Canada's Inter-agency Wild Bird Influenza Survey

Operational Plan – 2011-12

Introduction

Canada's wild bird influenza survey has been carried out each year since 2005. It is undertaken by the governments of Canada and of Canada's provinces and territories, and is coordinated on behalf of these government agencies by the Canadian Cooperative Wildlife Health Centre (CCWHC). This proposal for a Survey in 2011 is based on discussion by that Committee during a teleconference on 14 February 2011. During the teleconference, there was widespread support for the Survey being continued in 2011-12. Government budgets will not be known until April 2011, but all major participants in the 2010 Survey indicated their intention to continue to support the 2011-12 Survey at the same level as in the previous year.

Surveillance Using Wild Birds Found Dead

Purpose: The main purpose of this element of the Survey is to achieve vigilance for highly-pathogenic avian influenza viruses (HPAI) that threaten animal or human health. Secondary purposes are to sample a wide range of wild bird species in order to gain a better understanding of which species may be important in the circulation of influenza viruses, and to characterize any influenza viruses detected.

Procedures: Provincial and Territorial governments will take primary responsibility for organizing the detection of dead wild birds and their conveyance to participating veterinary diagnostic laboratories. Procedures and the scale of activity may differ among provinces and territories. The degree of vigilance achieved by the Survey will depend on the number of specimens examined in each area of the country. The table below shows the number of dead wild birds tested in 2010 from each province and territory. It is hoped that at least 3000 dead birds will be tested Canada-wide in 2011 12, and that areas that have been under-represented in the past will be better represented in 2011-12.

DEAD BIRD SURVEY 2010:

Number of dead birds tested and matrix PCR positives between Jan. 01 & Dec. 31, 2010

Region	Year to Date			
		Submitted	Tested	Matrix Positive*
British Columbia		296	296	1
Alberta		59	59	1
Saskatchewan		362	362	2
Manitoba		8	8	0
Ontario		370	370	0
Quebec		405	405	2
New Brunswick		10	10	0
Nova Scotia		63	63	0
Prince Edward Island		129	129	0
Newfoundland		135	134	1
Yukon Territory		13	13	0
Northwest Territories		1	1	0
Nunavut		11	11	0
Total		**1862**	**1861**	**7**

* No highly pathogenic viruses were detected

Engaging the public to report dead wild birds is one option each province and territory may choose to use to improve sample numbers and, thus, vigilance. Since ducks are a group of wild birds commonly infected with influenza viruses and since other aquatic birds such as gulls and shorebirds are known sometimes to be infected, an alternative to engagement of the general public is to engage government and private-sector biologists and nature groups who are most likely to encounter dead aquatic birds during their activities. Whether or not to engage the public, and the level of public engagement, are the prerogatives of each province and territory to decide.

- Dead wild birds will be examined in participating laboratories for cause of death and will be tested by PCR for avian influenza virus. Samples to be tested for influenza will consist of two swabs, one from the oropharynx and one from the cloaca, combined in one vial of virus transport medium and tested as a single sample, as noted in greater detail below under General Survey Methods. All matrix protein gene-positive samples will be tested by PCR for H5 and H7 viruses and any samples positive by these tests will be sent to the National Centre for Foreign Animal Diseases (NCFAD) for further characterization.

- The notion of vigilance implies rapid testing of birds found dead. Each interval in the chain of events from finding a dead bird to conveying it to a laboratory to testing the bird to entering the test results in the national database can impose a delay and reduce vigilance. All participants in this element of the Survey must take all feasible steps to reduce these potential delays and minimize the interval between finding a dead bird and obtaining the test result for influenza.

Element #2 – Surveillance for Influenza Viruses Circulating in Wild Bird Populations in Canada

Purpose: The purpose of this element of the Survey is to obtain and characterize a representative sample of the Influenza A viruses circulating in wild bird populations across Canada in summer and fall of 2011. Wild ducks, in particular, constitute the largest known reservoir and source of Influenza A viruses world-wide. This element of the Survey contributes to understanding patterns of virus occurrence over multiple years and the genetic changes and exchanges which occur within this important reservoir of Influenza A viruses. This element of the Survey is of particular interest and importance to assessing risks to agriculture and to public health.

Procedures: Apparently-healthy, live wild birds will be captured during routine banding operations or special collections specifically for this survey.

Prairie Canada

Dabbling ducks, particularly Blue-Winged teal, will be sampled at locations in Manitoba, Saskatchewan and Alberta in a program funded by the US Department of Agriculture with some in-kind contributions from Canada. Approximately 600 ducks will be tested.

Northeastern Canada

Approximately 2000 samples of a wide range of species of aquatic birds will be sampled in Quebec, Nunavut and the Maritime Provinces and tested. This program is funded by the National Wildlife Health Centre of the US Geological Survey with some in-kind contributions from Canada.

General Survey Methods – All Elements

- Both a cloacal and an oral swab will be taken from each bird and combined in a single vial containing 3 ml of virus transport medium. Swab tips will remain in the vials until

the samples are tested. For samples taken in the field, vials will be placed directly into a liquid nitrogen container and will be held at -80C or colder until processed at a laboratory. Samples will be re-frozen at -80C or colder immediately after testing at regional laboratories.

- Regional laboratories in the Avian Influenza Virus Laboratory Network will test each sample by PCR for the matrix protein gene, and also for H5 and H7 protein genes. The newest PCR primers for matrix protein gene, H5 and H7 genes available from NCFAD will be used to ensure detection of the broadest possible range of Influenza A viruses, including the 2009 H1N1 strain.

- PCR testing of wild birds found dead should be completed within four working days after the bird is received by the laboratory.

    - Results of matrix protein PCR should be entered into the Survey database and displayed on the CCWHC website within two working days of completing PCR tests.

