# SAMPLING PROTOCOL FOR HIGHLY PATHOGENIC ASIAN H5N1 AVIAN INFLUENZA IN MIGRATORY BIRDS IN ALASKA

Alaska Interagency HPAI Bird Surveillance Working Group

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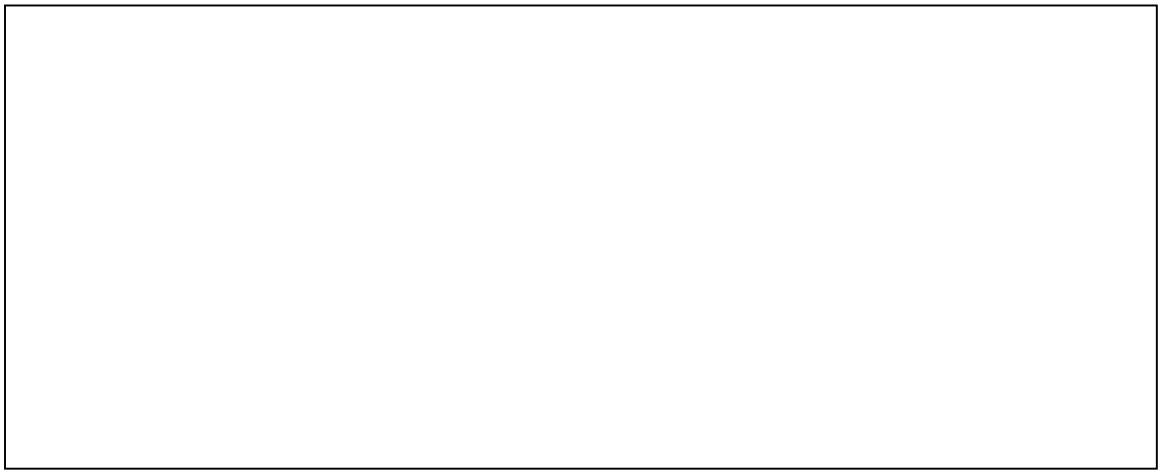

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# SAMPLING PROTOCOL FOR HIGHLY PATHOGENIC ASIAN H5N1 AVIAN INFLUENZA IN MIGRATORY BIRDS IN ALASKA

## INTRODUCTION

The highly pathogenic avian influenza referred to as Asian H5N1 continues to spread across the Asian continent. Recent reports indicate that Asian H5N1 has crossed into Africa (WHO 2006). Much debate centers on the question of whether Asian H5N1 is being spread by wild birds, or through movement of domestic poultry and waterfowl (Chen et al. 2005, Normile 2005). Clearly this disease occurs in wild birds, but the observed die-offs suggested that wild birds suffered high mortality and thus were not likely efficient carriers (Chen et al. 2005). However, recent data indicate that apparently healthy wild birds are carriers of Asian H5N1 substantiating concerns that migrating birds may distribute this virus around the globe (Chen et al. 2006).

Alaska represents a unique crossroads where migratory flyways from Asia and North America overlap. Species of birds that winter in Southern Asia return and breed in Alaska each summer. Conversely, species of birds that winter in North America cross the Bering Straits and spend a portion of the summer in Asia. Alaska was identified as the most likely location that Asian H5N1 would first occur in North America if introduced by wild birds (Interagency Working Group 2005).

In early 2006, an Alaska Interagency Avian Influenza Working Group was formed to develop a ranking matrix for setting priority species for sampling within Alaska. All wild bird species with populations that utilize areas of both Alaska and Asia were identified. For each species, a score was given for each of five factors:

1) proportion of the population occurring in Asia (score 1-5; 5=100%)
2) contact with a known 'hot spot' or source (1=no contact, 2=contact)
3) Habitats used in Asia in context with exposure potential (1=offshore marine, 2=estuary, 3=terrestrial, 4=freshwater)
4) population size in Alaska (1=1,000, 2=10,000, 3=100,000, 4=1,000,000)
5) ability to obtain a representative sample of sufficient size (1=no, 2=maybe, 3=yes)

The overall emphasis for this ranking system was based on opinions regarding the probability of individuals of each species contracting the virus in Asia and bringing it to Alaska in summer 2006. Factor 1 is simply based on numerical probability such that the more individuals within a species that winter in, or migrate through, Asia, the higher the likelihood that one or more will encounter the virus. Factor 2 considers if these species are using areas where Asian H5N1 is currently known to occur. Obviously, this factor is in a constant state of flux as the virus continues to spread and new areas are identified. The scores presented in this document will be updated as new information becomes available. Factor 3 considers the habitats used by each species in the context of the probability of contacting avian influenza. For example, Long-tailed Ducks winter in areas where Asian H5N1 is known to occur, but these birds primarily utilize near shore marine habitats reducing their probability of exposure. Conversely, Northern Pintails winter in areas known to have Asian H5N1 and utilize freshwater and agricultural habitats significantly increasing their likelihood of coming into contact with domestic fowl or domestic fowl wastes. Factor 4 considers the total population of a species that occurs in Alaska in the summer and similar to Factor 1 is based on numerical probability. Factor 4 de-emphasizes rare

and accidental species. Factor 5 considers the likelihood of obtaining a representative sample. Alaska is very large with numerous logistical and economic constraints on access. Locations used by large numbers of some species are ephemeral and impossible to predict. Thus, this factor represents the working group opinion regarding the likelihood of successful sampling. The scores from each of the five fields were summed to provide the overall rank score.

Starting from these ranked scores, teams with expertise within each of four taxonomic groups (waterfowl, shorebirds, seabirds, passerines) were formed to develop species-specific sampling plans. These plans detail optimal sampling protocols for each species considering timing of arrival from Asia, known concentration areas, existing points of access and ongoing research/monitoring programs. Accordingly these plans represent the most feasible sampling scenario where overlap with existing studies, and among species, result in economies in funding and personnel.

This document is a step-down plan from the U.S. Strategic Plan that includes specific surveillance protocols for sampling birds in Alaska during 2006. It also relates to "Surveillance for Early Detection of Highly Pathogenic Avian Influenza H5N1 in Wild Migratory Game Birds: A Strategy for the Pacific Flyway" which guides surveillance efforts for many of the same populations in the western contiguous states. Each of the 29 species plans presented herein provides a sampling protocol for 2006, including: dates, locations (Figure 1), sample size, and study design. These plans also provide natural history information regarding the species' particular connections in Alaska and Asia and the derivation of the species' rank score.

**Literature cited:**

Chen, H., G. J. D. Smith, S. Y. Zhang, K. Qin, J. Wang, K. S. Li, R. G. Webster, J. S. M. Peiris, and Y. Guan. 2005. H5N1 virus outbreak in migratory waterfowl. Nature 436:191-192.

Chen, H., G. J. D. Smith, K. S. Li, J. Wang, X. F. Fan, J. M. Rayner, D. Vijaykrishna, J. X. Zhang, L. J. Zhang, C. T. Guo, C. L. Cheung, K. M. Xu, L. Duan, K. Huang, K. Qin, Y. H. C. Leung, W. L. Wu, H. R. Lu, Y. Chen, N. S. Xia, T. S. P. Naipospos, K. Y. Yuen, S. S. Hassan, S. Bahri, T. D. Nguyen, R. G. Webster, J. S. M. Peiris, and Y. Guan. 2006 Establishment of multiple sublineages of H5N1 influenza virus in Asia: implications for pandemic control. Proceedings of the National Academy of Science, www.pnas.org/cgi/doi/10.1073/pnas.0511120103.

Interagency Working Group. 2005. An early detection system for Asian H5N1 highly pathogenic avian influenza in wild migratory birds. Draft U.S. Interagency Strategic Plan. Reston, VA.

Normile, D. 2005. Avian influenza: are wild birds to blame? Science 310(5747):426-428.

World Health Organization. 2006. Avian Influenza – situation (birds) in Nigeria. Epidemic and Pandemic Alert and Response, Disease Outbreak News, 8 February 2006.

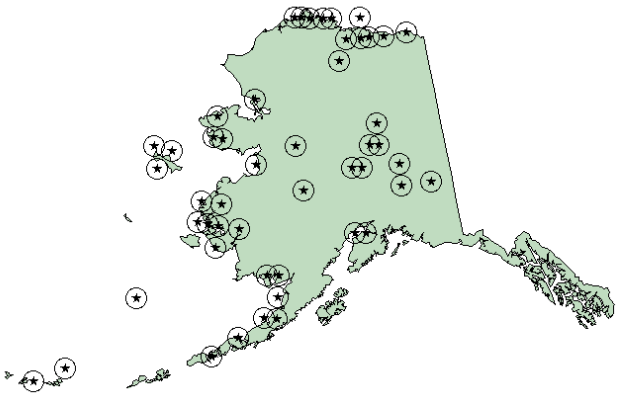


Figure 1. Locations of 2006 sampling effort for Asian H5N1 in Alaska.

## Taxon: Steller's Eider (*Polysticta stelleri*)

**Justification:** The vast majority of Steller's Eiders breed in East Asia and return to Alaska each fall to molt and winter.

**Background:** The Pacific population of Steller's Eiders primarily breeds in the Siberian Arctic and molts, winters and stages along the Alaska Peninsula and Northern Bristol Bay (Kertell 1991). Spring migration starts in May as birds disperse to breeding grounds; males and failed- and non-breeding females return to Alaskan molting areas in July and August. Successful breeders and hatch year birds likely return to Alaska in October. Known molting and staging areas include Izembek Lagoon, Nelson Lagoon, Seal Islands, and Kuskokwim Shoals. Within these molting and staging estuaries, Steller's Eiders are commonly found in dense flocks that simultaneously dive while foraging. These flocks are regularly observed roosting on sand bars and beaches facilitating transmission of disease among individuals within flocks. For molting birds there is strong evidence of site fidelity to specific molting locations and the sexes are somewhat segregated temporally and spatially during the flightless period as males molt earlier than females (Flint et al. 2000). However, there is no evidence of segregation of breeding populations among molting areas (Dau et al. 2000).

Previous work on virus exposure (not avian influenza) of molting sea ducks showed substantial variation in prevalence among flocks and locations (Hollmén et al. 2003). Thus, it seems clear that birds within flocks are not independent from the standpoint of virus exposure. During the flightless molt, flocks of birds are functionally isolated within lagoons as large areas of unsuitable habitat separate flocks; however, exchange of individuals prior to the molt likely creates a positive correlation in exposure probability within lagoons. Thus, a sampling strategy spread relatively uniformly across the molting range is the most effective sampling strategy for birds molting in clumped distributions.

**Ranking score:** 15

**Methods:**

*No. of samples*. A total of 800 birds will be sampled using a 2-stage stratified design. The first level of stratification will be at the level of lagoons or molting areas. The second level will consider functionally isolated flocks of flightless eiders within lagoons where possible. Thus, we will sample 50 birds from each of 4 flocks within each lagoon yielding a total of 200 from each of the 4 lagoons.

*Sampling locations*: Primary locations in order of priority include Nelson Lagoon, Izembek Lagoon, Seal Islands, and Kuskokwim Shoals. Secondary locations, within these lagoons, will be determined based on channel systems and observed flock locations and movement patterns.

*Sampling timeframe*: Late August through late September.

*Sample demographics*: After-hatch-year males and females. The sample will be primarily post-breeding males and both failed and non-breeding (likely sub-adult) females.

*Methods of capture*: Flocks of flightless birds will be herded with boats and driven out of the water into corral traps. This approach has been used to capture >65,000 Steller's Eiders for >20 years.

*Other targeted species:* None, flocks of eiders rarely mix with other species.

*Supplemental sampling:* Small numbers of Steller's Eiders can be sampled in conjunction with other ongoing studies. A study of the nesting productivity of Steller's Eiders near Barrow, Alaska finds from 0 to 30 active nests per year. Fecal samples and a small number of cloacal swabs can be obtained in conjunction with this work. Also, several studies of wintering ecology and movements are capturing <30 Steller's Eiders at several different wintering areas. Cloacal swabs will be taken from these live captured birds.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management (sampling at Seal Islands)

*Contact:* Julian Fischer/ Tim Bowman

Izembek NWR (Sampling at Izembek and Nelson Lagoons)

*Contact:* Kristine Sowl

Yukon Delta NWR (sampling at Kuskokwim Shoals)

*Contact:* Fred Broerman

U.S. Geological Survey

Alaska Science Center (sampling at Kuskokwim Shoals)

*Contact:* Paul Flint

**Literature cited:**

Dau, C. P., P. L. Flint and M. R. Petersen. 2000. Distribution of recoveries of Steller's Eiders banded on the lower Alaska Peninsula, Alaska. Journal of Field Ornithology 71:543-550.

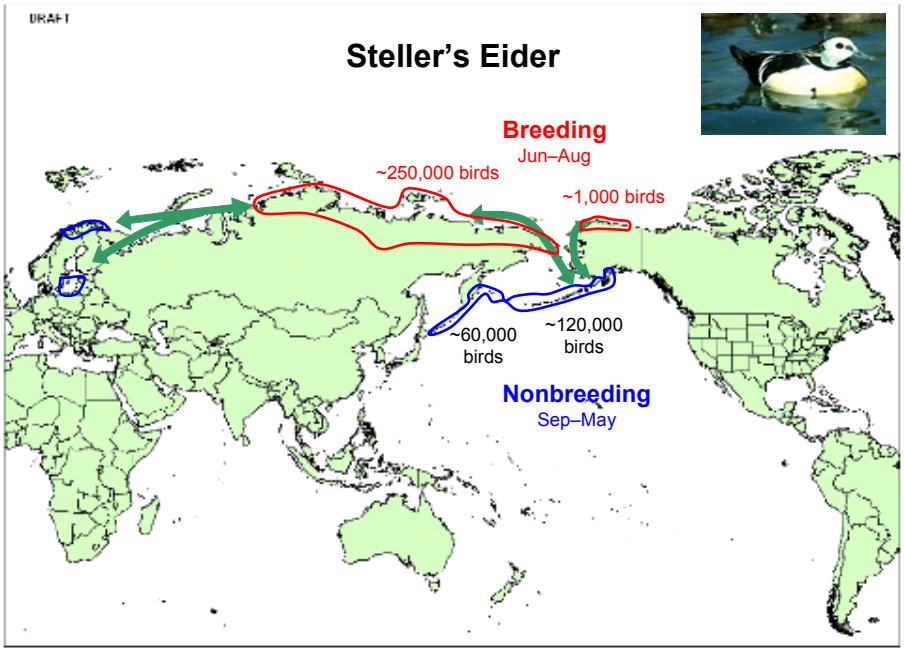
Flint, P. L., M. R. Petersen, C. P. Dau, J. E. Hines, and J. D. Nichols. 2000. Annual survival and site fidelity of Steller's eiders molting along the Alaska Peninsula. Journal of Wildlife Management. 64:261-268.

Hollmén, T. E., J. C. Franson, P. L. Flint, J. B. Grand, R. B. Lanctot, D. E. Docherty, H. M. Wilson. 2003. An Adenovirus Linked to Mortality and Disease in Long-tailed Ducks (*Clangula hyemalis*) in Alaska. Avian Diseases 47:1434-1440.

Kertell, K. 1991. Disappearance of the Steller's Eider from the Yukon-Kuskokwim Delta, Alaska. Arctic 44:177-187.

Asian H5N1 ranking criteria for Steller's Eider, *Polysticta stelleri*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 4 | 1 | 4 | 3 | 3 | 15 |
| Most (>90%) of the Pacific-wintering population (250,000) breeds in northeastern Asia | No known use of AI-infected areas | Uses estuarine and freshwater habitats | Winter pop. approximately 80,000. Breeding pop. <1,000 | Rel. easy to trap during fall molting period | |



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

**Justification:** Northern Pintails are one of the most common ducks found in Alaska during the breeding season. The combination of band recovery and satellite telemetry data indicate that birds wintering in Asia are found in Alaska in summer and birds that winter in North America cross to Asia in summer. Thus, this species has regular contact with Asian species making it a likely vector for disease transmission.

