SURVEILLANCE FOR EARLY DETECTION OF HIGHLY PATHOGENIC AVIAN INFLUENZA H5N1 IN WILD MIGRATORY BIRDS

A STRATEGY FOR THE PACIFIC FLYWAY

prepared by

Pacific Flyway Study Committee

and

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for

Pacific Flyway Council

Adopted by Pacific Flyway Council

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This strategy is one of many cooperatively developed plans and guidelines to aid in the management of migratory birds in the Pacific Flyway. Inquiries about this plan may be directed to the Pacific Flyway Representative, U.S. Fish and Wildlife Service, 911 N.E. 11th Avenue, Portland, OR.

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INTRODUCTION

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 Asian 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 the next flu pandemic. Currently, public concern has been heightened by extensive media coverage about this virus in Asia, its spread to Europe, and the very 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 here.

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 strategy, here are some key points and assumptions:

- 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 Asian H5N1virus 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 Asian 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 Asian H5N1 is poorly documented. In nearly all cases of expansion in Eurasia, movements of poultry and poultry products are suspected as the primary vehicle. Mortalities of wild birds

have been associated with contact or shared use of habitats with domestic birds. Migratory waterfowl, however, are tolerant of avian influenza and could be vectors.

- Currently, there is inadequate information about the virulence of Asian 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 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—Asian H5N1 or any other type—adapted into a form that was infectious and virulent among humans. It is not a given that Asian H5N1 is the mostly likely threat for a global pandemic.

GOAL AND OBJECTIVES

The overall goal for this strategy is to provide guidance to Pacific Flyway wildlife agencies in planning and implementing surveillance to detect Asian H5N1 in wild migratory birds. This document is intended as a step-down approach from the draft U.S. Interagency Strategic Plan (Interagency HPAI Early Detection Working Group 2006) to articulate flyway-level objectives, recommend surveillance strategies, and support further planning in each state to assess available and needed agency resources.

The goal of the national strategy and this Pacific Flyway strategy is early detection of Asian H5N1 in wild migratory birds—not to assess its prevalence over time, monitor its rate of movement, or investigate the ecology of the disease.

This strategy is not intended to provide detailed implementation plans for each Pacific Flyway state. The strategy also does not dictate rigid sampling objectives—the intent is to provide a sense of priorities, but not to constrain sampling of species or areas deemed important by the states or other cooperators. Surveillance efforts for Asian H5N1 will involve, by necessity, extensive cooperation at state and local levels among wildlife agencies, agriculture agencies, public health systems, and other entities—efforts best left to adaptive approaches by our member agencies. Thus, the scope of this strategy is focused on a flyway-level framework for surveillance of wild migratory waterbird populations that are shared and cooperatively managed throughout the Pacific Flyway.

Objectives:

1. Prioritize waterbird species to be sampled for Asian H5N1 in the Pacific Flyway.
2. Recommend a suite of sampling approaches to effectively establish an Asian H5N1 detection system in wild migratory birds.
3. Provide guidance to states and cooperators to develop state-specific implementation plans.
4. Recommend procedures to integrate detection efforts within the Pacific Flyway and with national programs.

5. Describe additional planning efforts and coordination necessary to establish and maintain an effective Asian H5N1 detection system in the flyway.

APPROACHES

Species Prioritization

During development of the U.S. strategic plan, wildlife agencies in Alaska collaborated with the U.S. Geological Survey (USGS) 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 Asian H5N1 (IAEDWG 2006; Attachment 4). There are over 150 species of birds that move between Asia and North America, generally in three categories: (1) species that winter primarily in Asia or migrate through Asia to breeding grounds in Alaska—primarily shorebirds like the bar-tailed godwit; (2) species that generally breed in Alaska with some portion of the population known to winter in Asia—these include northern pintail, Pacific brant, and several sea duck species; and (3) species that intermingle seasonally (e.g., breeding, summer molt, staging) across the Russian Far East, Alaska, and parts of Canada—these include northern pintail, Steller's eider, common eider, emperor goose, and Midcontinent sandhill cranes.

The list of species with substantial connections to Asia was evaluated according to five criteria to allow prioritization for Asian H5N1 surveillance: (1) the degree of contact with Asia; (2) contact with any known Asian H5N1 outbreaks; (3) habitat preferences in relation to the occurrence of H5N1; (4) the proportion of the population that would be available for sampling in Alaska; and (5) the probability of obtaining a sufficient number of birds for sampling. This process resulted in identification of 26 primary candidate species that should be sampled (Table 1).

Table 1. Ranking of primary candidate species for Asian H5N1 surveillance in Alaska.

Migratory Game Birds	Migratory Non-game Birds
Steller's Eider	Dunlin
Northern Pintail	Sharp-tailed Sandpiper
Lesser Snow Goose	Bar-tailed Godwit
Emperor Goose	Ruddy Turnstone
Black Brant	Pectoral Sandpiper
Spectacled Eider	Red Knot
Aleutian Cackling Goose	Long-billed Dowitcher
Long-tailed Duck	Rock Sandpiper
Tundra Swan	Pacific Golden Plover
Common Eider	Buff-breasted Sandpiper
King Eider	Glaucous Gull
Lesser Sandhill Crane	Arctic Warbler
	Eastern Yellow Wagtail
	Gray-cheeked Thrush

Based on the ranked species identified for surveillance in Alaska, the technical committees for all four flyway councils were consulted to provide preliminary priorities for "downstream" surveillance of those species that winter in the contiguous 48 states and Mexico. The U.S. Strategic Plan reflects those priorities in Attachment 4 on live bird surveillance and Attachment 5 on surveillance of hunter-killed birds.

It should be noted that these planning exercises, by necessity, assumed that Asian H5N1 was not already present in North America—the objective was to design a system to detect its arrival. In addition, the probability of secondary transmission between an Asian migrant and North American birds could not be assessed in the species ranking process. Very little is known about the actual prevalence of the virus in wild populations, or the persistence and transmissibility of the virus in migrant birds. If an infected bird survives migration from Asia and actively sheds virus, one could assume that contact among birds in Alaska and during fall migration could make virtually any bird from Alaska a potential carrier of Asian H5N1.

