

**Surveillance for Early Detection of  
Highly Pathogenic Avian Influenza HPAI H5N1 in Wild Birds:  
2007-08 Washington Interagency Sampling Plan  
August 20, 2007**

Avian influenza is widely endemic in wild populations of waterfowl and many other species of birds. The emergence and spread of a Highly Pathogenic Avian Influenza (HPAI) H5N1 subtype in Asia over the past few years (hereafter called HPAI H5N1) has elevated concerns about potential expansion of this virus to North America.

Apprehensions among government agencies and the public are based on a range of possibilities that include sickness and mortality in wild bird populations, introduction of a disease that could devastate the poultry industry, and potential mutation of the virus into a form that could be highly infectious and pathogenic to humans—possibly the source of a flu pandemic. Currently, public concern has been heightened by extensive media coverage about this virus in Asia, its spread to Europe, and the small number of human infections—much of it includes speculation that migratory birds are a primary vector and will bring it to North America. Thus, government agencies, particularly state and federal wildlife agencies, are being called upon to develop an early detection system to determine if and when the virus arrives in North America.

Some clarifications of terms and the current situation are warranted because the terminology of avian influenza is often confusing, and it is important that a shared understanding of this disease is accurate. For purposes of this plan, here are some key points and assumptions as of June 2007:

- Migratory aquatic birds are the natural reservoir for many of the 144 subtypes of avian influenza, named for their protein components hemagglutinin (H) and neuraminidase (N). Most avian influenza types are not very pathogenic, but the H5 and H7 types seem to be more pathogenic to domestic poultry.
- The terms “highly pathogenic” (HPAI) and “low pathogenic” (LPAI) refer specifically to pathogenicity to domestic poultry—testing for HPAI is documented by mortality rates in dosed poultry.
- Some avian influenza varieties may mutate into forms that become pathogenic to specific taxa (e.g., birds, swine, humans). The currently prominent HPAI H5N1 virus is highly pathogenic to some birds, particularly domestic poultry, but is not easily transmitted to people. This is primarily a bird disease that has infected a small number of people who have been heavily exposed to infected poultry or raw poultry parts.
- The HPAI H5N1 strain has not been detected in North America. Low pathogenic H5N1 and a wide variety of other AI types have been documented in poultry and wild waterbirds.
- The degree to which migratory birds may be agents in the spread of HPAI H5N1 is not definitive. In nearly all cases of expansion in Eurasia, movement of poultry and poultry products by humans are suspected as the primary vehicle for transmission of the virus across the continents. Mortalities of wild birds have

been associated with contact or shared use of habitats with domestic birds. However local distribution of HPAI H5N1 may be linked to transmission by migratory birds.

- Currently, there is inadequate information about the virulence of HPAI H5N1 in wild bird species, its persistence in wild populations, and the degree to which it can spread from bird to bird during seasonal and annual cycles. Fecal and respiratory contamination is assumed to be the primary mode of transmission, and viruses can remain viable for extensive periods in cold, fresh water.
- The onset of a major human influenza pandemic could result if some form of AI—HPAI H5N1 or any other type—adapted into a form that was infectious and virulent among humans and easily transmitted from human to human. It is not a given that HPAI H5N1 is the mostly likely threat for a global pandemic.

## **GOAL AND OBJECTIVE**

The overall goal of this state-level effort is to detect HPAI H5N1 in wild birds if it occurs in Washington during July 2007 through June 2008. This goal, and the goals of the national strategy and the Pacific Flyway strategy, is focused on early detection of HPAI H5N1 in wild migratory birds—not its prevalence over time, its rate of movement, or the ecology of the disease. This document is intended as a step-down approach from the draft U.S. Interagency Strategic Plan (Interagency HPAI Early Detection Working Group [IAEDWG ] 2006) and the Pacific Flyway strategic plan (Pacific Flyway Council 2006, as amended in 2007), as part of the National Early Detection System for HPAI H5N1.

The objective of this document is to provide an implementation plan for sampling wild bird species for HPAI H5N1 in Washington State, including sampling priorities, focus periods, and target locations. Planning for these surveillance efforts for HPAI H5N1 has involved extensive cooperation among federal, state, and local agencies, including U.S. Department of Agriculture APHIS/Wildlife Services (USDA), U.S. Fish and Wildlife Service (USFWS), and the Washington Interagency Avian Influenza Coordination Committee (including the agencies listed above and the Washington Department of Agriculture, Washington Animal Disease Diagnostic Laboratory, Washington Department of Health, Washington Military Department, Washington Emergency Management Division).