**Background:** Approximately 50% of the North American population of Northern Pintails is counted in Alaska each summer. However, the number of pintails counted in Alaska can increase substantially in some years, depending habitat conditions in the prairie pothole region. When prairie regions are dry, more pintails "overfly" to Alaska (Smith 1970, Derksen and Eldridge 1980). Band recovery data indicate that a small proportion of birds found in Alaska in late summer likely wintered in southern Asia (i.e., Japan, Nicholi et al. 2005). These Asian wintering birds may be utilizing Asian H5N1 infected areas. Thus, birds sampled in Western Alaska in spring likely represent small proportions of Asian wintering birds. Further, satellite telemetry data demonstrate that pintails marked in California regularly cross the Bering Straits during the summer months (Miller et al. 2005). Thus, pintails captured in late July and August likely represents some proportion of North American wintering birds returning from Asia, although it is unlikely these birds are utilizing Asian H5N1 infected areas. In developed areas, pintails prefer ephemeral wetlands and regularly utilize farm fields and wetlands. Thus, the habitats used by pintails increases their likelihood of exposure to poultry wastes.

Spring pintails may be sampled extensively from a subsistence harvest of 15-20,000 birds, or through capture of live birds and directed collecting. Fall pintails can be captured on molting and staging areas across Alaska, and samples can be taken from hunter-harvested birds. These populations likely include some North American wintering birds that crossed the Bering Strait for a portion of the summer, as well as Asian wintering birds that have not departed for wintering areas yet.

*Spring*

We recommend a geographically stratified sampling design for spring arrival/pre-nesting birds. Sampling strata (and associated strata priority) are broadly defined as Yukon-Kuskokwim Delta (high), Seward Peninsula - including Kotzebue Sound - (high), St. Lawrence Island (high), Bristol Bay (low), and the Arctic Coastal Plain (low). High priority designations among these strata are based on subjective opinions regarding relative abundance of pintails and the likelihood of encountering Asian wintering birds. Spring arrival birds are difficult to capture efficiently, thus we recommend that sampling be based on collected birds: either subsistence harvested birds, or birds specifically collected for this study. Pintails are a widespread and common duck in traditional spring subsistence harvests. Roughly 15-20,000 pintails are taken annually for subsistence, mostly during spring. On the Y-K Delta alone, 8-10,000 pintails are taken during spring. With an appropriate program to gain access to harvested birds, a representative sample of pintails could be obtained in key strata. Influenza sampling will be by cloacal swab from collected birds. Ideal sample size is 200 per strata with collections spread across each stratum. However, we acknowledge that logistic constraints will make sample size and distribution within strata problematic.

*Fall*

We propose a geographic stratification targeting known concentrations of molting or staging pintails, as well as principal fall harvest areas. Sampling strata (and associated strata priority) include Yukon-Kuskokwim Delta (high), Innoko NWR (medium), St. Lawrence Island (high), Lower Yukon Valley (Koyukuk/Nowitna) (medium), Minto Flats (high), Yukon Flats (medium), Cook Inlet (medium), Seward Peninsula and Kotzebue Sound (high), Izembek Lagoon (high) and Arctic Coastal Plain (medium). Within each stratum we propose a cluster sample design targeting 200 birds spread across 3-4 sampling (i.e. trap) locations (i.e., clusters): 50 from each location. Sampling would occur in late July and August and will sample mostly adult males with fewer females and hatch year birds. Pintails will be captured during summer with baited live traps or rocket nets. Sampling will be by cloacal swab from live-captured birds. Using this capture approach there will be substantial opportunity to sample other dabbling ducks such as Mallards and Green-winged Teal. In addition, samples will be obtained from hunter-shot pintails where sufficient access to hunters and birds can be arranged. Pintails rank second (18%) in the fall dabbling duck bag, totaling about 11-12,000. Samples of pintails originating in northern and interior Alaska can be obtained at Minto Flats and in the Tanana Valley. Pintails migrating from southern and western Alaska can be sampled in Cook Inlet (42% of fall sport-harvested ducks).

**Ranking score:** 15

**Methods:**

*No. of samples*. A total of 2,000 birds will be sampled spread across spring and fall sampling.

*Sampling locations*: Yukon-Kuskokwim Delta, Seward Peninsula, St. Lawrence Island, Bristol Bay, Arctic Coastal Plain, Innoko NWR, Lower Yukon Valley, Minto Flats, Yukon Flats, Cook Inlet, and Izembek Lagoon.

*Sampling timeframe*: May through mid September.

*Sample demographics*: Spring sampling will be from after-hatch-year males and females. Fall sampling will be adults as well as hatch year birds of both sexes.

*Methods of capture*: Spring sampling will focus on subsistence-harvested birds. Fall sampling will be from a combination of live birds captured over bait and hunter harvested birds. Sport harvested birds will be sampled where there is adequate access to hunters.

*Other targeted species:* Numerous other species will be encountered during spring subsistence sampling. Other species likely to be encountered include Black Brant, Emperor Geese, Long-tailed Ducks, Tundra Swans and Lesser Sandhill Cranes. Numerous other unranked species will also be encountered.

*Harvest sampling:* Samples can likely be obtained from sport-harvested birds in several areas where substantial harvest occurs. However, some of these same areas will also be sampled just prior to hunting season with live captures. Samples from sport-harvested birds will be used to increase the total species sample and to provide sampling during fall migration when birds aggregate on staging areas and sex-age composition varies.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management (Seward Peninsula, July/August captures, St Lawrence Island)

*Contact:* Julian Fischer

Yukon Delta NWR (Spring arrival and July/August Captures)

*Contact:* Fred Broerman

Innoko NWR (July/August captures)

*Contact:* Steve Kovach

Koyukuk-Nowitna NWR (July/August captures)

*Contact:* Brad Scotton

Yukon Flats NWR (July/August captures)

*Contact:* Mark Bertram

Izembek NWR (fall sampling)

*Contact:* Kristine Sowl

Togiak NWR (Spring arrival sampling)

*Contact:* Rob MacDonald

Selawik NWR (spring and fall sampling)

*Contact:* Tina Moran

Alaska Department of Fish and Game

Minto Flats (July/August captures)

Cook Inlet (July/August captures, sport harvest sampling in all areas)

*Contact:* Mike Petrula

North Slope Borough (late summer/fall Arctic Coastal Plain sampling)

*Contact:* Robert Suydam

**Literature cited:**

Derksen, D. V., and W. D. Eldridge. 1980. Drought-displacement of pintails to the arctic coastal plain, Alaska. Journal of Wildlife Management 44:224-229.

Smith, R. I. 1970. Response of pintail breeding population to drought. Journal of Wildlife Management 34:943-946.

Nicholi, C., P. L. Flint, and M. Wege. 2005. Annual survival, recovery rates, and site fidelity of Northern Pintails banded on the Yukon-Kuskokwim Delta, Alaska. Journal of Wildlife Management 69:1202-1210.

Miller, M. R., J. Y. Takekawa, J. P. Fleskes, D. L. Orthmeyer, M. L. Casazza, and W. M. Perry. 2005. Spring migration of Northern Pintails from California's central valley wintering area tracked with satellite telemetry: routes, timing and destinations. Canadian Journal of Zoology 83:1314-1332.

Asian H5N1 ranking criteria for Northern Pintail, *Anas acuta*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 2 | 2 | 4 | 4 | 3 | 15 |
| Unknown number of Siberian-breeding birds migrate through Alaska to winter in North Ameria | Asian summer range overlaps with known AI-infected areas | Freshwater marshes, ephemeral wetlands | Summer population approximately 1 million | Easy to capture in Alaska in autumn | |

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

**Justification:** The entire breeding population of Lesser Snow Geese from Wrangel Island, Russia, migrates to Alaska and to the southern Pacific Flyway. A very small segment of this Asian-breeding population also winters in Japan. As Asian residents, Wrangel Island Lesser Snow Geese could come into contact with the Asian H5N1 strain of avian influenza.

**Background:** Lesser Snow Geese that nest on Wrangel Island, Russia, migrate through Alaska to wintering areas in British Columbia and California. Depending on reproductive success the autumn population can exceed 120,000 individuals. Wrangel Island Lesser Snow Geese use St. Lawrence Island and the Yukon-Kuskokwim Delta (YKD) in western Alaska as stopover areas during autumn migration (Ely et al. 1993). Part of the population also stops on the Stikine River Delta in Southeast Alaska in fall. In spring the population uses stopover areas in Southeast Alaska, Cook Inlet, and the YKD. Approximately 2,000-3,000 snow geese are harvested for subsistence purposes on the YKD in fall and spring. A small number (<100) are shot by sport hunters in Southeast Alaska. In addition to Lesser Snow Geese from Wrangel Island, >3000 Snow Geese occur at several nesting colonies on the North Slope of Alaska, and their numbers at some colonies are increasing.

Wrangel Island snow geese may become exposed to the Asian H5N1 virus from other waterbirds that winter in Asia and nest or molt on Wrangel Island. Exposure to Asian H5N1 may also occur among snow geese that stop over on the north coast of the Chukotka Peninsula during autumn migration, where they could come in contact with a variety of species that may carry the virus from winter or migration sites in Asia or Siberia. Transmission of the virus within this population may be rapid because they nest colonially, rear goslings on a common brood-rearing area, and congregate in large flocks during migration and winter. Exposure of North Slope snow geese to Asian H5N1 may occur when they intermingle with Wrangel Island geese on wintering areas, or if some Wrangel Island birds that are carriers of the virus disperse to the North Slope for breeding. Snow geese marked at Wrangel Island have been captured at some North Slope nesting colonies.

**Ranking score:** 15

**Methods:** Live capture of Wrangel Island snow geese in Alaska would be very difficult because the birds are highly mobile, reside at stopover areas for short periods, and the timing of their arrival and distribution during those periods cannot be predicted. Consequently, sampling of Asian H5N1 in Wrangel Island snow geese in Alaska should focus on subsistence harvested birds on the YKD. Birds are most consistently harvested in late September and early October by people in villages on the northern portion of the YKD as well as by people in villages near the Askinuk Mountains.

Sampling of subsistence-harvested birds will require much cooperation from local hunters on the YKD. To facilitate cooperation, the subsistence HPAI working group will develop outreach material on Asian H5N1 for distribution to local hunters. The flyer will describe in English and Yupik how the Asian H5N1 virus spreads among migratory birds, which species on the YKD are strongest candidates for carrying Asian H5N1, transmission of the virus from birds to humans, procedures hunters can follow to diminish their likelihood of contracting the virus, and the

importance of sampling harvested birds for presence of the virus. During the spring and summer of 2006, the Yukon Delta NWR will distribute flyers to villages, provide information on the virus to local people, and request assistance from hunters. Refuge personnel will also be trained to obtain and preserve cloacal or tracheal swabs from hunter-shot birds, but the majority of the subsistence-harvested snow geese will be sampled by sub-contractors. Age (juvenile versus adult plumage) of sampled birds should be recorded. Samples will be returned to the USFWS coordinator who will transfer samples to the National Wildlife Health Center. The number of subsistence-harvested birds sampled will depend on hunting efforts and success of local people, and the ability to collect samples.

Sampling for Asian H5N1 in snow geese on the North Slope will occur when birds are captured during molt in July as part of ongoing marking efforts led by Alaska Biological Research, Inc (ABR). ABR plans to capture snow geese on the Ikpikpuk River Delta in July 2006. In past years they have captured approximately 1,100 individuals at that site. Cloacal swabs will be collected from about 100 adult and 100 juvenile snow geese of both sexes. USGS will provide 1-2 individuals to assist with sampling.

The most efficient, least expensive means of obtaining samples from Wrangel Island Snow Geese would be to capture geese on Wrangel Island during on-going banding operations. Due to the remoteness of the field site, samples will be stored in alcohol, which will still provide very useful samples (Hon Ip, USGS, pers. com). Sampling vials and media could be delivered to Russian scientists attending the Pacific Flyway meeting in Oregon during March. Importation permits will be required to get the samples back into the country.

*No. of samples*: Total 400, including 200 birds from brood flocks on Wrangel Island, Russia, 200 from brood flocks on the North Slope, and 100 sampled opportunistically from subsistence hunters.

*Sampling locations*: Samples will be collected from brood flocks on Wrangel Island and on the Ikpikpuk River Delta, Alaska. Additional samples will be obtained from subsistence hunters on St. Lawrence Island, and on the YKD, Alaska.

*Sampling timeframe*: Geese will be sampled during July and August on Wrangel Island and on the North Slope. Subsistence harvest on St. Lawrence Island and the YKD generally occurs in September.

*Sample demographics*: An equal sample of adults and young will be taken from brood flocks, whereas all subsistence-harvested birds encountered will be sampled for Asian H5N1.

*Methods of capture*: Brood flocks will be herded into standard drive traps on Wrangel Island, and the North Slope of Alaska. Subsistence-harvested birds will be sampled by hunters in local villages.

*Other targeted species*: It may be possible to obtain samples from other high-ranking species during brood drives on Wrangel Island and when conducting subsistence harvest surveys.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Yukon Delta NWR (Sampling of YKD subsistence harvest)

*Contact:* Fred Broerman

Alaska Biological Research, Inc. (Sampling of North Slope snow geese)

*Contact:* Robert Ritchie

**Literature cited:**


Armstrong, W. T., K. M. Meeres, R. H. Kerbes, W. S. Boyd, J. G. Silveira, J. P. Taylor, and B. Turner. 1999. Routes and timing of migration of Lesser Snow Geese from the Western Canadian Arctic and Wrangel Island, Russia, 1987-1992. Pp. 75-89 *In* Distribution, survival, and numbers of Lesser Snow Geese of the Western Canadian Arctic and Wrangel Island, Russia. Canadian Wildlife Service Occasional Paper No. 98.

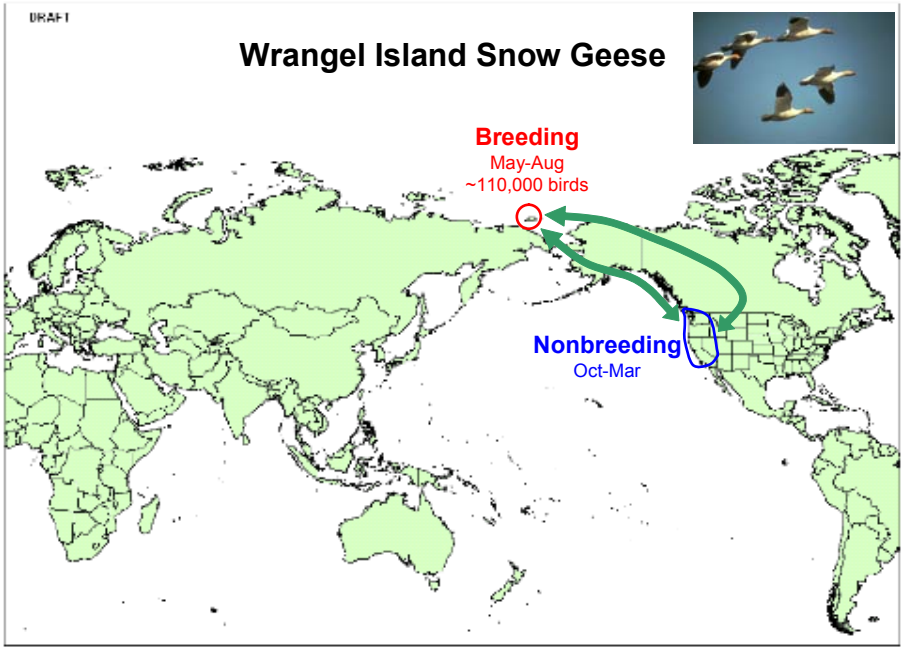
Ely, C. R., Takekawa, J. Y., and M. L. Wege. 1993. Distribution, abundance, and productivity of Wrangel Island Lesser Snow Geese *Anser caerulescens* during autumn migration on the Yukon-Kuskokwim Delta, Alaska. Wildfowl 44:24-32.