The Pacific Flyway preliminary list of surveillance candidates (Table 2) reflects both "primary" species that could come directly from breeding in Asia (see examples in Appendix A), 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 Asian H5N1 is not detected in Alaska, but makes its way through the surveillance network.

Table 2. Primary and secondary candidate species for Asian H5N1 surveillance in the Pacific Flyway (IAEDWG 2006; Attachment 4).

Primary Candidates	Secondary Candidates
Tundra Swan (Western Population)	Cackling Goose
Lesser Snow Goose (Wrangel Is.)	Greater White-fronted Goose (Pacific)
Pacific Brant	Mallard
Northern Pintail	American Wigeon
Long-billed Dowitcher	American Green-winged Teal
Red Knot (small numbers)	Northern Shoveler
Pacific Golden Plover (small numbers)	
Ruddy Turnstone (very small numbers)	

Sampling Intensity

Currently, there is no reliable information on the prevalence of Asian H5N1 in wild bird populations—anywhere. The U.S. Strategic Plan includes a hypothetical rationale for <u>minimum</u> rates of sampling that would be necessary to detect Asian H5N1 in a target population under assumed rates of virus prevalence (IAEDWG 2006; Attachment 7). The national plan, however, does not define "target populations" in deference to adaptive approaches in sampling schemes for species, seasons, and sampling areas. For general guidance, it has been suggested that a <u>minimum</u> of 200 samples would be required to detect <u>one</u> positive Asian H5N1 sample in a defined population with >1,000 individuals (probability 95%) if the virus had a prevalence of only 1%. Statistically, sampling rates would need to be gradually higher with larger populations, but could be lower if the prevalence was greater. This hypothetical approach assumes that the population of interest is homogenous and entirely accessible for sampling and that representative sampling can be done in a random or otherwise unbiased manner, which is not the expected case in wild migratory waterfowl. The need to define "populations of interest" is critical for establishing a sampling frame and specific species/time/area sampling goals. For the purposes of the Pacific Flyway strategy, our primary interest is in detection at the flyway level. This document, however, also establishes more detailed regional sampling goals, given that migration of primary target species and potential Asian migrants may be distributed unevenly across the flyway and throughout migration periods, and that any Asia-related birds will be joined by a large number of North American birds as fall migration progresses.

Sampling Methods

This section describes several methods that can be employed to detect Asian H5N1 in Pacific Flyway birds. For the sake of ensuring adequate coverage and efficiency, it will be important to assess and design each surveillance effort in the context of monitoring priority species populations across seasons and at appropriate geographic scales. For example, if a target population can be thoroughly sampled prior to fall migration or at a major staging area, sampling may not be warranted at many locations. If a population is sampled in an area during banding of live birds, it may not be useful to sample hunter-shot birds at the same location unless there is expectation of substantial turnover. Conversely, such as the case with most geese and swans in the flyway, if hunter-shot birds provide an effective sampling opportunity, more difficult capture and live sampling operations are not warranted. If samples of particular species are difficult to obtain at certain locations, samples of feces or water may at least provide composite samples for testing of presence or absence of Asian H5N1. Overall, more efficient surveillance will result if an array of methods is designed in the context of regional, flyway, and national efforts.

Sampling Live Birds - Waterfowl

In the Pacific Flyway, routine banding programs provide access to large numbers of waterfowl. There is a need to evaluate the merits of marking and banding of birds in conjunction with Asian H5N1 surveillance to directly investigate the distribution of avian influenza viruses in birds and to supplement other management objectives that rely on banding and marking. The utility of ongoing banding programs for sampling should be evaluated in terms of both intercepting migrant birds potentially infected with Asian H5N1, and sampling locally produced birds that could indicate the arrival of the virus. The sampling regime recommended below places primary focus on Asian or Alaska connections—including capture of birds from August to October prior to hunting seasons, and perhaps from January through March after hunting seasons have closed.

The majority of waterfowl banding in most states occurs during the post-breeding molt period. Many of these birds originated from within the banding region, or have undergone a molt migration (usually northward) from an adjacent region. In most cases, birds that breed and molt in the contiguous states in 2006 will not likely have the potential for contact with Asian H5N1 unless or until they mingle with Asian/Alaska migrants. Locally produced birds, however, can act as wild sentinel birds to detect the arrival of Asian H5N1, 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. Thus, the strategy below includes sampling of local mallards during summer banding.

Sampling Live Birds - Shorebirds
As a group, the shorebirds represent an important potential source of information regarding the early detection of Asian H5N1 in the Pacific Flyway. Although there are few ongoing shorebird banding programs in the Pacific Flyway, these efforts may provide an opportunity for collecting samples or dedicated sampling efforts may be initiated. There may be opportunities at state and federal wildlife areas and refuges to collect samples at staging or stopover sites along the coast or interior Great Basin migration paths. This will enable sampling of migrants potentially infected with Asian H5N1, and those birds from Alaska (or elsewhere) that may have been infected during migration. The shorebirds listed in Table 2 are those with a strong Asian connection or that mingle with species from Asia during migration. Samples from shorebirds should be collected between early July through mid-November as appropriate given the migration strategy of the species involved. Additionally, sampling of other species that meet the prioritization criteria may be collected on an opportunistic basis. In subsequent years, it may be important to broaden the sampling strategy to include other species or species groups to better monitor the prevalence of Asian H5N1 in wild bird populations throughout the flyway.

Sampling Hunter-Harvested Birds
If Asian H5N1 is carried to North America 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). The challenge will be to mount a detection network in the Pacific Flyway of sufficient coverage to detect birds potentially infected with Asian H5N1, including a relatively small number of Asian migrants, secondarily infected birds, and locally produced birds that may acquire the virus. Hunters in the Pacific Flyway currently harvest about 2.5 million ducks, 380,000 geese, and 1,000 tundra swans. This presents an opportunity to access and sample a large number of harvested birds in 2006 and beyond, primarily on public hunting areas with existing check stations. In some cases, to meet species/area sampling goals and to minimize the impact on the hunting public from testing, additional check stations or hunter contact sites should be established with enhanced staffing and support. The harvest sampling regime below is designed to test both migrant waterfowl from the far north, as well as a sample of local mallards that may be taken in the early part of seasons.

