

## ATTACHMENT 5

### Surveillance for Highly pathogenic H5N1 avian influenza in Hunter-killed Birds

#### *Overview*

Check stations for waterfowl hunting are operated by some state natural resource agencies and National Wildlife Refuges to collect information on local waterfowl harvest. Hunter check stations provide an opportunity to collect additional samples to monitor for the presence of Highly pathogenic H5N1 avian influenza virus and other avian influenza (AI) virus subtypes. This sampling would supplement live bird surveillance (Attachment 4) by increasing the number of selected species, geographic locations, and time periods represented in surveillance efforts. Previous and current studies that have sampled hunter-killed waterfowl to detect AI include an ongoing 20-year study in Ohio by Dr. Richard Slemons of Ohio State University, current work in North Carolina by Dr. David Stallknecht of the Southeastern Cooperative Wildlife Disease Study (the North Carolina Wildlife Resources Commission has been collecting samples from hunter-killed ducks and tundra swans for Dr. Stallknecht), and sampling in New Mexico, Texas, and Maryland by state wildlife agencies and/or university researchers. A number of the state natural resource agencies and other researchers are developing plans to sample hunter-killed birds for AI in 2005 and/or 2006.

This conceptual surveillance strategy includes (1) sampling birds killed in fall by sport hunters and in summer by subsistence hunters in Alaska; (2) sampling birds killed in fall in the lower 48 states. As with surveillance of live-captured birds, sampling hunter-killed birds in Alaska will focus on hunted species that are most likely to be exposed to HPAI in Asia, and that have relatively direct migratory pathways from those areas to Alaska (primary species). Additional samples collected on the wintering grounds in the lower 48 states will include both primary species and species that mix with the primary species in Alaska staging areas (secondary species). Currently, the probability of highly pathogenic H5N1 avian influenza virus transmission from primary species to secondary species is poorly understood, but AI viruses are known to remain viable for months in cold freshwater. From a surveillance standpoint, if secondary transmission proves to be potent and extensive, a very large number of species could be involved. However, this conceptual program is focused on early detection, with adaptation to more intensive efforts as needed. Thus, it is recommended that sampling efforts involving hunter-killed birds in the lower 48 states should concentrate on the species/populations and wintering areas in which the presence of highly pathogenic H5N1 avian influenza virus is most likely to be detected. Some research indicates that susceptibility may vary among game birds. The complete design, implementation and development of an operational plan and the funding necessary for this strategy requires closer coordination with states through the Flyway Council system.

A similar approach to investigate the possible movement of Highly pathogenic H5N1 avian influenza virus from Europe could be developed. There are few data on migratory bird movement rates between North America and Europe, but the band recovery data that are available suggest very low exchange rates. Presently we only have data on movement from North America to Europe, but if we make the tenuous assumption that movement rates are similar in both directions, then only 3 species emerge as likely primary species: Eurasian wigeon, northern pintail, and green-winged teal. Of American wigeon banded in the Atlantic Flyway, only 6 of 2,211 recoveries (0.27%) were from Europe. The rates for northern pintail and green-winged teal are 0.06% (3 of 5,341 recoveries) and 0.04% (5 of 12,274 recoveries), respectively. If immigration rates are similar to emigration rates, and if those rates are indicative of the proportion of eastern North American birds that are immigrants from Europe, the chance of sampling even one hunter-killed immigrant is very low. Some common eiders (Keith McAloney, Canadian Wildlife Service, personal communication) and North Atlantic Population Canada geese (Fox et al. 1996) move back and forth between northeastern North America and Greenland, where they could interact with birds from mainland Europe. Likewise, the high-arctic Atlantic brant that breed in North America and winter in Ireland also come into contact with European birds. Thus, these are additional species that should be considered when implementing surveillance for highly pathogenic H5N1 avian influenza virus in the Atlantic flyway.