## **APPROACH**

### **Species Prioritization**

During development of the U.S. strategic plan, wildlife agencies in Alaska collaborated with the U.S. Geological Survey, National Wildlife Health Center (NWHC) and others to establish relative priorities among migratory bird species in terms of the relative probability that they could be exposed to HPAI H5N1 (IAEDWG 2006). The Pacific Flyway Council subsequently developed a preliminary list of surveillance candidates that reflects both “primary” species that could come directly from breeding grounds in Asia, as well as “secondary” species that would likely intermingle with Asian migrants and speculatively could be subject to secondary transmission. Monitoring abundant

“secondary” species, such as juvenile mallards, may be useful if HPAI H5N1 is not detected in Alaska but makes its way through the surveillance network via migrants to Washington. In addition, USDA (2007) developed the national Implementation Plan for HPAI Surveillance in Wild Migratory Birds in the United States, which listed wood duck as a target species for 2007 based on sampling results from 2006-07. The Washington State plan’s sampling strategies are focused on primary and secondary species occurring in Washington (see Table 1), considering national and Pacific Flyway strategic plan priorities.

Table 1. Primary and secondary candidate waterfowl and shorebird species for HPAI H5N1 surveillance of live and hunter-killed birds in Washington.

Primary Candidates	Secondary Candidates
Lesser Snow Goose (Wrangel Is.)	Cackling Goose
Pacific Brant	Mallard
Northern Pintail	American Wigeon
Western Sandpiper	American Green-winged Teal
Red Knot	Northern Shoveler
Ruddy Turnstone	Wood Duck
Swan (Tundra and Trumpeter)	

In 2007, emphasis will be placed on maintaining hunter-harvest sampling, and refocusing live-bird sampling on competent carriers (primary and secondary species). Evidence from 2006-07 sampling has shown that dabbling ducks can be significant reservoirs of low pathogenic avian influenza and are therefore could serve as asymptomatic carriers of HPAI. Based on the amended Pacific Flyway surveillance plan, sampling of pintails (Asian connections) and juvenile mallards (wild sentinel birds) will be emphasized. Sampling of shorebirds will be reduced significantly because of relatively high cost, difficulty of capture, and low prevalence of LPAI detected in the 2006 sampling program.

**Sampling Intensity**

Currently, there is no reliable information on the prevalence of HPAI H5N1 in wild bird populations—anywhere. The national and Pacific Flyway plans suggest that a minimum of 200 samples would be required to detect one positive HPAI H5N1 sample in a defined population with >1,000 individuals (probability 95%) if the virus had a prevalence of only 1%. Statistically, sampling rates need to be higher with larger populations, but could be lower if the prevalence of H5N1 was greater. This hypothetical approach assumes that the population of interest is homogenous and entirely accessible for sampling, that H5N1 is uniformly distributed within that population, and that representative sampling can be done in a random or otherwise unbiased manner, which is not the expected case in wild migratory waterfowl.

**Funding**

Federal funding for 2007-08 surveillance activities has been allocated to federal agencies

in Washington, and a portion will be passed through to state agencies. In March 2007, USDA ranked states for funding prioritization using criteria such as migratory bird relative abundance, sampling efficacy based upon that abundance, and resource capabilities of the state agencies. Washington was ranked as a level 1 State, and WDFW will receive \$100,000 from USDA to collect and ship 750 samples from live birds and hunter-killed waterfowl. These funds must be spent during FY 2008 (July 1, 2007 – June 30, 2008). In addition, USDA is receiving direct funding to collect 750 samples from live and hunter-killed birds, and 1,215 fecal samples. USDA direct non-contract expenditures must occur by the end of federal FY 2007.

USFWS will provide \$190,000 for sampling activities related to HPAI H5N1 in Washington State in 2007. This funding will be used by WDFW to collect 700 live and hunter-killed samples, and expand an extensive surveillance and sampling network for mortality events developed in 2006. Distribution of USFWS funds will follow priorities outlined in this plan.

### **General Sampling Methods**

Several methods will be employed to monitor for HPAI H5N1 presence in Washington's wild migratory waterfowl and shorebirds. This plan is intended to provide efficient surveillance with an array of methods designed in the context of regional, flyway, national efforts, and available funding. If HPAI H5N1 is carried to North America from migratory birds moving through Alaska, it is likely to move south with about 150,000 swans, 1 million geese, and 12 million ducks that leave Alaska beginning in August (>60% oriented toward the Pacific Flyway), or with hundreds of thousands of autumn migrant shorebirds that begin arriving in Washington between July and October. Many of these birds pass through and/or winter in Washington. The challenge, given existing budgetary constraints, will be to mount a detection network in Washington of sufficient coverage to detect birds potentially infected with HPAI H5N1, including a relatively small number of Asian migrants, secondarily infected birds, and locally produced birds that may acquire the virus. Additional details on sampling methods are provided in a later section, sampling strategies for the detection of HPAI H5N1 in Washington wild birds (also see summary in Appendix A).

### **Detection and Monitoring of Morbidity-Mortality Events**

An enhanced surveillance and reporting network for detecting wildlife mortality events will be continued by WDFW utilizing a toll-free telephone reporting line, combined with an existing reporting system with county health agencies to monitor bird mortalities from West Nile Virus. An expanded program to investigate mortalities will be continued to integrate with this network, along with other reports of avian mortalities. In the event of a major event, Washington cooperators will work with U.S. Fish and Wildlife Service, U.S. Department of Agriculture, the USGS National Wildlife Health Center, and state animal health authorities to implement the plan Washington Multi-Agency Response to a Highly Pathogenic Avian Influenza Animal Emergency (WSDA 2007).