Environmental Sampling
In the U.S. Strategic Plan, the U.S. Department of Agriculture (USDA) is charged with developing a program for sampling feces and water, and other environmental materials as part of the surveillance system. Depending on the extent and nature of a cooperative sampling plan, we assume that all agencies will cooperate with the collection of environmental samples in conjunction with live bird and hunter-shot bird surveillance, as well as ongoing management of state and federal wildlife areas. This program also is likely to involve state water quality agencies, as well as state and federal offices engaged in environmental monitoring near poultry operations. Design of this program will involve assessing the merits and reliability of environmental sampling to inform the surveillance effort from composite samples. In some areas of the Pacific Flyway, migratory birds come in close proximity to human population centers and livestock operations where live bird sampling and hunter-harvest sampling will not occur. Participation by Pacific Flyway wildlife agencies in environmental sampling may be particularly appropriate in these areas. The USDA National Wildlife Research Center (NWRC) will establish analytical capacity for fecal samples and water.

Detection and Response to Morbidity-Mortality Events
Most states have some form of reporting network for detecting wildlife mortality events. These systems were improved and expanded in recent years to monitor bird deaths from West Nile Virus. The Council does not intend to establish a Pacific Flyway reporting and response system to document bird deaths or mortality events, independent of a federal-state process under development. Each state agency will be responsible for establishing an appropriate mortality detection network. In the event of a major event, state agencies should work with U.S. Fish and Wildlife Service (USFWS), USDA, the USGS National Wildlife Health Center, and their state animal health authorities as they currently respond to outbreaks of botulism, avian cholera, and other mortality events. All agencies are encouraged to review and update their coordination procedures and response plans, with the expectation that systems will have to be more responsive than they were for WNV and other issues.

STRATEGIC SPECIES AND AREA PRIORITIES

Sampling of Live Wild Birds - Waterfowl

Recommended Pacific Flyway priorities for sampling live migratory birds are based on (1) the list of primary and secondary species with the highest potential for exposure to Asian H5N1; (2) specific staging and wintering locations where high-priority species are accessible; and (3) recognition that principal winter terminus areas present opportunities to sample large population units. Specific locations for sampling live birds from target populations are indicated below, with consideration for planned sampling of hunter-harvested birds from game bird populations. Numerical sampling objectives are not established, but as with other sampling approaches, a minimum of 200 samples should apply to all units of interest. Live bird sampling will require close coordination among federal and state agencies, and among management and research activities.

Sampling Priorities for Dabbling Ducks
The primary focus of sampling in the Pacific Flyway is on northern pintail, a migrant species with Asia and Alaska connections. Sampling of locally produced mallards is included as a secondary detection method.

- Northern Pintail
  Pre-season capture – Where abundant and accessible
  Post-season capture – Where abundant and accessible (primarily Central Valley of California)
- Mallard
  Summer banding – Flyway-wide (mostly 2007)
  Pre-season captures – Focus on migrants

Sampling Priorities for Geese and Tundra Swans
In most cases, capture and sampling of live geese and swans in the Lower 48 states during fall and winter is not warranted. Populations of Wrangel Island lesser snow geese, Pacific brant, cackling geese, greater white-fronted geese, and tundra swans will be sampled on their breeding grounds and northern staging areas. In addition, most of these populations will be sampled more

efficiently through hunter-harvest monitoring at selected locations (see below). The primary exception to this approach is the Aleutian cackling goose, which was added to the Pacific Flyway list of primary species after completion of the national plan. Collection of breeding ground samples may be difficult, there is no feasible access to the small harvest in Alaska, and it is not likely that sufficient samples can be obtained from winter harvest locations in California.

- Aleutian Cackling Goose – winter banding Central California

Sampling Priorities for Shorebirds

As with waterfowl, recommended Pacific Flyway priorities for sampling shorebirds are based on (1) the list of primary and secondary species with the highest potential for exposure to Asian H5N1; (2) specific staging and wintering locations where high-priority species are accessible; and (3) recognition that principal winter terminus areas present opportunities to sample large population units. The Pacific Flyway Nongame Technical Committee developed the following strategies for sampling high priority shorebird species, adding western sandpipers, red-necked phalarope, and dunlin to the former Pacific Flyway list in the national strategy and removing Pacific golden plover.

Locations for sampling live shorebirds from target populations would include migratory staging or stopover sites along the flyway where birds congregate and where large numbers of samples can be collected. Numerical sampling objectives are not established, but as with other sampling approaches, a minimum of 200 samples should apply to all units of interest. Live bird sampling will require close coordination among federal and state agencies, and among management and research activities.

Sampling for the six shorebird species should occur during the fall migration at coastal and interior sites distributed throughout the flyway. We anticipate that large numbers of Western Sandpipers and Dunlins can be sampled readily at numerous sites in the flyway.

- Western Sandpiper (Early July through September) – Flyway wide where abundant and accessible
- Dunlin (October through November) – Flyway-wide where abundant and accessible.
- Long-billed Dowitcher (early July through September) – freshwater sites primarily in the interior part of the flyway.
- Red-necked Phalarope (early July through mid-October) – inland saline and hypersaline lakes where abundant and accessible.
- Red Knot (July through October) – this species is extremely localized during migration and should be sampled *opportunistically* where found in adequate abundance.
- Ruddy Turnstone (July through October) – sample opportunistically in coastal areas where the species is abundant and accessible.

Sampling of Hunter-Harvested Game Birds

The U.S. Strategic Plan listed some preliminary priorities for species and regions in the Pacific Flyway for sampling harvested migratory game birds (IAEDWG 2006; Attachment 5).