Mowbray, T. B., F. Cooke, and B. Ganter. 2000. Snow Goose (*Chen caerulescens*). *In* The Birds of North America, No. 514 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Takekawa, J.Y., Orthmeyer, D.L., Kurechi, M., Sabano, Y., Syroechkovsky, E.V., Litvin, K.E., Baranyuk, V.V. & Andreev, A.V. 1994. Restoration of lesser snow geese to east Asia: a north Pacific rim conservation project. Trans. N. Am. Wildl. & Natur. Resour. Conf. 59: 132-145.

Asian H5N1 ranking criteria for Lesser Snow Goose, *Chen caerulescens caerulescens.*

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 5 | 1 | 4 | 3 | 2 | 15 |
| The Wrangel Island colony of 110,000 breeding birds is managed as a discreet population | No known use of AI-infected areas | Freshwater marshes, ephemeral wetlands | Entire breeding population of 110,000 breeding birds plus young of the year migrate through Alaska enroute to the west coast states | Could be difficult to obtain target number depending on timing and route of migration | |



## Taxon: Emperor Goose (*Chen canagica*)

**Justification:** Most (>90%) of the world population breeds on the Yukon-Kuskokwim Delta (YKD). A substantial portion of this population (subadults and failed breeders) migrates to the northern Chukotka Peninsula in east Asia to molt, either as subadults. Small numbers breed in east Asia, principally in the Anaydr lowlands and southern Chukotka, and small numbers winter in Asia, primarily in the Commander Islands.

**Background:** Most of the global population of Emperor Geese breeds on the outer coast of the YKD (Eisenhauer and Kirkpatrick 1977), with as many as 35,000 nests estimated in some years (Fischer et al. 2005). These geese are not colonial, but are readily captured in small numbers in June while nesting and in large numbers (with young) in late July/early August during the flightless primary molt (Petersen et al. 1994). Most Emperor Geese that fail to incubate a nest then migrate in early June from the YKD to northern Chukotka in eastern Russia where they then molt their flight feathers. In some years, the number of geese undergoing this migration likely exceeds 50,000, and perhaps substantially more (Hupp et al; in review). The flight trajectory of geese migrating to Chukotka is directly through or over St. Lawrence Island. Data to document the timing and route of a return migration in late summer or early fall does not exist, but preliminary subsistence harvest figures from St. Lawrence Island suggest they likely fly through again at that time (T. Rothe, pers. comm.). Small numbers breed in eastern Russia, primarily in the Anadyr Lowlands and the southern Chukotka Peninsula (Eisenhauer and Kirkpatrick 1977, E. Syroechkovskiy Jr., pers. comm.). Very limited banding data suggests that these Russian breeders migrate to fall staging and wintering areas in western Alaska (Schmutz and Kondratyev 1995). Most of the global population spends spring and fall staging periods on the Alaska Peninsula (Nelson Lagoon having the greatest number), and during winter they are distributed from Kodiak Island to the Commander Islands, Russia, with the majority on the Aleutian Islands (Petersen et al. 1994). Whereas all telemetry data from Emperor Geese breeding on the YKD indicate that geese fly east to west to get to wintering areas, there are also incidental observations from the Kamchatka Peninsula and the western Aleutian Islands of geese moving west to east at the beginning of winter (V. Byrd and E. Syroechkovskiy, pers. comm.).

**Ranking Score:** 13

**Methods:**

*No. of samples*: 200 live samples (cloacal swabs) breeding adults. 200 live samples from nearly fledged young. 200+ fecal samples from each of 3 sites during fall migration and winter. Ideally, some subsistence harvest samples would be obtained from St. Lawrence Island, but given the current harvest restrictions on this species, obtaining such samples is highly unlikely. Sampling at molting areas in Russia would be desirable, but is not specifically planned and budgeted for here, as it could not be accomplished before July 2007.

*Sampling locations*: YKD (Manokinak River, Kigigak Island) during breeding, Nelson Lagoon during fall migration, and Adak and Shemya islands in the Aleutian Islands during winter.

*Sampling timeframe*: June - early Aug for YKD, late Sept/early Oct for Nelson Lagoon, and January for Adak and Shemya islands.

*Sample demographics*: Breeding adults and 6-week old young while on YKD. Elsewhere at other times, fecal samples will not allow relation to age/sex class.

*Methods of capture:* Hoop or bow traps for incubating adults and traditional drive (pot) nets for capture of late summer molters. On fall and winter areas, fecal samples will be picked up when geese roost at high tide (Schmutz 1994). At these sites, we will likely also experiment with means for live capture.

*Other target species*: During captures on the YKD, we could also catch, if necessary, significant numbers of Black brant and small numbers of Sandhill cranes, Tundra swans, Spectacled eiders, Common eiders, Northern pintails, and Glaucous gulls, all of which are on the national list of species for priority sampling.

**Principal Investigators(s):**

U.S. Fish and Wildlife Service
- Yukon Delta NWR (June-August)
  - *Contact:* Fred Broerman
- Alaska Maritime NWR (Adak – January)
  - *Contact:* Vernon Byrd

U.S. Geological Survey
- Alaska Science Center (for live captures and fecal sampling)
  - *Contact:* Craig Ely

Russian Academy of Sciences, Russian Ringing Centre.
- *Contact:* Vasily Baranyuk

**Literature Cited:**


Eisenhauer, D. I., and C. M. Kirkpatrick. 1977. Ecology of the emperor geese in Alaska. Wildlife Monographs 57:1-62.

Fischer, J. B, R. A. Stehn, T. D. Bowman, and G. Walters. 2005. Nest population size and potential production of geese and spectacled eiders on the Yukon-Kuskokwim Delta, Alaska, 2005. US Fish and Wildlife Service report, Anchorage, AK, 28pp.

Hupp, J. W., J. A. Schmutz, C. R. Ely, E. E. Syroechkovskiy, A. V. Kondratyev, and W. D. Eldridge. The molt migration of emperor geese between Alaska and Russia. In review for Journal of Avian Biology.

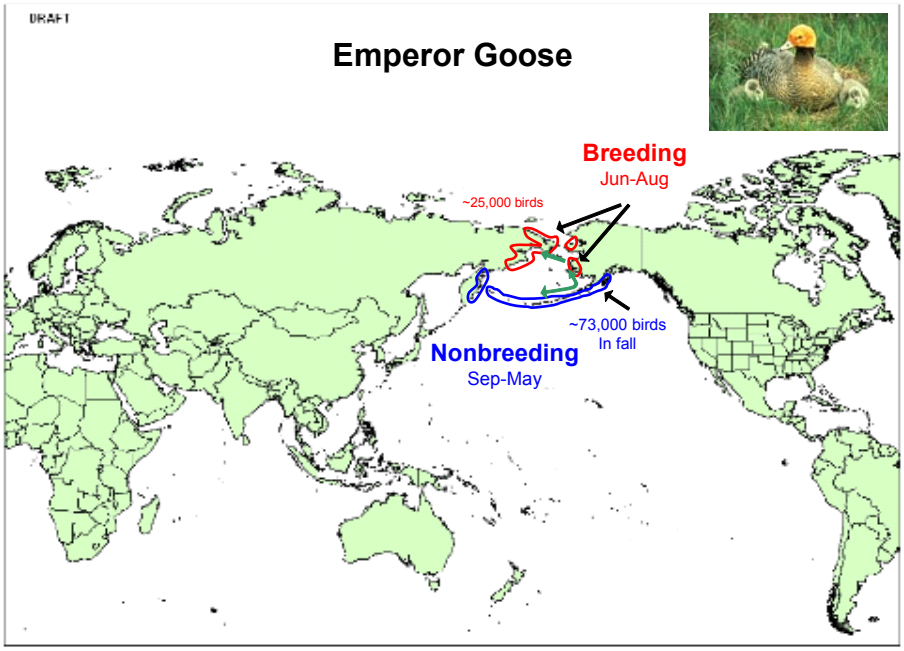
Petersen, M.R., J.A. Schmutz, and R.F. Rockwell. 1994. Emperor goose (*Chen canagica*). *In*: The birds of North America, no. 97 (A. Poole and F. Gill, eds.). Phila. Acad. of Natural Science; Washington, D.C.: The American Ornithologists' Union.

Schmutz, J.A**.** 1994. Age, habitat, and tide effects on feeding activity of emperor geese during autumn migration. Condor 96:46-51.

Schmutz, J.A., and A.Y. Kondratyev. 1995. Evidence of emperor geese breeding in Russia and staging in Alaska. Auk 112:1037-1038.

Asian H5N1 ranking criteria for Emperor Goose, *Chen canagica*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 2 | 1 | 4 | 3 | 3 | 13 |
| Approximately 20,000 birds molt in Chukotka, several thousand breed in the Anadyr lowlands | No known use of AI-infected areas | Breeds moist tundra meadows and near wetlands | Approximately 90% of the population winters in Alaska and approximately 60% summers in Alaska | Relatively easy to trap during summer and fall molting period | |



## Taxon: Spectacled Eider (*Somateria fischeri*)

**Justification:** The vast majority of Spectacled Eiders breed in East Asia and return to the Alaskan Bering Sea each fall to molt and winter.

**Background:** Spectacled Eiders breed in three geographically distinct areas: the Yukon-Kuskokwim Delta, the Alaskan Arctic Coastal Plain, and the Siberian Arctic (Petersen et al. 2000). Birds from all three breeding populations winter in large mixed flocks in the Bering Sea (Petersen et al. 1999). Conditions observed for wintering flocks in some years are highly conducive for fecal/oral transmission of viruses with large concentrations of birds packed into small leads in the sea ice (Petersen et al. 1999). If the wintering population is not currently exposed, then there is a very low likelihood that Spectacled Eiders could bring the virus to Alaska breeding areas in 2006. However, if Asian breeding birds are exposed during summer 2006, the virus would likely spread among wintering birds and then would appear in Alaska breeding birds in 2007.

Spectacled Eiders breed at relatively low densities and nests can be difficult to detect. Thus, locating and capturing a large sample of breeding birds is difficult and labor intensive. However, eiders have a relatively consistent behavior of defecating on their eggs when flushed from their nests. Thus, fresh fecal samples can be obtained from a large proportion of the nests found without having to capture females.

**Ranking score:** 12

**Methods:**

*No. of samples*. A total of 300 nests will be fecal sampled by swabbing fecal material deposited on eggs when females flush. In addition, 50 females will be live captured on nests and sampled with cloacal swabs. In cases where females are trapped, paired fecal samples from eggs will be taken as a comparison of sampling approaches.

*Sampling locations*: Primary locations include Kigigak Island, Tutakoke River and random plot locations used in the nesting eider surveys.

*Sampling timeframe*: Late May through early July.

*Sample demographics*: After-second-year breeding females.

*Methods of capture*: Females will be captured on nests using mist nest or bow-traps.

*Other targeted species:* Sympatric nesting species include, Common Eiders, Black Brant, Northern Pintails, and Emperor Geese.

*Supplemental sampling:* Hatch year Spectacled Eiders are being captured and banded at Kigigak Island to estimate recruitment. Juvenile waterfowl may be sensitive indicators of viruses present in populations as they have limited immunity. Cloacal swabs will be taken from these live-captured individuals. Small numbers of Spectacled Eider nests are found and monitored in conjunction with work in and around Prudhoe Bay. Opportunistic fecal samples can likely be obtained from these nests. Pooled fecal samples could be obtained from wintering concentrations if access to wintering areas were possible via ship.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management (sampling from YKD random plot surveys)

*Contact:* Julian Fischer

Yukon Delta NWR (sampling at Kigigak Island)

*Contact:* Fred Broerman

University of Nevada Reno: (sampling at Tutakoke River).

*Contact:* Jim Sedinger

Alaska Biological Research, Inc.: (sampling near Prudhoe Bay)

*Contact:* Robert Ritchie

**Literature cited:**

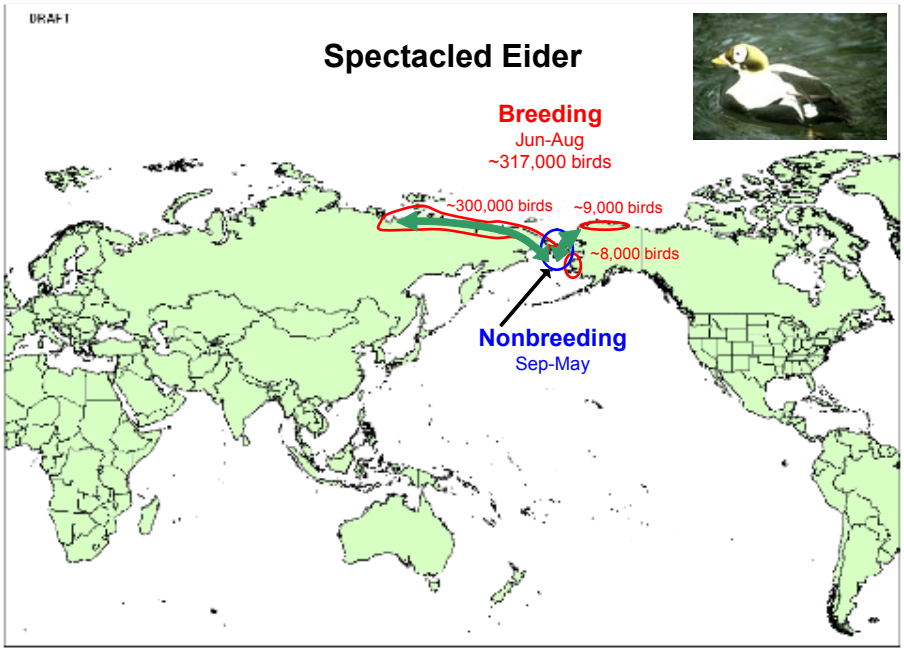
Petersen, M. R. , J. B. Grand, and C. P. Dau. 2000. Spectacled Eider (*Somateria fischeri*). in A. Poole and F. Gill (eds.), The Birds of North America No. 547. The Academy of Natural Sciences, Philadelphia, Pennsylvania and the American Ornithologists' Union, Washington, D. C

Petersen, M. R., W. W. Larned, and D. C. Douglas. 1999. At-sea distribution of spectacled eiders (*Somateria fischeri*): 120 year-old mystery resolved. Auk 116:1009-1020

Scribner, K. T., M. R. Petersen, R. L. Fields, S. L . Talbot, J. M. Pearce, and R. K. Chesser. 2001. Sex-biased gene flow in Spectacled Eiders (Anatidae): inferences from molecular markers with contrasting modes of inheritance. Evolution 55:2105-2115.

Asian H5N1 ranking criteria for Spectacled Eider, *Somateria fischeri*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 4 | 1 | 4 | 2 | 1 | 12 |
| Over 90% of the world population (approx 300,000) nests in Arctic Russia | No known use of AI-infected areas | Breeds moist tundra meadows and near wetlands | Approximately 9,000 birds breed on the Arctic slope, and 8,000 on the Yukon-Kuskokwim Delta | Could be difficult to obtain target number | |



## Taxon: Black Brant (*Branta bernicla*)

**Justification:** Black brant that breed and winter in northeastern Asia have both direct and indirect links with Alaska.

**Background:** Several thousand black brant breed and molt along the arctic coast of Russia. The eastern portion of the Russian population, which nests from the Lena River Delta in the west to the Anadyr River lowlands in the east, winters in North America. The western portion of the Russian breeding population (approximately 5,000 birds) winters in Japan, Korea, and northeastern China, near recent outbreaks of the Asian H5N1 virus (e.g., Hong Kong). Mixing of flocks likely occurs between these two Russian breeding populations, and potentially with birds wintering in northern Europe. Also, molt migrants from Russia may come to the arctic coast of Alaska (King and Hodges 1979) and conversely molters from Alaska may migrate to Russia (e.g., Wrangel Island; Ward et al. 1993). Finally, Brant marked in Alaska have been observed staging and wintering in Japan (Derksen et al. 1996), indicating that there is interchange between birds from Alaska and those that winter closest to infected areas. The highest probability of Asian H5N1 transmission would be at Izembek Lagoon, Alaska, in the fall, when the Russian–breeding and molting birds make landfall in North America in largest numbers. Izembek Lagoon and adjacent embayments support virtually the entire population of black brant during fall and significant numbers of birds in winter. The individuals most vulnerable to Asian H5N1 would likely be goslings, which are especially susceptible to new virus after their maternal immunity fades (at about 30 days) and they might act to amplify the virus (Hon Ip, pers. comm.).