In 2007, morbidity and mortality surveillance will include pro-active, systematic surveys. Priority investigations will be initiated on reports of unusual single-species die-offs and events involving known sensitive species such as diving ducks, swans, wood ducks, gulls, and shorebirds, that have epidemiology consistent with HPAI. Training of field personnel in mortality investigations will be emphasized. In addition, pro-active public education programs will be implemented.

We have utilized available population survey and hunter-harvest data to determine waterfowl concentration areas across Washington. Areas with large concentrations of waterfowl will be systematically surveyed for mortality of susceptible birds. These areas include state, federal and private lands with high waterfowl use.

#### Sampling Live Birds - Waterfowl

In Washington, banding programs can provide access to large numbers of waterfowl. Sampling during ongoing and new banding operations will focus on Asian or Alaska connections—including capture of dabbling ducks from August to October prior to hunting seasons. Following the strategies described in the amended Pacific Flyway strategic plan, live bird sampling in Washington will focus on mallards and pintails, but secondary species that meet the prioritization criteria (green-winged teal, shoveler, wood duck) will be sampled on an opportunistic basis. Samples from live birds will be cloacal and oral-pharyngeal swabs. Birds captured during testing for HPAI H5N1 will be banded to document recaptures and distribution during the 2007-08 season.

Birds that breed and molt in Washington in 2007 will not likely have the potential for contact with HPAI H5N1 unless or until they mingle with Asian/Alaska migrants. Locally produced birds can act as wild sentinel birds to detect the arrival of HPAI H5N1 after migrants from Alaska have arrived. This is based on findings that: (1) mallards and pintails are known reservoirs of low pathogenic viruses with higher prevalence rates than some other species; (2) juvenile ducks have the highest prevalence of LPAI among North American surveys; and (3) the rate of virus shedding is high during late summer and early migration staging. Sampling of local mallards will occur during late summer banding, after migrants from Alaska are known to occur in the area.

#### Sampling Live Birds - Shorebirds

As a group, the shorebirds represent an important potential source of information regarding the early detection of HPAI H5N1 in Washington, although sampling intensity will be reduced in 2007 based on results of 2006-07 sampling efforts. Samples (cloacal and oral-pharyngeal swabs) from shorebirds, primarily western sandpiper, will be collected between mid-July through August. Additionally, sampling of other species that meet the prioritization criteria (red knot, ruddy turnstone) may occur on an opportunistic basis. Birds captured during testing for HPAI H5N1 will be banded to document recaptures.

#### Sampling Hunter-Harvested Waterfowl

Hunters in Washington currently harvest about 400,000 ducks and 30,000 geese. This presents an opportunity to access and sample a large number of harvested birds in 2007 and beyond, primarily on public hunting areas with existing check stations. In some

cases, to meet species/area sampling goals, additional check stations or hunter contact sites will be established with enhanced staffing and support.

The harvest sampling regime is designed to test both migrant waterfowl from the north, as well as sample local mallards that may be taken in the early part of seasons. Wrangel Island snow goose, brant, cackling geese, mallard, and wigeon will be the primary species of focus, but other species that meet the prioritization criteria (pintail, green-winged teal, wood duck, and shoveler) will be sampled on an opportunistic basis. Samples from hunter-killed birds will be cloacal and oral-pharyngeal swabs. Following the end of waterfowl seasons, directed collection under existing federal scientific collection permits will only be used if required sample sizes have not been achieved using the above methods.

#### Fecal Sampling

Fecal samples will be taken in areas of waterfowl concentrations that are not sampled extensively through live or hunter-killed bird sampling. Samples will be taken via swabs of fecal material in fields. USDA will be collecting all fecal samples in 2007, which will be sent to the USDA National Wildlife Research Center in Fort Collins, CO.

#### **Staffing**

USDA has assigned 20 staff to this effort through December 2007. Existing WDFW permanent staff and temporary staff will be assigned to this project to meet sampling goals and develop the mortality response network. Additional needs for assistance will be filled by other WDFW permanent staff, who will be able to charge time and expenses to the project when collecting samples.

#### **Methodologies and Training**

Basic protocols for taking and handling avian influenza samples have been developed in cooperation with NWHC, USDA, and other cooperators. The national strategic plan includes procedures and protocols for taking oral-pharyngeal and cloacal swabs, collecting carcasses, collecting fecal samples, and shipping to laboratories (IAEDWG 2006). Sampling kits - including vials with media, coolers, and initial shipping containers - will be provided by the funding agencies. USDA kits will include sampling swabs and USFWS kits will not. Some shipping containers will need to be purchased for smaller shipments. In general, samples cannot be held longer than 72 hours and can only be shipped on Mondays, Tuesdays, and Wednesdays. Field staff collecting samples will be required to wear personal protective equipment (PPE) as required by USFWS. All Washington State personnel involved in collecting samples will be required to adhere to collection protocols.