Sampling Priorities for Dabbling Ducks

In order to determine opportunities to sample priority duck species during the hunting season, an analysis was conducted on the distribution of band recoveries of Alaska-banded ducks and relative magnitude of duck harvest in states entirely in the Pacific Flyway. The results do not include the easternmost states that are partially in the flyway because equivalent datasets were not available and harvest levels for that part of the flyway are relatively low. There is no implication, however, that harvested ducks should not be sampled for avian influenza in the eastern Pacific Flyway states.

Proportion of recoveries of Alaska-banded dabblers by species across primary PF states 1970-2004.
Relative proportions for the top three states are shown decreasing from orange, gold and yellow.

Species	Arizona	California	Idaho	Nevada	Oregon	Utah	Washington
NOPI	7	1013	29	28	179	64	245
	0.4%	*64.7%*	*1.9%*	*1.8%*	*11.4%*	*4.1%*	*15.7%*
AMWI	0	25	1		8	1	12
	0.0%	*53.2%*	*2.1%*	*0.0%*	*17.0%*	*2.1%*	*25.5%*
AGWT	4	326	11	11	59	36	51
	0.8%	*65.5%*	*2.2%*	*2.2%*	*11.8%*	*7.2%*	*10.2%*
MALL	0	28	6		73	1	208
	0.0%	*8.9%*	*1.9%*	*0.0%*	*23.1%*	*0.3%*	*65.8%*
TOTAL	**11**	**1392**	**47**	**39**	**319**	**102**	**516**

In addition, the distribution of duck species harvests among Pacific Flyway states can be used to guide the design of a sampling plan.

Proportion of dabbling duck harvest by species across primary PF states (avg 2001-2004)
Relative proportions for the top three states are shown decreasing from orange, gold and yellow.

Species	Arizona	California	Idaho	Nevada	Oregon	Utah	Washington
NOPI	1,153	86,939	3,667	1,774	17,210	13,262	12,525
	0.8%	*63.7%*	*2.7%*	*1.3%*	*12.6%*	*9.7%*	*9.2%*
AMWI	5,054	147,643	16,723	3,057	44,968	16,538	64,104
	1.7%	*49.5%*	*5.6%*	*1.0%*	*15.1%*	*5.5%*	*21.5%*
AGWT	6,986	251,776	11,777	7,308	37,522	33,561	29,127
	1.8%	*66.6%*	*3.1%*	*1.9%*	*9.9%*	*8.9%*	*7.7%*
MALL	11,181	294,007	133,131	15,470	133,798	81,244	212,911
	1.3%	*33.3%*	*15.1%*	*1.8%*	*15.2%*	*9.2%*	*24.1%*
NOSH	1,978	114,886	2,337	4,391	12,359	18,887	8,264
	1.2%	*70.4%*	*1.4%*	*2.7%*	*7.6%*	*11.6%*	*5.1%*
TOTAL	**26,352**	**895,251**	**167,635**	**32,000**	**245,857**	**163,492**	**326,931**

Based on the distribution of Alaska band recoveries and dabbling duck species harvests in the Pacific Flyway, priorities for sampling hunter-killed ducks and geese are indicated below. Ideally, sampling should be distributed appropriately throughout hunting seasons, with consideration of obtaining early samples of local mallards and late migrants.

- Northern Pintail – California Central Valley; Oregon; Utah
- Mallard – western Washington; western Oregon; western Idaho

- American Wigeon – California Central Valley; western Washington: western Oregon
- American Green-winged Teal – California Central Valley; Oregon; Utah
- Northern Shoveler – California Central Valley; Utah; Oregon

Sampling Priorities for Geese and Tundra Swans

Regarding sampling of primary and secondary goose populations for Asian H5N1, the following sampling regimes are recommended:

Wrangel Island Snow Geese – Current surveillance planning identifies sampling live snow geese on Wrangel Island during summer banding and, if feasible, sampling of hunter harvest in Alaska during spring and fall. South of Alaska, Wrangel Island snow geese winter both in a northern component primarily in the Skagit-Fraser River deltas of Washington and British Columbia, and a southern component in California. Because of commingling of several abundant white goose populations in California, targeted sampling of Wrangel Island birds there is not feasible.

- Skagit-Fraser region – obtain a sample of harvested snow geese.

Pacific Brant – Surveillance plans in Alaska will include sampling of brant on all major breeding colonies, the major molting area near Teshekpuk Lake, and Izembek Lagoon where the entire population stages for fall migration. Most Pacific brant will migrate to the west coast of Mexico, but up to 10% may winter in coastal states.

- Puget Sound, Washington – obtain a sample of hunter harvested brant
- Humboldt, Morro, and Tomales Bays of California - obtain a collective sample of hunter harvested brant.
- Samples may be obtained also in British Columbia and Mexico

Aleutian Cackling Geese – Aleutian cackling geese are scheduled to be sampled on the breeding grounds at Buldir and Agattu Islands in Alaska; a small portion of the population winters on the Asian side of the Pacific. In fall migration, however, there are few staging areas where they would be accessible between Alaska and the wintering grounds. Aleutian geese concentrate seasonally in the Sacramento and San Joaquin Valleys during November - December, then move to the northwest coast of California as early as January. Hunting seasons have been liberalized in these areas and harvest samples may be acquired at check stations. In addition, large numbers of Aleutian geese now use the southwest Oregon coast in spring, and could be captured or collected here.

- Central Valley, California – obtain a sample of harvested Aleutian geese.
- Northwest California – obtain a sample of harvested Aleutian geese.

Cackling Geese – Cackling geese are considered a secondary target for Asian H5N1 surveillance because they will mingle with brant and other species, potentially including Asian migrants, on the breeding grounds and fall staging areas. Harvest of cackling geese is currently monitored in primary wintering areas where restrictive regulations and check stations are in place; this provides a valuable surveillance opportunity.

- Quota Zones of southwest Washington and western Oregon – obtain a collective sample of harvested cackling geese.