Brant segregate into breeding populations (colonies) during nesting, to which they show fidelity. There may be mixing among colonies during brood rearing. Molting flocks at Teshekpuk Lake are non-breeders and failed breeders from many colonies across North America and possibly Russia. During the fall staging period at Izembek Lagoon nearly the entire world population of black brant comes together. For the most part, Brant nest in high concentrations (colonies) and during brood rearing, molting, and staging, they concentrate in flocks. Thus, they are relatively easy to capture both on nests with nest traps, and during brood rearing and molting using corral traps. Brant are much more difficult to capture in spring and fall but they are hunted both for subsistence in the spring and fall, and for sport in the fall.

**Ranking score:** 12

**Methods:** We propose a 4-stage sampling design targeting birds that may be arriving from Asia. The first level will be stratified based on timing and breeding status: arrival/early nesting, molting, brood rearing, and fall staging. Further stratification or cluster sampling will occur within each of these strata as Hollmén et al. (2003) found that the prevalence of a virus may vary greatly among spatially segregated segments of a population.

*Arrival / Early Nesting*

Spring subsistence killed birds could be sampled from the Seward Peninsula (Shishmaref), Saint Lawrence Island, and Yukon Delta NWR. At Izembek NWR samples could also be obtained through collections and fecal samples.

Spring sampling will be spread across two broadly defined breeding areas: the Yukon-Kuskokwim Delta (YKD) and the Arctic Coastal Plain. Within each of these areas brant typically nest in colonies, which we will sample as clusters. Thus, on the YKD where colony sizes are large, we will sample 70 females from each of 3 major colonies: Kigigak Island, Baird Inlet, and Tutakoke River. Conversely, on the Arctic Coastal Plain, nesting colony sizes are small and samples of 10 females will be taken from 4 distinct colonies. Sampling of nesting females will occur in conjunction with other nesting studies. Females will be captured on nests in incubation and samples will be taken as cloacal swabs.

*Molting*

Failed and non-breeding birds from a variety of breeding colonies concentrate in the vicinity of Teshekpuk Lake for molt. Large flocks of birds are regularly found dispersed across a series of large lakes. We will sample lakes as clusters, 50 birds per lake from each of 4 lakes, live capturing birds in corral traps and taking cloacal swabs.

Molting flocks of non-breeding birds have also been observed in the vicinity of the Black River on the YKD, however, little is known about their abundance and distribution. Two hundred birds will be sampled to replicate the design used at Teshekpuk Lake if the distribution of birds allows.

*Brood-Rearing*

Goslings will be sampled from the major breeding colonies on the YKD by driving brood flocks into corral traps. Samples of 200 goslings from each colony will be sampled by cloacal swab.

*Fall Staging*

Fall staging birds will be sampled at Izembek Lagoon, Morzhovoi, and Bechevin lagoons in late September and October. Samples will be taken as cloacal swabs from sport hunter harvested birds when possible. Collections and fecal samples will be used to supplement hunter samples. A total of 200 samples will be obtained.

**Principal Investigators:**

U.S. Fish and Wildlife Service
- Yukon Delta NWR (Kigigak Island, Baird Inlet, and Kokechik Bay colonies)
  - *Contact:* Fred Broerman
- Izembek NWR (Izembek Lagoon and adjacent embayments)
  - *Contact:* Kristine Sowl

U.S. Geological Survey
- Alaska Science Center (Teshekpuk Lake area - Arctic Coastal Plain, Izembek Lagoon)
  - *Contact:* Paul Flint

Alaska Department of Fish and Game (Izembek State Game Refuge)
- *Contact:* John Hechtel

University of Nevada, Reno (Tutakoke River)
- *Contact:* Jim Sedinger

Subsistence cooperators are yet to be determined

**Literature cited:**

Derksen, D.V., K. S. Bollinger, D. H. Ward, J. S. Sedinger, and Y. Miyabayashi. 1996. Black brant from Alaska staging and wintering in Japan. Condor 98:653-657.

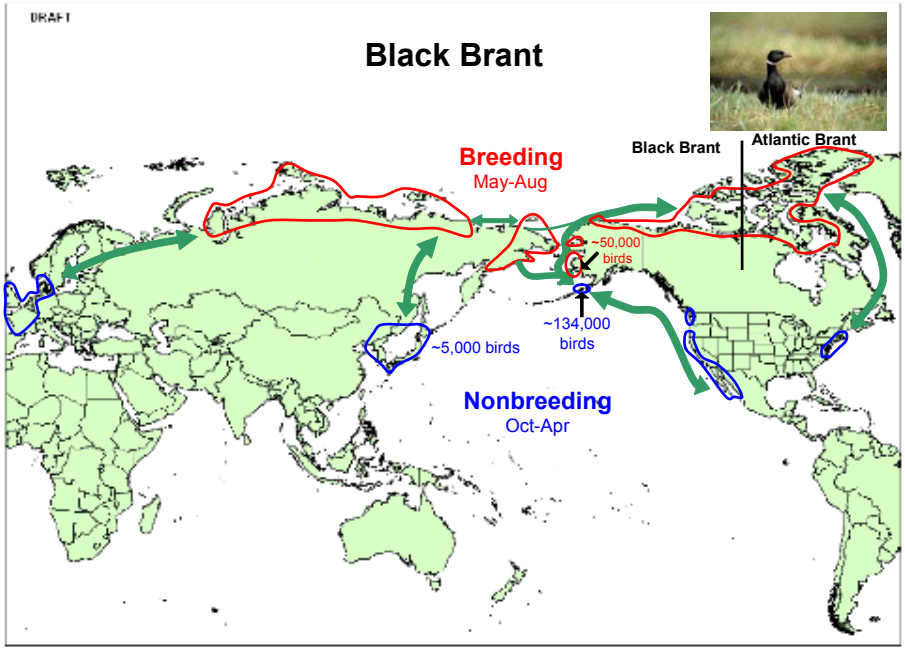
Hollmén T. E., J. C. Franson, P. L. Flint, J. B. Grand, R. B. Lanctot, D. E. Docherty, and H. M. Wilson. 2003. An adenovirus linked to mortality and disease in long-tailed ducks (*Clangula hyemalis*) in Alaska. Avian Diseases 47:1434-1440.

King, J. G. and J. I. Hodges. 1979. A preliminary analysis of goose banding on Alaska's arctic slope. Pages 176-188 *in* R.L. Jarvis and J. C. Bartonek (eds). Management and Biology of Pacific Flyway Geese. Oregon State University Bookstores, Corvallis.

Ward, D. H., D. V. Derksen, S. P. Kharitonov. M. Stishov, and V. Baranyuk. 1993. Status of Pacific black brant *Branta bernicla* on Wrangel Island, Russian Federation. Wildfowl 44:39-48.

Asian H5N1 ranking criteria for Black Brant, *Branta bernicla.*

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 3 | 3 | 12 |
| Several thousand birds nest in the Anadyr lowlands and on Wrangel Island | No known use of AI-infected areas | Breeds in moist sedge coastal tundra areas | Nearly entire Pacific population (130,000) birds stage at Izembek Lagoon prior to fall migration to winter from B.C. to Mexico | Samples could be obtained easily from fall birds | |



## Taxon: Lesser Sandhill Crane (*Grus canadensis canadensis*)

**Justification:** A large proportion of the mid-continent population of Lesser Sandhill Cranes migrates through Alaska in the spring on the way to their breeding grounds in eastern Chukotka, and returns in autumn.

**Background:** The Lesser Sandhill Crane in Alaska consists of two different populations, the Midcontinent Population and Pacific Flyway Population, based on segregation during the breeding, migration and wintering periods (Tacha et al. 1994). Recent results from satellite tracking studies have confirmed earlier research, that indicates that the only Alaskan population of Sandhill Crane that migrates to Asia is the mid-continent population of Lesser Sandhill Crane (G. Krapu, unpubl. data), which winters primarily in Texas, and migrates through Nebraska and the Canadian Prairies and nests from north central Canada, throughout northern and western Alaska, into eastern Siberia (Portenko 1981, Tacha et al. 1992, Tacha et al. 1994). As much as 25% of the mid-continent population (which numbers up to 500,000 birds) may migrate through Alaska each spring and breed in Asia (8 of 31 PTT-marked birds over 3 years; G. Krapu, unpubl. data). The probability of Lesser Sandhill Cranes being exposed to Asian H5N1 is greater than for many other species of birds not only because of their great abundance in Asia, but also because of their proclivity to mix with other species cranes (Johnsgard 1983) which likely migrate through areas infected with Asian H5N1, and the diversity of natural and agricultural habitats they use for foraging and roosting (McIvor and Conover 1991), making them more likely than many migratory species to come into contact with Asian H5N1 carrying domestic poultry.

**Ranking score:** 11.5

**Methods**

*No. of samples:* Total of 400 desirable given the large number of birds likely to be passing through Alaska, but obtaining samples will likely be very difficult.

*Sampling locations*: Sampling will be conducted primarily on the Seward Peninsula, and the northern portion of Norton Sound, and on St. Lawrence Island, to optimize the chances of encountering birds returning from Chukotka. Potential sites include: Kuzitrin River Flats west of Imuruk Basin; Sinuk River and Safety Lagoon near Nome, and coastal flats near Moses Point, Koyuk River, and Shaktoolik River Flats in Norton Bay. St. Lawrence Island is also a primary site if sufficient sampling is feasible (Kawerak Corp. estimated that Gambel and Savoonga took > 250 cranes in 2002). Secondary locations will include Creamers Field Migratory Waterfowl Refuge (state) in Fairbanks, and public hunting areas in the Tanana Valley near Delta Junction.

*Sampling timeframe*: Birds returning from Asia in August and early September will be targeted. Tanana Valley migration and hunting occurs throughout September.

*Sample demographics*: Given the likely difficulty in obtaining samples, birds of all ages and sex will be targeted.

*Methods of capture*: Most samples will be obtained from subsistence hunters (Aug-Sept), sport hunters (1-30 Sept), or through scientific collection. A few samples may be obtained from birds rocket-netted during late summer and early autumn at Creamers Field in Fairbanks.

*Other targeted species*: Several other avian species returning to Alaska from eastern Siberia could possibly be sampled on St. Lawrence Island and the Seward Peninsula, including many on the list of 26 high priority species noted in the National Plan.

**Principal Investigators:**

U. S. Fish and Wildlife Service
Migratory Bird Management
*Contact:* Julian Fischer
Selawik NWR
*Contact:* Tina Moran
Alaska Department of Fish and Game
Waterfowl Program
*Contact:* Tom Rothe
Fairbanks Regional Office (Creamers Field Waterfowl Refuge)
*Contact:* Jason Caikoski
Delta Junction Area Office
*Contact:* Steve DuBois
Kawerak Inc. (Seward Peninsula, Nome area, St. Lawrence Island)
*Contact:* Andrew Ahmasuk

**Literature Cited:**

Johnsgard, P. 1983. Cranes of the World. Indiana University Press, Bloomington, Indiana, USA.

McIvor, D. E., and M. R. Conover. 1991. Sandhill Crane habitat use in northwestern Utah and southwestern Wyoming. Pp. 81-84 *In* Proceedings of the sixth North American Crane Workshop, Regina, Saskatchewan. Guynes Printing Co., Albuquerque, New Mexico.

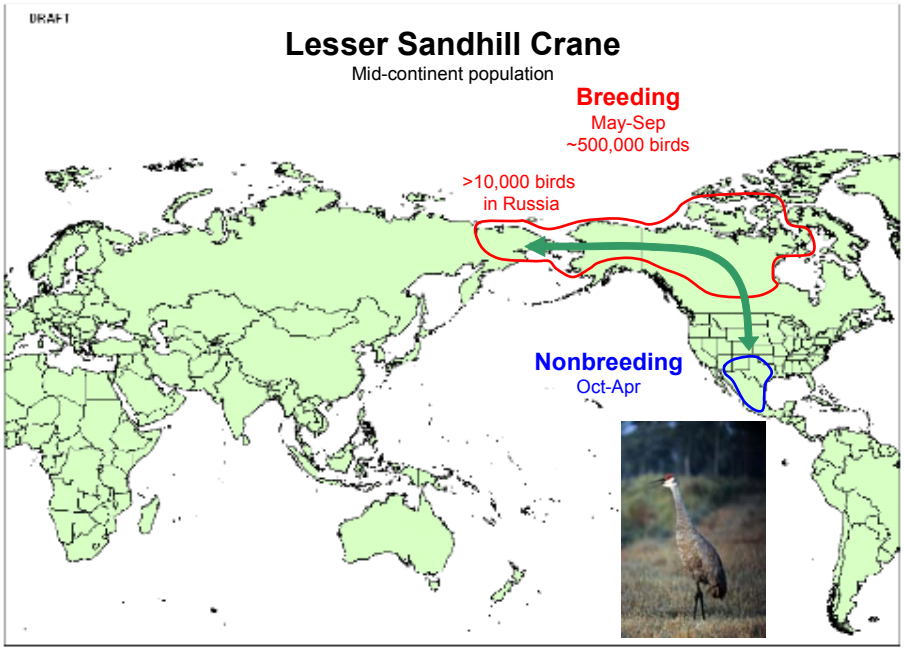
Portenko, L. A. 1981. Birds of the Chukchi Peninsula and Wrangel Island. Nauka Publishers, Leningrad. Translated from Russian. Published for the Smithsonian Institution and the National Science Foundation, Washington, D.C.

Tacha, T. C., S. A. Nesbit, and P. A. Vohs. 1992. Sandhill Crane (*Grus canadensis*). *In* The Birds of North America, No. 31 (A. Poole, P. Stettenheim, and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, DC: The American Ornithologist's Union.

Tacha, T. C., S. A. Nesbitt, and P. A. Vohs. 1994. Sandhill Crane. Pp. 77-94 *In* Migratory Shore and Upland Game Bird Management in North America. Allen Press, Lawrence, Kansas.

Asian H5N1 ranking criteria for Lesser Sandhill Crane, *Grus canadensis canadensis.*

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 2 | 1 | 3.5 | 3 | 2 | 11.5 |
| Unknown numbers of mid-continent population breed in Siberia | No known use of AI-infected areas | Breeds in wet or moist tundra meadows, near wetlands, or on barrier islands; often feeds in agricultural areas where available | Alaska population believed to be in the low tens of thousands | Could be difficult to obtain target numbers | |



## Taxon: Tundra Swans (*Cygnus columbianus*)

**Justification:** A segment of the breeding population of Tundra swans is believed to breed in eastern Asia and winter in North America, and could potentially carry Asian H5N1 from Asia to North America.

**Background:** Tundra swans are polytypic, with three recognized subspecies: the nominate form (Whistling Swan) in North America, *C. c. bewickii* in Western Eurasia and *C. c. jankowski* in eastern Asia. The validity of *jankowski* has been questioned because of the lack of any clear division between this and *bewickii*. The nominate form is thought to breed as far west as eastern Chukotka. In Alaska, birds breeding on the North Slope migrate eastward during autumn and winter in the Atlantic Flyway (Limpert et al. 1991, Limpert and Earnst 1994), whereas birds breeding in western Alaska migrate down the Pacific Flyway (Ely et al. 1998). A small non-migratory population on the lower Alaska Peninsula (Izembek NWR, Dau and Sarvis 2002) and Unimak Island nearly doubles in size in winter to approximately 600 birds. Extensive marking to the north along the Alaska Peninsula and less so elsewhere in Alaska has not indicated the source of the additional swans. It is not known what Alaskan population of Tundra swans is most likely to migrate to Asia. The Tundra swan is one of the lowest ranked waterfowl to make the final list of 26 species of concern for Asian H5N1 transmission in the National Plan, primarily because there is only weak evidence supporting their presence in eastern Asia. It will also be very hard to identify the likely small fraction of birds migrating to or from Asia, so obtaining samples from birds that are most likely exposed to Asian H5N1 will be very difficult. In addition, large numbers (> 30) of Tundra swans have rarely been captured and banded in Alaska. It is unknown where the large concentrations of non-breeding Tundra swans that use the outer Yukon-Kuskokwim Delta (YKD) in early July go to molt. Swans have, however, been one of the primary species groups affected by Asian H5N1 in Asia and Eastern Europe, and Tundra swans have been identified as a high priority species in the Pacific Flyway.

