Canada's Inter-agency Wild Bird Influenza Survey

Draft Proposal for the 2010-11 Survey

Version 1 – 25 January 2010

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 2010-11 is based on a discussion paper prepared for the Survey Steering Committee and on discussion by that Committee during a teleconference on 15 January 2010. During the teleconference, there was widespread support for the Survey being continued in 2010-11. Government budgets will not be known until close to 1 April 2010, but all major participants in the 2009-10 Survey indicated their intention to continue to support the 2010-11 Survey to at least the same level as in the previous year.

Since the total of funds available for the 2010-11 Survey is not known at the present time, this proposal describes three separate Survey components in order of the priority for implementation. Funding levels will determine whether one, two or all three elements can be included in the 2010-11 Survey, and also the scale of the first two elements. The scale of the Survey also may be extended through collaborations with scientists in the provinces and in the United States.

This proposal is offered for review by Steering Committee members in order to achieve a general agreement on aims and elements of a Survey in 2010-11. Comments on this version are requested by Friday, February 19th 2010, and should be sent to the Survey Coordinator, Ted Leighton of the CCWHC, at <Ted.Leighton@Usask.ca>.

Survey Element #1 – 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. In general, the practices followed in 2009-10 will be followed again, or enhanced, in 2010-11.

- 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 2008-09 and during the first 10 months of 2009-10. It is hoped that at least 3000 dead birds will be tested Canada-wide in 2010-11, and that areas that have been under-represented in the past two years will be better represented in 2010-11.

Province/Territory	**Samples achieved in 2008-09**	**Samples achieved as of 21 January 2010**
NF & Labrador	145	228
Nova Scotia	153	107
Prince Edward Island	192	127
New Brunswick	61	18
Québec	881	403
Ontario	759	482
Manitoba	51	2
Saskatchewan	267	333
Alberta	57	115
British Columbia	285	281
Nunavut	19	5
Northwest Territories	13	6
Yukon	26	6
Totals	2909	2113

- 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

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. The CCWHC will work with all participants in this element of the Survey to reduce 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 Duck 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 duck populations across Canada in summer and fall of 2010. Wild ducks 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 ducks will be captured during routine banding operations in the selected target area. Sampling will focus on mallards, because they are wide-spread and regularly infected with a large number of different influenza viruses, and blue-winged teal, because they are long-distance migrants which connect Canada to Central and South American Influenza A virus populations, and also have a high rate of infection.

- Sampling of live wild ducks will be done on a small scale in 2010, limited by available funding. At present, collection of a total of 800 samples from live wild ducks is proposed for funding by Canadian federal agencies. Collaborations with provincial programs, such as that of Newfoundland and Labrador, and with American scientists, will expand the scale of this element by providing additional test results. Sampling also will focus on birds hatched in summer 2010, since this age-class is expected to have the highest rate of infection with influenza viruses.

- The geographic locations where sampling will occur will be selected to be most representative of influenza viruses present across Canada. Analysis of wild duck band-return data by Survey analysts, and a more complex analysis using Canadian and

American data,[1] both identify the prairie pothole region of southern Manitoba, Saskatchewan and Alberta as a key location where wild ducks from this area and from breeding areas far to the east, north and west congregate in late summer and fall and from which these ducks then migrate to areas far to the west, east and south. If only one geographic area can be sampled, the prairie pothole region is the region that will be most representative of viruses currently present in, or likely to move to, the widest range of Canadian territory, if sampled in late August-early September. Based on Survey data from previous years, it can be anticipated that approximately 20% of mallards and blue-winged teal sampled at this time in the prairie pothole region will be infected with one or more influenza viruses. From a collection of 800 samples, we can anticipate 160 to be positive by PCR and, again based on Survey data, that virus will be cultured from about 40% of these – 64 viruses recovered for characterization. The proposed sampling plan is tabulated below.

Proposed Sampling Plan for Live Wild Ducks - 2010		
Location of Sampling	**Species to be Sampled**	**Number to be Sampled**
Prairie Pothole Region	Mallards	400
	Blue-winged teal	300
	Other Dabblers	100
Total		**800**

- Planned collaborations with other influenza surveillance and research programs will provide additional results to the 2010 Survey. In 2009, Newfoundland and Labrador sampled and tested 1163 live aquatic birds, and in 2008 British Columbia sampled and tested 181 live wild ducks. Similar programs carried out by the provinces and territories would extend the 2010 Survey. Through collaboration with American scientists, it is anticipated that 800 dabbling ducks and 1000-1500 aquatic birds of other species will be sampled in eastern and northern Canada.

