lymphocryptovirus 1 in the gammaherpes subfamily found in non-human primates was detected in three primates: A strain of the known virus Panine herpesvirus 2 (AF480884) in the betaherpesvirus subfamily found in non-human primates was detected in one primate To date these viruses have not been detected in humans and there is no evidence at this time to suggest this virus poses a threat to human health.	Yes
Bats (117 animals, 1717 specimens) - blood, swabs.	MUWRP	PCR	Adeno, Arena, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Paramyxo, Retrovirus - Lentivirus genus, Rhabdo viruses	Products for sequencing detected for Paramyxo, Corona, Arena, Filo, Bunya, Rhabdo viruses	Sequencing Pending	No

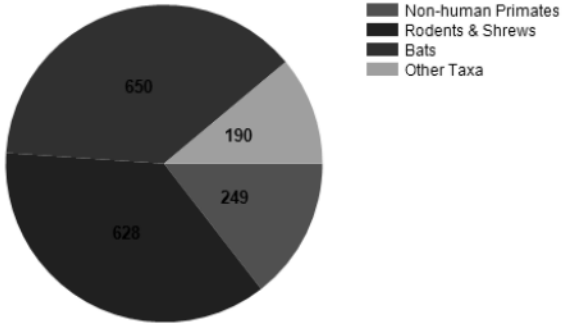
USAID FROM THE AMERICAN PEOPLE | PREDICT

PREDICT Sampling and Testing in Tanzania, United Republic of

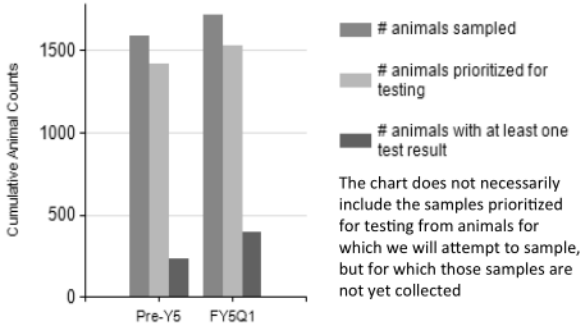
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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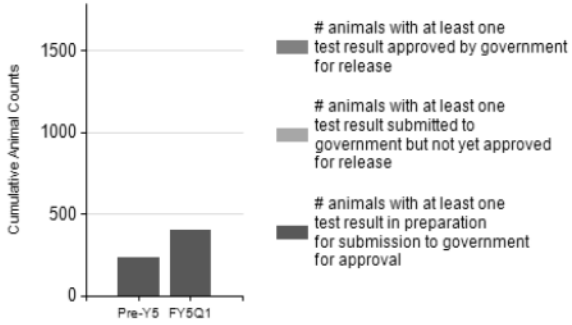
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories for TANZANIA:

- Completed all planned wildlife surveillance activities. Focus for the remainder of the project is now directed towards data cleaning, specimen testing, and preparing data for reporting and publications.
- Shared the first batch of test results with government and ministry partners and received permission for public release of our surveillance and test result data on the public PREDICT data viewing platform HealthMap.
- Continued to explore the use of PREDICT's diagnostic approach or deep sequencing to detect any viral, bacterial, parasitic and/or fungal agents using an existing MOU between SUA and UC Davis.
- Continued to communicate and collaborate with the Center for Disease Control Global Disease Detection Group in Kenya on plans for collaborative surveillance at sugarcane plantations planned for the spring.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	113	650	75	75	29
Non-human Primates	0	249	0	0	0
Other Taxa	19	190	5	5	0
Rodents & Shrews	0	628	317	317	159
High Risk Interface					
Raiding markets	0	9	0	0	0
Peri-domestic/in or near human dwelling(s)	101	878	221	221	84
Hunted	19	233	0	0	0
Preying on livestock or their food	0	15	0	0	0
Raiding crops	0	265	158	158	86
Contact with park personnel/intensive wildlife management area	0	122	0	0	0
Contact with tourists/ecotourism	0	89	0	0	0

Contact with workers in extractive industry	12	50	18	18	18
Other	0	56	0	0	0
Total	132	1717	397	397	188

PREDICT Test Findings (Q1Y5):

Tanzania						
Number of animals and samples submitted by taxa	**Diagnostic lab**	**Diagnostics method**	**Pathogen family genus screening or specific virus**	**Results**	**Pathogen discovery**	**Approved by government for release**
Rodents & Shrews (158 animals, 190 samples - Feces, Oral swab, Rectal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Alpha, Arena, Astro, Bunya, Flavi, Influenza, Paramyxo, Rhabdo viruses	Product for sequencing detected for Alpha, Arena, Astro, Bunya, Flavi, Hanta, Influenza, Rhabdo viruses	Sequencing Pending	No
Other Mammals (2 animals, 2 samples - Oral swab)	UC Davis Wildlife Diagnostic Lab	PCR	Alpha, Arena, Astro, Bunya, Flavi, Hanta, Influenza, Paramyxo, Rhabdo viruses	All negative		No
Bats (48 animals, 48 samples - Feces, Rectal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Arena, Astro, Bunya, Corona, Filo, Henipa, Influenza, Nipah, Rhabdo viruses	Product for sequencing detected for Arena, Astro, Bunya, Corona, Filo, Nipah , Paramyxo, Rhabdo viruses	Sequencing Pending	No
Bats (48 animals, 48 samples - Feces, Rectal swab)	UC Davis Wildlife Diagnostic Lab	PCR	Paramyxoviruses	Product for sequencing detected	A new paramyxovirus in bats was detected in one bat. There is no evidence at this time to suggest this virus poses a threat to human health.	Yes

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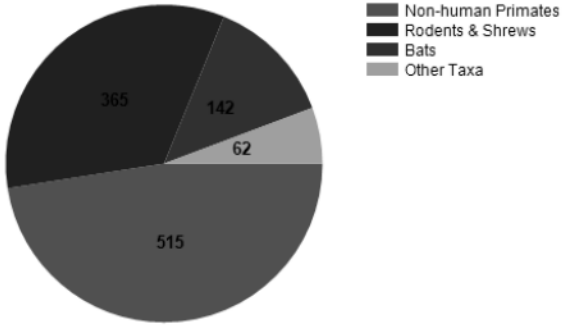
PREDICT Sampling and Testing in Uganda

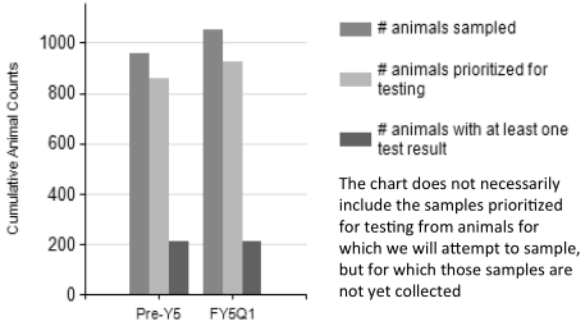
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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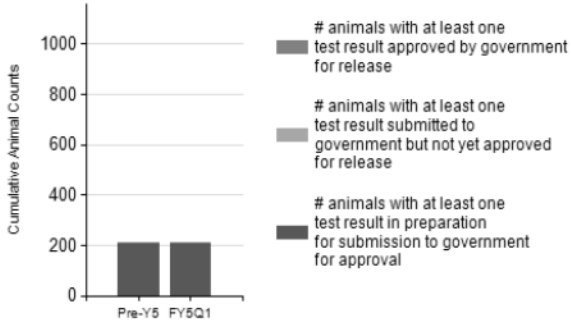
Test Results Reporting Progress



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Significant Highlights, Results, and Success Stories for UGANDA:

- Participated in the dedication and strategic plan launch of the new Wildlife Health and Research Center (WHRC) of the Wildlife and Aquatic Resources Management Department, College of Veterinary Medicine, Makerere University; PREDICT's office and laboratory/storage space are co-located with the WHRC.
- Attended a USAID Mission Uganda Implementing Partners meeting in Kampala to strengthen coordination and cooperation among USAID-funded projects.
- Continued wildlife sampling for the Deep Forest Project: captured 58 rodents and collected 182 samples.
- Conducted wildlife sampling in Kampala: captured 25 marabou storks utilizing waste dump sites and abattoirs and collected 92 samples.
- Started PREDICT viral family testing at Makerere University Walter Reed Project laboratory of samples collected from >300 mountain gorillas (most were human-habituated) obtained during the 2012 census.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	0	108	25	25	0
Non-human Primates	9	510	68	68	6
Other Taxa	25	60	18	18	0
Rodents & Shrews	58	365	98	98	0
High Risk Interface					
Peri-domestic/in or near human dwelling(s)	50	196	46	46	0
Hunted	0	36	28	28	1
Preying on livestock or their food	0	4	2	2	0
Public safety hazard (e.g. threat to humans)	0	32	15	15	0
Raiding crops	0	5	4	4	0
Temporary holding facility	0	30	30	30	0
Sanctuary	0	47	0	0	0
Zoo	0	60	0	0	0
Contact with park personnel/intensive	0	27	23	23	0

wildlife management area					
Contact with researchers (other than PREDICT staff)	9	9	0	0	0
Contact with tourists/ecotourism	8	422	13	13	5
Contact with domestic animals or humans NOT likely	0	150	48	48	0
Other	25	25	0	0	0
Total	**92**	**1043**	**209**	**209**	**6**

PREDICT Test Findings (Q1Y5):

Uganda						
Number of animals and samples submitted by taxa	**Diagnostic Lab**	**Diagnostics method**	**Pathogen family genus screening or specific virus**	**Results**	**Pathogen discovery**	**Approved by government for release**
Bats (25 animals, 36 samples - Blood (whole), Blood clot, Oral swab, Rectal swab)	MUWRP	PCR	Adeno, Arena, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Paramyxo, Retrovirus - Lentivirus genus, Rhabdo viruses	Product for sequencing detected for Adeno, Filo, Flavi, Herpes, Rhabdo viruses	Sequence Confirmation Pending at UC Davis Wildlife Diagnostic Lab	No
Non-human Primates (47 animals, 141 samples - Blood (whole), Oral swab, Rectal swab)	MUWRP	PCR	Adeno, Boca, Corona, Entero, Filo, Flavi, Henipa, Herpes, Influenza, Paramyxo, Retro - Lentivirus genus, Rhabdo viruses	Product for sequencing detected for Entero, Filo, Flavi, Henipa, Herpes, Paramyxo, Retrovirus - Lentivirus genus	Sequence Confirmation Pending at UC Davis Wildlife Diagnostic Lab	No
Rodents & Shrews (67 animals, 200 samples - Blood (whole), Oral swab, Rectal swab)	MUWRP	PCR	Adeno, Arena, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Paramyxo, Retro - Lentivirus genus, Rhabdo viruses	Product for sequencing detected for Adeno, Arena, Corona, Filo, Flavi, Henipa, Herpes, Paramyxo, Rhabdo viruses	Sequence Confirmation Pending at UC Davis Wildlife Diagnostic Lab	No
Birds (1 animals, 3 samples - Blood (whole), Cloacal swab, Oral swab)	MUWRP	PCR	Adeno, Arena, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Paramyxo, Retro - Lentivirus genus, Rhabdo viruses	All negative		No
Ungulates (17 animals, 28 samples - Blood (whole), Feces)	MUWRP	PCR	Alpha, Arena, Corona, Filo, Flavi, Hanta, Henipa, Influenza, Paramyxo, Rhabdo viruses	Product for sequencing detected for Henipa, Influenza, Rhabdo viruses	Sequence Confirmation Pending at UC Davis Wildlife Diagnostic Lab	No

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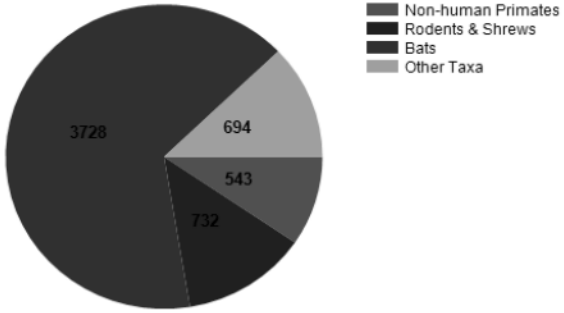
PREDICT Sampling and Testing in Bangladesh

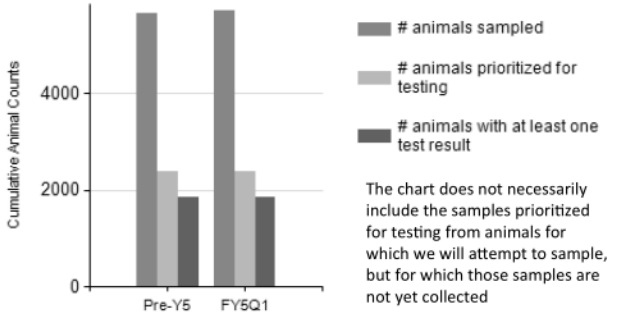
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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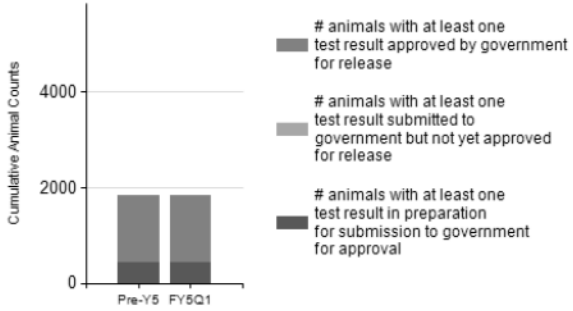
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories in BANGLADESH:

- Presented PREDICT activities at the National One Health Bangladesh meeting in Dhaka; Government of Bangladesh, USAID, and local implementing partners were in attendance.
- Held meetings with IEDCR, Directorate of Health Services to update them on PREDICT activities.
- Shipped priority wildlife samples shipped to the Columbia University Center for Infection and Immunity (CII) for viral family testing.

Summary of Surveillance Activities and Testing in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	0	4027	1411	1409	0
Non-human Primates	0	543	4	4	0
Other Taxa	0	395	10	10	0
Rodents & Shrews	49	732	421	421	0
High Risk Interface					
Raiding markets	0	135	0	0	0
Peri-domestic/in or near human dwelling(s)	0	4744	1752	1750	0
Raiding crops	0	40	0	0	0
Contact with tourists/ecotourism	0	23	23	23	0
Contact with domestic animals or humans NOT likely	0	567	71	71	0
Other	49	188	0	0	0
Total	**49**	**5697**	**1846**	**1844**	**0**

PREDICT Test Findings (Q1Y5):

Number of animals and samples submitted by taxa	Diagnostic lab	Diagnostics method	Pathogen family genus screening or specific virus	Results	Pathogen discovery	Approved by government for release
Bats (704 animals, 706 samples - Urine/urogenital swab, Urine, Oral swab, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Adenoviruses, Astroviruses, Bocaviruses, Coronaviruses, Herpesviruses, Nipahviruses, Paramyxoviruses, Polyomaviruses	Product for sequencing detected for Adenoviruses, Astroviruses, Bocaviruses, Coronaviruses, Herpesviruses, Nipahviruses , Paramyxoviruses	Interpretation Ongoing	No
Rodents & Shrews (169 animals, 249 samples - Urine/urogenital swab, Oral swab, Rectal swab)	ICDDR,B	PCR	Arenaviruses, Hantaviruses, Paramyxoviruses	Product for sequencing detected for Hantaviruses	Sequencing pending	No

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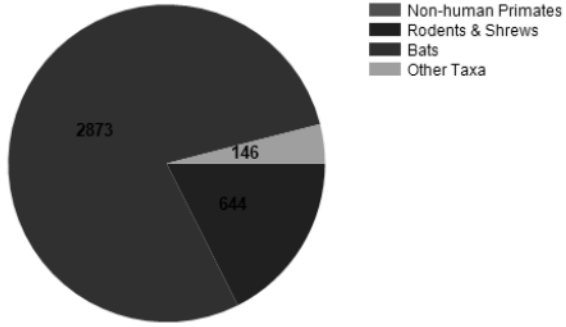
PREDICT Sampling and Testing in China

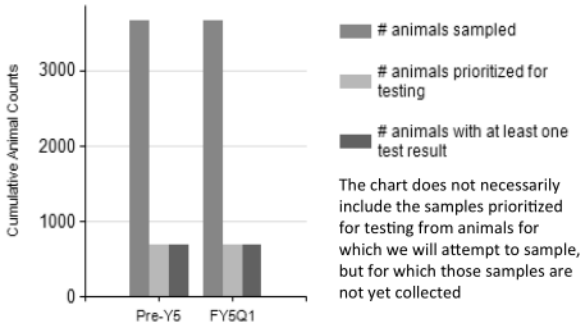
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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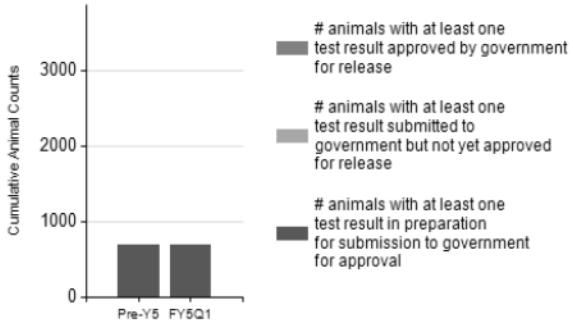
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories in CHINA:

- Extended regional technical cooperation network with Jiangsu Provincial Center for Disease Control and Prevention (JSCDC).
- Performed cost analysis comparing WHO H7N9 and PREDICT protocols for responding to influenza outbreaks of unknown type.
- Completed human behavioral data entry and QA/QC for enrollment and follow up phases of animal-human interface study.

Summary of Y5Q1 Surveillance Activities in GAINS to date:

Taxa	No. Animals Sampled this Quarter	No. Animals Sampled to date	No. Animals with at least one final test result	No. Animals with at least one test result with interpretation completed	No. Animals with at least one test result cleared for release by govt
Bats	0	2874	487	487	0
Other Taxa	0	145	6	6	0
Rodents & Shrews	0	644	161	161	0
Total	0	3663	654	654	0
High Risk Interface					
Contact with locals for religious activities	0	107	0	0	0
Contact with workers harvesting crops	0	644	0	0	0
Peri-domestic/in or near human dwelling(s)	0	237	36	36	0
For sale in large market (> 20 vendors)	0	191	0	0	0
Hunted	0	174	0	0	0
Raiding crops	0	76	0	0	0
Free-ranging	0	267	237	237	0
Wild animal farm	0	253	167	167	0
Contact with tourists/ecotourism	0	1307	214	214	0

Contact with workers in extractive industry	0	83	0	0	0
Contact with domestic animals or humans NOT likely	0	324	0	0	0
Total	**0**	**3663**	**654**	**654**	**0**

NOTE: Human Surveillance activities:

Name of Sample Set	Sample Type	Quantity	Sampling Location
Human Encephalitis	Serum (23), CSF (63), Nasopharyngeal Swab (13)	23	Luoding, Meizhou, Maoming
Human Hemorrhagic Fever	Serum	31	Fengkai, Lianping, Yunfu, Yangjiang, Guangzhou
Animal-Human Interface	Human Serum	1,389	Fengkai, Dabu, Xinyi, Jiaoling, Lianshan, Lianzhou, Pingyuan, Yunan, Lianping, Heping, Yunfu, Deqing
Human H7N9	Serum	1	Dongguan
Human Influenza-like Illness	Throat Swab	2,249	Jiangmen, Chaozhou, Huizhou, Qingyuan, Shaoguan, Yangjiang, Zhongshan, Zhanjiang
Human Fever with Thrombocytopenia	Serum	3	Nanjing, Suzhou, Zhenjiang
Rodent	Serum	200	Zhanjiang
Bird	Anal Swab	130	Shaoguan, Heyuan
Bat	Brain (670), Lung (670), Kidney (670)	670	Zhaoqing

PREDICT Test Findings (Q1Y5):

Number of animals and samples submitted by taxa	Diagnostic lab	Diagnostic method	Pathogen family genus screening or specific virus	Results	Pathogen discovery	Approved by government for release
Bats (487 animals, 627 samples - Oral swab, Rectal swab)	Wuhan Institute of Virology, CAS	PCR	AstV, CoV, PMV	Product for sequencing detected for AstV, CoV, PMV	Interpretation Ongoing	No
Rodents & Shrews (161 animals, 324 samples - Oral swab, Rectal swab)	Wuhan Institute of Virology, CAS	PCR	AstV, CoV, PMV	Product for sequencing detected for AstV, CoV, PMV	Interpretation Completed, Preparation of Report for Government in Progress	No
Carnivores (6 animals, 12 samples - Oral swab, Rectal swab)	Wuhan Institute of Virology, CAS	PCR	AstV, CoV, PMV	Product for sequencing detected for CoV	Interpretation Completed, Preparation of Report for Government in Progress	No

NOTE: Human Test Results:

# Samples Submitted	**Diagnostic Lab**	**Diagnostics Method**	**Pathogen family/genus screening / or specific virus**	**Results**	**Pathogen Discovery**	**Approved by Government for release**
Human Encephalitis CSF (29), Nasopharyngeal Swab (12), Serum (12)	GDCDC	Conventional PCR	Seadorna, Flavi, Paramyxo, Arena, Hanta viruses	All negative		No
Human Hemorrhagic Fever Serum (8)	GDCDC	Conventional PCR	Paramyxo, Arena, Hanta, Filo, Flavi viruses	All negative		No
Human Fever with Thrombocytopenia Serum (3)	GDCDC	Conventional PCR	Filo, Flavi, Hanta, Paramyxo, Arena, Phlebo, Rhabdo, Bunya, Entero viruses	All negative		No
Human H7N9 Serum (1)	GDCDC	Conventional PCR	Influenza A	Product for Sequencing	Sequence confirmation pending	No

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PREDICT Sampling and Testing in Nepal

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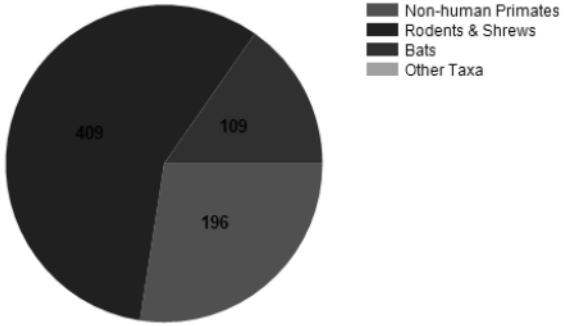
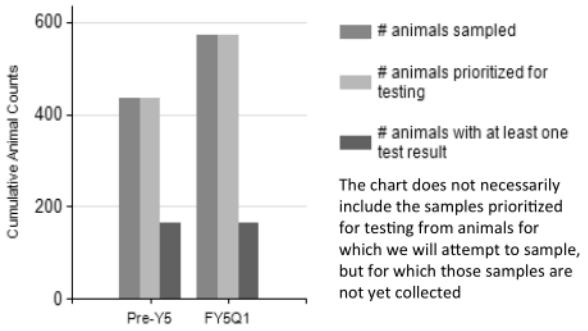
Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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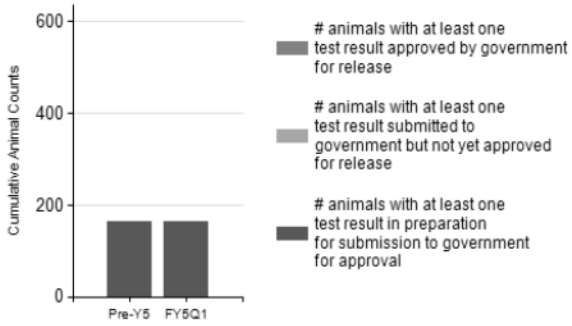
Test Results Reporting Progress



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Significant Highlights, Results, and Success Stories in NEPAL:

- Established an agreement with the Animal Health Directorate to begin testing a subset of avian swab samples screened by the central veterinary laboratory for H5N1 and H1N1 testing for additional viral families using PREDICT protocols.
- Optimized and completed the surveillance site characterization sheets for Nepal.
- Held initial meetings with the Patan Academy of Health Sciences to discuss potential collaboration and participation in the Deep Freeze project or other prospective human sample collection in tandem with ongoing influenza like illness surveillance in Kathmandu.
- Completed sample collection at all planned bat and primate sites; began sampling of rodents at the remaining informal settlement site.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	# animals sampled this quarter	# animals sampled to date	# of animals with at least one final test result	# of animals with at least one test result with interpretation completed	# of animals with at least one test result cleared for release by govt
Bats	0	109	0	0	0
Non-human Primates	0	144	107	107	0
Rodents & Shrews	123	306	57	57	0
High Risk Interface					
Peri-domestic/in or near human dwelling(s)	123	415	57	57	0
Public safety hazard (e.g. threat to humans)	0	144	107	107	0
Total	**123**	**559**	**164**	**164**	**0**

PREDICT Test Findings (Q1Y5):

Nepal						
Number of animals and samples submitted by taxa	**Diagnostic lab**	**Diagnostics method**	**Pathogen family genus screening or specific virus**	**Results**	**Pathogen discovery**	**Approved by government for release**
Non-human Primates (27 animals, - Saliva)	CMDN/Intrepid Nepal	PCR	Corona, Influenza, Paramyxo, Retro, Henipa viruses	All negative		No
Non-human Primates (3 animals, Saliva)	CMDN/Intrepid Nepal	PCR	Influenza	Product for sequencing		No
Non-human Primates (1 animals, Saliva)	CMDN/Intrepid Nepal	PCR	Paramyxoviruses	Product for sequencing		No
Non-human Primates (4 animals, Saliva)	CMDN/Intrepid Nepal	PCR	Coronaviruses	Product for sequencing		No
Non-human Primates (1 animals, Saliva)	CMDN/Intrepid Nepal	PCR	Henipaviruses	Product for sequencing		No
Rodents and Shrews (59 animals, oral swabs)	CMDN/Intrepid Nepal	PCR	Arena, Hanta, Bunya, Paramyxo, Rhabdo viruses	All negative		No
Rodent (1 animal, oral swab)	CMDN/Intrepid Nepal	PCR	Arenaviruses	Product for sequencing		No
Non-human Primates (105, Saliva)	UC Davis	PCR	Corona, Retro –Lenti genus, Simian Foamy viruses	Products for sequencing	Sequencing ongoing	No
Rodents and Shrews (135, Oral and Recta; swabs)	UC Davis	PCR	Paramyxo, Rhabdo, Influenza viruses	Products for sequencing	Sequencing ongoing	No
Bats (108, Feces and Urine)	UC Davis	PCR	Coronaviruses	Products for sequencing	Sequencing ongoing	No

USAID FROM THE AMERICAN PEOPLE | PREDICT

PREDICT Sampling and Testing in Cambodia

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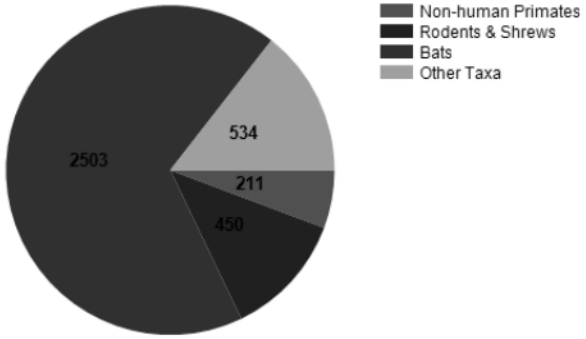
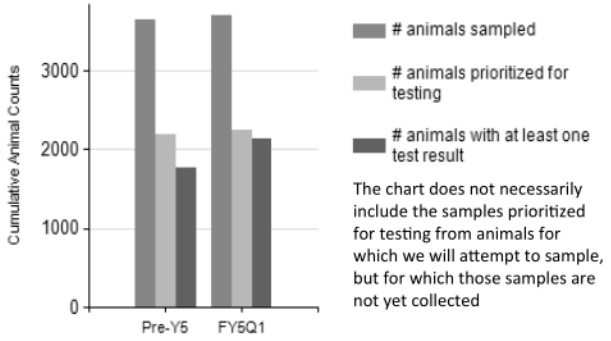
Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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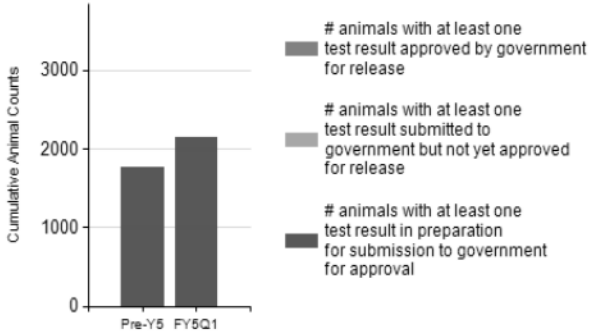
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories in CAMBODIA:

- Increased collaboration with the Forestry Administration (FA) for joint sampling activities in 4 provinces.
- The National Veterinary Research Institute signed the Results Sharing document, and it is in review by the Forestry Administration (FA) to move forward approval of public reporting of testing results.
- Presented on “Targeted Wildlife Disease Surveillance at High Risk. Interfaces” at the Royal University of Agriculture’s One Health Workshop.
- Gave demonstration on safe sample collection and cold chain usage at the South East Asian Bat Conservation Research Unit (SEABCRU) regional workshop.
- Two students from the Prek Leap National College of Agriculture (PNCA) joined field sampling activities and were trained on PREDICT protocols.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	29	2507	1260	1260	0
Non-human Primates	9	208	158	158	0
Other Taxa	0	530	358	358	0
Rodents & Shrews	11	448	365	365	0
High Risk Interface					
Peri-domestic/in or near human dwelling(s)	0	177	176	176	0
For sale in large market (> 20 vendors)	0	84	57	57	0
For sale in medium market (5-20 vendors)	0	95	1	1	0
For sale in small market (< 5 vendors)	0	1	0	0	0
For sale in restaurant	0	347	213	213	0
Hunted	45	1861	1184	1184	0
Private wildlife collection or pet	0	1	0	0	0

Rehabilitation center	0	8	6	6	0
Sanctuary	0	8	0	0	0
Wild animal farm	0	898	322	322	0
Zoo	2	4	0	0	0
Contact with tourists/ecotourism	0	153	128	128	0
Contact with domestic animals or humans NOT likely	2	2	0	0	0
Other	0	54	54	54	0
Total	**49**	**3693**	**2141**	**2141**	**0**

PREDICT Test Findings (Q1Y5):

Cambodia						
Number of animals and samples submitted by taxa	**Diagnostic lab**	**Diagnostics method**	**Pathogen family genus screening or specific virus**	**Results**	**Pathogen discovery**	**Approved by government for release**
Bats (604 animals, 1185 samples - Brain, Feces, Liver, Oral swab, Spleen, Rectal swab, Lung)	Institut Pasteur Cambodia	PCR	Alpha, Arena, Astro, Corona, Filo, Flavi, Hanta, Henipa, Lyssa, Paramyxo viruses	Products for sequencing detected for Astro, Corona, Filo, Hanta, Lyssa, Paramyxo viruses	Interpretation Ongoing	No
Rodents & Shrews (289 animals, 1237 samples - Heart, Urine, Feces, Liver, Oral swab, Spleen, Rectal swab, Kidney, Lung)	Institut Pasteur Cambodia	PCR	Astro, Bunya, Corona, Entero, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Lyssa, Orthopox, Paramyxo, Retrovirus - Lentivirus genus, Seadorna, Simian Foamy viruses	Products for sequencing detected for Astro, Filo, Hanta viruses	Interpretation Ongoing	No
Other Mammals (2 animals, 7 samples - Liver, Oral swab,	Institut Pasteur Cambodia	PCR	Astro, Filo, Flavi, Henipa, Lyssa viruses	All negative		No

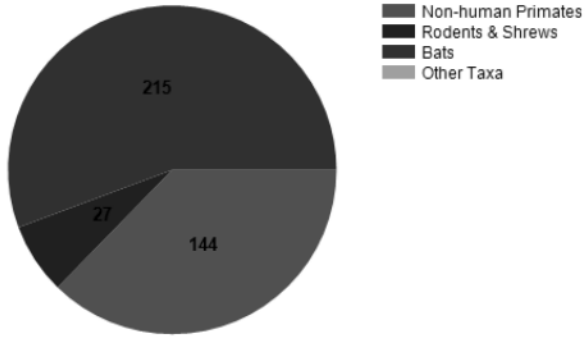
Spleen, Rectal swab, Lung)						
Carnivores (8 animals, 24 samples - Liver, Oral swab, Spleen, Rectal swab, Lung)	Institut Pasteur Cambodia	PCR	Boca, Corona, Filo, Flavi, Henipa, Lyssa viruses	Product for sequencing detected for Coronaviruses	Interpretation Pending	No
Non-human Primates (152 animals, 302 samples - Heart, Urine, Blood drop, Brain, Feces, Liver, Oral swab, Muscle, Spleen, Skin, Lung, Rectal swab, Small intestine, Kidney, Stomach, Intestine with feces)	Institut Pasteur Cambodia	PCR	Bunya, Corona, Entero, Filo, Flavi, Henipa, Herpes, Influenza, Orthopox, Paramyxo, Retrovirus - Lentivirus genus, Seadorna, Simian Foamy viruses	Products for sequencing detected for Entero, Herpes, Simian Foamy viruses	Interpretation Ongoing	No
Ungulates (16 animals, 37 samples - Heart, Liver, Oral swab, Spleen, Rectal swab, Lung)	Institut Pasteur Cambodia	PCR	Corona, Filo, Flavi, Henipa, Lyssa viruses	Product for sequencing detected for Coronaviruses	Interpretation Pending	No
Bats (49 animals, 134 samples - Liver, Lung, Oral swab, Rectal swab, Spleen)	Institut Pasteur Cambodia	PCR	Orthoreoviruses	All negative		No

PREDICT Sampling and Testing in Indonesia

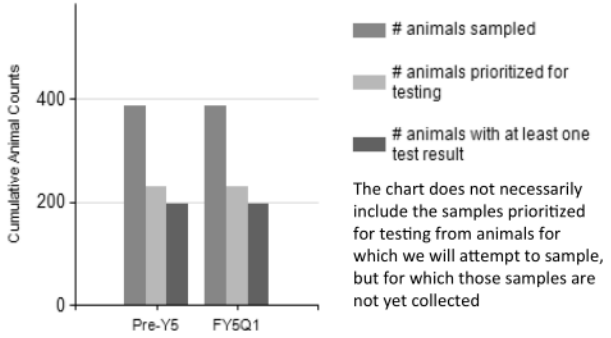
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled

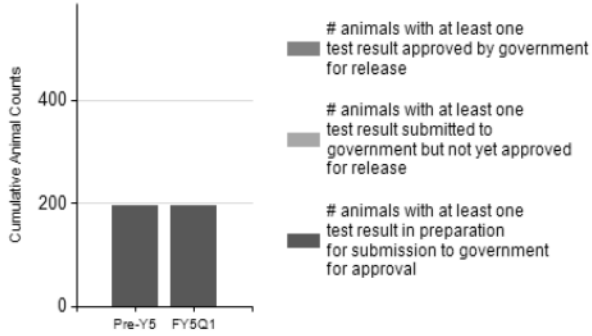


Sampling and Testing Progress



The chart does not necessarily include the samples prioritized for testing from animals for which we will attempt to sample, but for which those samples are not yet collected

Test Results Reporting Progress



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Significant Highlights, Results, and Success Stories in INDONESIA:

- Communicated with MoH regarding the mechanism of sharing results from human surveillance; agreed to apply existing results reporting mechanism for human pathogens surveillance.
- Attended the National Coordination meeting on zoonosis control organized by the KomNas Zoonosis Control in Jakarta.
- Attended meeting with USAID Indonesia (Anita Holidaja) and PREVENT team ((b)(6) (b)(6)) emphasizing future coordination in specimen sampling, especially from markets; PREVENT team conducted market scope inspections and had good information on which market to sample and what time of year.
- Invited by Director of Animal Health Services to serve as an advisor to discuss review of Health Requirement of nonhuman primate importation to Indonesia.
- Attended Cross Sectoral Meeting on Diagnostic Laboratory Network in Zoonoses Control, in Salatiga, Central Java, and presented PREDICT Indonesia activities; the meeting was organized by the Institute for Vector and Reservoir Control Research and Development, National Institute of Health Research and Development - Ministry of Health, Republic of Indonesia.
- Enhanced capacity of lab staff via training: meeting on zoonosis laboratory network; workshop on laboratory biosafety; laboratory training for next generation sequencing; workshop on manuscript preparation.
- Installed new thermocycler in PREDICT lab to increase throughput.
- Met with (b)(6) (b)(6) (b)(6)
- Extended access to acute human samples was made possible via approval of the in-country project, “Study of emerging viruses in samples from fever surveillance studies in the Indonesian Archipelago.”

Summary of Surveillance Activities and Testing in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	0	215	80	80	0
Non-human Primates	0	144	124	124	0
Rodents & Shrews	0	27	5	5	0
High Risk Interface					
Peri-domestic/in or near human dwelling(s)	0	37	37	37	0
For sale in large market (> 20 vendors)	0	158	31	31	0
Sanctuary	0	4	0	0	0
Contact with researchers (other than PREDICT staff)	0	31	17	17	0
Contact with tourists/ecotourism	0	156	124	124	0
Total	0	386	209	209	0

PREDICT Test Findings (Q1Y5):

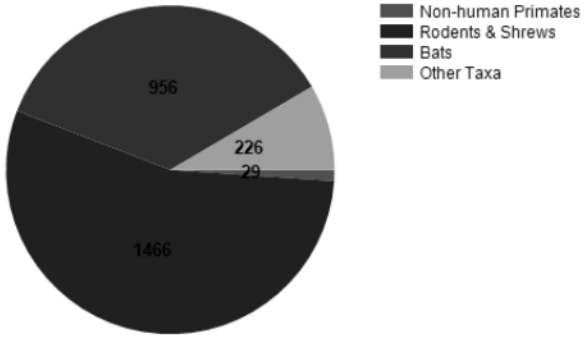
Indonesia						
Number of animals and samples submitted by taxa	**Diagnostic lab**	**Diagnostics method**	**Pathogen family genus screening or specific virus**	**Results**	**Pathogen discovery**	**Approved by government for release**
Bats (33 animals, 36 samples - Oral swab, Saliva, Serum, Tissue)	Primate Research Center, Bogor Agricultural University	PCR	Arena, Corona, Filo, Flavi, Paramyxo viruses	Product for sequencing detected for Paramyxoviruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Rodents & Shrews (5 animals, 5 samples - Blood clot)	Primate Research Center, Bogor Agricultural University	PCR	Arenaviruses	All negative		No

PREDICT Sampling and Testing in Lao Peoples Democratic Republic

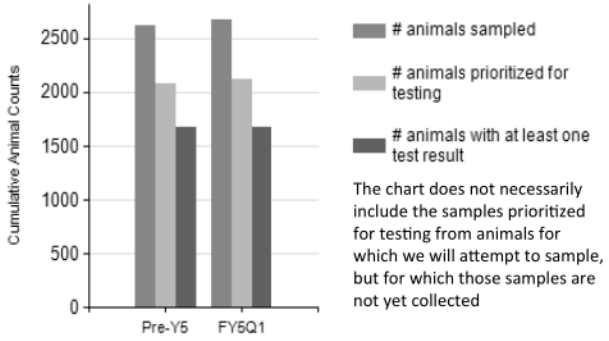
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled

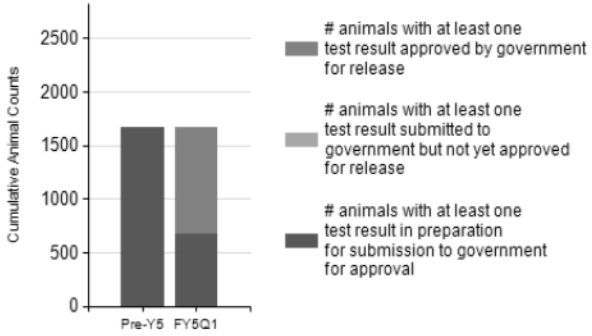


Sampling and Testing Progress



The chart does not necessarily include the samples prioritized for testing from animals for which we will attempt to sample, but for which those samples are not yet collected

Test Results Reporting Progress



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Significant Highlights, Results, and Success Stories in LAOS:

- Trained two National Animal Health Laboratory (NAHL) staff in the field on biosafety, maintaining cold chain, data entry, and wildlife species identification.
- Delivered kits, equipment, and essential supplies to partner laboratories.
- Focused surveillance activities focused on sampling primates (11) and bats (18) at new interfaces including temples, private pets, and a tourism site as well as the market interface.
- Re-extracted original samples from 30 pooled samples that initially tested positive for coronavirus or astrovirus at Institut Pasteur Cambodia at NAHL to aim to identify whether the virus originated in the rectal or oral swab.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	18	956	798	798	487
Non-human Primates	11	29	1	1	0
Other Taxa	5	226	128	128	51
Rodents & Shrews	22	1466	747	747	458
High Risk Interface					
Peri-domestic/in or near human dwelling(s)	5	6	0	0	0
For sale in large market (> 20 vendors)	37	1895	1153	1153	561
For sale in medium market (5-20 vendors)	0	75	25	25	2
For sale in small market (< 5 vendors)	12	59	33	33	30
For sale in market, unknown size	0	93	93	93	91
Hunted	0	547	370	370	312
Private wildlife collection or pet	1	1	0	0	0
Contact with tourists/ecotourism	1	1	0	0	0
Total	**56**	**2677**	**1674**	**1674**	**996**

PREDICT Test Findings (Q1Y5):

Lao PDR						
Number of animals and samples submitted by taxa	**Diagnostic lab**	**Diagnostics method**	**Pathogen family genus screening or specific virus**	**Results**	**Pathogen discovery**	**Approved by government for release**
Bats (455 animals, 1017 samples - Oral swab, Rectal swab)	Institut Pasteur Cambodia	PCR	Arena, Filo, Flavi, Henipa, Influenza, Lyssa, Paramyxo viruses	Product for sequencing detected for Arenaviruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Rodents & Shrews (603 animals, 1159 samples - Feces, Liver, Lung, Oral swab, Rectal swab, Urine/urogenital swab)	Institut Pasteur Cambodia	PCR	Arena, Bunya, Flavi, Hanta, Influenza, Paramyxo viruses	Product for sequencing detected for Arenaviruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Other Mammals (32 animals, 86 samples - Feces, Liver, Lung, Oral swab, Rectal swab, Urine, Urine/urogenital swab)	Institut Pasteur Cambodia	PCR	Arena, Bunya, Flavi, Hanta, Influenza, Paramyxo viruses	All negative		No
Bats (310 animals, 576 samples - Oral swab, Rectal swab)	National Animal Health Centre	PCR	Corona, Rhabdo viruses	All negative		No
Non-human Primates (1 animals, 2 samples - Oral swab, Rectal swab)	National Animal Health Centre	PCR	Corona, Rhabdo viruses	All negative		No
Rodents & Shrews (3 animals, 6 samples - Oral swab, Rectal swab)	National Animal Health Centre	PCR	Corona, Rhabdo viruses	All negative		No
Carnivores (68 animals, 129 samples - Oral swab, Rectal swab, Urine/urogenital swab)	National Animal Health Centre	PCR	Corona, Rhabdo viruses	All negative		No
Other Mammals (8 animals, 16 samples - Oral swab, Rectal swab)	National Animal Health Centre	PCR	Corona, Rhabdo viruses	All negative		No
Birds (3 animals, 6 samples - Oral swab, Rectal swab)	Institut Pasteur Cambodia	PCR	Flavi, Influenza, Paramyxo viruses	All negative		No

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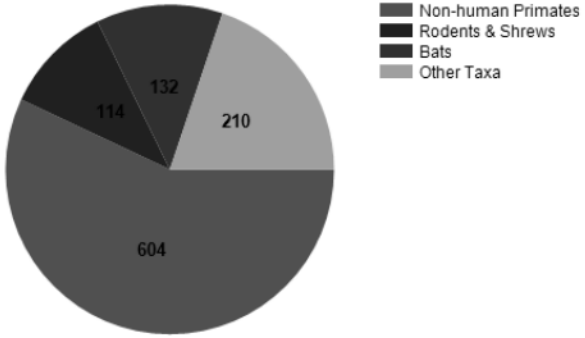
PREDICT Sampling and Testing in Malaysia, Peninsular

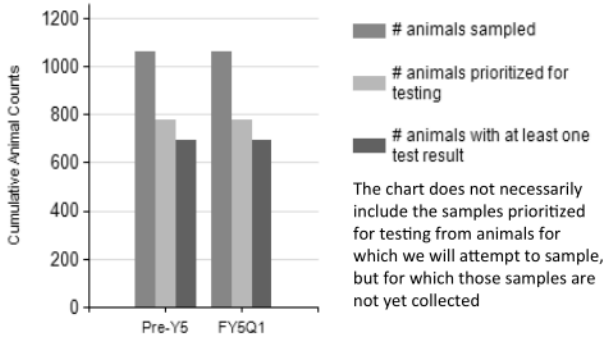
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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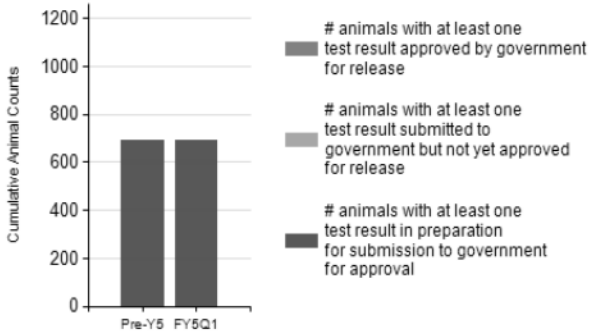
Test Results Reporting Progress



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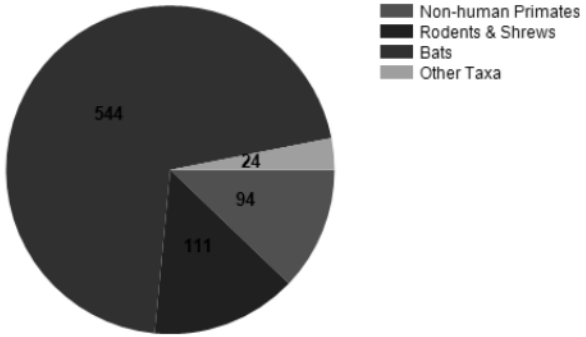
PREDICT Sampling and Testing in Malaysia, Sabah

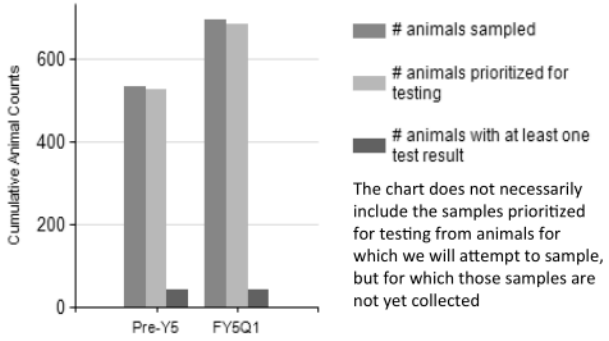
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled

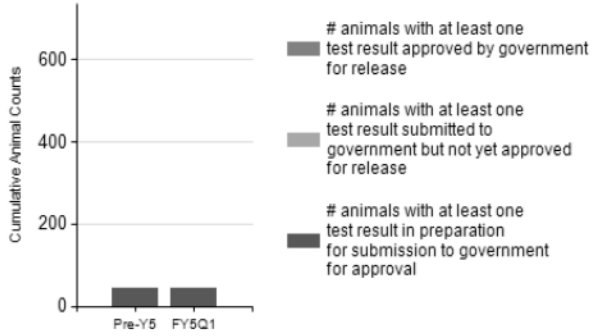


Sampling and Testing Progress



The chart does not necessarily include the samples prioritized for testing from animals for which we will attempt to sample, but for which those samples are not yet collected

Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories in MALAYSIA (quad charts above are separate due to separate reporting requirements for government):

- Sent first shipment of Deep Forest samples from Sabah to the Columbia University Center for Infection and Immunity for novel pathogen detection; 1,333 samples collected form bats, rodents and macaques.
- The Wildlife Health, Genetic and Forensic Laboratory (WHGFL) established by PREDICT, SWD, and DGFC has been certified as a BSL 2 laboratory by the FAO Regional BioSafety Coordinator according to international standards.
- Presented on PREDICT work in Malaysia at Wildlife Animal Rescue Network meeting in Sabah.
- Started testing PREDICT and Deep Forest samples at the new WHGFL.
- Met with US Ambassador (b)(6) to discuss PREDICT work in Malaysia.
- Signed MOU with SWD at the official opening of WHGFL by US Ambassador and Sabah Minister of Tourism, Culture and Environment. Opening generated a huge amount of local media coverage for PREDICT and USAID.
- Started to assist SWD with sampling confiscated bushmeat and advising SWD on necessary steps to use WHGFL for forensic work that can be used for country uses in the future.
- Completed 5 Deep Forest sampling trips; Human Disturbance surveillance transect was completed for all 5 sites.

Summary of Surveillance Activities and Testing in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	101	617	123	123	0
Non-human Primates	1	697	468	468	0
Other Taxa	3	222	36	36	0
Rodents & Shrews	55	209	110	110	0
High Risk Interface					
Wildlife trade transport	0	194	24	24	0
Contact with workers harvesting crops	0	44	13	13	0
Peri-domestic/in or near human dwelling(s)	42	631	475	475	0

Private wildlife collection or pet	0	10	10	10	0
Raiding crops	118	127			
Public safety hazard (e.g. threat to humans)	0	57	22	22	0
Rehabilitation center	0	12	4	4	0
Contact with park personnel/intensive wildlife management area	0	596	188	146	0
Sanctuary	0	59			
Zoo	0	3	1	1	
Contact with tourists/ecotourism	0	12			
Total	**320**	**3490**	**1474**	**1474**	**0**

PREDICT Test Findings (Q1Y5):

Number of animals and samples submitted by taxa	Diagnostic lab	Diagnostics method	Pathogen family genus screening or specific virus	Results	Pathogen discovery	Approved by government for release
Bats (124 animals, 749 samples - Urine/urogenital swab, Feces, Oral swab, Rectal swab, Red blood cells, Serum)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Adeno, Alpha, Arena, Astro, Bunya, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Nipah, Orthopox, Paramyxo, Parapox, Rhabdo, Seadorna viruses	Products for sequencing detected for Arena, Astro, Corona, Filo, Herpes, Paramyxo viruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Bats (27 animals, 78 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Adeno, Astro, Boca, Corona, Filo, Flavi, Hanta, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Polyoma viruses	Products for sequencing detected for Adeno, Astro, Herpes viruses	Interpretation Ongoing	No
Non-human Primates (257 animals, 757 samples -	BSL 3, Veterinary Research	PCR	Adeno, Alpha, Arena, Astro, Boca, Bunya, Corona, Entero, Filo,	Product for sequencing detected for Alpha,	Interpretation Completed, Preparation of	No

Urine/urogenital swab, Oral swab, Rectal swab)	Institute Ipoh, Department of Veterinary Services		Flavi, Henipa, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Retrovirus - Lentivirus genus, Rhabdo, Seadorna, Simian Foamy viruses	Arena, Astro, Filo, Flavi, Herpes, Paramyxo, Retrovirus - Lentivirus genus, Simian Foamy viruses	Report for Government in Progress	
Non-human Primates (50 animals, 150 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Adeno, Astro, Boca, Corona, Filo, Flavi, Hanta, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Polyoma viruses	Product for sequencing detected for Herpesviruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Rodents & Shrews (111 animals, 329 samples - Urine/urogenital swab, Oral swab, Rectal swab, Serum)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Adeno, Alpha, Arena, Astro, Bunya, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Rhabdo, Seadorna viruses	Products for sequencing detected for Alpha, Astro, Hanta, Paramyxo viruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Rodents & Shrews (27 animals, 75 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Center for Infection and Immunity, Columbia University	PCR	Adeno, Astro, Boca, Corona, Filo, Flaviviruses, Hanta, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Polyoma viruses	Products for sequencing detected for Adeno, Astro viruses	Interpretation Ongoing	No
Carnivores (12 animals, 37 samples - Urine/urogenital swab, Feces, Oral swab, Rectal swab)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Adeno, Alpha, Arena, Astro, Bunya, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Rhabdo, Seadorna viruses	All negative		No
Ungulates (7 animals, 13 samples - Urine/urogenital swab, Oral swab, Rectal swab)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary	PCR	Adeno, Alpha, Arena, Astro, Bunya, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Orthopox, Paramyxo, Parapox,	Products for sequencing detected for Alpha, Hanta viruses	Interpretation Completed, Preparation of Report for Government in Progress	No

	Services		Rhabdo, Seadorna viruses			
Other Mammals (12 animals, 39 samples - Urine/urogenital swab, Oral swab, Rectal swab)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Adeno, Alpha, Arena, Astro, Bunya, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Rhabdo, Seadorna viruses	Product for sequencing detected for Astro, Flavi viruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Bats (14 animals, 14 samples - Urine/urogenital swab)	Diagnostic Lab, Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)	PCR	Arena, Flavi, Hanta viruses	Product for sequencing detected for Arenaviruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Rodents & Shrews (11 animals, 12 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Diagnostic Lab, Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)	PCR	Arena, Corona, Flavi, Hanta viruses	Product for sequencing detected for Coronaviruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Non-human Primates (414 animals, 826 samples - Urine/urogenital swab, Oral swab, Rectal swab)	Diagnostic Lab, Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)	PCR	Corona, Herpes viruses	Product for sequencing detected for Corona, Herpes viruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Carnivores (8 animals, 16 samples - Oral swab, Rectal swab)	Diagnostic Lab, Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN)	PCR	Coronaviruses	All negative		No
Non-human Primates (50 animals, 150 samples - Oral swab, Rectal swab,	Center for Infection and Immunity, Columbia	PCR	Papillomaviruses L1 Gene	All negative		No

Urine/urogenital swab)	University					
Bats (25 animals, 78 samples - Oral swab, Rectal swab, Urine/urogenital swab)	Center for Infection and Immunity, Columbia University	PCR	Papillomaviruses L1 Gene	All negative		No
Rodents & Shrews (27 animals, 75 samples - Oral swab, Rectal swab, Urine/urogenital swab)	Center for Infection and Immunity, Columbia University	PCR	Papillomaviruses L1 Gene	All negative		No
Bats (25 animals, 25 samples - Serum)	Center for Infection and Immunity, Columbia University	Serology	Retroviruses	All negative		No
Non-human Primates (50 animals, 50 samples - Plasma)	Center for Infection and Immunity, Columbia University	Serology	Retroviruses	All negative		No
Rodents & Shrews (24 animals, 24 samples - Serum)	Center for Infection and Immunity, Columbia University	Serology	Retroviruses	All negative		No
Non-human Primates (38 animals, 115 samples - Heart, Urine/urogenital swab, Brain, Oral swab, Spleen, Rectal swab, Nerve)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Alpha, Arena, Astro, Boca, Bunya, Corona, Filo, Flavi, Henipa, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Retrovirus - Lentivirus genus, Seadorna, Simian Foamy viruses	Product for sequencing detected for Alpha, Arena, Astro, Boca, Corona, Henipa, Herpes, Seadorna viruses	Interpretation Completed, Preparation of Report for Government in Progress	No
Other Mammals (4 animals, 30 samples - Heart, Brain, Feces, Liver, Spleen, Small intestine, Blood (whole), Colon, Kidney,	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary	PCR	Alpha, Arena, Astro, Boca, Bunya, Corona, Filo, Flavi, Henipa, Herpes, Influenza, Orthopox, Paramyxo, Parapox, Retrovirus -	Products for sequencing detected for Boca, Herpes, Parapox, Rhabdo viruses	Interpretation Completed, Preparation of Report for Government in Progress	No

Intestinal content, Lung)	Services		Lentivirus genus Rhabdo, Seadorna viruses			
Other Mammals (4 animals, 30 samples - Blood (whole), Brain, Colon, Feces, Heart, Intestinal content, Kidney, Liver, Lung, Small intestine, Spleen)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Endotheliotropic herpesviruses - general, Endotheliotropic herpesviruses - specific 3/4, Endotheliotropic herpesviruses - specific 5, Endotheliotropic herpesviruses - Specific 6	Products for sequencing detected for Endotheliotropic	Interpretation Completed, Preparation of Report for Government in Progress	No
Non-human Primates (38 animals, 115 samples - Brain, Heart, Nerve, Oral swab, Rectal swab, Spleen, Urine/urogenital swab)	BSL 3, Veterinary Research Institute Ipoh, Department of Veterinary Services	PCR	Hepadna, Picorna viruses	All negative	Interpretation Completed, Preparation of Report for Government in Progress	No
Peninsular Malaysia non-human primates pooled throat, rectal urine swab samples from 170 animals	VRI	Consensus PCR	Alpha, Corona, Flavi,, Paramyxo, Seadorna, Boca	All negative		No
Sabah non-human primates pooled throat, rectal urine swab samples from 52 animals	WHGFL	Consensus PCR	Adeno, Alpha, Arena,, Astro, Corona, Entero, Filo, Flavi, Herpes, Influenza, Paramyxo, Retro, Rhabdo, Seadorna, SFV, Boca, Bunya, Henipa, Pox Viruses	Product for sequencing detected for: Adeno , Arena, Astro Entero, Herpes, Paramyxo, Retro, Seadorna, SFV, Boca, Bunya, Pox viruses	Interpretation Ongoing	No

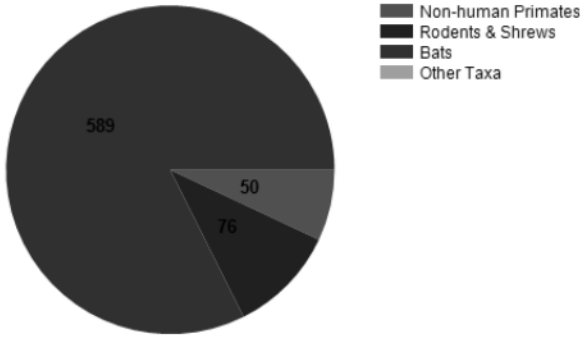
USAID FROM THE AMERICAN PEOPLE | PREDICT

PREDICT Sampling and Testing in Thailand

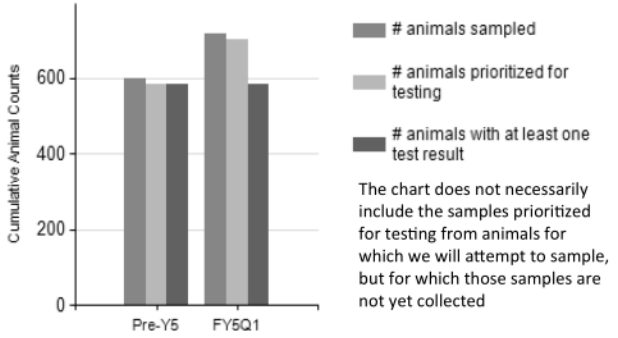
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled

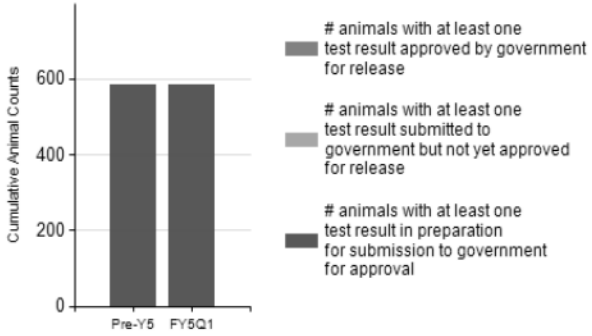


Sampling and Testing Progress



The chart does not necessarily include the samples prioritized for testing from animals for which we will attempt to sample, but for which those samples are not yet collected

Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories in THAILAND:

- Performed testing of macaque specimens to support the surveillance project of Thai government (Department of National Parks, Wildlife and Plant Conservation).
- Coordinated wildlife sampling near CDC human site (near Myanmar border, Chiang Mai).
- Developed specimen storage management for CDC human surveillance project (Chiang Mai and Nakornratchasrima). These specimens will be further screened for pathogens using PREDICT protocols.