Pacific White-fronted Geese – Pacific white-fronted geese are considered a secondary target for Asian H5N1 sampling because they will mingle with brant and other species, potentially including Asian migrants, on the breeding grounds. Harvest of this population occurs primarily in California where monitoring of public hunting areas provides sampling opportunity.

- Central Valley of California – obtain a collective sample of harvested white-fronted geese.

Tundra Swans – The Western Population of tundra swans is considered a primary target for Asian H5N1 surveillance, but only a small number of birds may breed or molt in Asia, and they will mingle with brant and other species, potentially including Asian migrants, on the breeding grounds. Harvest of tundra swans is restricted to limited permit hunts only in Montana, Utah, and Nevada. Swan harvests are closely monitored through a variety of means, providing opportunities to access and sample birds for Asian H5N1.

- Swan harvest zones of Montana, Utah, and Nevada – obtain a collective sample harvested tundra swans.

INTEGRATION AND SUPPORT FUNCTIONS

Methodologies and Training

Basic protocols for taking and handling avian influenza samples have been developed in cooperation with NWHC, USDA, and other cooperators. The U.S. Strategic Plan includes procedures and protocols for shipping carcasses (IAEDWG 2006; Attachment 8), taking tracheal and cloacal swabs (IAEDWG 2006; Attachment 9), and taking and shipping fecal samples (IAEDWG 2006; Attachment 10).

Samples for full analysis (molecular RT-PCR testing and virus isolation) should be fresh material that is chilled and shipped immediately to a testing laboratory. Fresh chilled samples should arrive at the laboratory no later than 48 hours after collection. Alternately, samples may be frozen at -80ºC or colder and shipped on dry ice or in a nitrogen vapor shipper. Acquisition of these high-value samples should be done by personnel trained in taking and preserving samples, using precautions in the field, and providing appropriate information in public contacts; it also will involve special materials and shipping (e.g., transport media, nitrogen shippers). Specific sampling plans may include samples that can be simply preserved in alcohol—in those cases where samples cannot be submitted to preserve fresh material. These samples have limited value, primarily for preliminary screening for H5 and H7 virus types. Both USDA and NWHC intend to provide sampling packs with tubes and medium—but there may be costs for some materials to the sampling agency.

Given that there will be a substantial investment of resources to implement Asian 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 USGS National Wildlife Health Center and USDA have developed training materials and are working on distance-delivery tools. In addition, training sessions for cooperators will be arranged.

Analytical Capabilities and Data Management

At present, the establishment of a network of laboratories certified to screen and test Asian H5N1 samples is in progress. Some of these laboratories are listed in the U.S. Strategic Plan (IAEDWG 2006; Attachment 11) and in Appendix C. Ultimately, the definitive identification of Asian H5N1 in samples is confirmed at the USDA National Veterinary Services Laboratory (NVSL) in Ames, Iowa. Although there may not be a need for a rigid, singular system of testing within the Pacific Flyway, all cooperators should send samples to National Animal Health Laboratory Network (NAHLN) laboratories, all agencies should coordinate their testing intentions through their veterinary authorities, and all samples and results should be contributed to an integrated database. Samples taken by Department of the Interior (USDOI) agencies, or taken by state or other contractors to USDOI, are scheduled to be processed at the NWHC in Madison, Wisconsin. Samples taken by or under contract from USDA may be directed to other certified laboratories. Note that most fecal/environmental samples will be analyzed at the USDA-NWRC laboratory in Fort Collins.

USDA and USDOI are currently working on a web-based database and archive system through the USGS National Biological Information Infrastructure - Wildlife Disease Information Node (WDIN). State wildlife agencies and other cooperators should investigate and evaluate this system to integrate their sampling and testing data.

Coordination and Communication

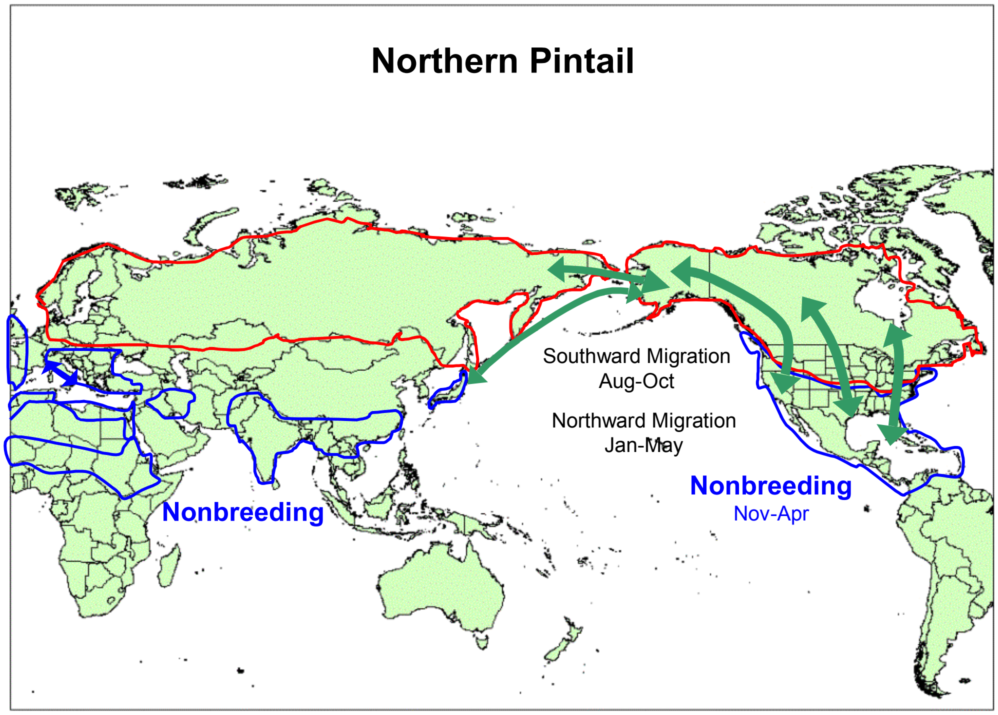
Given the high level of concern among the public and wildlife agencies, and the level of media coverage about the disease, Pacific Flyway agencies should collaborate and coordinate their public information products and outreach programs. Members and cooperators should work with those entities that are implementing national strategies, as well as their state and local authorities to produce: (1) accurate and consistent information about the nature and status of Asian H5N1; (2) sound advice about hygienic handling of birds; and (3) summaries of current surveillance and detection efforts. Coordination of outreach may not require a flyway-level working group, but Pacific Flyway cooperators, in the development of state implementation plans, should exchange information and collaborate on public communications among federal and state agencies, tribes, NGO cooperators, and other potentially affected interests.