- If funds are available to permit additional sampling of live wild ducks in 2010, the second geographic area to be sampled would be coastal British Columbia. Band return data indicate that ducks found in coastal areas of British Columbia primarily move north and south along the Pacific coast and into Alaska. Thus, the viruses present in ducks in coastal BC may not be fully represented in late summer samples from the southern Canadian prairies, which also potentially will include ducks and viruses originating in Alaska, of from interior BC locations. Logistical issues associated with sampling 300 or more live wild ducks in late summer or early fall in Coastal BC will have to be solved to

[1] Final Report. Avian Influenza Risk Assessment for the United States: Modeling Pathways of Disease Spread by Wild Birds, July 2009. P.F. Doherty and K.R. Wilson (eds). Final Report to the USDA/WS/APHIS/National Wildlife Research Center. 1-107.

make this sampling feasible. A very low infection rate (5%) was present in a winter collection of live wild ducks carried out by the Survey in the lower Fraser Valley in 2006. This is typical for winter samples of ducks in North America, and thus a winter collection on an affordable scale is likely to yield very few viruses for characterization.

Element #3 - Surveillance at the Wild Bird-Poultry Interface

Background: In 2007-08, the Survey sponsored a study of the use of poultry farms by wild birds. Twenty-one farms in southern Ontario and 20 in the Fraser Valley of British Columbia were monitored each month for 12 months by professional ornithologists. The starling (*Sturnus vulgaris*) was the species present most commonly on poultry farms in both BC and Ontario. Starlings were one of three species seen to enter poultry barns (the others were the rock pigeon and barn swallow). Little published information about infection in this species exists, but infection has been detected. In Canada's wild bird Survey, 136 starlings found dead have been tested and 2 (1.5%) were positive by PCR for the matrix protein gene.

Purpose: The purpose of this element of the Survey is to carry out a pilot study to determine the infection rate of wild birds which make abundant use of poultry farm habitat. The results of the pilot study will be of value directly to issues of on-farm biosecurity, but also will be used to determine whether or not further studies of this nature would be of value to bio-security issues and, if so, how best to design such studies.

Procedure: The pilot study would be undertaken in summer 2010 and would sample at least 300 starlings in the region of commercial poultry farming around Guelph, Ontario. Locations would be chosen to ensure that poultry farms would not be at risk of regulatory action should an important strain of avian influenza be detected in the starlings. Samples from all birds which test positive for matrix protein gene by PCR would be sent to NCFAD for virus characterization.

- Capture of starlings will be done using mist nets. Since other species will be caught during capture of starlings, permits to sample and band all birds captured will be sought.

- Oropharyngeal and cloacal swabs will be taken from each bird, placed together in a single vial of virus transport medium, and analyzed together by PCR. Since a collaborating scientist is willing to test these birds for antibodies to influenza A viruses, a small blood sample also will be taken if this sampling can be made feasible within the bird handling protocol and budget. All birds will be banded with standard USFWS aluminum bands and released after sampling.

- The Survey will work closely with the Ontario Ministry of Natural Resources and the Canadian Wildlife Service to ensure that this study is carried out with all required permits in place. The study will be submitted for approval to an animal care review committee recognized by the Canadian Council on Animal Care.

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.

- In Survey Element #1, 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.

- In Survey Element #2, all PCR tests should be completed, and results entered into the Survey database, within 6 weeks of field collection of samples from live birds.

- All samples that are positive by any PCR test will be sent to the National Centre for Foreign Animal Diseases (CFIA – Winnipeg) for further characterization of all influenza A viruses. As viruses are further characterized, these results, also, should be entered into the Survey database within two working and communicated according to the 2009 Survey communication plan (see 2009 Survey Plan at <http://www.ccwhc.ca/documents/word_proposal_09.pdf >) .

- An analytical team consisting of scientists from CFIA, PHAC, EC and CCWHC will review results regularly as the Survey progresses, and will communicate significant findings and observations to other Survey participants in a timely manner.