PREDICT Update No. 2
(April – September 2016)

Highlights:
Wildlife farm surveillance & significance of results

In July 2016, PREDICT worked with the Department of Animal Health to release the final results from PREDICT-1 surveillance of wildlife farms in Viet Nam. The information represents the first data on viruses circulating in farmed wildlife in Viet Nam. The findings support concerns that wildlife farms are associated with factors that increase the risk of pandemic emergence. Viruses from viral families of public health concern (**Coronaviruses** and **Rhabdoviruses**) were detected in wildlife on **62%** (18/29) of the farms screened. More than one virus was detected on some farms and viruses were detected in multiple species. The viruses detected included both known viruses and novel viruses with evidence of cross species transmission. These viruses will be further characterized under PREDICT-2.

PREDICT Surveillance on Wildlife Farms in Viet Nam: Viruses Identified, Positive Species and Positive Farms

Viral Family Tests Performed	Viruses Identified	No. Positive Individuals/ No. Tested (Species)	No. Positive Farms/ No. Farms Tested
Flavi- Arena- Bunya- Hanta- Paramyxo- Rhabdo- Influenzas Corona- Filo- *Non-human primates were also tested for: Alphav- Henipa- Retro-	Known Coronavirus a known alphacoronavirus Bat Coronavirus 512/2005 (Genbank Accession no. NC_009657)	25/333 Malayan porcupines 3/57 Bamboo Rats (Rhizomyinae subfamily)	16/29
	Known Coronavirus a known avian gammacoronavirus Infectious bronchitis virus (IBV Genbank Accession No. KP036505)	1/333 Malayan porcupines 1/57 Bamboo Rats (Rhizomyinae subfamily)	2/29
	Novel Rhabdovirus PREDICT_RbdV-15: a new Rhabdovirus found in feces from porcupines in Viet Nam and saliva from macaques in Viet Nam and Bangladesh	5/333 Malayan porcupines 2/14 Long-tailed Macaques (3 Pig-tailed, 1 Stump-tailed, and 1 other species of Macaque were negative)	4/29

Table 1: Viruses identified in samples collected from 409 individual wildlife from 29 wildlife farms in Dong Nai Province, Viet Nam, between March 18 - 29, 2014. Approximately 2 farms were selected for sampling from each district of Dong Nai Province. Farms raising mammals were prioritized and sampling was focused on rodents and non-human primates. Samples were screened with consensus PCR probes to detect viruses from viral families of public health concern. PCR products were sequenced and compared to viral genetic databases to identify the specific viruses detected and interpret results.

Wildlife farming has been present in Viet Nam since the 1800s, but the practice has increased dramatically in scale and scope over the past decade. In 2005, according to government records, 579 farms were registered in Viet Nam. By 2013, 360 wildlife farms were registered in the Hanoi metropolitan area alone, with thousands of farms registered across the nation. The highest concentration of wildlife farms is in the southern region of Viet Nam.

* **Cover photos:** (left to right) Pig-tailed macaque, Malayan porcupine and Asian palm civet on wildlife farms in Dong Nai Province, Viet Nam

Wildlife farms are located in agricultural zones and within close proximity to cities with high human population densities. In Dong Nai Province, where PREDICT-1 surveillance of wildlife farms was conducted, 1,366 wildlife farms (120,813 animals) were registered by the Dong Nai Forest Protection Department (FPD) according to records completed in 2013.

PREDICT-2 will continue to focus on the wildlife farm interface in Viet Nam as part of a One Health approach to understanding the dynamics of zoonotic virus evolution, spillover from animals to people, amplification, and spread to inform prevention and control.

Common species (885 farms)	Endangered species (381 farms)
Malayan porcupine, Chinese ratsnake, Asian palm civet, Sambar deer, Sika deer, Ring-necked pheasant, Wild boar, Bamboo rat, Bocourt's water snake, Tokay gecko, Asian leaf turtle, Malayemys turtle, Chinese softshell turtle, Junglefowl	Indian rat snake, Siamese crocodile, Asian water monitor, Indian cobra, Indian python, Elongated tortoise, Giant asian pond turtle, Java mouse-deer, Crab-eating macaque, Stump-tailed macaque, Pig-tailed macaque, Copperhead ratsnake, Bear (70 farms)

Table 2: Wildlife species farmed in Dong Nai Province according to the Dong Nai Forestry Protection Department 2013 report.