**Ranking score:** 11

**Sampling Design:**

*No. of samples*. A sample of $\geq$ 200 birds will be necessary to detect the virus. Attaining this goal might prove quite difficult.

*Sampling locations*: It is believed that Asian-bound, or returning Tundra swans will migrate over the Seward Peninsula, Kotzebue Sound and St. Lawrence Island, so sampling efforts will be concentrated in these areas. Additional birds may be captured on the Yukon Delta, Alaska Peninsula, or North Slope of Alaska.

*Sampling timeframe*: Late Spring and early summer (May-June) for swans migrating to Asia, July for molting flocks on the YKD and North Slope, and August-September for swans returning from Asia.

*Sample demographics*: All age and sex classes will be sampled given the difficulty in obtaining samples.

*Methods of capture*: Spring and autumn migrants will be sampled via subsistence harvest. Molting birds will be live-captured using aircraft and boats.

*Other targeted species*: Other Asian-bound and returning migrants will be sampled in the subsistence harvest on St. Lawrence Island and the Seward Peninsula.

**Principal Investigators(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management (subsistence harvest)

*Contact:* Deborah Rocque

Selawik NWR (molting flocks is July)

*Contact:* Tina Moran

Yukon Delta NWR (molting flocks in July)

*Contact:* Fred Broerman

Kawerak Corporation

*Contact:* Austin Ahmasuk

**Literature cited:**


Ely, C. R**.,** D. Douglas, A. Fowler, C. Babcock, D. V. Derksen, and Y. Takekawa. 1998. Migration behavior of Tundra Swans from the Yukon-Kuskokwim Delta, Alaska. Wilson Bulletin 109:679-692.

Evans, M. E., and W. J. Sladen. A comparative analysis of the bill markings of Whistling and Bewick's Swans and out-of-range occurrences of the two taxa. Auk 97:697-703.

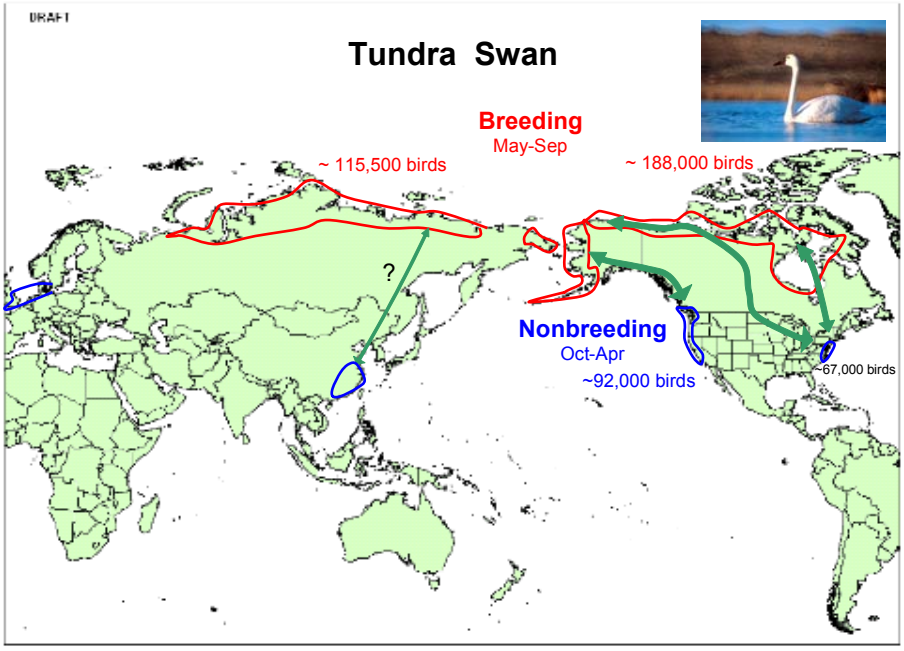
Limpert, R. J., W. J. Sladen, and H. A. Allen, Jr. 1991. Winter distribution of Tundra Swans *Cygnus columbianus columbianus* breeding in Alaska and western Canadian Arctic. Wildfowl Suppl. No.1:78-83.

Limpert, R. J. and S. L. Earnst. 1994. Tundra Swan (*Cygnus columbianus*). *In* The Birds of North America, No. 89 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Ogilvie, M. A. 1972. Distribution, numbers and migration. Pp. 30-55 *In* The Swans. (P. Scott, ed.). Houghton Mifflin Co., Boston, Masssachusetts.

Asian H5N1 ranking criteria for Tundra Swans, *Cygnus columbianus.*

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 3 | 2 | 11 |
| Unknown numbers breed in e. Chukotka; may be associated with Pacific flyway | No known use of AI-infected areas | Nests coastal tundra; migration and nonbreeding in coastal habitats | Approximately 150,000 summer in Alaska | Could be difficult to obtain target number | |



## Taxon: Long-tailed Ducks (*Clangula hyemalis*)

**Justification:** A large proportion of the Alaskan breeding Long-tailed Ducks winter along the East coast of Asia. Approximately 15% of females marked in Alaska with satellite transmitters wintered as far south as Japan, North Korea, and the southern Sakhalin Islands near areas where Asian H5N1 has been identified.

**Background:** Long-tailed Ducks breeding in Alaska are dispersed at very low densities throughout coastal tundra from the Alaska Peninsula and Bristol Bay to the Arctic Coastal Plain. Long-tailed Ducks nest at very low densities and nests are difficult to locate. Long-tailed Ducks marked with satellite transmitters at a single breeding location on the Yukon Delta wintered from British Colombia to the Chukotka Peninsula (Petersen et al. 2003). Similar patterns were observed for molting Long-tailed Ducks marked in the lagoons along the Beaufort Sea. Thus, there is known to be exchange between Alaskan breeding females and Asian molting and wintering areas from satellite telemetry data, and some fraction of the Long-tailed Ducks that will be found in Alaska in 2006, are wintering very near areas with known Asian H5N1 exposure. However, wintering Long-tailed Ducks primarily utilize near shore and estuarine habitats reducing their likelihood of exposure. Breeding Long-tailed Ducks will be difficult to sample as they nest at very low densities and nests are difficult to find. There are no known molting concentrations associated with one of the primary nesting areas (i.e., the Yukon-Kuskokwim Delta). Concentrations of molting birds that likely represent the Arctic Coastal Plain breeding population are found in the lagoons of the Beaufort Sea in late July and Early August. Large numbers are regularly counted in Simpson Lagoon, near the Maguire and Flaxman islands, and along the coast of the Arctic National Wildlife Refuge.

Previous work on virus exposure (not avian influenza) of molting Long-tailed Ducks showed substantial variation in prevalence among flocks and locations (Hollmén et al. 2003). Thus, it seems clear that birds within flocks are not independent from the standpoint of virus exposure. During the flightless molt, flocks of birds are functionally isolated within lagoons as large areas of unsuitable habitat separate flocks (Flint et al. 2004); however, exchange of individuals prior to the molt likely creates a positive correlation in exposure probability within lagoons. Thus, a sampling strategy spread relatively uniformly across the molting range is the most effective sampling strategy for birds molting in clumped distributions.

**Ranking score:** 10

**Methods:**

*No. of samples*. A total of 600 birds will be sampled using a 2-stage stratified design. The first level of stratification will be at the level of lagoons or molting areas. The second level will consider functionally isolated flocks of flightless Long-tailed ducks within lagoons. Thus, we will sample 50 birds from each of 4 flocks within each lagoon yielding a total of 200 from each of 3 lagoons.

*Sampling locations*: Primary locations in order of priority include Flaxman/Maguire Islands, Simpson Lagoon, and the coast of the Arctic NWR. Secondary locations, within these lagoons, will be determined based on observed flock locations and movement patterns.

*Sampling timeframe*: Late July through early August.

*Sample demographics*: After-hatch-year males and females. The sample will be primarily post-breeding males and both failed and non-breeding (likely sub-adult) females.

*Methods of capture*: Flocks of flightless birds will be herded with boats and driven into water-based corral traps. This approach has been used to capture Long-tailed Ducks in the Beaufort Sea lagoons in the past.

*Other targeted species:* None, flocks of Long-tailed Ducks rarely mix with other species.

*Supplemental sampling:* Small numbers of Long-tailed Ducks can be sampled in conjunction with other ongoing studies. Small numbers of nests are found during various studies on the Yukon-Kuskokwim Delta. Fecal samples can be obtained from many of these nests.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management (sampling at Simpson Lagoon)

*Contact:* Richard Lanctot

Arctic NWR (Sampling along Refuge and near Flaxman and Maguire Islands)

*Contact:* Steve Kendall

**Literature cited:**

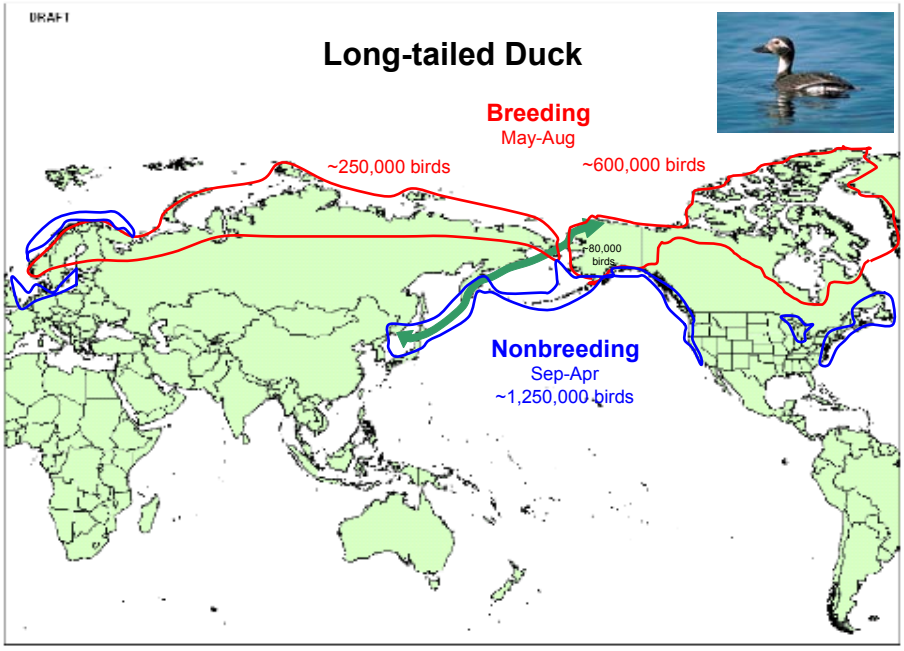
Flint, P. L., D. L. Lacroix, J. A. Reed, and R. B. Lanctot. 2004. Movements of flightless Long-tailed Ducks during wing molt. Waterbirds 27:35-40.

Hollmén, T. E., J. C. Franson, P. L. Flint, J. B. Grand, R. B. Lanctot, D. E. Docherty, H. M. Wilson. 2003. An Adenovirus Linked to Mortality and Disease in Long-tailed Ducks (*Clangula hyemalis*) in Alaska. Avian Diseases 47:1434-1440.

Petersen, M. R., B. J. McCaffery, and P. L. Flint 2003. Postbreeding distribution of Long-tailed Ducks *Clangula hyemalis* from the Yukon-Kuskokwim Delta. Wildfowl 54: 129-139.

Asian H5N1 ranking criteria for Long-tailed Ducks, *Clangula hyemalis*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 2 | 1 | 2 | 3 | 2 | 10 |
| Approx 250,000 breed in northeastern Russia, unknown numbers cross to North America | No known use of AI-infected areas | Nests coastal tundra; postbreeding use estuarine area | Approx. 80,000 summer in western Alaska, 600,000 in northern Alaska and western Canada | Samples could be obtained easily from fall birds | |



## Taxon: Aleutian Cackling Geese (*Branta hutchinsii leucopareia*)

**Justification:** A portion of the population of Aleutian Cackling Geese breeding on the Aleutian Islands may winter in Japan where they could possibly contract Asian H5N1, and the majority of geese breeding in the western Aleutians occupy islands visited by hundred of direct Asiatic migrant birds of a number of species directly from Asia annually.

**Background:** Aleutian Cackling Geese breed on the western end of the Aleutian Islands (Byrd 1998). An eastern Asia taxon, formerly identified as a separate subspecies, *B. c. asiatica*, reportedly bred in the Komandorski and Kuril islands and wintered in Japan, but the population was wiped out by the 1940's (Mowbray et al. 2002). Based on only a few specimens, *asiatica* is now considered identical, by several authorities synonymous, with *B. h. leucopareia*. Since the middle of the 20th century, only vagrant individuals of *B. h. leucopareia* and *B. h. minima* from North America have occurred in Korea and Japan. However breeding stock of *B. h. leucopareia* that originated from Buldir Island, have been reintroduced to the Kuril Islands and have been recorded wintering in Japan (N. Gerasimov, unpubl. data). The Aleutian Cackling Goose is of low rank of waterfowl species to make the final list of 26 species of concern for Asian H5N1 transmission in the National Plan, primarily because we have a poor understanding of movements between Alaska and Asia. Nevertheless, the likelihood of secondary contact with Asian H5N1 is high, given the plethora of Asian birds using the western Aleutians (25 species are annual through migrants, and more than 90 species occur less than annually). Like nearly every other species of waterfowl considered, the main threat of contacting the Asian H5N1 virus is from other species, or populations of the same species coming directly from Asia and carrying the virus to the continental U.S. Aleutian Cackling geese winter in California.

**Ranking score:** 11

**Sampling Design:**

*No. of samples*: Total of 400 samples, including 200 fecal samples from nesting birds and 200 cloacal swabs from brood flocks.

*Sampling locations*: Samples will be collected at different Islands in the Aleutian chain, including Buldir, Shemya and Agattu where Alaska Maritime NWR will have crews in place for seabird monitoring.

*Sampling timeframe*: Primary time frames will be late May to early June when birds are on nests, and late July and early August when adults with young are flightless.

*Sample demographics*: Geese of all age and sex classes will be sampled. Fecal samples of nesting birds will only include adults.

*Methods of capture*: Samples of nesting birds will likely be restricted to fecal specimens obtained in areas where nesting birds have recently foraged. Flightless birds will be captured be a field crew on Buldir Island by using long-handled nets.

*Other targeted species*: Sampling during the nesting period on Agattu will be done in conjunction with sampling for Common Eiders. Asiatic species are abundant on the Aleutian Islands and it may be possible to obtain fecal samples from a number of them.

**Principal Investigator(s):**

U. S. Fish and Wildlife Service
Alaska Maritime NWR
*Contact:* Vernon Byrd
U. S. Geological Survey
Alaska Science Center
*Contact:* Margaret Petersen

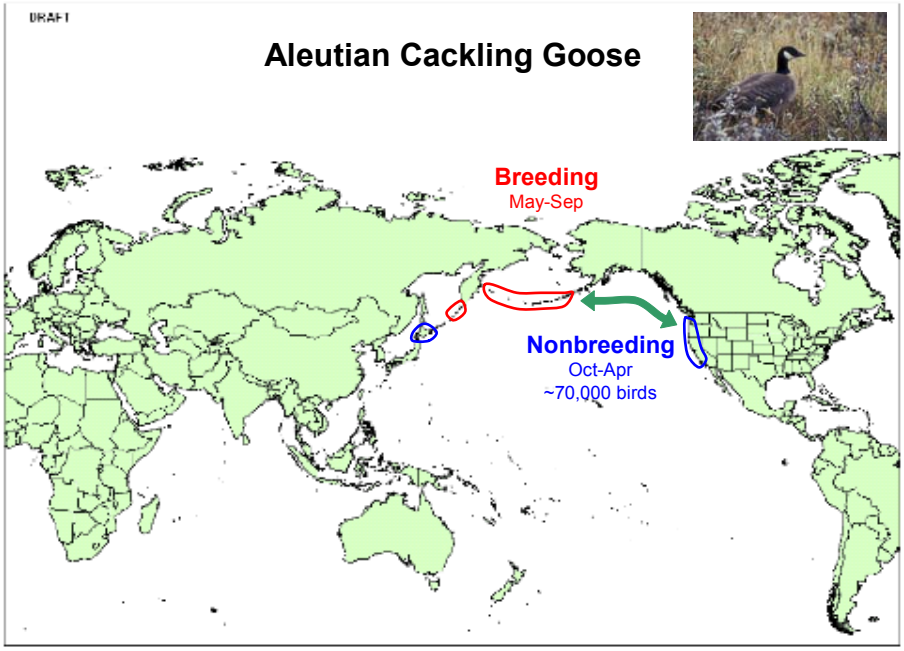
**Literature cited:**

Byrd, G. V. 1998. Current breeding status of the Aleutian Canada Goose, a recovering endangered species. Pp. 21-28 *In* Biology and management of Canada Geese (D.H. Rusch, M.D. Samuel, D. D. Humburg, and B. D. Sullivan, eds.).