Summary of Surveillance Activities and Testing in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	114	485	359	359	0
Non-human Primates	0	50	50	50	0
Rodents & Shrews	4	76	72	72	0
High Risk Interface					
Contact with locals for religious activities	0	33	21	21	0
Contact with park personnel/intensive wildlife management area	0	175	175	175	0
Contact with researchers (other than PREDICT staff)	118	118	0	0	0
Contact with tourists/ecotourism	0	57	57	57	0
Other	0	228	228	228	0
Total	**118**	**611**	**481**	**481**	**0**

PREDICT Test Findings (Q1Y5):

Number of animals and samples submitted by taxa	Diagnostic lab	Diagnostics method	Pathogen family genus screening or specific virus	Results	Pathogen discovery	Approved by government for release
Non-human Primates (50 animals, 200 samples - Oral swab, Plasma, Rectal swab, Urine)	WHO-CC viral zoonoses, Chulalongkorn University	PCR	Arena, Astro, Boca, Bunya, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Influenza, Paramyxo, Parapoxs, Retrovirus - Lentivirus genus, Seadorna viruses	Products for sequencing detected for Astro, Herpes viruses	Interpretation Ongoing	No
Bats (193 animals, 212 samples - Feces, Rectal swab)	WHO-CC viral zoonoses, Chulalongkorn University	PCR	Astroviruses	Products for sequencing detected	Interpretation Ongoing	No
Rodents & Shrews (63 animals, 69 samples - Feces, Rectal swab)	WHO-CC viral zoonoses, Chulalongkorn University	PCR	Astroviruses	Products for sequencing detected	Interpretation Ongoing	No

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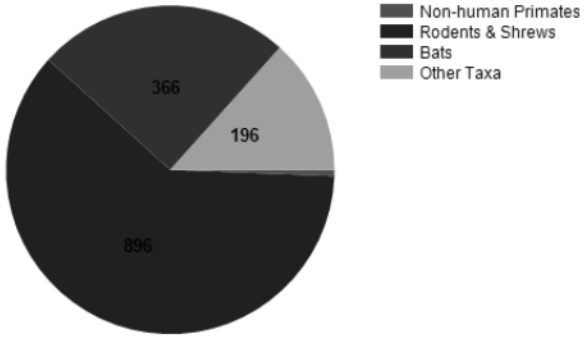
PREDICT Sampling and Testing in Vietnam

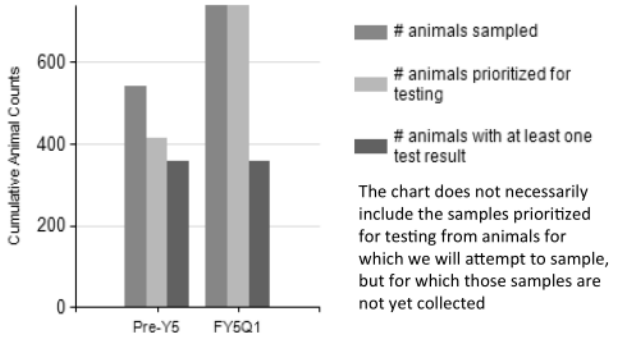
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled



Sampling and Testing Progress



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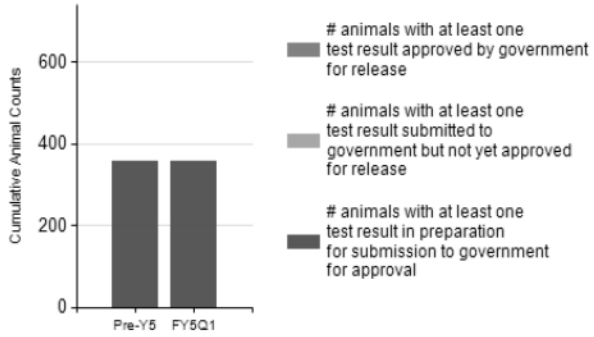
Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories in VIETNAM:

- Completed a large wildlife sampling effort in the Mekong Delta Region of Vietnam in collaboration with the Department of Animal Health (DAH), Ministry of Agriculture and Rural Development; collected a total of 3,236 samples from 301 bats and 574 rodents (of which not all are prioritized for testing); collected fecal samples from bats on guano farms (generally located near human dwellings) and below natural bat roosts at a local religious site; collected oral swabs, urine and tissue samples from rats on sale as food in large markets, restaurants and by private vendors; delivered samples collected to the DAH Regional Animal Health Office No. 6 laboratory in Ho Chi Minh City where they will be screened for viral families.
- Initiated sampling on wildlife farms in Dong Nai Province, Vietnam. Dong Nai Province borders Ho Chi Minh City and is a province with one of the highest densities of wildlife farms in the country; launched wildlife farm surveillance work with a wildlife health training (*wildlife disease management and surveillance on wildlife farms*) co-organized by PREDICT and RESPOND and attended by (b)(6) trained participants on conducting bio-security assessments and collecting samples from wildlife species on three farms, 38 in total, included rangers and officials from the Dong Nai Forest Protection Department (FPD), veterinarians, and animal health officers from the Dong Nai sub-Department of Animal Health and wildlife farm owners. Trainers included lecturers from the Vietnam One Health University Network, PREDICT, and RESPOND staff.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	301	366	38	38	0
Non-human Primates	5	7	2	2	0
Other Taxa	8	196	71	71	0
Rodents & Shrews	611	896	245	245	0
High Risk Interface					
Contact with locals for religious activities	12	12	0	0	0
Peri-domestic/in or near human dwelling(s)	289	354	38	38	0

For sale in large market (> 20 vendors)	295	372	69	69	0
For sale in restaurant	90	430	205	205	0
Private sale	189	189	0	0	0
Rehabilitation center	0	42	42	42	0
Sanctuary	6	8	2	2	0
Wild animal farm	44	58	0	0	0
Total	**925**	**1465**	**356**	**356**	**0**

PREDICT Test Findings (Q1Y5):

There are no test results to report for Vietnam in Q1Y5.

PREDICT Quarter 1 Year 5 Reporting - BRAZIL

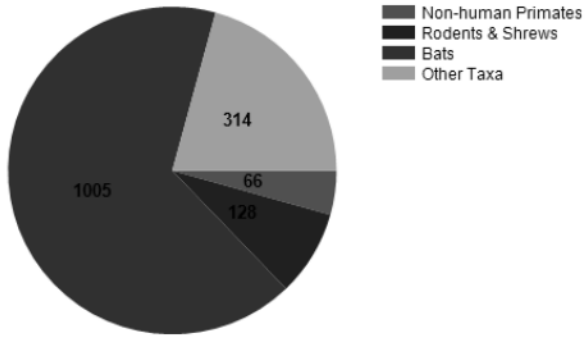
USAID FROM THE AMERICAN PEOPLE | PREDICT

PREDICT Sampling and Testing in Brazil

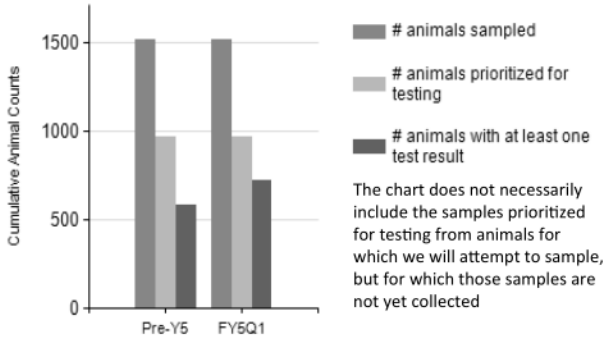
The USAID Emerging Pandemic Threats PREDICT project has been working with government partners in 20 countries to develop efforts for surveillance, testing, and reporting of potential human pathogens in wildlife. This summary provides a country-level view of where wildlife sampling has been conducted to date, how sampling has been targeted on taxonomic groups of animals of high concern for human pathogens, and progress in laboratory analyses and approval of findings for sharing with the global health community.

Sampling Locations

Number of Animals Sampled

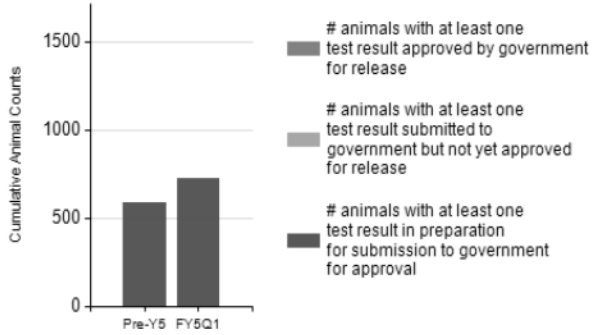


Sampling and Testing Progress



The chart does not necessarily include the samples prioritized for testing from animals for which we will attempt to sample, but for which those samples are not yet collected

Test Results Reporting Progress



For information purposes only - no action required

Significant Highlights, Results, and Success Stories in BRAZIL:

- Initiated Deep Forest wet season fieldwork.
- Completed surveillance activity in the pristine site with a total of 33 bats, 4 rodents, and 10 marsupials sampled.

Summary of Surveillance Activities and Testing in GAINS to date:

Taxa	Number animals sampled this quarter	Number animals sampled to date	Number of animals with at least one final test result	Number of animals with at least one test result with interpretation completed	Number of animals with at least one test result cleared for release by govt
Bats	33	1062	594	594	0
Non-human Primates	0	66	16	16	0
Other Taxa	10	240	28	28	0
Rodents & Shrews	4	129	85	85	0
High Risk Interface					
Contact with locals for religious activities	0	23	8	8	0
Peri-domestic/in or near human dwelling(s)	0	415	195	195	0
Private wildlife collection or pet	0	56	0	0	0
Raiding crops	0	6	0	0	0
Urban forest fragment with recreational activities	0	128	84	84	0
Contact with researchers (other than PREDICT staff)	0	113	86	86	0
Contact with domestic animals or humans NOT likely	47	628	286	286	0
Other	0	128	64	64	0
Total	**47**	**1497**	**723**	**723**	**0**

PREDICT Test Findings (Q1Y5):

Number of animals and samples submitted by taxa	Diagnostic lab	Diagnostics method	Pathogen family genus screening or specific virus	Results	Pathogen discovery	Approved by government for release
Bats (178 animals, 701 samples - Skin, Urine, Oral swab, Rectal swab, Anal swab, Blood clot, Serum)	Center for Infection and Immunity, Columbia University	PCR	Alpha, Astro, Bunya, Corona, Entero, Filo, Flavi, Hanta, Influenza, Orbi, Orthopox, Parapox, Pox, Rhabdo viruses	Product for sequencing detected for Astro, Corona, Entero viruses	Interpretation Ongoing	No
Rodents & Shrews (39 animals, 76 samples - Liver, Lung, Serum)	Center for Infection and Immunity, Columbia University	PCR	Alpha, Astro, Bunya, Entero, Filo, Flavi, Hanta, Influenza, Orbi, Orthopox, Paramyxo, Parapox, Pox, Rhabdo viruses	Products for sequencing detected for Astro, Paramyxo viruses	Sequencing Pending	No
Bats (286 animals, 355 samples - Urine/urogenital swab, Feces, Oral swab, Rectal swab, Blood (whole))	ICB II, University of São Paulo	PCR	Arena, Adeno, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Paramyxo viruses	Products for sequencing detected for Arena, Corona, Flavi, Hanta,Herpes, Henipa viruses	Interpretation Ongoing	No
Non-human Primates (12 animals, 24 samples - Oral swab, Rectal swab, red blood cells)	ICB II, University of São Paulo	Conventional and nested RT-PCR	Arena, Boca, Corona, Filo, Flavi, Hanta, Henipa, Paramyxo, Herpes viruses	Products for sequencing detected for Arena, Flavi, Herpes viruses	Interpretation Completed	No
Rodents & Shrews (64 animals, 113 samples - Oral swab, Rectal swab)	ICB II, University of São Paulo	PCR	Arena, Corona, Filo, Flavi, Hanta, Henipa, Herpes, Paramyxo	Products for sequencing detected for Arena, Flavi, Hanta viruses	Interpretation Completed	No
Other Mammals (20 animals, 39 samples - Oral swab, Rectal swab)	ICB II, University of São Paulo	PCR	Arena, Corona, Filo, Flavi, Hanta, Henipa, Paramyxo viruses	All negative		No

PREDICT Quarter 2 Year 3 Reporting

GLOBAL - US, Africa, Southeast Asia, Asia & Latin America

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building (includes infrastructure, training, coordination and systems improvements toward sustainability)**
  - Sub-activity 1.1.1: **Operationalizing One Health**

a) International, National or Regional Surveillance System Improvements

- Collaborated with the Lima Administration of Forestry and Wildlife (Peru) in holding their workshop for environmental staff on the "Management of captive wildlife from the trade". The workshop included 50 representatives from 16 government and private institutions.
- Made an agreement with Cambodia National Veterinary Research Institute and Forestry Administration for their staff to join the PREDICT team on future field surveillance, and hired new senior staff member who is a native speaker from the Khmer region.
- Met with Sabah Wildlife Department (SWD; Malaysia) authorities and attended SWD's first conference. The meeting initiated a plan to finalize working agreements for the year. Additionally, SWD expressed great interest in setting up a Wildlife Health Team that will be dedicated to Deep Forest activities in Borneo.
- Attended USAID-funded "Second Regional Workshop on Collaboration between Human and Animal Health Sectors on Zoonoses Prevention and Control" in Chang Mai, Thailand.
- Attended FAO's "One Health in Motion" meeting in Thailand to discuss and provide insight on FAO areas of focus.
- Conducted a workshop on Emerging Zoonoses in Wildlife for members of the Lao PDR staff from the provincial agriculture, forestry, and forest inspection.
- The first day of the inaugural Indonesia training was attended by government representatives from the Ministries of Forestry, Agriculture, Health, and Coordinating Ministry of People's Welfare. Information on One Health and disease surveillance was

presented.

- Provided training on One Health, Wildlife Disease Surveillance approaches, and Wildlife Disease Risk Assessment to species conservation specialists at the IUCN SSC Specialist Group Chairs Meeting.

b) **Laboratory System Improvements**

- Began to implement and optimize viral family-level PCR protocols at Chulalongkorn University (Thailand), PERHILITAN (Malaysia), Guangdong CDC and Wuhan Institute for Virology (China), Makerere University (Uganda), Care and Health Program (Cameroon) Institute of Molecular and Biotechnology (Bolivia) and NAMRU-6 (Peru).
- Provided equipment for surveillance and laboratory diagnostics to additional labs including Liquid Nitrogen generators at INRB (DRC) and Iringa site (Tanzania); ultralow freezers to VRI (Malaysia) and ICDDR,B (Bangladesh); two PCR machines and TissueLyser to INRB (DRC); centrifuge and pipetters to INRB (DRC) and RAB (Rwanda); and a MiniMag extraction system to Makerere University (Uganda).
- Purchased supplies to begin viral family testing at Institute of Health (Peru) and Institut Pertanian Bogor (Indonesia), and sent the Universal Control 1 and PCR protocols to Mexico.
- Hired new staff to perform viral family testing, including a research assistant at Eijkman Institute (Indonesia), laboratory technicians at INS (Peru) and RAB (Rwanda), and post-doctoral fellow at Institute of Biomedical Sciences, USP (Brazil).
- Refined test result tracking in GAINS and reporting of test findings to in-country government to streamline sharing of findings, obtaining government approvals for release of data, and moving of data to partners and the public on HealthMap.
- Drafted a sample testing algorithm for testing human specimens based on syndromic symptoms to be implemented in all laboratories performing diagnostics on human samples.
- Continued to provide training and support to laboratory technicians including a lab coordinator and post-doctoral fellow travelling to CHP (Cameroon), RAB (Rwanda), and SUA (Tanzania) for extensive on-site training; training of lab technicians at INRB (DRC), ZDL (RoC), and CHP (Cameroon); training a wildlife veterinarian from the Forestry Department (Bangladesh) on sample extractions, data management including storage and tracking of samples, conducting PCR, BSL-2 and -3 procedures and cold chain management; exposure of seven senior HUA vet students in sampling with FTA filter cards,

buffer, viral transport medium, environmental sampling, and PPE (Vietnam).
- Coordinated with other EPT partners, including finalization of a combined Laboratory Work Plan for specimen sharing and testing with CDC at Eijkman Institute (Indonesia); coordinated with IDENTIFY for a consultation and development of a new biosafety protocol at HUA (Vietnam); finalized arrangements with Institut Pasteur (Cambodia) to host two laboratory technicians from NaVRI to be trained in viral family screening; and Laboratory Director from CHP (Cameroon) attended a meeting for the Network of National Laboratories held by the Cameroon Ministry of Health.

Table 1: Labs Receiving Assistance from PREDICT to date:

	# of labs targeted for screening with desired viral families	# of labs receiving training in preparation for screening of desired viral families	# of labs that have initiated work that will eventually lead to screening desired viral families (labs with partial capacity)
Africa	7	6	3
Asia / SE Asia	12	8	6
Latin America	6	3	3
Totals	**25**	**17**	**12**

- Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
  - Assimilated data from the PREDICT Rapid Survey Update Tool in a central database for analysis purposes for seventeen countries. Data verification procedures are underway. Additionally, the survey was issued to Indonesia for initial capacity tracking purposes.
  - The preliminary analysis of PREDICT Rapid Survey Update Tool data indicate that 88% of countries reported improvements in zoonotic disease surveillance, 81% reported improvement in the availability of trained personnel for conducting wildlife surveillance, and 94% reported improvement in laboratory capacity to conduct pathogen testing from wildlife samples during the past year.
  - The top five challenges associated with conducting wildlife surveillance as reported by the majority of countries were 1) Financial issues, 2) Insufficient training to work with wildlife, 3)

Poverty issues, 4) Insufficient enforcement, and 5) Time delay between disease/outbreak events and when official information is available to the public.

- The top five priority actions to improve wildlife surveillance as reported by the majority of countries were 1) Establishing sustainable funding/resources; 2) Training in wildlife diseases and surveillance; 3) Identifying pathogens that may affect wildlife, livestock, or humans; 4) Increasing human capacity; and 5) Educating and engaging governments and communities.

- Sub-activity 1.1.3: **PREDICT Training Results Summary by Country to date**

  - Trained 1072 laboratory and field personnel and in-country collaborators. Personnel and collaborators previously trained were trained in additional field skills and topics for a total of 211 additional personnel trained in the second quarter.
  - Completed the PREDICT Team Guide for Providing Assistance During a Zoonotic Disease Outbreak and distributed to Country Coordinators.
  - Completed the Country Coordinator review of protocol and guides and training by interviews. The review found a strong demand for short training videos on some of the more technical tasks related to bat, rodent, and primate sampling; sample handling; and cold chain.

Table 2: PREDICT Training Results by Country to date:

Country	Persons	# Women	Trainings covered various combinations of the following topics:
Asia:			
Bangladesh	**5**	**0**	Lab techniques in BSL2 lab & lab diagnostics; epidemiology and outbreak investigation; capture and sampling of rodents & bats. Sample collection and GAINS System; use of GIS.
Cambodia	**61**	**10**	Core safety, animal capture, & sampling skills and protocols; data collection & management; rodent and primate ID & primate and rodent sampling.
China	**2**	**1**	Core safety, animal capture, & sampling skills and protocols; sample collection, handling and transport; wildlife restraint & anesthesia; human & animal safety; bat, rodent and primate sampling.
India	**18**	**2**	Core safety, animal capture & sampling, laboratory safety protocols and zoonoses; surveillance and sampling protocols; bar-coding and data management; animal

			necropsies.
Indonesia	**23**	**10**	Modeling behind the PREDICT project; zoonotic diseases of bats and rodents; human and animal safety during capture; laboratory safety & PPE use; sample collection. Set up for sampling bats and rodents.
Lao PDR	**74**	**8+**	Core safety, animal capture, & sampling skills and protocols; data collection; PPE Use; bar-coding & data management; animal necropsies; surveillance & sampling; laboratory molecular techniques.
Malaysia	**36**	**11**	Core safety protocols, PPE and biosafety, animal capture & sampling skills and protocols; bat and rodent capture, handling & sampling; laboratory skills; packing and shipping samples & cold chain; sampling strategy & data collection; bat, rodent & macaque sampling; collection of trigeminal nerve root ganglia from macaques for Herpes testing; virus extraction, bat & rodent capture; rodent retro-orbital bleed.
Thailand	**1**	**0**	Lab and bioinformatics training.
Vietnam	**48**	**10+**	Core safety, animal capture, & sampling skills and protocols; packing & shipping samples; barcode system; animal pathology; sample collection & data management & use of GAINS; surveillance; filter paper blood spot sampling; lab diagnostic protocols, virus family level protocols, and one health & sampling strategy; sample transport & lab methods; wildlife pathology.
Africa:			
Cameroon	**65**	**18**	Core safety, animal capture, & sampling skills and protocols; specialized field sampling and laboratory skills; packing & shipping samples to reference lab; PPE Use; bushmeat policy and wildlife ethics; extraction, RT-PCR, ELISE and other lab methods; lab systems; immunology and serology; ethics; pan-viral protocols; emergency preparedness and management.
DRC	**17**	**3**	Core safety, animal capture, & sampling skills and protocols; specialized field sampling and laboratory skills; RT-PCR, ELISA; administration and reporting; Monkeypox surveillance; sample tracking & GAINS system; ethical issues; blood spot sampling; DNA & RNA extraction from animal samples.
Gabon	**5**	**2**	Bushmeat sampling; packing & shipping samples; PPE Use and biosafety; lab safety; animal capture; bat & rodent sampling; sampling for AI; animal sample collection; cold chain; lab methods, DNA extraction, PCR; sample prioritization; safe handling of liquid nitrogen; sequencing; virus isolation of RNA & RT-PCR; GAINS system & data management
Republic of Congo	**13**	**2**	Core safety, PPE and biosafety, safe animal capture, & sampling skills and protocols; bat, rodent and primate sampling; laboratory safety & skills; data collection; cold chain; protecting human subjects in research; virology laboratory methods.
Rwanda	**120**	**11**	Core safety, animal capture, & sampling skills and protocols; PPE Use and biosafety; bat, rodent and primate capture, handling and sampling; zoonoses; ethics and responsibilities; wildlife pathology & necropsy; sample collection & preservation; packing & shipping samples; tracking primates & health monitoring; lab personnel

			safety; PCR protocols & sample processing; bushmeat handling.
Tanzania	**32**	**7**	Core safety, animal capture, & sampling skills and protocols; bat and rodent capture, handling & sampling; data management; laboratory safety; surveillance; information management and GAINS system; wildlife capture & restraint; emergency preparedness; ethics, cultural sensitivity & SHP; pathogen detection; extraction and PCR & protocols; cold chain.
Uganda	**29**	**9**	Core safety, animal capture, & sampling skills and protocols; PPE & biosafety; laboratory safety; packing & shipping samples; bushmeat sampling; cold chain; GPS; Animal Mortality Monitoring Study; bat capture, handling & sampling; PPE & biosafety to handle dead animals.
Latin America:			
Bolivia	**222**	**?**	Core safety, animal capture, laboratory & sampling skills and protocols and zoonotic diseases; bat, rodent and primate sampling; bushmeat sampling; molecular and parasite diagnostic methods; lab safety and methods; packing and shipping samples; wildlife management and disease management; work ethics, cultural sensitivity & SHP; managing livestock & poultry diseases; detecting zoonoses; sample collection and storage; methods of detecting Salmonella in wildlife; biostatistics.
Brazil	**25**	**13**	Core safety, animal capture, handling & sampling skills and protocols; PPE Use & biosafety; bat and rodent sampling; bushmeat sampling; packing and shipping samples; cold chain; surveillance, ethics and responsibilities; primate sampling.
Colombia	**54**	**29**	Core safety, animal capture, & sampling skills and protocols; lab safety & methods; One Health; Conservation Medicine; GAINS system and data management.
Mexico	**24**	**12**	Core safety, animal capture, handling & sampling skills and protocols; lab safety & methods; PPE Use & biosafety; disease modeling; animal care and use protocols; lab diagnostic techniques.
Peru	**198**	**?**	Core safety, animal capture, & sampling skills and protocols; PPE Use & biosafety; surveillance; zoonotic disease risks from wildlife trade and consumption; wildlife regulations, wildlife management and disease monitoring; sample collection & storage; species ID & health risks; emergency management of spider bites.
Total Trained	**1072**		

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Continued surveillance activities in Bolivia, Brazil, Mexico, Peru, Bangladesh, Cambodia, China, Lao PDR, Malaysia, Indonesia, Thailand, Vietnam, Cameroon, DRC, Gabon,

Republic of Congo, Rwanda, Tanzania, and Uganda.
- Conducted planning and surveys of sites for future intensive surveillance efforts in Brazil, Malaysia, and Uganda for Deep Forest projects.

- **Activity 1.2.2: Summary of Surveillance Sampling and Testing**

Table 3: PREDICT Global Surveillance Summary by Region, Taxa and Interface in GAINS

- Sub-Activity

	# of Animals sampled in Y3Q2	# of Animals sampled to date	# of Samples collected to date	# of Samples collected with at least one final test result	Total # of diagnostic tests run to date
Africa					
Bats	11	3,234	16,521	7,476	20,085
Rodents	2	2,482	7,592	408	960
Non-human Primates	50	2,903	8,316	883	4,345
Other taxa	25	4,163	7,924	548	980
Asia and Southeast Asia					
Bats	294	3,003	20,156	22	22
Rodents	309	1,479	7,879	3	3
Non-human Primates	16	521	9,019	107	137
Other taxa	74	1,600	9,464	695	702
Latin America					
Bats	109	2,697	13,383	0	0
Rodents	0	624	5,592	23	49
Non-human Primates	77	570	4,443	48	111
Other taxa	23	1,743	10,474	427	788
Primary Interface (all regions)					
Free-ranging	180	10,091	61,308	8,182	21,784
Hunter	39	9,161	27,021	1,436	2,552
Market	0	925	3,290	79	81
Sanctuary	8	1,036	5,194	574	2,733
Other High-Risk interfaces	763	3,514	20,846	315	971
Unclassified	0	352	3,104	54	61
TOTALS	**990**	**25,079**	**120,763**	**10,640**	**28,182**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of new technologies**
    - Developed a beta version of the next-generation Animal Mortality Monitoring Program (AMMP) mobile phone application, which was developed and deployed in Uganda (Queen Elizabeth Conservation Area) to facilitate data collection on animal (wildlife and domestic) mortality events in remote areas. The updated application includes GPS, photo-documentation, and data disaster management functions.
    - Expanded infrastructure of CIRMF diagnostic center to improve viral diagnostics capacity via development of a new sequencing array in collaboration with the Pasteur Institut, France.
    - Implemented and optimized an assay for serological diagnosis of DBS samples and generated SOP describing the process.
    - Solidified a relationship with a commercial sequencing company (Macrogen Europe), for confirmation of PCR positive samples.
    - Continued to develop a smartphone PREDICT application for field data entry that can be synced with GAINS (Cameroon and Tanzania).

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 2):**
    - Serological testing of close contacts of Mangala virus cases (new rhabdovirus discovered as part of PREDICT activities) revealed additional putative asymptomatic cases in the nurse who transported the survivor and the wife of this patient.
    - Retroviruses (SFVs) identified in primate species where retroviruses have not previously been detected.
    - Identified potential new reservoirs of PTLV/HTLV.
    - In addition to virus family level molecular assays, specific samples were identified for further pathogen discovery by deep-sequencing in the laboratories of PREDICT US collaborators:
      - Tissues from atypical swine mortality
      - Historical viral hemorrhagic fever illnesses of unknown etiology (tested negative for all known VHF viruses)
      - Free-range wildlife from priority taxa

Table 4: PREDICT Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Comments or other Pathogen discovery	Country	Approved by Government for release (yes or no)
1200 bat samples	Columbia	Family level PCR	*Hantaviruses,* Paramyxoviruses, Astroviruses, Influenza, Herpes	Confirmation of Results Pending	-	Bangladesh	no
50 NHP, 25 rodent and 25 bat samples	Columbia	Family level PCR	Filoviruses, Hantaviruses, Herpesviruses, Coronaviruses, Astroviruses, Bocaviruses, Influenza, Flaviviruses, Adenoviruses, Polyomaviruses Paramyxoviruses Poxviruses, Retroviruses	Confirmation of Results Pending	-	Malaysia	no
22 NHP samples	INRB/PREDICT	Immunodiffusion and PCR	Alphaviruses, retroviruses	Confirmation of Results Pending	–	DRC	no
8 human samples (outbreak follow-up)	INRB/PREDICT and UCSF	Immunodiffusion and neutralization	Alphaviruses and novel rhabdovirus	Confirmation of Results Pending	Mangala virus serology aids in confirmation of transmissibility of this novel virus	DRC	no
5 swine samples (derived from die-off with hemorrhagic signs)	PREDICT Gabon Laboratory	Real-Time PCR, PCR	Crimean Congo Hemorrhagic Fever, Ebola-Zaire, Ebola-Ivory Cost, Ebola-Bundi, Marburg virus, West Nile Virus, O'Nyong Nyong Virus, yellow fever virus, Rift Valley Fever and Zika Virus, Coronavirus (4 types : OC43, HKU1, 229E, NL63), Herpes virus and Paramixoviruses	Negative	Submitted for deep-sequencing	Gabon	no

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Comments or other Pathogen discovery	Country	Approved by Government for release (yes or no)
57 Rodent samples	GVFI-Yaounde	PCR	Arenaviruses, Hantaviruses, Alphaviruses	Negative	-	Cameroon	no
NHPs	GVFI-Yaoundé	PCR	Parvoviridae, Plasmodium, PTLV, SFVs (POL and LTR), SIV	Confirmation of Results Pending	-	Cameroon	no
Other*	GVFI-Yaounde	PCR	Plasmodium, PTLV3, PTLV4, SFV	Confirmation of Results Pending	-	Cameroon	no
166 NHP samples	CII	PCR	Bocaviridae, Flaviviviridae, Filoviridae, Paramyxoviridae, Poxviridae, Coronaviridae, Herpesviridae	Confirmation of Results Pending	-	Rep of Congo	no
667 bat samples	Institute Pasteur Cambodia	Cell-inoculation. RT-PCR and qPCR	Flavivirus, Henipaviruses, Coronavirus, Astroviruses, Lyssaviruses, Filoviruses, Paramyxoviruses, , Astroviruses, ,	Confirmation of Results Pending	-	Cambodia	no
144 rodent samples	Institut Pasteur du Cambodge (IPC)	RT-PCR	Hantaviruses Arenaviruses	Negative		Cambodia	no
20 avian samples	Hanoi University of Agriculture (HUA)	Conventional PCR using PREDICT protocols	Flaviviridae	Negative		Vietnam	no
51 rodent samples	Hanoi University of Agriculture (HUA)	Conventional PCR using PREDICT protocols	Arenaviridae Flaviviridae	Negative		Vietnam	no
1 carnivore sample	Hanoi University of Agriculture (HUA)	Conventional PCR using PREDICT protocols	Flaviviridae	Negative		Vietnam	no
43 bat samples	IBMB-UMSA	Conventional and nested RT-PCR	flavivirus, coronavirus, arenavirus and filovirus	Pending	Pending	Bolivia	no

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Comments or other Pathogen discovery	Country	Approved by Government for release (yes or no)
75 NHP samples	IBMB-UMSA	RT-PCR	Arenavirus, Flavivirus	Confirmation of Results Pending	-	Bolivia	no
1,001 NHP samples	US NAMRU-6; INS	Conventional and nested RT-PCR	Filovirus, paramyxovirus, flavivirus and coronavirus	Pending	Pending	Peru	no
69 bat samples	WHO-cc Chula	PCR	Coronaviruses	Confirmation of Results Pending	-	Thailand	no
96 rodent samples	WIV	RT-PCR	Astroviridae	Confirmation of Results Pending	-	China	no
6 other spp samples	WIV	RT-PCR	Astroviridae	Confirmation of Results Pending	-	China	no
75 bat samples	GDEI	PCR	Hantavirus	Confirmation of Results Pending	-	China	no

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Optimize surveillance data management system**
    - Finalized the test & test results data import Excel template and upload process to include the new fields Interpretation and Test Status.
    - A process for reporting to the lab team was developed, and a new test & results system for GAINS was tested and optimized. Email reports will be sent out to the lab team bi-weekly, listing any new positive test results to be interpreted prior to distribution to governments for data release approval.
    - The specifications for updating test & test results data in GAINS were drawn up, approved, and further developed. Beta testing has been performed on the module, and it should be live in GAINS within the next month.
    - Tested the newly developed genomic sequencing data entry & search modules in the GAINS website.
    - Added a new update process to amend surveillance events already submitted to the GAINS database.
    - Added the PREDICT hotspot layer to the Surveillance Data Mapping tool on the GAINS website.

- Sub-activity 1.4.2: **Establish global open access to database and procedure for dissemination of knowledge**
  - Evaluated the software package Geneious, a bioinformatic tool that combines DNA and protein analysis information, for use in release of detailed data.

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Communication and integration with other relevant agencies about PREDICT strategy and successes**
    - Presented at the International Conference on Emerging Infectious Diseases, and met with the CDC/OID/NCEZID group to discuss potential future EPT+ projects; participated in the Editorial Board meeting; and met with the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) (b)(6) (b)(6)
    - Attended the NCEZID-PREDICT SME Modeling meeting, and met with collaborators from PREVENT to discuss their participation in the Deep Forest Project.
    - Traveled to Indonesia to launch PREDICT; held training workshops and met with ministry and other partners.
    - Met with CDC in Atlanta to discuss possible collaborations in human-animal surveillance.
    - Met with PREVENT collaborators to finalize the human-wildlife contact survey.
    - Presented PREDICT at the International Union for Conservation of Nature (IUCN) Species Survival Commission Chairs meeting, and in collaboration with RESPOND, hosted and presented at a session on wildlife disease surveillance, One Health, and wildlife disease risk analysis.
    - Participated in Thailand-specific EPT meeting with USAID in Bangkok (RDMA-organized).
    - Attended the EPT quarterly partner meeting in Washington DC; held additional meetings with CDC and IDENTIFY.
    - Attended the OIE Scientific Commission on Animal Diseases with IDENTIFY partners.
    - Attended National Science Foundation (NSF) Ecology of Emerging Infectious Diseases Conference.
    - Attended the Institute of Medicine (IOM) forum on Public Health.
    - Contributed to a working group aimed at developing a comprehensive research and

educational agenda for One Health in Atlanta led by Emory University and CDC.

- Participated and gave presentation on PREDICT at CDC Global Disease Detection (GDD) annual meeting, and held discussions with GDD leadership on potential for joint PREDICT-GDD projects.
- Hosted a Chinese delegation from livestock ministries and animal health in Davis and introduced them to PREDICT and EPT.
- Attended “Inception Workshop on Partnership of Global Animal Health and Biosecurity Initiatives” in Bangkok organized by FAO and Department of Agriculture, Fisheries and Forestry, Australia.
- Attended "International Conference for Veterinary Services 2010: Asia Web for World Food Security" in "One Health in Motion: Models for One Health Practices" in Bangkok organized by FAO and ASEAN.
- Attended Second Thailand National One Health Forum “Strengthen the network and let’s move forward” organized by RESPOND.
- Traveled to Kathmandu, Nepal for initial scoping visit where PREDICT team met USAID Mission and senior officials at the Ministry of Health, Ministry of Agriculture, Ministry of Parks and Wildlife Conservation, among others, to provide an overview and explore project development in Nepal. Also met with National Trust for Nature Conservation and toured–laboratory facilities at the Center for Molecular Dynamics, National Zoonoses and Food Hygiene Research Center, and AFRIMS/Walter Reed Research Unit Nepal (WARUN). At a joint meeting with Ministry of Agriculture/Department of Livestock Services, National Trust for Nature Conservation, Ministry of Parks and Wildlife Conservation, and FAO, discussion focused on how PREDICT could provide the opportunity for focal projects on which the ministries could work together on zoonotic disease detection and assist with wildlife veterinary training and long-term laboratory capacity building.

LOW 2: Risk Determination

- **Activity 2.1: Develop risk filter strategy**

  - Sub-activity 2.1.1: **Develop a conceptual and structural framework for Extractive Industry work**
    - Continued collaborating with the Extractive Industry Working Group (EIWG) to complete the

refinement of the risk-screening tool for zoonotic diseases. The new risk screening tool and accompanying narrative are designed to integrate with existing impact assessment templates and guidelines developed and promoted by the International Finance Corporation, World Bank, and industry advocacy groups like the International Council on Mining and Metals (ICMM).

- Supported the development of EIWG outreach and advocacy materials, including a brochure targeting zoonoses and infectious diseases in the mining sector that will be featured on the ICMM website, and the expansion of a white paper outlining current knowledge of zoonoses and emerging infectious disease risks to extractive industries from French Equatorial Africa to Sub Saharan Africa.
- Developed a new risk assessment methodology and structure, and the team is refining content for a beta version of the tool expected for release in quarter 4. This version of the risk tool will support qualified ranking of risks from wildlife zoonoses to the extractive industry sector, allow field validation of tool output for ongoing refinement, and enable users to target specific risk factors in monitoring and risk mitigation planning.

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Sub-activity 2.2.1: **Refine and test geographical and temporal 'hotspot' models**
    - Completed comparative analysis examining the proposed drivers of disease outbreaks using gridded data on human conflict, public health measures, wildlife trade, human water security, cropland, pasture, population growth, livestock distribution, and mammal species richness.
    - Began analysis using occupancy modeling to predict the probability of detecting a disease outbreak.
    - Began developing methods to increase computational efficiency of models.

  - Sub-activity 2.2.2: **Iteratively improve datasets**
    - Obtained new datasets on mammal species richness and meat consumption for analysis examining drivers of disease outbreaks.
    - Gridded new time series datasets on mining, migration, and climate variability to be used in the EID hotspots model.
    - Enabled a new online platform to update the EID database.

- Updated the structure of the EID database. New features added: spatially enabled and grid support.

- Sub-activity 2.2.3: **Design a 'Global Vulnerability' modeling strategy**
  - Finalized a standard survey approach in collaboration with PREVENT to assess and quantify human-wildlife contact rates in different disturbance gradients as part of the Deep Forest Project.
  - Completed a model simulating evolution of viruses in the wildlife trade.

AFRICA

CAMEROON

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Participated, as member of the technical secretariat, in a development workshop, pre-validation meeting, and validation meeting for the National Program on the Control and Fight against Emergent and Re-emergent Zoonoses organized by the Ministry of Livestock, Fisheries and Animal Industry at the invitation of the Minister of Livestock.
    - Wildlife technician working in Cameroon successfully completed requirements for Masters in Science (Animal biology: applied ecology).

    b) **Laboratory Improvements**
    - Successfully tested field-ready Cepheid SmartCycler Real Time PCR in lab setting, ready for deployment for field-testing.
    - Hired lab coordinator to streamline lab work and sample flow to improve sample throughput.
    - Attended the validation meeting for the Network of National Laboratories held by the Cameroon Ministry of Health February 1-3, 2011;
    - Implemented a new beta-actin (housekeeping gene) protocol for rodents and bat samples.
    - Registered with Macrogen Europe, a commercial sequencing company, for confirmation of PCR positive samples.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**

Summary of Surveillance Activities and Testing in GAINS to date:

Cameroon	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	436	3596	0	0	233	260	29	895
Hunter	189	446	0	0	121	123	5	274
Rodents								
Free-ranging	110	998	0	0	58	58	0	178
Hunter	844	1214	0	0	100	100	0	139
Non-human Primates								
Free-ranging	142	13	134	0	0	0	0	1
Hunter	696	1017	0	0	27	27	2	70
Sanctuary	884	4374	0	0	550	563	120	2696
Other taxa								
Free-ranging	128	457	0	0	3	3	0	3
Hunter	2368	2625	0	0	64	64	0	127
Sanctuary	19	50	0	0	5	5	0	5
TOTALS	**5816**	**14790**	**134**	**0**	**1161**	**1203**	**156**	**4388**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Tested mobile application for field data collection on smartphones and formulated recommendations for improvement.

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

- Examined post mortem tissue samples from non-human primates for Parvoviruses, PTLV, SFV and SIV. A number tested positive and findings will be confirmed through sequencing.

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Rodents	GVFI-Yaounde	PCR	Arenaviruses	Negative	-	Cameroon	No
Rodents	GVFI-Yaounde	PCR	Hantaviruses	Negative	-	Cameroon	No
Rodents	GVFI-Yaounde	PCR	Alphaviruses	Negative	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	Parvoviridae	Result Confirmation Pending	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	Plasmodium	Result Confirmation Pending	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	PTLV	Result Confirmation Pending	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	SFV (POL and LTR)	Result Confirmation Pending	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	SIV	Negative	-	Cameroon	No
Other*	GVFI-Yaounde	PCR	Plasmodium	Result Confirmation Pending	-	Cameroon	No
Other	GVFI-Yaounde	PCR	PTLV3	Negative	-	Cameroon	No
Other	GVFI-Yaounde	PCR	PTLV4	Negative	-	Cameroon	No
Other	GVFI-Yaounde	PCR	SFV	Result Confirmation Pending	-	Cameroon	No

***** Due to a sample selection error in the laboratory, a number of samples from other taxa (carnivores, rodents, pangolins) were extracted and analyzed for NHP microbes. We have now put in place a system whereby all extractions are cross-referenced as the technicians proceed rather than assuming pre-selected samples have been appropriately organized by taxa.

- **Activity 1.5 Program Management;**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Promoted (b)(6) taking on more responsibility within the PREDICT program.
    - Promoted (b)(6) who will take on cross-site coordination within Central Africa.

  - Sub-activity 1.5.2: **Communication**
    - Visited US Ambassador in Cameroon to introduce the new Laboratory Coordinator.
    - Met regularly with Cameroon EPT group partners to coordinate in-country activities (b)(6) (b)(6)
    - Communicated with the new Minister for Wildlife and received written permission to publicly release 2010-11 laboratory findings.
    - Met separately with the Minister of Livestock and the Secretary of State for Pandemics and Epidemics at the Ministry of Public Health to discuss lab progress, promote the one health surveillance strategy, and to reinforce the ability of PREDICT staff in Cameroon to support outbreak responses.
    - Received a visit from staff from the Cameroon National Veterinary Laboratory (LANAVET) (Garoua, Cameroon), part of Ministry of Livestock, and exchanged ideas for collaborative research and the establishment of a laboratory network in Cameroon.

LOW 3: Outbreak Response Capacity Building

- Provided information to the Ministries of Health and Livestock on Arenavirus outbreak preparedness and on testing relevant to Arenavirus surveillance during an ongoing outbreak of Lassa fever in Nigeria (over 400 cases and 40 deaths). In addition, we informed the Ministry of the capacity within the network of PREDICT partners to understand and investigate Lassa Fever outbreaks.
- Received field containment devices that will complete the mobile laboratory requirements for effective outbreak response preparedness.

DEMOCRATIC REPUBLIC OF CONGO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**

    - Visited new communities in very remote places in three health zones, Kole, Lomela and Tshudi-Loto, located in the Sankuru District, Kasai Oriental Province, where bush meat hunters were enrolled to participate in wildlife surveillance activities. Individuals exposed to wild animals were informed and sensitized on preventing zoonotic diseases by healthy hunting/butchering practices.

    b) **Laboratory Improvements**

    - Trained three individuals (two laboratory technicians from the INRB and one from the PREDICT team) on laboratory techniques including: DNA/RNA extractions from different biological specimens, and serological methods.
    - The Liquid Nitrogen generator was received at INRB, and awaits installation.
    - Received laboratory equipment including PCR machines, Tissue Lyser, centrifuges for RNA/ DNA extractions, and began installation of electricity back-up system to protect diagnostic equipment from electrical failures.
    - Translated laboratory protocols (blood sample processing, field collection of fecal samples from non-human primates, and serologic testing) into French.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Trained a veterinary field technician in wildlife capture and collection of blood samples from bats and rodents.
    - Visited two new sites to expand sampling: 1) Katanga Province (Ankoro health zone in the District of Tanganyika, where non-human primates and small rodents are hunted by

community members), 2) Bandundu Province (Vanga health in the Kwilu District, where people hunt fruit bats for consumption). An MOU will be prepared to add these two sites for collection of wildlife samples;

Summary of Surveillance Activities and Testing in GAINS to date:

DRC	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	49	443	76	0	0	0	0	0
Hunter	4	0	0	0	0	0	0	0
Other High Risk	9	160	0	0	0	0	0	0
Rodents								
Free-ranging	5	94	0	0	0	0	0	0
Hunter	633	0	833	0	0	1	1	2
Other High Risk	1	44	0	0	0	0	0	0
Non-human Primates								
Free-ranging	4	74	0	0	0	0	0	0
Hunter	480	0	586	0	160	160	0	255
Sanctuary	16	138	0	0	5	5	0	26
Other taxa								
Free-ranging	3	59	0	0	0	0	0	0
Hunter	575	0	728	0	6	6	0	9
TOTAL ANIMALS	**1779**	**1012**	**2233**	**0**	**171**	**172**	**1**	**292**
Humans*								
Symptomatic	0	16	0	16	16	16	0	32
Outbreak investigation$^{\Psi}$	0	0	6	0	6	6	0	6
TOTAL HUMANS	**0**	**16**	**6**	**16**	**22**	**22**	**0**	**38**

* Persons tested for Chikungunya and Dengue during the outbreak

$^{\Psi}$ These persons were close contacts of a suspected case of viral hemorrhagic fever in 2009, from whose samples a new Rhabdovirus was suspected.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Implemented, optimized and performed serological diagnosis on DBS and blood samples (from bonobos and humans).

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1 Bonobo sample	INRB-Kinshasa	Immunodiffusion	Chikungunya virus	IgM Result Confirmation Pending	-	DRC	No
2 samples from C. neglectus	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
2 samples from C. ascanius	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
1 sample from P. tholloni	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
1 sample from C. wolfi	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
1 sample from C. aterrimus	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1 sample from A. nigroviridis	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
2 samples from L. aterrimus	INRB-Kinshasa	PCR	SFV	Result Confirmation Pending	-	DRC	No
5 samples from C. ascanius	INRB-Kinshasa	PCR	SFV	Result Confirmation Pending	-	DRC	No
3 samples from C. neglectus	INRB-Kinshasa	PCR	SFV	Result Confirmation Pending	-	DRC	No
3 samples from C. ascanius	INRB-Kinshasa	PCR	SFV	Result Confirmation Pending	-	DRC	No
2 samples from humans	INRB-Kinshasa	Immunodiffusion	Chikungunya virus	IgM Result Confirmation Pending	-	DRC	No
6 samples from human	UCSF San Francisco	Neutralization test	Rhabdoviridae	IgG Result Confirmation Pending	Mangala virus	DRC	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Trained the laboratory manager and staff members on data management, storage and tracking of samples and preparation of data for submission to GAINS.

- **Activity 1.5 Program**

  - Sub-activity 1.5.1: **Significant Change in Project Management**

- Removed the position of field coordinator to improve efficiency; all field teams are now under the direct supervision of the country coordinator.

- Sub-activity 1.5.2: **Communication**
  - Instituted weekly meetings to discuss progress in sample collection and testing as well as any challenges for PREDICT activities.

Partners: University of Lubumbashi School for Veterinary Medicine; "Lola Ya Bonobo" Sanctuary, WWF/CARPO in Bolobo (Bandundu Province), INRB, Ministry of Health

LOW 3: Outbreak Response Capacity Building

- Assisted during an encephalitis outbreak (provisionally thought to be Chikungunya) in Kinshasa. We collected samples from suspected human and NHP (bonobo) cases, tested serum samples for antibodies to Chikungunya and Dengue viruses, met with representatives from the Ministry of Health, Kinshasa Division of Disease Control, and assisted with mosquito trapping (trapping by entomologists from the INRB and USAID) with INRB.
- Participated in the investigation into the etiology of two bonobo deaths at the sanctuary near Kinshasa. We received samples and discussed diagnostic testing of these samples with the lead organization.

PREDICT Outbreak Report Short Form

Summary Information to Report	**Report below:**
Working Name of the Outbreak (Report name if assigned or use name of region and other descriptors)	Human-bonobo paired outbreak
Date of last update of this form (most often today if you are making a change)	April 4, 2012
Inclusive dates (from start of outbreak to end of response – use today as end date if response ongoing)	From January 19 to April 4, 2012
Date of first notification of PREDICT	January 19, 2012
Date of request of support from PREDICT (Number of days from notification to request)	January 20, 2012

Date of initiation of response by PREDICT (Number of days from request to response)	January 20, 2012 (the same day)
Briefly describe the outbreak. Was this an outbreak in humans, in animals (what species)? How many were affected & what was the range of symptoms?	This outbreak was in humans and bonobos. Two bonobos (from the sanctuary) presented with symptoms of fever, rash with an attitude suggestive of joint pain. They were sampled: one was positive by serology; 16 humans presented symptoms (headache, fever, skin rash and joint pain). Some were sampled and tested (see below). Of them, 2 were positive.
What type of assistance did PREDICT provide? Who were the PREDICT personnel involved? Include inclusive dates of PREDICT's involvement in the response.	PREDICT coordinated collection of samples, stored and tested human and animal samples, coordinated with the Ministry of Health and the INRB to send a team of entomologists to trap mosquitoes at the site. - The PREDICT DRC laboratory coordinator received the first suspected case and collected a sample (January 19, 2012) and asked the manager of the bonobo sanctuary (origin of the first case) to collect samples from the sick bonobos and explained what kind of samples to collect; she also asked for serologic tests available at the INRB when the suspicion of Chikungunya virus was made; - The PREDICT DRC laboratory manager collected samples from other suspected cases and tested the samples (from January 25); - The PREDICT country coordinator visited the sanctuary, conferred with INRB, and suggested Chikungunya virus as the etiology of the outbreak (January 24). He also contacted the Deputy Director of Disease Surveillance at the Ministry of Health (January 25) and collected samples from 4 humans (animal keepers). - The PREDICT DRC scientific director organized a meeting with the head of INRB and a team of entomologists from INRB and USAID (January 26). She coordinated the site visit for entomologists, facilitated the logistics for the mission, and made a summary report to the Ministry of Health.
Provide description of how first noticed & date if possible. When was the first official acknowledgement of the outbreak (by which government or other reputable body and date)? When was a response initiated and by whom? Which ministries or NGOs were involved? Who was in charge of the national response?	The first case of suspected Chikungunya was observed in a nurse caring for a young bonobo newly arrived at the sanctuary from the Equator Province (orphan). The PREDICT team was informed by the director of the sanctuary on January 19. The Ministry of Health officially informed the public through a TV show covering the outbreak on February 20, 2012. The response was initiated during the meeting between the Ministry of Health, INRB, entomologists, and PREDICT on January 25. Partners who were involved included: Ministry of Health, INRB, USAID, Ministry of Agriculture, Central Veterinary Laboratory, Ministry of Environment.

Comments on where it started, speed and extent of geographic spread	Three samples were positive for Chikungunya virus, one from a bonobo at the sanctuary and two from humans (one working at the sanctuary and the other from Macampagne neighborhood, who never visited the sanctuary and never left Kinshasa). This outbreak was restricted in the Mont-ngafula and Ngaliema communities of Kinshasa.
If a lab diagnosis and confirmation has been obtained give details, including species, sample type and dates. Where was the diagnosis made? Give number of days between initiation of response and lab confirmation of diagnosis.	1. January 25: 4 human samples and 2 bonobo samples (all serum) were tested: one human and one bonobo positive). 2. Response to the outbreak initiated. 3. January 30: 6 human samples (serum and plasma) tested: all negative. 4. March 12: 6 human samples (serum and plasma) tested: one positive.
Were other EPT partners involved in the response (which ones and how)?	USAID (entomologist).
Summary of the Outcome:	
Did people die? How many?	No
Did animals die? What species & how many?	2 bonobos
Was there a relationship between animals & humans in the disease or its transmission (state suspected or confirmed)?	Unsure

GABON

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Implemented a surveillance project in Libreville and the Haut Ogooue region with 10 health centers.

    b) **Laboratory Improvements**
    - Developed and implemented a new biobank for organization of human and animal samples.

- Trained laboratory technicians on isolation of viral RNA, and analysis of samples via RT-PCR.
- Assisted the Ministry of Health collecting data from provinces and district health officers, with the laboratory served as a reference center supporting the analysis of diagnostic samples.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Conducted one field sampling trip to Franceville to collect rodents (collections have been limited in this quarter due to the restrictions of the rainy season).

Summary of Surveillance Activities and Testing in GAINS to date:

Gabon	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free ranging	2193	7612	0	0	1834	7093	0	18806
Rodents								
Free ranging	193	20	0	0	189	220	0	517
Primates								
	0	0	0	0	0	0	0	0
Other taxa								
Free-ranging	372	370	0	0	372	372	0	374
TOTALS	**2758**	**8002**	**0**	**0**	**2395**	**7685**	**0**	**19697**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Expanded infrastructure of CIRMF diagnostic center to improve viral diagnostics capacity via the development of a new sequencing array in collaboration with the Pasteur Institut, France.

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Identified samples for pathogen discovery by pyrosequencing in US collaborating laboratories: 1) Tissues from atypical swine mortality and 2) Archived specimens from historical viral hemorrhagic fever illnesses of unknown etiology (tested negative for all known VHF viruses).
    - Continued testing human samples for various pathogens, including influenza, coronaviruses, adenoviruses, enteroviruses, parainfluenza virus, RSV, rhinovirus, astroviruses, rotaviruses, norovirus, sapovirus, filoviruses, arenaviruses, alphaviruses, hantaviruses, and bunyaviruses;
    - Aided in identifying a hemorrhagic outbreak by testing samples obtained from a swine die-off with evidence of hemorrhagic pathology.

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)*	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
5 Suidae (4 animals: liver; one animal: spleen, liver, intestine and lung); derived from swine die-off with hemorrhagic signs.	CIRMF	Real-Time PCR, PCR	Crimean Congo Haemorrhagic Fever, Ebola-Zaire, Ebola-Ivory Coast, Ebola-Bundi, Marburg virus, West Nile Virus, O'Nyong Nyong Virus, yellow fever virus, Rift Valley Fever and Zika Virus, Coronavirus (4 types : OC43, HKU1, 229^{E}, NL63), Herpes virus and Paramyxovirus	Negative	Submitted for deep-sequencing Preliminary results suggestive of: Porcine Circovirus 2	Gabon	No

* Laboratory testing has been hindered substantially by a prolonged strike among the laboratory support staff at CIRMF, which has been largely blocking access and deliveries to the facility

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Hired new Laboratory Coordinator
  - Sub-activity 1.5.2: **Communication**
    - Participated as part of the scientific council composed of 17 scientists specialized in different fields of emerging diseases, from the Gabonese Ministry and various Health Centers in Gabon
    - Country Coordinator met with WHO Brazzaville.
    - Country Coordinator with (b)(6) (b)(6) DRC to continue collaboration and develop new projects.

Partners: International Center for Medical Research (CIMRF); National Parks System; Ministry of Health for Gabon; INRB, DRC; Institut Pasteur of Paris, France; UCSF

PREDICT Outbreak Report Short Form

Summary Information to Report	Report below:
Working Name of the Outbreak (Report name if assigned or use name of region and other descriptors)	Franceville Swine Die-off Associated with Hemorrhagic Signs
Date of last update of this form (most often today if you are making a change)	3 April, 2012
Inclusive dates (from start of outbreak to end of response – use today as end date if response ongoing)	13 February 2012- 7 March 2012
Date of first notification of PREDICT	22 February 2012
Date of request of support from PREDICT (Number of days from notification to request)	3 days
Date of initiation of response by PREDICT (Number of days from request to response)	2 days
Briefly describe the outbreak. Was this an outbreak in humans, in animals (what species)? How many were affected & what was the range of symptoms?	This outbreak concerns Suidae, from a large farm located in Franceville, Gabon. About 7-8 swine have been affected, animals did not show any symptoms before dying, however the autopsies revealed hemorrhages throughout the body.
What type of assistance did PREDICT provide? Who were the PREDICT personnel involved? Include inclusive dates of PREDICT's involvement in the response.	PREDICT provided assistance directly in the field by organizing a small survey to assist in the necropsies and collect samples for virus screening. The PREDICT laboratory in Gabon was involved from 15 February 2012 to 7 March 2012.
Provide description of how first noticed & date if possible. When was the first official acknowledgement of the outbreak (by which government or other reputable body and date)? When was a response initiated and by whom?	The first case was detected following several swine deaths (13 February 2012), and then this observation was reported to the PREDICT country coordinator in Gabon (22 February 2012). This has not been reported to any government or reputable body since the laboratory results have not been confirmed. A response was initiated on 22 February 2012 by the PREDICT laboratory in Franceville, Gabon.

Which ministries or NGOs were involved? Who was in charge of the national response?	
Comments on where it started, speed and extent of geographic spread	It started in a swine farm in Franceville, and did not spread or extend geographically.
If a lab diagnosis and confirmation has been obtained give details, including species, sample type and dates. Where was the diagnosis made? Give number of days between initiation of response and lab confirmation of diagnosis.	Samples tested negative for all usual suspects. Initial deep-sequencing results suggest Porcine Circovirus 2 as a possible etiological agent, but analysis continues given the high prevalence of this agent in swine populations.
Were other EPT partners involved in the response (which ones and how)?	No
Summary of the Outcome:	
Did people die? How many?	No
Did animals die? What species & how many?	Yes between 7-8 swine died (Suidae).
Was there a relationship between animals & humans in the disease or its transmission (state suspected or confirmed)?	No human cases were detected in relation to this outbreak, although employees were in direct contact with the diseased animals.

REPUBLIC OF CONGO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    b) **Laboratory Improvements**
    - Trained lab staff on RNA extraction from tissues and cold chain management.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**

Summary of Surveillance Activities and Testing in GAINS to date:

RoC	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	203	1606	0	0	0	0	0	0
Other High Risk Interfaces	52	0	293	0	20	30	0	110
Rodents								
Free-ranging	9	89	0	0	0	0	0	0
Hunter	29	174	0	0	0	0	0	0
Other High Risk Interfaces	129	19	1091	0	17	29	0	124
Non-human Primates								
Free ranging	129	6	0	0	1	1	0	372
Hunter	52	221	0	0	0	0	0	0
Other High Risk Interfaces	11	105	0	0	0	0	0	0
Other taxa								
Free-ranging	2	6	0	0	0	0	0	0
Hunter	179	929	0	0	14	19	0	76
Other High Risk Interfaces	124	494	523	0	14	59	0	246
TOTALS	**919**	**3649**	**1907**	**0**	**66**	**138**	**0**	**928**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Introduced use of TissueLyser for sample preparation.

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
166 Primate feces	Center for Infection and Immunity – Mailman School of Public Health, Columbia University (CII)	PCR	Bocaviridae	Negative	-	Rep of Congo	No
166 Primate feces	CII	PCR	Flaviviviridae	Negative	-	Rep of Congo	No
22 Primate feces	CII	PCR	Filoviridae	Negative	-	Rep of Congo	No
166 Primate feces	CII	PCR	Paramyxoviridae	Negative	-	Rep of Congo	No
166 Primate feces	CII	PCR	Poxviridae	Negative	-	Rep of Congo	No
166 Primate feces	CII	PCR	Coronaviridae	Results Pending Confirmation	-	Rep of Congo	No
166 Primate feces	CII	PCR	Herpesviridae	Results Pending Confirmation	-	Rep of Congo	No

LOW 3: Outbreak Response Capacity Building

PREDICT Outbreak Report Short Form

Summary Information to Report	Report below:
Working Name of the Outbreak (Report name if assigned or use name of region and other descriptors)	Etoumbi outbreak Feb 2012

Date of last update of this form (most often today if you are making a change)	Feb 16, 2012
Inclusive dates (from start of outbreak to end of response – use today as end date if response ongoing)	Feb 10-Feb 15th, 2012
Date of first notification of PREDICT	Feb 14th, 2012
Date of request of support from PREDICT (Number of days from notification to request)	Same day
Date of initiation of response by PREDICT (Number of days from request to response)	1 day
Briefly describe the outbreak. Was this an outbreak in humans, in animals (what species)? How many were affected & what was the range of symptoms?	A large number of people drank the free alcohol at a village celebration. Numerous people then began complaining of excessive fatigue, followed by vision loss, abdominal discomfort, vomiting, convulsions and death. The alcohol was purchased through back channels of a brewery and was provided in jerry cans. Ten people had died by Feb 14 (exact dates of deaths unknown) and others were hospitalized.
What type of assistance did PREDICT provide? Who were the PREDICT personnel involved? Include inclusive dates of PREDICT's involvement in the response.	Under a long-standing partnership with the National Public Health Lab ((b)(6)) and an MOU signed between relevant parties in 2010, PREDICT staff has a mandate to conduct wildlife health surveillance in the RoC. In addition, PREDICT staff is officially recognized in RoC's National Ebola Response Plan, specifically named to conduct wildlife health surveillance. PREDICT staff ((b)(6)) ((b)(6)) informed the National Public Health Partners on Feb 14 of the incoming information regarding the outbreak and their intention to conduct wildlife surveillance should it be indicated. Although at this point the exact cause of the epidemic was not confirmed, PREDICT staff was prepared to start animal investigations if infectious diseases appeared to be the cause of the outbreak. On 15 Feb, PREDICT staff ((b)(6)) met with regional government officials and the Congo Red Cross, where local government officials announced the cause of the epidemic as alcohol poisoning. Animal investigations were not conducted in connection with the event.
Provide description of how first noticed & date if possible. When was the first official acknowledgement of the outbreak (by which government or other reputable body and date)? When was a response initiated and by whom? Which ministries or NGOs were involved? Who was in charge of the national response?	Feb 14, the Sous-prefect of Etoumbi village informed the director of the African Parks Network, who manages the nearby Odzala Kokoua National Park (OKNP). The Sous-prefect suggested, at that time, that it was likely mass alcohol poisoning. The director of OKNP notified PREDICT staff of the event. PREDICT staff then notified contacts at the National Public Health Laboratory, informing them that they would be visiting the village to rule out wildlife involvement, as part of their official role in wildlife health surveillance (see above). The Congolese Red Cross was already at the village on Feb 15th, when PREDICT staff arrived. Other than the Red Cross, it is unknown who was involved in any national response.
Comments on where it started, speed and extent of geographic spread	Started in Etoumbi village, one man reported fled to the town of Makoua, about 80 km away, where he subsequently died.