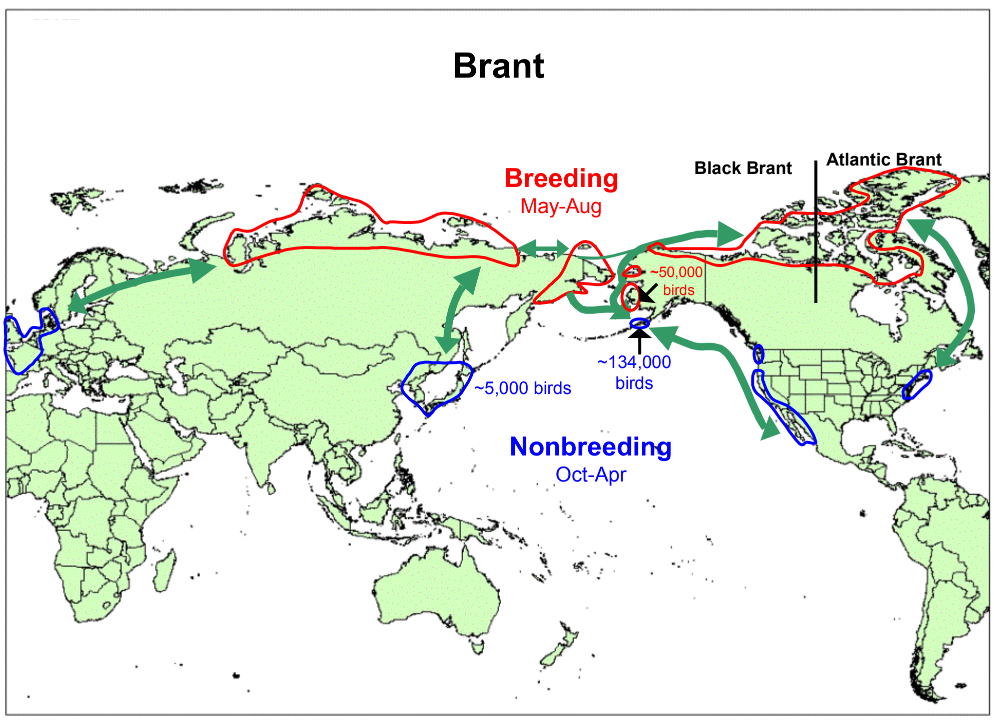
Highly pathogenic H5 or H7 viruses are reportable diseases (i.e., laboratories are required to report them). Positive tests will result in immediate notification to the agency submitting the sample, the state veterinarian, the area veterinarian in charge, the chief state public health official, and the CDC/USDA Select Agent program. Because of the importance and public impacts of a confirmation of Asian H5N1 by the NVSL, notification will go first to top federal and state officials (e.g., Secretaries of Agriculture and Interior, Governors, Directors, etc.). Each Pacific Flyway wildlife agency should cooperatively work with involved agencies to prepare a contingency plan for initial notification chains, communicating with other wildlife agencies, responding to such events, and releasing information to the public.