Mowbray, T. B., C. R. Ely, J. S. Sedinger, and R. E. Trost. 2002. Canada Goose (*Branta canadensis*). *In* The Birds of North America, No. 682 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Asian H5N1 ranking criteria for Aleutian Cackling Geese, *Branta hutchinsii leucopareia.*

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 1 | 1 | 4 | 3 | 2 | 11 |
| Small numbers breed on Commander Islands and winter in Asia | No known use of AI-infected areas | Breeds on Aleutian Islands in wet, grassy freshwater meadows | Approximately 70,000 birds in fall population | Could be difficult to obtain target number in Alaska | |



## Taxon: Pacific common eider (*Somateria mollissima v-nigrum*)

**Justification:** Almost all (>95%) of the 80,000 Pacific common eider population that nests on the North Slope of Alaska and northwestern Canada Alaska winters in northeast Asia. In addition it is likely that some of the 20,000 Common eiders that nest in the Aleutian Islands winter in northeast Asia along the Kamchatka Peninsula, Russia.

**Background:** Pacific common eiders nest in coastal regions from eastern Russia, northwestern Canada, and in Alaska from the eastern North Slope to the far western Aleutian Islands (Kear 2005, Dement'ev and Gladkov 1967). Eiders are found in the arctic and sub-arctic in dense nesting colonies on islands and shorelines in fresh water lakes, coastal barrier islands, off-shore islands, and moist coastal wetlands (Gabrielson and Lincoln 1959, Goudie et. al 2000), and at the southern portion of its range, under trees and brush (Gabrielson and Lincoln 1959). Eiders from discrete breeding areas winter in primarily non-overlapping areas (Petersen and Flint 2002, Petersen pers. com.). For instance, the bulk of the population which nests in northern Alaska and northwest Canada winters along the Chukotka Peninsula (including St. Lawrence Island) with a small percent wintering south along the Russian Far East coast and in Bristol Bay. The population that nests on the YKD winters primarily in open waters off the YKD to Bristol Bay and south to the north side of the Alaska Peninsula. In winter birds are generally in small (100s), dense flocks and restricted to coastal waters. Eiders may be found in large (10,000s), dense flocks when staging during spring migration (Goudie et. al 2000).

Common eiders are accidental in Japan (Brazil 1991) and common in the Sea of Okhotsk and along the Kamchatka Peninsula coast in winter (Dement'ev and Gladkov 1967). The breeding origins of these wintering birds are unknown, but are most likely from the closest known nesting areas in the western Aleutian Islands (Near, Rat and Andraenof islands), Commander Islands, and northeast Kamchatka Peninsula. Birds infected in Asia during winter and returning to North America to nest are most likely to be from the western Aleutian Islands and North Slope/northwest Canadian breeding populations.

**Ranking score:** 10

**Methods:** We propose sampling at least 200 Common eiders from each of the major nesting areas or colonies. Since nesting populations appear to be genetically and behaviorally distinct, the probability of eiders being exposed to the Asian strain of H5N1 of each sampling area varies. Based on the known or subjective probability that some portion of eiders from each breeding area winters in Asia and their distribution in Asia, birds nesting in the Aleutian Islands, Near Islands (most likely), the North Slope/Western Canadian Arctic (known to winter in northeast Asia), Aleutian Islands, offshore islets of Adak Island (possibly), and YKD (rarely) may be exposed to Asian H5N1 in winter.

Many samples will be from fresh fecal material deposited on eggs as the hen flushes; however, the relationship of the viral loads of cloacal and fresh fecal samples is unknown, but assumed to be strong. Thus, cloacal samples and fecal samples will be taken from 200 captured birds.

*Locations, numbers, demographics, and timing of sampling*

- Aleutian Islands, Near Islands, 200 samples. Samples from adult females will be collected in late-May to early June 2006 from Attu, Agattu, Nizki, and Alaid islands with 50 individuals per island from as many locations as possible on each island. All individuals will be nesting females early in incubation. Capture of 25 birds will be by nest trapping (mist netting, dip net, bow trap). Tracheal and cloacal swabs, blood plasma, and fecal samples will be taken from these eiders. The remainder (175) of the samples will be from fresh fecal samples deposited on eggs as the hen flushes.
- North Slope/Western Canadian Arctic, 200 samples. Samples of adult males and females shot at Barrow will be taken during May-June. Cloacal samples will be acquired from birds shot during spring migration by subsistence hunters.
- Aleutian Island, Andraenof Islands, offshore islets of Adak Island, 50 samples. Fresh fecal samples from nesting adult females will be collected in early to mid-June. Due to the relatively small number of nesting COEI, a larger sample size is unlikely.
- YKD, 400 samples. (1) Both cloacal and fecal samples of 100 nesting individuals and 50 fecal samples from additional hens will be collected at Kigigak Island (150 total individuals; 100 individuals fecal, 50 individuals fecal & cloacal), which has a large, relatively dense concentration (colony) of common eiders. (2) Fecal samples from 200 females representing the remaining central (coastal) Y-K Delta nesting population will occur at Baird Inlet (25 fecal), Tutakoke River (50 cloacal & fecal, 100 fecal), and the random plot surveys (25 fecal).

*Other targeted species*

Significant numbers of spectacled eiders, black brant, and emperor geese are present at all sampling locations on the YKD. Although northern pintail and long-tailed ducks also nest in these areas, few nests are found each year and individuals not on nests are difficult to capture. Nesting Steller's eiders are rarely found. King eiders are the most common eider shot during spring migration at Barrow and will be available for sampling.

**Principal Investigators**

U.S. Fish and Wildlife Service
Migratory Bird Management (Yukon Delta NWR ground plot surveys)
*Contact:* Julian Fischer
Yukon Delta NWR (Yukon Delta NWR ground plot surveys, Tutakoke River, Kigigak Island, Kokechik Bay, and Baird Inlet)
*Contact:* Fred Broerman
Alaska Maritime NWR (Aleutian Islands - Near Islands & Adak Islets)
*Contact:* Vernon Byrd
U.S. Geological Survey (Aleutian Islands - Near Islands)
Alaska Science Center
*Contact:* Margaret Petersen
University of Nevada, Reno (Tutakoke River)
*Contact:* Jim Sedinger
North Slope Borough (Barrow - North Slope/Western Canadian Arctic breeding birds)
*Contact:* Robert Suydam

**Literature cited**


Brazil, M. A. 1991. The birds of Japan. Smithsonian Institution Press, Washington, D.C.

Dement'ev, G. P. and N. A. Glandov, eds. 1967. Birds of the Soviet Union. Israel Program for Scientific Translations, Jerusalem.

Flint, V. E., R. L. Boehme, Y: V. Kostin, and A. A. Kuznetsov. 1984. A field guide to the birds of the USSR. Princeton University Press, Princeton, NJ.

Gabrielson, I. N. and F. C. Lincoln. 1959. Birds of Alaska. Wildlife Management Institute, Washington, D.C.

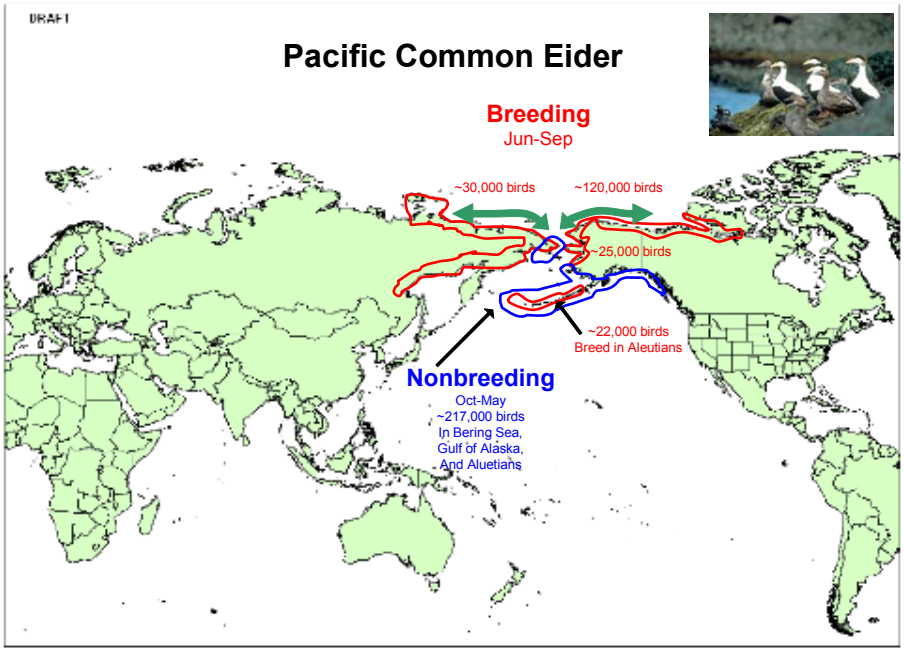
Goudie, R. I., G. J. Robertson, and A. Reed. 2000. Common Eider (*Somateria mollissima*). *In* The Birds of North America, No. 546 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Kear, J., ed. 2005. Ducks, Geese, and Swans, Vol. 2. Oxford University Press, Oxford.

Petersen, M. R. and P. L. Flint. 2002. Population structure of Pacific common eiders breeding in Alaska. Condor 104: 780-787.

Asian H5N1 ranking criteria for Common eider, *Somateria mollissima*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 2 | 1 | 2 | 3 | 2 | 10 |
| Approx. 80,000 winter in Russia and breed in North America and 30,000 breed in northeastern Russia | No known use of AI-infected areas | Breeds in wet or moist tundra meadows near wetlands or on barrier islands. Winters in coastal waters | Est. 120,000 in northern Alaska and western Canada, 25,000 in western Alaska, 20,000 in Aleutian Isls. | Could be difficult to obtain at a few locations | |



## Taxon: King Eider (*Somateria spectabilis*)

**Justification:** A major segment of the Pacific population breeds not only in coastal Alaska, but also across arctic Russia from the Chukotka Peninsula west to the Taimyr Peninsula. Nesting habitat is nearly identical to that of Steller's and Spectacled Eiders (species that scored high on the ranking matrix for birds to be sampled for Asian H5N1). Similar to other eiders, the distribution of King Eiders does not overlap with known outbreak areas of Asian H5N1, but breeds in sympatry with shorebird and landbird species that migrate and or winter in known outbreak areas.

**Background:** The King Eider nests in high-latitude coastal tundra throughout Russia, Alaska, and Canada. During the non-breeding season, birds rarely come on shore and forage in coastal marine waters throughout the Pacific Ocean generally no farther south than the Kamchatka Peninsula of Russia, Aleutian Islands, and Prince William Sound of Alaska (Suydam 2000). The Pacific population was estimated to be approximately 350,000 based on migration counts at Point Barrow (Suydam 2000). The King Eider is one of the first waterfowl species to appear in the Arctic each spring, often migrating in flocks of > 10,000 individuals (Suydam 2000). Movements between breeding and wintering ranges have been determined through extensive use of satellite telemetry (Dickson et al. 1997, Powell et al., unpubl. data available at: http://users.iab.uaf.edu/~abby_powell/). Genetic analyses suggest gene flow among breeding populations (Pearce et al. 2004), which has been confirmed with satellite telemetry (Powell et al., unpubl. data) and stable isotope analysis (Mehl et al. 2004). In Alaska and Russia, the species is mostly found on coastal salt meadows, on barrier islands of river deltas, and on islands within freshwater tundra lakes. The core spring staging area in Alaska appears to be ice-free waters between Cape Lisburne and Point Barrow of northeast Alaska.

**Ranking score:** 10 (lowest score of the waterfowl species ranked. However, the King Eider occurs in sympatry with Steller's, Common, and Spectacled eiders during spring migration, breeding, fall migration and during times of flightless molt)

**Methods:**

*No. of samples*: *No. of samples*: Total 250 (100 spring and 100 fall migrants sampled at Point Barrow and 50 sampled in the Beaufort Sea Lagoon area).

*Sampling locations*: Primary locations include Point Barrow and the Beaufort Sea Lagoon area near Prudhoe Bay.

*Sampling timeframe*: May/June and July/August.

*Sampling demographics*: Adults will be sampled during spring and fall migration. It is likely that an equal ratio of males and females will be obtained during migration sampling.

*Methods of capture*: Samples of spring and fall migrants will come from hunter harvested (subsistence) birds near Point Barrow and from fecal samples collected from birds flushed from roosting areas in the Beaufort Sea Lagoon area.

*Other targeted species*: At Point Barrow it will also be possible to sample long-tailed ducks and common eiders. Glaucous gulls, long-tailed ducks, and common eiders will also be sampled for feces in the Beaufort Sea Lagoon area.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service
*Contact:* Rick Lanctot
U.S. Geological Survey
Alaska Science Center
*Contact:* John Pearce
North Slope Borough
*Contact:* Robert Suydam
LGL Limited, Environmental Research Associates
*Contact*: Robert Rodrigues

**Literature cited:**

Dickson, D., R. Cotter, J. Hines, and M. Kay. 1997. Distribution and abundance of King Eiders in the western Canadian Arctic, p. 29–39. In D. Dickson (ed.), King and Common Eiders of the western Canadian Arctic. Canadian Wildlife Service Occasional Paper No. 94, Ottawa, ON, Canada.

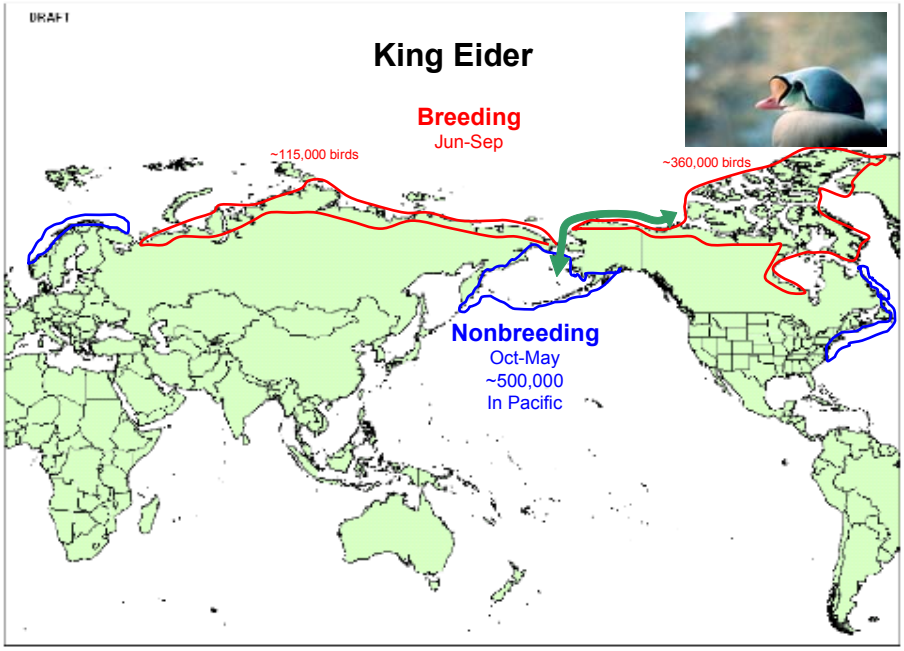
Mehl, K., R. Alisauskas, K. Hobson, and D. Kellett. 2004. To winter east or west? Heterogeneity in winter philopatry in a central-arctic population of King Eiders. Condor 106:241–251.