If a lab diagnosis and confirmation has been obtained give details, including species, sample type and dates. Where was the diagnosis made? Give number of days between initiation of response and lab confirmation of diagnosis.	Unknown if Lab diagnosis was made.
Were other EPT partners involved in the response (which ones and how)?	Not aware if other partners involved.
Summary of the Outcome:	
Did people die? How many?	10 deaths
Did animals die? What species & how many?	No evidence of animal deaths
Was there a relationship between animals & humans in the disease or its transmission (state suspected or confirmed)?	N/A

RWANDA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

a) **National or Regional Surveillance System Improvements**

- Invited as wildlife health expert to accompany Ministry of Health and Ministry of Agriculture officials on preliminary investigations into reports of disease in human and domestic animal populations:
  - Ministry of Health, Gisagara sector: Reports of human fatalities, later determined by MoH to be due to local beer poisoning
  - Ministry of Health, Rusizi sector: Suspected human cholera cases
  - Ministry of Agriculture, Bugesera sector: Suspected Contagious Bovine Pleuropneumonia outbreak in cattle.
- Invited to serve as wildlife health expert to Rwanda Government's One Health Steering Committee, comprised of representatives from the Ministries of Health and Agriculture and

the Rwanda Development Board/Tourism and Conservation Department. PREDICT's role has been to provide expertise on wildlife health and disease surveillance as it pertains to plans and activities of the committee, and to assist with improving lines of communication among members on animal (domestic and wildlife) diseases reporting.

b) **Laboratory Improvements**

- Hired Rwanda's first dedicated wildlife virology laboratory technician to be based at the Rwanda Agricultural Board's Animal Veterinary Services Facility in Rubilizi, Kigali.
- Provided training to the wildlife virology laboratory technician on protocols for raw sample processing and extraction.
- Provided laboratory equipment and supplies to enhance laboratory capacity for wildlife sample processing and extraction (e.g. gel documentation system, extraction kits, primers).

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Sampled 10 wild human-habituated chimpanzees in Nyungwe National Park.
    - Sampled 15 wild baboons living in and around human dwellings at Akagera National Park.
    - Sampled 10 bats trapped in subsistence agriculture areas in Rwamagana sector.

Summary of Surveillance Activities and Testing in GAINS to date:

Rwanda	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	80	368	0	0	0	0	0	0
Rodents								
Free-ranging	229	0	367	0	0	0	0	0
Other High Risk Interfaces	35	0	70	0	0	0	0	0

Non-human Primates								
Free-ranging	62	4	328	0	22	46	46	323
Hunter	11	57	0	0	10	44	44	309
Other High Risk* Interfaces	31	114	258	0	0	0	0	0
Sanctuary	2	39	0	0	0	0	0	0
Other taxa								
Free-ranging	118	106	95	0	1	2	2	14
Hunter	4	8	0	0	4	8	8	56
Other High Risk* Interfaces	6	0	12	0	0	0	0	0
TOTALS	**578**	**696**	**1130**	**0**	**37**	**100**	**100**	**702**

* Note: the interface categories for these data will be revised/refined; “Other High Risk Interfaces” is primarily ecotourism.

- Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
35 primates (swabs, sera, blood, urine, tissue, and pericardial fluid)	Center for Infection and Immunity, Mailman School of Public Health, Columbia University	Sequencing	All viral nucleic acid	Testing underway	-	Rwanda	
38 primates (swabs, blood, buffy coats	UC Davis Wildlife Health Center Laboratory	PCR	PREDICT Viral Family Testing	Testing underway	-	Rwanda	

TANZANIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National Surveillance System Improvements**

    - Trained on operating and maintaining the liquid nitrogen generating plant and safe handling of liquid nitrogen.
    - Trained sample collectors from nine villages on biosafety, sample collection, sample transport, and data recording as part of a newly introduced bushmeat surveillance effort in villages surrounding Ruaha National Park and protected areas.

    b) **Laboratory Improvements**

    - Continued training laboratory technicians on RNA/DNA extraction and PCR.
    - Established the bar coding system in the laboratory for specimen tracking, linking field and lab tracking and information management systems.
    - Initiated pilot testing of specimen transfer between the Tanzania laboratory and regional laboratory in Uganda.
    - Initiated training and mentorship of the lab team by the molecular virologist from UC Davis; training will continue through quarter 3.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Continued media surveillance program, and submitted five articles from local language print media to GAINS. The media surveillance program is now fully functional, with articles submitted to GAINS posting publicly on HealthMap, extending HealthMap's reach to non-digital media in Tanzania.
    - Initiated a one-month pilot surveillance project targeting bushmeat from informal bushmeat markets in villages surrounding Ruaha National Park and protected areas. Sampling was

conducted in 9 villages identified as hubs for bushmeat hunting and trading resulting in 48 samples collected from 24 animals.

Summary of Surveillance Activities and Testing in GAINS to date:

Tanzania	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Other high risk interfaces*	11	56	0	0	0	0	0	0
Rodents								
Other high-risk interfaces*	200	1187	0	0	0	0	0	0
Hunter	6	0	36	0	0	0	0	0
Non-human Primates								
Hunter	9	0	50	0	0	0	0	0
Other taxa								
Other high-risk interfaces*	6	38	0	0	0	0	0	0
Hunter	197	0	1089	0	0	0	0	0
TOTALS	**429**	**1281**	**1175**	**0**	**0**	**0**	**0**	**0**

* The interface categories for these data will be revised/refined; “Other High Risk Interfaces” are primarily in and around people’s homes (peri-domestic) and raiding crops

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Began pilot testing a mobile application designed to assist field teams with the electronic capture of real time field data, and automated synchronization of captured field data with the GAINS server. The beta version of the application is being modified based on field team feedback from Tanzania and Cameroon.

- Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 2):**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
20	Sokoine University of Agriculture	PCR	Arenavirus	Testing Underway		Tanzania	

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Initiated electronic sample tracking and management system for the field and lab teams.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.1: **Significant Change in Project Management.**
    - Completed registration of project foreign veterinarians with the Veterinary Council of Tanzania.

  - Sub-activity 1.5.2: **Communication**
    - Attended the EPT IDENTIFY meeting in Dar es Salaam, and provided an overview of PREDICT activities and operations in country.
    - Shared new EPT IDENTIFY contacts for East Africa with the in-country team; combined with the introductory meetings with IDENTIFY this quarter, progress was made to support greater EPT program coordination in Tanzania.

UGANDA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Assisted in "dry-run" test of methods for shipment of extracted wildlife samples from Tanzania to Uganda for PREDICT viral family testing at Makerere University Walter Reed Project (MUWRP) Laboratory, to assess feasibility of MUWRP as regional diagnostic laboratory for emerging wildlife pathogen testing.

    b) **Laboratory Improvements**
    - Provided laboratory equipment and supplies to enhance MUWRP Laboratory's capacity for high-volume through-put of samples (Mini-mag™ extraction robot; extraction kits, lysis buffer).

  - Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
    - Completed and resubmitted the Rapid Survey Tool to assess progress in building capacity for wildlife zoonotic disease surveillance.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Updated in-country wildlife SMART surveillance plan to include plan to sample bats in caves in Mgahinga National Park that are slated for ecotourism activities.
    - Collected samples from olive baboons, rodents, and bats in Queen Elizabeth Conservation Area, and from mountain gorillas in Bwindi Impenetrable National Park.
    - Received reports of 46 wildlife mortality events representing one or two carcasses per report. Through the Animal Mortality Monitoring Program in Queen Elizabeth Conservation Area.

Summary of Surveillance Activities and Testing in GAINS to date:

(Country)	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Unclassified	8	0	0	0	0	0	0	0
Rodents								
Unclassified	1	0	0	0	0	0	0	0
Free-ranging	13	0	0	207	0	0	0	0
Other High Risk Interfaces*	45	174	0	0	0	0	0	0
Primates								
Free-ranging	14	2	72	0	3	6	6	41
Other High Risk Interfaces	314	20	356	0	3	8	8	56
Unclassified	15	0	0	0	0	0	0	0
Other taxa								
Free-ranging	6	0	41	12	0	0	0	0
Market	2	0	6	0	0	0	0	0
Other High Risk Interfaces*	50	194	0	62	0	0	0	0
TOTALS	**468**	**390**	**475**	**281**	**6**	**14**	**14**	**97**

*The interface categories for these data will be revised/refined; “Other High Risk Interfaces” is primarily ecotourism

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Ensured that 20 of 30 park outposts have at least one mobile phone, and that all outpost personnel have been trained to use the mobile phones and data forms to report observed animal mortality for the Animal Mortality Monitoring Program.

- Completed development and deployment (on five mobile phones) in Queen Elizabeth Conservation Area of a beta version of a new mobile phone application that has the capacity to automatically capture GPS data and upload a photograph of an animal mortality event, in addition to filling out custom data forms, for animal mortality reporting.

- Sub-activity 1.3.2: **Pathogen detection and discovery:**
  - Submitted wildlife specimens to MUWRP to begin PREDICT viral family testing

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
63 rodent (blood, feces, urine)	MUWRP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
336 primate (incl. blood, feces, serum, plasma, mucosal swabs)	MURWP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
1 bat (oral swab)	MURWP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
1 bird (blood)	MUWRP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
6 wild hoofstock/suids (blood and oral swabs)	MUWRP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
4 domestic livestock (blood and feces)	MUWRP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Selected wildlife sampling sites across varied land-use gradients in and around Bwindi Impenetrable National Park to collect data for Deep Forest modeling activity.

LOW 3: Outbreak Response Capacity Building:

- Invited to assist/participate in outbreak preparedness: Field Simulation Exercise, Avian Influenza National Task Force, Mukono District: Tested and strengthened integrated national response for prevention and control of avian influenza outbreaks.
- Invited to assist/participate in outbreak preparedness: National Task Force on Epidemic Preparedness and Response monthly meetings / discussions and planning for a National Response plan for the Nodding Disease Syndrome in Northern Uganda.

SOUTHEAST ASIA

CAMBODIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Provided field training of surveillance activities to National Veterinary Research Institute (NaVRI) veterinarian and vet students from Royal Univ. of Agriculture.
    - Provided input on wildlife disease perspectives to National Zoonoses Policy through Cambodian Zoonotic Technical Working Group (ZTWG).
    - Co-hosted training with Dept. of Animal Health and Production (DAHP) on “Disease

Surveillance at the Wildlife-Human-Livestock Interface" for personnel from NaVRI, 24 Provincial DAHP offices, Forestry Administration (FA), the Ministries of Health and Environment, and the three veterinary schools.

b) **Laboratory Improvements**

- Finalized arrangements with Institut Pasteur du Cambodge (IPC) to host two laboratory technicians from NaVRI to be trained in viral family screening.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Surveyed market and restaurant trade in wild primates (Lorisidae) used for medicines.
    - Obtained approval from 10 ethnic minority village chiefs to sample hunted wildlife.
    - Approval granted by local leaders in Mondulkiri Province to conduct surveys and collect samples from wildlife hunted by their communities.
    - Identified future sites to sample insectivorous bat hunted in Phnom Penh, restaurants near Phnom Penh trading bats and other key taxa, and fruit bat hunted in rainy season.

Summary of Surveillance Activities and Testing in GAINS to date:

Cambodia	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Hunter	262	0	610	0	0	0	0	0
Unknown	87	340	32	0	0	0	0	0
Rodents								
Hunter	49	0	330	0	0	0	0	0
Primates								
Hunter	13	0	26	0	0	0	0	0
Sanctuary	8	0	51	0	0	0	0	0

Other taxa								
Hunter	347	0	702	0	327	654	0	654
Unknown	1	1	0	0	0	0	0	0
TOTALS	**767**	**341**	**1751**	**0**	**327**	**654**	**0**	**654**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Chiroptera- 340	Institute Pasteur Cambodia	Cell-inoculation. RT-PCR and Hemi-nested PCR	*Flavivirus, Henipaviruses, Coronavirus, Astroviruses, Lyssaviruses, Filoviruses, Paramyxoviruses*	Confirmation of Results Pending	-	Cambodia	NO

Partners: Royal University of Agriculture (RUA).

INDONESIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Launched PREDICT Indonesia Program during training workshop that was attended by government representatives from Ministry of Forestry, Ministry of Agriculture, Ministry of Health, and Coordinating Ministry of People's Welfare.
    - Held 2 meetings with Deputy Minister and Staff from Coordinating Ministry of People's Welfare.
    - Attended RESPOND meeting in Jakarta to discuss the upcoming training by RESPOND in Indonesia: "In-service Training on Zoonotic Disease Outbreak Response."
    - Conducted bat, rodent, and primate training workshop for field teams. Attended by 20 participants from 8 universities and research institutions which cover 5 regions of Indonesia: Aceh (northern part of Sumatra), East Java, Central Java and Yogyakarta, West Java, South Kalimantan and North Sulawesi.

    b) **Laboratory Improvements**
    - Conducted scoping visit to the Indonesia National Institute of Science (LIPI) in Cibinong, to discuss sharing of archived specimens from bats and rodents for pathogen detection and discovery.
    - Conducted scoping visit to the Veterinary Research Institute (Bbalitvet) in Bogor, to discuss sharing of archived specimens from bats they had collected to be analyzed for pathogen detection and discovery.
    - Negotiated with LIPI, Bbalitvet and PRC-IPB to work on MTAs to cover the sharing of the archived samples from each institution to be included in the PREDICT Indonesia program of pathogen detection and discovery.
    - Began ordering necessary reagents and supplies to perform family level testing.
    - Trained research assistant on specimen processing, arbovirus serology, arbovirus cell

culture, RT-PCR of DEN, JE, CHIK, as well as BSL-3 procedures, at USAMC-AFRIMS in Bangkok.
- Submitted study proposal to Eijkman Institute Research Ethics Commission.
- Finalized combined Laboratory Work Plans, including specimen sharing, flow, and testing jointly with CDC.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Evaluated a population of feral long-tailed macaques on Java Island (East Java, Central Java and West Java provinces) to identify potential sampling locations.
    - Conducted visit to wild animal market in Jakarta to survey bats, primates, and birds in close contact with other mammalian species, including people.
    - Finalized agreement for transfer of archived specimens from the Bandung hospitalized study to Eijkman Institute.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Transferred PREDICT family level protocols to Eijkman Institute.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 2):**
    - Finalized strategy for testing of human samples: first tier testing to include Seadornaviruses, Paramyxoviruses, Arenaviruses, Filoviruses, Coronaviruses and Bocaviruses.
    - Finalized strategy for testing archived bat, rodent, and non-human primate samples.
    - Identified 100 archived samples of blood/ serum/ plasma specimens from nonhuman primates to be analyzed for pathogen detection and discovery. MTA is being developed to cover this activity.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**

- Made preliminary plans for USAID mission director to visit with country coordinator and tour facilities
- Updated lead implementing partner on training of staff, laboratory management, study related documents, procurement of supplies and budget issues bi-monthly.

Partners: Institut Pertanian Bogor Primate Research Center (PRC-IPB); Eijkman Institute of Microbiology.

LAO PDR

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National Surveillance System Improvements**
    - Trained Provincial Forestry and Agriculture staff in zoonotic disease surveillance.
    - Trained National Animal Health Centre (NAHC) staff in biosecurity, sampling, species ID.
    - Trained students from the National University in wildlife sampling at the wildlife/human interface in subsistence hunting villages.
    - Collaborated with central NAHC and Provincial Agriculture and Forestry Offices on Workshops and associated activities.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Trained PREDICT staff from Lao and Cambodia and three NAHC staff to perform observation surveys in markets selling wildlife.
    - Collected samples for disease surveillance at 18 markets/locations in 9 provinces

Summary of Surveillance Activities and Testing in GAINS to Date:

Laos	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	86	176	0	0	0	0	0	0
Hunter	108	0	0	0	0	0	0	0
Market	338	0	800	0	0	0	0	0
Other High Risk	260	216	826	0	0	0	0	0
Rodents								
Free-ranging	106	232	0	0	0	0	0	0
Market	156	0	1064	0	0	0	0	0
Hunter	176	0	269	0	0	0	0	0
Other High Risk	478	385	1548	0	0	0	0	0
Primates								
Other High Risk	5	7	12	0	0	0	0	0
Other taxa								
Market	18	0	75	0	0	0	0	0
Free-ranging	52	111	0	0	0	0	0	0
Hunter	50	0	107	0	0	0	0	0
Other High Risk	92	135	242	0	0	0	0	0
TOTALS	**1925**	**1262**	**4943**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
327 Chiroptera	Institut Pasteur du Cambodge (IPC)	RT-PCR for Coronaviruses, Hemi-nested PCR for Astroviruses, RT-PCR for Filoviruses, hemi-nested RT-PCR + Taq Man RT-PCR (genotype 1) + Real-time RT-PCR SYBR Green (other genotypes) for lyssaviruses	*Coronaviruses, Astroviruses, Lyssaviruses, Filoviruses*	All negative for Filovirus and Lyssavirus Confirmation of other Results Pending	-	Cambodia (country of testing)	No
144 Rodentia	Institut Pasteur du Cambodge (IPC)	RT-PCR for Hantaviruses, RT-PCR for Arenaviruses	Hantaviruses Arenaviruses	Negative	-	Cambodia (country of testing)	No

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Hired New Country Coordinator for Lao PDR in January, to replace previous coordinator who moved to Cambodia.
  - Sub-activity 1.5.2: **Communication**
    - Briefed the new US Deputy Chief of Mission in Lao on project workplan and objectives and travelled together to visit sampling sites and observe activities

Partners: National University of Laos (NUoL), Institute Pasteur du Cambodge

MALAYSIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) National or Regional Surveillance System Improvements
    - Assisting with the development of a Zoonosis Technical Working Committee (ZTWC) comprised of Ministry of Health (MOH), DVS, PERHILITAN and PREDICT which will meet at least once every 3 months to discuss project progress and results, and report to the Malaysian Government steering committee on the control of zoonotic diseases.

    b) Laboratory Improvements
    - Finalized negotiations with PERHILITAN and Department of Veterinary Services (DVS) to transfer PREDICT wildlife samples from PERHILITAN to Veterinary Research Institute (VRI) for screening.
    - Received – 80°C Freezers at VRI in Ipoh and Sabah Wildlife Department (SWD) in Kota Kinabalu.
    - Began assisting with the setup of the new lab at VRI dedicated to testing PREDICT samples.
    - Developed protocols for managing lab, samples and work flow.
    - Created a lab plan and timeline with SWD for getting lab operational.
    - Participated in Indonesia PREDICT training and lab protocol exchange.
    - Trained PERHILITAN lab scientist and PREDICT lab and field team scientist at CII, Columbia University for a month in March and April with bat, rodent and primate samples to learn PCR and 454 techniques;

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Malaysia	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	132	640	822	0	0	0	0	0
Rodents								
Free-ranging	68	499	258	0	0	0	0	0
Unclassified	47	0	558	0	0	0	0	0
Primates								
Hunter	84	0	1974	0	1	1	0	1
Other	5	0	121	0	0	0	0	0
Free-ranging	377	0	6380	0	64	106	0	136
Other taxa								
Free-ranging	134	62	1022	0	0	0	0	0
Hunter	256	0	2803	0	0	0	0	0
Sanctuary	15	0	144	0	0	0	0	0
Unclassified	61	0	523	0	23	40	0	47
TOTALS	**1179**	**1201**	**14605**	**0**	**88**	**147**	**0**	**184**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Sequencing results from rodent and bat samples to confirm testing from last quarter are pending.
    - cDNA being screened for viruses on samples shipped to CII, Columbia University for pathogen discovery.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Serum samples from 50 macaques	CII/CUMC	Reverse transcriptase assay, PCR and cloning	Retroviruses – Gammaretrovirus and Lentivirus	Results pending sequencing confirmation	-	Malaysia	No
Serum samples from 25 bats	CUMC	Reverse transcriptase assay	Retroviruses – Gammaretrovirus and Lentivirus	Negative	-	Malaysia	No
Serum samples from 25 rodents	CUMC	Reverse transcriptase assay	Retroviruses – Gammaretrovirus and Lentivirus	Negative	-	Malaysia	No
Pooled cDNA of throat, urine and rectal swab samples from 50 macaques	CII	PREDICT consensus PCR and CII PCR (for influenza A)	Astroviruses (2 protocols), coronaviruses (2 protocols), filoviruses, flaviruses, paramyxoviruses, hantaviruses, herpesviruses, bocaviruses, poxviruses (2 protocols), papillomaviruses, adenoviruses, polyomaviruses and influenza A	Results pending sequence confirmation	-	Malaysia	No

Pooled cDNA of throat, urine and rectal swab samples from 25 bats	CII	PREDICT consensus PCR and CII PCR (for influenza A)	Astroviruses (2 protocols), coronaviruses (2 protocols), filoviruses, flaviruses, paramyxoviruses, hantaviruses, herpesviruses, bocaviruses, poxviruses (2 protocols), papillomaviruses, adenoviruses, polyomaviruses and influenza A	Results pending sequence confirmation	-	Malaysia	No
Pooled cDNA of throat, urine and rectal swab samples from 25 rodents	CII	PREDICT consensus PCR and CII PCR (for influenza A)	Astroviruses (2 protocols), coronaviruses (2 protocols), filoviruses, flaviruses, paramyxoviruses, hantaviruses, herpesviruses, bocaviruses, poxviruses (2 protocols), papillomaviruses, adenoviruses, polyomaviruses and influenza A	Results pending sequence confirmation	-	Malaysia	No
Serum and feces/rectal swab from 14 macaques	CII	Sample prep for Illumina® deep sequencing	Any	Sequencing results pending	-	Malaysia	No
Serum and feces/rectal swab from 18 bats	CII	Sample prep for Illumina® deep sequencing	Any	Sequencing results pending	-	Malaysia	No
Serum and feces/rectal swab from 18 rodents	CII	Sample prep for Illumina® deep sequencing	Any	Sequencing results pending	-	Malaysia	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Sample data entered into GAINS database.
    - Test results entered into GAINS Test Result Spread Sheet.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Continued communication with US Embassy in KL.
    - Meeting with IDENTIFY to discuss lab development at Sabah Wildlife Department.
    - Meeting with RESPOND to discuss PREDICT/RESPOND collaborations in Malaysia.
    - Ongoing communication with SWD to discuss Deep Forest activities.
    - Attended EPT+ meeting in Bangkok to discuss Malaysia activities.

Partners: DVS/VRI; PERHILITAN; MOH; SWD; PREVENT; IDENTIFY.

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Began site selection for the Deep Forest Project.

THAILAND

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**

- Participated in Second Regional Workshop on Collaboration Between Human and Animal Health Sectors on Zoonoses Prevention and Control in Chiang Mai, organized by FAO/OIE/WHO.
- Participated in ASEAN/FAO/OIE/WHO Rabies Workshop, Chiang Mai, organized by FAO/OIE/WHO.
- Presented a lecture on “Bat urine collection in the field” for veterinarians during the "Veterinary Field Epidemiology in Action" workshop on organized by DLD/FAO/OIE/USAID.
- Lectured on “Climate change and health impacts” and “Zoonoses of concern in the region: panel of experts: Rabies and Nipah viruses“ in Training Workshops on Zoonoses and Public Health Response in Savannakhet, Lao PDR, organized by Kenan Institute Asia and USAID.
- Lectured on “Climate change and emerging infectious diseases” in Bangkok organized by Thai Red Cross Society Nurse College.
- Lectured on “Emerging infectious diseases from flood water” in Bangkok organized by Ministry of Science Thailand.
- Attended “Inception Workshop on Partnership of Global Animal Health and Biosecurity Initiatives” in Bangkok organized by FAO and Department of Agriculture, Fisheries and Forestry, Australia.
- Attended "International Conference for Veterinary Services 2010: Asia Web for World Food Security" in "One Health in Motion: Models for One Health Practices" in Bangkok organized by FAO and ASEAN.
- Attended Second Thailand National One Health Forum “Strengthen the network and let’s move forward” organized by RESPOND.

b) **Laboratory Improvements**

- Presented training lecture on Lyssavirus Diagnostics for Ministry of Public Health.

- **Activity 1.2 Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Thailand	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	36	36	0	0	22	22	0	22
Unclassified	146	146	0	0	0	0	0	0
Rodents								
Free-ranging	3	3	0	0	3	3	0	3
Unclassified	4	4	0	0	0	0	0	0
Primates								
N/A	0	0	0	0	0	0	0	0
Other taxa								
Free-ranging	1	1	0	0	1	1	0	1
TOTALS	**190**	**190**	**0**	**0**	**26**	**26**	**0**	**26**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Performed PCR screening of Coronaviruses on archived specimens.
    - Performed nucleic acid library preparation on wildlife specimens using Roche 454 Jr. to optimize protocols for viral discovery using next-generation sequencing.
    - Continued to optimize viral family-level PCR protocols. Specifically, compared three

Coronavirus PCR protocols to improve the sensitivity and specificity of these assays on wildlife specimens.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bat - feces, n = 69	WHO-CC Chula	PCR	Coronaviruses	Confirmation of Results Pending	-	Thailand	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Uploaded test results and associated specimen information into GAINS

.

Activity 1.5 Program Management

- Sub-activity 1.5.2: **Communication**
  - Participated in 2012 EPT work plan review meeting for Thailand at USAID offices in Bangkok.
  - Met with RESPOND to discuss synergistic activities.

Partners: Chulalongkorn University; AFRIMS; RESPOND; Ministry of Science, Thailand; Ministry of Health; Department of National Parks, Wildlife and Plant Conservation (DNP).

VIETNAM

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Introduced Vietnam OIE national point person on wildlife, to Canadian Cooperative Wildlife Health Centre, interested in supporting a national wildlife surveillance program. Provided background on wildlife/livestock/human interfaces in Vietnam, One Health, and PREDICT to Vietnam's National Focal Point for Wildlife for OIE Regional Training.

    b) **Laboratory Improvements**
    - Improved sample management/ storage in ultralow freezers maintained at partner labs (HUA and RAHO6) in Ho Chi Minh City.
    - Coordinated with IDENTIFY on consultant TOR for new biosafety protocol in HUA lab.
    - Finalized partnership MOU with the Oxford University Clinical Research Unit (OUCRU), Ho Chi Minh City, for training and advanced diagnostics.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Piloted a wildlife survey of 74 restaurants in Hanoi to document species sold, assess risk interfaces, collect samples, and improve future survey methods and sample collection.
    - Negotiating partnership between with Welcome Trust funded 'Vietnam Initiative on Zoonotic Infections' (VIZIONs) program, implemented with University of Edinburgh, GVFI, and Welcome Trust Sanger Institute (WTSI), to sample wildlife in VIZIONs high risk cohorts and provide information on risk interfaces in six provinces.
    - Included seven Hanoi University of Agriculture (HUA) veterinary students in sample and collection training including sampling with FTA Filter cards, lysis buffer and Viral Transport Medium, environmental sampling, and PPE use.

Summary of Surveillance Activities and Testing in GAINS to date:

Vietnam	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
	0	0	0	0	0	0	0	0
Rodents								
Wildlife for sale in restaurant	32	0	114	0	0	0	0	0
Primates								
	0	0	0	0	0	0	0	0
Other taxa								
Wildlife for sale in restaurant	64	0	157	0	0	0	0	0
Rehabilitation centre	50	0	50	0	0	0	0	0
TOTALS	**146**	**0**	**321**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Avian - 20	HUA	PCR	*Flaviviridae*	Negative	-	Vietnam	NO
Rodentia - 51	HUA	PCR	*Arenaviridae* *Flaviviridae*	Negative	-	Vietnam	NO
Carnivora – 1	HUA	PCR	*Flaviviridae*	Negative	-	Vietnam	NO

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Obtained signed PREDICT Sample Sharing and Data Policy documents from all three Partner labs (NCVD, RAHO6 and HUA).
    - Provided training to Vietnam Program Officer with the Laos team on sample and data management, and GAINS system

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Finalized MOU to share office space with PREVENT in Hanoi.
    - Negotiating partnership between PREDICT and Wellcome Trust funded 'Vietnam Initiative on Zoonotic Infections' (VIZIONs) program, implemented with University of Edinburgh, GVFI, and Wellcome Trust Sanger Institute (WTSI). PREDICT to sample wildlife in VIZIONs high risk cohorts and provide information on risk interfaces in six provinces.

ASIA

BANGLADESH

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Participated in One Health Bangladesh meeting for developing country-level strategic plans and a road map for facing emerging infectious diseases.
    - Began organization of the One Health Alliance of South Asia (OHASA) regional meeting in Delhi, India. Ministerial staff and scientists will be invited to discuss One Health,

collaborations and policy among South Asian countries using the example of PREDICT.

b) **Laboratory Improvements**

- Installed a new -80°C freezer in laboratory.
- Consulted with Bangladesh Forest Department regarding development of their new diagnostic laboratory.
- Trained a wildlife veterinarian from the Bangladesh Forest Department in BSL-2 laboratory protocols and conducting PCR.

- Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
  - Completed the Rapid Survey Tool Update.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Identified new areas with wildlife-human interfaces (such as areas with heavy hunting activity and/or wildlife consumption); developed surveillance strategies for these areas using a One Health approach. Coordinated with ICDDR,B on USAID-supported human surveillance for bat-borne (e.g. Nipah virus) pathogens.

Summary of Surveillance Activities and Testing in GAINS to date:

Bangladesh	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	688	9607	0	301	0	0	0	0
Hunter	137	1781	0	0	0	0	0	0

Other High Risk Interfaces	24	212	0	0	0	0	0	0
Rodents								
Free-ranging	183	2454	0	0	0	0	0	0
Other High Risk Interfaces	15	221	0	0	0	0	0	0
Primates								
Other High Risk Interfaces	4	60	0	0	0	0	0	0
Other taxa								
Free-ranging	521	3598	0	0	0	0	0	0
Other High Risk Interfaces	4	60	0	0	0	0	0	0
TOTALS	**1576**	**17993**	**0**	**301**	**0**	**0**	**0**	**0**

- Sub-activity 1.3.1: **Introduction of New Technologies.**
  - Implemented Nipah virus PCR methodology at ICDDR,B.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

- Sub-activity 1.3.2: **Pathogen detection and discovery:**
  - Initiated Nipah PCR testing of bat urine samples; results pending.
  - Processed samples for shipping to CII, Columbia University for pathogen discovery.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1200 bat samples (throat and urine from Bangladesh)	CII, Columbia University	Family level PCR	Hantavirus	Negative	-	Bangladesh	No
1200 bat samples (throat and urine from Bangladesh)	CII	Family level PCR	Paramyxovirus	Confirmation of Results Pending	-	Bangladesh	No
1200 bat samples (throat and urine from Bangladesh)	CII	Family level PCR	Astrovirus	Confirmation of Results pending	-	Bangladesh	No
1200 bat samples (throat and urine from Bangladesh)	CII	Family level PCR	Influenza	Results pending	-	Bangladesh	N/A
1200 bat samples (throat and urine from Bangladesh)	CII	Family level PCR	Herpes	Results pending	-	Bangladesh	N/A

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management:**
    - Entered all field and surveillance data into GAINS database.
    - Reported sample collection activities to the Bangladesh Forest Department.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.1: **General Management**
    - Selected new country coordinator.

- Hired Field Research (Administrative Assistant) to support surveillance and reporting activities.

- Sub-activity 1.5.2: **Communication**
  - Held in-person meetings with FAO and WHO representatives on issues relating to zoonotic diseases of bats and birds.

Partners: International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B), Forestry Department (Government of Bangladesh), Center for Immunity and Infection at Columbia University (CII).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Worked with modeling and hotspots ID team to refine map of predicted hotspots.
  - Integrated agents-based modeling activities (Nipah virus).

LOW 3: Outbreak Response Capacity Building

- Trained wildlife veterinarian from the Bangladesh Forest Department at ICDDR,B on Wildlife Surveillance activities in the context of an Outbreak Investigation, epidemiology, and disease surveillance.

CHINA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Discussions with Guangdong Institute of Public Health to participate in the PREDICT

project as a collaborative partner to increase disease surveillance capacity in Guangdong.
- Discussions with the Nutrition and Food Safety Institute of the GDCDC regarding possible collaborations for disease surveillance.
- Met with (b)(6) from Beijing US Embassy and (b)(6) to discuss the surveillance project targeting extraction industries in Gabon; invited (b)(6) (b)(6) to visit Gabon.

a) **Laboratory Improvement**
- Introduced serology testing for novel Bunyavirus at GDCDC.
- Preparing to test fruit bat samples for Nipah virus.
- Began to take fruit bat samples from Southern China and Yunnan and screen these samples by RT-PCR.

- **Activity 1.2: Surveillance**

- Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
  - Linked animal and human surveillance data to identify priority samples for testing as well as locations for future sampling.
  - Partnered with the Guangdong Zhanjiang Ratproof Institute to support rodent collection and sample testing that will be linked with hospital-based surveillance of acute human disease in the region.
  - Developed acute human hospital-based surveillance protocols for Guangdong and for review by collaborating governmental partners.
  - Prepared application for submission to UC Davis IRB to include China in the human surveillance follow-up protocols (Protocol No. 215253-6).
  - Visited additional animal markets in Southern China, to establish sites for mammal sampling.

Summary of Surveillance Activities and Testing in GAINS to date:

China	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	369	738	0	0	0	0	0	0
Other High Risk Interfaces	36	72	0	0	0	0	0	0
Rodents								
Other High Risk Interfaces	161	322	0	0	0	0	0	0
Primates								
Other taxa								
Other High Risk Interfaces	6	12	0	0	0	0	0	0
TOTALS	**572**	**1144**	**0**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Amplified long sequence of Hanta virus amplified from bat with new primers.

- Tested human samples for antibodies to the novel Bunyavirus (recently identified in China) at Guangdong CDC; this is the first time this testing has been conducted in Southern China.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1301 Human blood serum	GDCDC	Serology	Hanta, Ebola, SARS CoV, Bunyavirus	Pending approval for release of data	-	China	No
67 Chinese Bamboo rats (pooled anal swab & oral swab)	WIV	PCR	Astroviridae	19 positives	-	China	Yes
6 Masked palm civets (pooled anal swab & oral swab)	WIV	PCR	Astroviridae	4 positives	-	China	Yes
29 Malayan Porcupines (pooled anal swab & oral swab)	WIV	PCR	Astroviridae	18 positives	-	China	Yes
3 bat spp.	GDEI	PCR	Hantavirus	Confirmation of Results Pending	-	China	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Linked laboratory results with human behavioral information in the secured database; negotiations are underway with a US partner for epidemiological analysis; collaborating partner for analysis has been identified by GDCDC; permission to results pending.

- Entered animal samples (collected and analyzed at GDEI) in GAINS database.

Partners: East China Normal University; Wuhan Institute of Virology; Guangdong Entomological Institute; Guangdong CDC; Guangdong Zhanjiang Ratproof Institution

LATIN AMERICA

BOLIVIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Met with Bolivian Ministries of Health, Agriculture, Environment, Education and Defense, with support from the Pan-American Health Organization (PAHO Bolivia) to design a new regulatory framework to improve zoonotic disease surveillance, outbreak response, and risk communication. PREDICT facilitated and informed national coordinators of zoonoses (Ministry of Public Health) and veterinary epidemiology (SENASAG)
    - Planned joint rodent sampling trips with the Beni Regional Department of Health (SEDES Beni) in areas affected by arenavirus hemorrhagic fever.
    - Seven PREDICT staff received training from a hematology technician from the National Institute of Health in techniques for collecting and processing blood samples.

    b) **Laboratory Improvements**
    - Initiated screening for Arenaviridae, Bunyaviridae (specifically hantaviruses), Flaviviridae at Institute of Molecular Biology and Biotechnology (IBMB).
    - Evaluated options for sharing primer sequences and protocols for targeting Machupo viral strains on arenavirus positive samples with a regional reference center for hemorrhagic fevers (National Institute of Human Viral Diseases-INEVH).

- Prioritized wildlife samples for viral screening based on primary interfaces in country, and most likely routes of transmission of pathogens to people

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Bolivia	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	419	1657	177	0	0	0	0	0
Other High Risk Interfaces	2	0	62	0	0	0	0	0
Unclassified	44	0	0	0	0	0	0	0
Rodents								
Free-ranging	11	0	190	0	0	0	0	0
Hunter	44	0	868	0	13	13	0	20
Other High Risk Interfaces	221	3151	299	0	5	10	0	29
Primates								
Free-ranging	3		125					
Hunter	45	0	805	0	32	39	0	96
Other High Risk Interfaces	23	0	122	0	2	3	0	5
Sanctuary	18	0	299	0	2	3	0	4
Other taxa								
Free-ranging	3	0	0	0	0	0	0	0
Hunter	282	0	4370	0	126	138	0	273
Other High Risk Interfaces	96	0	1238	0	54	94	0	297
Sanctuary	23	0	33	0	0	0	0	0
TOTALS	**1234**	**4808**	**8588**	**0**	**234**	**300**	**0**	**724**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
43 samples from monkeys and bats (dried blood spots on FTA/Protein saver cards; oral/rectal swabs, blood/serum/clots, feces, either VTM and RNAlater	IBMB-UMSA	Conventional and nested RT-PCR	1. Bats: flavi, corona, arena and filovirus. 2. Primates: filo, paramyxo, flavi and coronavirus. 3. Rodents: hanta, arena, alpha and flavivirus.	Pending	-	Bolivia	No
32 blood samples from monkeys sampled in indigenous territories and rescue centers	IBMB-UMSA	RT-PCR	Arenavirus and Flavivirus	Confirmatory testing underway	-	Bolivia	No

Partners: Bolivian Network to Combat the Illegal Wildlife Trade (REBOCTAS).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  Finalized English version of report characterizing wildlife trade in county (PREDICT/ DGB/ REBOCTAS). This tool for risk assessment and policy-making will be handed to government

agencies and partners.

PREDICT Outbreak Report Short Form

Summary Information to Report	Report below:
Working Name of the Outbreak (Report name if assigned or use name of region and other descriptors)	Howler monkey deaths in Santa Cruz (eastern Bolivia).
Date of last update of this form (most often today if you are making a change)	April 06, 2012
Inclusive dates (from start of outbreak to end of response – use today as end date if response ongoing)	Beginning of March – April 06, 2012
Date of first notification of PREDICT	On March 28 2012, PREDICT was informed about deaths in monkeys by field veterinarians from "Ambue Ari" Wildlife Refuge Park (owned by the NGO "Inti Wara Yassi Community", a PREDICT collaborator). On April 05 2012, PREDICT communicated the event and laboratory findings to (b)(6) (b)(6) (b)(6)
Date of request of support from PREDICT (Number of days from notification to request)	On March 28 2012, PREDICT was asked for collaboration by the NGO "Inti Wara Yassi Community". On April 05 2012, PREDICT was requested by the Ministry of Public Health to become involved in discussions regarding outbreak response.
Date of initiation of response by PREDICT (Number of days from request to response)	In preparation phase. Discussions are underway with the Ministry of Public Health for collaborative work for outbreak response.
Briefly describe the outbreak. Was this an outbreak in humans, in animals (what species)? How many were affected & what was the range of symptoms?	From the beginning of March to April 03 2012, five (5) Red Howler monkeys (*Alouatta seniculus*) were found dead in a Wildlife Refuge Park ("Ambue Ari") in the surroundings of Guarayos (Department of Santa Cruz). No clinical signs were reported in animals or humans in the affected area, except from the deaths. Carcasses of two monkeys were shipped by local veterinarians to the Municipal Zoo "Vesty Pakos" (La Paz) for conducting necropsies. PREDICT staff performed post-mortem examinations and found diffuse hemorrhages and petechiae on different organs (mainly the liver).
What type of assistance did PREDICT provide? Who were the PREDICT personnel involved? Include inclusive dates of PREDICT's involvement in the response.	In preparation phase. PREDICT was invited to join discussions with the Ministry of Public Health around outbreak response activities in Santa Cruz due to presumptive Yellow Fever diagnosis. Disease control measures to be adopted may include: 1. Vaccination of people; 2. Reduction of mosquito populations; 3. Field investigations on monkeys and humans; 4. Education campaigns. PREDICT country coordinator (Erika Alandia) involved so far.
Provide description of how first noticed & date if possible.	Outbreak first noticed at beginning of March. Response activities planned April 07 2012, led by the National Immunization Program (Ministry of Public Health). Government continuing to consider implications of outbreak and interventions.

When was the first official acknowledgement of the outbreak (by which government or other reputable body and date)? When was a response initiated and by whom? Which ministries or NGOs were involved? Who was in charge of the national response?	
Comments on where it started, speed and extent of geographic spread	By the beginning of March 2012, a first Red Howler monkey was found dead in “Ambue Ari” Wildlife Park and buried on site. On March 25 a second monkey (an adult female with its young) was found dead and buried on site too. On March 28 two additional monkeys were found dead and shipped to La Paz for necropsies and testing. An additional monkey was found dead on April 03. The outbreak seems to be restricted to the wildlife refuge park, with an increase in the speed of transmission during the last week.
If a lab diagnosis and confirmation has been obtained give details, including species, sample type and dates. Where was the diagnosis made? Give number of days between initiation of response and lab confirmation of diagnosis.	Tissue samples and blood from the two dead howler monkeys were submitted to the Institute of Molecular Biology (IBMB-UMSA) for flavivirus and arenavirus testing. On April 04 2012, flavivirus infections were confirmed on liver samples (preserved in lysis buffer) by RT-PCR performed at IBMB-UMSA laboratory. Further studies are underway at the Bolivian Reference Center for Tropical Diseases (CENETROP) to prove the identity of the virus, and its putative relatedness with the Yellow fever antigenic group. No response activities have initiated yet.
Were other EPT partners involved in the response (which ones and how)?	None.
Summary of the Outcome:	
Did people die? How many?	None.
Did animals die? What species & how many?	Yes, five (5) Red Howler monkeys (*Alouatta seniculus*) were found dead in a Wildlife Refuge Park (“Ambue Ari”).
Was there a relationship between animals & humans in the disease or its transmission (state suspected or confirmed)?	This is under study. Intense deforestation caused by expanding agriculture may have led susceptible monkeys to come in closer contact with mosquito populations that breed in water cisterns in the wildlife refuge. Should Yellow fever be confirmed, this event may represent the first description of the disease affecting monkeys in Bolivia.

BRAZIL

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Formed a new partnership with the Manaus Center for Zoonosis Control (CCZ), trained two collaborators from CCZ and another from Instituto Nacional de Pesquisas da Amazônia (INPA) on PREDICT protocols. The CCZ partners also joined the team on Manaus field trip.

    b) **Laboratory Improvements**
    - Hired new lab personnel to analyze samples at University of Sao Paulo (USP) Institute of Biomedical Sciences (ICB).
    - Continued the application process for permits from the Brazilian government (Institute "Chico Mendes" of Conservation and Biodiversity-ICMBIO).

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Sampled a total of 107 bats and 9 non-human primates yielding 397 samples from Manaus.
    - Coordinated field trip to remote sites in the Amazon in Santa Izabel do Rio Negro (State of Amazonas, northwestern Brazil).

Summary of Surveillance Activities and Testing in GAINS to date:

Brazil	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	302	1074	0	0	0	0	0	0
Other High Risk Interfaces	98	421	0	0	0	0	0	0
Unclassified	16	75	0	0	0	0	0	0
Rodents								
Free-ranging	15	76	0	0	0	0	0	0
Other High Risk Interfaces	38	100	0	0	0	0	0	0
Primates								
Free-ranging	8	46	0	0	0	0	0	0
Other High Risk Interfaces	24	93	0	0	0	0	0	0
Other taxa								
Free-ranging	13	51	0	0	0	0	0	0
Other High Risk Interfaces	270	1853	0	0	17	68	0	68
Unclassified	2	15	0	0	0	0	0	0
TOTALS	**786**	**3804**	**0**	**0**	**17**	**68**	**0**	**68**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
68 Bats	ICBII USP	Real Time PCR	Hantavirus	All Negative	N/A	Brazil	No

- **Activity 1.4: Sample Tracking and Information Management**
  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Updated and corrected GAINS files.

Partners (New): Manaus Center for Zoonosis Control (CCZ).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Initiated sampling activities for Deep Forest Project in the Amazon region. This project will test the assumptions of the EID hotspots model.

COLOMBIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Prepared draft agreement with Ministry of Environment to develop a national program for wildlife disease surveillance and monitoring of Avian Influenza.
    - Prepared preliminary report for Ministry of Environment on "Knowledge and management of wildlife diseases in Colombia", with details on current regulations and research focused on wildlife diseases, with local Association of Wildlife Veterinarians (AVVS)

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Colombia	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Rodents								
Free-ranging	1	0	0	0	0	0	0	0
Hunter	1	0	6	0	0	0	0	0
Primates								
Hunter	22	0	165	0	0	0	0	0
Other taxa								
Hunter	92	0	605	0	0	0	0	0
TOTALS	**116**	**0**	**776**	**0**	**0**	**0**	**0**	**0**

Partners: Ministry of Environment; Ministry of Agriculture; Ministry of Public Health; the local Association of Wildlife Veterinarians (AVVS); Javeriana Pontiff University; Environmental Regional Authorities (Corporaciones Autónomas Regionales); San Martín University Foundation (FUSM); Virology Lab, National Institute of Health (INS); Antioquía University; Colombian Foundation for Studies on Parasites (FUNCEP)

MEXICO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Mexico	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	1560	7445	38	0	0	0	0	0
Other High Risk Interfaces	72	0	184	0	0	0	0	0
Unclassified	29	0	64	0	0	0	0	0
Rodents								
Free-ranging	26	119	0	0	0	0	0	0

Unclassified	6	0	0	0	0	0	0	0
Primates								
	0	0	0	0	0	0	0	0
Other taxa								
Free-ranging	7	21	0	0	0	0	0	0
TOTALS	**1700**	**7585**	**286**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Government approved release of results from pathogen discovery conducted at CII, Columbia University. Finalized test result data are pending in GAINS.
    - Reviewed pathogen detection protocols and ordered laboratory reagents to begin testing.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
66 samples of bat rectal swabs	CII	PCR and sequencing	Coronavirus, Astrovirus, Adenovirus and Herpesvirus	1 Coronavirus 9 Herpesviruses 8 Astroviruses 2 Adenoviruses	-	Mexico	Yes
70 samples of bat throat swabs	CII	PCR and sequencing	Coronavirus, Astrovirus, Adenovirus and Herpesvirus	1 Coronavirus 21 Herpesviruses 1 Astrovirus	-	Mexico	Yes
105 samples of bat blood	CII	PCR and sequencing	Coronavirus, Astrovirus, Adenovirus and Herpesvirus	1 Coronavirus 1 Herpesvirus 3 Adenoviruses	-	Mexico	Yes

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Met with government agencies SEMARNAT and SAGARPA, to discuss project and seek approval for release of test results

PERU

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Finalized cooperative agreement with Peruvian Institute of Health (INS), for PREDICT to be involved in field investigations and outbreak response in country, and to access INS' bat and rodent samples for testing.
    - Workshop held for field staff from collaborating institutions (PREDICT, INS, NAMRU-6, a local zoo) on wildlife handling/sampling for disease surveillance to harmonize protocols.
    - Advanced plans for a workshop on wildlife disease surveillance for government staff, with Peruvian Veterinary Service (SENASA) and USDA-APHIS Wildlife Disease Program.

    b) **Laboratory Improvements**
    - Hired a laboratory technician and acquired supplies for viral family testing at Peruvian Institute of Health (INS Iquitos)

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Formalized cooperative work with the Loreto Regional Directorate of Health (DIRESA) for disease surveillance in northern Peruvian Amazonia.

Summary of Surveillance Activities and Testing in GAINS to date:

Peru	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	70	24	259	0	0	0	0	0
Rodents								
Free-ranging	1	0	8	0	0	0	0	0
Hunter	206	204	39	0	0	0	0	0
Market	11	42	0	0	0	0	0	0
Unclassified	17	200	0	0	0	0	0	0
Primates								
Hunter	225	369	530	0	0	0	0	0
Market	35	120	3	0	0	0	0	0
Other High Risk Interfaces	152	444	1183	0	0	0	0	0
Unclassified	10	84	0	0	0	0	0	0
Other taxa								
Free-ranging	1	0	4	0	0	0	0	0
Hunter	544	861	100	0	1	1	0	2
Market	365	963	45	0	58	76	0	81
Unclassified	11	52	0	0	0	0	0	0
TOTALS	**1648**	**3363**	**2171**	**0**	**59**	**77**	**0**	**83**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Began to implement testing for 7 priority viral families at INS.

- Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1,001 samples from monkeys (frozen dried blood spots in FTA cards, oral/rectal swabs, blood/serum/clots, feces, and tissues frozen in either VTM and RNAlater; feces in Cary-Blair medium; fixed blood smears)	US NAMRU-6; INS	Conventional and nested RT-PCR	Filovirus, paramyxovirus, flavivirus and coronavirus.	Pending	-	Peru	No

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Finalized agreement for collaboration with INS.
  - Sub-activity 1.5.2: **Communication**
    - Presented on “Biosafety procedures for handling bats for research” at the “Peruvian Symposium on Bat Taxonomy, Ecology and Conservation”
    - Presented formal reports to seven collaborating zoos on surveillance of primates conducted this quarter.

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease**
  - Survey study protocol under review by NAMRU-6’s ethics committee. The survey will be implemented at wetmarkets across northern and central Peru to characterize human behaviors and risk factors that can influence emergence of zoonotic diseases in the wildlife trade.

PREDICT Quarter 1 Year 3 Reporting

GLOBAL - US, Africa, Southeast Asia, Asia & Latin America

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - Refined taxonomic sampling goals based on modeling work done to date.
    - Improved site and event data templates in GAINS to collect more specific and standardized information on primary and secondary interfaces, anthropogenic change, domestic animal presence, and habitat type at sampling sites.
    - Continued discussions with IDENTIFY regarding normative testing needs.
    - Distributed materials to Surveillance Coordination Team to promote sharing and dissemination of resources that support PREDICT goals and EPT country capacity building (i.e. FAO Field Manual on Bats).
  - Sub-activity 1.1.2: **Laboratory System Improvements**
    - Five laboratories received protocols and Universal Control 1 for PREDICT surveillance for 10 priority virus family level diagnostics including Zoonotic Diseases Lab, Mexican Institute of Social Security (Mexico); Zoonotic Disease Laboratory housed in the National Public Health Lab (Republic of Congo); and Institute Pertanian Bogor Primate Research Center (Indonesia).
    - Provided equipment for surveillance and laboratory diagnostics to additional labs including ultralow freezer at the INRB lab (DRC); ultralow and -30 freezers, centrifuge, and vortex to Hanoi University Infectious Diseases and Microbiology Laboratory and Regional Animal Health Office-6 (RAHO6), Dept. of Animal Health (Vietnam); and ultralow freezers for VRI, the National Public Health Lab and Sabah Wildlife Department (Malaysia).
    - Improved laboratory facilities to enhance viral diagnostic capacity including PCR clean-room at INRB (DRC) and new laboratory space for new zoonotic disease molecular

diagnostics at VRI (Malaysia).

- Began RNA extraction and testing for one viral family at the Sokoine University of Agriculture laboratory (Tanzania), tested kits for sample preparation at IBMB-UMSA laboratory (Bolivia), and implemented a new HCV PCR protocol at CHP lab (Cameroon).
- Continued to provide training and support to laboratory technicians from INRB (DRC), CIRMF (Gabon), ZDL (ROC), SUA (Tanzania), NAHC (Lao PDR), PERHILITAN Wildlife laboratory (Malaysia), Chulalongkorn University (Thailand), Wuhan University (China), and IBMB (Bolivia).
- Assisted the Ministry of Health in the training of 11 laboratory technicians from public hospitals in four regions of Cameroon.
- Trained 25 government and university pathologists from Vietnam, Laos, and Cambodia through a Wildlife Pathology Workshop held in Hanoi (Vietnam) in partnership with HUA.
- Conducted a joint training with Identify (WHO) and Ministry of Health of 11 laboratory technicians from public hospitals in Cameroon, November 9th-11th 2011 on sample collection, packing and shipping for disease surveillance, and outbreak response.
- Facilitated cross training among collaborating labs to support diagnostic capacity development between labs in China and Malaysia, Malaysia and Indonesia, and Cameroon and DRC.

Table 1: Labs Receiving Assistance from PREDICT to date:

	# of labs targeted for screening with desired viral families	# of labs receiving training in preparation for screening of desired viral families	# of labs that have initiated work that will eventually lead to screening desired viral families (labs with partial capacity)
Africa	7	6	3
Asia / SE Asia	12	8	6
Latin America	6	3	3
Totals	**25**	**17**	**12**

- Sub-activity 1.1.3: **Operationalizing One Health**
  - Collaborated with local conservation groups, subsistence hunters, and wildlife authorities in sampling trainings and expeditions across PREDICT countries.
  - PREDICT staff (along with RESPOND and IDENTIFY staff) assisted the Cameroon Government in the preparation of a national action plan for the control of zoonosis during meetings held in December; the final draft plan was presented to national and international partners and ratified by the Ad-hoc Working Committee for Control of Diseases of Zoonotic Origin.
  - Implemented new community meeting protocols in DRC that communicate the importance of animal diseases, their recognition, and reporting.
  - Attended the CIRMF symposium on the “Emergence of infectious diseases, environments and biodiversity” in Libreville, Gabon, which will facilitate harmonization of activities across the country.
  - PREDICT representatives from Malaysia, Indonesia, and Thailand participated in an IDENTIFY meeting in Kuala Lumpur in October.

- Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
  - Completed Rapid Survey Update Tool from all seventeen countries from which they were requested, including the first Rapid Survey for China. The online data system, CAPTURE, was piloted to submit the updated information into the GAINS database.
  - Updated map layers were also received for Bangladesh, Gabon, Republic of Congo and Bolivia.
  - Data were checked and verified for all submissions in order to prepare for data analysis and summary. Data are now being assimilated in the central database for analysis purposes.

Table 2: PREDICT Training Results Summary by Country to date:

Country	Persons	Trainings covered various combinations of the following topics:
Asia:		
Bangladesh	5	Lab techniques in BSL2 lab, epidemiology and outbreak investigation, capture and sampling of bats
Cambodia	5	Core safety, animal capture & sampling skills and protocols, data collection and management, rodent and primate ID
China	2	Core safety, animal capture & sampling skills and protocols
India	18	Core safety, animal capture & sampling, laboratory safety protocols, zoonoses
Lao PDR	44	Core safety, animal capture, & sampling skills and protocols
Malaysia	35	Core safety, PPE and biosafety, animal capture & sampling skills and protocols, bat and rodent capture, sampling and laboratory skills, packing and shipping samples, cold chain
Vietnam	41	Core safety, animal capture & sampling skills and protocols, packing and shipping samples, barcode system, animal pathology
Africa:		
Cameroon	53	Core safety, animal capture & sampling skills and protocols, specialized field sampling and laboratory skills
Congo	12	Core safety, PPE and biosafety, animal capture & sampling skills and protocols, bat and rodent and primate sampling, laboratory skills, data collection, cold chain
DRC	11	Core safety, animal capture & sampling skills and protocols, specialized field sampling and laboratory skills
Rwanda	82	Core safety, animal capture & sampling skills and protocols, bat and rat and primate sampling, zoonoses, ethics and responsibilities.
Tanzania	19	Core safety, animal capture & sampling skills and protocols, bat and rodent sampling, data management
Uganda	26	Core safety, animal capture & sampling skills and protocols
Latin America:		
Bolivia	222	Core safety, animal capture, laboratory & sampling skills and protocols, zoonotic diseases, bat and rodent sampling, primate sampling, bushmeat sampling, molecular and parasite diagnostic methods, packing and shipping samples, wildlife management, disease management
Brazil	16	Core safety, animal capture & sampling skills and protocols, bat and rodent sampling, bushmeat sampling, packing and shipping samples, maintaining cold chain, surveillance, ethics and responsibilities
Colombia	52	Core safety, animal capture & sampling skills and protocols
Mexico	25	Core safety, animal capture & sampling skills and protocols
Peru	193	PPE Use & biosafety, surveillance, zoonotic disease risks from wildlife trade and consumption, wildlife regulations, wildlife management, disease monitoring
Total Trained	861	

- Prepared the first draft of the PREDICT Team Guide for Providing Assistance During a Zoonotic Disease Outbreak.
- Reviewed training completed using protocols and guides, and assessed needed adjustments going forward for 19 countries.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Coordination of surveillance activities across all EPT countries**
    - Developed a mechanism for representatives from other PREDICT arms (i.e. Pathogen Detection and Modeling) and other EPT programs to provide updates on the Surveillance Coordination Team conference calls as necessary to promote coordination and synergy among efforts in EPT countries.

  - Sub-activity 1.2.2: **Specific Surveillance Activities Completed in Current Quarter**
    - Surveillance activities continued in Bolivia, Brazil, Mexico, Peru, Bangladesh, Cambodia, China, Lao PDR, Malaysia, Thailand, Vietnam, Cameroon, DRC, Gabon, Republic of Congo, Rwanda, Tanzania, and Uganda.
    - Identified surveillance partners and planned project participant training in Indonesia.
    - Collected samples from 959 unique animals, 876 of which were in PREDICT target taxa.
    - Identified problems with diagnostic test result collection and reporting in GAINS. Improved test reporting interface with programmers. Test data collection and reporting of results expected to dramatically increase next quarter, as existing and pending test results can now be entered more efficiently and correctly.