- All samples that are positive by PCR test for H5 or H7 viruses will be sent immediately to the National Centre for Foreign Animal Diseases (CFIA – Winnipeg) for further characterization. As viruses are further characterized, these results, also, should be entered into the Survey database.

GENERAL BACKGROUND

In 2005, Canada initiated a national inter-agency survey for influenza A viruses in healthy live wild ducks. This survey was stimulated, in the first instance, by a major outbreak of influenza in the Canadian poultry industry in 2004, and subsequently by the spread of the Asian H5N1 highly pathogenic strain from SE Asia to Europe and Africa in 2004-05. The Survey objectives were to identify strains of influenza viruses present in Canada's wild bird reservoir, to acquire information needed to assess the biosecurity of Canada's poultry industry, and to monitor viral genes of concern to human and animal health.

From 2006 to 2010, the wild bird influenza survey was continued, with both live bird and dead bird components. The objective of the survey based on birds found dead was vigilance for highly pathogenic virus strains and careful assessment regarding whether or not influenza viruses had caused the death of the birds. The objectives of the live bird survey were to monitor year-to-year variation in viruses present in the wild duck population, to sample in the eastern Canadian arctic to which trans-Atlantic migrant birds might carry the virus from European or African wintering grounds, to sample species that migrate seasonally deeply into Central and South America, and to sample additional species of aquatic birds to better understand the wildlife reservoirs of influenza A viruses.

These Surveys have been highly successful. The importance of wild duck populations as reservoirs for avian influenza viruses, particularly compared with other related bird species, was clarified. The probable precursor virus of Canada's 2004 and 2005 influenza outbreaks in poultry, a low-pathogenicity H7N3 strain, was discovered in wild duck populations. Canada's national *Avian Influenza Virus Laboratory Network* was greatly strengthened through the conduct of the Surveys. New communications challenges associated with responses to important epidemic diseases were identified and protocols were established to overcome them. Collaborations among federal, provincial and territorial agencies responsible for animal health, public health and wildlife, and with Canada's veterinary college wildlife health expertise, were greatly advanced through the planning and conduct of the Surveys, and new tools and methods for complex data management on a national scale were developed, tested and improved. The entire genetic composition of over 100 avian influenza viruses has been sequenced and is now being analysed for evidence of intercontinental virus movement, among other parameters. Through this Survey, Canada participates in Canada-USA-Mexico Tri-lateral collaborations for continental surveillance for avian influenza, and in analysis of the risks posed to commercial poultry by avian influenza viruses in wild birds, collaboratively with the US Department of Agriculture.

Consultation with the Survey Steering Committee: In February 2011, the Steering Committee of the Inter-agency Wild Bird Influenza Survey met by teleconference to review survey options for 2009. There was wide support for continuing and further enhancing surveillance based on wild birds found dead. There also was wide recognition of the value of surveillance based on live birds and concern that live bird sampling also should continue if possible, in 2011.

RATIONALE FOR AVIAN INFLUENZA SURVEILLANCE
IN WILD BIRDS IN CANADA IN 2011:

Surveillance for Avian Influenza in wild birds serves several important purposes.

Protection of Canada's export trade in poultry and poultry products

- Mitigation efforts to minimize the socioeconomic impact of the most recent occurrence of Avian Influenza in poultry in BC (domestic ducks, fall 2005; domestic turkeys January 2009), and Saskatchewan (fall 2007) benefited greatly from background information on virus strains in wild ducks and the evidence of Canada's high level of veterinary infrastructure provided by the wild bird survey. It is predicted that current, credible data on avian influenza strains in wild birds in Canada will similarly reduce the socioeconomic impacts of future outbreaks of Avian Influenza in commercial poultry in Canada. Conversely, absence of such data is an important risk factor for larger socioeconomic impacts. Biosecurity issues for the Canadian poultry industry have been clarified by the Survey.

Early detection of highly pathogenic Avian Influenza (HPAI) strains

- Surveillance based on wild birds found dead is a sensitive surveillance method for detection in wild birds of HPAI strains, such as the Eurasian H5N1 strain, irrespective of how these strains may arrive

in Canada. Detection of such strains as early as possible upon their arrival or evolution in Canada is one of the most critical mitigation factors in reducing their human health and socioeconomic impacts.

Maintenance and improvement of national laboratory and surveillance capacity for Avian Influenza viruses

- Analysis of wild duck samples in 2005 identified many weaknesses in Canada's national capacity to manage Avian Influenza in any species, but the survey also produced many solutions and improvements to national capacity. These were further tested in subsequent surveys and were further improved. Continuation of the wild bird survey will play a critical role in maintaining national Avian Influenza surveillance capacity, including field, laboratory, and communication components, and contributions to the evolution of government policies.

Risk analysis and risk communication

-The risk factors posed by Avian Influenza viruses in wild birds in Canada to the poultry industry, human health, other human economies and natural resources can only be assessed on the basis of correct information about the range of Avian Influenza virus strains, their distribution among species and regions, their variation among years, regions and species, and the extent of interchange with pools of virus strains in Asia, Europe, Central and South America. Wild bird Avian Influenza surveillance is the only means of obtaining this information.

International contributions and obligations

- In the current climate of concern regarding potential pandemic Avian Influenza, Canada is obliged to contribute to the global understanding of Avian Influenza virus strains in wild birds, since wild birds are the ultimate global reservoir of the Avian Influenza gene pool. Canada is geographically situated such that early detection of foreign virus strains arriving in the Americas via transatlantic bird migration can best be achieved by surveillance conducted in Canada. Canada also must consider potential routes of virus transfer from the Americas northward into Canada and from Canada southward to the Americas.