Capacity Building

• PREDICT provided lectures on the risks of zoonotic disease emergence associated with wildlife trade practices in Viet Nam at two trainings in Dak Lak Province and Da Lat City, organized by DAH-FAO and WCS respectively. The Dak Lak training engaged animal health, public health and environment officials and stressed the critical importance of a coordinated One Health approach in reducing the threats of infectious disease emergence. The Da Lat training included wildlife law enforcement officers working along Viet Nam's borders with Cambodia and Lao PDR, and highlighted the important role they play in preventing the spread of pathogens and pandemic disease emergence by preventing illegal wildlife trade. PREDICT-2 training activities to date have involved **113 individuals** (78 male, 35 female).

Photo 1: Collecting feces samples from porcupines on a wildlife farm in Dong Nai Province.
Photo credit: WCS Viet Nam

Photo 2: Wildlife farm surveillance results presented to sub-DAH and FPD of Dong Nai Province, July 2016.
Photo credit: WCS Viet Nam

Photo 3: Law enforcement training in Da Lat for officials tasked with preventing the illegal trade and trans-border movement of wildlife. Photo credit: WCS Viet Nam

Surveillance and Field Activities

• PREDICT conducted surveillance along the wildlife trade animal value chain in Viet Nam by working with government agencies and local rescue centers to collect samples from wildlife confiscated from the illegal wildlife trade.
• Morbidity and mortality events reported in non-human primates were investigated. Samples were collected and necropsy exams were performed, but no evidence of a disease outbreak was found.
• Species sampled this period included gibbons, pangolins, leopard cats and palm civets. PREDICT-2 surveillance activities to date have resulted in the collection of **585 specimens** from **135 individuals.**

Laboratory Development/Testing

• PREDICT partner laboratories in Viet Nam (RAHO6, NIHE and VNUA), received the PREDICT-2 Protocols and Universal Control this period. Laboratory capacity assessments were performed at the Pasteur Institute in Ho Chi Minh City (PI-HCM) with plans to extend PREDICT laboratory protocols to PI-HCM for testing of human samples as part of the LISN project in Viet Nam. The PREDICT protocols and University Control provide the technology required to identify novel viruses in specimens collected from humans, wildlife or domestic animals.
• RAHO6 is currently testing 185 nasal swabs from domestic swine with PREDICT protocols for Paramyxovirus, Coronavirus, Influenza, Flavivirus and Filovirus as part of a pilot study in preparation for extending PREDICT testing to livestock species in Viet Nam.

Stakeholder Engagement and Partner Coordination

• PREDICT participated in the Global Health Security Agenda external technical review meeting held April 26-27, 2016, in Hai Phong City. PREDICT contributed to the discussions with more than 100 participants from the human and animal health sectors that were focused on developing targeted activities to reduce disease prevalence and prevent infectious disease emergence in Viet Nam.
• PREDICT provided technical inputs in the multi-stakeholder process to develop the Viet Nam Coordinated Surveillance for Influenza and Other Viruses with Pandemic Potential (LISN) network. The collaborative initiative involves concurrent surveillance and coordinated testing of humans, wildlife and domestic animals for influenza and respiratory pathogens in Dong Thap and Quang Ninh Provinces.
• PREDICT also participated in consultations organized by the Viet Nam One Health Partnership for Zoonoses (OHP) by providing reviews and recommendations on studies regarding the economic cost of rabies and developing a risk analysis and assessment program for food safety and zoonotic disease.

References:
• WCS 2008. Commercial wildlife farms in Vietnam: a problem or solution for conservation? Wildlife Conservation Society, Hanoi, Vietnam.
• P.A. HN: Nâng cao quản lý cơ sở nuôi động vật hoang dã. As at 13 Sep. 2016.
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Contact information:
Amanda E. Fine, VMD, PhD
Wildlife Conservation Society
Room 1302, 57 Lang Ha Street,
Ba Dinh District,
Hanoi, Viet Nam
Tel: +84 4 35149750
Email: afine@wcs.org

PREDICT partners in Viet Nam:
• Department of Animal Health, Ministry of Agriculture and Rural Development (MARD)
• National Institute of Hygiene and Epidemiology (NIHE), Ministry of Health (MoH)
• Viet Nam National University of Agriculture (VNUA)
• Regional Animal Health Office No. 6 (RAHO6)