Given that there will be a substantial investment of resources to implement HPAI H5N1 surveillance in the Pacific Flyway, and that quality control of sample collection is vital, there is an immediate need for training and collaborative planning among cooperators. The NWHC and USDA have developed training materials and web-based distance-delivery tools. In addition, training sessions for cooperators will be arranged in summer

2007 to cover sample collection protocols. All Washington State personnel involved in collecting samples will be required to complete these training regimes.

### **Analytical Capabilities and Data Management**

Swab samples that will be analyzed with USDA funds and Washington Department of Agriculture funds will be sent to one of the following labs:

#### Eastern Washington

Washington Animal Disease Diagnostic Lab

Bustad Hall Room 155-N

Pullman, WA 99164-7034

Primary Contact:

Dr. Terry McElwain

509/335-9696

#### Western Washington

Avian Health and Food Safety Laboratory

7613 Pioneer Way E.

Puyallup, WA 98371-4919

Primary Contact:

Dr. A. S. Dhillon

253-445-4537

Swab samples and carcasses that will be analyzed with USFWS funds will be sent to the USGS National Wildlife Health Research Center in Madison, Wisconsin:

USGS National Wildlife Health Center

6006 Schroeder Road

Madison, WI 53711

Primary Contact:

Dr. Leslie Dierauf

608-270-2400

All fecal samples will be analyzed at the USDA-NWRC laboratory in Fort Collins:

USDA/APHIS/WS

National Wildlife Research Center

4101 LaPorte Avenue

Fort Collins, CO 80521-2154

Primary Contact:

Dr. Robert G. McLean

(970) 266-6122

WDFW will provide centralized tracking and shipping of samples and will maintain databases and take other steps to ensure quality control and assurance. All samples and results will be contributed to an integrated database. USDA and USDI have developed

web-based database and archive systems that are associated with the USGS National Biological Information Infrastructure - Wildlife Disease Information Node (WDIN). Washington cooperators will use this system to integrate reporting of sampling and testing data.

### **Coordination and Communication**

Because of the importance and public impacts of a confirmation of HPAI H5N1 by the NVSL, notification will go first to top federal and state officials (e.g., Secretaries of Agriculture and Interior, Governors, Directors, etc.). A Steering Committee consisting of USGS, USFWS, USDA-APHIS, IAFWA, HHS, the National Flyway Council, and Alaska has been formed to facilitate communication and coordination among state and federal agencies for contingency planning and other preparations for the appearance of highly pathogenic H5N1 avian influenza virus in wild birds in North America.

It is anticipated that strategies outlined in this plan will change significantly if a positive test for H5, H5N1, or HPAI H5N1 is received. Resources will necessarily be redirected to assist in interagency response to a positive test. In the case of a positive test for HPAI H5N1 in any location of the Pacific Flyway, a working group comprised of membership of the Pacific Flyway Study Committee, Pacific Flyway Non-Game Technical Committee, USFWS, USDA, USGS and state animal health veterinarians will convene immediately to formulate recommendations for specific state redirection of established surveillance. These recommendations will be forwarded immediately to the National Steering Committee.



**SAMPLING STRATEGIES FOR THE DETECTION OF HPAI H5N1 IN  
WASHINGTON WILD BIRDS  
(also see Summary in Appendix 1)**

**1. Morbidity and Mortality Events**

According to the national strategic plan, “The systematic investigation of morbidity and mortality events in wild birds to determine if the highly pathogenic H5N1 avian influenza subtype of avian influenza (AI) is playing a role in causing illness and death offers the highest and earliest probability of detecting the virus if it is introduced by migratory birds into the United States.” WDFW will employ the 4 methods listed below for implementing the Morbidity and Mortality Investigation sampling strategy of this plan.

**a. Continue routine mortality event investigations throughout the state**

**Background:** Each year, several hundred sick and dead migratory birds are recovered in Washington, affected by a variety of infectious and non-infectious conditions. Common causes of bird mortalities include infectious diseases (salmonellosis, avian cholera, pox), poisoning (lead, pesticides, natural toxins), and trauma (window strikes, powerline and vehicle collisions, gunshot). In addition, large-scale mortalities of some species, particularly seabirds, occur every year caused by starvation or by drowning in fishing nets. WDFW routinely investigates reports of dead wild birds. Typically, dead bird reports are made to the WDFW wildlife veterinarian by WDFW field staff, other agencies, or members of the public.

As more people become aware of avian influenza and concerned about sick and dead birds they may encounter, it is expected that the number of reports WDFW receives will greatly increase. In order to prevent WDFW’s existing mortality investigation system from becoming overwhelmed, it will be necessary to work with cooperating local, state, and federal agencies to continue to improve reporting systems and to enhance field response capabilities for mortality investigations.

**Methods:** WDFW will continue the use of its toll-free telephone system established in 2006 to solicit reports of bird mortalities, and increase publicity of the toll-free number. This system is linked to the current West Nile Virus reporting system. WDFW has developed criteria for county agencies to use in routing reports. It is anticipated that WDFW will continue to receive direct reports from other sources, including other agencies (e.g. USDA and USFWS refuges). The toll-free number and a basic disease information fact sheet will be provided to groups likely to have interactions with wildlife, or encounters with sick or dead birds. This group includes, but is not limited to, federal law enforcement agents, wildlife rehabilitators, and the Audubon Society. Efforts will be coordinated between all state and federal agencies so that the same message is sent consistently to the public.