## ***Methodology***

### Alaska

The surveillance of live-captured birds strategy (Attachment 4) has provided the biological basis for identifying the primary species recommended for sampling in Alaska. Below is a list of these target species and sampling locations recommended for surveillance of hunter-killed birds.

#### *Samples from fall hunters:*

- Northern pintail: Mendenhall Refuge, Minto Flats, and Cook Inlet
- Lesser sandhill crane: Delta Junction
- Black brant: Cold Bay
- Common eider, king eider, long-tailed duck: Kodiak National Wildlife Refuge, and perhaps cooperating hunting guides along the coast of Alaska.

#### *Samples from summer hunters:*

- Seward Peninsula: lesser sandhill crane, bar-tailed godwit, long-billed dowitcher
- Yukon-Kuskokwim Delta: black brant, emperor goose, common eider, king eider, northern pintail, long-tailed duck
- Barrow: common eider, king eider, black brant, long-tailed duck, glaucous gull
- St. Lawrence Island: emperor goose, black brant, common eider, king eider

### North American Flyways

There are at least 25 states in which either the state wildlife agencies or USFWS routinely check hunter harvested birds: 9 in the Atlantic Flyway, 7 in the Mississippi Flyway, 4 in the Central Flyway, and 5 in the Pacific Flyway. Those 25 states and most other states have already expressed some willingness to collect samples from hunter-killed birds. States are encouraged to develop specific implementation plans in consultation with their respective flyway council using the guidance provided in this strategic plan.

Four primary target species/populations have been identified for highly pathogenic H5N1 avian influenza virus sampling in the lower 48 states: northern pintail, Pacific black brant, Wrangel Island snow geese, and lesser sandhill crane (mid-continent population). Also, several secondary species that mix with the primary species in Alaska (and thus have an increased risk of exposure to highly pathogenic H5N1 avian influenza virus) and later winter in the 4 flyways have been identified (see below). Given the ephemeral nature of birds at specific sites along their migration routes, sampling efforts for both primary and secondary species should be concentrated on the wintering grounds.

The target species/populations and general sampling locations presented in this document are based on band recovery and in some cases radio telemetry data for birds banded in Alaska. Specific sampling sites (i.e., check stations or other areas where hunter-harvested birds could be sampled) will be determined by the individual states and National Wildlife Refuges that elect to participate in the sampling.

*Pacific Flyway:*

- Northern pintail (primary species): Central Valley of California
- Wrangel Island snow geese (primary): Skagit-Fraser Rivers Delta, Washington and British Columbia
- Black brant (primary): Humboldt Bay, California and San Quintin Bay, Mexico if permits to collect samples and ship them to the U.S. can be obtained
- American wigeon combined (secondary): Central Valley of California
- American green-winged teal (secondary): Central Valley of California
- Northern shoveler (secondary): Central Valley of California
- Cackling goose (secondary): Northwest Oregon/Southwest Washington permit goose areas
- Pacific greater white-fronted geese (secondary): Central Valley of California
- Tundra Swan (secondary): Montana and Utah
- Mallard (secondary): western Washington

*Central Flyway:*

- Lesser sandhill crane (primary): New Mexico, west Texas, Nebraska
- Northern pintail (primary, but few from Alaska): Gulf Coast, Texas
- Lesser snow goose (secondary): North Dakota, Nebraska
- Mid-continent greater white-fronted geese (secondary): Texas
- American wigeon (secondary): Gulf Coast, Texas
- American green-winged teal (secondary): Gulf Coast, Texas
- Northern shoveler (secondary): Gulf Coast, Texas

- Tundra Swan (secondary): North Dakota, South Dakota
- Mallard (secondary): Oklahoma, Texas, Nebraska

*Mississippi Flyway:*

- Northern pintail (primary, but few from Alaska): Gulf Coast, Louisiana
- Mid-continent greater white-fronted geese (secondary): Louisiana
- American wigeon (secondary): Gulf Coast, Louisiana
- American green-winged teal (secondary): Gulf Coast, Louisiana
- Northern shoveler (secondary): Gulf Coast, Louisiana
- Mallard (secondary): Arkansas, Mississippi, Louisiana
- Lesser scaup (secondary): Gulf Coast of Louisiana, Mississippi, Alabama