Table 3: PREDICT Quarter 1 Year 3 Surveillance Summary by Region, Taxa, and Interface:

	# of Animals Sampled Year 3 Q1 in GAINS	# of Animals Sampled to date in GAINS	# Animals with at least One Sample Result reported in GAINS to date
REGION			
Africa	480	11034	1388
Asia	174	2225	0
Latin America	267	4893	240
Southeast Asia	38	3052	446
TAXA			
Bats	379	7948	339
Rodents	225	3102	82
Primates	272	3216	648
Birds	0	1763	468
Other Mammals	65	4401	484
Reptiles	2	517	29
Unclassified in ITIS	0	0	0
Taxa not yet typed	9	152	0
Unknown	7	105	24
INTERFACE			
Free-ranging	157	8950	715
Hunter	335	8174	594
Market	0	435	0
Sanctuary	4	926	555
Other High-Risk interfaces	463	1657	126
Unknown	0	1062	84
Total Animals Sampled	**959**	**21204**	**2074**

Table 4: PREDICT Surveillance Summary to Date by Geographical Region:

Region	# of Animals Sampled in GAINS	# of Animals sampled among taxa targeted for initial testing* in GAINS	# of Animals with at least one sample result reported in GAINS	Total # of diagnostic test results reported in GAINS
Africa	11034	7395	1388	4662
Asia/SoutheastAsia	5277	3782	446	864
Latin America	4893	3089	240	646
Totals	**21204**	**14266**	**2074**	**6172**

** # of rodent, bats, and primates sampled (excluded animals not yet classified)*

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of new technologies**
    - *Amazon Region*
      - Received new sampling collection technology and field equipment purchased in the US for surveillance of free-ranging rodents (Peru).
      - Imported customized primers and RNA extraction reagents, to be used at the US NAMRU-6 lab for molecular screening for 7 priority viral families (Peru).
      - New reagents have been purchased by DELIVER for the DNA extraction robot, all of which should be shipped to ICB-USP in Q2Y3 (Brazil).
    - *Congo Basin*
      - Completed a comprehensive Android App for the collection of data in the field pertaining to samples, animal die-offs, surveys, and mapping of locations of interest; App connects via web API to an online Django app, which is free and open source, and can be run securely on any cloud server; App was field tested in Cameroon.
      - Introduced new HCV PCR protocol to detect hepacivirus genus in the flaviviradae, including the recently discovered canine HCV and pegiviruses, as well as PREDICT

alphaviruses and coronaviruses screening protocols (Cameroon).
- Received universal controls and associated conventional PCR protocols (ROC).
- Ordered primers (arenaviridae, coronaviridae, filoviridae, flaviviridae, nipah), kits, and reagents for family level virus screening (ROC).
- Sent Dried Blood Spot (DBS) card samples to UC Davis to test utility for RNA recovery.
- Implemented PREDICT poxvirus, retrovirus, and flavivirus protocols (DRC).
- Installed new real-time RT-PCR smartcycler (DRC).

- *Asian Region*
  - Translated PREDICT pathogen discovery protocols into Chinese.
  - Generating Western-blot assays to confirm human serology results (China).
  - Received universal controls and associated conventional PCR protocols (Indonesia).

- Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 1):**

Table 5: Findings Approved for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Diagnostic methods	Pathogen family/genus screening	Results	Pathogen discovery	Country
8 blood samples from Bonobos (*Pan paniscus*)	INRB	Serology and RT-PCR tests	SIV, HBV, Yellow fever, Influenza A	Negative	None	DRC
4 blood samples from Bonobos (*Pan paniscus*)	PREDICT/INRB	Serology	Malaria, SIV	Negative	None	DRC
5 blood samples from humans (animal keepers at the Sanctuary of bonobos)	PREDICT/INRB	Serology	Malaria, HIV	Negative	None	DRC
1 blood sample from a Bonobo (*Pan paniscus*)	INRB	Serology	Measles	Negative	None	DRC
24 DBS on filter papers from non-human primates	GVF-Cameroon	PCR	SIV, SFV, Orthopox virus (OPV)	SIV: negative SFV: OPV: 2 Presumptive Positive from C. neglectus and C. wolfii	OPV	DRC
370 feces/ Syncerus Caffer Nanus	UMVE (CIRMF)	Real time PCR	Rift Valley Fever	Negative	None	Gabon
27 parasites found on Rodentia	UMVE (CIRMF)	one step PCR	Alphavirus, Flavivirus, Phlebovirus, Rhabdovirus, Paramyxovirus	Negative	None	Gabon
387 parasites found on Chiroptera	UMVE (CIRMF)	one step PCR	Alphavirus, Flavivirus, Phlebovirus, Rhabdovirus, Paramyxovirus	Negative	None	Gabon

# Samples submitted (type/ taxa)	Diagnostic lab	Diagnostic methods	Pathogen family/genus screening	Results	Pathogen discovery	Country
385 tissue from heart, lungs, kidney/ Rodentia	UMVE (CIRMF)	one step PCR	Coronavirus	Negative	None	Gabon
385 tissue from liver spleen/ Rodentia	UMVE (CIRMF)	one step PCR	Arenavirus, Pramyxovirus	Negative	None	Gabon
1714 heart/lungs/kidney or intestine/ Chiroptera	UMVE (CIRMF)	one step PCR	Coronavirus	3 Presumptive Positive	Coronavirus	Gabon
1714 liver/spleen/ Chiroptera	UMVE (CIRMF)	Real time PCR	Marburgvirus	1 Presumptive Positive	Marburgvirus	Gabon
1714 liver/spleen or brain/ Chiroptera	UMVE (CIRMF)	one step PCR	Flavivirus	2 brain samples Presumptive Positive	Flavivirus	Gabon
1714 brain/ Chiroptera	UMVE (CIRMF)	one step PCR	Lyssavirus	6 Presumptive Positive	Lyssavirus	Gabon
1714 liver/spleen/ Chiroptera	UMVE (CIRMF)	one step PCR	Paramyxovirus	10 Presumptive Positive	Paramyxovirus	Gabon
5 brain samples/ Chiroptera	UMVE (CIRMF)	one step PCR	Rabies virus	Negative	None	Gabon
1714 (liver/spleen or brain) 13 (blood) Chiroptera	UMVE (CIRMF)	Real time PCR	Alphavirus, Ebolavirus	Negative	None	Gabon
149 Bats oral swab	GDEI	PCR	Hanta	51 Presumptive Positives	Pending	China
75 Rodents cloacae swab	GDEI	PCR	Hanta	Negative	None	China
51 Rodents blood serum	GDEI	PCR	Dengue	51 (-)	None	China
238 Bats throat swab	GDEI	PCR	Coronavirus	238 (-)	None	China
121 Rodents blood serum	GDEI	PCR	Hanta	4 (+), 117 (-)	Pending	China

Table 6: Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Diagnostic methods	Pathogen family/genus screening	Results	Pathogen discovery	Country
2,710 samples frozen dried blood spots in FTA/Protein saver cards; oral/rectal swabs, blood/serum/clots, feces, and tissues frozen in either VTM and RNAlater; formalin-preserved tissues; fixed blood smears; hair/ monkeys, bats, rodents	IBMB-UMSA	Conventional and nested RT-PCR	1. Bats: flavi, corona, arena and filovirus. 2. Primates: filo, paramyxo, flavi and coronavirus. 3. Rodents: hanta, arena, alpha and flavivirus.	Pending	Pending	Bolivia
54 archived samples serum/ 18 primates sampled in previous quarters	INS; FUSM SIU Laboratory (University of Antioquia)	Serological tests (ELISA; Hemagglutination inhibition test)	Hantavirus; Flavivirus (Dengue; Yellow fever).	Negative	None	Colombia
36 archived samples feces/ 18 primates sampled in previous quarters	Colombian Foundation for Parasitological Studies (FUNZEP)	Direct observation and parasite egg count	Gastrointestinal parasites	Pending	None	Colombia
1200 bat samples (Urine, Throat Swab, Faeces)	Columbia University		Hantavirus, Paramyxovirus, Astrovirus	Pending	Pending	Bangladesh
500 Bat samples (Urine, Thorat Swab, Faeces)	Columbia University		Coronavirus	Pending	Pending	Bangladesh

1,659 samples (frozen dried blood spots in FTA cards; oral/rectal swabs, blood/serum/clots, feces, and tissues frozen in either VTM and RNAlater; feces in Cary-Blair medium; formalin-preserved tissues; fixed blood smears) monkeys, bats, rodents, xenarthra	US NAMRU-6; INS	Conventional and nested RT-PCR	1. Bats: flavi, corona, arena and filovirus. 2. Primates: filo, paramyxo, flavi and coronavirus. 3. Rodents: hanta, arena, alpha and flavivirus. 4. Xenarthra: bunyavirus.	Pending	Pending	Peru
15 Plasma/NHP	GVF-Yaounde	PCR	Filoviruses (12)	Negative	None	Cameroon
		PCR	HCV (15)			
39 Plasma/bats	GVF-Yaounde	PCR	HCV	Negative	None	Cameroon
173 Plasma/bats	GVF-Yaounde	PCR	Coronaviruses	Negative	None	Cameroon
93 DBS/NHP	GVF-Yaounde	PCR	Poxviruses	Negative	None	Cameroon
76 plasma/bats	GVF-Yaounde	PCR	Filoviruses	Negative	None	Cameroon
		PCR	Flaviviruses	Negative	None	Cameroon
		PCR	Arenaviruses	Negative	None	Cameroon
32 plasma/rodents	GVF-Yaounde	PCR	Hantaviruses	Negative	None	Cameroon
			Alphaviruses	Negative	None	Cameroon
164 DBS/rodents	GVF-Yaounde	PCR	Poxviruses	Negative	None	Cameroon
4 (nasal swabs, blood) Capra	UMVE (CIRMF)	one step PCR	PRR (Peste des Petits Ruminants)	Pending	PRR	Gabon
13 blood/ *Pan Troglodytes*	UMVE (CIRMF)	one step PCR	Enterovirus	Pending	None	Gabon
20 Blood drop on filter paper, oral & rectal swab) Chiroptera	Brazzaville lab	RT-PCR	EBOV	Negative	None	Rep Of Congo
16 Blood drop on filter paper, large & small intestine, liver, lung, spleen, kidney, oral & rectal swab) Rodentia	Brazzaville lab	RT-PCR	EBOV	Negative	None	Rep Of Congo

7 Blood spots on filter paper, kidney, large & small intestine, lung, spleen, oral & rectal swab) Soricomorpha	Brazzaville lab	RT-PCR	EBOV	Negative	None	Rep Of Congo
19 Blood spots on filter paper, oral & rectal swabs) Chiroptera	Brazzaville lab	RT-PCR	MARV	Negative	None	Rep Of Congo
16 Blood spots on filter paper, kidney, large & small intestine, spleen, liver, lung, oral & rectal swab) Rodentia	Brazzaville lab	RT-PCR	MARV	Negative	None	Rep Of Congo
5 Blood spots on Filter paper, kidney, large intestine, liver, lung, spleen, oral & rectsal swab) *Soricomorpha*	Brazzaville lab	RT-PCR	MARV	Negative	None	Rep Of Congo
12 (Liver, lung,) Artiodactyla	Brazzaville lab	RT-PCR	BEBOV	Negative	None	Rep Of Congo
12 (Liver, lung) Artiodactyla	Brazzaville lab	RT-PCR	CIEBOV	Negative	None	Rep Of Congo
12 (Liver, lung) Artiodactyla	Brazzaville lab	RT-PCR	SEBOV	Negative	None	Rep Of Congo
12 (Liver, lung) Artiodactyla	Brazzaville lab	RT-PCR	ZEBOV	Negative	None	Rep Of Congo
1 (Muscle) Primate	Brazzaville lab	RT-PCR	ZEBOV	Negative	None	Rep Of Congo
1 (Muscle) Primate	Brazzaville lab	RT-PCR	BEBOV	Negative	None	Rep Of Congo
1 (Muscle) Primate	Brazzaville lab	RT-PCR	CIEBOV	Negative	None	Rep Of Congo
21 mountain gorilla mucosal swabs, sera, blood, urine, tissue, and pericardial fluid	Columbia University	454	NA	Pending	Pending	Rwanda
6 golden monkey sera, blood, mucosal swabs, and tissue	Columbia University	454	NA	Pending	Pending	Rwanda

8 Grauer's gorilla mucosal swabs	Columbia University	454	NA	Pending	Pending	Rwanda
8 golden monkey mucosal swabs, blood, buffy coats	UC Davis Wildlife Health Center Laboratory	PCR	Retro, Filo, Flavi, Orthomyxo, Paramyxo, Pox, Herpes, Corona, Arena	Pending	Pending	Rwanda
18 Grauer's gorilla buffy coats and blood	UC Davis Wildlife Health Center Laboratory	PCR	Retro, Filo, Flavi, Orthomyxo, Paramyxo, Pox, Herpes, Corona, Arena	Pending	Pending	Rwanda
12 mountain gorilla buffy coats and mucosal swabs	UC Davis Wildlife Health Center Laboratory	PCR	Retro, Filo, Flavi, Orthomyxo, Paramyxo, Pox, Herpes, Corona, Arena	Pending	Pending	Rwanda
680 bat and primate samples	Columbia University	454	NA	Pending	Pending	Brazil
8 Rhinolophus bats	Wuhan	PCR	Corona	Pending	Pending	China
1301 human blood serum	GDCDC	Colloidal Gold	Hanta	Pending	None	China
1301 human blood serum	GDCDC	ELISA	Ebola	Pending	None	China
1301 human blood serum	GDCDC	ELISA	SARS CoV	Pending	None	China

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Optimize surveillance data management system**
    - Field-tested CAPTURE for surveillance data collection to facilitate data entry and sharing even where Internet access is intermittent.
    - Enabled editing of the Rapid Survey Tool surveys through GAINS.org.
    - Added import process allowing field staff to resubmit and update events, animal sample, and specimen information already in the GAINS database.
    - Refined Test and Test Findings templates and data collection process to optimize GAINS

data for analysis.
- Began defining data entry screens to allow online data entry of tests, test results, and test findings through GAINS.org.
- Continued work on the Genomics project to facilitate sharing and analysis of genomic data (ie RNA sequences of viruses found through surveillance data) on GAINS.org.
- Completed beta versions of user interfaces for gene sequencing data entry and searching tools.
- Implemented new GAINS database information/reports for tracking surveillance data submissions for field staff to be able to view their submissions and outstanding items.

- Sub-activity 1.4.2: **Establish global open access to database and procedure for dissemination of knowledge**
  - Implemented a new security model on the GAINS website and assigned users to appropriate security groups and dataset access.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.1: **Communication**
    - Held an EPT regional quarterly meeting in Cameroon in October. USAID Coordinator hosted, with IDENTIFY, PREDICT/PREVENT, and RESPOND all in attendance. The team discussed the on-going support to the MINEPIA Ad-hoc Working Group. PREDICT explained the new strategy for the clearance of lab data results before they are released internationally.
    - Held the quarterly PREDICT meeting in New York in November. All partners attended, as well as USAID HQ personnel. Partners presented on country/global activities and milestones were developed for submission to USAID.
    - Attended the Eijkman Institute's 5th International Conference on "Vitamins, genomics and welfare" from 8-10 November. Team members met with Indonesian collaborators, USCDC, and USAID country leads to operationalize the PREDICT program in Indonesia.
    - Attended the Annual Meeting of the American Society of Tropical Medicine and Hygiene from 4-8 December to facilitate communication on the PREDICT program with partners and the scientific community.
    - Presented at IOM Forum on Microbial Threats' workshop on "Improving Food Safety

through One Health."

- Participated in OIE brainstorming meeting on Invasive Species and the Movement of Emerging Infectious Diseases.
- Presented at DTRA Chemical and Biological Defense Science and Technology Conference.
- Attended OIE Working Group on Wildlife Diseases meeting to discuss reporting requirements for wildlife and emerging zoonotic diseases and review IUCN Guidelines to Disease Risk Analysis in collaboration with RESPOND.
- Presented at the International Conference on Emerging Infectious Diseases in Gabon.
- Attended Steering Committee on GF-TADS to coordinate OIE and FAO activities related to emerging infectious disease.
- Presented at World Veterinary Association Conference on OIE WAHIS-Wildlife disease reporting system, and its implications/uses for international reporting of disease.
- Met with RDMA in Bangkok to provide an update on activities in Asia.
- Met with Department of Defense and Naval Research Lab to increase communication between USAID and Department of Defense regarding bio-surveillance and modeling initiatives.
- Met with PREVENT to finalize a standard survey approach to assess and quantify human-animal contact rates in different disturbance gradients as part of the Deep Forest Metagenomics project.
- Met with RESPOND to discuss white paper on the effects of extractive industries on rodents, bats, and non-human primates.
- Met with HealthMap to discuss analysis on potential drivers of human outbreaks.
- Met with FAO/EPT+ representatives in Bangladesh.
- PREDICT representatives from Malaysia, Indonesia, and Thailand participated in an IDENTIFY meeting in Kuala Lumpur in October.
- Mexico Assistant Country Coordinator was appointed as the OIE (World Organization for Animal Health) National Focal Point for Wildlife for Mexico, and has been continuing frequent meetings with the ministries of wildlife and agriculture.
- Hosted the 2nd Disease Ecology and Conservation Medicine Congress in Mexico, an international conference at which PREDICT team members presented.

- Hosted a meeting with the Secretariat of Environment and Natural Resources (SEMARNAT) and Ministry of Agriculture (SANGARPA) representatives in Mexico in response to the government agencies' interest in PREDICT.
- Hosted a workshop in Bolivia with the Ministry of Public Health and Veterinary service to develop a national strategy for zoonotic disease control and prevention.
- Presented the PREDICT strategy and inclusion of modeling and wildlife health professionals in global public health approaches at the Infectious Disease Society of America meeting (ID Week; see article at http://www.infectiousdiseasenews.com/print.aspx?rid=91629).
- Lectured in Gabon as invited speaker at CIRMF symposium on "Infectious diseases emergence, environments and biodiversity".
- Invited Plenary Speaker at International Society for Disease Surveillance (ISDS) Annual Meeting in Atlanta.

LOW 2: Risk Determination

Activity 2.1: Develop risk filter strategy

- Sub-activity 2.1.1: **Develop a conceptual and structural framework (EI Risk Tool)**
  - Began to refocus the risk assessment tool (XRAT) for zoonotic disease at the extractive industry interface to integrate with existing impact assessment guidelines developed and promoted by the International Finance Corporation, World Bank, and industry advocacy groups like the International Council on Mining and Metals.
    - Discussed modifying the tool at the Extractive Industry Working Group meeting in D.C. in December, and collaboration with occupational health professionals at Yale University to refine the tool to better address human health risks, prevention, and treatment options.
    - Re-evaluated the tool to assess its potential as a supplementary component for current impact assessment "screening and scoping" activities to enable more rigorous baseline characterization of both country and site-specific infectious disease burden, along with potential zoonotic disease hazards.
  - In collaboration with the working group, we supported the development of a draft policy

briefing describing potential infectious disease risks at the extractive industry interface, along with the challenges and opportunities in mitigating those risks with currently available tools.

- Sub-activity 2.1.2: **Documentation of PREDICT strategy and successes**
  - New PREDICT Publications:
    - Characterization of a new simian immunodeficiency virus strain in a naturally infected Pan troglodytes chimpanzee with AIDS related symptoms. (b)(6) (b)(6) (b)(6) 2011. Retrovirology 2011, 8:4 http://www.retrovirology.com/content/8/1/4.
    - Widespread infection with homologues of human parvoviruses B19, PARV4, and human bocavirus of chimpanzees and gorillas in the wild. (b)(6) (b)(6) (b)(6) (2010) Journal of Virology 84(19): 10289-96.
    - Emergence of Divergent ZaireEbola Virus Strains in Democratic Republic of the Congo in 2007 and 2008. (b)(6) et al. Journal of Infectious Diseases 204 (Suppl. 3): S776-S784.
    - Human Metapneumovirus Infection in Wild Mountain Gorillas, Rwanda. (b)(6) (2011) Emerging Infectious Diseases 17 (4): 711-713 DOI: 10.3201/eid1704100883.
    - Identification of GBV-D, a Novel GB-like Flavivirus from Old World Frugivorous Bats (Pteropus giganteus) in Bangladesh. (b)(6) (b)(6) 2010) PLoS Pathogens 6 (7): e1000972 DOI: 10.1371/journal.ppat.1000972.
  - Other PREDICT-authored literature:
    - Invited review on “Public Health Surveillance and Infectious Disease Detection”, for special issue of journal *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* (discusses surveillance systems, including EPT/PREDICT).

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Sub-activity 2.2.1: **Refine and test geographical and temporal 'hotspot' models**
    - Continued to work with country coordinators to discuss sampling design and methods as part of the Deep Forest Metagenomics Project. This project will test the EID hotspots assumption that increasing mammal diversity results in increased viral diversity.
    - Began analysis to examine the proposed drivers of disease outbreaks using gridded data on human conflict, public health services, wildlife trade, human water security, cropland, pasture, population growth, and domestic livestock distribution.
    - Began exploring new methods to predict the probability of detecting a disease outbreak.

  - Sub-activity 2.2.2: **Iteratively improve datasets**
    - Obtained a database of all reported human outbreaks from 1996-2009; updated database to present; gridded all disease outbreaks at local scale (e.g. province or country level).
    - Began to analyze land use and land cover datasets to be used in new version of the hotspots maps.
    - Continued update of the database of mammals pathogens host associations.
    - Populated dataset describing transmission interfaces for viral zoonotic disease transmission events involving wildlife occurring from 2000-2010.

  - Sub-activity 2.2.3: **Design a 'Global Vulnerability' modeling strategy**
    - Worked with PREVENT to develop a standard survey approach to assess and quantify human-animal contact rates in different disturbance gradients as part of the Deep Forest Metagenomics project.
    - Began to analyze data in GAINS to target surveillance activities.

AFRICA
CAMEROON

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - Assisted the IDENTIFY team (WHO) and Ministry of Health in training 11 laboratory technicians from public hospitals in four regions of Cameroon focused on sample collection, packing, and shipping to reference laboratories for disease surveillance and outbreak response.
    - One PREDICT staff member attended an Information Technology Emergency Management Field Training offered by the World Food Program (November 15-16, 2011) in Yaoundé.
  - Sub-activity 1.1.2: **Laboratory System**
    - Assisted DRC staff in developing laboratory diagnostic capacity and laboratory management through on-the-job training in the Cameroon lab.
    - Received aliquots of samples collected by DRC staff for their training in Cameroon. Initial testing was completed, and samples will serve as quality control samples for further testing conducted in DRC.
    - Hired new laboratory coordinator to facilitate laboratory testing under protocols for pathogen discovery.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Assisted the Cameroonian Government (along with RESPOND and IDENTIFY) in the preparation of a national action plan for the control of zoonosis during meetings held December 12-16, 2011. The final draft plan was presented to national and international partners (with PREDICT, IDENTIFY, and RESPOND staff) on December 16, 2011 and ratified by the Ad-hoc Working Committee for Control of Diseases of Zoonotic Origin. Meeting participants included representatives from the ministries responsible for health, livestock, wildlife, as well as Centre Pasteur, WWF, and other international partners.

- Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
  - Submitted a revised Rapid Survey Tool to the GAINS capture interface.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Yaoundé	Bats	Hunted	18	100	Yaoundé	Yaoundé Laboratory	Flavivirus, Arenavirus, Filovirus
South and East Regions	NHP	Hunted	80	80	Yaoundé	Yaoundé Laboratory	Poxvirus, Herpesvirus,
Southeast and Southwest Regions	Rodents	Hunted	30	30	Yaoundé	Yaoundé Laboratory	Poxviruses
Yaoundé and Limbe	NHP	Sanctuary	70	398	Yaoundé	Yaoundé Laboratory	Poxvirus, Herpesvirus, Arenavirus, Coronavirus, Filovirus, Flavivirus
South and East Regions	Reptiles*	Hunted	14	14	Yaoundé	NA	NA
Southeast and Southwest Regions	Ungulates*	Hunted	147	147	Yaoundé	NA	NA
East and South Regions	Carnivores*	Hunted	18	18	Yaoundé	NA	NA
East Region	Birds*	Hunted	2	2	Yaoundé	NA	Na
South Region	Hyrax*	Hunted	4	4	Yaoundé	NA	NA
East and South Region	Pangolins*	Hunted	16	16	Yaoundé	NA	NA

*Samples from these non-priority species were collected as part of broad collections by people involved in hunting wildlife. These species were not specifically sought, and PREDICT funds were not used to obtain these samples. They have been archived for potential testing in the future but there are no plans to analyze these in the current round of PREDICT pathogen testing.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Implemented a new HCV PCR protocol to detect Hepacivirus genus in the flaviviridae (including the recently discovered canine HCV) and Pegiviruses.
    - Introduced and optimized alphavirus and coronavirus screening protocols.
    - Field-tested new mobile phone data collection software technology.
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
15 (Plasma/NHP)	Yaoundé		Filoviruses	Negative		Cameroon
			HCV	Negative		Cameroon
39 (Plasma/bats)	Yaoundé		HCV	Negative		Cameroon
173 (Plasma/bats)	Yaoundé		Coronaviruses	Negative		Cameroon
93 (DBS/NHP)	Yaoundé		Poxviruses	Negative		Cameroon
76 (Plasma/bats)	Yaoundé		Filoviruses	Negative		Cameroon
			Flaviviruses	Negative		Cameroon
			Arenaviruses	Negative		Cameroon
32 (Plasma/rodents)	Yaoundé		Hantaviruses	Negative		Cameroon
			Alphaviruses	Negative		Cameroon
164 (DBS/rodents)	Yaoundé		Poxviruses	Negative		Cameroon

- **Activity 1.4: Sample Tracking and Information Management**
  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Updated sample analysis data to GAINS: 1,854 findings from in country partner labs, and 1,353 findings from the PREDICT lab.

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Held a quarterly EPT team meeting in October hosted by (b)(6) (b)(6) with IDENTIFY, PREDICT/PREVENT, and RESPOND all in attendance. The team discussed on-going support to the MINEPIA Ad-hoc Working Group. PREDICT explained the new strategy for the clearance of lab data results before they are released internationally.

Partners: IDENTIFY, RESPOND, USAID, MINSANTE, MINEPIA, MINFOF

LOW 3: Outbreak Response Capacity Building

- The Cameroon team was informed by the Cameroonian Government of a suspected hemorrhagic fever outbreak on December 16th [one death, five other suspected cases] in Douala. PREDICT offered PPE kits for a possible response, and though the kits were not needed, PREDICT, along with IDENTIFY and RESPOND monitored the situation closely and was available to provide support to the government as needed. The case was rapidly diagnosed as yellow fever [December 19th]. The Ministry of Health is awaiting final case confirmation from the WHO Regional Reference Laboratory for Yellow Fever in Dakar, Senegal.

TIMELINE OF SUSPECTED VIRAL HEMMORHAGIC FEVER (VHF) CASE IN CAMEROON:

December 15 - Case of suspected Ebola/hemorrhagic fever detected in the Douala Central Hospital by MOH Clinician and sample collected by MOH clinician (most likely Dec 15th). The standard procedure for such a case was enacted by the MOH (Regional Delegate for Health in charge).
December 16 - IDENTIFY Cameroon contacted PREDICT Laboratory Director regarding a suspected case of VHF in Douala and requested possible assistance with PPE kits for the MOH. PREDICT was informed that the sample may be sent to CIRMF in Gabon if VHF.
PREDICT Ecology Director and Regional PM were informed of the case.
PREDICT prepared PPE kits for Douala.
PREDICT informed HQ of the potential case, along with RESPOND Representatives who were in country from DRC.
The PREDICT ecology team prepared for a possible field investigation.
PREDICT Regional PM discussed the case with IDENTIFY and received information that patient zero died, and 7 contacts had been sampled. IDENTIFY also confirmed samples were being collected and the MOH planned to send them to the MOH National Reference Laboratory (Centre Pasteur) in Yaoundé.
MINSANTE and WHO team visited the PREDICT laboratory to review the PPE kits available.
The PREDICT team was informed MINSANTE would hold a coordination meeting later that day.
PREDICT Regional PM and RESPOND Country Manager for Cameroon discussed the case 'unofficially' with the Director of Epidemiology (DE) from the Direction of Disease Control at the MOH. However, the DE could not speak openly because she had not been authorized by the MOH to discuss the issue with international partners. DE was well aware that PREDICT had sampling and investigation capacity if needed and requested by MOH.
PREDICT received information that the suspected case and contacts were Namibians who had arrived via sea from an unknown location. The wildlife sampling team held off on surveillance plans to await further information.
The PREDICT team was informed that the coordination meeting at MINSANTE was cancelled.
Sample received by CP. Method of collection unknown.
December 17/18 - Samples tested by CP, all were positive for Yellow Fever.
December 19 - WHO and MINSANTE informed PREDICT that 6 samples from 8 of the exposed individuals were received by CP, and tested positive for yellow fever. These samples were sent to the WHO Regional Reference Lab for Yellow Fever in Dakar, Senegal (Cameroon is still awaiting final confirmation as of 6 Jan 2012).
PREDICT's presence in the Outbreak Response Team at the MOH under the Direction of Disease Control was solidified.

DEMOCRATIC REPUBLIC OF CONGO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Installed a -80 C freezer at the INRB, enabling suitable sample storage and cold chain.
    - Received a liquid nitrogen generator in country.
    - Trained two PREDICT staff and two INRB laboratory technicians on DNA and RNA extraction methods from animal samples (blood, tissues, DBS, blood in RNA*later*).
    - Trained the laboratory manager on the data management of PREDICT samples and preparing the data for submission to the GAINS database.
    - Sent a DRC scientist to the Cameroon lab for hands-on training on data management, sample extraction, processing, testing, troubleshooting, and developing sample flow for viral discovery testing.
    - Installed new real-time RT-PCR smartcycler.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Implemented new community meeting protocols that communicate the importance of animal diseases, their recognition, and reporting.
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**
    - Extended active surveillance in the Sankuru District to include extremely remote areas of three health zones (Kole, Lomela, and Tshudi-Loto) where no sampling had previously been completed. Trained hunters and others exposed to wild animals to collect DBS and tissue samples from bats and rodents.
    - Initiated a collaborative agreement with the Congolese Institute for Environment for the introduction of surveillance activities among wildlife in a new park located in N'Sele.

Sample Collection and Status:

Sample Location	Taxa	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory	Tests Requested
Province Kasai Oriental, Sankuru District, Villages from Health Zones of Kole, Lomela and Tshudi Loto+	Rodent *(Anomalures)*	Hunted/ Butchered	3	11	INRB/ KINSHASA	INRB/ PREDICT DRC	Arenavirus, Hantavirus, Alphavirus, Poxvirus
+	Birds*	Hunted/ Butchered	1	4	INRB/ KINSHASA	INRB	TBD
+	Carnivores	Hunted/ Butchered	1	2	INRB/ KINSHASA	INRB	TBD
+	Genets/Civets	Hunted/ Butchered	14	61	INRB/ KINSHASA	INRB	TBD
+	Rodents sp.	Hunted/ Butchered	3	11	INRB/ KINSHASA	INRB	Arenavirus, Hantavirus, Alphavirus, Poxvirus
+	Large Terrestrial Rodents	Hunted/ Butchered	15	51	INRB/ KINSHASA	INRB	Arenavirus, Hantavirus, Alphavirus, Poxvirus
+	Rats and Mice/Rodents	Hunted/ Butchered	54	208	INRB/ KINSHASA	INRB	Arenavirus, Hantavirus, Alphavirus, Poxvirus
+	Squirrels/Rodents	Hunted/ Butchered	34	118	INRB/ KINSHASA	INRB	Arenavirus, Hantavirus, Alphavirus, Poxvirus
+	Mongoose	Hunted/ Butchered	3	8	INRB/ KINSHASA	INRB	TBD
+	Pangolins*	Hunted/ Butchered	6	27	INRB/ KINSHASA	INRB	TBD
+	Non-Human Primates	Hunted/ Butchered	80	348	INRB/ KINSHASA	GVFI-Cameroon	HIV, SFV, Orthopox virus

Sample Location	Taxa	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory	Tests Requested
						lab	on 24 DBS samples
+	Otters*	Hunted/ Butchered	1	2	INRB/ KINSHASA	INRB	TBD
+	Prosimians	Hunted/ Butchered	11	36	INRB/ KINSHASA	INRB	TBD
+	Reptiles*	Hunted/ Butchered	5	21	INRB/ KINSHASA	INRB	TBD
+	Ungulates*	Hunted/ Butchered	83	330	INRB/ KINSHASA	INRB	TBD
+	Unknown	Hunted/ Butchered	14	49	INRB/ KINSHASA	INRB	TBD

+All samples are Dried Blood Spot (DBS) samples, collected by hunters from hunted/butchered wild animals from villages located in Kasai Oriental Province, District of Sankuru, and the Health Zones of Kole, Lomela and Tshudi Loto.
*Samples from these non-priority species were collected as part of broad collections by people involved in hunting wildlife. These species were not specifically sought and PREDICT funds were not used to obtain these samples. They have been archived for potential testing in the future but there are no plans to analyze these in the current round of PREDICT pathogen testing.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Implemented PREDICT poxvirus, retrovirus, and flavivirus protocols.
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings Approved for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
8 (Blood samples/ Bonobos -*Pan paniscus*)	INRB	SIV, HBV, Yellow fever, Influenza A serology and RT-PCR		Negative		DRC
4 (Blood samples/ Bonobos -*Pan paniscus*)	INRB	Plasmodium, SIV serology		Negative		DRC
5 (Blood samples/ human - animal keepers at bonobo sanctuary)	/INRB	Plasmodium serology	Retrovirus serology	Negative		DRC
1 (Blood sample/ Bonobos -*Pan paniscus*)	INRB		Paramyxovirus serology	Negative		DRC
24 (DBS/Non human primates)	CHP-Cameroon	SIV, SFV PCR	Orthopox virus (OPV) PCR	SIV: negative SFV: Pending OPV: 2 presumptive positive from *C. neglectus* and *C. wolfii*		DRC

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **General Management**
    - Prepared a contingency plan in conjunction with the USAID mission, during the election and post-electoral period (November 28 – December 6) in case of unrest or other unanticipated problems.

Partners: Kinshasa School of Public Health, INRB, Ministry of Health, the CARPE consortium, Conservation International, WWF, Laboratoire d'Ecologie et Gestion des Ressources Animales - Kisangani and the School of Veterinary Medicine at the University of Lubumbashi, Centre de Surveillance de la Biodiversite at the University of Kisangani.

LOW 3: Outbreak Response Capacity Building

- Assisted in an outbreak that appeared to be the first suspected case of human monkeypox registered in Eastern DRC. The case was recorded in a hunter/mineworker from the District of Walikale, North Kivu Province. PREDICT staff facilitated the collection and shipment of the sample (skin lesions) through the Ministry of Health and the sample arrived at INRB for confirmation. PREDICT, in conjunction with the INRB virology lab, analyzed the sample, which was found negative for orthopox virus. PREDICT has sent investigation forms to the health district where the case was identified.

GABON

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Trained one scientist and two laboratory technicians to reinforce diagnostic activities; the new scientist will oversee all lab diagnostics.
    - Conducted extractions and analysis of key repository samples (bats, rodents, and NHPs) for various pathogens.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Attended the CIRMF symposium on the "Emergence of infectious diseases, environments and biodiversity" in Libreville, and gave a presentation on PREDICT, which will facilitate harmonization of activities across the country.
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
South East Gabon	Antelope*	Free ranging	~12	~12		NA	NA

* Samples submitted as part of an outbreak to CIRMF for testing

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Confirmed epidemic of PPRV among goats in Aboumi (tested samples previously obtained).

Findings Approved for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
370 (feces/ Syncerus Caffer Nanus)	UMVE (CIRMF)	Rift Valley Fever Real time PCR		Negative		Gabon
27 (parasites found on Rodentia)	UMVE (CIRMF)		Alphavirus, Flavivirus, Phlebovirus, Rhabdovirus, Paramyxovirus PCR	Negative		Gabon
387 (parasites found on Chiroptera)	UMVE (CIRMF)		Alphavirus, Flavivirus, Phlebovirus, Rhabdovirus, Paramyxovirus PCR	Negative		Gabon
385 (tissue from heart, lungs, kidney/Rodentia)	UMVE (CIRMF)		Coronavirus PCR	Negative		Gabon

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
385 (tissue from liver spleen/ Rodentia)	UMVE (CIRMF)		Arenavirus, Paramyxovirus PCR	Negative		Gabon
1714 (heart/lungs/kidney or intestine/Chiroptera)	UMVE (CIRMF)		Coronavirus PCR	3 presumptive Positive		Gabon
1714 (liver/spleen/ Chiroptera)	UMVE (CIRMF)	Marburg virus Real time PCR		1 presumptive Positive		Gabon
1714 (liver/spleen or brain/Chiroptera)	UMVE (CIRMF)		Flavivirus PCR	2 brain samples presumptive positive		Gabon
1714 (brain/Chiroptera)	UMVE (CIRMF)	Lyssavirus one step PCR		6 presumptive Positive		Gabon
1714 (liver/spleen/ Chiroptera)	UMVE (CIRMF)		ParamyxovirusPCR	10 presumptive Positive		Gabon
5 (brain samples/ Chiroptera)	UMVE (CIRMF)	Rabies virus one step PCR		Negative		Gabon
1714 (liver/spleen or brain/ 13 (blood 1714 (liver/spleen or brain/ Chiroptera)/Pan Chiroptera)	UMVE (CIRMF)	Ebolavirus Real time PCR	Alphavirus PCR	Negative		Gabon

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
4 (nasal swabs, blood/ *Capra*)	UMVE (CIRMF)	PPR (Peste des Petits Ruminants) One step PCR		Presumptive Positive		Gabon
13 (blood/*Pan Troglodytes*)	UMVE (CIRMF)		Enterovirus PCR	3 presumptive Positive		Gabon (from Pointe Noire)

- **Activity 1.4: Sample Tracking and Information Management**
  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Trained new country coordinator on GAINS data system.
- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **General Management**
    - Hired new country coordinator to facilitate laboratory and surveillance activities and reporting.

Partners: International Center for Medical Research Franceville (CIMRF), Gabon National Parks System, Ministry of Health, University of California at San Francisco.

LOW 3: Outbreak Response Capacity Building

- Assisted in Central African regional human outbreaks, including epidemics of unknown origin in DRC and RoC via the testing of 24 clinical samples from patients presenting with hemorrhagic fever syndrome, and 3 clinical samples from RoC obtained from 3 patients presenting neurological syndrome. The hemorrhagic fever syndrome samples were negative for Ebola, Marburg, Crimean Congo Hemorrhagic Fever, Yellow Fever, Pan Arenavirus, Rift Valley Fever, and Dengue. The ROC neurological syndrome samples were negative for Enterovirus and Lyssavirus.

REPUBLIC OF CONGO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Trained new laboratory technician in extraction/PCR procedures (NIH/NIAID/RML and Tulane University partners).
  - Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
    - Submitted Rapid Survey Tool update using CAPTURE.
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**
    - Continued to sample certain non-priority taxa (Carnivora, Artiodactyla) to investigate potential role in Filovirus epidemiology.
    - Conducted an education mission in the Sangha region in the north to meet with villagers (with a particular focus on hunters), and to develop and disseminate mortality reporting protocols. A total of 297 hunters were visited in 27 villages along the northern boundary of Odzala Kokoua National Park, a region previously experiencing Ebola epidemics. This is the second time PREDICT visited this region, and the number of hunters contacted has increased from 180 to 297.

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Libonga village	Artiodactyla	Hunter	41	326	Brazzaville Laboratory	Brazzaville Laboratory	EBOV (porcine) MARV, (porcine)
Libonga village	Carnivora	Hunter	2	20	Brazzaville Laboratory	Brazzaville Laboratory	Filovirus
Libonga village	Rodentia	Hunter	1	8	Brazzaville Laboratory	Brazzaville Laboratory	Monkeypox,
Libonga village	Primates	Hunter	6	54	Brazzaville Laboratory	Brazzaville Laboratory	Monkeypox, Chikungunya, Flaviviridae, EBOV, MARV
Libonga village	Chiroptera	Free-ranging	105	974	Brazzaville Laboratory	Brazzaville Laboratory and NIH Rocky Mountain Labs	Filovirus
Libonga region	Rodentia	Free-ranging	18	252	Brazzaville Laboratory	Brazzaville Laboratory	Monkeypox

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Received universal controls and associated protocols.
    - Ordered primers (*Arenaviridae, Coronaviridae, Filoviridae, Flaviviridae*, Nipah virus), kits, and reagents for family level virus screening.
  - Sub-activity 1.3.2: **Pathogen detection and discovery**
    - Sent 92 filter paper samples (91 rodents and one shrew) to the UC Davis laboratory to test for RNA recovery.

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
53 Chiroptera	Brazzaville Laboratory	EBOV, MARV Real Time PCR		Negative		RoC
113 Rodentia	Brazzaville Laboratory	EBOV, MARV Real Time PCR		Negative		RoC
3 NHP	Brazzaville Laboratory	EBOV, MARV Real Time PCR		Negative		RoC
62 Soricomorpha	Brazzaville Laboratory	EBOV, MARV Real Time PCR		Negative		RoC
76 Artiodactyla	Brazzaville Laboratory	EBOV, MARV Real Time PCR		Negative		RoC

- **Activity 1.4: Sample Tracking and Information Management**
  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Field-tested barcoding system.
- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Met with staff from RESPOND, RoC.

Partners: National Institute of Allergic and Infectious Diseases, National Institute of Health, Rocky Mountain Labs, Laboratoire National de Santé Public, Congolese Ministry of Health, Brazzaville, RoC National Public Health Laboratory, RoC Ministry of Health, Public Health Agency of Canada, Special Pathogens Project, Tulane University.

LOW 3: Outbreak Response Capacity Building

- Conducted clinical case and outbreak response efforts in Republic of Congo for human sample testing and captive and domestic animal sampling and screening (sick sheep, goat, and Chimpanzee populations).

RWANDA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Completed interior refurbishment and installation of essential equipment to establish the Wildlife Virology Laboratory at the Rwanda Agricultural Board's Veterinary Services Extension Laboratory in Rubilizi, Kigali as fully operational for wildlife sample processing and extraction.
    - Hired dedicated laboratory technician for Wildlife Virology Laboratory, and co-located PREDICT offices and storage facilities with Wildlife Virology Lab.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Trained 28 Rwanda Development Board Nyungwe National Park and 30 Akagera National Park personnel on zoonoses, primate and rodent capture, handling and sampling, bush meat handling and sampling, and PPE and biosafety protocols.
  - Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
    - Completed the Rapid Survey Tool update to capture developments and improvements in wildlife zoonoses surveillance capacity.
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Nyungwe National Park	Primate (Chimpanzee)	Ecotourism	28	28	RAB Wildlife Virology Lab, Kigali	TBD	TBD
Kitabi/ Nyungwe National Park	Primate (Baboon)	Human-Wildlife Conflict	2	10	RAB Wildlife Virology Lab, Kigali	TBD	TBD
Cyamudongo	Priamte (Chimpanzee)	Ecotourism	30	30	RAB Wildlife Virology Lab, Kigali	TBD	TBD
Nyungwe National Park	Primate (vervet monkey)	Human-Wildlife Conflict	2	8	RAB Wildlife Virology Lab, Kigali	TBD	TBD

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings Approved for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family screening/genus	Results	Pathogen discovery	Country
21 (Mucosal swabs, sera, blood, urine, tissue, and pericardial fluid/Mountain gorilla)	Center for Infection and Immunity, Mailman School of Public Health, Columbia University (CII)				Pending	Rwanda
6 (Sera, blood, mucosal swabs, and tissue/Golden monkey)	CII				Pending	Rwanda

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family screening/genus	Results	Pathogen discovery	Country
8 (Mucosal swabs/Grauer's gorilla	CII				Pending	Rwanda
8 (Mucosal swabs, blood, buffy coats/Golden monkey)	UC Davis Wildlife Health Center Laboratory (UCD)		Retroviruses, Filoviruses, Flaviviruses, Orthomyxoviruses, Paramyxoviruses, Poxviruses, Herpesviruses, Coronaviruses, and Arenaviruses	Pending		Rwanda
18 (Buffy coats and blood/Grauer's gorilla)	UCD		Retroviruses, Filoviruses, Flaviviruses, Orthomyxoviruses, Paramyxoviruses, Poxviruses, Herpesviruses, Coronaviruses, and Arenaviruses	Pending		Rwanda
12 (Buffy coats and mucosal swabs/Mountain gorilla)	UCD		Retrovirus, Filovirus, Flavivirus, Orthomyxovirus, Paramyxovirus, Poxvirus, Herpesvirus, Coronavirus, and Arenavirus PCR	Pending		Rwanda

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Held several meetings with one or more staff of the Rwanda Development Board, Rwanda Agricultural Board, and Ministry of Health (Epidemic Infectious Diseases Division) to provide updates on PREDICT activities and to participate in the multi-agency One Health initiative.

Partners: Rwanda Development Board, Rwanda Agricultural Board, Ministry of Health.

TANZANIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - Received the Stirlite liquid nitrogen generating plant provided by USAID DELIVER at the Iringa field station. Plant installation and training on plant operation are scheduled for Q2.
  - Sub-activity 1.1.2: **Laboratory System**
    - Installed an automated switch to the back-up power generator at the project laboratory at Sokoine University. With the back-up power system in place, the project laboratory is fully operational, and sample-processing activities are underway.
    - Continued mentoring the project laboratory technician and laboratory manager. The technician is now capable of independently processing all project samples (RNA extraction, cDNA synthesis, and Beta-actin PCR), and is now working with mentors at UC Davis on arenavirus protocols for collected rodent specimens.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Participated in the annual conference of the Tanzania Veterinary Association and the Tanzania Wildlife Research Institute in Arusha, and gave presentations on current project scope, plans, and achievements, garnering greater institutional support for EPT program objectives.
  - Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
    - Provided all requested updates to the Rapid Survey Tool.
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**
    - Consulted with the Sokoine University Pest Management Centre to identify rodent species and confirm the listed species of all sampled rodents from the Ruaha ecosystem.

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Ruaha	Chiroptera *(Epomophorus)*	Peridomestic	11	56	SUA lab	SUA, MUWRP	Arenavirus, Filovirus
Ruaha	Rodentia	Crop raiding, Peridomestic	82	235	SUA lab	SUA, MUWRP	Arenavirus *(other tests pending lab capacity)*

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Completed extractions of 20 duplicate rodent specimens from the Ruaha crop raiding and peridomestic interfaces as part of a pilot project to ensure quality control in the extraction phase of sample processing between the Tanzania lab and the regional diagnostic laboratory. Results from the pilot, which will compare results from extracted RNA, cDNA, and positive Beta-actin bands from PCR will support lab standardization among the two facilities.

- **Activity 1.5 Program Management.**
  - Sub-activity 1.5.3: **Communication**
    - Resumed communication with the USAID Mission following the approval of an appropriate point of contact by the USAID Africa Bureau and USAID Tanzania.
    - Maintained communications with District, Regional, and Municipal Officers, and conducted visits with Village Chairmen in targeted surveillance areas to provide official briefings on all local surveillance activities.
    - Conducted meetings with TAWIRI and Tanzania National Parks leaders during the Tanzania Wildlife Research Institute (TAWIRI) conference in Arusha with regard to project activities and plans, and project permissions and regulations.

Partners: Sokoine University of Agriculture, HALI Project, Mountain Gorilla Veterinary Project, Makerere University Walter Reed Project, Tanzania Wildlife Research Institute, Tanzania National Parks.

UGANDA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - In preparation for sample testing, evaluated PCR protocols for priority pathogen diagnostics at the viral family level at Makerere University Walter Reed Project laboratory using positive and negative controls.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Finalized and signed the MOU between MGVP and Uganda Wildlife Authority that includes permission for PREDICT surveillance.
    - Trained six district vermin guards in conjunction with Uganda Wildlife Authority on safe collection of samples from depredated vermin in Bwindi – Mgahinga Conservation Area using the safety guide for *Bio-safety and PPE Use*, and the protocol on *Bushmeat Sampling Methods*
  - Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
    - Completed the Rapid Survey Tool update to capture developments and improvements in wildlife zoonoses surveillance capacity.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Luwero District	Primate (Vervet monkey)	Human wildlife conflict	2	24	MUWRP laboratory	MUWRP laboratory	Filovirus, Flavivirus, Paramyxovirus, Coronavirus, Arenavirus
Luwero District	Primate (Prosimian - bushbaby)	Human wildlife conflict	1	12	MUWRP laboratory	MUWRP laboratory	Filovirus, Flavivirus, Paramyxovirus, Coronavirus, Arenavirus
Luwero District	Bat	Human wildlife conflict	1	8	MUWRP laboratory	MUWRP laboratory	Flavivirus, Coronavirus, Arenarirus, Filovirus
Budongo Forest Reserve	Primate (Chimpanzee)	Human wildlife conflict	1	10	MUWRP laboratory	MUWRP laboratory	Filovirus, Flavivirus, Paramyxovirus, Coronavirus, Arenavirus
Bwindi Impenetrable NationalPark	Primate (Mountain gorilla)	Wildlife Tourism	306	320	MUWRP laboratory	MUWRP laboratory	Filovirus, Flavivirus, Paramyxovirus, Coronavirus, Arenavirus

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - The cell phone-based Animal Mortality Monitoring Program was formally approved by the Uganda Wildlife Authority (UWA); AMMP is being phased in as an on-going UWA activity in Queen Elizabeth Conservation Area.

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Participated in Uganda EPT partners meetings (monthly meetings started in September) to share plans and facilitate coordination among EPT partners in Uganda.

Partners: Makerere University Walter Reed Project, Makerere University School of Veterinary Medicine, Uganda Wildlife Authority.

LOW 3: Outbreak Response Capacity Building

- Invited to participate in the National Task Force's risk assessment team conducting follow-up on the May/June 2010 Ebola virus outbreak: visited outbreak site, collected wildlife samples.
- Reviewed and provided input on the draft PREDICT protocol for outbreak investigations.

SOUTHEAST ASIA
CAMBODIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - National Veterinary Research Institute (NaVRI) and Forestry Administration (FA) staff members agreed to participate infield surveillance activities.
    - Lectured to the first graduating veterinary class of the Royal University of Agriculture (RUA) on wildlife disease surveillance.
    - Recruited five RUA veterinary students for PREDICT field work.
    - FA and NaVRI staff veterinarians and a PREDICT staff member participated in the PREDICT supported Wildlife Pathology Workshop in Vietnam.

- Sub-activity 1.1.2: **Laboratory System**
  - Institut Pasteur du Cambodge (IPC) agreed to train a staff member from NaVRI to conduct viral family screening of wildlife samples at IPC.

- Sub-activity 1.1.3: **Operationalizing One Health**
  - Assisted with drafting national "Zoonoses Policy and Plan", focusing on cross-sectoral collaboration in training, research, surveillance and response to outbreaks.
  - Incorporated wildlife disease surveillance perspective at national-level Zoonotic Technical Working Group meetings.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**
    - Identified wildlife trade interfaces in Pursat, Mondulkiri, and Preah Vihear provinces for future wildlife pathogen surveillance.

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Battambang Province	Chiroptera	Hunting	33	76	Institut Pasteur du Cambodge	Institut Pasteur du Cambodge	None as Yet
Battambang Province	Rodentia	Hunting	1	2	IPC	IPC	None as Yet
Battambang Province	Ungulate	Hunting	1	1	IPC	IPC	None as Yet
Battambang Province	Lagomorpha	Hunting	1	2	IPC	IPC	None as Yet
Pursat Province	Ungulate	Hunting	2	16	IPC	IPC	None as Yet

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
Chiroptera- 340	IPC		Flavivirus, Henipaviruses, Coronavirus, Astroviruses, Lyssaviruses, Filoviruses, Paramyxoviruses	15 RT-PCR presumptive positive for Coronavirus (sequencing results pending) 9 Hemi-nested presumptive PCR positive for Astrovirus (sequencing results pending) 1 presumptive positive for Paramyxovirus (sequencing results pending		Cambodia
Rodents- 44	IPC		Arenaviridae Hantaviridae	Negative		Cambodia

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Provided monthly update to (b)(6)
    - Obtained support from NaVRI for PREDICT to assist in outbreak responses where wildlife involvement is suspected.

Partners: Royal University of Agriculture (RUA).

INDONESIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Performed lab visit to IPB Bogor Agricultural Institution Primate Center facilities to evaluate for diagnostic activities.
    - Two lab visits to Eijkman Institute to discuss staffing and needs.
    - Presented at IDENTIFY regional coordination meeting in Kuala Lumpur.
    - Identified archived samples that may be tested at Eijkman Institute.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Planned official launch of program with government officials from Health, Agriculture, Forestry, and People's Welfare ministries.
- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Transferred diagnostic protocols and universal positive control to IPB.
- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **General Management**
    - Selected (b)(6)
    - Hired (b)(6)
  - Sub-activity 1.5.3: **Communication**
    - Working with US CDC to coordinate activities in Indonesia.

Partners: Institut Pertanian Bogor (IPB) Primate Research Center; Eijkman Institute (provisionally); US Centers for Disease Control and Prevention (CDC).

LAO PDR

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - Trained new project coordinator (wildlife necropsies, bar-coding, data management).
    - Three government partner staff at National Animal Health Centre (NAHC) attended the Wildlife Pathology Workshop in Vietnam.
    - Selected students from Science and Agriculture at National University (NUoL) to join field surveillance during their final research projects.
    - Trained NAHC, Agriculture, and Forestry staff in sampling and surveillance at key interfaces.
  - Sub-activity 1.1.2: **Laboratory System**
    - Provided training to three lab staff in molecular techniques at IPC in anticipation of NAHC's completion of the new laboratory. Tested wildlife samples collected through PREDICT/NAHC collaboration during training at IPC.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Assisted with cross-sectoral workshops promoting One Health in zoonoses surveillance.
    - Shared surveillance data in Lao Surveillance Working Group (Government, multi-laterals, NGOs).
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**
    - Identified new wildlife trade interfaces for sampling in three provinces in southern Laos.
    - Sampling is opportunistic and relies on the cooperation of villagers and vendors in the markets, while we will focus diagnostics on priority species, to build relationships we sample all species presented at the time of sampling.

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface (s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Champassak Province	Rodentia	Market	24	122	National Animal Health Centre (NAHC)	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Champassak Province	Carnivora	Market	7	36	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Attapeu Province	Rodentia	Market/ Hunter	4	16	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Attapeu Province	Carnivora	Market/ Hunter	6	24	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Salavan Province	Rodentia	Market/ Hunter	43	177	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Salavan Province	Carnivora	Market	12	51	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Salavan Province	Primate	Market	2	7	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Xiengkhouang Province	Rodentia	Market	51	203	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Xieng Khouang Province	Carnivora	Market	6	28	NAHC	NAHC (Potentially Institute Pasteur du Laos)	None as Yet
Houapanh Province	Chiroptera	Hunting	22	88	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Houapanh Province	Rodentia	Hunting	71	485	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Houapanh Province	Carnivora	Hunting	1	4	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Houapanh Province	Insectivora (shrews)	Hunting	2	18	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet
Houapanh Province	Artiodactyla	Hunting	1	1	NAHC	NAHC (Potentially Institut Pasteur du Laos)	None as Yet

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
327 Chiroptera	Institut Pasteur du Cambodge (IPC)		Coronaviruses, Astroviruses, Lyssaviruses, Filoviruses	12 RT-PCR presumptive positive for Coronavirus (sequencing results pending) 12 Hemi-nested presumptive PCR positive for Astrovirus (sequencing results pending) All negative for Filovirus, Lyssavirus		Cambodia (country of testing)
144 Rodentia	Institut Pasteur du Cambodge (IPC)		Hantaviruses Arenaviruses	Negative		Cambodia (country of testing)

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **General Management**
    - Hired new Country Coordinator for Lao PDR.
  - Sub-activity 1.5.3: **Communication**
    - PREDICT and NAHC presented collaborative achievements and planned Y3 activities to National Emerging Infectious Disease Coordination Office (NEIDCO) and USAID.
    - Discussed collaborations with NuOL veterinary faculty for wildlife health instruction and student participation in fieldwork.

Partners: National University of Laos (NUoL), Institute Pasteur du Cambodge.

MALAYSIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Ordered -80 Freezers for VRI, NPHL, and SWD to store samples collected from humans and wildlife.
    - Worked closely with VRI in planning work flow for the new BSL facility to test wildlife samples.
    - Prepared to send the first shipment of samples to CII for pathogen discovery.
    - PERHILITAN and DVS have agreed to test 4500 samples for 4 different virus families before the end of Y3 at VRI, upon signing of Material Transfer Agreement.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Attended an inter-ministerial meeting on the Control of Zoonotic Diseases between DVS, MOH, and PERHILITAN, held for the first time since 2003 to discuss PREDICT project and promote the One Health concept.
  - Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
    - Updated Rapid Survey Tool.
- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Positive Control used to screen samples for Coronavirus, Arenavirus, Hantavirus and Flavivirus.
    - Began to train PERHILITAN staff in the use of the Positive Control.
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approved for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
Urine swabs, 14 bats	PERHILITAN		Arenavirus	1 sample was presumptive PCR positive, not yet confirmed with sequencing		Malaysia
Urine swabs, 9 rodents	PERHILITAN		Arenavirus	1 sample was presumptive PCR positive, not yet confirmed with sequencing		Malaysia
Urine swabs, 14 bats	PERHILITAN		Hantavirus	Negative		Malaysia
Urine swabs, 10 rodents	PERHILITAN		Hantavirus	Negative		Malaysia
Urine swabs, 13 bats	PERHILITAN		Flavivirus	Negative		Malaysia
Urine swabs, 9 rodents	PERHILITAN		Flavivirus	2 samples were presumptive PCR positive, not yet confirmed with sequencing		Malaysia

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **General Management**
    - All government partners have agreed to abide by a single agreement, currently in the final stages of review.

- Sub-activity 1.5.3: **Communication**
  - Attended Laboratory Strengthening for Emerging Infectious Diseases in Asia Pacific Meeting hosted by IDENTIFY with PERHILITAN, DVS, and MOH staff.
  - Finalized agreement with PERHILITAN to prepare results from Herpes B virus testing for publication and to move first shipment of samples to CII for novel pathogen screening.
  - Met with Sabah Wildlife Department (SWD) to discuss wildlife sampling in Sabah to establish a Wildlife Health Unit to perform sample collection. Testing of samples will be conducted at SWD, University Malaysia Sabah, VRI and sub set of samples sent to CII for novel pathogen screening.

Partners: Department of Wildlife and National Parks (PERHILITAN); Department of Veterinary Services (DVS), Veterinary Research Institute (VRI); National Public Health Laboratory (NPHL); Sabah Wildlife Department (SWD).

THAILAND

1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - Assisted DNP to develop plans for Nipah virus and other pathogen surveillance in Y3. Will also receive financial support from the Thai government.
  - Sub-activity 1.1.2: **Laboratory System**
    - Developed diagnostic PCR protocol for viral families testing, based on PREDICT protocols.
- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Prepared manuscript on the detection of coronavirus from bat quano fertilizers.
    - Continued Nipah virus genetic testing.

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
25 (Bat urine/ P.Hypomelanus)	Chulalongkorn University		filovirus RT-PCR	Negative		Thailand
4 (1 saliva, 2 urine, 1plasma/rodents)	Chulalongkorn University		filovirus RT-PCR	Negative		Thailand
42 (Bat pooled saliva) 2 of Cynopterus.sphinx 8 of Hipposideros.armiger 2 of H.larvatus 7 of H.lekaguli 2 of Miniopterus.pusillus 10 of M.schreibersi 1 of Macroglossus.sorbinus 1 of Rousettus.leschenaulti 1 of Rhinolophus.malayanus 3 of Taphozous.longimanus 2 of T.melanopogon 1 of Tadarida.plicata 1 of Vespertiliondae 1 of Pipistrellus	Chulalongkorn University		filovirus- RT-PCR	Negative Presumptive Positive Negative Negative Negative Negative Negative Negative Negative Negative Negative Negative Negative Negative	Sequence confirmation pending	Thailand
11(Bat pooled urine) 1 of C.sphinx 2 of H.armiger 1 of H.larvatus 1of H.lekaguli 1 of M.schreibersi 1 of R.leschenaulti 2 of T.longimanus 1 of T.theobaldi 1 of T.plicata	Chulalongkorn University		filovirus RT-PCR	Negative Negative Negative Negative Negative Negative Negative Negative Negative		Thailand
112 (Bat feces/ pooled feces) Archived /non PREDICT specimens	Chulalongkorn University		coronavirus	4 presumptive positive	pending confirmation	Thailand

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
42 (Bat feces/ M.schreibersi) Archived /non PREDICT specimens	Chulalongkorn University		coronavirus	12 presumptive positive	pending confirmation	Thailand
6 (Bat feces/ H.lekaguli) Archived /non PREDICT specimens	Chulalongkorn University		coronavirus	1 presumptive positive	pending confirmation	Thailand
3 (Bat feces/ H.armiger) Archived /non PREDICT specimens	Chulalongkorn University		coronavirus	negative		Thailand
1 (Bat feces/ C.sphinx) Archived /non PREDICT specimens	Chulalongkorn University		coronavirus	negative		Thailand

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Attended IDENTIFY meeting on Laboratory Strengthening for Emerging Infectious Diseases Diagnosis in Asia Pacific to initiate closer relationship between staff of public health and animal health laboratories.
    - Attended EID Preparedness Forum meeting to better facilitate cross-EPT communication.
    - Attended Regional Workshop Emerging and Dangerous Pathogens Laboratory Network (EDPLN) to establish a new collaborative network.
    - Attended meeting of Collaborating/Reference Centres on EID and zoonoses to begin a new collaborative network.
    - Met with the Director of the Center for Infection and discussed techniques for disease diagnostics and pathogen discovery at Chulalongkorn University for ongoing collaboration with AFRIMS.
    - Worked with PREVENT on human-animal interface for pathogen risk questionnaire.
    - Identified the Points of Contact in 3 ministries: Ministry of Public Health, Ministry of Agriculture and Ministry of National Resources and Environment.