In general, WDFW will be the primary contact for dead bird reports (except for corvids) and will make the determination as to whether a field investigation is needed. An interagency mortality investigation network will be continued, with each member assigned responsibility for a given geographical area. If a field investigation is needed, the appropriate member of the mortality investigation network will be notified of the need to respond. Existing WDFW permanent staff and temporary staff will be assigned to participate in the mortality response network. Additional needs for assistance will be filled by other WDFW permanent staff, who will be able to charge time and expenses to the project when collecting samples. In addition, USDA will have field staff available to assist with mortality investigations throughout the state, and USFWS and National Park Service will investigate mortalities on their lands. A phone tree has been developed for each geographical area, in case the primary member of the network in that area is unavailable.

When reports are received, information about the mortality event will be collected including: the location, species, number of birds, sex and age classes, clinical signs, duration of the event, population(s) at risk, and any pertinent environmental factors. Further investigation is deemed warranted only when obvious causes of death (such as trauma) cannot be ruled out and suitable carcasses are available for diagnostic evaluation. If these criteria are met, and HPAI H5N1 cannot be ruled out as a cause of death, project funding will be used to submit either a representative sample of carcasses to the USGS National Wildlife Health Center in Madison, WI, or paired swab samples to state WADDL labs.

The involvement of multiple organizations will require close coordination and data sharing. Training sessions will be held throughout the state to ensure that all cooperators follow consistent protocols with respect to response criteria, sample collection, shipping, and information management.

**Responsibility:** WDFW, USDA, USFWS (on refuges), other federal agencies, tribes.

**b. Test sick and dead swans for avian influenza**

**Background:** Swans have been one of the primary species groups affected by HPAI H5N1 in Asia and Europe. Trumpeter swans offer a potentially efficient sampling opportunity due to annual collection of sick and dead trumpeter swans in the north Puget Sound area. Each year since 1999, several hundred trumpeter swans have died in this area due to ingestion of lead shot, and these birds have been regularly collected to reduce secondary poisoning of other species. WDFW also regularly collects tundra swans that die from powerline collisions and other causes.

**Methods:** Collection of sick and dead swans will continue in 2007-08 through WDFW. It is anticipated that up to 100 usable samples (paired cloacal and oral-pharyngeal swabs) can be collected in 2007-08 if current mortality levels

continue. Most of these samples will be collected when lead mortalities typically occur in December and January, but other opportunistic collections will occur during the entire wintering period. Samples will be sent to state WADDL labs.

**Responsibility:** WDFW

**c. Implement active mortality / morbidity surveillance**

**Background:** The 2007 update of the Pacific Flyway plan calls for active surveillance for sick and dead birds in major concentration areas. In many cases, agencies do not receive reports from the public when they encounter sick or dead birds. Based on incidence of HPAI H5N1 discoveries in Europe and Asia, these samples are probably the most valuable for detecting the virus in the wild.

**Methods:** Surveillance for candidate species (see Table 2) identified by USFWS will be implemented in association with other AI sample collection activities and other agency activities in major waterfowl concentration areas (North Puget Sound, Columbia Basin, Yakima Basin, southwest Washington), considering areas of emphasis identified in Appendix 2. Additional outreach to all agency field biologists will greatly expand our reporting network. Targeted surveillance will also involve the areas listed in Table 3.

**Table 2: Primary and Secondary Candidate Species for HPAI H5N1 Mortality Surveillance**

Primary Candidate Species	Secondary Candidate Species
All <i>Cygnus</i> (swans)	Greater white-fronted geese (closest NA relative of bar-headed geese)
Trumpeter swan	Other dabbling duck species
Tundra swan	Wood duck
Feral swans	Northern shoveler
Subfamily Aythyinae	Other waterbirds
Canvasback	Hérons, egrets, grebes, cormorants
Scaup (greater and lesser)	Lariidae, including terns and relatives of laughing, black-headed and brown-headed gulls
Redhead	Other Charadriiformes
Ring-necked Duck	

**Table 3: Targeted HPAI H5N1 Mortality / Morbidity Surveillance**

Area	Technique	Target Species	Agency / Organization
Whatcom, Skagit Co.	Aerial, ground surveys	Trumpeter, Tundra Swan	WDFW, University of Washington
Chehalis Valley	Ground surveys	Trumpeter Swan	WDFW
SW WA	Ground surveys	Tundra Swan	USFWS (Hoskins)
Ridgefield NWR	Ground surveys	Shoveler	USFWS (Ridgefield NWR)
Columbia Basin	Ground surveys	Dabbling / Diving Duck	USFWS (Mid-Columbia NWR Complex)

Surveillance will continue monthly until guidance or funding from federal agencies dictates discontinuation. Based on waterfowl density patterns throughout the year two survey periods are recommended; October through March, and April through September. During October through March when waterfowl densities peak in Washington all identified surveillance sites will be monitored. During April through September only important breeding areas will be monitored.