Pearce, J., S. Talbot, B. Pierson, M. Petersen, K. Scribner, D. Dickson, and A. Mosbech. 2004. Lack of spatial genetic structure among nesting and wintering King Eiders. Condor 106:229–240.

Suydam, R. 2000. King Eider (*Somateria spectabilis*). In A. Poole and F. Gill (eds.), The birds of North America, Inc., Philadelphia, PA.

Asian H5N1 ranking criteria for King Eider, *Somateria spectabilis*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 2 | 1 | 2 | 3 | 2 | 10 |
| Approx. 150,000 breed in northeastern Russia | No known use of AI-infected areas | Breeds in moist and uplands tundra | Approximately, 360,000 breed in northern Alaska and western Canada | Could be difficult to obtain target numbers in most locations | |



## Taxon: Dunlin (*Calidris alpina arcticola*)

**Justification:** The *arcticola* subspecies of Dunlin is a high priority taxon because the entire population—numbering in the hundreds of thousands—nests on the North Slope of Alaska and spends the nonbreeding season in South and East Asia where the Asian H5N1 virus is prevalent. The population's use of inland waterways and estuaries further increases the likelihood that birds come into contact with virus infected poultry and waterfowl.

**Background:** Dunlin of the *arcticola* subspecies, along with three other subspecies (*sakhalina, kistchinski* and *actites),* spend the winter in significant numbers in East Asia as far south as southern China (Wetlands International–Oceania 2004). Exactly how the subspecies distribute themselves on their nonbreeding grounds is unclear, although *arcticola* Dunlin banded on the North Slope of Alaska have been resighted in Japan, Taiwan, and parts of China (Y. Shigeta, R. Gill, and R. Lanctot, unpubl.). While on the wintering grounds, Dunlin occupy primarily estuarine habitats, although they can be found in interior seasonal wetlands, flooded fields, and other agricultural lands. Movement to and from the breeding and nonbreeding grounds entails prolonged stays in coastal East Asia, primarily on estuarine habitats. In March through April the *arcticola* race of Dunlin migrates to Alaska, presumably over the Sea of Okhotsk and western Bering Sea, to arrive on their breeding grounds in Northern Alaska in early June (Warnock and Gill 1996). The remaining three subspecies breed along the Kamchatka and Chukotka peninsulas of Asia and Eastern Russia. Post-breeding (July–August), *arcticola* Dunlin stopover at littoral areas on the North Slope for up to a month (Andres 1994) before migrating directly either to East Asia (Norton 1971) or to the Yukon-Kuskokwim Delta (YKD) in western Alaska (R. Gill, unpubl.). Once on the YKD, *arcticola* Dunlin mix with large numbers of the *pacifica* race of Dunlin before moving to Asia in September or October (Gill and Handel 1981, Warnock and Gill 1996).

*Breeding*

The total population of *arcticola* is estimated at 750,000 birds (Brown et al. 2001), although a more realistic number may be closer to 200,000–300,000 (Wetlands International–Oceania 2004). The only place in Alaska where *arcticola* Dunlin are known to occur in isolation of the *pacifica* subspecies is the North Slope. Breeding a*rcticola* Dunlin are found in good numbers throughout the National Petroleum Reserve – Alaska (NPR-A) and east to the western edge of the Arctic National Wildlife Refuge. High densities have been reported at Barrow and Prudhoe Bay (Troy and Wickliffe 1990, R. Lanctot, unpubl. data); nest densities in these areas average between 12 and 15 nests/km$^2$. Additional areas within the NPR-A also have high densities based on surveys conducted in the late 1990s and early 2000s (J. Bart, unpubl.). Somewhere in the vicinity of Point Hope, it is suspected that the breeding areas of the *arcticola* and *pacifica* subspecies overlap (R. Gill, pers. comm.), although genetic and morphological studies have not been conducted to confirm this hypothesis.

*Post-breeding*

Thousands of *arcticola* Dunlin stopover along the North Slope coast after breeding (Andres 1994). They were the most common shorebird on the Colville River delta during fall surveys in 1987 and 1988, with an average of 13.9 birds/km of shoreline and an average density of 71.9 birds/km$^2$ (Andres 1994). Surveys in the same area in 2005 also indicated Dunlin were present in large numbers during late August (1,075 birds/km$^2$ on 21 August survey); these birds were primarily adults with 3:1 adult to juvenile age ratio (Johnson et al. 2005). Significant numbers of Dunlin also frequent coastal sites near Elson Lagoon at Barrow and the Canning River delta (Martin and Moitoret 1981, Taylor et al. in press). After leaving the North Slope, a sizeable portion (or all?) of *arcticola* Dunlin migrate to the outer Yukon-Kuskokwim Delta to stage in August and September. Here they mix with *pacifica* Dunlin and form huge aggregations, numbering in the tens of thousands (Gill and Handel 1981, 1990). Large aggregations are present from Hooper Bay south to the Kuskokwim River (Gill and Handel 1990; R. Gill and B. McCaffery unpubl.). Dunlin leave the YKD for Asia in September or early October.

**Ranking score:** 17

**Methods:**

*No. of samples*. We plan to obtain 400 samples (200 ea. from the North Slope and YKD).

*Sampling locations*: Breeding *arcticola* will primarily be sampled on the North Slope at established camps at Barrow, Canning River, Teshekpuk Lake, Prudhoe Bay, and surrounding areas. Secondary post-breeding locations on the North Slope will be Elson Lagoon, the Colville River delta, Kaktovik, and Peard Bay. Secondarily, post-breeding birds will be sampled on the central and southern YKD (Tutakoke and Kuskokwim Shoals, respectively).

*Sampling timeframe*: Breeding birds will be sampled during June and July on the North Slope; post-breeding birds will be sampled during August and early September on the North Slope and YKD.

*Sample demographics*: Adults will be sampled during breeding, and adults and juveniles will be sampled during fall staging.

*Methods of capture*: Birds breeding on the North Slope will be live-trapped on nests using walk-in and bow traps. Post-breeding birds on the North Slope and YKD will be live-trapped using bow traps, walk-in traps, mist nets, and/or rocket nets. Fecal sampling will occur at both areas during the post-breeding period at high tide roost or from areas where birds were observed feeding.

*Ability to capture birds:*

Breeding locations: As part of a shorebird community breeding ecology study, *arcticola* Dunlin were captured at Barrow in 2001 and 2003–2005 (R. Lanctot, unpubl.). During this time, 275 adults and 307 chicks were captured. We anticipate higher numbers of birds to be captured in the coming year as biologists focus on this one species. We also anticipate

similar to higher capture rates to occur in other breeding locations where similar densities have been documented.

Post-breeding locations: In 2005, 36 Dunlin were captured at Barrow (18), Colville River delta (10) and Peard Bay (8) during a study investigating the post-breeding ecology of shorebirds (Taylor et al. in press). Dunlin were not targeted during this study, and it is expected that a larger number could be captured. Since the mid-1970s there have been several efforts to capture post-breeding Dunlin on the YKD resulting in over 3,000 birds being processed, including over 600 in 2005 (R. Gill, unpubl.). Most birds were captured at high tide roosts with rocket nets, but mist nets and walk-in traps were also used.

*Other targeted species:* At the proposed primary breeding sites it will be possible to sample small to moderate numbers of Long-billed Dowitchers, Pectoral Sandpipers, and Buff-breasted Sandpipers. On the post-breeding locations on the YKD it will be possibly to sample moderate to large numbers of Rock Sandpipers and Sharp-tailed Sandpipers, and small numbers of Bar-tailed Godwits, Pectoral Sandpipers, and Long-billed Dowitchers.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service
Migratory Bird Management
*Contact:* Richard Lanctot
Yukon Delta NWR
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U.S. Geological Survey
Alaska Science Center - Shorebird Project
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**Literature cited:**


Andres, B. A. 1994. Coastal zone use by postbreeding shorebirds in Northern Alaska. Journal of Wildlife Management 58:206–213.

Brown, S., C. Hickey, B. Harrington, and R. Gill (eds.). 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

Gill, R. E., Jr., and C. M. Handel. 1981. Shorebirds of the eastern Bering Sea, p. 719–738. *In* D. W. Hood and J. A. Calder (eds.) The eastern Bering Sea shelf: Oceanography and resources. Vol. 2. Univ. of Washington Press, Seattle.

Gill R. E., Jr., and C. M. Handel. 1990. The importance of subarctic intertidal habitats to shorebirds: a study of the central Yukon-Kuskokwim Delta, Alaska. Condor 92:702–725.

Johnson, J., T. McKinnon, and B. Andres. 2005. Summary Report: Autumn Migration at the Colville River Delta: Arctic Coastal Plain, Alaska, 25 July–23 August 2005. Unpubl. Report by U.S. Fish and Wildlife Service.

Johnson, J. A., R. B. Lanctot, B. A. Andres, J. R. Bart, S. C. Brown, S. J. Kendall, and D. C. Payer. In review. Distribution of breeding shorebirds on the Arctic Coastal Plain of Alaska. *Arctic*.

Martin, P. D., and C. S. Moitoret. 1981. Bird populations and habitat use, Canning River Delta, Alaska. Report to Arctic National Wildlife Refuge by Alaska Cooperative Wildlife Research Unit and Dept of Biological Sciences, University of Alaska Fairbanks.

Norton, D. W. 1971. Two Soviet recoveries of Dunlins banded at Point Barrow, Alaska. Auk 88:927.

Taylor, A. R., A. N. Powell and R. B. Lanctot. In press. Pre-migratory movements and physiology of shorebirds staging on Alaska's North Slope. OCS Study MMS 2006-xxx, Annual Report No. 11, Federal Fiscal Year 2005, pages xxx-xxx.

Troy, D. M. and J. K. Wickliffe. 1990. Trends in bird use of the Pt. McIntyre Reference Area 1981-1989.Unpubl. report by Troy Ecological Research Associates for BP Exploration (Alaska) Inc.

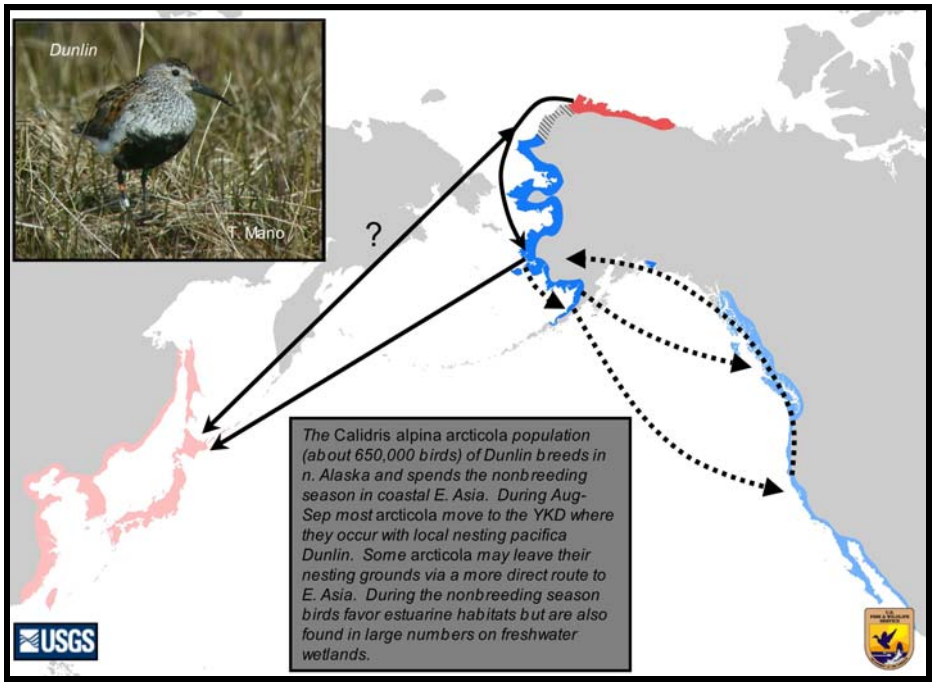
U.S. Interagency Strategic Plan. 2006. Final Draft: An early detection system for Asian H5N1 highly pathogenic avian influenza in wild migratory birds.

Warnock, N. D. and R. E. Gill, 1996. Dunlin (*Calidris alpine*). *In* The Birds of North America, No. 203 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Wetlands International–Oceania. 2004. Science Action Plan for the Dunlin *Calidris alpina* in the East Asian-Australasian Flyway. Unpubl. report by Wetlands International–Oceania.

Asian H5N1 ranking criteria for Dunlin, *Calidris alpina arcticola*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 5 | 2 | 3 | 4 | 3 | 17 |
| Entire population winters from Taiwan north to Yellow Sea and n. Japan | Winters throughout areas where H5N1 identified | Uses estuarine and freshwater habitats; also ephemeral inland lakes where domestic waterfowl are raised | Est. at 650,000 | Relatively easy to trap on nests and during postbreeding when in flocks | |



## Taxon: Sharp-tailed Sandpiper (*Calidris acuminata*)

**Justification:** A major segment of the annual cohort of juvenile Sharp-tailed Sandpipers comes to western Alaska each autumn following contact with adults on the breeding grounds that in turn staged in East Asia during northward migration.

**Background:** The Sharp-tailed Sandpiper nests in northeastern Siberia from the Lena River delta east to Chaun Gulf and spends the nonbreeding season in Australasia, primarily southeastern Australia (Higgins and Davies 1995). Its population as of 2004 was estimated at 160,000 individuals (Bamford et al. in press). Northward migration from Australia occurs in two long legs, the first to coastal East Asian (Taiwan, Korea, Yellow Sea, Japan, southern Russian Far East) and second direct to the breeding grounds. Southward migration may be unique among all shorebirds. Adults depart from breeding grounds and pass overland through Mongolia, China, and Manchuria to coastal Asia; juveniles (possibly the annual cohort) fly east across the Bering Strait to western Alaska (Kotzebue Sound south to central Alaska Peninsula estuaries), but return to Australasia (September-October) via an apparent direct, nonstop flight (cf. Gill et al. 2004). During the nonbreeding period birds prefer freshwater swamps and ephemeral wetlands, but also occur on intertidal habitats and hypersaline environments, especially during droughts. During passage, birds are found regularly in East Asia at sewage ponds and pasturelands but they are equally common on intertidal areas. In Alaska, the species is mostly found on coastal salt meadows and on nonvegetated substrates along tidally influenced rivers. The core staging area in Alaska appears to be the central Yukon-Kuskokwim Delta (YKD). Sharp-tailed Sandpipers frequently occur with other species of shorebirds during passage and when staging in Alaska. There are numerous regional reports on the seasonal occurrence and numbers of Sharp-tailed Sandpipers in Alaska (e.g., Gill et al. 1981; Connors and Connors 1985; Gill et al. 1985; Gill 1987; Gill and Handel 1981, 1990; Gill and Vacca 1987; Schamel et al. 1979; Shields and Peyton 1979; Woodby and Divoky 1983).

**Ranking score:** 14.5

**Methods:**

*No. of samples*. Total 400 (200 ea. from the YKD and Alaska Peninsula). The extent of the range in Alaska and the prolonged period of residence (late August into early November) warrant the increased sampling effort.

*Sampling locations*: Primary locations include the central YKD (Old Chevak, Tutakoke River, Kashunuk River, Hazen Bay) and Alaska Peninsula estuaries (Ugashik Bay and Hook-Cinder Lagoon). Secondary locations include Kuskokwim Shoals, eastern Norton Sound and the St. Michael wetland complex.

*Sampling timeframe*: Late August through early November.

*Sample demographics*: Only juveniles will be sampled since they are the only age cohort to occur in Alaska. Equal numbers of males and females will be sampled (sex determined from measurements when bird in hand).