- Met with PREDICT Asia Regional Coordinator and USAID RDMA in Bangkok. Discussed surveillance projects (bat telemetry, coronavirus results, Nipah surveillance) and planned for future support.
- Developed educational materials for bat conservation and public health awareness.

Partners: Chulalongkorn University; Department of Natural Parks, Wildlife and Plant Conservation (DNP).

VIETNAM

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Transferred equipment to partner labs
      - Hanoi University (HUA) Infectious Diseases and Microbiology Laboratory: -30 freezer, centrifuge, Vortex (x2), miscellaneous supplies.
      - Regional Animal Health Office-6 (RAHO6), Dept. of Animal Health: Ultralow freezer, -30 freezer, Vortex, miscellaneous supplies.
    - Trained 25 government and university pathologists from Vietnam, Laos, and Cambodia during the Wildlife Pathology Workshop in partnership with HUA.
    - Obtained permission to transfer samples collected in 2010-11 to HUA for diagnostic testing.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Contributed to national "Integrated National Operational Program on Avian Influenza, Pandemic Preparedness and Emerging Infectious Diseases (AIPED), 2011-2015", joint program of Ministries of Agriculture & Rural Development, and Health.
    - Introduced One Health concept to 78 participants from government, UN agencies, USAID API partners, EPT partners, and HUA during lectures of the Wildlife Pathology Workshop.
  - Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
    - Completed Rapid Survey Tool update with Capture software.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**
    - Samples were collected from all animals at the interface to help build relationships, but diagnostic preference will be given to PREDICT priority species.

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Dalat City, Lam Dong Province	Rodentia, (*Rhizomys* sp.)	Wildlife restaurant	24	96	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Arenaviridae Flaviviridae
Dalat City, Lam Dong Province	Rodentia, Family Hystricidae	Wildlife restaurant	5	15	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Arenaviridae Flaviviridae
Dalat City, Lam Dong Province	Carnivora Family Viverridae	Wildlife restaurant	17	32	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Arenaviridae Flaviviridae
Dalat City, Lam Dong Province	Carnivora (*Melogale* sp.)	Wildlife restaurant	1	5	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Arenaviridae Flaviviridae
Dalat City, Lam Dong Province	Carnivora (*Ursus* sp.)	Wildlife restaurant	2	4	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Archived pending future diagnostics
Dalat City, Lam Dong Province	Aves (*Streptopelia* sp.)	Wildlife restaurant	11	51	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Archived pending future diagnostics
Dalat City, Lam Dong Province	Ungulate (*Tragulus* sp.)	Wildlife restaurant	14	26	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Archived pending future diagnostics
Dalat City, Lam Dong Province	Artiodactyl (*Sus* sp.)	Wildlife restaurant	10	20	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Archived pending future diagnostics
Dalat City, Lam Dong Province	Family Manidae (Pangolin)	Wildlife restaurant	2	4	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Archived pending future diagnostics
Dalat City, Lam Dong Province	Reptilia (Monitor Lizard)	Wildlife restaurant	1	2	Veterinary Faculty, HUA	Infectious Diseases and Microbiology Laboratory	Archived pending future diagnostics

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Shared PREDICT Universal Positive Control 1 and Diagnostic Protocols with partner labs.
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family screening/genus	Results	Pathogen discovery	Country
47 (Packed blood cells / Carnivora, Family Ursidae)	HUA		*Paramyxoviridae, Flaviviridae, Coronaviridae, Herpesviridae* PCR	PENDING (currently finalizing results)		Vietnam
10 (Packed blood cells, oral swab, rectal swab / Carnivora, Family Viverridae)	HUA		*Paramyxoviridae, Flaviviridae, Coronaviridae, Herpesviridae* PCR	PENDING (currently finalizing results)		Vietnam

- **Activity 1.4: Sample Tracking and Information Management**
  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Improved data sheets for varied interfaces (wildlife farm, restaurant, rescue centre).

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Distributed new weekly *PREDICT One Health Media Digest* (digital media stories on wildlife, domestic livestock, and human disease outbreaks in Vietnam and internationally) to government partners, USAID, EPT partners, and other interested individuals.
    - National Centre for Veterinary Diagnostics (NCVD), RAHO6, and HUA agreed to sign the Sample and Data Sharing Policy.

ASIA
BANGLADESH

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Initiated Nipah virus PCR testing of bat samples.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Participated in One Health meetings held by FAO and by One Health Alliance of South Asia – OHASA, participants included UNICEF; FAO; ICDDR,B; Department of Livestock Services of Bangladesh (DLS); Central Disease Investigation Laboratory (CDIL); Ministry of Health in Bangladesh (IEDCR); Ministry of Health (Bangladesh CDC); U.S. CDC; Bangladesh Livestock Research Institute (BLRI) of the Ministry of Fisheries and Livestock; USAID; Chittagong Veterinary and Animal Sciences University (CVASU); Bangladesh Department of Forests.
  - Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
    - Completed the Rapid Survey Tool Update.
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**

Sample Collection and Status:

Sample Location	Taxa	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory	Tests Requested
Bangabandhu Safaripark,Chakaria	Primates	captive and semi-wild	4	56	ICDDR,B	ICDDR,B, CII	Herpes B, viral family PCR
Bangabandhu Safaripark,Chakaria	Rodents	wild	19	262	ICDDR,B	ICDDR,B, CII	PCR
Shubarampur,Faridpur	Bats	wild	100	1400	ICDDR,B	ICDDR,B, CII	Nipah PCR
Ambicapur,Faridpur	Rodents	wild	51	709	ICDDR,B	ICDDR,B, CII	PCR
TOTAL			**174**	**2427**			

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results (*)	Pathogen discovery	Country
400 samples of throat swabs and roost urine from bats	ICDDR,B	Nipah virus		All negative		Bangladesh

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Met with (b)(6) and (b)(6) upon their visit to Bangladesh.
    - Participated in meetings and field visits with FAO and USAID representatives regarding EPT+.

Partners: ICDDR,B; Bangladesh Department of Forests.

CHINA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - Extension of human surveillance to include acute unidentified hospital-based surveillance in locations with high seropositive results.
  - Sub-activity 1.1.2: **Laboratory System**
    - Evaluated animal and human surveillance data to identify priority bat and rodent samples from Guangdong Institute of Education (GDEI) to send to Wuhan Institute of Virology (WIV) for analysis.
    - WIV began using PREDICT protocols for testing.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Met with the Institute of Nutrition and Food Safety at Guangdong Centers for Disease Control to introduce the PREDICT program.
    - Presented activities to the Guangdong Public Health Bureau and the Guangdong Centers for Disease Control to increase collaboration in China.
    - Met with Shanghai CDC, introduced EPT/PREDICT and discussed potential linkages with wildlife surveillance.
    - Discussions with collaborating partners in Beijing (China Ministry of Foreign Affairs) regarding a surveillance project targeting extraction industries in Gabon; (b)(6) GDCDC has been invited to visit Gabon.
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**
    - Developed acute human hospital-based surveillance protocols for Guangdong.
    - Identified additional live animal markets and market-associated farms in Guangxi and Guangdong for sampling.

Sample Collection and Status:

Sample Location	Taxa	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory	Tests Requested
Southern China	Bat	wildlife	11	11	Southern China	WIV	PCR
Southern China	Bats		398	1564	GDEI	GDEI	PCR
Southern China	Rodents		113	393	GDEI	GDEI	PCR
Southern China	Rodents	farmed wildlife	160	320	GuangXi	ECNU/WIV	PCR
Southern China	Carnivore	farmed wildlife	6	12	GuangXi	ECNU/WIV	PCR
Total			**688**	**2300**			

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings Approved for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
149 Bats oral swab	GDEI		Hanta	51 presumptive +		China
75 Rodents Rectal swab	GDEI		Hanta	75 -		China
51 Rodents blood serum	GDEI	Dengue		51 -		China
238 Bats throat swab	GDEI		Coronavirus	238 -		China
121 Rodents blood serum	GDEI		Hanta	4 presumptive +		China

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
8 Rhinolophus bats	WIV		Coronavirus PCR	pending		China
1301 human blood serum	GDCDC	Hanta Colloidal Gold		pending		China
1301 human blood serum	GDCDC	Ebola ELISA		pending		China
1301 human blood serum	GDCDC	SARS CoV ELISA		pending		China

- **Activity 1.4: Sample Tracking and Information Management**
  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Translated animal collection and results data (from GDEI) into English; being formatted for GAINS.
    - Completed entry of human behavioral information into a secured database.

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **General Management**
    - Received official Representative Office (RO) status approval from the Chinese government for office space in Guangzhou.
  - Sub-activity 1.5.3: **Communication**
    - Asia Regional Coordinator met with RDMA and reported on Q1 activities and Y3 plans.

Partners: East China Normal University (ECNU); Guangdong Centers for Disease Control and Prevention (GDCDC); Wuhan Institute of Virology (WIV); Guangdong Entomological Institute/South China Institute of Endangered Animals (GDEI).

LATIN AMERICA
BOLIVIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - Gained permission to be involved in rodent capture/sampling with government staff in outbreak affected areas.
    - Improved communications of disease outbreaks in northern Bolivia.
    - Informed National Veterinary Service on normative diseases in Takana indigenous communities (e.g., anthrax and piroplasmosis in cattle).
    - Trained 100 students from U. Gabriel René Moreno and Museo Noel Kempff Mercado.
    - Trained a PREDICT collaborator in bat and rodent monitoring in the field in Santa Cruz.
    - Trained two collaborators from UPEA University and La Senda Verde Wildlife Rescue Ctr.
    - Trained six PREDICT staff in Biostatistics at IBMB-UMSA laboratory.
  - Sub-activity 1.1.2: **Laboratory System**
    - Continued setting up molecular protocols for viral family testing at Institute of Molecular and Biotechnology-IBMB, Univ. San Andrés.
    - Tested efficacy of two RNA extraction and reverse transcription methods at IBMB-UMSA lab (Chelex vs. Guanidinium, Invitrogen RT enzymes vs. Solis B reverse transcriptase).
    - Planned for protocols testing with field samples; improving biosafety for RNA extractions; cloning plasmid with universal control 1, increasing availability of positive controls; addressing request to National Reference Lab for hantavirus and arenavirus positive control samples.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Designed a preliminary national plan to prevent and control zoonotic and neglected diseases during workshop with Ministries of Health, Agriculture and Environment, and Pan-American Health Organization (PAHO Bolivia).

- Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
  - Completed Rapid Survey Update.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Community of Puerto Nuevo (Río Grande, Santa Cruz)	Bats	Free-ranging wild caught	10	158	IBMB-UMSA	IBMB-UMSA	Samples stored until screening for: Flavivirus, Arenavirus, Coronavirus and Filovirus.
Community of Puerto Nuevo (Río Grande, Santa Cruz)	Rodent	Free-ranging wild caught	1	31	IBMB-UMSA	IBMB-UMSA	Samples stored until screening for: Hantavirus, Arenavirus, Alphavirus, Flavivirus.
Community of Elvira (Beni)	Rodents	Free-ranging wild caught	83	771	IBMB-UMSA	IBMB-UMSA	Samples stored until screening for: Hantavirus, Arenavirus, Alphavirus, Flavivirus.
Municipality of San Andrés (Beni)	Rodents	Free-ranging wild caught	126	760	IBMB-UMSA	IBMB-UMSA	Samples stored until screening for: Hantavirus, Arenavirus, Alphavirus, Flavivirus.
Campus of the University of San Andrés (La Paz)	Rodents	Free-ranging wild caught (rodent control program)	8	250	IBMB-UMSA	IBMB-UMSA	Samples stored until screening for: Hantavirus, Arenavirus, Alphavirus,

							Flavivirus.
Cachichira indigenous community (Madidi National Park)	Primate	Subsistence hunting	1	9	IBMB-UMSA	IBMB-UMSA	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, Arenavirus, (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
La Senda Verde Wildlife Rescue Center (Coroico District, La Paz)	Primates	Donations of wild pets by private owners to rescue centers	17	326	IBMB-UMSA	IBMB-UMSA	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, and Arenavirus/ (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
Chairo and Yolosa (Yungas of La Paz)	Bats	Free-ranging wild caught	121	540	IBMB-UMSA	Columbia University	Pathogen discovery

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
2,845 samples (frozen dried blood spots in FTA/Protein saver cards; oral/rectal swabs, blood/serum/clots, feces, and tissues frozen in either VTM and RNAlater; formalin-preserved tissues; fixed blood smears; hair/ monkeys, bats, rodents)	IBMB-UMSA		1. Bats: flavi, corona, arena and filovirus PCR 2. Primates: filo, paramyxo, flavi and coronavirus PCR 3. Rodents: hanta, arena, alpha and flavivirus PCR	Pending	Pending	Bolivia

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Agreed on information sharing mechanisms with Ministry of Public Health and National Veterinary Service (SENASAG) re: PREDICT findings to government and public release.

Partners: Departmental Services of Health (SEDES Beni); Police Institute for Technical and Scientific Research (IITCUP, Police University); Natural Museum "Noel Kempff Mercado"; Autonomous University Gabriel René Moreno (UAGRM).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Finalized report characterizing wildlife trade in the country in collaboration with Bolivian General Directorate of Biodiversity and Bolivian Network to Combat the Illegal Wildlife Trade (REBOCTAS).

LOW 3: Outbreak Response Capacity Building

- Responded to an outbreak and assisted with coordination of surveillance for hemorrhagic fever in northern Bolivia, working closely with National Ministry of Health (Zoonoses, Hantavirus/Hemorrhagic Fever Programs), and Beni Regional Department of Health (SEDES) on field investigations in

province of Cercado (communities of Elvira and San Andrés). Please see Highlight Annex for details.
- Provided technical advice to National Veterinary Service (SENASAG) to design a strategy to respond to a fox-borne rabies outbreak affecting camelids.

BRAZIL

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Discussed diagnostic testing plan with ICB-USP, the Wildlife Health Center Lab at UC Davis, and CII at Colombia University.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**

Sample Collection and Status:

Sample Location	Taxa	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory	Tests Requested
Manaus, Amazonia State	Bats	Free-ranging wild caught; Urban	154	616	Manaus (ultralow freezer -80)	ICB-USP; CII	Flavivirus, Arenavirus, Coronavirus and Filovirus
Manaus, Amazonia State	Rodents	Free-ranging wild caught; Urban	9	36	Manaus (ultralow freezer -80)	ICB-USP; CII	Hantavirus, Arenavirus, Alphavirus, Flavivirus
Presidente Figueiredo, Amazonia State	Rodents	Free-ranging wild caught; Pristine	10	40	Manaus (ultralow freezer -80)	ICB-USP; CII	Hantavirus, Arenavirus, Alphavirus, Flavivirus
Presidente Figueiredo, Amazonia State	Marsupials	Free-ranging wild caught; Pristine	7	28	Manaus (ultralow freezer -80)	ICB-USP; CII	Hantavirus, Arenavirus, Alphavirus, Flavivirus
Presidente Figueiredo, Amazonia State	Bats	Free-ranging wild caught; Pristine	35	144	Manaus (ultralow freezer -80)	ICB-USP; CII	Flavivirus, Arenavirus, Coronavirus, Filovirus
Presidente Figueiredo, Amazonia State	Primates	Free-ranging wild caught; Pristine	1	5	Manaus (ultralow freezer -80)	ICB-USP; CII	Flavivirus, Arenavirus, Coronavirus, Filovirus
Serra do Apiaú, State of Roraima, (northern Brazil)	Bats	Free-ranging wild caught	90	588	Manaus (liquid nitrogen tanks)	ICB-USP; UC Davis	Flavivirus, Arenavirus, Coronavirus, Filovirus
Serra do Apiaú, State of Roraima, (northern Brazil)	Rodents	Free-ranging wild caught	7	45	Manaus (liquid nitrogen tanks)	ICB-USP; UC Davis	Hantavirus, Arenavirus, Alphavirus, Flavivirus
Serra do Apiaú, State of Roraima, (northern Brazil)	Marsupials	Free-ranging wild caught	3	25	Manaus (liquid nitrogen tanks)	ICB-USP; UC Davis	Mayaro-like alphaviruses
Total			**316**	**1527**			

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - New reagents have been purchased by DELIVER for the DNA extraction robot, all of which should be shipped to ICB-USP in Q2Y3.
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - In preparation for in-country family level viral diagnostics, it has been agreed that all CITES species and primate samples will be analyzed in Brazil.

Findings Approved for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
680 samples (blood clots, serum and oral/rectal swabs, from bats and rodents	CII, Columbia University			Pending	Pending	United States
658 samples (blood clots, serum, oral/rectal swabs, tissues, and dried blood spots on FTA cards from free-ranging bats, rodents, and marsupials)	Institute of Biomedical Sciences (ICB-USP); Wildlife Health Center Lab (UC Davis)		1. Bats: flavi, corona, arena and filovirus PCR 2. Rodents: hanta, arena, alpha and flavivirus PCR 3. Marsupials: alphavirus PCR	Pending	Pending	Brazil

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **General Management**
    - Permission to work in restricted areas in Manaus continuing to be negotiated.

Partners: Department of Preventive Medicine at Faculty of Veterinary Sciences, Wildlife Comparative

Pathology Lab, and Institute of Biomedical Sciences (ICB-USP) at the University of São Paulo (USP); Instituto Biotrópicos; National Research Institute of Amazonia (INPA); FIOCRUZ, Amazonia and Manaus; Emilio Goeldi Museum; Federal University of Amazonia (UFAM); Federal University of Pará (UFPA).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Continued to work with the Modeling and Hotspots ID Team to strategize the sampling design as part of the Deep Forest Metagenomics project.

COLOMBIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Continued to support the establishment of an inter-ministerial alliance (Ministries of Health, Agriculture and Environment) for wildlife disease surveillance.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
54 archived samples (serum/ 18 primates sampled in previous quarters by former country leads)	INS; FUSM SIU Laboratory (University of Antioquia)	Hantavirus; Flavivirus (Dengue; Yellow fever). ELISA, Hemagglutination inhibition test		Negative		Colombia

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.3: **Communication**
    - Agreed on information sharing mechanisms with the Regional Environmental Authorities and National Ministries of Public Health and Agriculture for results communications.

MEXICO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.2: **Laboratory System**
    - Reviewed the pathogen detection protocols to begin testing next quarter.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Organized an international conference on wildlife disease and conservation medicine.
    - Hosted a meeting with both SEMARNAT and SANGRAPA representatives interested in PREDICT. These two ministries rarely meet. Meeting established commitment to project.
  - Sub-activity 1.1.4: **Capacity Assessment and Tracking of Development Progress**
    - Completed the Rapid Survey Tool update and submitted it via the CAPTURE program.
- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Signed data sharing document.

Partners: Instituto de Ecología and Facultad de Medicina Veterinaria y Zootecnia at Universidad Nacional Autónoma de México (UNAM); Instituto Mexicano del Seguro Social, Institute of Social Security (IMSS); Comisión Nacional de Salud Animal (Wildlife Health Commission); Comisión Nacional de Áreas Naturales Protegidas (Commission for Protected Natural Areas) de la Secretaría de Medio Ambiente y Recursos

Naturales (SEMARNAT); Secretaría de Ganadería, Agricultura, Desarrollo Rural, Pesca y Alimentación (SAGARPA), Ministry of Agriculture.

PERU

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Surveillance System Improvements**
    - Received permission from the National Institute of Health-INS' Scientific Committee to be involved in official field investigations and outbreak response activities.
    - Received new permit to survey traded wildlife.
    - Formalized agreement with National Institute of Health (INS) for sample sharing and intellectual property.
    - Met with INS for possible joint sampling of bats and rodents in northern Amazonia and sharing NIH samples with PREDICT for testing.
    - Planned for training workshop on wildlife disease surveillance for government staff with the USDA-APHIS Wildlife Disease Program, and Peruvian Veterinary Service (SENASA).
    - Participated in a workshop organized by Forestry and Wildlife (ATFFS) on management of captive wild animals from the trade.
  - Sub-activity 1.1.2: **Laboratory System**
    - Imported primers and extraction reagents to be used at NAMRU-6 for molecular screening.
    - Shared PREDICT nitrogen dewars with INS laboratory for storing rodent samples collected during Plague investigations in northern Peru.
  - Sub-activity 1.1.3: **Operationalizing One Health**
    - Reached agreement on information sharing mechanisms with National Ministry of Health and Veterinary Service (SENASA).
    - Staff made ten scientific presentations on infectious diseases in the wildlife trade at three international events.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Specific Surveillance Activities Completed in Current Quarter**
    - Expanded surveillance of traded wildlife to new rescue centers and zoos in central Peru.

Sample Collection and Status:

Sample Location	Taxa (one line per taxa)	Interface(s)	# of Animals Sampled	# of Samples Collected	Current Location	Diagnostic Laboratory (list lab(s))	Tests Requested
Tumbes	Primates	Active surveillance at market	12	43	US NAMRU-6	NAMRU-6	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, Arenavirus / (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
Lima	Primates	Captivity	18	300	US NAMRU-6	NAMRU-6	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, Arenavirus / (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
Cusco	Primates	Trade	1	13	US NAMRU-6	NAMRU-6	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, Arenavirus / (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
		Captivity	17	257	US NAMRU-6	NAMRU-6	

Puerto Maldonado	Primates	Captivity	24	373	US NAMRU-6	NAMRU-6	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, Arenavirus / (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
Tingo María, Huánuco	Primates	Captivity	5	40	US NAMRU-6	NAMRU-6	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, Arenavirus / (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
Yurimaguas	Primates	Trade	45	514	US NAMRU-6	NAMRU-6	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, Arenavirus / (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
Pucallpa	Bats	Free-ranging wild caught	7	61	US NAMRU-6	NAMRU-6; INS Iquitos	Samples stored until screening for: Flavivirus, Arenavirus, Coronavirus and Filovirus.

Riverside community of Nueva Esperanza (Yavarí District Loreto Region)	Primates	Subsistence hunting	22	22	US NAMRU-6	NAMRU-6	Samples stored until screening for: (first round) Filovirus, Paramyxovirus, Flavivirus, Coronavirus, Arenavirus / (second round) Retrovirus, Herpesvirus, Poxvirus, Orthobunyavirus, others.
	Rodents	Subsistence hunting	32	32	US NAMRU-6	NAMRU-6; INS Iquitos	Samples stored until screening for: Hantavirus, Arenavirus, Alphavirus, Flavivirus.
	Xenarthra (armadillos)	Subsistence hunting	4	4	US NAMRU-6	NAMRU-6	Samples stored until screening for: Ortho-bunyaviruses.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Received equipment (RNALater; Sherman traps, etc.) for surveillance of wild rodents.
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings PENDING Approval for Release of Data:

# Samples submitted (type/ taxa)	Diagnostic lab	Normative diagnostics	Pathogen family/genus screening	Results	Pathogen discovery	Country
1,659 samples (frozen dried blood spots in FTA cards; oral/rectal swabs, blood/serum/clots, feces, and tissues frozen in either VTM and RNAlater; feces in Cary-Blair medium; formalin-preserved tissues; fixed blood smears/ monkeys, bats, rodents, xenarthra)	US NAMRU-6; INS		1. Bats: flavi, corona, arena and filovirus. 2. Primates: filo, paramyxo, flavi and coronavirus. 3. Rodents: hanta, arena, alpha and flavivirus. 4. Xenarthra: bunyavirus.	Pending	Pending	Peru

- **Activity 1.4: Sample Tracking and Information Management**
  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Refined data templates and questionnaires for proposed wet market observation study.

Partners: Zoo of the National University San Antonio Abad (UNSAAC, Cusco city); "Mundo Andino" Wildlife Rescue Center (Tipón, Cusco); "Taricaya" Wildlife Rescue and Conservation Center (Puerto Maldonado); "Mundo Natural" Wildlife Rescue Center (Tingo María Huánuco).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Submitted a proposed market study for review by US NAMRU-6's ethics committee and IRB approval.

Partners: Vendors at wetmarkets of Pucallpa, Tumbes, Piura, Ica, Lima, Trujillo, Chiclayo, and Iquitos cities.

PREDICT Quarter 2 Year 3 Reporting

GLOBAL - US, Africa, Southeast Asia, Asia & Latin America

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building (includes infrastructure, training, coordination and systems improvements toward sustainability)**
  - Sub-activity 1.1.1: **Operationalizing One Health**

a) International, National or Regional Surveillance System Improvements

- Collaborated with the Lima Administration of Forestry and Wildlife (Peru) in holding their workshop for environmental staff on the "Management of captive wildlife from the trade". The workshop included 50 representatives from 16 government and private institutions.
- Made an agreement with Cambodia National Veterinary Research Institute and Forestry Administration for their staff to join the PREDICT team on future field surveillance, and hired new senior staff member who is a native speaker from the Khmer region.
- Met with Sabah Wildlife Department (SWD; Malaysia) authorities and attended SWD's first conference. The meeting initiated a plan to finalize working agreements for the year. Additionally, SWD expressed great interest in setting up a Wildlife Health Team that will be dedicated to Deep Forest activities in Borneo.
- Attended USAID-funded "Second Regional Workshop on Collaboration between Human and Animal Health Sectors on Zoonoses Prevention and Control" in Chang Mai, Thailand.
- Attended FAO's "One Health in Motion" meeting in Thailand to discuss and provide insight on FAO areas of focus.
- Conducted a workshop on Emerging Zoonoses in Wildlife for members of the Lao PDR staff from the provincial agriculture, forestry, and forest inspection.
- The first day of the inaugural Indonesia training was attended by government representatives from the Ministries of Forestry, Agriculture, Health, and Coordinating Ministry of People's Welfare. Information on One Health and disease surveillance was

presented.

- Provided training on One Health, Wildlife Disease Surveillance approaches, and Wildlife Disease Risk Assessment to species conservation specialists at the IUCN SSC Specialist Group Chairs Meeting.

b) **Laboratory System Improvements**

- Began to implement and optimize viral family-level PCR protocols at Chulalongkorn University (Thailand), PERHILITAN (Malaysia), Guangdong CDC and Wuhan Institute for Virology (China), Makerere University (Uganda), Care and Health Program (Cameroon) Institute of Molecular and Biotechnology (Bolivia) and NAMRU-6 (Peru).
- Provided equipment for surveillance and laboratory diagnostics to additional labs including Liquid Nitrogen generators at INRB (DRC) and Iringa site (Tanzania); ultralow freezers to VRI (Malaysia) and ICDDR,B (Bangladesh); two PCR machines and TissueLyser to INRB (DRC); centrifuge and pipetters to INRB (DRC) and RAB (Rwanda); and a MiniMag extraction system to Makerere University (Uganda).
- Purchased supplies to begin viral family testing at Institute of Health (Peru) and Institut Pertanian Bogor (Indonesia), and sent the Universal Control 1 and PCR protocols to Mexico.
- Hired new staff to perform viral family testing, including a research assistant at Eijkman Institute (Indonesia), laboratory technicians at INS (Peru) and RAB (Rwanda), and post-doctoral fellow at Institute of Biomedical Sciences, USP (Brazil).
- Refined test result tracking in GAINS and reporting of test findings to in-country government to streamline sharing of findings, obtaining government approvals for release of data, and moving of data to partners and the public on HealthMap.
- Drafted a sample testing algorithm for testing human specimens based on syndromic symptoms to be implemented in all laboratories performing diagnostics on human samples.
- Continued to provide training and support to laboratory technicians including a lab coordinator and post-doctoral fellow travelling to CHP (Cameroon), RAB (Rwanda), and SUA (Tanzania) for extensive on-site training; training of lab technicians at INRB (DRC), ZDL (RoC), and CHP (Cameroon); training a wildlife veterinarian from the Forestry Department (Bangladesh) on sample extractions, data management including storage and tracking of samples, conducting PCR, BSL-2 and -3 procedures and cold chain management; exposure of seven senior HUA vet students in sampling with FTA filter cards,

buffer, viral transport medium, environmental sampling, and PPE (Vietnam).
- Coordinated with other EPT partners, including finalization of a combined Laboratory Work Plan for specimen sharing and testing with CDC at Eijkman Institute (Indonesia); coordinated with IDENTIFY for a consultation and development of a new biosafety protocol at HUA (Vietnam); finalized arrangements with Institut Pasteur (Cambodia) to host two laboratory technicians from NaVRI to be trained in viral family screening; and Laboratory Director from CHP (Cameroon) attended a meeting for the Network of National Laboratories held by the Cameroon Ministry of Health.

Table 1: Labs Receiving Assistance from PREDICT to date:

	# of labs targeted for screening with desired viral families	# of labs receiving training in preparation for screening of desired viral families	# of labs that have initiated work that will eventually lead to screening desired viral families (labs with partial capacity)
Africa	7	6	3
Asia / SE Asia	12	8	6
Latin America	6	3	3
Totals	**25**	**17**	**12**

- Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
  - Assimilated data from the PREDICT Rapid Survey Update Tool in a central database for analysis purposes for seventeen countries. Data verification procedures are underway. Additionally, the survey was issued to Indonesia for initial capacity tracking purposes.
  - The preliminary analysis of PREDICT Rapid Survey Update Tool data indicate that 88% of countries reported improvements in zoonotic disease surveillance, 81% reported improvement in the availability of trained personnel for conducting wildlife surveillance, and 94% reported improvement in laboratory capacity to conduct pathogen testing from wildlife samples during the past year.
  - The top five challenges associated with conducting wildlife surveillance as reported by the majority of countries were 1) Financial issues, 2) Insufficient training to work with wildlife, 3)

Poverty issues, 4) Insufficient enforcement, and 5) Time delay between disease/outbreak events and when official information is available to the public.

- The top five priority actions to improve wildlife surveillance as reported by the majority of countries were 1) Establishing sustainable funding/resources; 2) Training in wildlife diseases and surveillance; 3) Identifying pathogens that may affect wildlife, livestock, or humans; 4) Increasing human capacity; and 5) Educating and engaging governments and communities.

- Sub-activity 1.1.3: **PREDICT Training Results Summary by Country to date**

  - Trained 1072 laboratory and field personnel and in-country collaborators. Personnel and collaborators previously trained were trained in additional field skills and topics for a total of 211 additional personnel trained in the second quarter.
  - Completed the PREDICT Team Guide for Providing Assistance During a Zoonotic Disease Outbreak and distributed to Country Coordinators.
  - Completed the Country Coordinator review of protocol and guides and training by interviews. The review found a strong demand for short training videos on some of the more technical tasks related to bat, rodent, and primate sampling; sample handling; and cold chain.

Table 2: PREDICT Training Results by Country to date:

Country	Persons	# Women	Trainings covered various combinations of the following topics:
Asia:			
Bangladesh	**5**	**0**	Lab techniques in BSL2 lab & lab diagnostics; epidemiology and outbreak investigation; capture and sampling of rodents & bats. Sample collection and GAINS System; use of GIS.
Cambodia	**61**	**10**	Core safety, animal capture, & sampling skills and protocols; data collection & management; rodent and primate ID & primate and rodent sampling.
China	**2**	**1**	Core safety, animal capture, & sampling skills and protocols; sample collection, handling and transport; wildlife restraint & anesthesia; human & animal safety; bat, rodent and primate sampling.
India	**18**	**2**	Core safety, animal capture & sampling, laboratory safety protocols and zoonoses; surveillance and sampling protocols; bar-coding and data management; animal

			necropsies.
Indonesia	**23**	**10**	Modeling behind the PREDICT project; zoonotic diseases of bats and rodents; human and animal safety during capture; laboratory safety & PPE use; sample collection. Set up for sampling bats and rodents.
Lao PDR	**74**	**8+**	Core safety, animal capture, & sampling skills and protocols; data collection; PPE Use; bar-coding & data management; animal necropsies; surveillance & sampling; laboratory molecular techniques.
Malaysia	**36**	**11**	Core safety protocols, PPE and biosafety, animal capture & sampling skills and protocols; bat and rodent capture, handling & sampling; laboratory skills; packing and shipping samples & cold chain; sampling strategy & data collection; bat, rodent & macaque sampling; collection of trigeminal nerve root ganglia from macaques for Herpes testing; virus extraction, bat & rodent capture; rodent retro-orbital bleed.
Thailand	**1**	**0**	Lab and bioinformatics training.
Vietnam	**48**	**10+**	Core safety, animal capture, & sampling skills and protocols; packing & shipping samples; barcode system; animal pathology; sample collection & data management & use of GAINS; surveillance; filter paper blood spot sampling; lab diagnostic protocols, virus family level protocols, and one health & sampling strategy; sample transport & lab methods; wildlife pathology.
Africa:			
Cameroon	**65**	**18**	Core safety, animal capture, & sampling skills and protocols; specialized field sampling and laboratory skills; packing & shipping samples to reference lab; PPE Use; bushmeat policy and wildlife ethics; extraction, RT-PCR, ELISE and other lab methods; lab systems; immunology and serology; ethics; pan-viral protocols; emergency preparedness and management.
DRC	**17**	**3**	Core safety, animal capture, & sampling skills and protocols; specialized field sampling and laboratory skills; RT-PCR, ELISA; administration and reporting; Monkeypox surveillance; sample tracking & GAINS system; ethical issues; blood spot sampling; DNA & RNA extraction from animal samples.
Gabon	**5**	**2**	Bushmeat sampling; packing & shipping samples; PPE Use and biosafety; lab safety; animal capture; bat & rodent sampling; sampling for AI; animal sample collection; cold chain; lab methods, DNA extraction, PCR; sample prioritization; safe handling of liquid nitrogen; sequencing; virus isolation of RNA & RT-PCR; GAINS system & data management
Republic of Congo	**13**	**2**	Core safety, PPE and biosafety, safe animal capture, & sampling skills and protocols; bat, rodent and primate sampling; laboratory safety & skills; data collection; cold chain; protecting human subjects in research; virology laboratory methods.
Rwanda	**120**	**11**	Core safety, animal capture, & sampling skills and protocols; PPE Use and biosafety; bat, rodent and primate capture, handling and sampling; zoonoses; ethics and responsibilities; wildlife pathology & necropsy; sample collection & preservation; packing & shipping samples; tracking primates & health monitoring; lab personnel

			safety; PCR protocols & sample processing; bushmeat handling.
Tanzania	**32**	**7**	Core safety, animal capture, & sampling skills and protocols; bat and rodent capture, handling & sampling; data management; laboratory safety; surveillance; information management and GAINS system; wildlife capture & restraint; emergency preparedness; ethics, cultural sensitivity & SHP; pathogen detection; extraction and PCR & protocols; cold chain.
Uganda	**29**	**9**	Core safety, animal capture, & sampling skills and protocols; PPE & biosafety; laboratory safety; packing & shipping samples; bushmeat sampling; cold chain; GPS; Animal Mortality Monitoring Study; bat capture, handling & sampling; PPE & biosafety to handle dead animals.
Latin America:			
Bolivia	**222**	**?**	Core safety, animal capture, laboratory & sampling skills and protocols and zoonotic diseases; bat, rodent and primate sampling; bushmeat sampling; molecular and parasite diagnostic methods; lab safety and methods; packing and shipping samples; wildlife management and disease management; work ethics, cultural sensitivity & SHP; managing livestock & poultry diseases; detecting zoonoses; sample collection and storage; methods of detecting Salmonella in wildlife; biostatistics.
Brazil	**25**	**13**	Core safety, animal capture, handling & sampling skills and protocols; PPE Use & biosafety; bat and rodent sampling; bushmeat sampling; packing and shipping samples; cold chain; surveillance, ethics and responsibilities; primate sampling.
Colombia	**54**	**29**	Core safety, animal capture, & sampling skills and protocols; lab safety & methods; One Health; Conservation Medicine; GAINS system and data management.
Mexico	**24**	**12**	Core safety, animal capture, handling & sampling skills and protocols; lab safety & methods; PPE Use & biosafety; disease modeling; animal care and use protocols; lab diagnostic techniques.
Peru	**198**	**?**	Core safety, animal capture, & sampling skills and protocols; PPE Use & biosafety; surveillance; zoonotic disease risks from wildlife trade and consumption; wildlife regulations, wildlife management and disease monitoring; sample collection & storage; species ID & health risks; emergency management of spider bites.
Total Trained	**1072**		

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Continued surveillance activities in Bolivia, Brazil, Mexico, Peru, Bangladesh, Cambodia, China, Lao PDR, Malaysia, Indonesia, Thailand, Vietnam, Cameroon, DRC, Gabon,

Republic of Congo, Rwanda, Tanzania, and Uganda.
- Conducted planning and surveys of sites for future intensive surveillance efforts in Brazil, Malaysia, and Uganda for Deep Forest projects.

- **Activity 1.2.2: Summary of Surveillance Sampling and Testing**

Table 3: PREDICT Global Surveillance Summary by Region, Taxa and Interface in GAINS

- Sub-Activity

	# of Animals sampled in Y3Q2	# of Animals sampled to date	# of Samples collected to date	# of Samples collected with at least one final test result	Total # of diagnostic tests run to date
Africa					
Bats	11	3,234	16,521	7,476	20,085
Rodents	2	2,482	7,592	408	960
Non-human Primates	50	2,903	8,316	883	4,345
Other taxa	25	4,163	7,924	548	980
Asia and Southeast Asia					
Bats	294	3,003	20,156	22	22
Rodents	309	1,479	7,879	3	3
Non-human Primates	16	521	9,019	107	137
Other taxa	74	1,600	9,464	695	702
Latin America					
Bats	109	2,697	13,383	0	0
Rodents	0	624	5,592	23	49
Non-human Primates	77	570	4,443	48	111
Other taxa	23	1,743	10,474	427	788
Primary Interface (all regions)					
Free-ranging	180	10,091	61,308	8,182	21,784
Hunter	39	9,161	27,021	1,436	2,552
Market	0	925	3,290	79	81
Sanctuary	8	1,036	5,194	574	2,733
Other High-Risk interfaces	763	3,514	20,846	315	971
Unclassified	0	352	3,104	54	61
TOTALS	**990**	**25,079**	**120,763**	**10,640**	**28,182**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of new technologies**
    - Developed a beta version of the next-generation Animal Mortality Monitoring Program (AMMP) mobile phone application, which was developed and deployed in Uganda (Queen Elizabeth Conservation Area) to facilitate data collection on animal (wildlife and domestic) mortality events in remote areas. The updated application includes GPS, photo-documentation, and data disaster management functions.
    - Expanded infrastructure of CIRMF diagnostic center to improve viral diagnostics capacity via development of a new sequencing array in collaboration with the Pasteur Institut, France.
    - Implemented and optimized an assay for serological diagnosis of DBS samples and generated SOP describing the process.
    - Solidified a relationship with a commercial sequencing company (Macrogen Europe), for confirmation of PCR positive samples.
    - Continued to develop a smartphone PREDICT application for field data entry that can be synced with GAINS (Cameroon and Tanzania).

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 2):**
    - Serological testing of close contacts of Mangala virus cases (new rhabdovirus discovered as part of PREDICT activities) revealed additional putative asymptomatic cases in the nurse who transported the survivor and the wife of this patient.
    - Retroviruses (SFVs) identified in primate species where retroviruses have not previously been detected.
    - Identified potential new reservoirs of PTLV/HTLV.
    - In addition to virus family level molecular assays, specific samples were identified for further pathogen discovery by deep-sequencing in the laboratories of PREDICT US collaborators:
      - Tissues from atypical swine mortality
      - Historical viral hemorrhagic fever illnesses of unknown etiology (tested negative for all known VHF viruses)
      - Free-range wildlife from priority taxa

Table 4: PREDICT Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Comments or other Pathogen discovery	Country	Approved by Government for release (yes or no)
1200 bat samples	Columbia	Family level PCR	*Hantaviruses,* Paramyxoviruses, Astroviruses, Influenza, Herpes	Confirmation of Results Pending	-	Bangladesh	no
50 NHP, 25 rodent and 25 bat samples	Columbia	Family level PCR	Filoviruses, Hantaviruses, Herpesviruses, Coronaviruses, Astroviruses, Bocaviruses, Influenza, Flaviviruses, Adenoviruses, Polyomaviruses Paramyxoviruses Poxviruses, Retroviruses	Confirmation of Results Pending	-	Malaysia	no
22 NHP samples	INRB/PREDICT	Immunodiffusion and PCR	Alphaviruses, retroviruses	Confirmation of Results Pending	–	DRC	no
8 human samples (outbreak follow-up)	INRB/PREDICT and UCSF	Immunodiffusion and neutralization	Alphaviruses and novel rhabdovirus	Confirmation of Results Pending	Mangala virus serology aids in confirmation of transmissibility of this novel virus	DRC	no
5 swine samples (derived from die-off with hemorrhagic signs)	PREDICT Gabon Laboratory	Real-Time PCR, PCR	Crimean Congo Hemorrhagic Fever, Ebola-Zaire, Ebola-Ivory Cost, Ebola-Bundi, Marburg virus, West Nile Virus, O'Nyong Nyong Virus, yellow fever virus, Rift Valley Fever and Zika Virus, Coronavirus (4 types : OC43, HKU1, 229E, NL63), Herpes virus and Paramixoviruses	Negative	Submitted for deep-sequencing	Gabon	no

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Comments or other Pathogen discovery	Country	Approved by Government for release (yes or no)
57 Rodent samples	GVFI-Yaounde	PCR	Arenaviruses, Hantaviruses, Alphaviruses	Negative	-	Cameroon	no
NHPs	GVFI-Yaoundé	PCR	Parvoviridae, Plasmodium, PTLV, SFVs (POL and LTR), SIV	Confirmation of Results Pending	-	Cameroon	no
Other*	GVFI-Yaounde	PCR	Plasmodium, PTLV3, PTLV4, SFV	Confirmation of Results Pending	-	Cameroon	no
166 NHP samples	CII	PCR	Bocaviridae, Flaviviviridae, Filoviridae, Paramyxoviridae, Poxviridae, Coronaviridae, Herpesviridae	Confirmation of Results Pending	-	Rep of Congo	no
667 bat samples	Institute Pasteur Cambodia	Cell-inoculation. RT-PCR and qPCR	Flavivirus, Henipaviruses, Coronavirus, Astroviruses, Lyssaviruses, Filoviruses, Paramyxoviruses, , Astroviruses, ,	Confirmation of Results Pending	-	Cambodia	no
144 rodent samples	Institut Pasteur du Cambodge (IPC)	RT-PCR	Hantaviruses Arenaviruses	Negative		Cambodia	no
20 avian samples	Hanoi University of Agriculture (HUA)	Conventional PCR using PREDICT protocols	Flaviviridae	Negative		Vietnam	no
51 rodent samples	Hanoi University of Agriculture (HUA)	Conventional PCR using PREDICT protocols	Arenaviridae Flaviviridae	Negative		Vietnam	no
1 carnivore sample	Hanoi University of Agriculture (HUA)	Conventional PCR using PREDICT protocols	Flaviviridae	Negative		Vietnam	no
43 bat samples	IBMB-UMSA	Conventional and nested RT-PCR	flavivirus, coronavirus, arenavirus and filovirus	Pending	Pending	Bolivia	no

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Comments or other Pathogen discovery	Country	Approved by Government for release (yes or no)
75 NHP samples	IBMB-UMSA	RT-PCR	Arenavirus, Flavivirus	Confirmation of Results Pending	-	Bolivia	no
1,001 NHP samples	US NAMRU-6; INS	Conventional and nested RT-PCR	Filovirus, paramyxovirus, flavivirus and coronavirus	Pending	Pending	Peru	no
69 bat samples	WHO-cc Chula	PCR	Coronaviruses	Confirmation of Results Pending	-	Thailand	no
96 rodent samples	WIV	RT-PCR	Astroviridae	Confirmation of Results Pending	-	China	no
6 other spp samples	WIV	RT-PCR	Astroviridae	Confirmation of Results Pending	-	China	no
75 bat samples	GDEI	PCR	Hantavirus	Confirmation of Results Pending	-	China	no

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Optimize surveillance data management system**
    - Finalized the test & test results data import Excel template and upload process to include the new fields Interpretation and Test Status.
    - A process for reporting to the lab team was developed, and a new test & results system for GAINS was tested and optimized. Email reports will be sent out to the lab team bi-weekly, listing any new positive test results to be interpreted prior to distribution to governments for data release approval.
    - The specifications for updating test & test results data in GAINS were drawn up, approved, and further developed. Beta testing has been performed on the module, and it should be live in GAINS within the next month.
    - Tested the newly developed genomic sequencing data entry & search modules in the GAINS website.
    - Added a new update process to amend surveillance events already submitted to the GAINS database.
    - Added the PREDICT hotspot layer to the Surveillance Data Mapping tool on the GAINS website.

- Sub-activity 1.4.2: **Establish global open access to database and procedure for dissemination of knowledge**
  - Evaluated the software package Geneious, a bioinformatic tool that combines DNA and protein analysis information, for use in release of detailed data.

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Communication and integration with other relevant agencies about PREDICT strategy and successes**
    - Presented at the International Conference on Emerging Infectious Diseases, and met with the CDC/OID/NCEZID group to discuss potential future EPT+ projects; participated in the Editorial Board meeting; and met with the Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET) (b)(6) (b)(6)
    - Attended the NCEZID-PREDICT SME Modeling meeting, and met with collaborators from PREVENT to discuss their participation in the Deep Forest Project.
    - Traveled to Indonesia to launch PREDICT; held training workshops and met with ministry and other partners.
    - Met with CDC in Atlanta to discuss possible collaborations in human-animal surveillance.
    - Met with PREVENT collaborators to finalize the human-wildlife contact survey.
    - Presented PREDICT at the International Union for Conservation of Nature (IUCN) Species Survival Commission Chairs meeting, and in collaboration with RESPOND, hosted and presented at a session on wildlife disease surveillance, One Health, and wildlife disease risk analysis.
    - Participated in Thailand-specific EPT meeting with USAID in Bangkok (RDMA-organized).
    - Attended the EPT quarterly partner meeting in Washington DC; held additional meetings with CDC and IDENTIFY.
    - Attended the OIE Scientific Commission on Animal Diseases with IDENTIFY partners.
    - Attended National Science Foundation (NSF) Ecology of Emerging Infectious Diseases Conference.
    - Attended the Institute of Medicine (IOM) forum on Public Health.
    - Contributed to a working group aimed at developing a comprehensive research and

educational agenda for One Health in Atlanta led by Emory University and CDC.

- Participated and gave presentation on PREDICT at CDC Global Disease Detection (GDD) annual meeting, and held discussions with GDD leadership on potential for joint PREDICT-GDD projects.
- Hosted a Chinese delegation from livestock ministries and animal health in Davis and introduced them to PREDICT and EPT.
- Attended “Inception Workshop on Partnership of Global Animal Health and Biosecurity Initiatives” in Bangkok organized by FAO and Department of Agriculture, Fisheries and Forestry, Australia.
- Attended "International Conference for Veterinary Services 2010: Asia Web for World Food Security" in "One Health in Motion: Models for One Health Practices" in Bangkok organized by FAO and ASEAN.
- Attended Second Thailand National One Health Forum “Strengthen the network and let’s move forward” organized by RESPOND.
- Traveled to Kathmandu, Nepal for initial scoping visit where PREDICT team met USAID Mission and senior officials at the Ministry of Health, Ministry of Agriculture, Ministry of Parks and Wildlife Conservation, among others, to provide an overview and explore project development in Nepal. Also met with National Trust for Nature Conservation and toured– laboratory facilities at the Center for Molecular Dynamics, National Zoonoses and Food Hygiene Research Center, and AFRIMS/Walter Reed Research Unit Nepal (WARUN). At a joint meeting with Ministry of Agriculture/Department of Livestock Services, National Trust for Nature Conservation, Ministry of Parks and Wildlife Conservation, and FAO, discussion focused on how PREDICT could provide the opportunity for focal projects on which the ministries could work together on zoonotic disease detection and assist with wildlife veterinary training and long-term laboratory capacity building.

LOW 2: Risk Determination

- **Activity 2.1: Develop risk filter strategy**

  - Sub-activity 2.1.1: **Develop a conceptual and structural framework for Extractive Industry work**
    - Continued collaborating with the Extractive Industry Working Group (EIWG) to complete the

refinement of the risk-screening tool for zoonotic diseases. The new risk screening tool and accompanying narrative are designed to integrate with existing impact assessment templates and guidelines developed and promoted by the International Finance Corporation, World Bank, and industry advocacy groups like the International Council on Mining and Metals (ICMM).

- Supported the development of EIWG outreach and advocacy materials, including a brochure targeting zoonoses and infectious diseases in the mining sector that will be featured on the ICMM website, and the expansion of a white paper outlining current knowledge of zoonoses and emerging infectious disease risks to extractive industries from French Equatorial Africa to Sub Saharan Africa.
- Developed a new risk assessment methodology and structure, and the team is refining content for a beta version of the tool expected for release in quarter 4. This version of the risk tool will support qualified ranking of risks from wildlife zoonoses to the extractive industry sector, allow field validation of tool output for ongoing refinement, and enable users to target specific risk factors in monitoring and risk mitigation planning.

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Sub-activity 2.2.1: **Refine and test geographical and temporal 'hotspot' models**
    - Completed comparative analysis examining the proposed drivers of disease outbreaks using gridded data on human conflict, public health measures, wildlife trade, human water security, cropland, pasture, population growth, livestock distribution, and mammal species richness.
    - Began analysis using occupancy modeling to predict the probability of detecting a disease outbreak.
    - Began developing methods to increase computational efficiency of models.

  - Sub-activity 2.2.2: **Iteratively improve datasets**
    - Obtained new datasets on mammal species richness and meat consumption for analysis examining drivers of disease outbreaks.
    - Gridded new time series datasets on mining, migration, and climate variability to be used in the EID hotspots model.
    - Enabled a new online platform to update the EID database.

- Updated the structure of the EID database. New features added: spatially enabled and grid support.

- Sub-activity 2.2.3: **Design a 'Global Vulnerability' modeling strategy**
  - Finalized a standard survey approach in collaboration with PREVENT to assess and quantify human-wildlife contact rates in different disturbance gradients as part of the Deep Forest Project.
  - Completed a model simulating evolution of viruses in the wildlife trade.

AFRICA

CAMEROON

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Participated, as member of the technical secretariat, in a development workshop, pre-validation meeting, and validation meeting for the National Program on the Control and Fight against Emergent and Re-emergent Zoonoses organized by the Ministry of Livestock, Fisheries and Animal Industry at the invitation of the Minister of Livestock.
    - Wildlife technician working in Cameroon successfully completed requirements for Masters in Science (Animal biology: applied ecology).

    b) **Laboratory Improvements**
    - Successfully tested field-ready Cepheid SmartCycler Real Time PCR in lab setting, ready for deployment for field-testing.
    - Hired lab coordinator to streamline lab work and sample flow to improve sample throughput.
    - Attended the validation meeting for the Network of National Laboratories held by the Cameroon Ministry of Health February 1-3, 2011;
    - Implemented a new beta-actin (housekeeping gene) protocol for rodents and bat samples.
    - Registered with Macrogen Europe, a commercial sequencing company, for confirmation of PCR positive samples.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**

Summary of Surveillance Activities and Testing in GAINS to date:

Cameroon	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	436	3596	0	0	233	260	29	895
Hunter	189	446	0	0	121	123	5	274
Rodents								
Free-ranging	110	998	0	0	58	58	0	178
Hunter	844	1214	0	0	100	100	0	139
Non-human Primates								
Free-ranging	142	13	134	0	0	0	0	1
Hunter	696	1017	0	0	27	27	2	70
Sanctuary	884	4374	0	0	550	563	120	2696
Other taxa								
Free-ranging	128	457	0	0	3	3	0	3
Hunter	2368	2625	0	0	64	64	0	127
Sanctuary	19	50	0	0	5	5	0	5
TOTALS	**5816**	**14790**	**134**	**0**	**1161**	**1203**	**156**	**4388**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Tested mobile application for field data collection on smartphones and formulated recommendations for improvement.

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

- Examined post mortem tissue samples from non-human primates for Parvoviruses, PTLV, SFV and SIV. A number tested positive and findings will be confirmed through sequencing.

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Rodents	GVFI-Yaounde	PCR	Arenaviruses	Negative	-	Cameroon	No
Rodents	GVFI-Yaounde	PCR	Hantaviruses	Negative	-	Cameroon	No
Rodents	GVFI-Yaounde	PCR	Alphaviruses	Negative	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	Parvoviridae	Result Confirmation Pending	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	Plasmodium	Result Confirmation Pending	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	PTLV	Result Confirmation Pending	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	SFV (POL and LTR)	Result Confirmation Pending	-	Cameroon	No
NHPS	GVFI-Yaounde	PCR	SIV	Negative	-	Cameroon	No
Other*	GVFI-Yaounde	PCR	Plasmodium	Result Confirmation Pending	-	Cameroon	No
Other	GVFI-Yaounde	PCR	PTLV3	Negative	-	Cameroon	No
Other	GVFI-Yaounde	PCR	PTLV4	Negative	-	Cameroon	No
Other	GVFI-Yaounde	PCR	SFV	Result Confirmation Pending	-	Cameroon	No

***** Due to a sample selection error in the laboratory, a number of samples from other taxa (carnivores, rodents, pangolins) were extracted and analyzed for NHP microbes. We have now put in place a system whereby all extractions are cross-referenced as the technicians proceed rather than assuming pre-selected samples have been appropriately organized by taxa.

- **Activity 1.5 Program Management;**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Promoted [redacted] taking on more responsibility within the PREDICT program.
    - Promoted [redacted] who will take on cross-site coordination within Central Africa.

  - Sub-activity 1.5.2: **Communication**
    - Visited US Ambassador in Cameroon to introduce the new Laboratory Coordinator.
    - Met regularly with Cameroon EPT group partners to coordinate in-country activities (US Embassy contact - [redacted].
    - Communicated with the new Minister for Wildlife and received written permission to publicly release 2010-11 laboratory findings.
    - Met separately with the Minister of Livestock and the Secretary of State for Pandemics and Epidemics at the Ministry of Public Health to discuss lab progress, promote the one health surveillance strategy, and to reinforce the ability of PREDICT staff in Cameroon to support outbreak responses.
    - Received a visit from staff from the Cameroon National Veterinary Laboratory (LANAVET) (Garoua, Cameroon), part of Ministry of Livestock, and exchanged ideas for collaborative research and the establishment of a laboratory network in Cameroon.

LOW 3: Outbreak Response Capacity Building

- Provided information to the Ministries of Health and Livestock on Arenavirus outbreak preparedness and on testing relevant to Arenavirus surveillance during an ongoing outbreak of Lassa fever in Nigeria (over 400 cases and 40 deaths). In addition, we informed the Ministry of the capacity within the network of PREDICT partners to understand and investigate Lassa Fever outbreaks.
- Received field containment devices that will complete the mobile laboratory requirements for effective outbreak response preparedness.

DEMOCRATIC REPUBLIC OF CONGO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Visited new communities in very remote places in three health zones, Kole, Lomela and Tshudi-Loto, located in the Sankuru District, Kasai Oriental Province, where bush meat hunters were enrolled to participate in wildlife surveillance activities. Individuals exposed to wild animals were informed and sensitized on preventing zoonotic diseases by healthy hunting/butchering practices.

    b) **Laboratory Improvements**
    - Trained three individuals (two laboratory technicians from the INRB and one from the PREDICT team) on laboratory techniques including: DNA/RNA extractions from different biological specimens, and serological methods.
    - The Liquid Nitrogen generator was received at INRB, and awaits installation.
    - Received laboratory equipment including PCR machines, Tissue Lyser, centrifuges for RNA/ DNA extractions, and began installation of electricity back-up system to protect diagnostic equipment from electrical failures.
    - Translated laboratory protocols (blood sample processing, field collection of fecal samples from non-human primates, and serologic testing) into French.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Trained a veterinary field technician in wildlife capture and collection of blood samples from bats and rodents.
    - Visited two new sites to expand sampling: 1) Katanga Province (Ankoro health zone in the District of Tanganyika, where non-human primates and small rodents are hunted by

community members), 2) Bandundu Province (Vanga health in the Kwilu District, where people hunt fruit bats for consumption). An MOU will be prepared to add these two sites for collection of wildlife samples;

Summary of Surveillance Activities and Testing in GAINS to date:

DRC	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	49	443	76	0	0	0	0	0
Hunter	4	0	0	0	0	0	0	0
Other High Risk	9	160	0	0	0	0	0	0
Rodents								
Free-ranging	5	94	0	0	0	0	0	0
Hunter	633	0	833	0	0	1	1	2
Other High Risk	1	44	0	0	0	0	0	0
Non-human Primates								
Free-ranging	4	74	0	0	0	0	0	0
Hunter	480	0	586	0	160	160	0	255
Sanctuary	16	138	0	0	5	5	0	26
Other taxa								
Free-ranging	3	59	0	0	0	0	0	0
Hunter	575	0	728	0	6	6	0	9
TOTAL ANIMALS	**1779**	**1012**	**2233**	**0**	**171**	**172**	**1**	**292**
Humans*								
Symptomatic	0	16	0	16	16	16	0	32
Outbreak investigation$^{\Psi}$	0	0	6	0	6	6	0	6
TOTAL HUMANS	**0**	**16**	**6**	**16**	**22**	**22**	**0**	**38**

* Persons tested for Chikungunya and Dengue during the outbreak

$^{\Psi}$ These persons were close contacts of a suspected case of viral hemorrhagic fever in 2009, from whose samples a new Rhabdovirus was suspected.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Implemented, optimized and performed serological diagnosis on DBS and blood samples (from bonobos and humans).

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1 Bonobo sample	INRB-Kinshasa	Immunodiffusion	Chikungunya virus	IgM Result Confirmation Pending	-	DRC	No
2 samples from C. neglectus	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
2 samples from C. ascanius	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
1 sample from P. tholloni	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
1 sample from C. wolfi	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
1 sample from C. aterrimus	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1 sample from A. nigroviridis	INRB-Kinshasa	Immunodiffusion	SIV	IgG Result Confirmation Pending	-	DRC	No
2 samples from L. aterrimus	INRB-Kinshasa	PCR	SFV	Result Confirmation Pending	-	DRC	No
5 samples from C. ascanius	INRB-Kinshasa	PCR	SFV	Result Confirmation Pending	-	DRC	No
3 samples from C. neglectus	INRB-Kinshasa	PCR	SFV	Result Confirmation Pending	-	DRC	No
3 samples from C. ascanius	INRB-Kinshasa	PCR	SFV	Result Confirmation Pending	-	DRC	No
2 samples from humans	INRB-Kinshasa	Immunodiffusion	Chikungunya virus	IgM Result Confirmation Pending	-	DRC	No
6 samples from human	UCSF San Francisco	Neutralization test	Rhabdoviridae	IgG Result Confirmation Pending	Mangala virus	DRC	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Trained the laboratory manager and staff members on data management, storage and tracking of samples and preparation of data for submission to GAINS.

- **Activity 1.5 Program**

  - Sub-activity 1.5.1: **Significant Change in Project Management**

- Removed the position of field coordinator to improve efficiency; all field teams are now under the direct supervision of the country coordinator.

- Sub-activity 1.5.2: **Communication**
  - Instituted weekly meetings to discuss progress in sample collection and testing as well as any challenges for PREDICT activities.

Partners: University of Lubumbashi School for Veterinary Medicine; "Lola Ya Bonobo" Sanctuary, WWF/CARPO in Bolobo (Bandundu Province), INRB, Ministry of Health

LOW 3: Outbreak Response Capacity Building

- Assisted during an encephalitis outbreak (provisionally thought to be Chikungunya) in Kinshasa. We collected samples from suspected human and NHP (bonobo) cases, tested serum samples for antibodies to Chikungunya and Dengue viruses, met with representatives from the Ministry of Health, Kinshasa Division of Disease Control, and assisted with mosquito trapping (trapping by entomologists from the INRB and USAID) with INRB.
- Participated in the investigation into the etiology of two bonobo deaths at the sanctuary near Kinshasa. We received samples and discussed diagnostic testing of these samples with the lead organization.