During October through March, targeted surveillance areas would be monitored at minimum one day a week. Monitoring efforts will be integrated with ongoing normal field operations to the greatest extent possible. If additional assistance or special monitoring is deemed necessary for any one area, the use of temporary/seasonal employees will be considered.

During April through September, surveillance areas with significant breeding populations would be monitored once monthly. Again, protocols integrating monitoring in ongoing field operations will be developed.

The University of Washington's Coastal Observation and Seabird Survey Team (COASST) has an ongoing program using volunteers to survey and document bird mortalities at regular intervals along Washington marine shorelines. In 2005, this team found 200 fresh carcasses representing nearly 40 aquatic species of birds. The COASST program, therefore, is a valuable source of samples for the Morbidity and Mortality Investigation sampling strategy of Washington's avian influenza surveillance plan.

In addition, several ongoing management programs will be enhanced for mortality/morbidity surveillance; these programs are the Puget Sound Assessment and Monitoring Program (PSAMP), periodic North Puget Sound waterfowl surveys, and the statewide duck breeding population survey. PSAMP surveys utilize aerial transects, periodic North Puget Sound waterfowl surveys utilize area inventories, and Washington Breeding Waterfowl Population Surveys utilize aerial plot surveys in western Washington and ground transects in eastern Washington. Enhancing these programs will expand the spatial and temporal surveillance beyond previous efforts.

**Responsibility:** WDFW, USFWS, USDA

## 2. Live and Hunter Killed Birds

### a. Primary Species

#### Lesser Snow Goose (*Chen caerulescens caerulescens*)

**Background:** Lesser snow geese from Wrangel Island, Russia, could come into contact with the HPAI H5N1 because they breed and migrate through parts of northeast Asia. The entire breeding population of Wrangel Island migrates through Alaska and over 60% winters in Washington. The current Washington-BC population of Wrangel Island snow geese is estimated at 80,000.

**Methods:** We propose to sample Wrangel Island snow geese by targeting principal fall and winter use areas in north Puget Sound, including the Skagit Wildlife Area and surrounding private lands in Skagit, Snohomish, and Island counties. A total of 200 samples will be collected, due to the direct link of this population to Asian breeding areas. We propose a sample design targeting hunter-killed birds during November-January (see Appendix 1). Samples would be collected using a combination of methods, focusing on hunter field checks, mandatory enforcement check stations, and directed collections. Part of the samples may also be provided as a result of increased mortality surveillance of wintering flocks.

**Responsibility:** WDFW

#### Pacific Brant (*Branta bernicla*)

**Background:** Brant that breed and winter in northeastern Asia have both direct and indirect links with Washington. Several thousand black brant breed and molt along the arctic coast of Russia and Wrangel Island. The highest probability of HPAI H5N1 transmission from these brant to other brant is at Izembek Lagoon, Alaska, in the fall. Izembek Lagoon and adjacent embayments support virtually the entire population of brant during fall, including brant that migrate through or winter in Washington.

**Methods:** We propose to sample brant from hunter-killed birds. A total of 200 samples from hunter-killed brant will be taken during the January brant season in Padilla, Samish, and Fidalgo Bays in Skagit County (see Appendix 1). Samples will be collected in Skagit County (e.g. Swinomish channel, Samish Bay) through hunter field checks and possibly directed collections.

**Responsibility:** WDFW

### **Northern Pintail (*Anas acuta*)**

**Background:** Northern pintail is a common duck in western Washington during migration and wintering periods. The combination of band recovery and satellite telemetry data indicates that birds wintering in Asia are found in Alaska in summer, possibly mixing with birds that winter in Washington. Satellite telemetry data demonstrate that pintails marked in California regularly move through Washington and cross the Bering Straits to Asia during the summer months (Miller et al. 2005). For these reasons, pintail is listed as a priority duck species proposed for sampling in 2007-08.

**Methods:** We propose to sample pintails by targeting known fall and spring staging areas in western Washington, as well as principal fall and winter harvest areas. Sampling areas will include north Puget Sound and coastal estuaries, including the Skagit Wildlife Area, Lake Terrell Wildlife Area, southwest Washington, and the Yakima Basin. We propose a sample design targeting 200 birds during the pre-season period and the hunting season (see Appendix 1).

Pre-season sampling will begin in late August and September using baited live traps or rocket nets, and will target mostly adult males, with fewer females and hatch year birds. Using this capture approach, there will be substantial opportunity to sample other dabbling ducks such as green-winged teal. Samples will also be obtained from hunter-shot pintails at existing mandatory check stations and/or field checks. Hunter-killed pintail samples will be distributed throughout the hunting season. Sampling intensity of hunter-killed birds will increase if adequate samples are not obtained from live trapping. Spring pintails will be sampled through capture of live birds and directed collecting if quotas are not met using other methods.