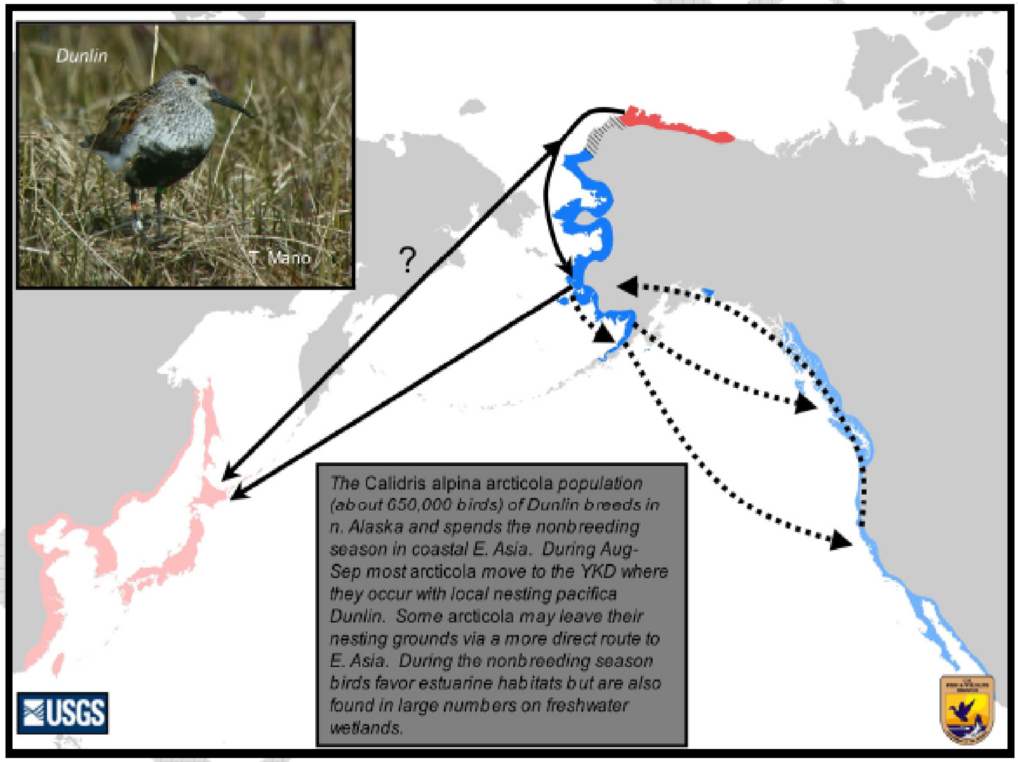
REFERENCES

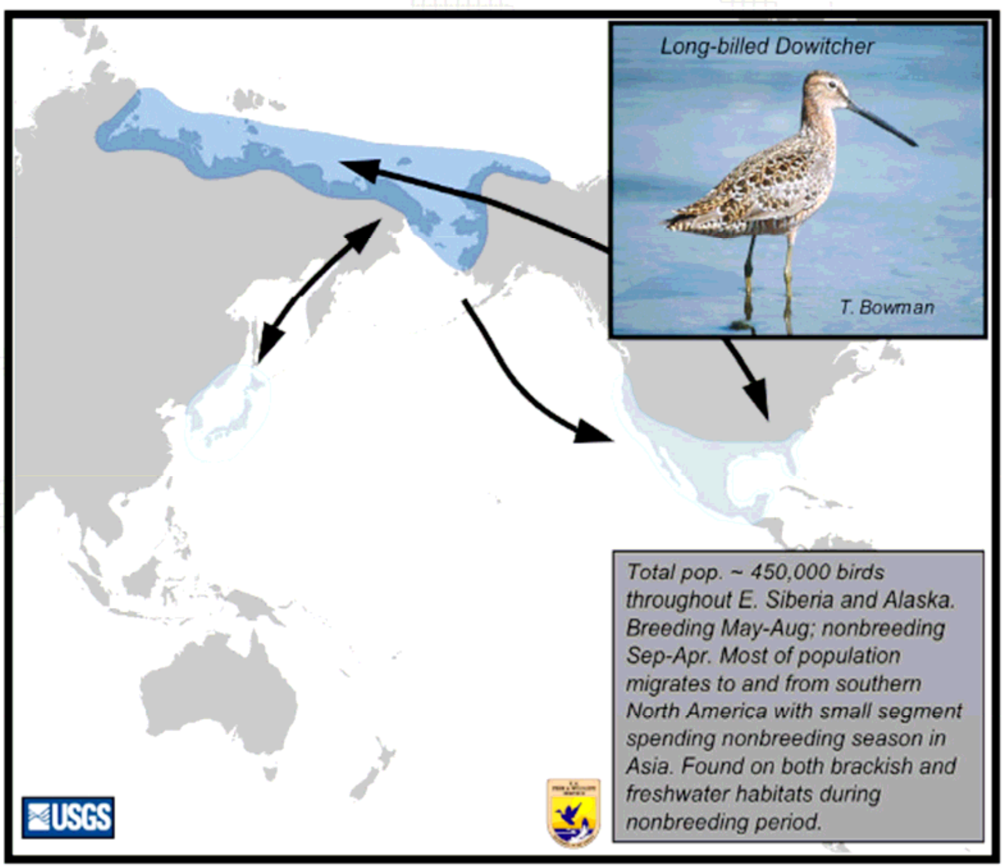
Interagency Asian H5N1 Early Detection Working Group. 2006. An early detection system for Asian H5N1 highly pathogenic avian influenza in wild migratory birds: U.S. Interagency Strategic Plan. Unpubl. Rept. Report to the Department of Homeland Security, Policy Coordinating Committee for Pandemic Influenza Preparedness.

APPENDIX A. Examples of Pacific Flyway Migratory Bird Connections to Asia and Alaska.






Dunlin
T. Mano
?
The Calidris alpina arcticola population (about 650,000 birds) of Dunlin breeds in n. Alaska and spends the nonbreeding season in coastal E. Asia. During Aug-Sep most arcticola move to the YKD where they occur with local nesting pacifica Dunlin. Some arcticola may leave their nesting grounds via a more direct route to E. Asia. During the nonbreeding season birds favor estuarine habitats but are also found in large numbers on freshwater wetlands.


Long-billed Dowitcher
T. Bowman
Total pop. ~ 450,000 birds throughout E. Siberia and Alaska. Breeding May-Aug; nonbreeding Sep-Apr. Most of population migrates to and from southern North America with small segment spending nonbreeding season in Asia. Found on both brackish and freshwater habitats during nonbreeding period.

APPENDIX C

National Animal Health Laboratory Network (NAHLN) laboratories certified (through 3/14/06) to conduct avian influenza screening (alphabetical by state).

National Wildlife Health Center
USDOI U.S. Geological Survey
6006 Schroeder Road
Madison, WI 53711-6223
Contact: Dr. Leslie Dierauf
608/270-2400

National Veterinary Services Lab
USDA-APHIS
P.O. Box 844
1800 Dayton Ave.
Ames, IA 50010
515/663-7200

Charles S. Roberts Veterinary Diag. Lab
1001 Wire Road
Auburn, AL 36830
Contact: Dr. Fred Hoerr
334/844-4987

Arkansas Livestock & Poultry Comm. Lab
One Natural Resources Drive
Little Rock, AR 72205
Contact: Dr. Paul Norris
501/907-2400

Arizona Veterinary Diagnostic Lab
2831 N. Freeway
Tucson, AZ 85705
Contact: Dr. Greg Bradley
520/621-2356

Calif. Animal Health & Food Safety Lab
Univ. of California, School of Vet. Med.
W. Health Science Drive
Davis, CA 95616
Contact: Dr. Alex Ardans
530/752-8709

Colorado State Univ. Vet. Diagnostic Lab
College of Vet. Med. & Biomedical Sci.
300 West Drake
Fort Collins, CO 80523
Contact: Dr. Barbara Powers
970/297-1281

Department of Pathobiology & Vet. Sci.
University of Connecticut
Unit 3089, 61 N. Eagleville Rd,
Storrs, CT 06269-3089
Contact: Dr. Herbert Van Kruiningen
860/486-0837