PREDICT Outbreak Report Short Form

Summary Information to Report	**Report below:**
Working Name of the Outbreak (Report name if assigned or use name of region and other descriptors)	Human-bonobo paired outbreak
Date of last update of this form (most often today if you are making a change)	April 4, 2012
Inclusive dates (from start of outbreak to end of response – use today as end date if response ongoing)	From January 19 to April 4, 2012
Date of first notification of PREDICT	January 19, 2012
Date of request of support from PREDICT (Number of days from notification to request)	January 20, 2012

Date of initiation of response by PREDICT (Number of days from request to response)	January 20, 2012 (the same day)
Briefly describe the outbreak. Was this an outbreak in humans, in animals (what species)? How many were affected & what was the range of symptoms?	This outbreak was in humans and bonobos. Two bonobos (from the sanctuary) presented with symptoms of fever, rash with an attitude suggestive of joint pain. They were sampled: one was positive by serology; 16 humans presented symptoms (headache, fever, skin rash and joint pain). Some were sampled and tested (see below). Of them, 2 were positive.
What type of assistance did PREDICT provide? Who were the PREDICT personnel involved? Include inclusive dates of PREDICT's involvement in the response.	PREDICT coordinated collection of samples, stored and tested human and animal samples, coordinated with the Ministry of Health and the INRB to send a team of entomologists to trap mosquitoes at the site. - The PREDICT DRC laboratory coordinator received the first suspected case and collected a sample (January 19, 2012) and asked the manager of the bonobo sanctuary (origin of the first case) to collect samples from the sick bonobos and explained what kind of samples to collect; she also asked for serologic tests available at the INRB when the suspicion of Chikungunya virus was made; - The PREDICT DRC laboratory manager collected samples from other suspected cases and tested the samples (from January 25); - The PREDICT country coordinator visited the sanctuary, conferred with INRB, and suggested Chikungunya virus as the etiology of the outbreak (January 24). He also contacted the Deputy Director of Disease Surveillance at the Ministry of Health (January 25) and collected samples from 4 humans (animal keepers). - The PREDICT DRC scientific director organized a meeting with the head of INRB and a team of entomologists from INRB and USAID (January 26). She coordinated the site visit for entomologists, facilitated the logistics for the mission, and made a summary report to the Ministry of Health.
Provide description of how first noticed & date if possible. When was the first official acknowledgement of the outbreak (by which government or other reputable body and date)? When was a response initiated and by whom? Which ministries or NGOs were involved? Who was in charge of the national response?	The first case of suspected Chikungunya was observed in a nurse caring for a young bonobo newly arrived at the sanctuary from the Equator Province (orphan). The PREDICT team was informed by the director of the sanctuary on January 19. The Ministry of Health officially informed the public through a TV show covering the outbreak on February 20, 2012. The response was initiated during the meeting between the Ministry of Health, INRB, entomologists, and PREDICT on January 25. Partners who were involved included: Ministry of Health, INRB, USAID, Ministry of Agriculture, Central Veterinary Laboratory, Ministry of Environment.

Comments on where it started, speed and extent of geographic spread	Three samples were positive for Chikungunya virus, one from a bonobo at the sanctuary and two from humans (one working at the sanctuary and the other from Macampagne neighborhood, who never visited the sanctuary and never left Kinshasa). This outbreak was restricted in the Mont-ngafula and Ngaliema communities of Kinshasa.
If a lab diagnosis and confirmation has been obtained give details, including species, sample type and dates. Where was the diagnosis made? Give number of days between initiation of response and lab confirmation of diagnosis.	1. January 25: 4 human samples and 2 bonobo samples (all serum) were tested: one human and one bonobo positive). 2. Response to the outbreak initiated. 3. January 30: 6 human samples (serum and plasma) tested: all negative. 4. March 12: 6 human samples (serum and plasma) tested: one positive.
Were other EPT partners involved in the response (which ones and how)?	USAID (entomologist).
Summary of the Outcome:	
Did people die? How many?	No
Did animals die? What species & how many?	2 bonobos
Was there a relationship between animals & humans in the disease or its transmission (state suspected or confirmed)?	Unsure

GABON

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Implemented a surveillance project in Libreville and the Haut Ogooue region with 10 health centers.

    b) **Laboratory Improvements**
    - Developed and implemented a new biobank for organization of human and animal samples.

- Trained laboratory technicians on isolation of viral RNA, and analysis of samples via RT-PCR.
- Assisted the Ministry of Health collecting data from provinces and district health officers, with the laboratory served as a reference center supporting the analysis of diagnostic samples.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Conducted one field sampling trip to Franceville to collect rodents (collections have been limited in this quarter due to the restrictions of the rainy season).

Summary of Surveillance Activities and Testing in GAINS to date:

Gabon	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free ranging	2193	7612	0	0	1834	7093	0	18806
Rodents								
Free ranging	193	20	0	0	189	220	0	517
Primates								
	0	0	0	0	0	0	0	0
Other taxa								
Free-ranging	372	370	0	0	372	372	0	374
TOTALS	**2758**	**8002**	**0**	**0**	**2395**	**7685**	**0**	**19697**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Expanded infrastructure of CIRMF diagnostic center to improve viral diagnostics capacity via the development of a new sequencing array in collaboration with the Pasteur Institut, France.

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Identified samples for pathogen discovery by pyrosequencing in US collaborating laboratories: 1) Tissues from atypical swine mortality and 2) Archived specimens from historical viral hemorrhagic fever illnesses of unknown etiology (tested negative for all known VHF viruses).
    - Continued testing human samples for various pathogens, including influenza, coronaviruses, adenoviruses, enteroviruses, parainfluenza virus, RSV, rhinovirus, astroviruses, rotaviruses, norovirus, sapovirus, filoviruses, arenaviruses, alphaviruses, hantaviruses, and bunyaviruses;
    - Aided in identifying a hemorrhagic outbreak by testing samples obtained from a swine die-off with evidence of hemorrhagic pathology.

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)*	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
5 Suidae (4 animals: liver; one animal: spleen, liver, intestine and lung); derived from swine die-off with hemorrhagic signs.	CIRMF	Real-Time PCR, PCR	Crimean Congo Haemorrhagic Fever, Ebola-Zaire, Ebola-Ivory Coast, Ebola-Bundi, Marburg virus, West Nile Virus, O'Nyong Nyong Virus, yellow fever virus, Rift Valley Fever and Zika Virus, Coronavirus (4 types : OC43, HKU1, 229^{E}, NL63), Herpes virus and Paramyxovirus	Negative	Submitted for deep-sequencing Preliminary results suggestive of: Porcine Circovirus 2	Gabon	No

* Laboratory testing has been hindered substantially by a prolonged strike among the laboratory support staff at CIRMF, which has been largely blocking access and deliveries to the facility

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Hired new Laboratory Coordinator
  - Sub-activity 1.5.2: **Communication**
    - Participated as part of the scientific council composed of 17 scientists specialized in different fields of emerging diseases, from the Gabonese Ministry and various Health Centers in Gabon
    - Country Coordinator met with WHO Brazzaville.
    - Country Coordinator with (b)(6) DRC to continue collaboration and develop new projects.

Partners: International Center for Medical Research (CIMRF); National Parks System; Ministry of Health for Gabon; INRB, DRC; Institut Pasteur of Paris, France; UCSF

PREDICT Outbreak Report Short Form

Summary Information to Report	**Report below:**
Working Name of the Outbreak (Report name if assigned or use name of region and other descriptors)	Franceville Swine Die-off Associated with Hemorrhagic Signs
Date of last update of this form (most often today if you are making a change)	3 April, 2012
Inclusive dates (from start of outbreak to end of response – use today as end date if response ongoing)	13 February 2012- 7 March 2012
Date of first notification of PREDICT	22 February 2012
Date of request of support from PREDICT (Number of days from notification to request)	3 days
Date of initiation of response by PREDICT (Number of days from request to response)	2 days
Briefly describe the outbreak. Was this an outbreak in humans, in animals (what species)? How many were affected & what was the range of symptoms?	This outbreak concerns Suidae, from a large farm located in Franceville, Gabon. About 7-8 swine have been affected, animals did not show any symptoms before dying, however the autopsies revealed hemorrhages throughout the body.
What type of assistance did PREDICT provide? Who were the PREDICT personnel involved? Include inclusive dates of PREDICT's involvement in the response.	PREDICT provided assistance directly in the field by organizing a small survey to assist in the necropsies and collect samples for virus screening. The PREDICT laboratory in Gabon was involved from 15 February 2012 to 7 March 2012.
Provide description of how first noticed & date if possible. When was the first official acknowledgement of the outbreak (by which government or other reputable body and date)? When was a response initiated and by whom?	The first case was detected following several swine deaths (13 February 2012), and then this observation was reported to the PREDICT country coordinator in Gabon (22 February 2012). This has not been reported to any government or reputable body since the laboratory results have not been confirmed. A response was initiated on 22 February 2012 by the PREDICT laboratory in Franceville, Gabon.

Which ministries or NGOs were involved? Who was in charge of the national response?	
Comments on where it started, speed and extent of geographic spread	It started in a swine farm in Franceville, and did not spread or extend geographically.
If a lab diagnosis and confirmation has been obtained give details, including species, sample type and dates. Where was the diagnosis made? Give number of days between initiation of response and lab confirmation of diagnosis.	Samples tested negative for all usual suspects. Initial deep-sequencing results suggest Porcine Circovirus 2 as a possible etiological agent, but analysis continues given the high prevalence of this agent in swine populations.
Were other EPT partners involved in the response (which ones and how)?	No
Summary of the Outcome:	
Did people die? How many?	No
Did animals die? What species & how many?	Yes between 7-8 swine died (Suidae).
Was there a relationship between animals & humans in the disease or its transmission (state suspected or confirmed)?	No human cases were detected in relation to this outbreak, although employees were in direct contact with the diseased animals.

REPUBLIC OF CONGO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    b) **Laboratory Improvements**
    - Trained lab staff on RNA extraction from tissues and cold chain management.
- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**

Summary of Surveillance Activities and Testing in GAINS to date:

RoC	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	203	1606	0	0	0	0	0	0
Other High Risk Interfaces	52	0	293	0	20	30	0	110
Rodents								
Free-ranging	9	89	0	0	0	0	0	0
Hunter	29	174	0	0	0	0	0	0
Other High Risk Interfaces	129	19	1091	0	17	29	0	124
Non-human Primates								
Free ranging	129	6	0	0	1	1	0	372
Hunter	52	221	0	0	0	0	0	0
Other High Risk Interfaces	11	105	0	0	0	0	0	0
Other taxa								
Free-ranging	2	6	0	0	0	0	0	0
Hunter	179	929	0	0	14	19	0	76
Other High Risk Interfaces	124	494	523	0	14	59	0	246
TOTALS	**919**	**3649**	**1907**	**0**	**66**	**138**	**0**	**928**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Introduced use of TissueLyser for sample preparation.

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
166 Primate feces	Center for Infection and Immunity – Mailman School of Public Health, Columbia University (CII)	PCR	Bocaviridae	Negative	-	Rep of Congo	No
166 Primate feces	CII	PCR	Flaviviviridae	Negative	-	Rep of Congo	No
22 Primate feces	CII	PCR	Filoviridae	Negative	-	Rep of Congo	No
166 Primate feces	CII	PCR	Paramyxoviridae	Negative	-	Rep of Congo	No
166 Primate feces	CII	PCR	Poxviridae	Negative	-	Rep of Congo	No
166 Primate feces	CII	PCR	Coronaviridae	Results Pending Confirmation	-	Rep of Congo	No
166 Primate feces	CII	PCR	Herpesviridae	Results Pending Confirmation	-	Rep of Congo	No

LOW 3: Outbreak Response Capacity Building

PREDICT Outbreak Report Short Form

Summary Information to Report	Report below:
Working Name of the Outbreak (Report name if assigned or use name of region and other descriptors)	Etoumbi outbreak Feb 2012

Date of last update of this form (most often today if you are making a change)	Feb 16, 2012
Inclusive dates (from start of outbreak to end of response – use today as end date if response ongoing)	Feb 10-Feb 15th, 2012
Date of first notification of PREDICT	Feb 14th, 2012
Date of request of support from PREDICT (Number of days from notification to request)	Same day
Date of initiation of response by PREDICT (Number of days from request to response)	1 day
Briefly describe the outbreak. Was this an outbreak in humans, in animals (what species)? How many were affected & what was the range of symptoms?	A large number of people drank the free alcohol at a village celebration. Numerous people then began complaining of excessive fatigue, followed by vision loss, abdominal discomfort, vomiting, convulsions and death. The alcohol was purchased through back channels of a brewery and was provided in jerry cans. Ten people had died by Feb 14 (exact dates of deaths unknown) and others were hospitalized.
What type of assistance did PREDICT provide? Who were the PREDICT personnel involved? Include inclusive dates of PREDICT's involvement in the response.	Under a long-standing partnership with the National Public Health Lab (b)(6) and an MOU signed between relevant parties in 2010, PREDICT staff has a mandate to conduct wildlife health surveillance in the RoC. In addition, PREDICT staff is officially recognized in RoC's National Ebola Response Plan, specifically named to conduct wildlife health surveillance. PREDICT staff (b)(6) (b)(6) informed the National Public Health Partners on Feb 14 of the incoming information regarding the outbreak and their intention to conduct wildlife surveillance should it be indicated. Although at this point the exact cause of the epidemic was not confirmed, PREDICT staff was prepared to start animal investigations if infectious diseases appeared to be the cause of the outbreak. On 15 Feb, PREDICT staff (b)(6) met with regional government officials and the Congo Red Cross, where local government officials announced the cause of the epidemic as alcohol poisoning. Animal investigations were not conducted in connection with the event.
Provide description of how first noticed & date if possible. When was the first official acknowledgement of the outbreak (by which government or other reputable body and date)? When was a response initiated and by whom? Which ministries or NGOs were involved? Who was in charge of the national response?	Feb 14, the Sous-prefect of Etoumbi village informed the director of the African Parks Network, who manages the nearby Odzala Kokoua National Park (OKNP). The Sous-prefect suggested, at that time, that it was likely mass alcohol poisoning. The director of OKNP notified PREDICT staff of the event. PREDICT staff then notified contacts at the National Public Health Laboratory, informing them that they would be visiting the village to rule out wildlife involvement, as part of their official role in wildlife health surveillance (see above). The Congolese Red Cross was already at the village on Feb 15th, when PREDICT staff arrived. Other than the Red Cross, it is unknown who was involved in any national response.
Comments on where it started, speed and extent of geographic spread	Started in Etoumbi village, one man reported fled to the town of Makoua, about 80 km away, where he subsequently died.

If a lab diagnosis and confirmation has been obtained give details, including species, sample type and dates. Where was the diagnosis made? Give number of days between initiation of response and lab confirmation of diagnosis.	Unknown if Lab diagnosis was made.
Were other EPT partners involved in the response (which ones and how)?	Not aware if other partners involved.
Summary of the Outcome:	
Did people die? How many?	10 deaths
Did animals die? What species & how many?	No evidence of animal deaths
Was there a relationship between animals & humans in the disease or its transmission (state suspected or confirmed)?	N/A

RWANDA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

a) **National or Regional Surveillance System Improvements**

- Invited as wildlife health expert to accompany Ministry of Health and Ministry of Agriculture officials on preliminary investigations into reports of disease in human and domestic animal populations:
  - Ministry of Health, Gisagara sector: Reports of human fatalities, later determined by MoH to be due to local beer poisoning
  - Ministry of Health, Rusizi sector: Suspected human cholera cases
  - Ministry of Agriculture, Bugesera sector: Suspected Contagious Bovine Pleuropneumonia outbreak in cattle.
- Invited to serve as wildlife health expert to Rwanda Government's One Health Steering Committee, comprised of representatives from the Ministries of Health and Agriculture and

the Rwanda Development Board/Tourism and Conservation Department. PREDICT's role has been to provide expertise on wildlife health and disease surveillance as it pertains to plans and activities of the committee, and to assist with improving lines of communication among members on animal (domestic and wildlife) diseases reporting.

b) **Laboratory Improvements**

- Hired Rwanda's first dedicated wildlife virology laboratory technician to be based at the Rwanda Agricultural Board's Animal Veterinary Services Facility in Rubilizi, Kigali.
- Provided training to the wildlife virology laboratory technician on protocols for raw sample processing and extraction.
- Provided laboratory equipment and supplies to enhance laboratory capacity for wildlife sample processing and extraction (e.g. gel documentation system, extraction kits, primers).

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Sampled 10 wild human-habituated chimpanzees in Nyungwe National Park.
    - Sampled 15 wild baboons living in and around human dwellings at Akagera National Park.
    - Sampled 10 bats trapped in subsistence agriculture areas in Rwamagana sector.

Summary of Surveillance Activities and Testing in GAINS to date:

Rwanda	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	80	368	0	0	0	0	0	0
Rodents								
Free-ranging	229	0	367	0	0	0	0	0
Other High Risk Interfaces	35	0	70	0	0	0	0	0

Non-human Primates								
Free-ranging	62	4	328	0	22	46	46	323
Hunter	11	57	0	0	10	44	44	309
Other High Risk* Interfaces	31	114	258	0	0	0	0	0
Sanctuary	2	39	0	0	0	0	0	0
Other taxa								
Free-ranging	118	106	95	0	1	2	2	14
Hunter	4	8	0	0	4	8	8	56
Other High Risk* Interfaces	6	0	12	0	0	0	0	0
TOTALS	**578**	**696**	**1130**	**0**	**37**	**100**	**100**	**702**

* Note: the interface categories for these data will be revised/refined; “Other High Risk Interfaces” is primarily ecotourism.

- Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
35 primates (swabs, sera, blood, urine, tissue, and pericardial fluid)	Center for Infection and Immunity, Mailman School of Public Health, Columbia University	Sequencing	All viral nucleic acid	Testing underway	-	Rwanda	
38 primates (swabs, blood, buffy coats	UC Davis Wildlife Health Center Laboratory	PCR	PREDICT Viral Family Testing	Testing underway	-	Rwanda	

TANZANIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National Surveillance System Improvements**

    - Trained on operating and maintaining the liquid nitrogen generating plant and safe handling of liquid nitrogen.
    - Trained sample collectors from nine villages on biosafety, sample collection, sample transport, and data recording as part of a newly introduced bushmeat surveillance effort in villages surrounding Ruaha National Park and protected areas.

    b) **Laboratory Improvements**

    - Continued training laboratory technicians on RNA/DNA extraction and PCR.
    - Established the bar coding system in the laboratory for specimen tracking, linking field and lab tracking and information management systems.
    - Initiated pilot testing of specimen transfer between the Tanzania laboratory and regional laboratory in Uganda.
    - Initiated training and mentorship of the lab team by the molecular virologist from UC Davis; training will continue through quarter 3.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Continued media surveillance program, and submitted five articles from local language print media to GAINS. The media surveillance program is now fully functional, with articles submitted to GAINS posting publicly on HealthMap, extending HealthMap's reach to non-digital media in Tanzania.
    - Initiated a one-month pilot surveillance project targeting bushmeat from informal bushmeat markets in villages surrounding Ruaha National Park and protected areas. Sampling was

conducted in 9 villages identified as hubs for bushmeat hunting and trading resulting in 48 samples collected from 24 animals.

Summary of Surveillance Activities and Testing in GAINS to date:

Tanzania	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Other high risk interfaces*	11	56	0	0	0	0	0	0
Rodents								
Other high-risk interfaces*	200	1187	0	0	0	0	0	0
Hunter	6	0	36	0	0	0	0	0
Non-human Primates								
Hunter	9	0	50	0	0	0	0	0
Other taxa								
Other high-risk interfaces*	6	38	0	0	0	0	0	0
Hunter	197	0	1089	0	0	0	0	0
TOTALS	**429**	**1281**	**1175**	**0**	**0**	**0**	**0**	**0**

* The interface categories for these data will be revised/refined; “Other High Risk Interfaces” are primarily in and around people’s homes (peri-domestic) and raiding crops

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Began pilot testing a mobile application designed to assist field teams with the electronic capture of real time field data, and automated synchronization of captured field data with the GAINS server. The beta version of the application is being modified based on field team feedback from Tanzania and Cameroon.

- Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 2):**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
20	Sokoine University of Agriculture	PCR	Arenavirus	Testing Underway		Tanzania	

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Initiated electronic sample tracking and management system for the field and lab teams.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.1: **Significant Change in Project Management.**
    - Completed registration of project foreign veterinarians with the Veterinary Council of Tanzania.

  - Sub-activity 1.5.2: **Communication**
    - Attended the EPT IDENTIFY meeting in Dar es Salaam, and provided an overview of PREDICT activities and operations in country.
    - Shared new EPT IDENTIFY contacts for East Africa with the in-country team; combined with the introductory meetings with IDENTIFY this quarter, progress was made to support greater EPT program coordination in Tanzania.

UGANDA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Assisted in "dry-run" test of methods for shipment of extracted wildlife samples from Tanzania to Uganda for PREDICT viral family testing at Makerere University Walter Reed Project (MUWRP) Laboratory, to assess feasibility of MUWRP as regional diagnostic laboratory for emerging wildlife pathogen testing.

    b) **Laboratory Improvements**
    - Provided laboratory equipment and supplies to enhance MUWRP Laboratory's capacity for high-volume through-put of samples (Mini-mag™ extraction robot; extraction kits, lysis buffer).

  - Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
    - Completed and resubmitted the Rapid Survey Tool to assess progress in building capacity for wildlife zoonotic disease surveillance.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Updated in-country wildlife SMART surveillance plan to include plan to sample bats in caves in Mgahinga National Park that are slated for ecotourism activities.
    - Collected samples from olive baboons, rodents, and bats in Queen Elizabeth Conservation Area, and from mountain gorillas in Bwindi Impenetrable National Park.
    - Received reports of 46 wildlife mortality events representing one or two carcasses per report. Through the Animal Mortality Monitoring Program in Queen Elizabeth Conservation Area.

Summary of Surveillance Activities and Testing in GAINS to date:

(Country)	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Unclassified	8	0	0	0	0	0	0	0
Rodents								
Unclassified	1	0	0	0	0	0	0	0
Free-ranging	13	0	0	207	0	0	0	0
Other High Risk Interfaces*	45	174	0	0	0	0	0	0
Primates								
Free-ranging	14	2	72	0	3	6	6	41
Other High Risk Interfaces	314	20	356	0	3	8	8	56
Unclassified	15	0	0	0	0	0	0	0
Other taxa								
Free-ranging	6	0	41	12	0	0	0	0
Market	2	0	6	0	0	0	0	0
Other High Risk Interfaces*	50	194	0	62	0	0	0	0
TOTALS	**468**	**390**	**475**	**281**	**6**	**14**	**14**	**97**

*The interface categories for these data will be revised/refined; “Other High Risk Interfaces” is primarily ecotourism

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Ensured that 20 of 30 park outposts have at least one mobile phone, and that all outpost personnel have been trained to use the mobile phones and data forms to report observed animal mortality for the Animal Mortality Monitoring Program.

- Completed development and deployment (on five mobile phones) in Queen Elizabeth Conservation Area of a beta version of a new mobile phone application that has the capacity to automatically capture GPS data and upload a photograph of an animal mortality event, in addition to filling out custom data forms, for animal mortality reporting.

- Sub-activity 1.3.2: **Pathogen detection and discovery:**
  - Submitted wildlife specimens to MUWRP to begin PREDICT viral family testing

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
63 rodent (blood, feces, urine)	MUWRP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
336 primate (incl. blood, feces, serum, plasma, mucosal swabs)	MURWP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
1 bat (oral swab)	MURWP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
1 bird (blood)	MUWRP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
6 wild hoofstock/suids (blood and oral swabs)	MUWRP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	
4 domestic livestock (blood and feces)	MUWRP	PCR	PREDICT Viral Family Screening	Testing underway	-	Uganda	

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Selected wildlife sampling sites across varied land-use gradients in and around Bwindi Impenetrable National Park to collect data for Deep Forest modeling activity.

LOW 3: Outbreak Response Capacity Building:

- Invited to assist/participate in outbreak preparedness: Field Simulation Exercise, Avian Influenza National Task Force, Mukono District: Tested and strengthened integrated national response for prevention and control of avian influenza outbreaks.
- Invited to assist/participate in outbreak preparedness: National Task Force on Epidemic Preparedness and Response monthly meetings / discussions and planning for a National Response plan for the Nodding Disease Syndrome in Northern Uganda.

SOUTHEAST ASIA

CAMBODIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Provided field training of surveillance activities to National Veterinary Research Institute (NaVRI) veterinarian and vet students from Royal Univ. of Agriculture.
    - Provided input on wildlife disease perspectives to National Zoonoses Policy through Cambodian Zoonotic Technical Working Group (ZTWG).
    - Co-hosted training with Dept. of Animal Health and Production (DAHP) on “Disease

Surveillance at the Wildlife-Human-Livestock Interface" for personnel from NaVRI, 24 Provincial DAHP offices, Forestry Administration (FA), the Ministries of Health and Environment, and the three veterinary schools.

b) **Laboratory Improvements**

- Finalized arrangements with Institut Pasteur du Cambodge (IPC) to host two laboratory technicians from NaVRI to be trained in viral family screening.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Surveyed market and restaurant trade in wild primates (Lorisidae) used for medicines.
    - Obtained approval from 10 ethnic minority village chiefs to sample hunted wildlife.
    - Approval granted by local leaders in Mondulkiri Province to conduct surveys and collect samples from wildlife hunted by their communities.
    - Identified future sites to sample insectivorous bat hunted in Phnom Penh, restaurants near Phnom Penh trading bats and other key taxa, and fruit bat hunted in rainy season.

Summary of Surveillance Activities and Testing in GAINS to date:

Cambodia	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Hunter	262	0	610	0	0	0	0	0
Unknown	87	340	32	0	0	0	0	0
Rodents								
Hunter	49	0	330	0	0	0	0	0
Primates								
Hunter	13	0	26	0	0	0	0	0
Sanctuary	8	0	51	0	0	0	0	0

Other taxa								
Hunter	347	0	702	0	327	654	0	654
Unknown	1	1	0	0	0	0	0	0
TOTALS	**767**	**341**	**1751**	**0**	**327**	**654**	**0**	**654**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Chiroptera- 340	Institute Pasteur Cambodia	Cell-inoculation. RT-PCR and Hemi-nested PCR	*Flavivirus, Henipaviruses, Coronavirus, Astroviruses, Lyssaviruses, Filoviruses, Paramyxoviruses*	Confirmation of Results Pending	-	Cambodia	NO

Partners: Royal University of Agriculture (RUA).

INDONESIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Launched PREDICT Indonesia Program during training workshop that was attended by government representatives from Ministry of Forestry, Ministry of Agriculture, Ministry of Health, and Coordinating Ministry of People's Welfare.
    - Held 2 meetings with Deputy Minister and Staff from Coordinating Ministry of People's Welfare.
    - Attended RESPOND meeting in Jakarta to discuss the upcoming training by RESPOND in Indonesia: "In-service Training on Zoonotic Disease Outbreak Response."
    - Conducted bat, rodent, and primate training workshop for field teams. Attended by 20 participants from 8 universities and research institutions which cover 5 regions of Indonesia: Aceh (northern part of Sumatra), East Java, Central Java and Yogyakarta, West Java, South Kalimantan and North Sulawesi.

    b) **Laboratory Improvements**
    - Conducted scoping visit to the Indonesia National Institute of Science (LIPI) in Cibinong, to discuss sharing of archived specimens from bats and rodents for pathogen detection and discovery.
    - Conducted scoping visit to the Veterinary Research Institute (Bbalitvet) in Bogor, to discuss sharing of archived specimens from bats they had collected to be analyzed for pathogen detection and discovery.
    - Negotiated with LIPI, Bbalitvet and PRC-IPB to work on MTAs to cover the sharing of the archived samples from each institution to be included in the PREDICT Indonesia program of pathogen detection and discovery.
    - Began ordering necessary reagents and supplies to perform family level testing.
    - Trained research assistant on specimen processing, arbovirus serology, arbovirus cell

culture, RT-PCR of DEN, JE, CHIK, as well as BSL-3 procedures, at USAMC-AFRIMS in Bangkok.
- Submitted study proposal to Eijkman Institute Research Ethics Commission.
- Finalized combined Laboratory Work Plans, including specimen sharing, flow, and testing jointly with CDC.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Evaluated a population of feral long-tailed macaques on Java Island (East Java, Central Java and West Java provinces) to identify potential sampling locations.
    - Conducted visit to wild animal market in Jakarta to survey bats, primates, and birds in close contact with other mammalian species, including people.
    - Finalized agreement for transfer of archived specimens from the Bandung hospitalized study to Eijkman Institute.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Transferred PREDICT family level protocols to Eijkman Institute.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 2):**
    - Finalized strategy for testing of human samples: first tier testing to include Seadornaviruses, Paramyxoviruses, Arenaviruses, Filoviruses, Coronaviruses and Bocaviruses.
    - Finalized strategy for testing archived bat, rodent, and non-human primate samples.
    - Identified 100 archived samples of blood/ serum/ plasma specimens from nonhuman primates to be analyzed for pathogen detection and discovery. MTA is being developed to cover this activity.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**

- Made preliminary plans for USAID mission director to visit with country coordinator and tour facilities
- Updated lead implementing partner on training of staff, laboratory management, study related documents, procurement of supplies and budget issues bi-monthly.

Partners: Institut Pertanian Bogor Primate Research Center (PRC-IPB); Eijkman Institute of Microbiology.

LAO PDR

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National Surveillance System Improvements**
    - Trained Provincial Forestry and Agriculture staff in zoonotic disease surveillance.
    - Trained National Animal Health Centre (NAHC) staff in biosecurity, sampling, species ID.
    - Trained students from the National University in wildlife sampling at the wildlife/human interface in subsistence hunting villages.
    - Collaborated with central NAHC and Provincial Agriculture and Forestry Offices on Workshops and associated activities.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Trained PREDICT staff from Lao and Cambodia and three NAHC staff to perform observation surveys in markets selling wildlife.
    - Collected samples for disease surveillance at 18 markets/locations in 9 provinces

Summary of Surveillance Activities and Testing in GAINS to Date:

Laos	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	86	176	0	0	0	0	0	0
Hunter	108	0	0	0	0	0	0	0
Market	338	0	800	0	0	0	0	0
Other High Risk	260	216	826	0	0	0	0	0
Rodents								
Free-ranging	106	232	0	0	0	0	0	0
Market	156	0	1064	0	0	0	0	0
Hunter	176	0	269	0	0	0	0	0
Other High Risk	478	385	1548	0	0	0	0	0
Primates								
Other High Risk	5	7	12	0	0	0	0	0
Other taxa								
Market	18	0	75	0	0	0	0	0
Free-ranging	52	111	0	0	0	0	0	0
Hunter	50	0	107	0	0	0	0	0
Other High Risk	92	135	242	0	0	0	0	0
TOTALS	**1925**	**1262**	**4943**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
327 Chiroptera	Institut Pasteur du Cambodge (IPC)	RT-PCR for Coronaviruses, Hemi-nested PCR for Astroviruses, RT-PCR for Filoviruses, hemi-nested RT-PCR + Taq Man RT-PCR (genotype 1) + Real-time RT-PCR SYBR Green (other genotypes) for lyssaviruses	*Coronaviruses, Astroviruses, Lyssaviruses, Filoviruses*	All negative for Filovirus and Lyssavirus Confirmation of other Results Pending	-	Cambodia (country of testing)	No
144 Rodentia	Institut Pasteur du Cambodge (IPC)	RT-PCR for Hantaviruses, RT-PCR for Arenaviruses	Hantaviruses Arenaviruses	Negative	-	Cambodia (country of testing)	No

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Hired New Country Coordinator for Lao PDR in January, to replace previous coordinator who moved to Cambodia.
  - Sub-activity 1.5.2: **Communication**
    - Briefed the new US Deputy Chief of Mission in Lao on project workplan and objectives and travelled together to visit sampling sites and observe activities

Partners: National University of Laos (NUoL), Institute Pasteur du Cambodge

MALAYSIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) National or Regional Surveillance System Improvements
    - Assisting with the development of a Zoonosis Technical Working Committee (ZTWC) comprised of Ministry of Health (MOH), DVS, PERHILITAN and PREDICT which will meet at least once every 3 months to discuss project progress and results, and report to the Malaysian Government steering committee on the control of zoonotic diseases.

    b) Laboratory Improvements
    - Finalized negotiations with PERHILITAN and Department of Veterinary Services (DVS) to transfer PREDICT wildlife samples from PERHILITAN to Veterinary Research Institute (VRI) for screening.
    - Received – 80°C Freezers at VRI in Ipoh and Sabah Wildlife Department (SWD) in Kota Kinabalu.
    - Began assisting with the setup of the new lab at VRI dedicated to testing PREDICT samples.
    - Developed protocols for managing lab, samples and work flow.
    - Created a lab plan and timeline with SWD for getting lab operational.
    - Participated in Indonesia PREDICT training and lab protocol exchange.
    - Trained PERHILITAN lab scientist and PREDICT lab and field team scientist at CII, Columbia University for a month in March and April with bat, rodent and primate samples to learn PCR and 454 techniques;

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Malaysia	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	132	640	822	0	0	0	0	0
Rodents								
Free-ranging	68	499	258	0	0	0	0	0
Unclassified	47	0	558	0	0	0	0	0
Primates								
Hunter	84	0	1974	0	1	1	0	1
Other	5	0	121	0	0	0	0	0
Free-ranging	377	0	6380	0	64	106	0	136
Other taxa								
Free-ranging	134	62	1022	0	0	0	0	0
Hunter	256	0	2803	0	0	0	0	0
Sanctuary	15	0	144	0	0	0	0	0
Unclassified	61	0	523	0	23	40	0	47
TOTALS	**1179**	**1201**	**14605**	**0**	**88**	**147**	**0**	**184**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Sequencing results from rodent and bat samples to confirm testing from last quarter are pending.
    - cDNA being screened for viruses on samples shipped to CII, Columbia University for pathogen discovery.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Serum samples from 50 macaques	CII/CUMC	Reverse transcriptase assay, PCR and cloning	Retroviruses – Gammaretrovirus and Lentivirus	Results pending sequencing confirmation	-	Malaysia	No
Serum samples from 25 bats	CUMC	Reverse transcriptase assay	Retroviruses – Gammaretrovirus and Lentivirus	Negative	-	Malaysia	No
Serum samples from 25 rodents	CUMC	Reverse transcriptase assay	Retroviruses – Gammaretrovirus and Lentivirus	Negative	-	Malaysia	No
Pooled cDNA of throat, urine and rectal swab samples from 50 macaques	CII	PREDICT consensus PCR and CII PCR (for influenza A)	Astroviruses (2 protocols), coronaviruses (2 protocols), filoviruses, flaviruses, paramyxoviruses, hantaviruses, herpesviruses, bocaviruses, poxviruses (2 protocols), papillomaviruses, adenoviruses, polyomaviruses and influenza A	Results pending sequence confirmation	-	Malaysia	No

Pooled cDNA of throat, urine and rectal swab samples from 25 bats	CII	PREDICT consensus PCR and CII PCR (for influenza A)	Astroviruses (2 protocols), coronaviruses (2 protocols), filoviruses, flaviruses, paramyxoviruses, hantaviruses, herpesviruses, bocaviruses, poxviruses (2 protocols), papillomaviruses, adenoviruses, polyomaviruses and influenza A	Results pending sequence confirmation	-	Malaysia	No
Pooled cDNA of throat, urine and rectal swab samples from 25 rodents	CII	PREDICT consensus PCR and CII PCR (for influenza A)	Astroviruses (2 protocols), coronaviruses (2 protocols), filoviruses, flaviruses, paramyxoviruses, hantaviruses, herpesviruses, bocaviruses, poxviruses (2 protocols), papillomaviruses, adenoviruses, polyomaviruses and influenza A	Results pending sequence confirmation	-	Malaysia	No
Serum and feces/rectal swab from 14 macaques	CII	Sample prep for Illumina® deep sequencing	Any	Sequencing results pending	-	Malaysia	No
Serum and feces/rectal swab from 18 bats	CII	Sample prep for Illumina® deep sequencing	Any	Sequencing results pending	-	Malaysia	No
Serum and feces/rectal swab from 18 rodents	CII	Sample prep for Illumina® deep sequencing	Any	Sequencing results pending	-	Malaysia	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Sample data entered into GAINS database.
    - Test results entered into GAINS Test Result Spread Sheet.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Continued communication with US Embassy in KL.
    - Meeting with IDENTIFY to discuss lab development at Sabah Wildlife Department.
    - Meeting with RESPOND to discuss PREDICT/RESPOND collaborations in Malaysia.
    - Ongoing communication with SWD to discuss Deep Forest activities.
    - Attended EPT+ meeting in Bangkok to discuss Malaysia activities.

Partners: DVS/VRI; PERHILITAN; MOH; SWD; PREVENT; IDENTIFY.

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Began site selection for the Deep Forest Project.

THAILAND

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**

- Participated in Second Regional Workshop on Collaboration Between Human and Animal Health Sectors on Zoonoses Prevention and Control in Chiang Mai, organized by FAO/OIE/WHO.
- Participated in ASEAN/FAO/OIE/WHO Rabies Workshop, Chiang Mai, organized by FAO/OIE/WHO.
- Presented a lecture on “Bat urine collection in the field” for veterinarians during the "Veterinary Field Epidemiology in Action" workshop on organized by DLD/FAO/OIE/USAID.
- Lectured on “Climate change and health impacts” and “Zoonoses of concern in the region: panel of experts: Rabies and Nipah viruses“ in Training Workshops on Zoonoses and Public Health Response in Savannakhet, Lao PDR, organized by Kenan Institute Asia and USAID.
- Lectured on “Climate change and emerging infectious diseases” in Bangkok organized by Thai Red Cross Society Nurse College.
- Lectured on “Emerging infectious diseases from flood water” in Bangkok organized by Ministry of Science Thailand.
- Attended “Inception Workshop on Partnership of Global Animal Health and Biosecurity Initiatives” in Bangkok organized by FAO and Department of Agriculture, Fisheries and Forestry, Australia.
- Attended "International Conference for Veterinary Services 2010: Asia Web for World Food Security" in "One Health in Motion: Models for One Health Practices" in Bangkok organized by FAO and ASEAN.
- Attended Second Thailand National One Health Forum “Strengthen the network and let’s move forward” organized by RESPOND.

b) **Laboratory Improvements**

- Presented training lecture on Lyssavirus Diagnostics for Ministry of Public Health.

- **Activity 1.2 Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Thailand	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	36	36	0	0	22	22	0	22
Unclassified	146	146	0	0	0	0	0	0
Rodents								
Free-ranging	3	3	0	0	3	3	0	3
Unclassified	4	4	0	0	0	0	0	0
Primates								
N/A	0	0	0	0	0	0	0	0
Other taxa								
Free-ranging	1	1	0	0	1	1	0	1
TOTALS	**190**	**190**	**0**	**0**	**26**	**26**	**0**	**26**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Performed PCR screening of Coronaviruses on archived specimens.
    - Performed nucleic acid library preparation on wildlife specimens using Roche 454 Jr. to optimize protocols for viral discovery using next-generation sequencing.
    - Continued to optimize viral family-level PCR protocols. Specifically, compared three

Coronavirus PCR protocols to improve the sensitivity and specificity of these assays on wildlife specimens.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bat - feces, n = 69	WHO-CC Chula	PCR	Coronaviruses	Confirmation of Results Pending	-	Thailand	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Uploaded test results and associated specimen information into GAINS

.

Activity 1.5 Program Management

- Sub-activity 1.5.2: **Communication**
  - Participated in 2012 EPT work plan review meeting for Thailand at USAID offices in Bangkok.
  - Met with RESPOND to discuss synergistic activities.

Partners: Chulalongkorn University; AFRIMS; RESPOND; Ministry of Science, Thailand; Ministry of Health; Department of National Parks, Wildlife and Plant Conservation (DNP).

VIETNAM

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Introduced Vietnam OIE national point person on wildlife, to Canadian Cooperative Wildlife Health Centre, interested in supporting a national wildlife surveillance program. Provided background on wildlife/livestock/human interfaces in Vietnam, One Health, and PREDICT to Vietnam's National Focal Point for Wildlife for OIE Regional Training.

    b) **Laboratory Improvements**
    - Improved sample management/ storage in ultralow freezers maintained at partner labs (HUA and RAHO6) in Ho Chi Minh City.
    - Coordinated with IDENTIFY on consultant TOR for new biosafety protocol in HUA lab.
    - Finalized partnership MOU with the Oxford University Clinical Research Unit (OUCRU), Ho Chi Minh City, for training and advanced diagnostics.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Piloted a wildlife survey of 74 restaurants in Hanoi to document species sold, assess risk interfaces, collect samples, and improve future survey methods and sample collection.
    - Negotiating partnership between with Welcome Trust funded 'Vietnam Initiative on Zoonotic Infections' (VIZIONs) program, implemented with University of Edinburgh, GVFI, and Welcome Trust Sanger Institute (WTSI), to sample wildlife in VIZIONs high risk cohorts and provide information on risk interfaces in six provinces.
    - Included seven Hanoi University of Agriculture (HUA) veterinary students in sample and collection training including sampling with FTA Filter cards, lysis buffer and Viral Transport Medium, environmental sampling, and PPE use.

Summary of Surveillance Activities and Testing in GAINS to date:

Vietnam	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
	0	0	0	0	0	0	0	0
Rodents								
Wildlife for sale in restaurant	32	0	114	0	0	0	0	0
Primates								
	0	0	0	0	0	0	0	0
Other taxa								
Wildlife for sale in restaurant	64	0	157	0	0	0	0	0
Rehabilitation centre	50	0	50	0	0	0	0	0
TOTALS	**146**	**0**	**321**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Avian - 20	HUA	PCR	*Flaviviridae*	Negative	-	Vietnam	NO
Rodentia - 51	HUA	PCR	*Arenaviridae* *Flaviviridae*	Negative	-	Vietnam	NO
Carnivora – 1	HUA	PCR	*Flaviviridae*	Negative	-	Vietnam	NO

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Obtained signed PREDICT Sample Sharing and Data Policy documents from all three Partner labs (NCVD, RAHO6 and HUA).
    - Provided training to Vietnam Program Officer with the Laos team on sample and data management, and GAINS system

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Finalized MOU to share office space with PREVENT in Hanoi.
    - Negotiating partnership between PREDICT and Wellcome Trust funded 'Vietnam Initiative on Zoonotic Infections' (VIZIONs) program, implemented with University of Edinburgh, GVFI, and Wellcome Trust Sanger Institute (WTSI). PREDICT to sample wildlife in VIZIONs high risk cohorts and provide information on risk interfaces in six provinces.

ASIA

BANGLADESH

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Participated in One Health Bangladesh meeting for developing country-level strategic plans and a road map for facing emerging infectious diseases.
    - Began organization of the One Health Alliance of South Asia (OHASA) regional meeting in Delhi, India. Ministerial staff and scientists will be invited to discuss One Health,

collaborations and policy among South Asian countries using the example of PREDICT.

b) **Laboratory Improvements**

- Installed a new -80°C freezer in laboratory.
- Consulted with Bangladesh Forest Department regarding development of their new diagnostic laboratory.
- Trained a wildlife veterinarian from the Bangladesh Forest Department in BSL-2 laboratory protocols and conducting PCR.

- Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
  - Completed the Rapid Survey Tool Update.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Identified new areas with wildlife-human interfaces (such as areas with heavy hunting activity and/or wildlife consumption); developed surveillance strategies for these areas using a One Health approach. Coordinated with ICDDR,B on USAID-supported human surveillance for bat-borne (e.g. Nipah virus) pathogens.

Summary of Surveillance Activities and Testing in GAINS to date:

Bangladesh	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	688	9607	0	301	0	0	0	0
Hunter	137	1781	0	0	0	0	0	0

Other High Risk Interfaces	24	212	0	0	0	0	0	0
Rodents								
Free-ranging	183	2454	0	0	0	0	0	0
Other High Risk Interfaces	15	221	0	0	0	0	0	0
Primates								
Other High Risk Interfaces	4	60	0	0	0	0	0	0
Other taxa								
Free-ranging	521	3598	0	0	0	0	0	0
Other High Risk Interfaces	4	60	0	0	0	0	0	0
TOTALS	**1576**	**17993**	**0**	**301**	**0**	**0**	**0**	**0**

- Sub-activity 1.3.1: **Introduction of New Technologies.**
  - Implemented Nipah virus PCR methodology at ICDDR,B.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

- Sub-activity 1.3.2: **Pathogen detection and discovery:**
  - Initiated Nipah PCR testing of bat urine samples; results pending.
  - Processed samples for shipping to CII, Columbia University for pathogen discovery.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1200 bat samples (throat and urine from Bangladesh)	CII, Columbia University	Family level PCR	Hantavirus	Negative	-	Bangladesh	No
1200 bat samples (throat and urine from Bangladesh)	CII	Family level PCR	Paramyxovirus	Confirmation of Results Pending	-	Bangladesh	No
1200 bat samples (throat and urine from Bangladesh)	CII	Family level PCR	Astrovirus	Confirmation of Results pending	-	Bangladesh	No
1200 bat samples (throat and urine from Bangladesh)	CII	Family level PCR	Influenza	Results pending	-	Bangladesh	N/A
1200 bat samples (throat and urine from Bangladesh)	CII	Family level PCR	Herpes	Results pending	-	Bangladesh	N/A

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management:**
    - Entered all field and surveillance data into GAINS database.
    - Reported sample collection activities to the Bangladesh Forest Department.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.1: **General Management**
    - Selected new country coordinator.

- Hired Field Research (Administrative Assistant) to support surveillance and reporting activities.

- Sub-activity 1.5.2: **Communication**
  - Held in-person meetings with FAO and WHO representatives on issues relating to zoonotic diseases of bats and birds.

Partners: International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B), Forestry Department (Government of Bangladesh), Center for Immunity and Infection at Columbia University (CII).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Worked with modeling and hotspots ID team to refine map of predicted hotspots.
  - Integrated agents-based modeling activities (Nipah virus).

LOW 3: Outbreak Response Capacity Building

- Trained wildlife veterinarian from the Bangladesh Forest Department at ICDDR,B on Wildlife Surveillance activities in the context of an Outbreak Investigation, epidemiology, and disease surveillance.

CHINA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Discussions with Guangdong Institute of Public Health to participate in the PREDICT

project as a collaborative partner to increase disease surveillance capacity in Guangdong.
- Discussions with the Nutrition and Food Safety Institute of the GDCDC regarding possible collaborations for disease surveillance.
- Met with (b)(6) of GDCDC, (b)(6) Beijing US Embassy and (b)(6) to discuss the surveillance project targeting extraction industries in Gabon; invited (b)(6) of GDCDC to visit Gabon.

a) **Laboratory Improvement**
- Introduced serology testing for novel Bunyavirus at GDCDC.
- Preparing to test fruit bat samples for Nipah virus.
- Began to take fruit bat samples from Southern China and Yunnan and screen these samples by RT-PCR.

- **Activity 1.2: Surveillance**

- Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
  - Linked animal and human surveillance data to identify priority samples for testing as well as locations for future sampling.
  - Partnered with the Guangdong Zhanjiang Ratproof Institute to support rodent collection and sample testing that will be linked with hospital-based surveillance of acute human disease in the region.
  - Developed acute human hospital-based surveillance protocols for Guangdong and for review by collaborating governmental partners.
  - Prepared application for submission to UC Davis IRB to include China in the human surveillance follow-up protocols (Protocol No. 215253-6).
  - Visited additional animal markets in Southern China, to establish sites for mammal sampling.

Summary of Surveillance Activities and Testing in GAINS to date:

China	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	369	738	0	0	0	0	0	0
Other High Risk Interfaces	36	72	0	0	0	0	0	0
Rodents								
Other High Risk Interfaces	161	322	0	0	0	0	0	0
Primates								
Other taxa								
Other High Risk Interfaces	6	12	0	0	0	0	0	0
TOTALS	**572**	**1144**	**0**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Amplified long sequence of Hanta virus amplified from bat with new primers.

- Tested human samples for antibodies to the novel Bunyavirus (recently identified in China) at Guangdong CDC; this is the first time this testing has been conducted in Southern China.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1301 Human blood serum	GDCDC	Serology	Hanta, Ebola, SARS CoV, Bunyavirus	Pending approval for release of data	-	China	No
67 Chinese Bamboo rats (pooled anal swab & oral swab)	WIV	PCR	Astroviridae	19 positives	-	China	Yes
6 Masked palm civets (pooled anal swab & oral swab)	WIV	PCR	Astroviridae	4 positives	-	China	Yes
29 Malayan Porcupines (pooled anal swab & oral swab)	WIV	PCR	Astroviridae	18 positives	-	China	Yes
3 bat spp.	GDEI	PCR	Hantavirus	Confirmation of Results Pending	-	China	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Linked laboratory results with human behavioral information in the secured database; negotiations are underway with a US partner for epidemiological analysis; collaborating partner for analysis has been identified by GDCDC; permission to results pending.

- Entered animal samples (collected and analyzed at GDEI) in GAINS database.

Partners: East China Normal University; Wuhan Institute of Virology; Guangdong Entomological Institute; Guangdong CDC; Guangdong Zhanjiang Ratproof Institution

LATIN AMERICA

BOLIVIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Met with Bolivian Ministries of Health, Agriculture, Environment, Education and Defense, with support from the Pan-American Health Organization (PAHO Bolivia) to design a new regulatory framework to improve zoonotic disease surveillance, outbreak response, and risk communication. PREDICT facilitated and informed national coordinators of zoonoses (Ministry of Public Health) and veterinary epidemiology (SENASAG)
    - Planned joint rodent sampling trips with the Beni Regional Department of Health (SEDES Beni) in areas affected by arenavirus hemorrhagic fever.
    - Seven PREDICT staff received training from a hematology technician from the National Institute of Health in techniques for collecting and processing blood samples.

    b) **Laboratory Improvements**
    - Initiated screening for Arenaviridae, Bunyaviridae (specifically hantaviruses), Flaviviridae at Institute of Molecular Biology and Biotechnology (IBMB).
    - Evaluated options for sharing primer sequences and protocols for targeting Machupo viral strains on arenavirus positive samples with a regional reference center for hemorrhagic fevers (National Institute of Human Viral Diseases-INEVH).

- Prioritized wildlife samples for viral screening based on primary interfaces in country, and most likely routes of transmission of pathogens to people

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Bolivia	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	419	1657	177	0	0	0	0	0
Other High Risk Interfaces	2	0	62	0	0	0	0	0
Unclassified	44	0	0	0	0	0	0	0
Rodents								
Free-ranging	11	0	190	0	0	0	0	0
Hunter	44	0	868	0	13	13	0	20
Other High Risk Interfaces	221	3151	299	0	5	10	0	29
Primates								
Free-ranging	3		125					
Hunter	45	0	805	0	32	39	0	96
Other High Risk Interfaces	23	0	122	0	2	3	0	5
Sanctuary	18	0	299	0	2	3	0	4
Other taxa								
Free-ranging	3	0	0	0	0	0	0	0
Hunter	282	0	4370	0	126	138	0	273
Other High Risk Interfaces	96	0	1238	0	54	94	0	297
Sanctuary	23	0	33	0	0	0	0	0
TOTALS	**1234**	**4808**	**8588**	**0**	**234**	**300**	**0**	**724**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
43 samples from monkeys and bats (dried blood spots on FTA/Protein saver cards; oral/rectal swabs, blood/serum/clots, feces, either VTM and RNAlater	IBMB-UMSA	Conventional and nested RT-PCR	1. Bats: flavi, corona, arena and filovirus. 2. Primates: filo, paramyxo, flavi and coronavirus. 3. Rodents: hanta, arena, alpha and flavivirus.	Pending	-	Bolivia	No
32 blood samples from monkeys sampled in indigenous territories and rescue centers	IBMB-UMSA	RT-PCR	Arenavirus and Flavivirus	Confirmatory testing underway	-	Bolivia	No

Partners: Bolivian Network to Combat the Illegal Wildlife Trade (REBOCTAS).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  Finalized English version of report characterizing wildlife trade in county (PREDICT/ DGB/ REBOCTAS). This tool for risk assessment and policy-making will be handed to government

agencies and partners.

PREDICT Outbreak Report Short Form

Summary Information to Report	Report below:
Working Name of the Outbreak (Report name if assigned or use name of region and other descriptors)	Howler monkey deaths in Santa Cruz (eastern Bolivia).
Date of last update of this form (most often today if you are making a change)	April 06, 2012
Inclusive dates (from start of outbreak to end of response – use today as end date if response ongoing)	Beginning of March – April 06, 2012
Date of first notification of PREDICT	On March 28 2012, PREDICT was informed about deaths in monkeys by field veterinarians from "Ambue Ari" Wildlife Refuge Park (owned by the NGO "Inti Wara Yassi Community", a PREDICT collaborator). On April 05 2012, PREDICT communicated the event and laboratory findings to (b)(6) (b)(6) and (b)(6) (b)(6)
Date of request of support from PREDICT (Number of days from notification to request)	On March 28 2012, PREDICT was asked for collaboration by the NGO "Inti Wara Yassi Community". On April 05 2012, PREDICT was requested by the Ministry of Public Health to become involved in discussions regarding outbreak response.
Date of initiation of response by PREDICT (Number of days from request to response)	In preparation phase. Discussions are underway with the Ministry of Public Health for collaborative work for outbreak response.
Briefly describe the outbreak. Was this an outbreak in humans, in animals (what species)? How many were affected & what was the range of symptoms?	From the beginning of March to April 03 2012, five (5) Red Howler monkeys (*Alouatta seniculus*) were found dead in a Wildlife Refuge Park ("Ambue Ari") in the surroundings of Guarayos (Department of Santa Cruz). No clinical signs were reported in animals or humans in the affected area, except from the deaths. Carcasses of two monkeys were shipped by local veterinarians to the Municipal Zoo "Vesty Pakos" (La Paz) for conducting necropsies. PREDICT staff performed post-mortem examinations and found diffuse hemorrhages and petechiae on different organs (mainly the liver).
What type of assistance did PREDICT provide? Who were the PREDICT personnel involved? Include inclusive dates of PREDICT's involvement in the response.	In preparation phase. PREDICT was invited to join discussions with the Ministry of Public Health around outbreak response activities in Santa Cruz due to presumptive Yellow Fever diagnosis. Disease control measures to be adopted may include: 1. Vaccination of people; 2. Reduction of mosquito populations; 3. Field investigations on monkeys and humans; 4. Education campaigns. PREDICT country coordinator (Erika Alandia) involved so far.
Provide description of how first noticed & date if possible.	Outbreak first noticed at beginning of March. Response activities planned April 07 2012, led by the National Immunization Program (Ministry of Public Health). Government continuing to consider implications of outbreak and interventions.

When was the first official acknowledgement of the outbreak (by which government or other reputable body and date)? When was a response initiated and by whom? Which ministries or NGOs were involved? Who was in charge of the national response?	
Comments on where it started, speed and extent of geographic spread	By the beginning of March 2012, a first Red Howler monkey was found dead in "Ambue Ari" Wildlife Park and buried on site. On March 25 a second monkey (an adult female with its young) was found dead and buried on site too. On March 28 two additional monkeys were found dead and shipped to La Paz for necropsies and testing. An additional monkey was found dead on April 03. The outbreak seems to be restricted to the wildlife refuge park, with an increase in the speed of transmission during the last week.
If a lab diagnosis and confirmation has been obtained give details, including species, sample type and dates. Where was the diagnosis made? Give number of days between initiation of response and lab confirmation of diagnosis.	Tissue samples and blood from the two dead howler monkeys were submitted to the Institute of Molecular Biology (IBMB-UMSA) for flavivirus and arenavirus testing. On April 04 2012, flavivirus infections were confirmed on liver samples (preserved in lysis buffer) by RT-PCR performed at IBMB-UMSA laboratory. Further studies are underway at the Bolivian Reference Center for Tropical Diseases (CENETROP) to prove the identity of the virus, and its putative relatedness with the Yellow fever antigenic group. No response activities have initiated yet.
Were other EPT partners involved in the response (which ones and how)?	None.
Summary of the Outcome:	
Did people die? How many?	None.
Did animals die? What species & how many?	Yes, five (5) Red Howler monkeys (*Alouatta seniculus*) were found dead in a Wildlife Refuge Park ("Ambue Ari").
Was there a relationship between animals & humans in the disease or its transmission (state suspected or confirmed)?	This is under study. Intense deforestation caused by expanding agriculture may have led susceptible monkeys to come in closer contact with mosquito populations that breed in water cisterns in the wildlife refuge. Should Yellow fever be confirmed, this event may represent the first description of the disease affecting monkeys in Bolivia.

BRAZIL

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Formed a new partnership with the Manaus Center for Zoonosis Control (CCZ), trained two collaborators from CCZ and another from Instituto Nacional de Pesquisas da Amazônia (INPA) on PREDICT protocols. The CCZ partners also joined the team on Manaus field trip.

    b) **Laboratory Improvements**
    - Hired new lab personnel to analyze samples at University of Sao Paulo (USP) Institute of Biomedical Sciences (ICB).
    - Continued the application process for permits from the Brazilian government (Institute "Chico Mendes" of Conservation and Biodiversity-ICMBIO).

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Sampled a total of 107 bats and 9 non-human primates yielding 397 samples from Manaus.
    - Coordinated field trip to remote sites in the Amazon in Santa Izabel do Rio Negro (State of Amazonas, northwestern Brazil).

Summary of Surveillance Activities and Testing in GAINS to date:

Brazil	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	302	1074	0	0	0	0	0	0
Other High Risk Interfaces	98	421	0	0	0	0	0	0
Unclassified	16	75	0	0	0	0	0	0
Rodents								
Free-ranging	15	76	0	0	0	0	0	0
Other High Risk Interfaces	38	100	0	0	0	0	0	0
Primates								
Free-ranging	8	46	0	0	0	0	0	0
Other High Risk Interfaces	24	93	0	0	0	0	0	0
Other taxa								
Free-ranging	13	51	0	0	0	0	0	0
Other High Risk Interfaces	270	1853	0	0	17	68	0	68
Unclassified	2	15	0	0	0	0	0	0
TOTALS	**786**	**3804**	**0**	**0**	**17**	**68**	**0**	**68**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
68 Bats	ICBII USP	Real Time PCR	Hantavirus	All Negative	N/A	Brazil	No

- **Activity 1.4: Sample Tracking and Information Management**
  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Updated and corrected GAINS files.

Partners (New): Manaus Center for Zoonosis Control (CCZ).

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Initiated sampling activities for Deep Forest Project in the Amazon region. This project will test the assumptions of the EID hotspots model.

COLOMBIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Prepared draft agreement with Ministry of Environment to develop a national program for wildlife disease surveillance and monitoring of Avian Influenza.
    - Prepared preliminary report for Ministry of Environment on "Knowledge and management of wildlife diseases in Colombia", with details on current regulations and research focused on wildlife diseases, with local Association of Wildlife Veterinarians (AVVS)

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Colombia	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Rodents								
Free-ranging	1	0	0	0	0	0	0	0
Hunter	1	0	6	0	0	0	0	0
Primates								
Hunter	22	0	165	0	0	0	0	0
Other taxa								
Hunter	92	0	605	0	0	0	0	0
TOTALS	**116**	**0**	**776**	**0**	**0**	**0**	**0**	**0**

Partners: Ministry of Environment; Ministry of Agriculture; Ministry of Public Health; the local Association of Wildlife Veterinarians (AVVS); Javeriana Pontiff University; Environmental Regional Authorities (Corporaciones Autónomas Regionales); San Martín University Foundation (FUSM); Virology Lab, National Institute of Health (INS); Antioquía University; Colombian Foundation for Studies on Parasites (FUNCEP)

MEXICO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Mexico	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	1560	7445	38	0	0	0	0	0
Other High Risk Interfaces	72	0	184	0	0	0	0	0
Unclassified	29	0	64	0	0	0	0	0
Rodents								
Free-ranging	26	119	0	0	0	0	0	0

Unclassified	6	0	0	0	0	0	0	0
Primates								
	0	0	0	0	0	0	0	0
Other taxa								
Free-ranging	7	21	0	0	0	0	0	0
TOTALS	**1700**	**7585**	**286**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery:**
    - Government approved release of results from pathogen discovery conducted at CII, Columbia University. Finalized test result data are pending in GAINS.
    - Reviewed pathogen detection protocols and ordered laboratory reagents to begin testing.