**Responsibility:** WDFW (North Sound); USDA (Southwest Washington and Coast)

### **Shorebird Species**

**Background:** Shorebirds using Washington habitats for migration and wintering are a high priority group for sampling because of their interaction in Alaska with other shorebirds from Asia. Efforts will be focused on the primary shorebird surveillance candidate species in the Pacific Flyway strategic plan, mainly western sandpiper (*Calidris mauri*), but also other associated species. Shorebird use of inland waterways and estuaries further increases the likelihood that birds could come into contact with virus infected poultry and waterfowl. Although shorebirds have been assigned a lower priority in this year's Pacific Flyway surveillance plan edits developed in March 2007, four ruddy turnstones collected in Delaware during May 2007 tested positive for LPAI H5N1, pointing to the need for limited shorebird testing again this year.

**Methods:** We propose to capture and sample a total of 200 shorebirds using mist nets and net guns at high tide roosts on outer coastal beaches adjacent to Grays Harbor and Willapa Bay (see Appendix 1). Samples of western sandpiper will be collected between mid-July and August. Sampling of other species that meet the prioritization criteria may be conducted on an opportunistic basis.

**Responsibility:** WDFW

b. **Secondary Species**

**Cackling Goose (*Branta hutchinsii minima*)**

**Background:** Cackling geese that winter in southwest Washington mingle with brant and other species, potentially including Asian migrants, on the breeding grounds and fall staging areas. Approximately 150,000 cackling geese breed on the Yukon-Kuskokwim Delta (YKD) in western Alaska. The YKD is a primary stopover area for migratory birds arriving from Asia (e.g. Wrangel Island snow geese), and has a direct link to Washington migration and wintering areas.

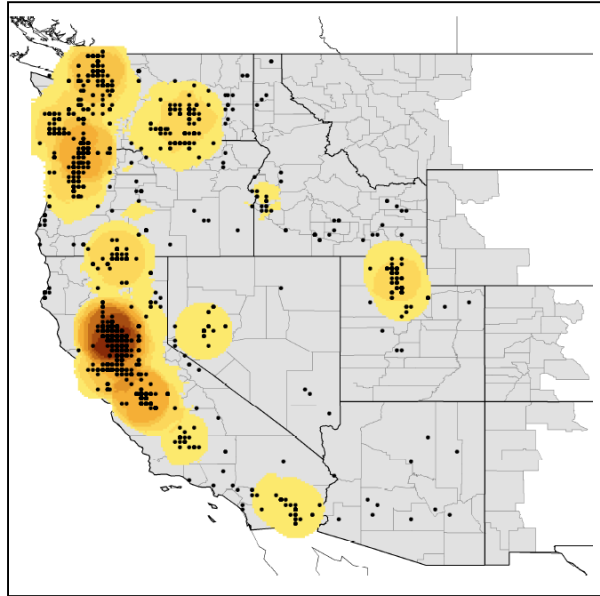
**Methods:** Based on past data, most cackling geese in southwest Washington occur in Clark and Cowlitz counties. A total of 200 samples will be taken from cackling geese at hunter check stations in southwest Washington (see Appendix 1). The hunting season for cackling geese begins in November and runs through March 10 in this area, and but samples will collected through January. Part of the samples may also be provided as a result of increased mortality surveillance of wintering flocks.

**Responsibility:** WDFW

**Secondary Dabbling Duck Species**

**Background:** In order to determine opportunities to sample priority duck species during the hunting season, the Pacific Flyway Study Committee conducted an analysis on the distribution of band recoveries of Alaska-banded ducks (see Figure 1) and relative magnitude of duck harvest in Pacific Flyway states.

Figure 1. Recoveries of ducks banded in Alaska (Mikal Moore, pers. comm.)



Based on this analysis, pre-season sampling of mallards, and sampling of hunter-killed mallard and wigeon in western Washington were identified as secondary priorities. Wood ducks surfaced as a target species in 2007 based on results of 2006 sampling (USDA 2007), and will be sampled during the pre-season period by USDA. In addition to sampling hunter-killed mallard and wigeon, pintail, green-winged teal, and shoveler will be collected to meet sampling targets.

**Methods:** We propose to sample a total of 1,200 secondary dabbling species, including 400 mallards, 800 from other dabbling species (see Appendix 1). Samples will be collected from live-trapping and hunter-killed birds.

Mallard: Mallards will be sampled before the hunting season using bait traps. Due to susceptibility of juvenile mallards to avian influenza, priority will be given to sampling this age class during pre-season trapping. Hunter-killed mallards in north Puget Sound, southwest Washington, and the north Columbia Basin will provide additional samples. Hunter-killed samples will be distributed throughout the hunting season.

Other Dabblers: Wood ducks will be sampled before the hunting season in the Yakima Basin using bait traps. Green-winged teal will be sampled before the hunting season in conjunction with the live-sampling strategy for pintail and wood ducks. Green-winged teal, shoveler, and wigeon will be sampled from hunter-killed birds during field checks in southwest Washington and in the north Sound. Shovelers will mainly be sampled at the Ridgefield NWR check station. Hunter-killed samples will be distributed throughout the hunting season.