*Atlantic Flyway*

- Tundra swan (secondary): North Carolina, Virginia
- Greater scaup (secondary): East Coast from Massachusetts to Virginia
- Lesser scaup (secondary): Florida, East Coast from Chesapeake Bay south
- Canvasback (secondary): Chesapeake Bay
- Long-tailed duck (secondary): East Coast from Massachusetts to Virginia

Duck breeding population estimates can provide some indication of the relative likelihood (among species) that a given hunter-killed bird came from Alaska. That is, samples from species that have a larger proportion of their breeding population in Alaska are more likely to contain birds from Alaska than samples from species with a lower proportion of their breeding population occurring in Alaska. Based on that premise, we ranked the secondary species of ducks listed above according to sampling priority. In 2005, 39% of the American wigeon breeding population occurred in Alaska, making that the highest priority species according to this criterion. The others are ranked as follows: 2. northern pintail (35% of the breeding population occurred in Alaska), 3. American green-winged teal (33%), 4. greater and lesser scaup combined (28%), 5. northern shoveler (18%), 6. canvasback (18%), and 7. mallard (10%).

As in Alaska, a sample size of 200 birds from each sample population is needed to detect highly pathogenic H5N1 avian influenza virus prevalence of 1.5% or greater with 95% power. Therefore, it is recommended that a minimum sample size goal of 200 birds per species per wintering area. Tracheal and/or cloacal samples should be collected in accordance with protocols identified in this document (Attachment 8).

**Discussion**

Sampling of hunter-killed birds would supplement targeted surveillance in live wild birds (Attachment 4) and other strategies identified in this strategic plan. The advantage to this approach is that it is cost-effective because for most of the species that are classified as game birds, existing infrastructure (e.g., check stations) is in place in most wintering areas and sufficient numbers of birds are expected to be encountered. The disadvantages to this approach are: 1) most of the sampling in the lower 48 states will be of secondary species, thus the likelihood of sampling birds that have come into contact with infected primary species birds is small, especially in the Atlantic, Mississippi, and Central Flyways; and 2)

numerous sampling sites throughout the U.S. will require sufficient training of sampling personnel to ensure samples are properly acquired, preserved, and shipped. There are advantages and disadvantages in terms of public perceptions of sampling hunter-harvested birds. Public perceptions could be positive if user-groups will appreciate that samples are being taken. Conversely, if hunters do not have accurate information about highly pathogenic H5N1 avian influenza virus, they could become unnecessarily alarmed about exposure (especially if agency samplers are wearing protective gear). For spring and summer subsistence users, providing access to birds that were historically taken illegally may make sampling difficult and basic information on highly pathogenic H5N1 avian influenza virus and the sampling program may be harder to deliver.

### **Recommendation**

Sampling hunter-killed birds would supplement other approaches in a cost-effective manner and may allow us to determine if certain species of birds (e.g., migratory game birds) are currently infected with highly pathogenic H5N1 avian influenza subtype or other AI viruses. This expanded effort to identify highly pathogenic H5N1 avian influenza virus should be considered a supplemental part of any surveillance system. Specific implementation plans and budgets should be developed in concert with affected state agencies and the flyway councils.

Unlike other surveillance approaches, the use of hunter-killed birds has high public profile. Therefore, the implementation of this action should be discussed with agencies and organizations that have experience regarding the public relations aspects of researching and assessing zoonoses (e.g., chronic wasting disease and West Nile virus) to ensure that we develop an appropriate and consistent message to hunters.

### **References**

Fox, A.D., Christian Glahder, Carl R. Mitchell, David A. Stroud, Hugh Boyd, and John Frikke. 1996. North American Canada geese (*Branta canadensis*) in west Greenland. *Auk* 113(1): 231-233.