Findings:

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
66 samples of bat rectal swabs	CII	PCR and sequencing	Coronavirus, Astrovirus, Adenovirus and Herpesvirus	1 Coronavirus 9 Herpesviruses 8 Astroviruses 2 Adenoviruses	-	Mexico	Yes
70 samples of bat throat swabs	CII	PCR and sequencing	Coronavirus, Astrovirus, Adenovirus and Herpesvirus	1 Coronavirus 21 Herpesviruses 1 Astrovirus	-	Mexico	Yes
105 samples of bat blood	CII	PCR and sequencing	Coronavirus, Astrovirus, Adenovirus and Herpesvirus	1 Coronavirus 1 Herpesvirus 3 Adenoviruses	-	Mexico	Yes

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Met with government agencies SEMARNAT and SAGARPA, to discuss project and seek approval for release of test results

PERU

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Finalized cooperative agreement with Peruvian Institute of Health (INS), for PREDICT to be involved in field investigations and outbreak response in country, and to access INS' bat and rodent samples for testing.
    - Workshop held for field staff from collaborating institutions (PREDICT, INS, NAMRU-6, a local zoo) on wildlife handling/sampling for disease surveillance to harmonize protocols.
    - Advanced plans for a workshop on wildlife disease surveillance for government staff, with Peruvian Veterinary Service (SENASA) and USDA-APHIS Wildlife Disease Program.

    b) **Laboratory Improvements**
    - Hired a laboratory technician and acquired supplies for viral family testing at Peruvian Institute of Health (INS Iquitos)

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Formalized cooperative work with the Loreto Regional Directorate of Health (DIRESA) for disease surveillance in northern Peruvian Amazonia.

Summary of Surveillance Activities and Testing in GAINS to date:

Peru	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	70	24	259	0	0	0	0	0
Rodents								
Free-ranging	1	0	8	0	0	0	0	0
Hunter	206	204	39	0	0	0	0	0
Market	11	42	0	0	0	0	0	0
Unclassified	17	200	0	0	0	0	0	0
Primates								
Hunter	225	369	530	0	0	0	0	0
Market	35	120	3	0	0	0	0	0
Other High Risk Interfaces	152	444	1183	0	0	0	0	0
Unclassified	10	84	0	0	0	0	0	0
Other taxa								
Free-ranging	1	0	4	0	0	0	0	0
Hunter	544	861	100	0	1	1	0	2
Market	365	963	45	0	58	76	0	81
Unclassified	11	52	0	0	0	0	0	0
TOTALS	**1648**	**3363**	**2171**	**0**	**59**	**77**	**0**	**83**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Began to implement testing for 7 priority viral families at INS.

- Sub-activity 1.3.2: **Pathogen detection and discovery:**

Findings:

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
1,001 samples from monkeys (frozen dried blood spots in FTA cards, oral/rectal swabs, blood/serum/clots, feces, and tissues frozen in either VTM and RNAlater; feces in Cary-Blair medium; fixed blood smears)	US NAMRU-6; INS	Conventional and nested RT-PCR	Filovirus, paramyxovirus, flavivirus and coronavirus.	Pending	-	Peru	No

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Finalized agreement for collaboration with INS.
  - Sub-activity 1.5.2: **Communication**
    - Presented on “Biosafety procedures for handling bats for research” at the “Peruvian Symposium on Bat Taxonomy, Ecology and Conservation”
    - Presented formal reports to seven collaborating zoos on surveillance of primates conducted this quarter.

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease**
  - Survey study protocol under review by NAMRU-6’s ethics committee. The survey will be implemented at wetmarkets across northern and central Peru to characterize human behaviors and risk factors that can influence emergence of zoonotic diseases in the wildlife trade.

PREDICT Quarter 3 Year 3 Reporting

GLOBAL - US, Africa, Southeast Asia, Asia & Latin America

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building (includes infrastructure, training, coordination and systems improvements toward sustainability)**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) International, National or Regional Surveillance System Improvements
    - Workshops and trainings for ministries and government employees, including site visits to areas of intense surveillance, conducted in Cambodia, Malaysia, and Thailand.
    - Held a training workshop on laboratory biosafety for wildlife diagnostics jointly by PREDICT & IDENTIFY in Vietnam, at Hanoi University of Agriculture (HUA); presentations included participation from a representative of the Mahidol-Oxford Tropical Medicine Research Unit, Bangkok.
    - Had participation of partners from the Bangladesh Forestry Department and ICDDR,B in the EcoHealth Net training workshop on epidemiology and zoonotic disease outbreak detection and response held in Wisconsin, USA.
    - Led a wildlife disease monitoring course for Bolivian wildlife rescue centers and zoos from five cities. The course was organized in coordination with the National Secretariat for Biodiversity (DGB) and rescue centers.
    - Organized disease surveillance training in Peru co-hosted by USDA-APHIS.
    - Disseminated the World Bank publication *"People, pathogens and our planet: the economics of one health" (*published June 2012) to over 400 people, which included information obtained through the IUCN SSC Wildlife Health Specialist Group (WHSG) from wildlife health experts globally, including those representing EPT countries.
    - Finalized updates to the IUCN SSC WHSG website, which aims to expand access to

capacity-building resources for global WHSG network and the wider health and conservation communities.

- Compiled information on animal disease occurrence and mortality events in Bolivia and Peru in response to requests from WHO and IUCN.
- Contributed papers and editing support for the *"Compendium of the OIE Global Conference on Wildlife"*, which was published in May.
- In coordination with RESPOND, established the on-line network *WildHealthNet* as part of the follow-up activities for RESPOND and FAO's WILD (Wildlife Investigation, Livestock and Public Health) training programs in Southern Africa. The network intends to boost capacity and encourage participants to collaborate on regional issues related to wildlife health. The network currently has 51 participants representing 19 countries. The network will become regionally administered by the African Union Inter-African Bureau for Animal Resources (AU-IBAR) in the fall of 2012.

b) **Laboratory System Improvements**

- Began to implement and/or optimize viral family-level PCR protocols at additional laboratories including INRB (DRC), Sokoine University of Agriculture (Tanzania), VRI (Malaysia), Hanoi Agricultural University (Vietnam), ICDDR,B (Bangladesh), IPB (Indonesia), Eijkman Institute (Indonesia), Guangdong Entomological Institute (China) and Peruvian Institute of Health (Peru).
- Purchased supplies to begin training for viral family testing at National Animal Health Center (Lao PDR), RAHO6 (Vietnam), NCVD (Vietnam), Guangdong Institute of Public Health (China) and Zoonotic Disease Lab IMSS (Mexico).
- Provided equipment for surveillance and laboratory diagnostics to additional labs including Roche 454 bench-top sequencer obtained through DELIVER at IPC (Cambodia), equipment for freezer sample management at HUA RAHO6m NCVD (Vietnam), disease diagnostics for Sabah Wildlife Health Unit, and PCR machine to IBMB (Bolivia).
- Continued to provide training and support to laboratory technicians including post-doctoral fellow travelling to SUA (Tanzania) for extensive on-site training; training of lab technicians at INRB (DRC), ZDL (ROC), CHP (Cameroon), CIRMF (Gabon), and RAB (Rwanda) on sample extractions, PCR analysis, preparation of samples for sequencing, data management including storage and tracking of samples; and Bioinformatics at Chulalongkorn University (Thailand).

- Coordinated with other EPT partners including with IDENTIFY to perform a Laboratory Biosafety site visit and training for Hanoi University of Agriculture Central Veterinary Laboratory (Vietnam), Virology Workshop with CDC at Eijkman Institute (Indonesia),and training (Cameroon, Republic of Congo and DRC) funded by US Department of State (BioEngagement Program).
- Conducted trainings between PREDICT partner labs including personnel from GDEI trained at Wuhan Institute of Virology (China) and laboratory technicians from NaVRi and NAHC (Lao PDR) at Institut Pasteur du Cambodge (Cambodia) on using PREDICT protocols.
- Established relationship with the Police Institute for Technical and Scientific Research (Bolivia) to provide sequencing capacity to confirm positive results in Latin America.
- Developed real-time, on-line test result tracking in GAINS to streamline reporting of test findings to in-country government, obtaining government approvals for release of data, and movement of data to become available to partners and the public on HealthMap.
- Supported regional laboratory and diagnostic infrastructure by training three National Animal Health Center staff members from Lao PDR and two Cambodian National Veterinary Research Institute (NaVRI) staff members on viral family level screening for wildlife pathogens at Institute Pasteur Cambodia.

Table 1: Labs Receiving Assistance from PREDICT to date

	# of labs targeted for screening with desired viral families	# of labs receiving training in preparation for screening of desired viral families	# of labs that have initiated work that will eventually lead to screening desired viral families (labs with partial capacity)
Africa	7	7	5
Asia / SE Asia	17	13	9
Latin America	6	5	2
Totals	**30**	**25**	**16**

- Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
  - Began data analysis for the PREDICT Rapid Survey Update Tool for seventeen countries. The survey for Indonesia is being completed for the first time to establish the baseline capacity levels and priorities. Regional meetings in Africa and Asia are planned for July 2012, when global PREDICT staff will meet with country coordinators about past and future capacity tracking activities.
  - Preliminary analyses of PREDICT Rapid Survey Update Tool data indicated that the majority of PREDICT countries report improvements in human capacity, laboratory capacity, and overall zoonotic pathogen surveillance capabilities in wildlife over the past year. Priority actions identified by country coordinators to further improve wildlife surveillance include establishing sustainable funding/resources, increasing human capacity to conduct surveillance activities, and engaging governments and communities to educate them about zoonotic pathogens and raise awareness about surveillance for early detection of events.
  - Began development of the Rapid Survey Update Tool for Year 3 with a two part format that will allow for 1) country coordinators to track progress and change as in Year 2, and 2) for country coordinators to interview key wildlife officials to obtain perspectives external to PREDICT that are important for understanding how PREDICT is viewed and how we may best build capacity to improve wildlife surveillance for zoonotic pathogens going forward.

Table 2: PREDICT Training Results Summary by Country to date:

Country	Persons	# Women	Trainings covered various combinations of the following topics:
Asia:			
Bangladesh	**5**	**0**	Lab techniques in BSL2 lab & lab diagnostics; epidemiology and outbreak investigation; capture and sampling of rodents & bats; sample collection and GAINS system; use of GIS.
Cambodia	**61**	**10**	Core safety, animal capture, & sampling skills and protocols; data collection & management; rodent and primate ID & primate and rodent sampling.
China	**3**	**2**	Core safety, animal capture & sampling skills and protocols; sample collection, handling, and transport; wildlife restraint & anesthesia; human & animal safety; bat, rodent, and primate sampling.
India	**18**	**2**	Core safety, animal capture & sampling; laboratory safety protocols; zoonoses;

			surveillance and sampling protocols; bar-coding and data management; animal necropsies.
Indonesia	**23**	**10**	Modeling behind the PREDICT project; zoonotic diseases of bats and rodents; human and animal safety during capture; laboratory safety & PPE use; sample collection; set up for sampling bats and rodents.
Lao PDR	**65**	**17**	Core safety, animal capture, & sampling skills and protocols; data collection; PPE use; bar-coding & data management; animal necropsies; surveillance & sampling; laboratory molecular techniques.
Malaysia	**69**	**15**	Core safety protocols; PPE and biosafety, animal capture & sampling skills and protocols; bat and rodent capture, handling & sampling; laboratory skills; packing and shipping samples & cold chain; sampling strategy & data collection; bat, rodent & macaque sampling; collection of trigeminal nerve root ganglia from macaques for Herpes testing; virus extraction; bat & rodent capture; rodent retro-orbital bleed; primate sampling & human and animal safety; PRC & cloning.
Thailand	**26**	**15**	Lab and bioinformatics training; animal capture; laboratory safety; animal sampling protocols; zoonotic diseases.
Vietnam	**48**	**10+**	Core safety, animal capture & sampling skills and protocols; packing & shipping samples; barcode system; animal pathology; sample collection & data management & use of GAINS; surveillance; filter paper blood spot sampling; lab diagnostic protocols, virus family level protocols; one health & sampling strategy; sample transport & lab methods; wildlife pathology; First Aid.
Africa:			
Cameroon	**75**	**21**	Core safety, animal capture & sampling skills and protocols; specialized field sampling and laboratory skills; packing & shipping samples to reference lab; PPE use; bushmeat policy and wildlife ethics; extraction, RT-PCR, ELISA and other lab methods; lab systems; immunology and serology; ethics; pan-viral protocols; emergency preparedness and management; outbreak response training; bio-risk management; use of satellite phones; molecular biology and conventional PCR.
DRC	**18**	**3**	Core safety, animal capture & sampling skills and protocols; specialized field sampling and laboratory skills; RT-PCR, ELISA; administration and reporting; Monkeypox surveillance; sample tracking & GAINS system; ethical issues; blood spot sampling; DNA & RNA extraction from animal samples.
Gabon	**5**	**2**	Bushmeat sampling; packing & shipping samples; PPE use and biosafety; lab safety; animal capture; bat & rodent sampling; sampling for AI; animal sample collection; cold chain; lab methods, DNA extraction, PCR; sample prioritization; safe handling of liquid nitrogen; sequencing; virus isolation; RNA & RT-PCR; GAINS system & data management.
Republic of Congo	**13**	**2**	Core safety, PPE and biosafety; safe animal capture, & sampling skills and protocols; bat, rodent, and primate sampling; laboratory safety & skills; data collection; cold chain; protecting human subjects in research; virology laboratory methods.

Rwanda	**185**	**19**	Core safety, animal capture & sampling skills and protocols; PPE use and biosafety; bat, rodent, and primate capture, handling, and sampling; zoonoses; ethics and responsibilities; wildlife pathology & necropsy; sample collection & preservation; packing & shipping samples; tracking primates & health monitoring; lab personnel safety; PCR protocols & sample processing; bushmeat handling.
Tanzania	**32**	**7**	Core safety, animal capture & sampling skills and protocols; bat and rodent capture, handling & sampling; data management; laboratory safety; surveillance; information management and GAINS system; wildlife capture & restraint; emergency preparedness; ethics, cultural sensitivity & SHP; pathogen detection; extraction and PCR & protocols; cold chain.
Uganda	**29**	**9**	Core safety, animal capture & sampling skills and protocols; PPE & biosafety; laboratory safety; packing & shipping samples; bushmeat sampling; cold chain; GPS; Animal Mortality Monitoring Study; bat capture, handling & sampling; PPE & biosafety to handle dead animals.
Latin America:			
Bolivia	**162**	**73**	Core safety, animal capture, laboratory & sampling skills and protocols and zoonotic diseases; bat, rodent, and primate sampling; bushmeat sampling; molecular and parasite diagnostic methods; lab safety and methods; packing and shipping samples; wildlife management and disease management; work ethics, cultural sensitivity & SHP; managing livestock & poultry diseases; detecting zoonoses; sample collection and storage; methods of detecting Salmonella in wildlife; biostatistics.
Brazil	**32**	**17**	Core safety, animal capture, handling & sampling skills and protocols; PPE use & biosafety; bat and rodent sampling; bushmeat sampling; packing and shipping samples; cold chain; surveillance, ethics, and responsibilities; primate sampling.
Colombia	**54**	**29**	Core safety, animal capture & sampling skills and protocols; lab safety & methods; One Health; Conservation Medicine; GAINS system and data management.
Mexico	**24**	**12**	Core safety, animal capture, handling & sampling skills and protocols; lab safety & methods; PPE use & biosafety; disease modeling; animal care and use protocols; lab diagnostic techniques.
Peru	**240**	**132**	Core safety, animal capture & sampling skills and protocols; PPE use & biosafety; surveillance; zoonotic disease risks from wildlife trade and consumption; wildlife regulations, wildlife management and disease monitoring; sample collection & storage; species ID & health risks; emergency management of spider bites;safe transport of confiscated animals.
Total Trained	**1187**	**407+**	

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Conducted active surveillance activities in Bolivia, Brazil, Mexico, Peru, Bangladesh, Cambodia, China, Lao PDR, Malaysia, Indonesia, Thailand, Vietnam, Cameroon, DRC, Gabon, Republic of Congo, Rwanda, Tanzania, and Uganda.
    - Collected samples from animals at high-risk interfaces (n = 2,348), most commonly animals from sanctuaries, hunter-killed animals, those raiding crops, and animals being sold at markets.
    - Refined interface categorization and updated data records to better capture information on high-risk sampling settings.
    - Conducted planning and initiated surveillance efforts for Deep Forest Project: selected preliminary sites along the Kinabatangan River in Malaysia and met with the Sabah Wildlife Department and the Department of Health to coordinate surveillance activities and the Deep Forest Human Contact survey; conducted program planning and surveillance expeditions in Brazil; initiated rodent and bat trapping in recently deforested areas in Uganda.
    - Responded to howler monkey mortality events in Bolivia and confirmed diagnosis of yellow fever (please see below for update on data and activities provided last quarter).
    - Continued response to outbreak of undiagnosed illness in bonobos in DRC by facilitating discussions among the DRC team, the head of the sanctuary, head of INRB laboratory, Republic of Congo team, and members of the Ministry of Health on a range of topics including previous Bonobos mortality, infection control strategies, and potential disease exposure routes. The PREDICT team provided recommendations for limiting the outbreak.

- Sub-activity 1.2.2: **Summary of Surveillance Sampling and Testing:**

Table 3: PREDICT Global Surveillance Summary by Region, Taxa and Interface in GAINS:

	# of Animals sampled in Y3Q2	# of Animals sampled to date	# of Samples collected to date	# of Samples collected with at least one final test result	Total # of diagnostic tests run to date
Africa					
Bats	121	3408	17511	7511	20163
Rodents	303	2970	9642	399	918
Non-human Primates	135	3099	9609	1253	5700
Other taxa	135	4346	8625	554	888
Asia and Southeast Asia					
Bats	1177	4218	24345	35	36
Rodents	226	1666	8334	376	537
Non-human Primates	23	544	9108	63	79
Other taxa	27	1748	9479	788	981
Latin America					
Bats	136	2691	13331	0	0
Rodents	13	685	6455	11	16
Non-human Primates	41	664	5350	54	181
Other taxa	26	1516	9281	194	510
Primary Interface (all regions)					
Free-ranging	216	8745	51910	8221	22387
Hunter	543	9564	24317	1525	3056
Market	362	2126	10520	111	336
Sanctuary	68	1297	6428	767	3152
Other High-Risk interfaces	1159	5250	33535	574	1031
Unclassified	15	573	4360	40	47
TOTALS	**2363**	**27555**	**131070**	**11238**	**30009**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of new technologies**

    a) **African Region**

    - Field tested a satellite internet terminal, and two additional staff trained in its use.
    - Introduced PCR/gel purification methods to support amplicon sequencing for confirmation of positive PCR results.
    - Implemented a new protocol for tissue disruption and homogenization using motorized pestle and QiaShredder homogenization columns.
    - Expanded use of simultaneous RNA/DNA isolation protocols from wildlife samples.
    - Increased Conventional PCR testing according to PREDICT protocols, optimizing additional protocols and tested for viruses included in Universal Control #1.

    b) **South and Latin American Region**

    - Purchased laboratory supplies in the US to be used for molecular screening of priority viral families.
    - Completed quality control tests for additional priority virus protocols and finalized protocol standardization.

    c) Asian Region

    - Expanded the number of PREDICT laboratories with the universal control and completed training in pathogen discovery protocols.
    - Completed quality control tests for additional priority virus protocols and finalized protocol standardization.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Continued regional support among PREDICT countries, bolstering testing efforts in addition to capacity increasing within countries to support pathogen discovery protocols
    - Increased verification of presumptive positive samples by sequencing via international sequencing laboratories/companies, strengthening connections between PREDICT countries and institutions that perform these assays.

- Increased sample extractions and PREDICT PCR reactions, for example, in Cameroon 1,700 samples were extracted and a total of 2,942 PCR reactions were run; globally, greater than 15,000 PCR reactions were completed in PREDICT countries.
- Identified specific samples for further pathogen discovery by pyrosequencing.

Table 4: PREDICT Findings:

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bats (225)	Institute Pasteur Cambodia	RT-PCR Hemi-nested PCR hemi-nested RT-PCR Taq Man SYBR Green Sequencing	*Coronavirus,* *Astroviruses,* *Lyssaviruses,* *Paramyxoviruses* Filoviruses	coronavirus presumptive positives undergoing sequencing, astrovirus, filovirus, henipavirus negative, lyssavirus pending	Sequencing pending	Cambodia	No
Rodents (500)	Institute Pasteur Cambodia	PCR RT-PCR	*Paramyxoviruses* Hantaviruses Arenaviruses	hantavirus pending, arenaviruses and paramyxovirus negative		Cambodia	Yes
Bats (1,256)	Columbia	Family level PCR	Pan Influenza A (1200) Herpes (1200) Bocavirus (1200) Filovirus (56) Astrovirus (56) Coronavirus (56) Deep-sequencing (56)	Herpesvirus, bocavirus, astrovirus, and coronavirus presumptive positives undergoing sequencing , influenza and filovirus negative	deep-sequencing pending	Bangladesh	No

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Birds (11)	Hanoi University of Agriculture	Conventional PCR	Arenavirus, Flavivirus	negative	-	Vietnam	No
Rodents (23)	Hanoi University of Agriculture	Conventional PCR	Arenavirus, Flavivirus	negative	-	Vietnam	No
Other (45)	Hanoi University of Agriculture, WCS Pathology lab	Conventional PCR, sequencing	Arenavirus, Coronavirus, Flavivirus, Herpesvirus, Paramyxovirus	herpesvirus presumptive positives undergoing sequencing		Vietnam	No
Other (55)	Zhengli Shi	RT-PCR (PREDICT)	Astroviruses *(10);* Coronaviruses (45); Paramyxoviruses (45)	None positive	-	China	Yes
Rodents (167)	Zhengli Shi	RT-PCR (PREDICT)	Astroviruses (55); Coronaviruses (112); Paramyxoviruses (112)	None positive	-	China	Yes
Bats (546)	Predict/GVF Cameroon	PCR (predict primers)	Coronavirus (430), Filovirus (471), Hantavirus (510), Paramyxovirus (504)	Hantavirus and GBV presumptive positives sequencing ongoing	Verification pending by sequencing	Cameroon	No
Rodents (81)	Predict/GVF Cameroon	PCR (predict primers)	Alphavirus (80), Arenavirus (81), Hantavirus (76)	Negative	-	Cameroon	No
Primates (445)	Predict/GVF Cameroon	PCR (PREDICT primers); ELISA	Bocavirus (93) Filovirus (24) Paramyxo (24)	Negative	Sequence verified	Cameroon	Yes
Carnivores (9)	Predict/GVF Cameroon	PCR	HCV	Negative	-	Cameroon	Yes
Bats (43)	INRB/PREDICT	Conventional RT-PCR	Arenavirus Coronavirus Flavivirus Filovirus	Negative	-	DRC	No

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Primates (5)	INRB/PREDICT	Immuno-diffusion	*Alphavirus* Retrovirus	Exposure suspected	Chikungunya virus	DRC	No
Primates (4)	PREDICT Gabon/CIRMF	PCR (virus genus level primers)	Coronaviruses, Enteroviruses, Paramyxoviruses, Orthopoxviruses, Adenoviruses, Picornaviruses, Reoviruses, Calciviruses, Astroviruses, Filoviruses, Arenaviruses, Flaviviruses,	All Negative	Sent for deep-sequencing	Gabon	No
Rodents (262)	PREDICT Gabon/CIRMF	PCR (virus genus level primers)	Astroviruses Adenoviruses Reoviruses Caliciviruses Enteroviruses	Negative	-	Gabon	No
Primates (34)	Columbia	Family level PCR Illumina	Astrovirus Coronavirus Filovirus Flavivirus Herpesvirus Bocavirus Polyomavirus Adenovirus Enterovirus Phlebovirus Poxvirus Paramyxovirus Deep Sequencing	herpesvirus, polyomavirus, adenovirus, enterovirus presumptive positives sequencing pending	bioinformatics ongoing	Rwanda	No
Bats (777)	Columbia	Family level PCR	Coronavirus Paramyxovirus Adenovirus Filovirus	Results Pending	Results Pending	Brazil	No

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bats (of 730 samples)	IBMB-UMSA	Conventional and nested RT-PCR	Flavivirus Coronavirus Arenavirus Filovirus	Pending	Pending	Bolivia	No
Primates (of 730 samples)	IBMB-UMSA	Conventional and nested RT-PCR	Filovirus Paramyxovirus, Flavivirus Coronavirus Arenavirus (59) Flavivirus (2)	arenavirus and flavivirus suspects ongoing sequencing	Sequencing underway	Bolivia	No
Rodents (84)	IBMB-UMSA	Conventional and nested RT-PCR	Hantavirus Arenavirus Alphavirus Flavivirus	hantavirus, arenavirus, flavivirus, and alphavirus presumptive positives ongoing sequencing	Pending	Bolivia	No
Primates (315 samples)	NAMRU-6; UNMSM	Conventional and nested RT-PCR	Flavivirus; Arenavirus; Filovirus; Coronavirus	Negative	None	Peru	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Optimize surveillance data management system**
    Ongoing improvements to and optimization of GAINS.org including:
    - Added new data entry screen for new Test Results Data.
    - Developed and made available a new report for sharing test results with governments.
    - Added country level security to the site and gave Event & Test Results update screens, and update access to all GAINS users; this allows GAINS users to view & update their previously submitted data.
    - Added the ability to upload pooled specimens to Test Results templates & upload process
    - Created new GAINS Reports:

- Sample Submissions to Columbia
- Animal Sample & Specimen Counts by Event
- Animal Samples with Taxa & Storage Medium

- Sub-activity 1.4.2: **Establish global open access to database and procedure for dissemination of knowledge**
  - Purchased the software / server package Geneious, a bioinformatic tool that combines DNA and protein analysis and information.
  - Developing and testing a new XML feed to send aggregated data to Healthmap

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Attended FAO/OIE Global Conference on Foot and Mouth Disease Control in Bangkok, Thailand. Presented at the opening plenary on “The Value of Disease Surveillance in Wildlife to Inform Agricultural and Public Health Decision-making and Disease Prevention Strategies.”
    - Attended the OIE 80th General Session of the General Assembly to represent the OIE Working Group on Wildlife Diseases. Provided information on wildlife and zoonotic diseases to OIE Delegates and participants.
    - Met with OIE officials to discuss opportunities to further One Health initiatives and strengthen capacity building around wildlife disease surveillance.
    - Met with World Health Organization officials and presented on the PREDICT program to the Emerging and Dangerous Pathogens Team, Department of Communicable Diseases Surveillance and Response.
    - Updated IUCN officials on PREDICT and identified areas for further collaboration among the health and conservation sectors through the IUCN Wildlife Health Specialist Group.
    - Presented at the AAAS Biosecurity meeting on "Emerging Zoonoses: Preventing the Next Pandemic" as a mechanism to provide an explanation and update on EPT.
    - Traveled to Dar es Salaam, Tanzania and Nairobi, Kenya to meet with USAID and CDC/GDD-Kenya about east African regional activities.
    - Organized a side event at the Convention on Biological Diversity's 16th Subsidiary Body on Scientific, Technical and Technological Advice in Montreal, Canada, in which the linkages

between health and biodiversity and the importance of utilizing a One Health approach were presented.
- Discussions with World Bank Agriculture lead about the EPT program and engaging the World Bank on integration of wildlife diseases and environmental health into country level analytical tools used by the Bank, such as the OIE Professional Veterinary Services analysis tool.
- Coordinated with USAID and PREVENT collaborators on future, joint Deep Forest activities.
- Participated in American Society for Microbiology (ASM) Communications Committee meetings (at ASM Annual General Meeting, San Francisco).
- Participated in leadership activities for the Prince Mahidol Award Conference.

LOW 2: Risk Determination

- **Activity 2.1: Develop risk filter strategy**

  - Sub-activity 2.1.1: **Develop a conceptual and structural framework for Extractive Industry work**
    - Continued collaborating with the Extractive Industry Working Group (EIWG) to complete the refinement of the risk screening tools for zoonotic diseases. This quarter the working group completed two tools: a Planning Tool targeting zoonotic disease risk to planned project sites and an Audit Tool targeting zoonotic disease risk to operating projects. Both tools are accompanied by a list of mitigation options and are designed to integrate with industry standard operating procedures as defined by multi-lateral and financial institutions. The tools were shared with USAID in a planning workshop this quarter.
    - Initiated development of a third EIWG tool that will target the decommissioning phase of EI project operations.
    - Refined EIWG outreach and advocacy materials (e.g. the brochure targeting zoonoses and infectious diseases in the mining sector).
    - Participated in a biweekly EIWG teleconferences to further EIWG plans into Y3Q4 and Y4, and initiated planning through the EIWG on potential testing of the EI tools in two EPT countries in Y4: Gabon and Uganda.

- Provided the EIWG with data resources, information, and technical guidance in the development of the tools and all associated activities.
- Continued working on the sub-activity between UCD and WCS/Yale to strengthen and improve the risk science foundation for the assessment tools.
  - A draft Hazard Assessment Tool for a suite of emerging infectious diseases at the EI interface has been developed and is under review. This tool supports qualified ranking of hazards from emerging infectious diseases (emphasis on wildlife zoonoses) to the extractive industry sector and will enable users to target site and context-specific risk factors for monitoring and risk mitigation planning.

- Sub-activity 2.1.2: **Inform and integrate other relevant agencies about PREDICT strategy and successes**
  - Held the Technical Advisory Committee on April 19 in San Francisco, in conjunction with the Quarterly Meeting; the Committee was highly supportive of PREDICT's current strategies, and the advisors made several recommendations for informing and integrating other relevant agencies, including:
    - PREDICT should continue its efforts to present at appropriate meetings and to publish. Additional venues were also suggested (*e.g.*, free-standing symposia at large scientific meetings; to engage the scientific policy community, meeting each fall with the incoming class of AAAS fellows).
    - Committee members were interested in receiving PREDICT updates, both for their own information and to be able to inform other agencies and colleagues, including those in the private sector. To enhance information sharing, an Advisory Committee webpage on the PREDICT Basecamp site was created.
    - The Committee recommended continuing communications and cooperation with other partners, such as CDC; in addition to currently ongoing efforts, the recent connection with GDD appeared promising.
    - Interactions among EPT projects should be continued and strengthened, especially in order to leverage social science expertise.

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Sub-activity 2.2.1: **Refine and test geographical and temporal 'hotspot' models**
    - Began exploratory analysis of alternate proxies for reporting bias in EID data for model inputs (e.g. health services).
    - Continued analysis on occupancy modeling to predict the probability of detecting a disease outbreak.
    - Optimized methods of high performance and parallel computing to increase efficiency.
    - Explored a range of new and alternative statistical techniques to analyze EID events and create risk maps that incorporate spatial and time series attributes such as socio-economic status, anthropogenic activities, and climate.

  - Sub-activity 2.2.2: **Iteratively improve datasets**
    - Obtained, gridded, and created metadata for 200 spatial and time series datasets. These variables include socio-economic (e.g. human migration), anthropogenic activities (e.g. mining), and climate variables (temperature and precipitation variability).
    - Designed a web application for collaborative literature review of historic EID events.
    - Continued development of the platform to update the EID database.
    - Reviewed scientific literature to expand the references related to the original events in Jones et al. 2008, and commenced updating the events' list to 2012 (to be completed in Y4).
    - Commenced planning to solicit expert peer review of the events through a conclave of experts and researchers.
    - Revised and updated mammal host pathogen database from literature to include 570 host species, 406 viruses, and 1,580 host-virus associations.
    - Updated and completed bird virus database from literature that includes 533 avian host species, 70 viruses, and over 1,000 host-virus associations.

  - Sub-activity 2.2.3: **Design a 'Global Vulnerability' modeling strategy**
    - Designed and implemented new approach to analyze diagnostic results from GAINS; allows estimates of the number of new viruses that could potentially be detected in a given

species/sampling unit, should sampling continue. Similarly, it is now possible to estimate the number of samples required to identify any percentage of the estimated total number of viruses in a given species/sampling unit, effectively quantifying sampling completeness and providing guidance on when to decide to stop sampling for new viruses.

- Standardized the Deep Forest Human Contact (DFHC) survey approach in collaboration with PREVENT to assess and quantify human-wildlife contact rates across a disturbance gradient.
- Built Generalized Linear Models to predict spillover risk of viruses known in mammals using both host and virus traits from mammal host-pathogen database.

LOW 3: Outbreak Response Capacity Building

Howler Monkey Deaths in Bolivia	
Background	From the beginning of March to April 03, 2012, five red howler monkeys (*Alouatta seniculus*) were found dead in a Wildlife Refuge Park ("Ambue Ari") in the surroundings of Guarayos (Department of Santa Cruz). PREDICT was informed and asked to collaborate in the investigation.
Investigation	No clinical signs were reported in animals or humans in the affected area, except for the deaths. Carcasses of two monkeys were shipped by local veterinarians to the Municipal Zoo for necropsy. PREDICT staff performed post-mortem examinations and found diffuse hemorrhages and petechiae on different organs (mainly the liver), splenomegaly, enlarged lymphatic nodes, and kidney congestion.
	Liver tissue samples were submitted to the Institute of Molecular Biology (IBMB, University of San Andres) for flavivirus and arenavirus testing. Liver formalin-preserved samples were submitted for histopathology to La Paz Military Hospital (COSSMIL).
	Flavivirus infections were confirmed in both individuals at IBMB laboratory (by RT-PCR), and further studies were conducted at the Bolivian Reference Center for Tropical Diseases (CENETROP). Final sequencing of the flavivirus positives was conducted at the IITCUP (Instituto de Investigaciones Técnico-Científicas de la UNIPOL, Policía Boliviana). Results were made available on June 5th, showing over 95% identity with yellow fever virus. Additional sequence analysis was conducted through the PREDICT Pathogen Discovery team to investigate strain type.

Collaboration	On April 05, 2012, PREDICT communicated the event and laboratory findings to the Ministry of Public Health and PAHO Bolivia. PREDICT was requested by the Ministry of Public Health to become involved in discussions regarding outbreak response activities in Santa Cruz. Specific disease control measures were adopted, including human vaccination campaign, reduction of mosquito populations, field investigations on monkeys and humans, and education/awareness campaigns.

AFRICA

CAMEROON

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Signed a Memorandum of Understanding with the Ministry of Livestock, Fishery and Animal Industries (MINEPIA).

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    b) **Laboratory System Improvements**
    - Trained local commercial contractors in operation and basic maintenance of the liquid nitrogen production plant.
    - Trained lab technicians on: DNA/RNA extractions from tissues; use of pestle and QiaShredder for tissue disruption and tissue homogenization prior to nucleic acid extraction; PCR purification methods for gene sequencing for confirmation of positive PCR results and phylogenetic analysis.
    - Attended a training led by Minister of Public Health and funded by US Department of State (BioEngagement Program), organized by PREDICT partners; training covered laboratory bio-risk management, and was attended by participants from multiple countries in Central Africa including Democratic Republic of the Congo, Central Africa Republic, Chad, Republic of Congo, Gabon and Cameroon.
    - Participated in a three-day workshop organized by UC Los Angeles/CTR and Sandia labs on biosafety risk assessment, biosafety risk mitigation, PPE and biological waste disposal.
    - Trained six Master's degree students from the Higher Institute of Medical Technology (ISTM), Yaoundé, on viral zoonoses of non-human primates, PCR, waste management, facilities and equipment maintenance, commercial ELISA, One Heath approach, PPE, and sample storage.
    - Introduced PCR/gel purification methods to support amplicon sequencing for confirmation of

positive PCR results.
- Implemented a new protocol for tissue disruption and homogenization using motorized pestle and QiaShredder homogenization columns.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Collected samples from 20 primates at Limbe Wildlife Sanctuary, Mvog-Beti Zoo and Mefou National Park, yielding 62 samples.
    - Collected samples from 256 animals in Ngoila, East Region, where there are high levels of hunting and population movements related to iron ore exploration.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Cameroon	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	333	3045	0	0	131	140	7	567
Hunter	289	1000	0	0	218	238	27	589
Other High Risk Interfaces	6	9	0	0	5	5	0	13
Rodents								
Free-ranging	108	992	0	0	56	56	0	172
Hunter	846	1220	0	0	102	102	0	144
Primates								
Free-ranging	141	8	134	0	0	0	0	0
Hunter	696	1021	0	0	28	28	3	71
Sanctuary	884	4519	0	0	550	630	120	2763
Other taxa (including humans)								

Free-ranging	128	458	0	0	3	3	0	3
Hunter	2368	2625	0	0	65	65	0	128
Sanctuary	67	250	0	0	30	30	0	30
Other High Risk Interfaces	1	9	0	0	0	0	0	0
TOTALS	**5867**	**15156**	**134**	**0**	**1188**	**1297**	**157**	**4480**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Acquired a satellite Internet terminal for field work and outbreak investigations; field tested the terminal and trained two additional staff members on its use.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Extracted 1,700 samples.
    - Ran a total of 3,740 PCR reactions.
    - Obtained sequence results for putative positive samples to confirm positive results; interpretation for these samples is complete, and some of the material will now be used to characterize new viral strains, work that is currently in progress in collaboration with US CDC.

PREDICT Findings (Y3Q3):

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Bats (490)	Predict/GVF Cameroon	PCR (predict primers)	Coronavirus (430) Filovirus (432) Hantavirus (510) Paramyxovirus (504)	Hantavirus (14 presumptive positive and 8 indeterminate) Paramyxovirus (7 indeterminate)	Sequence underway	Cameroon	No
Primates (116)	Predict/GVF Cameroon	PCR (predict primers)	Bocavirus (93), Filovirus (24), Paramyxovirus (24)	Negative	-	Cameroon	No

Rodents (64)	Predict/GVF Cameroon	PCR (predict primers)	Alphavirus (63) Arenavirus (64) Hantavirus 60	Negative	-	Cameroon	No
Shrews (17)	Predict/GVF Cameroon	PCR (predict primers)	Alphavirus (17) Arenavirus (17) Hantavirus (16)	Negative	-	Cameroon	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Completed updates in GAINS to PCR positive results where samples have been sent for sequencing and verification results received.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Attended a two-day workshop organized by IDENTIFY (FAO) on the prevention and control of rabies in Cameroon; participants included those working in both public health and livestock; objective was to improve collaboration between key partners in the prevention and management of zoonotic diseases; findings and recommendations were shared with the Ministry of Public Health and MINEPIA
    - Held a meeting with the Memvele Hydro Project management team; this team oversees the contract with Sinohydro Corporation Limited to construct a 200MW hydropower plant; PREDICT discussed potential for collaborations at the project site for sample collection.

LOW 3: Outbreak Response Capacity Building

Trained staff on Zoonotic Disease Outbreaks using the PREDICT Guide for Providing Assistance During a Zoonotic Disease Outbreak.

DEMOCRATIC REPUBLIC OF CONGO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    b) **Laboratory System Improvements**
    - Performed optimization of PREDICT viral family PCR methods and tested samples according to PREDICT protocols.
    - Drafted clear protocols in French specific for reagents and equipment present in the DRC laboratory.
    - Trained two laboratory technicians, one PREDICT staff and one from the INRB in molecular biology techniques, including preparation of PCR mix, preparation of template DNA/RNA, programming of PCR machines for performing conventional RT-PCR and PCR amplifications.
    - Completed simultaneous DNA and RNA extractions from tissue samples using AllPrep DNA/RNA Mini Kit.
    - Developed plans for an electrical back-up system to protect equipment from electrical failure.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Incorporated 3 new sites into our wildlife surveillance plan, in cooperation with the Institut Congolais pour la Conservation de la Nature (ICCN): Central Zoo of Kinshasa, N'Sele Park, and Mona Paradis Touristic Site.
    - Signed a MOU with the University of Kisangani, to add Kisangani in the Oriental Province and Lubumbashi in the Katanga Province as sample collection sites.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

DRC	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	69	671	0	0	43	178		178
Hunter	9	0	50	0	0	0	0	0
Other High Risk Interfaces	29	160	0	152	0	0	0	0
Rodents								
Free-ranging	5	94	0	0	0	0	0	0
Hunter	775	0	2446	0	4	4	0	9
Primates								
Free-ranging	4	74	0	0	0	0	0	0
Hunter	594	0	1045	0	257	257	0	745
Sanctuary	94	575	0	217	39	39	0	107
Other High Risk Interfaces	28	290	0	0	0	0	0	0
Other taxa (including humans)								
Free-ranging	3	59	0	0	0	0	0	0
Hunter	633	0	863	0	7	7	0	23
Other High Risk Interfaces	4	41	0	0	0	0	0	0
TOTALS	**2247**	**1964**	**4404**	**369**	**350**	**485**	**0**	**1062**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**

PREDICT Findings (Y3Q3):

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bats (43)	INRB/PREDICT	Conventional RT-PCR	Arenavirus	Negative	---	DRC	No
Bats (43)	INRB/PREDICT	Conventional RT-PCR	Coronavirus	Negative	---	DRC	No
Bats (43)	INRB/PREDICT	Conventional RT-PCR	Flavivirus	Negative	---	DRC	No
Bats (43)	INRB/PREDICT	Conventional RT-PCR	Filovirus	Negative	---	DRC	No
Bonobo (1)	INRB/PREDICT	Immunodiffusion	Alphavirus	Presumptive positive	---	DRC	No
Papio cynocephalus (1)	INRB/PREDICT	Immunodiffusion	Retrovirus	Presumptive positive	---	DRC	No

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Participated in monthly meetings with EPT partners (RESPOND and WHO) and other partner organizations (CDC and USAID health projects) to discuss ways to improve coordination, and maximize opportunities between projects.
    - Obtained exemption documents for taxes, customs, etc. with help from the USAID Mission.

LOW 3: Outbreak Response Capacity Building

Assisted the Lola ya Bonobo sanctuary in the investigation of an outbreak of an unidentified illness that was responsible for the death of 4 bonobos (*Pan Paniscus*) in the sanctuary nursery over a 3-month period; worked collaboratively with local veterinarians from RESPOND and the local INRB to assess the situation, and at the request of the sanctuary Director, worked with PREDICT Republic of Congo to evaluate the sick and deceased bonobos, collect biological samples and arrange for permits, shipping, and testing at two collaborative laboratories to determine the cause of the outbreak with

advanced pathogen discovery techniques at CIRMF in Gabon and Columbia University (USA);final results are pending.

GABON

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **Laboratory System Improvements**
    - Trained two laboratory scientists on rodent capture and sampling, isolation of viral RNA and DNA, and RT-PCR analysis.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Expanded wildlife sampling to an area of new road incursion into a forested area.
    - Assisted the Ministry of Health (MoH) with data collection from provinces and district health officers, serving as a reference center and supporting diagnostics on collected samples.
    -

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Gabon	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free ranging	1293	7612	0	0	1834	7093	0	18806

Rodents								
Free ranging	193	20	0	0	189	220	0	517
Other high risk interface	122	610	0	0	0	0	0	0
Primates								
Other high risk interface	3	15	0	0	0	0	0	0
Other taxa (including humans)								
Free ranging	372	370	0	0	372	372	0	374
Other high risk interface	19	95	0	0	0	0	0	0
TOTALS	**2002**	**8722**	**0**	**0**	**2395**	**7685**	**0**	**19697**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Extracted more than 300 samples
    - Ran a total of 1,366 PCR reactions.
    - Identified specific samples for further pathogen discovery by pyrosequencing.

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Primates (4)	PREDICT Gabon/CIRMF	PCR (virus genus level primers)	Coronaviruses, Enteroviruses, Paramyxoviruses, Orthopoxviruses, Adenoviruses, Picornaviruses, Reoviruses, Calciviruses, Astroviruses, Filoviruses, Arenaviruses, Flaviviruses	All Negative	Sent for deep-sequencing	Gabon	No
Rodents (262)	PREDICT Gabon/CIRMF	PCR (virus genus level primers)	Astroviruses, Adenoviruses, Reoviruses, Caliciviruses, Enteroviruses	All Negative	-	Gabon	No

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.2: **Communication**
    - Presented PREDICT project and its practical implications to the Governor and the Mayor of Makokou, and participated in radio and journal interviews to raise local awareness for the project.

LOW 3: Outbreak Response Capacity Building

Supported diagnostic testing during an outbreak at the Lola ya Bonobo sanctuary in Kinshasa, Democratic Republic of the Congo: screened samples for 35 different priority viral families and known zoonotic viruses; all samples tested negative except for one fecal sample positive for a virus not likely to be causative of observed clinical signs.

REPUBLIC OF CONGO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Extended the cold chain system for samples collected at hunter and free-ranging interfaces to the national level, including improved transport allowing RNALater™-preserved samples to reach -80 storage within 2-7 days of collection.
    - Attended the signing of an MOU at the invitation of the Congolese General Directorate of Scientific and Technical Research (DGRST) and U.S. National Institutes of Health, National Institutes of Allergic and Infectious Diseases (NIH/NIAID); which will facilitate stronger collaboration, including support for PREDICT in-country laboratory capacity development.

    b) **Laboratory System Improvements**
    - Trained laboratory technician in tissue and serum RNA extraction and cold chain

management.
- Improved coordination of PREDICT sample shipment between DRC and RoC.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Collected 1,898 samples from 158 bats and 468 samples from 45 rodents.
    - Collected 749 samples from 80 free-ranging primates, rodents and other wildlife at the hunter interface.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Republic of Congo	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	294	1769	55	0	13	19	0	76
Other high-risk interfaces	11	0	3	0	0	0	0	0
Rodents								
Free-ranging	103	0	158	0	5	17	0	76
Hunter	29	174	0	0	0	0	0	0
Market	6	51	0	0	0	0	0	0
Other high-risk interfaces	33	0	1	0	0	0	0	0
Unclassified	17	0	101	0	0	0	0	0
Primates								
Free-ranging	168	172	14	0	166	166	0	1018

Hunter	63	248	61	0	0	0	0	0
Market	30	278	0	0	0	0	0	0
Other taxa (including humans)								
Free-ranging	38	0	106	0	12	57	0	238
Hunter	184	893	79	0	12	16	0	64
Market	108	946	0	0	0	0	0	0
Other high-risk interfaces	13	0	15	0	0	0	0	0
Unclassified	1	0	6	0	0	0	0	0
TOTALS	**1098**	**4531**	**599**	**0**	**208**	**275**	**0**	**1472**

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Improved in-country sample data management systems, including sample location mapping and revised data entry protocols.
    - Trained laboratory manager and staff members on data management, sample storage and tracking.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Instituted weekly meetings to review progress on sample collection and testing, cold-chain and sample management, and any potential challenges to PREDICT activities.

LOW 3: Outbreak Response Capacity Building

Provided assistance to PREDICT Democratic Republic of the Congo (DRC) in the investigation of a disease outbreak among captive wild bonobos (*Pan paniscus*) and their close human contacts in Kinshasa, DRC. Facilitated rapid export of bonobo samples to Columbia University laboratory for molecular diagnostics under WCS CITES and PHS (CDC) import permits.

RWANDA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) National or Regional Surveillance System Improvements
    - Continued close coordination with Rwanda Development Board, Kigali city authorities and park concessionaires to incorporate zoonotic pathogen surveillance into planned primate (baboon, vervet) depredation and bat sampling.
    - Trained Umutara Polytechnic University senior-year veterinary students on primate sampling protocols; opened discussions with veterinary school dean to incorporate One Health principles and surveillance protocols into senior-year veterinary curriculum.

    b) **Laboratory System Improvements**
    - Wildlife virology laboratory technician continued to practice diagnostic testing protocols.
    - Established procurement process for successful acquisition of laboratory supplies from a regional supplier.
    - Tested protocol and equipment for transferring wildlife samples across the Uganda /Rwanda border for viral family testing at regional laboratory (Makerere University Walter Reed Project) in Kampala, Uganda.
    - Received laboratory supplies from USAID/DELIVER.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Obtained samples from 14 baboons at high-risk interfaces (crop-raiding; proximity to/entrance of human dwellings) outside Akagera National Park.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Rwanda	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Hunted	3	6	0	0	3	6	0	42
Other high risk	80	368	0	0	0	0	0	0
Rodents								
Other high risk	264	0	437	0	0	0	0	0
Primates								
Free-ranging	46	0	337	0	29	60	0	383
Hunted	10	44	0	0	10	44	0	309
Other high risk	50	118	281	0	8	18	0	72
Sanctuary	2	39	0	0	1	4	0	16
Other taxa (including humans)								
Free-ranging	2	0	4	0	1	2	0	14
Hunted	2	8	0	0	1	2	0	14
Other high risk	122	106	103	0	0	0	0	0
TOTALS	**581**	**689**	**1,162**	**0**	**53**	**136**	**0**	**850**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery:**

PREDICT Findings (Y3Q3):

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Non-human primate (47)	California National Primate Research Center	Serology	Measles Virus	10 positive	-	Rwanda	Y

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Non-human primate (47)	California National Primate Research Center	Serology	Simian Foamy Virus	3 positive	-	Rwanda	Y
Non-human primate (47)	California National Primate Research Center	Serology	Lymphocryptovirus	47 positive	-	Rwanda	Y
Non-human primate (47)	California National Primate Research Center	Serology	Human T-lymphotropic Virus	2 positive	-	Rwanda	Y
Non-human primate (47)	California National Primate Research Center	Serology	Simian Retrovirus	1 positive	-	Rwanda	Y
Non-human primate (47)	California National Primate Research Center	Serology	Simian Immunodeficiency Virus	Negative	-	Rwanda	Y
Non-human primate (47)	California National Primate Research Center	Serology	Rhesus Rhadinovirus	1 positive	-	Rwanda	Y
Non-human primate (47)	California National Primate Research Center	Serology	Varicella	Negative	-	Rwanda	Y
Non-human primate (47)	Focus Diagnostics, Inc. (Cypress, CA)	Serology	Dengue Fever Virus	4 positive	-	Rwanda	Y
Non-human primate (47)	Focus Diagnostics, Inc. (Cypress, CA)	Serology	West Nile Virus	5 positive	-	Rwanda	Y

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Non-human primate (47)	Focus Diagnostics, Inc. (Cypress, CA)	Serology	Hantavirus	1 positive	-	Rwanda	Y
Non-human primate (47)	Focus Diagnostics, Inc. (Cypress, CA)	Serology	Parainfluenza 1,2, & 3	Negative		Rwanda	Y
Non-human primate (47)	Focus Diagnostics, Inc. (Cypress, CA)	Serology	Influenza A & B	Negative		Rwanda	Y
Non-human primate (47)	Focus Diagnostics, Inc. (Cypress, CA)	Serology	Respiratory Syncitial Virus	Negative		Rwanda	Y

TANZANIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Discussed potential collaborations between PREDICT and CDC Global Disease Detection division in current and Y4 active surveillance activities in meetings in Dar es Salaam, Tanzania and Nairobi, Kenya.
    - Met with Ruaha National Park warden to strengthen collaboration between PREDICT and Tanzania National Parks to enhance wildlife surveillance.
    - Obtained training for staff in safe capture, handling, and sampling of non-human primates with the PREDICT Rwanda team.
    - Trained staff in Good Clinical Practices for Research at the National Institute for Medical

Research (NIMR).
- Developed a primate training guide and training videos for non-human primate capture and sampling.

b) **Laboratory System Improvements**
- Continued training and mentorship laboratory personnel on lab safety, specimen transport, nucleic acid extraction techniques, and arenavirus testing.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Filed application for wildlife sampling permit renewal from Tanzania Wildlife Research Institute.
    - Sampled 69 bats and 102 rodents in the Ruaha ecosystem.
    - Collected bushmeat samples from 27 animals in villages surrounding Ruaha ecosystem and prioritized specimens for viral family level testing
    - Generated a country-wide surveillance planning map to identify remaining critical interfaces for Y3 and Y4 active surveillance.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Tanzania	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Other high risk interface	80	454	0	0	0	0	0	11
Rodents								
Hunter	6	0	36	0	0	0	0	0
Other high risk interfaces	312	1842	0	0	0	0	0	127

Primates								
Hunter	16	0	81	0	0	0	0	0
Other taxa (including humans)								
-Hunter	214	0	1106	0	0	0	0	0
Other high risk interfaces	5	23	0	0	0	0	0	2
TOTALS	**633**	**2319**	**1223**	**0**	**0**	**0**	**0**	**138**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Conducted PCR testing for arenaviruses on oropharyngeal swabs from 217 rodents sampled during dry season; initiated RNA extractions from oropharyngeal and rectal swabs from rodents sampled during the wet season.
    - Initiated a pilot study comparing viruses detected in rectal and oropharyngeal swab specimens from a subset of rodents captured at the peri-domestic interface.
    - Shipped 100 bat and rodent oropharyngeal swab specimens to the Makerere University Walter Reed Project laboratory in Uganda for viral family-level testing and repeat testing for arenaviruses for laboratory quality control purposes.
    - Transported post-PCR products from 5 arenavirus presumptive positive specimens (rodent oropharyngeal swabs) to the UC Davis laboratory for confirmatory testing.

PREDICT Findings (Y3Q3):

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Rodents (140)	Sokoine University of Agriculture	Conventional PCR	Arenaviruses	Presumptive positives for arenavirus	Sequence confirmation pending	Tanzania	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1:**Surveillance Data Management**
    - Improved in-country sample tracking and management system between the field and lab teams through use of standardized priority specimen tracking forms shared through DropBox.
    - Tested the GAINS results template to refine the laboratory reporting system.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Hosted CDC Tanzania at Sokoine University of Agriculture; the team toured the laboratory facility to evaluate capacity for future collaborations.

UGANDA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **International, National or Regional Surveillance System Improvements**
    - Helped conduct the first dry-run test of methods for shipping extracted wildlife samples from Tanzania for viral family testing at Makerere University Walter Reed Project (MUWRP) Laboratory, to establish MUWRP as regional diagnostic laboratory for emerging wildlife pathogen testing; then received first shipment of samples from Tanzania.
    - Co-located laboratory and office in the Wild Animal Resource Management unit of Makerere University's School of Veterinary Medicine in Uganda.

    b) **Laboratory System Improvements**
    - Worked with MUWRP to identify a high-volume supplier of laboratory supplies to reduce

costs and improve MUWRP's efficiency for high-volume through-put of samples.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Conducted site selection and started wildlife sampling activities for the Deep Forest pathogen emergence modeling project in Bwindi –Mgahina Conservation Area: sampled 80 rodents and collected 662 samples.
    - Obtained 510 specimens from 34 fruit bats at a high-risk interface (peridomestic) in Kampala.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Uganda	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Other high risk interface	30	446	0	0	0	0	0	0
Rodents								
Hunted	13	0	0	207	0	0	0	0
Other high risk interface	61	224	0	0	0	0	0	0
Primates								
Free-ranging	10	0	71	0	4	7	0	45
Other high risk interface	319	36	357	0	3	8	0	56
Other taxa (including humans)								
Free-ranging	38	303	0	0	0	0	0	0
Hunted	19	0	6	74	0	0	0	0
Other high risk interface	22	144	18	0	0	0	0	0
TOTALS	**512**	**1,153**	**452**	**281**	**7**	**15**	**0**	**101**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Continued deployment of cell-phone based Animal Mortality Monitoring Program at 20 outposts both inside Queen Elizabeth National Park and at outposts in park border communities: 96 mortality events reported including 13 bats, 5 non-human primates, 2 rodents, and 72 other animals.

SOUTHEAST ASIA

CAMBODIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **International, National or Regional Surveillance System Improvements**
    - One NaVRI technical staff member joined PREDICT for wildlife surveillance work in the field.
    - Three NaVRI staff members participated in PREDICT-PREVENT training in quantitative surveys of wild meat consumption; surveys to inform future animal sampling work.
    - Trained four forestry rangers in Mondulkiri Province in sample collection, zoonoses and PPE protocols.

    b) **Laboratory System Improvements**
    - In-country partner Institut Pasteur du Cambodia (IPC) trained two laboratory technicians from NaVRI on viral family screening of PREDICT samples with the goal to transfer a portion of viral family screening to NaVRI in Year 4.
    - Installed Roche™ 454 sequencer at IPC; scheduled Roche training for next quarter.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Obtained approval from six village chiefs to sample hunted wildlife in protected area in Northern Cambodia.
    - Obtained approval from commune leaders and village chiefs in Preah Vihear and Banteay Meanchey Province to conduct future surveys and sample collection from wildlife hunted by their communities.

- Identified consumer and hunting households in three Phnong ethnic minority villages in protected area in Mondulkiri Province through quantitative surveys, and obtained approval from these households for future sampling of wildlife hunted for consumption.
- Conducted sampling of bats at local restaurants selling large numbers of bats for human consumption daily.
- Conducted sampling of primates being traded for food and medicinal purposes at local markets.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Cambodia	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	237	237	0	0	0	0	0	0
Hunter	698	345	1438	0	0	0	0	0
Other High Risk Interfaces	347	0	595	0	0	0	0	0
Rodents								
Free-ranging	10	10	0	0	0	0	0	0
Hunter	94	0	541	0	0	0	0	0
Primates								
Hunter	14	0	27	0	0	0	0	0
Market	12	0	12	0	0	0	0	0
Sanctuary	8	0	51	0	0	0	0	0
Other taxa (including humans)								
Hunter	349	0	708	0	327	654	0	654
Market	2	0	2	0	0	0	0	0
TOTALS	**1771**	**592**	**3374**	**0**	**327**	**654**	**0**	**654**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**

PREDICT Findings (Y3Q3):

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Bats (29)	Institute Pasteur Cambodia	Sequencing	Coronavirus, Astroviruses, Lyssaviruses, Paramyxoviruses	Pending		Cambodia	NO

INDONESIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Presented at the joint conference of Asia-Pacific Bio-safety Association and Indonesian Bio-Risk Association in Nusa Dua, Bali, on “Bio-Safety Issues in Field Research Related to Pathogen Surveillance and Identification.”
    - Presented seminar at Virology Laboratory Workshop at Eijkman Institute for Molecular Biology, Jakarta, on “Zoonoses of Bats, Rodents and Primates.”

b) **Laboratory Improvements**

- Obtained reagents and supplies to perform viral family-level PCR protocols at Institut Pertanian Bogor Primate Research Center (PRC-IPB).
- Propagated the PREDICT Universal Positive Control into plasmid system.
- Optimized the laboratory PCR system virus family-level testing using 27 primers for amplification of five virus families; validated PCR assays with propagated PREDICT Universal Positive Control.
- Finalized strategy and identified high-quality archived samples from nonhuman primates from Bali to be screened for priority viral families.
- Procured reagents and consumables for the testing of specimens collected from humans with undiagnosed febrile illness from Bandung, Indonesia using viral family-level PCR protocols for flaviruses, alphaviruses, coronaviruses, henipaviruses, filoviruses.
- Conducted hands-on training on molecular, serologic, and virus isolation techniques at the Eijkman Institute in collaboration with CDC; training was attended by 24 laboratory technicians from all over Indonesia.
- Obtained personal protective equipment (PPE) and other supplies through DELIVER.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Finalized strategy and obtained permission from LIPI, for collecting urine, fecal, and dropped food samples from bats roosting in trees within the Bogor Botanical Garden.
    - Finalized logistics for collecting bat and rodent specimens from Tinjil Island.
    - Performed exploratory site visit to Tangerang Provincial Hospital to meet with the Chief of the Hospital Laboratory with CDC staff to discuss potential collaboration on human fever studies (fever with rash, hemorrhagic manifestations, or encephalitis) to obtain samples from individuals with elevated risk of zoonotic infections for viral family testing.

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Shared first generation Universal Positive Control with Eijkman Institute.

LAOS

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Conducted training workshop on "Surveillance for Emerging Zoonotic Diseases" for provincial forestry and agriculture staff government staff.
    - Trained two National Animal Health Centre (NAHC) staff on biosecurity, sample collection, sample storage in liquid nitrogen, data entry and wildlife species identification.

    b) **Laboratory Improvements**
    - Sent three National Animal Health Centre (NAHC) laboratory staff for training at Institut Pasteur Cambodia on viral family PCR testing protocols.
    - Made arrangements for NAHC laboratory staff member to attend a Biological Safety Cabinet and Laboratory Fume Hood training.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Sampled wildlife at 11 markets in seven provinces.
    - Trained two NAHC staff members on survey techniques to assess wildlife-human interfaces in villages.
    - Conducted sample collection from subsistence hunted animals in an ethnic village.
    - Sampled a total of 416 animals.