**Responsibility:** WDFW (North Puget Sound), USDA (Southwest Washington)



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APPENDIX 1: WASHINGTON STATE 2007-08 AVIAN INFLUENZA SAMPLING TARGETS		NOPI			MALL		AGWT		AMWI	NSHO	WODU	WESA	BLBR	CACG	LSGO	TOTAL	
		NW WA	SW WA	Yakima	C. Basin	NW WA	SW WA	NW WA	Yakima	SW WA	SW WA	Yakima	Coast	NW WA	SW WA	NW WA	
WDFW	July											100					
	August	45			100			25				100					
	September	45			100			25									
WS	July																
	August			5							100						
	September			5				50			100						
LIVE	Subtotal	100			200		100				200	200				800	
WDFW	October	20			30	15		30									
	November	20			30	15		30						40	40		
	December	15			30	15		30						80	80		
	January	5			10	5		10					200	80	80		
WS	October		10				13		50	50							
	November		10				13		50	50							
	December		10				13		50	50							
	January		10				11		50	50							
HUNT	Subtotal	100			200		100		200	200			200	200	200	1400	
ALL	TOTAL	200			400		200		200	200	200	200	200	200	200	2200	
DFW-W	July-Sept.	90						50								140	
DFW-W	Oct.-Jan.	60				50		100					200		200	610	
DFW-F	July-Sept.				200							200				400	
DFW-F	Oct.-Jan.				100									200		300	
DFW	Subtotal	150			350		150					200	200	200	200	1450	
WS	July-Sept.			10				50			200					260	
WS	Oct.-Jan.		40			50			200	200						490	
WS	Subtotal	50			50		50		200	200	200					750	

DFW-W = WDFW - WILDLIFE SERVICES CONTRACT DFW-F = WDFW - USFWS CONTRACT

## Appendix 2

### **Suggested Steps To Establish Morbidity/Mortality Surveillance/Response Programs**

#### **1. Establish practices for routine, systematic, prospective mortality surveillance**

- A. Develop interagency teams for surveillance and investigation as appropriate
- B. Allocate funding to selected areas for enhanced mortality detection
- C. Identify target primary and secondary species in the surveillance area
  - i. Based generally on reported historical mortality events
- D. Identify/map habitat areas associated with target species
  - i. Use survey and inventory databases to identify concentration areas
  - ii. Determine land ownership and access needs on private lands
- E. Determine best practice for systematically surveying target habitat area
  - i. vehicle, boat, foot travel, etc.
- F. Identify key locations to stop and scan areas
  - i. binoculars, spotting scope, trained dogs, etc.
- G. Establish a schedule for surveillance
  - i. daily, weekly, etc,
  - ii. may vary by habitat condition, season, etc.
- H. For states with contiguous or similar habitat encourage development of similar strategies between states, to increase consistency in surveillance efforts
- I. Determine protocols for collecting and shipping specimens
  - i. establish contacts with state wildlife veterinarian
  - ii. establish contacts with diagnostic laboratories
- J. Establish standards for reporting surveillance effort
  - i. develop identifiers for transects
  - ii. document proximity to urban areas and domestic poultry sites
  - iii. log miles traveled, per transect, per date
  - iv. log species observed, both healthy and sick/dead (this should be done whether or not dead birds are observed)
  - v. log environmental conditions
- K. Add mortality surveillance to existing, unrelated bird surveys
  - i. Request assistance from breeding bird surveys, Christmas bird counts, raptor surveys, etc., in searching for carcasses
  - ii. educate survey crews in HPAI epidemiology, sample collection and reporting protocols.

#### **2. Enhance Response to Mortality Events**

- A. Conduct mortality investigation training in each state
- B. Disease overview, history collection, investigation techniques
  - i. description of HPAI epidemiology
  - ii. clinical presentation
  - iii. known or suspected high risk species groups
- C. Sampling, preserving and shipping specimens
- D. Personal protection
- E. Highlight importance of mortality reporting

- F. Create DVD and other handouts to use away from training.
- G. Establish centralized or toll-free numbers for collecting reports
- H. Utilize state wildlife veterinarians to triage and prioritize reports of M&M events
- I. Identify other potential contacts within each state
  - i. Agriculture
  - ii. Public Health
- J. Work with state Public Health departments to ensure that target species submitted for WNV testing also get submitted for AI testing.

### **3. Outreach**

- A. Identify target audiences
  - i. Wildlife professionals including FWS refuges, field stations, state wildlife areas, regional and district offices, etc.
  - ii. Other wildlife interest groups
    - a. Universities
    - b. Bird watching groups
    - c. Wildlife rehabilitators
    - d. Partners groups
    - e. Others
  - iii. General public
- B. Develop outreach materials appropriate for each group
  - i. Distribute copies of State and National AI Surveillance Plans to appropriate field stations and internal offices
  - ii. Develop 1-2 page color brochure “Be on the Lookout”
  - iii. Update and distribute Hunter Handouts, AI fact sheets
- C. Encourage publication of toll-free reporting numbers
- D. Ask State Agencies to share education and training materials to keep message consistent and avoid duplication of effort