University of Delaware Poultry Lab
16684 County Seat Hi-Way
Georgetown, DE 19947
Contact: Dr. Mariano Salem
302/856-1997

Kissimmee Diagnostic Laboratory
Florida Department of Agriculture
2700 N. John Young Parkway
Kissimmee, FL 34745
Contact: Dr. Betty Miguel
407/846-5200

Georgia Poultry Laboratory
4457 Oakwood Road
Oakwood, GA 30566
Contact: Dr. James Scroggs
770/535-5996

Athens Veterinary Diagnostic Lab
Univ. of Georgia College of Vet. Med.
Building 1079
Athens, GA 30602
Contact: Dr. Doris Miller
706/542-5568

Univ. of Georgia Veterinary Diag. Lab
43 Brighton Road
Tifton, GA 3i793
Contact: Dr. Charles Baldwin
229/386-3340

Hawaii State Laboratories Division
2725 Waimano Home Road
Pearl City, HI 96782
Contact: Dr. David T. Horio
808/453-5990

Veterinary Diagnostics Lab
Iowa State University
1600 S. 16th Street
Ames, IA 50011
Contact: Dr. Bruce Janke
515/294-1950

Purdue Univ. Animal Disease Diag. Lab
406 S. Lafayette
West Lafayette, IN 47907
Contact: Dr. Leon Thacker
765/494-7460

Louisiana State University
Veterinary Medical Diagnostic Lab
1909 Skip Bertman Drive
Baton Rouge, LA 70803
Contact: Dr. Wayne Taylor
225/578-9777

Maryland Dept. of Ag & An. Health Lab
27722 Nanticoke Road
Salisbury, MD 21801
Contact: Dr. Daniel Bautista
410/543-6610

Animal Health Diagnostic Lab
Michigan State University
4125 Beaumont Rd., Ste. 201H
Lansing, MI 48910
Contact: Dr. Willie Reed
517/353-0635

Univ. of Minnesota Veterinary Diag. Lab
1333 Gortner Ave., 244 Vet DL
St. Paul, MN 55108
Contact: Dr. James E. Collins
612/625-8787

University of Missouri
Veterinary Medical Diagnostic Lab
1600 East Rollins
Columbia, MO 65211
Contact: Dr. Stan Casteel
573/882-6811

Mississippi Vet. Res. & Diagnostic Lab
2531 North West Street
Jackson, MS 39216
Contact: Dr. Lanny Pace
601/354-6089

Rollins Animal Disease Diagnostic Lab
N. Carolina Dept. of Agriculture
2101 Blue Ridge Road
Raleigh, NC 27607
Contact: Dr. Gene Erickson
919/733-3986

Veterinary Diagnostic Center
University of Nebraska
Fair Street, E. Campus Loop
Lincoln, NE 68583
Contact: Dr. David Steffen
402/472-1434

NJ Dept. of Agriculture, Division of Animal Health State Diagnostic Lab
John Fitch Plaza, HNA Building, Rm 201
Trenton, NJ 08625
Contact: Dr. Bob Eisner
609/984-2293

New Mexico Department of Agriculture
Veterinary Diagnostic Services
700 Camino de Sauld NE
Albuquerque, NM 87106
Contact: Dr. Flint Taylor
505/841-2576

Nevada Animal Disease Lab
Nevada Dept. of Agriculture
350 Capitol Hill Ave.
Reno, NV 89502-2923
Contact: Dr. Annette Rink
775/668-1182

NYS Animal Health Diagnostic Lab
Cornell Univ. College of Vet. Med.
S3 110 Schurman Hall, Upper Tower Rd.
Ithaca, NY 14853
Contact: Dr. Alfonso Torres
607/253-4136

Ohio Department of Agriculture
8995 E. Main Street, Building 6
Reynoldsburg, OH 43068
Contact: Dr. Beverly Byrum
614/728-6220

Oklahoma Animal Disease Diag. Lab
Oklahoma State Univ., Coll. of Vet. Med.
Farm Road & Ridge Road
Stillwater, OK 74078
Contact: Dr. Bill Johnson
405/744-6623

Oregon State Veterinary Diagnostic Lab
Oregon State Univ., College of Vet. Med. 30th & Washington
Corvallis, OR 97331
Contact: Dr. Jerry Heidel
541/737-3261

Pennsylvania State Vet. Diagnostic Lab
2305 N. Cameron Street
Harrisburg, PA 17110
Contact: Dr. Helen Acland
717/787-8808

Large Animal Path. & Toxic. Lab
University of Pennsylvania
New Bolton Center
382 West Street Road
Kennet Square, PA 19348
Contact: Dr. Sherrill Davison
610/925-6210

Clemson Veterinary Diagnostic Center
500 Clemson Road
Columbia, SC 29229
Contact: Dr. Pamela Parnell
803/788-2260

Texas Vet. Medical Diagnostic Lab
1 Sippel Road, Drawer 3040
College Station, TX 77843
Contact: Dr. Lelve Gayle
979/845-9000

Utah Veterinary Diagnostic Lab
950 E. 1400 North
Logan, UT 84322
Contact: Dr. Tom Baldwin
435/797-1895

Virginia Dept of Agriculture and Animal Health Lab
116 Reservoir
Harrisonburg, VA 22801
Contact: Dr. Joe Garvin
540/434-3897

Washington Animal Disease Diag. Lab
Bustad Hall Room 155-N
Pullman, WA 99164-7034
Contact: Dr. Terry McElwain
509/335-9696

Avian Health & Food Safety Lab
7613 Pioneer Way E.
Puyallup, WA 98371-4919
Contact: Dr. A.S. Dhillon
253/445-4537

Wisconsin Vet. Diagnostic Lab
Wisconsin Dept of Agriculture
6101 Mineral Point Road
Madison, WI 53705
Contact: Dr. Kathy Kurth
608/262-5432

West Virginia Dept of Agriculture
1900 Boulevard East
Charleston, WV 25305-0172
Contact: Dr. Jewell Plumley
304/558-2214