Summary of Surveillance Activities and Testing in GAINS to date:

Laos	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Hunter	110	0	271	0	0	0	0	0
Market	632	216	2325	0	0	0	0	0
Other High Risk Interfaces	6	0	26	0	0	0	0	0
Rodents								
Hunter	377	0	1475	0	0	0	0	0
Market	701	385	2480	0	0	0	0	0
Other High Risk Interfaces	3	0	18	0	0	0	0	0
Primates								
Market	6	7	16	0	0	0	0	0
Other taxa (including humans)								
Hunter	56	0	149	0	0	0	0	0
Market	115	135	339	0	0	0	0	0
Other High Risk Interfaces	1	0	2	0	0	0	0	0
TOTALS	**2007**	**743**	**7101**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Transferred 630 wildlife samples to Institut Pasteur Cambodia (IPC) for viral family screening.
    - Shipped 44 bat samples to IPC for sequencing to confirm samples testing PCR positive for priority viral families.

PREDICT Findings (Y3Q3):

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bats (Chiroptera) (44)	Institut Pasteur du Cambodge Institut Pasteur du Cambodia	Sequence confirmation	Coronaviruses, Astroviruses	Pending		Laos, Country of testing - Cambodia	NA

MALAYSIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Conducted two training sessions in Sabah for 33 participants including staff from Sabah Wildlife Department (SWD), Wildlife Rescue Unit, WWF Malaysia, Danau Girang Field Centre and Institute for Tropical Biodiversity and Conservation, University of Malaysia Sabah on PREDICT protocols for Bio-safety and Animal Capture.
    - Continued discussions with Universiti Kebangsaan Malaysia, a participant in the RESPOND One Health Network, regarding training students from the Faculty of Health Sciences at NPHL or VRI.

    b) **Laboratory System Improvements**
    - Finalized agreement and Standard Operating Procedures (SOPs) with PERHILITAN and DVS for transfer of wildlife samples from PERHILITAN to VRI for screening.
    - Assisted VRI to set up BSL-2 laboratory for sample preparation, extraction and testing of

wildlife samples.
- Continued developing protocols for managing laboratory, samples and work flow at PERHILITAN and VRI.
- Conducted a second training session for 8 technicians on using the EasyMAG™ extraction robot at VRI.
- Modified lab plan for SWD with input from IDENTIFY.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Finalized field plans for Sabah Wildlife Health Unit
    - Began advertising to fill microbiologist and veterinarian positions.
    - Performed site visits and began selecting sites for Deep Forest Project along the Kinabatangan River and at the Tabin Forest Reserve in Sabah.
    - Began sampling primates at sites along the Kinabatangan River.
    - Received IRB approval for amendments and modifications made to consent forms and protocols for human sampling; carried out first site visit to six villages in Orang Asli Communities in Kula Kangsar Perak, PREDICT team was well received by village elders and the community.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Malaysia	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	19	199	0	0	0	0	0	0
Other High Risk	113	582	681	0	0	0	0	0

Interfaces								
Rodents								
Free-ranging	63	171	558	0	0	0	0	0
Other High Risk Interfaces	46	373	147	0	0	0	0	0
Sanctuary	4	0	38	0	0	0	0	0
Unclassified	2	0	28	0	0	0	0	0
Primates								
Free-ranging	29	0	460	0	15	25	0	0
Other High Risk Interfaces	362	44	6593	0	25	38	0	0
Sanctuary	5	28	0	0	0	0	0	0
Unclassified	104	0	1810	0	0	0	0	0
Other taxa (including humans)								
Free-ranging	8	17	92	0	0	0	0	0
Other High Risk Interfaces	396	45	3881	0	0	0	0	0
Sanctuary	12	0	115	0	0	0	0	0
Unclassified	25	0	16	0	23	40	0	0
TOTALS	**1188**	**1459**	**14419**	**0**	**63**	**103**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Provided PREDICT Universal Positive Control to VRI.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Transferred first set of wildlife samples and PREDICT Universal Control from PERHILITAN to VRI; samples currently being screened jointly by PREDICT and PERHILITAN personnel.
    - Extracted 1500 urine, throat and rectal samples using the EasyMAG extraction robot to be screened for priority viral families

- **Activity 1.4: Sample Tracking and Information Management**

- Sub-activity 1.4.1: **Surveillance Data Management**
  - Entered samples collected and tested into GAINS database.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Informed Department of Health Sabah (DOHS) of planned PREDICT and PREVENT activities in Sabah; DOHS agreed to provide assistance with the DFHC survey.
    - Communicated with RESPOND to discuss PREDICT/RESPOND collaborations in Malaysia to provide epidemiology and outbreak response training to staff from MOH, DVS and PERHILITAN.
    - Continued communication and coordination with Zoonosis Technical Working Committee covering all activities on Peninsular Malaysia.

THAILAND

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **National or Regional Surveillance System Improvements**
    - Participated in “Second Regional Workshop on Collaboration Between Human and Animal Health Sectors on Zoonoses Prevention and Control” in Chiang Mai, organized by FAO/OIE/WHO.
    - Presented on “Bat urine collection in the field” for veterinarians during the "Veterinary Field Epidemiology in Action" workshop organized by DLD/FAO/OIE/USAID.
    - Presented “Climate Change and Health Impacts” and “Zoonoses of Concern in the Region – Panel of experts: Rabies and Nipah Viruses“ in “Training Workshops on Zoonoses and Public Health Response in Savannakhet, Lao PDR”, organized by Kenan Institute Asia and USAID.

b) **Laboratory Improvements**

- Presented training lecture on Lyssavirus Diagnostics to the Ministry of Public Health.

- **Activity 1.2 Surveillance**

Summary of Surveillance Activities and Testing in GAINS to date:

Thailand	Total # of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	36	36	0	0	22	22	0	22
Ecotourism	146	146	0	0	0	0	0	0
Rodents								
Free-ranging	3	3	0	0	3	3	0	3
Ecotourism	4	4	0	0	0	0	0	0
Primates								
N/A	0	0	0	0	0	0	0	0
Other taxa								
Free-ranging	1	1	0	0	1	1	0	1
TOTALS	**190**	**190**	**0**	**0**	**26**	**26**	**0**	**26**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Performed PCR screening for coronaviruses on archived specimens.
    - Performed nucleic acid library preparation on wildlife specimens using Roche 454 Jr. to optimize protocols for viral discovery using next-generation sequencing.

- Continued to optimize viral family-level PCR protocols, specifically comparing three coronavirus PCR protocols, to improve the sensitivity and specificity of these assays on wildlife specimens.

PREDICT Findings (Y3Q3):

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bat (69)	WHO-CC Chula	PCR	Coronaviruses	Confirmation of Results Pending	-	Thailand	No

.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Presented on “Climate change and emerging infectious diseases” at Thai Red Cross Society Nurse College in Bangkok.
    - Presented on “Emerging infectious diseases from flood water” at Ministry of Science Thailand in Bangkok.
    - Attended “Inception Workshop on Partnership of Global Animal Health and Biosecurity Initiatives” in Bangkok organized by FAO and Department of Agriculture, Fisheries and Forestry, Australia.
    - Attended International Conference for Veterinary Services 2010: Asia Web for World Food Security in Bangkok organized by FAO and ASEAN. and presented "One Health in Motion: Models for One Health Practices"
    - Attended Second Thailand National One Health Forum “Strengthen the network and let’s move forward” organized by RESPOND.

VIETNAM

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **International, National or Regional Surveillance System Improvements**
    - Presented on One Health concept, human health risks of the wildlife trade as a significant wildlife/human interface in Vietnam, and PREDICT surveillance to 38 government staff from nine governmental departments (Customs, Environmental Police, Market Control, Legislative department, Nature Conservation, Forest Protection, Border Security, Mobile Rangers, and National Parks of Ha Tinh and Quang Binh Provinces, Central Vietnam).
    - Continued negotiations on partnership with Wellcome Trust-funded 'Vietnam Initiative on Zoonotic Infections' program, implemented with University of Edinburgh, and Wellcome Trust Sanger Institute (WTSI): PREDICT to sample wildlife in high risk cohorts and provide information on risk interfaces in six provinces as part of the collaboration.

    b) **Laboratory System Improvements**
    - Collaborated with IDENTIFY-funded Laboratory Biosafety consultant for Hanoi University of Agriculture (HUA) Central Veterinary Laboratory, to ensure that PREDICT biosafety needs were addressed during initial scoping visit.
    - Co-hosted *"Laboratory Biosafety for Wildlife Diagnostics"* workshop with HUA Faculty of Veterinary Medicine for 16 laboratory and faculty members from HUA, and 2 laboratory staff each from National Centre for Veterinary Diagnostics (NCVD), Regional Animal Health Office No. 6 (RAHO6) and Oxford University Clinical Research Unit (OUCRU), and one laboratory expert from FAO.
    - Implemented PREDICT freezer sample management system for ultralow freezers in RAHO6 and HUA Central Veterinary Laboratory.
    - Developed draft PREDICT Workplan Agreement for implementation of PREDICT activities with Department of Animal Health (DAH) laboratories; document provided to central DAH for comment; awaiting final approval.

- Obtained approval from HUA Central Veterinary Laboratory to host PREDICT molecular diagnostics training for laboratory technicians from HUA, NCVD and RAHO6 in September 2012.
- Continued negotiations for MOU with OUCRU Ho Chi Minh City, for training and advanced diagnostics.

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Obtained Province-level permission for PREDICT sampling of wildlife transferred from wildlife restaurants to temporary holding facilities by the Forest Protection Department of Lam Dong Province.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Vietnam	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Rodents								
Other High Risk Interfaces	31	3	111	0	23	51	0	51
Other taxa (including humans)								
Other High Risk Interfaces	99	3	241	0	14	31	0	61
Sanctuary	42	0	50	0	42	50	0	200
TOTALS	172	6	402	0	79	132	0	312

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**

- Obtained official documentation and shipped cDNA from HUA Central Veterinary Laboratory Vietnam to WCS Wildlife Health Centre Molecular Laboratory, New York, for confirmatory testing and further characterization (via sequencing) of positive results.

PREDICT Findings (Y3Q3):

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Birds (11)	Hanoi University of Agriculture	Conventional PCR	Arenavirus, Flavivirus	Negative		Vietnam	No
Rodents (23)	Hanoi University of Agriculture	PCR	Arenavirus, Flavivirus	Negative		Vietnam	No
Other mammals (42 Asiatic black bears from Rescue Centre, 3 common palm civets)	Hanoi University of Agriculture, WCS Pathology lab	Conventional PCR,	Arenavirus, Coronavirus, Flavivirus, Herpesvirus, Paramyxovirus	All negative for Arenavirus, Coronavirus Flavivirus, Paramyxovirus; Presumptive positives from Asiatic black bears and civets for Herpesvirus	Sequence results pending for presumptive herpesvirus positives	Vietnam	No

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Began recruitment for new Country Coordinator.
  - Sub-activity 1.5.2: **Communication**
    - Produced PREDICT Priority Species poster, providing photographs, scientific name, English and Vietnamese common names, at request of laboratory partner RAHO6. Poster has been distributed to all government partners in Vietnam, and will be provided to future trainees to help identification of priority species for surveillance.

ASIA

BANGLADESH

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Invited to give a presentation at the Wildlife Protection and Conservation Training Program organized by the Bangladesh Forest Department.
    - Helped teach a workshop at the National Rabies Control Program in Bangladesh, organized by Ministry of Health and Family Welfare of Bangladesh.
    - Participated in and delivered a lecture at the EcoHealthNet Workshop 2012 held at the University of Wisconsin, and the National Wildlife Health Center of USGS.
    - Participated in the Bangladesh USAID EPT planning meeting and discussed collaboration among EPT partners.
    - Participated in the Annual General Meeting of the One Health Bangladesh Initiative.

    b) **Laboratory System Improvements**
    - Discussed plans for the development of the Forest Department's new wildlife forensic and diagnostic laboratory.
    - Participated in workshop on the institutionalization of a laboratory network in Bangladesh organized by FAO.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter.**
    - Identified new areas with wildlife-human interfaces, including areas with heavy hunting activity and/or wildlife consumption, and developed surveillance strategies for these areas.

- Sampled 104 fruit bats, and 10 rodents, yielding 1780 samples.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Bangladesh	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Hunter	137	1781	0	0	0	0	0	0
Free-ranging	816	12203	0	0	0	0	0	0
Rodents								
Other High Risk Interfaces	15	221	0	0	0	0	0	0
Free-ranging	138	1836	0	0	0	0	0	0
Primates								
Other High Risk Interfaces	4	60	0	0	0	0	0	0
Other taxa (including humans)								
Other High Risk Interfaces	4	60	0	0	0	0	0	0
Free-ranging	451	3401	0	0	0	0	0	0
TOTALS	**1565**	**19562**	**0**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies:**
    - Received the PREDICT viral-family PCR protocols and PREDICT Universal Control.
    - Received the hantavirus primer and preparing to begin hantavirus PCR at the ICDDR,B lab.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Processed samples for shipping to the Center for Infection and Immunity, Columbia University, New York, for pathogen detection.

CHINA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **National or Regional Surveillance System Improvements**
    - Met with CDC–Shanghai to discuss possible collaboration and participation in a One Health workshop being planned jointly by both groups.
    - Held initial discussions with Yunnan Institute of Endemic Diseases Control and Prevention and Yunnan CDC.

    b) **Laboratory System Improvements**
    - Installed -80C freezer in the Zhanjiang Institute for Plague Control and Prevention in Guangdong Province for storage of wildlife samples.
    - Held PREDICT technique training for staff at Wuhan Virology Institute.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Sampled 11 bats from two sites in Yunnan Province.
    - Continued to build relationships with animal market vendors to allow wildlife sampling.
    - Met with head of wildlife farming association in Guilin regarding upcoming fieldwork.
    - Met with Yunnan Institute of Endemic Diseases Control and Prevention and Yunnan CDC regarding potential collaboration for wildlife surveillance (especially markets) in Yunnan Province.
    - Established partnership with Zhanjiang Institute for Plague Control and Prevention in Guangdong Province in order to access to rodent samples collected under normal surveillance activities.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

China	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	369	738	0	0	0	0	0	0
Ecotourism	83	166	0	0	0	0	0	0
Other high risk interfaces	36	72		0	0	0	0	0
Rodents								
Other high risk interfaces	362	513	0	0	0	0	0	501
Other taxa (including humans)								
Carnivores								
Other high risk interfaces	6	12	0	0	0	0	0	0
TOTALS	**856**	**1501**	**0**	**0**	**00**	**0**	**0**	**501**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of New Technologies**
    - Provided Universal Control to collaborating laboratory partners.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Screened samples from wet market workers for Coronavirus, Filovirus, Bunyavirus, and Hantavirus; awaiting for approval from country Government for release.
    - Initiated zoonotic pathogen surveillance in collaboration with CDC China's hospital-based syndromic surveillance for Encephalitis and Hemorrhagic Fever of Unknown Origin in Guangdong Province program: identified high-risk samples from initial cohort study for further pathogen detection using the PREDICT Universal Control.

PREDICT Findings (Y3Q3):

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Rodents (10 Malayan Porcupines) - pooled anal & oral swabs	Wuhan Institute of Virology	SuperScript III one-step RT-PCR kit with Pt Taq DNA Polymerase (Invitrogen)	Astroviridae	Negative		China	No
Rodents (55 Chinese Bamboo rats)	Wuhan Institute of Virology	SuperScript III one-step RT-PCR kit with Pt Taq DNA Polymerase (Invitrogen)	Astroviridae	Negative		China	No
Rodents (112 Chinese Bamboo rats)	Wuhan Institute of Virology	SuperScript III one-step RT-PCR kit with Pt Taq DNA Polymerase (Invitrogen)	Coronaviridae Paramyxoviridae	Negative		China	No
Carnivores (6 Masked palm civets)	Wuhan Institute of Virology	SuperScript III one-step RT-PCR kit with Pt Taq DNA Polymerase (Invitrogen)	Coronaviridae Paramyxoviridae	Negative		China	No
Rodents (39 Malayan Porcupines)	Wuhan Institute of Virology	SuperScript III one-step RT-PCR kit with Pt Taq DNA Polymerase (Invitrogen)	Coronaviridae Paramyxoviridae	Negative		China	No

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Hired Program Assistant to manage wildlife sampling, GAINS data input, and assist the Country Coordinator with reporting.

LATIN AMERICA

BOLIVIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **International, National or Regional Surveillance System Improvements**
    - Confirmed Yellow fever as the cause of death in primates in Santa Cruz by PREDICT-funded lab and strengthened linkages among the Bolivian government (Ministry of Public Health; National Veterinary Service-SENASAG), the local USAID mission, and PAHO Bolivia for outbreak response; implementation of vaccination and education campaigns was effective in preventing infections in humans in affected areas.
    - Trained 11 PREDICT staff and technicians from the Institute of Molecular Biology (IBMB-UMSA laboratory) in Occupational Health and Biosafety for laboratory operations at University of San Andres.
    - Trained 28 veterinarians and animal keepers from the National Veterinary Service (SENASAG) and wildlife rescue centers and zoos from Cochabamba, Oruro, Santa Cruz and La Paz, on “Methods for Wildlife Disease Surveillance;” the course was requested and funded by the General Directorate of Biodiversity (DGB).

    b) **Laboratory System Improvements**
    - Prioritized select wildlife samples for viral family screening.
    - Established relationship with the Police Institute for Technical and Scientific Research (IITCUP, Police University) for cloning and sequencing PCR positive products in-country; first collaborations with IITCUP enabled PREDICT to characterize two (2) Yellow fever viral strains (TN-96 NS5 and TVP11767) from primate flavivirus positive samples obtained during the recent mortality event in Santa Cruz.
    - Planned with country partners to support training of IBMB laboratory staff at an advanced

lab in the US (i.e., Columbia University/UC Davis).

- Successfully standardized and validated all protocols for the 7 viral families initially targeted (universal control 1) at IBMB.
- Hired a full time laboratory technician and a part time laboratory assistant to maximize PREDICT diagnostic capacity at IBMB.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

BOLIVIA	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	323	1032	178	0	0	0	0	0
Other High Risk Interfaces	2	0	62	0	0	0	0	0
Rodents								
Free-ranging	11	0	190	0	0	0	0	0
Hunter	44	0	868	0	11	11	0	16
Other High Risk Interfaces	137	2115	299	0	0	0	0	0
Primates								
Free-ranging	3	0	125	0	0	0	0	0
Hunter	45	0	844	0	27	31	0	113
Market	6	0	78	0	6	8	0	21
Other High Risk Interfaces	8	0	105	0	1	1	0	1
Sanctuary	36	0	438	0	13	14	0	46
Other taxa (including humans)								
Free-ranging	6	11	0	0	0	0	0	0
Hunter	219	0	3672	0	53	56	0	93
Market	109	0	1435	0	62	103	0	315
Other High Risk	124	1037	483	0	11	18	0	48

Interfaces								
Sanctuary	43	0	213	0	14	17	0	54
TOTALS	**1116**	**4195**	**8990**	**0**	**198**	**259**	**0**	**707**

- Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**

PREDICT Findings (Y3Q3):

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Bats (78)	IBMB-UMSA	Conventional and nested RT-PCR	Flavivirus, Coronavirus, Arenavirus, Filovirus	Pending	Pending	Bolivia	No
Monkeys (180)	IBMB-UMSA	Conventional and nested RT-PCR	Filovirus, Paramyxovirus, Arenavirus, Flavivirus, Coronavirus	Pending	Pending	Bolivia	No
Rodents (526)	IBMB-UMSA	Conventional and nested RT-PCR	Hantavirus, Arenavirus, Alphavirus, Flavivirus	Pending	Pending	Bolivia	No
Primates (59)	IBMB-UMSA	Conventional and nested RT-PCR	Arenavirus	Presumptively positive to Arenavirus	Pending	Bolivia	No
Bats (45)	IBMB-UMSA	Conventional and nested RT-PCR	Coronavirus	Pending	Pending	Bolivia	No
Rodents (84)	IBMB-UMSA	Conventional and nested RT-PCR	Alphavirus, Arenavirus, Flavivirus, and Hantavirus	Presumptively positive to Alphavirus	Pending	Bolivia	No

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Monkeys (2)	IBMB-UMSA	Conventional RT-PCR	Flavivirus and Arenavirus	Presumptive positive to Flavivirus	Sequence results pending of presumptive positives	Bolivia	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data**
    - Reviewed procedures for improving data management, sample labeling, and use of web-based tools available in GAINS.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Hired a consultant to help prepare formal reports to Bolivian government agencies.

  - Sub-activity 1.5.2: **Communication**
    - Made agreement with Director of Epidemiology, National Veterinary Service-SENASAG, to receive official epidemiologic reports on a weekly basis, to facilitate tracking of disease events in domestic animals and evaluate potential wildlife origin of zoonotic pathogens.
    - Compiled preliminary disease surveillance results from hunted wildlife (subsistence) to indigenous leaders and community members in San Jose de Uchupiamonas

BRAZIL

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**

    a) **International, National or Regional Surveillance System Improvements**
    - Conducted target taxa surveillance with the cooperation of Jungle Warfare Training Center of the Brazilian Army (CIGS), and with representatives of a new partner, the Manaus Center of Zoonosis Control (CCZ), working jointly with our team.

    b) **Laboratory System Improvements**
    - Filed essential paperwork for importation of MiniMag Extractor from France.
    - Developed a subcontract with the University of Sao Paulo (UCB II) for viral family testing of PREDICT samples.

- **Activity 1.2: Surveillance**
  - Sub-activity 1.2.1: **Highlights Surveillance Activities Completed in Current Quarter**
    - Sampled 103 bats, 8 rodents and 5 primates from a highly human-disturbed site at the CIGS, yielding 380 samples.
    - Completed the last expedition trip to remote sites of the Amazon (Santa Izabel do Rio Negro, State of Amazonas, northwestern Brazil), in conjunction with the National Research Institute of Amazonia (INPA) and the Federal University of Amazonia (UFAM) and sampled 8 rodents, 43 bats, 3 primates and 6 marsupials, yielding 540 specimens.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Brazil	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	33	137	0	0	0	0	0	0
Other High Risk Interfaces	548	2444	0	0	0	0	0	0
Rodents								
Free-ranging	12	65	0	0	0	0	0	0
Other High Risk Interfaces	44	119	0	0	0	0	0	0
Primates								
Free-ranging	5	18	0	0	0	0	0	0
Other High Risk Interfaces	32	139	0	0	0	0	0	0
Other taxa (including humans)								
Free-ranging	7	30	0	0	0	0	0	0
Other High Risk Interfaces	186	972	0	0	0	0	0	0
TOTALS	**867**	**3924**	**0**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.5 Program Management**
  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Hired a bat taxonomist.
  - Sub-activity 1.5.2: **Communication**
    - Updated the Health Program coordinator at USAID Mission on current PREDICT activities and Y4 work plan.

COLOMBIA

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **International, National or Regional Surveillance System Improvements**
    - Discussed terms and budget for cooperation with government to establish an inter-ministerial alliance for wildlife disease surveillance in Colombia; PREDICT and the Ministries of Environment, Health, and Agriculture, with assistance from the local Association of Wildlife Veterinarians (AVVS), will define conditions and timelines for work, and expected products.
    - Assisted by AVVS, finalized "Current knowledge and management of wildlife diseases in Colombia", a report summarizing current regulations and research focused on wildlife diseases; a Spanish version is currently available upon request.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

COLOMBIA	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Rodents								
Unclassified	1	0	6	0	0	0	0	0
Primates								
Hunter	17	0	132	0	0	0	0	0
Unclassified	5	0	33	0	0	0	0	0
Other taxa								
Hunter	38	0	237	0	0	0	0	0

Unclassified	54	0	368	0	0	0	0	0
TOTALS	**115**	**0**	**776**	**0**	**0**	**0**	**0**	**0**

MEXICO

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    b) **Laboratory System Improvements**
    - Laboratory reagents and PCR primers were purchased and shipped to IMSS (*Instituto Mexicano del Seguro Social)*.

- **Activity 1.2: Surveillance**

Summary of Surveillance Activities and Testing by Country in GAINS to date:

Mexico	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	1497	6872	88	0	0	0	0	0
Other High Risk Interfaces	31	0	122	0	0	0	0	0
Rodents								
Free-ranging	32	119	5	0	0	0	0	0
Other taxa (including humans)								

Free-ranging	16	63	10	0	0	0	0	0
TOTALS	**1576**	**7054**	**225**	**0**	**0**	**0**	**0**	**0**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**
  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**

PREDICT Findings (Y3Q3):

# Samples submitted	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Bats	Laboratorio de Inmunovirología	PCR	Flavivirus	Presumptive positives	Sequence results pending of presumptive positives	Mexico	Pending

PERU

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building**
  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) **International, National or Regional Surveillance System Improvements**
    - Signed cooperative agreement with Peruvian Institute of Health (INS) enabling PREDICT involvement in field investigations and outbreak response activities in country, and granting access to INS' samples (bats and rodents) for comprehensive pathogen testing.
    - Discussed collaborations with the Lima Administration of Forestry and Wildlife (ATFFS

Lima) to provide assistance in case of disease outbreak investigations.

- Explored opportunities and mechanisms for improving reporting of wildlife disease events to Peruvian Veterinary Service-SENASA with the Peruvian Association of Wildlife Veterinarians (APEVEFAS).
- Built capacity for a national wildlife disease surveillance system with the Peruvian Veterinary Service (SENASA) and the USDA-APHIS Wildlife Disease Program by co-organizing a workshop on wildlife disease surveillance for 115 key government staff and partners in Lima and Iquitos.
- Trained four staff in “Preventive measures against transmissible diseases that spread among animals and humans”, by the Peruvian Institute of Health
- Six staff passed the web-based course on “Social & Behavioral Research”, (CITI Collaborative Institutional Training Initiative). The course is required for staff involved in market surveys.
- Discussed cooperation for training students at two universities (Peruvian University Cayetano Heredia, and Major University of San Marcos), to improve knowledge and skills of veterinarians for wildlife disease surveillance.
- Presented “Risks associated with the Wildlife Trade” at a training seminar on that topic organized by the General Directorate of Forestry and Wildlife (DGFFS) for enforcement officers (Ecologic Police)”.

b) **Laboratory System Improvements**

- Prioritized select wildlife samples for viral family screening.
- Began to incorporate new molecular protocols for additional viral families in universal control 2 when they become available.
- Hired a full time laboratory technician to conduct PREDICT diagnostics at INS.

Summary of Surveillance Activities and Testing by Country in GAINS to date:

PERU	# of Animals sampled	# of Samples collected by active surveillance	# of Samples collected by opportunistic surveillance	# of Samples collected by syndromic surveillance or outbreak response	# of Animals with at least one final test result	# of Samples with at least one final test result	# of Samples with at least one final test result approved for release	Total # of diagnostic tests run
Bats								
Free-ranging	70	283	0	0	0	0	0	0
Hunter	1	0	0	0	0	0	0	0
Rodents								
Free-ranging	1	8	0	0	0	0	0	0
Hunter	190	42	0	0	0	0	0	0
Market	28	241	0	0	0	0	0	0
Other High Risk Interfaces	62	29	0	900	0	0	0	0
Unclassified	3	14	0	0	0	0	0	0
Primates								
Hunter	133	60	0	0	0	0	0	0
Market	103	553	20	0	0	0	0	0
Other High Risk Interfaces	204	923	1496	0	0	0	0	0
Sanctuary	55	0	248	0	0	0	0	0
Unclassified	4	63	0	0	0	0	0	0
Other taxa (including humans)								
Free-ranging	1	4	0	0	0	0	0	0
Hunter	411	169	0	0	0	0	0	0
Market	259	851	11	0	0	0	0	0
Other High Risk Interfaces	40	96	34	18	0	0	0	0
Unclassified	58	315	0	0	0	0	0	0
TOTALS	**1623**	**3692**	**1768**	**918**	**0**	**0**	**0**	**0**

- Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**

PREDICT Findings (Y3Q3) (Y3Q3):

# Samples submitted (by taxa – can list multiple tissues or sample types together, if appropriate)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release
Primates	NAMRU-6; UNMSM	Conventional and nested RT-PCR	Flavivirus; Arenavirus; Filovirus; Coronavirus	Negative	None	Peru	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Surveillance Data Management**
    - Reviewed procedures for improving data management, sample labeling, and use of web-based tools available in GAINS with Peru team.

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.1: **Significant Change in Project Management**
    - Hired a part-time consultant to support reporting and follow-up on diagnostics.

  - Sub-activity 1.5.2: **Communication**
    - With the General Directorate of Biodiversity (Ministry of Environment), reviewed procedures for public release of data, to be agreed with the Ministry of Public Health next quarter.

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**
  - Designed survey plan to be implemented at wet markets across northern and central Peru to help characterize human behaviors and risk factors that could influence emergence of zoonotic diseases in the wildlife trade; survey under review by NAMRU-6 IRB committee.

PREDICT Quarter 3 Year 3 Reporting

GLOBAL - US, Africa, Southeast Asia, Asia & Latin America

LOW 1: Wildlife Pathogen Detection—identification of novel wildlife pathogens that pose a significant public health threat

- **Activity 1.1 Capacity Building (includes infrastructure, training, coordination and systems improvements toward sustainability)**

  - Sub-activity 1.1.1: **Operationalizing One Health**
    a) International, National or Regional Surveillance System Improvements
    - Workshops and trainings for ministries and government employees, including site visits to areas of intense surveillance, conducted in Cambodia, Malaysia, and Thailand.
    - Held a training workshop on laboratory biosafety for wildlife diagnostics jointly by PREDICT & IDENTIFY in Vietnam, at Hanoi University of Agriculture (HUA); presentations included participation from a representative of the Mahidol-Oxford Tropical Medicine Research Unit, Bangkok.
    - Had participation of partners from the Bangladesh Forestry Department and ICDDR,B in the EcoHealth Net training workshop on epidemiology and zoonotic disease outbreak detection and response held in Wisconsin, USA.
    - Led a wildlife disease monitoring course for Bolivian wildlife rescue centers and zoos from five cities. The course was organized in coordination with the National Secretariat for Biodiversity (DGB) and rescue centers.
    - Organized disease surveillance training in Peru co-hosted by USDA-APHIS.
    - Disseminated the World Bank publication *"People, pathogens and our planet: the economics of one health" (*published June 2012) to over 400 people, which included information obtained through the IUCN SSC Wildlife Health Specialist Group (WHSG) from wildlife health experts globally, including those representing EPT countries.
    - Finalized updates to the IUCN SSC WHSG website, which aims to expand access to

capacity-building resources for global WHSG network and the wider health and conservation communities.

- Compiled information on animal disease occurrence and mortality events in Bolivia and Peru in response to requests from WHO and IUCN.
- Contributed papers and editing support for the *"Compendium of the OIE Global Conference on Wildlife"*, which was published in May.
- In coordination with RESPOND, established the on-line network *WildHealthNet* as part of the follow-up activities for RESPOND and FAO's WILD (Wildlife Investigation, Livestock and Public Health) training programs in Southern Africa. The network intends to boost capacity and encourage participants to collaborate on regional issues related to wildlife health. The network currently has 51 participants representing 19 countries. The network will become regionally administered by the African Union Inter-African Bureau for Animal Resources (AU-IBAR) in the fall of 2012.

b) **Laboratory System Improvements**

- Began to implement and/or optimize viral family-level PCR protocols at additional laboratories including INRB (DRC), Sokoine University of Agriculture (Tanzania), VRI (Malaysia), Hanoi Agricultural University (Vietnam), ICDDR,B (Bangladesh), IPB (Indonesia), Eijkman Institute (Indonesia), Guangdong Entomological Institute (China) and Peruvian Institute of Health (Peru).
- Purchased supplies to begin training for viral family testing at National Animal Health Center (Lao PDR), RAHO6 (Vietnam), NCVD (Vietnam), Guangdong Institute of Public Health (China) and Zoonotic Disease Lab IMSS (Mexico).
- Provided equipment for surveillance and laboratory diagnostics to additional labs including Roche 454 bench-top sequencer obtained through DELIVER at IPC (Cambodia), equipment for freezer sample management at HUA RAHO6m NCVD (Vietnam), disease diagnostics for Sabah Wildlife Health Unit, and PCR machine to IBMB (Bolivia).
- Continued to provide training and support to laboratory technicians including post-doctoral fellow travelling to SUA (Tanzania) for extensive on-site training; training of lab technicians at INRB (DRC), ZDL (ROC), CHP (Cameroon), CIRMF (Gabon), and RAB (Rwanda) on sample extractions, PCR analysis, preparation of samples for sequencing, data management including storage and tracking of samples; and Bioinformatics at Chulalongkorn University (Thailand).

- Coordinated with other EPT partners including with IDENTIFY to perform a Laboratory Biosafety site visit and training for Hanoi University of Agriculture Central Veterinary Laboratory (Vietnam), Virology Workshop with CDC at Eijkman Institute (Indonesia),and training (Cameroon, Republic of Congo and DRC) funded by US Department of State (BioEngagement Program).
- Conducted trainings between PREDICT partner labs including personnel from GDEI trained at Wuhan Institute of Virology (China) and laboratory technicians from NaVRi and NAHC (Lao PDR) at Institut Pasteur du Cambodge (Cambodia) on using PREDICT protocols.
- Established relationship with the Police Institute for Technical and Scientific Research (Bolivia) to provide sequencing capacity to confirm positive results in Latin America.
- Developed real-time, on-line test result tracking in GAINS to streamline reporting of test findings to in-country government, obtaining government approvals for release of data, and movement of data to become available to partners and the public on HealthMap.
- Supported regional laboratory and diagnostic infrastructure by training three National Animal Health Center staff members from Lao PDR and two Cambodian National Veterinary Research Institute (NaVRI) staff members on viral family level screening for wildlife pathogens at Institute Pasteur Cambodia.

Table 1: Labs Receiving Assistance from PREDICT to date

	# of labs targeted for screening with desired viral families	# of labs receiving training in preparation for screening of desired viral families	# of labs that have initiated work that will eventually lead to screening desired viral families (labs with partial capacity)
Africa	7	7	5
Asia / SE Asia	17	13	9
Latin America	6	5	2
Totals	**30**	**25**	**16**

- Sub-activity 1.1.2: **Capacity Assessment and Tracking of Development Progress**
  - Began data analysis for the PREDICT Rapid Survey Update Tool for seventeen countries. The survey for Indonesia is being completed for the first time to establish the baseline capacity levels and priorities. Regional meetings in Africa and Asia are planned for July 2012, when global PREDICT staff will meet with country coordinators about past and future capacity tracking activities.
  - Preliminary analyses of PREDICT Rapid Survey Update Tool data indicated that the majority of PREDICT countries report improvements in human capacity, laboratory capacity, and overall zoonotic pathogen surveillance capabilities in wildlife over the past year. Priority actions identified by country coordinators to further improve wildlife surveillance include establishing sustainable funding/resources, increasing human capacity to conduct surveillance activities, and engaging governments and communities to educate them about zoonotic pathogens and raise awareness about surveillance for early detection of events.
  - Began development of the Rapid Survey Update Tool for Year 3 with a two part format that will allow for 1) country coordinators to track progress and change as in Year 2, and 2) for country coordinators to interview key wildlife officials to obtain perspectives external to PREDICT that are important for understanding how PREDICT is viewed and how we may best build capacity to improve wildlife surveillance for zoonotic pathogens going forward.

Table 2: PREDICT Training Results Summary by Country to date:

Country	Persons	# Women	Trainings covered various combinations of the following topics:
Asia:			
Bangladesh	**5**	**0**	Lab techniques in BSL2 lab & lab diagnostics; epidemiology and outbreak investigation; capture and sampling of rodents & bats; sample collection and GAINS system; use of GIS.
Cambodia	**61**	**10**	Core safety, animal capture, & sampling skills and protocols; data collection & management; rodent and primate ID & primate and rodent sampling.
China	**3**	**2**	Core safety, animal capture & sampling skills and protocols; sample collection, handling, and transport; wildlife restraint & anesthesia; human & animal safety; bat, rodent, and primate sampling.
India	**18**	**2**	Core safety, animal capture & sampling; laboratory safety protocols; zoonoses;

			surveillance and sampling protocols; bar-coding and data management; animal necropsies.
Indonesia	**23**	**10**	Modeling behind the PREDICT project; zoonotic diseases of bats and rodents; human and animal safety during capture; laboratory safety & PPE use; sample collection; set up for sampling bats and rodents.
Lao PDR	**65**	**17**	Core safety, animal capture, & sampling skills and protocols; data collection; PPE use; bar-coding & data management; animal necropsies; surveillance & sampling; laboratory molecular techniques.
Malaysia	**69**	**15**	Core safety protocols; PPE and biosafety, animal capture & sampling skills and protocols; bat and rodent capture, handling & sampling; laboratory skills; packing and shipping samples & cold chain; sampling strategy & data collection; bat, rodent & macaque sampling; collection of trigeminal nerve root ganglia from macaques for Herpes testing; virus extraction; bat & rodent capture; rodent retro-orbital bleed; primate sampling & human and animal safety; PRC & cloning.
Thailand	**26**	**15**	Lab and bioinformatics training; animal capture; laboratory safety; animal sampling protocols; zoonotic diseases.
Vietnam	**48**	**10+**	Core safety, animal capture & sampling skills and protocols; packing & shipping samples; barcode system; animal pathology; sample collection & data management & use of GAINS; surveillance; filter paper blood spot sampling; lab diagnostic protocols, virus family level protocols; one health & sampling strategy; sample transport & lab methods; wildlife pathology; First Aid.
Africa:			
Cameroon	**75**	**21**	Core safety, animal capture & sampling skills and protocols; specialized field sampling and laboratory skills; packing & shipping samples to reference lab; PPE use; bushmeat policy and wildlife ethics; extraction, RT-PCR, ELISA and other lab methods; lab systems; immunology and serology; ethics; pan-viral protocols; emergency preparedness and management; outbreak response training; bio-risk management; use of satellite phones; molecular biology and conventional PCR.
DRC	**18**	**3**	Core safety, animal capture & sampling skills and protocols; specialized field sampling and laboratory skills; RT-PCR, ELISA; administration and reporting; Monkeypox surveillance; sample tracking & GAINS system; ethical issues; blood spot sampling; DNA & RNA extraction from animal samples.
Gabon	**5**	**2**	Bushmeat sampling; packing & shipping samples; PPE use and biosafety; lab safety; animal capture; bat & rodent sampling; sampling for AI; animal sample collection; cold chain; lab methods, DNA extraction, PCR; sample prioritization; safe handling of liquid nitrogen; sequencing; virus isolation; RNA & RT-PCR; GAINS system & data management.
Republic of Congo	**13**	**2**	Core safety, PPE and biosafety; safe animal capture, & sampling skills and protocols; bat, rodent, and primate sampling; laboratory safety & skills; data collection; cold chain; protecting human subjects in research; virology laboratory methods.

Rwanda	**185**	**19**	Core safety, animal capture & sampling skills and protocols; PPE use and biosafety; bat, rodent, and primate capture, handling, and sampling; zoonoses; ethics and responsibilities; wildlife pathology & necropsy; sample collection & preservation; packing & shipping samples; tracking primates & health monitoring; lab personnel safety; PCR protocols & sample processing; bushmeat handling.
Tanzania	**32**	**7**	Core safety, animal capture & sampling skills and protocols; bat and rodent capture, handling & sampling; data management; laboratory safety; surveillance; information management and GAINS system; wildlife capture & restraint; emergency preparedness; ethics, cultural sensitivity & SHP; pathogen detection; extraction and PCR & protocols; cold chain.
Uganda	**29**	**9**	Core safety, animal capture & sampling skills and protocols; PPE & biosafety; laboratory safety; packing & shipping samples; bushmeat sampling; cold chain; GPS; Animal Mortality Monitoring Study; bat capture, handling & sampling; PPE & biosafety to handle dead animals.
Latin America:			
Bolivia	**162**	**73**	Core safety, animal capture, laboratory & sampling skills and protocols and zoonotic diseases; bat, rodent, and primate sampling; bushmeat sampling; molecular and parasite diagnostic methods; lab safety and methods; packing and shipping samples; wildlife management and disease management; work ethics, cultural sensitivity & SHP; managing livestock & poultry diseases; detecting zoonoses; sample collection and storage; methods of detecting Salmonella in wildlife; biostatistics.
Brazil	**32**	**17**	Core safety, animal capture, handling & sampling skills and protocols; PPE use & biosafety; bat and rodent sampling; bushmeat sampling; packing and shipping samples; cold chain; surveillance, ethics, and responsibilities; primate sampling.
Colombia	**54**	**29**	Core safety, animal capture & sampling skills and protocols; lab safety & methods; One Health; Conservation Medicine; GAINS system and data management.
Mexico	**24**	**12**	Core safety, animal capture, handling & sampling skills and protocols; lab safety & methods; PPE use & biosafety; disease modeling; animal care and use protocols; lab diagnostic techniques.
Peru	**240**	**132**	Core safety, animal capture & sampling skills and protocols; PPE use & biosafety; surveillance; zoonotic disease risks from wildlife trade and consumption; wildlife regulations, wildlife management and disease monitoring; sample collection & storage; species ID & health risks; emergency management of spider bites;safe transport of confiscated animals.
Total Trained	**1187**	**407+**	

- **Activity 1.2: Surveillance**

  - Sub-activity 1.2.1: **Highlights of Surveillance Activities Completed in Current Quarter**
    - Conducted active surveillance activities in Bolivia, Brazil, Mexico, Peru, Bangladesh, Cambodia, China, Lao PDR, Malaysia, Indonesia, Thailand, Vietnam, Cameroon, DRC, Gabon, Republic of Congo, Rwanda, Tanzania, and Uganda.
    - Collected samples from animals at high-risk interfaces (n = 2,348), most commonly animals from sanctuaries, hunter-killed animals, those raiding crops, and animals being sold at markets.
    - Refined interface categorization and updated data records to better capture information on high-risk sampling settings.
    - Conducted planning and initiated surveillance efforts for Deep Forest Project: selected preliminary sites along the Kinabatangan River in Malaysia and met with the Sabah Wildlife Department and the Department of Health to coordinate surveillance activities and the Deep Forest Human Contact survey; conducted program planning and surveillance expeditions in Brazil; initiated rodent and bat trapping in recently deforested areas in Uganda.
    - Responded to howler monkey mortality events in Bolivia and confirmed diagnosis of yellow fever (please see below for update on data and activities provided last quarter).
    - Continued response to outbreak of undiagnosed illness in bonobos in DRC by facilitating discussions among the DRC team, the head of the sanctuary, head of INRB laboratory, Republic of Congo team, and members of the Ministry of Health on a range of topics including previous Bonobos mortality, infection control strategies, and potential disease exposure routes. The PREDICT team provided recommendations for limiting the outbreak.

- Sub-activity 1.2.2: **Summary of Surveillance Sampling and Testing:**

Table 3: PREDICT Global Surveillance Summary by Region, Taxa and Interface in GAINS:

	# of Animals sampled in Y3Q2	# of Animals sampled to date	# of Samples collected to date	# of Samples collected with at least one final test result	Total # of diagnostic tests run to date
Africa					
Bats	121	3408	17511	7511	20163
Rodents	303	2970	9642	399	918
Non-human Primates	135	3099	9609	1253	5700
Other taxa	135	4346	8625	554	888
Asia and Southeast Asia					
Bats	1177	4218	24345	35	36
Rodents	226	1666	8334	376	537
Non-human Primates	23	544	9108	63	79
Other taxa	27	1748	9479	788	981
Latin America					
Bats	136	2691	13331	0	0
Rodents	13	685	6455	11	16
Non-human Primates	41	664	5350	54	181
Other taxa	26	1516	9281	194	510
Primary Interface (all regions)					
Free-ranging	216	8745	51910	8221	22387
Hunter	543	9564	24317	1525	3056
Market	362	2126	10520	111	336
Sanctuary	68	1297	6428	767	3152
Other High-Risk interfaces	1159	5250	33535	574	1031
Unclassified	15	573	4360	40	47
TOTALS	**2363**	**27555**	**131070**	**11238**	**30009**

- **Activity 1.3: Technology Development and Pathogen Detection and Discovery**

  - Sub-activity 1.3.1: **Introduction of new technologies**

    a) **African Region**

    - Field tested a satellite internet terminal, and two additional staff trained in its use.
    - Introduced PCR/gel purification methods to support amplicon sequencing for confirmation of positive PCR results.
    - Implemented a new protocol for tissue disruption and homogenization using motorized pestle and QiaShredder homogenization columns.
    - Expanded use of simultaneous RNA/DNA isolation protocols from wildlife samples.
    - Increased Conventional PCR testing according to PREDICT protocols, optimizing additional protocols and tested for viruses included in Universal Control #1.

    b) **South and Latin American Region**

    - Purchased laboratory supplies in the US to be used for molecular screening of priority viral families.
    - Completed quality control tests for additional priority virus protocols and finalized protocol standardization.

    c) Asian Region

    - Expanded the number of PREDICT laboratories with the universal control and completed training in pathogen discovery protocols.
    - Completed quality control tests for additional priority virus protocols and finalized protocol standardization.

  - Sub-activity 1.3.2: **Pathogen detection and discovery (Year 3 Quarter 3):**
    - Continued regional support among PREDICT countries, bolstering testing efforts in addition to capacity increasing within countries to support pathogen discovery protocols
    - Increased verification of presumptive positive samples by sequencing via international sequencing laboratories/companies, strengthening connections between PREDICT countries and institutions that perform these assays.

- Increased sample extractions and PREDICT PCR reactions, for example, in Cameroon 1,700 samples were extracted and a total of 2,942 PCR reactions were run; globally, greater than 15,000 PCR reactions were completed in PREDICT countries.
- Identified specific samples for further pathogen discovery by pyrosequencing.

Table 4: PREDICT Findings:

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bats (225)	Institute Pasteur Cambodia	RT-PCR Hemi-nested PCR hemi-nested RT-PCR Taq Man SYBR Green Sequencing	*Coronavirus,* *Astroviruses,* *Lyssaviruses,* *Paramyxoviruses* Filoviruses	coronavirus presumptive positives undergoing sequencing, astrovirus, filovirus, henipavirus negative, lyssavirus pending	Sequencing pending	Cambodia	No
Rodents (500)	Institute Pasteur Cambodia	PCR RT-PCR	*Paramyxoviruses* Hantaviruses Arenaviruses	hantavirus pending, arenaviruses and paramyxovirus negative		Cambodia	Yes
Bats (1,256)	Columbia	Family level PCR	Pan Influenza A (1200) Herpes (1200) Bocavirus (1200) Filovirus (56) Astrovirus (56) Coronavirus (56) Deep-sequencing (56)	Herpesvirus, bocavirus, astrovirus, and coronavirus presumptive positives undergoing sequencing , influenza and filovirus negative	deep-sequencing pending	Bangladesh	No

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Birds (11)	Hanoi University of Agriculture	Conventional PCR	Arenavirus, Flavivirus	negative	-	Vietnam	No
Rodents (23)	Hanoi University of Agriculture	Conventional PCR	Arenavirus, Flavivirus	negative	-	Vietnam	No
Other (45)	Hanoi University of Agriculture, WCS Pathology lab	Conventional PCR, sequencing	Arenavirus, Coronavirus, Flavivirus, Herpesvirus, Paramyxovirus	herpesvirus presumptive positives undergoing sequencing		Vietnam	No
Other (55)	Zhengli Shi	RT-PCR (PREDICT)	Astroviruses *(10);* Coronaviruses (45); Paramyxoviruses (45)	None positive	-	China	Yes
Rodents (167)	Zhengli Shi	RT-PCR (PREDICT)	Astroviruses (55); Coronaviruses (112); Paramyxoviruses (112)	None positive	-	China	Yes
Bats (546)	Predict/GVF Cameroon	PCR (predict primers)	Coronavirus (430), Filovirus (471), Hantavirus (510), Paramyxovirus (504)	Hantavirus and GBV presumptive positives sequencing ongoing	Verification pending by sequencing	Cameroon	No
Rodents (81)	Predict/GVF Cameroon	PCR (predict primers)	Alphavirus (80), Arenavirus (81), Hantavirus (76)	Negative	-	Cameroon	No
Primates (445)	Predict/GVF Cameroon	PCR (PREDICT primers); ELISA	Bocavirus (93) Filovirus (24) Paramyxo (24)	Negative	Sequence verified	Cameroon	Yes
Carnivores (9)	Predict/GVF Cameroon	PCR	HCV	Negative	-	Cameroon	Yes
Bats (43)	INRB/PREDICT	Conventional RT-PCR	Arenavirus Coronavirus Flavivirus Filovirus	Negative	-	DRC	No

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Primates (5)	INRB/PREDICT	Immuno-diffusion	*Alphavirus* Retrovirus	Exposure suspected	Chikungunya virus	DRC	No
Primates (4)	PREDICT Gabon/CIRMF	PCR (virus genus level primers)	Coronaviruses, Enteroviruses, Paramyxoviruses, Orthopoxviruses, Adenoviruses, Picornaviruses, Reoviruses, Calciviruses, Astroviruses, Filoviruses, Arenaviruses, Flaviviruses,	All Negative	Sent for deep-sequencing	Gabon	No
Rodents (262)	PREDICT Gabon/CIRMF	PCR (virus genus level primers)	Astroviruses Adenoviruses Reoviruses Caliciviruses Enteroviruses	Negative	-	Gabon	No
Primates (34)	Columbia	Family level PCR Illumina	Astrovirus Coronavirus Filovirus Flavivirus Herpesvirus Bocavirus Polyomavirus Adenovirus Enterovirus Phlebovirus Poxvirus Paramyxovirus Deep Sequencing	herpesvirus, polyomavirus, adenovirus, enterovirus presumptive positives sequencing pending	bioinformatics ongoing	Rwanda	No
Bats (777)	Columbia	Family level PCR	Coronavirus Paramyxovirus Adenovirus Filovirus	Results Pending	Results Pending	Brazil	No

# Samples submitted (by taxa)	Diagnostic lab	Diagnostics Method	Pathogen family/genus screening / or specific virus	Results	Pathogen discovery	Country	Approved by Government for release (yes or no)
Bats (of 730 samples)	IBMB-UMSA	Conventional and nested RT-PCR	Flavivirus Coronavirus Arenavirus Filovirus	Pending	Pending	Bolivia	No
Primates (of 730 samples)	IBMB-UMSA	Conventional and nested RT-PCR	Filovirus Paramyxovirus, Flavivirus Coronavirus Arenavirus (59) Flavivirus (2)	arenavirus and flavivirus suspects ongoing sequencing	Sequencing underway	Bolivia	No
Rodents (84)	IBMB-UMSA	Conventional and nested RT-PCR	Hantavirus Arenavirus Alphavirus Flavivirus	hantavirus, arenavirus, flavivirus, and alphavirus presumptive positives ongoing sequencing	Pending	Bolivia	No
Primates (315 samples)	NAMRU-6; UNMSM	Conventional and nested RT-PCR	Flavivirus; Arenavirus; Filovirus; Coronavirus	Negative	None	Peru	No

- **Activity 1.4: Sample Tracking and Information Management**

  - Sub-activity 1.4.1: **Optimize surveillance data management system**
    Ongoing improvements to and optimization of GAINS.org including:
    - Added new data entry screen for new Test Results Data.
    - Developed and made available a new report for sharing test results with governments.
    - Added country level security to the site and gave Event & Test Results update screens, and update access to all GAINS users; this allows GAINS users to view & update their previously submitted data.
    - Added the ability to upload pooled specimens to Test Results templates & upload process
    - Created new GAINS Reports:

- Sample Submissions to Columbia
- Animal Sample & Specimen Counts by Event
- Animal Samples with Taxa & Storage Medium

- Sub-activity 1.4.2: **Establish global open access to database and procedure for dissemination of knowledge**
  - Purchased the software / server package Geneious, a bioinformatic tool that combines DNA and protein analysis and information.
  - Developing and testing a new XML feed to send aggregated data to Healthmap

- **Activity 1.5 Program Management**

  - Sub-activity 1.5.2: **Communication**
    - Attended FAO/OIE Global Conference on Foot and Mouth Disease Control in Bangkok, Thailand. Presented at the opening plenary on “The Value of Disease Surveillance in Wildlife to Inform Agricultural and Public Health Decision-making and Disease Prevention Strategies.”
    - Attended the OIE 80th General Session of the General Assembly to represent the OIE Working Group on Wildlife Diseases. Provided information on wildlife and zoonotic diseases to OIE Delegates and participants.
    - Met with OIE officials to discuss opportunities to further One Health initiatives and strengthen capacity building around wildlife disease surveillance.
    - Met with World Health Organization officials and presented on the PREDICT program to the Emerging and Dangerous Pathogens Team, Department of Communicable Diseases Surveillance and Response.
    - Updated IUCN officials on PREDICT and identified areas for further collaboration among the health and conservation sectors through the IUCN Wildlife Health Specialist Group.
    - Presented at the AAAS Biosecurity meeting on "Emerging Zoonoses: Preventing the Next Pandemic" as a mechanism to provide an explanation and update on EPT.
    - Traveled to Dar es Salaam, Tanzania and Nairobi, Kenya to meet with USAID and CDC/GDD-Kenya about east African regional activities.
    - Organized a side event at the Convention on Biological Diversity's 16th Subsidiary Body on Scientific, Technical and Technological Advice in Montreal, Canada, in which the linkages

between health and biodiversity and the importance of utilizing a One Health approach were presented.
- Discussions with World Bank Agriculture lead about the EPT program and engaging the World Bank on integration of wildlife diseases and environmental health into country level analytical tools used by the Bank, such as the OIE Professional Veterinary Services analysis tool.
- Coordinated with USAID and PREVENT collaborators on future, joint Deep Forest activities.
- Participated in American Society for Microbiology (ASM) Communications Committee meetings (at ASM Annual General Meeting, San Francisco).
- Participated in leadership activities for the Prince Mahidol Award Conference.

LOW 2: Risk Determination

- **Activity 2.1: Develop risk filter strategy**

  - Sub-activity 2.1.1: **Develop a conceptual and structural framework for Extractive Industry work**
    - Continued collaborating with the Extractive Industry Working Group (EIWG) to complete the refinement of the risk screening tools for zoonotic diseases. This quarter the working group completed two tools: a Planning Tool targeting zoonotic disease risk to planned project sites and an Audit Tool targeting zoonotic disease risk to operating projects. Both tools are accompanied by a list of mitigation options and are designed to integrate with industry standard operating procedures as defined by multi-lateral and financial institutions. The tools were shared with USAID in a planning workshop this quarter.
    - Initiated development of a third EIWG tool that will target the decommissioning phase of EI project operations.
    - Refined EIWG outreach and advocacy materials (e.g. the brochure targeting zoonoses and infectious diseases in the mining sector).
    - Participated in a biweekly EIWG teleconferences to further EIWG plans into Y3Q4 and Y4, and initiated planning through the EIWG on potential testing of the EI tools in two EPT countries in Y4: Gabon and Uganda.

- Provided the EIWG with data resources, information, and technical guidance in the development of the tools and all associated activities.
- Continued working on the sub-activity between UCD and WCS/Yale to strengthen and improve the risk science foundation for the assessment tools.
  - A draft Hazard Assessment Tool for a suite of emerging infectious diseases at the EI interface has been developed and is under review. This tool supports qualified ranking of hazards from emerging infectious diseases (emphasis on wildlife zoonoses) to the extractive industry sector and will enable users to target site and context-specific risk factors for monitoring and risk mitigation planning.

- Sub-activity 2.1.2: **Inform and integrate other relevant agencies about PREDICT strategy and successes**
  - Held the Technical Advisory Committee on April 19 in San Francisco, in conjunction with the Quarterly Meeting; the Committee was highly supportive of PREDICT's current strategies, and the advisors made several recommendations for informing and integrating other relevant agencies, including:
    - PREDICT should continue its efforts to present at appropriate meetings and to publish. Additional venues were also suggested (*e.g.*, free-standing symposia at large scientific meetings; to engage the scientific policy community, meeting each fall with the incoming class of AAAS fellows).
    - Committee members were interested in receiving PREDICT updates, both for their own information and to be able to inform other agencies and colleagues, including those in the private sector. To enhance information sharing, an Advisory Committee webpage on the PREDICT Basecamp site was created.
    - The Committee recommended continuing communications and cooperation with other partners, such as CDC; in addition to currently ongoing efforts, the recent connection with GDD appeared promising.
    - Interactions among EPT projects should be continued and strengthened, especially in order to leverage social science expertise.

LOW 2: Risk Determination

- **Activity 2.2 Optimize models for diversity of disease emergence**

  - Sub-activity 2.2.1: **Refine and test geographical and temporal 'hotspot' models**
    - Began exploratory analysis of alternate proxies for reporting bias in EID data for model inputs (e.g. health services).
    - Continued analysis on occupancy modeling to predict the probability of detecting a disease outbreak.
    - Optimized methods of high performance and parallel computing to increase efficiency.
    - Explored a range of new and alternative statistical techniques to analyze EID events and create risk maps that incorporate spatial and time series attributes such as socio-economic status, anthropogenic activities, and climate.

  - Sub-activity 2.2.2: **Iteratively improve datasets**
    - Obtained, gridded, and created metadata for 200 spatial and time series datasets. These variables include socio-economic (e.g. human migration), anthropogenic activities (e.g. mining), and climate variables (temperature and precipitation variability).
    - Designed a web application for collaborative literature review of historic EID events.
    - Continued development of the platform to update the EID database.
    - Reviewed scientific literature to expand the references related to the original events in Jones et al. 2008, and commenced updating the events' list to 2012 (to be completed in Y4).
    - Commenced planning to solicit expert peer review of the events through a conclave of experts and researchers.
    - Revised and updated mammal host pathogen database from literature to include 570 host species, 406 viruses, and 1,580 host-virus associations.
    - Updated and completed bird virus database from literature that includes 533 avian host species, 70 viruses, and over 1,000 host-virus associations.

  - Sub-activity 2.2.3: **Design a 'Global Vulnerability' modeling strategy**
    - Designed and implemented new approach to analyze diagnostic results from GAINS; allows estimates of the number of new viruses that could potentially be detected in a given

species/sampling unit, should sampling continue. Similarly, it is now possible to estimate the number of samples required to identify any percentage of the estimated total number of viruses in a given species/sampling unit, effectively quantifying sampling completeness and providing guidance on when to decide to stop sampling for new viruses.

- Standardized the Deep Forest Human Contact (DFHC) survey approach in collaboration with PREVENT to assess and quantify human-wildlife contact rates across a disturbance gradient.
- Built Generalized Linear Models to predict spillover risk of viruses known in mammals using both host and virus traits from mammal host-pathogen database.

LOW 3: Outbreak Response Capacity Building

Howler Monkey Deaths in Bolivia	
Background	From the beginning of March to April 03, 2012, five red howler monkeys (*Alouatta seniculus*) were found dead in a Wildlife Refuge Park ("Ambue Ari") in the surroundings of Guarayos (Department of Santa Cruz). PREDICT was informed and asked to collaborate in the investigation.
Investigation	No clinical signs were reported in animals or humans in the affected area, except for the deaths. Carcasses of two monkeys were shipped by local veterinarians to the Municipal Zoo for necropsy. PREDICT staff performed post-mortem examinations and found diffuse hemorrhages and petechiae on different organs (mainly the liver), splenomegaly, enlarged lymphatic nodes, and kidney congestion.
	Liver tissue samples were submitted to the Institute of Molecular Biology (IBMB, University of San Andres) for flavivirus and arenavirus testing. Liver formalin-preserved samples were submitted for histopathology to La Paz Military Hospital (COSSMIL).
	Flavivirus infections were confirmed in both individuals at IBMB laboratory (by RT-PCR), and further studies were conducted at the Bolivian Reference Center for Tropical Diseases (CENETROP). Final sequencing of the flavivirus positives was conducted at the IITCUP (Instituto de Investigaciones Técnico-Científicas de la UNIPOL, Policía Boliviana). Results were made available on June 5th, showing over 95% identity with yellow fever virus. Additional sequence analysis was conducted through the PREDICT Pathogen Discovery team to investigate strain type.

Collaboration	On April 05, 2012, PREDICT communicated the event and laboratory findings to the Ministry of Public Health and PAHO Bolivia. PREDICT was requested by the Ministry of Public Health to become involved in discussions regarding outbreak response activities in Santa Cruz. Specific disease control measures were adopted, including human vaccination campaign, reduction of mosquito populations, field investigations on monkeys and humans, and education/awareness campaigns.