*Methods of capture*: Almost all samples will come from live-captures using walk-in traps and mist nets. During relatively brief periods in autumn 2004 and

2005, over 300 birds were captured on the YKD using walk-in traps and mist nets. Small numbers of samples will be obtained from alternative methods, namely feces and lethal capture (~20–40 birds).

*Other targeted species:* At the proposed primary sampling sites it will be possible to sample large numbers (>200) of Dunlin, Rock Sandpipers, and Bar-tailed Godwits, and small numbers of Pectoral Sandpipers and Long-billed Dowitchers.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Yukon Delta NWR (August through October)

*Contact:* Brian McCaffery

Alaska Peninsula-Becharof NWR (August through October)

*Contact:* Susan Savage

Togiak NWR (August through October)

*Contact:* Rob MacDonald

U.S. Geological Survey

Alaska Science Center - Shorebird Project

*Contact:* Robert Gill

**Literature cited:**


Bamford, M., D. Watkins, W. Bancroft, and G. Tischler. 2006. Migratory shorebirds of the East Asian-Australasian Flyway: population estimates and important sites. Wetlands International Oceania. (In press).

Connors, P. G., and C. S. Connors. 1985. Shorebird littoral zone ecology of the southern Chukchi coast of Alaska. Pages 3–57 *in* Environmental Assessment of the Alaskan Continental Shelf, Final Reports of Principal Investigators, Vol. 35. NOAA, Environ. Res. Lab., Boulder, CO.

Engelmoer, M., and C. Roselaar. 1998. Geographical variation in waders. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Gill, R. E., Jr. 1987. Trip report: birds and mammals observed at Ugashik Bay, Alaska Peninsula, 26 September–22 October 1986. Unpubl. Rept., U.S. Fish and Wildlife Service, Anchorage, AK.

Gill, R. E., Jr., K. S. Bollinger, and M. R. Petersen. 1985. Trip report: birds and mammals observed at Ugashik Bay and Cinder River, Alaska Peninsula, September 26–October 19, 1985. Unpubl. Rept., U.S. Fish and Wildlife Service, Alaska Fish and Wildlife Research Center, Anchorage, AK.

Gill, R. E., Jr., and C. M. Handel. 1981. Shorebirds of the eastern Bering Sea. Pages 719–738 *in* D. W. Hood and J. A. Calder (eds.). The eastern Bering Sea shelf: oceanography and resources, Vol. 2. Univ. Washington Press, Seattle.

Gill, R. E., Jr., and C. M. Handel. 1990. The importance of subarctic intertidal habitats to shorebirds: a study of the central Yukon-Kuskokwim Delta, Alaska. Condor 92:709–725.

Gill, R. E., Jr., and M. M. Vacca. 1987. Trip report: birds and mammals recorded at Hook Lagoon and west Cinder Lagoon, Alaska Peninsula, September 26–October 22, 1986. Unpubl. Rept., U.S. Fish and Wildlife Service, Anchorage, AK.

Higgins, P. J., and S. J. J. F. Davies (eds.). 1996. Handbook of Australian, New Zealand and Antarctic birds. Volume 3: Snipe to Pigeons. Oxford University Press, Melbourne.

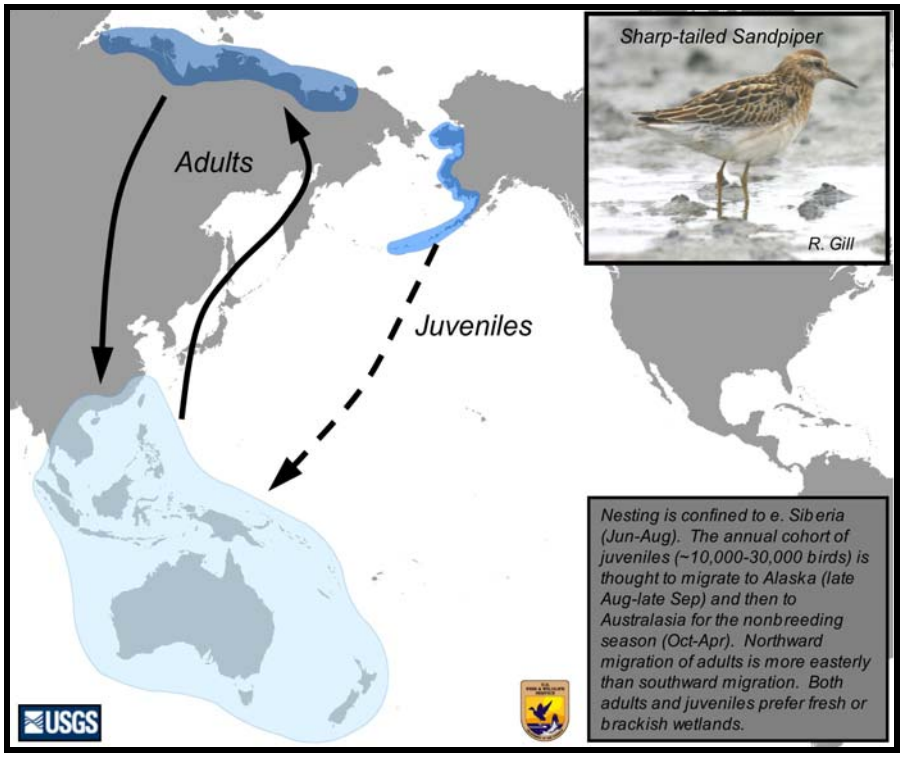
Schamel, D., D. Tracy, P. G. Mickelson, and A. Seguin. 1979. Avian community ecology at two sites on Espenberg Peninsula in Kotzebue Sound, Alaska. Pages 289–607 *in* Environmental Assessment of the Alaskan Continental Shelf, Final Reports of principal investigators, Vol. 5. NOAA, Environ. Res. Lab., Boulder, CO.

Shields, G. F., and L. J. Peyton. 1979. Avian community ecology at the Akulik-Inglutalik River Delta, Norton Bay, Alaska. Pages 608–710 *in* Environmental Assessment of the Alaskan Continental Shelf, Final Reports of Principal Investigators, Vol. 5. NOAA, Environ. Res. Lab., Boulder, CO.

Woodby, D., and G. Divoky. 1983. Bird use of coastal habitats in Norton Sound. Pages 353–704 *In* Environmental Assessment of the Alaska Continental Shelf, Final Reports of Principal Investigators, Vol. 18. NOAA, Environ. Res. Lab., Boulder, CO.

Asian H5N1 ranking criteria for Sharp-tailed Sandpiper, *Calidris acuminata*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 5 | 1 | 3.5 | 2 | 3 | 14.5 |
| Breeding restricted to n.c. Siberia with annual cohort of immatures coming to Alaska; adults move through EAA flyway | Adult migration passes through current known 'hot spots' in central e. Asia. Species of concern if adults can pass virus to offspring on breeding grounds | Freshwater marshes, brackish wetlands, salt ponds, sewage farms, ephemeral wetlands | 10,000 – 40,000 depending on annual production | Easy to capture in Alaska autumn | |



## Taxon: Bar-tailed Godwit (*Limosa lapponica*)

**Justification:** The Bar-tailed Godwit is a high priority species because migrant godwits arriving in Alaska to breed each spring are just days removed from their staging sites along the coast of eastern Asia. This species is one of only four on the priority species sampling list that has the entire population wintering in Asia *and* has contact with a known hot spot.

**Background:** The entire Alaska-breeding race of the Bar-tailed Godwit (*L. l. baueri*) migrates through the East Asian/Australasian flyway (McCaffery and Gill 2001). Each September, tens of thousands depart from their staging grounds in western Alaska on a non-stop over-water flight of up to 11,000 km to reach their non-breeding range in New Zealand and Australia (Gill et al. 2005). In early April, migrant flocks apparently fly directly from the non-breeding grounds to staging sites in China and the Koreas along the coast of the Yellow Sea (Battley 1997, Wilson and Barter 1998). While spending several weeks in this area, Bar-tailed Godwits feed and roost with many other species of waterbirds that have spent the non-breeding season throughout southeast Asia, Australia, and New Zealand (Barter 2002). Once they have acquired enough fat for their non-stop flight to the breeding grounds, *L. l. baueri* then head north directly to western and northern Alaska (McCaffery and Gill 2001).

**Ranking score:** 14 (With the inclusion of fecal sampling, the ease of sampling would change from 2 to 3, and the overall score would rise to 15)

**Methods:**

*No. of samples*. Total 500+ from Alaska.

*Sampling locations*: The primary sampling effort will occur during autumn staging when the entire Alaskan population is located along the coast of southwest Alaska. Because the specific distribution of post-breeding migrants in space and time within the staging distribution has not been determined for birds nesting in different areas of Alaska, sampling should span the geographic and temporal range of the staging population. Specific locations include three sites on the Yukon-Kuskokwim Delta (Tutakoke River, Tern Mountain, Kuskokwim Shoals) and one on the Alaska Peninsula (Egegik). In past years, accessible roosts have been found at all locations. Under similar conditions, the collection of $\geq$ 200 individual samples/site would be feasible. Secondary sampling will occur on the YKD among spring staging birds at Tutakoke River (up to 100 cloacal swabs and/or fecal samples) and breeding birds at Old Chevak (up to a few dozen cloacal swabs and/or fecal samples). Sampling of breeders will also occur on the Seward Peninsula and/or on the Colville River Delta in northern Alaska.

*Sampling timeframe*: Primary sampling will occur in August–September on the coast of YKD and Alaska Peninsula. Secondary sampling will occur during May at Tutakoke, May-July at Old Chevak, and June-July on the Seward Peninsula and Colville River Delta.

*Sample demographics*: Adults will be sampled during spring migration and on the breeding grounds. Both adults and juveniles will be sampled during autumn staging, although the relative proportion of the age classes sampled will likely vary among sites.

*Methods of capture*: The sample goal can most easily be achieved through fecal sampling at on-shore roost sites in autumn. Smaller numbers of samples can be obtained from fecal sampling and/or live capture (~20–40 birds/site) of adults at the 3-4 secondary sampling sites.

*Other targeted species:* At the proposed primary sampling sites it will be possible to sample moderate to large numbers of Sharp-tailed Sandpipers, Dunlins, and Rock Sandpipers.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service
Yukon Delta NWR (August through October)
*Contact:* Brian McCaffery

U.S. Geological Survey
Alaska Science Center – Shorebird Project
*Contact:* Robert Gill

**Literature cited:**

Barter, M. A. 2002. Shorebirds of the Yellow Sea: Importance, threats, and conservation status. Wetlands International Global Series 9, International Wader Studies 12, Canberra, Australia.

Battley, P. F. 1997. The northward migration of arctic waders in New Zealand: departure behaviour, timing, and possible migration routes of Red Knots and Bar-tailed Godwits from Farewell Spit, north-west Nelson. Emu 97:108–120.

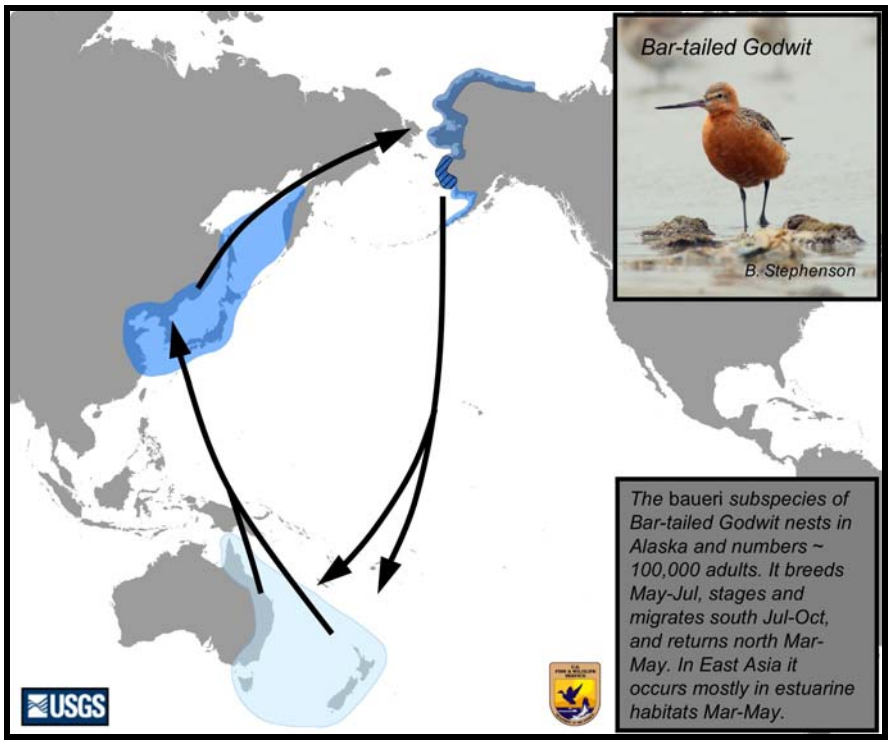
Gill, R. E., Jr., T. Piersma, G. Hufford, R. Servranckx, and A. Riegen. 2005. Crossing the ultimate ecological barrier: evidence for an 11,000-km-long nonstop flight from Alaska to New Zealand and eastern Australia by Bar-tailed Godwits. Condor 107:1–20.

McCaffery, B., and R. Gill. 2001. Bar-tailed Godwit (*Limosa lapponica*). *In* The Birds of North America, No. 581 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Wilson, J. R, and M. A. Barter. 1998. Identification of potentially important staging areas of "long jump" migration waders in the east Asian-Australasian flyway during northward migration. Stilt 32:16–27.

Asian H5N1 ranking criteria for Bar-tailed Godwit, *Limosa lapponica*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 5 | 2 | 2 | 3 | 2 | 14 |
| Entire pop. nests w. and n. Alaska & stages c.e. Asia (Yellow Sea, Korea, Japan) in spring; southward migration direct across Pacific | On migration stops in central e. Asia (Yellow Sea, Korea, Japan) | Estuarine | Est. at 120,000, but 2005 census efforts accounted for <50,000 | Could be difficult to obtain target number | |



## Taxon: Ruddy Turnstone (*Arenaria i. interpres*)

**Justification:** A large proportion of the population of Ruddy Turnstones that occurs in Alaska is distributed during the non-breeding season in parts of Asia having recent outbreaks of Asian H5N1.

**Background:** Approximately 40,000 Ruddy Turnstones utilize sites within Alaska each year (Alaska Shorebird Group 2006–2010). Half of these individuals breed in Chukotka, while half breed at upland tundra sites within the state (Brown et al. 2001). A portion of both breeding groups migrates to locations in eastern and southeastern Asia during the non-breeding season and stops in central east Asia at sites where birds could potentially be exposed to Asian H5N1 (e.g., Yellow Sea; Bamford et al. 2006). Additionally, each fall Alaska hosts Ruddy Turnstones that breed in Chukotka but stage at sites in western Alaska en route to non-breeding locations in Asia (Thompson 1974). Thus, not only does a percentage of Alaskan-breeding Ruddy Turnstones spend the nonbreeding season at sites near outbreaks of Asian H5N1 in Asia, but a high proportion of Asian-breeding turnstones stages at sites in western Alaska. Ruddy Turnstones are thus a potential vector species for Asian H5N1 virus in North America.

**Ranking Score:** 13

**Methods:**

*No. of sample:* Total of 200 from Alaska. Additional samples outside Alaska could potentially be collected from birds captured at nonbreeding sites in Hawaii.

*Sampling locations*: Primary sample locations include Barrow and Savoonga (St. Lawrence Island). Secondary samples may be collected at Wooley Lagoon (Seward Peninsula), Pribilof Islands, and Izembek Lagoon, with additional samples potentially collected in Hawaii.

*Sampling timeframe*: During May at Barrow and Savoonga and July at Barrow, focusing on municipal landfills and marine mammal bone yards. Samples from breeding birds would be obtained in June at Wooley Lagoon, an area with relatively high nesting densities of Ruddy Turnstones; additional breeding samples could likely be obtained from Barrow and Canning River. During fall staging/migration, sample locations would include the Pribilof Islands and Izembek Lagoon. Turnstones that nest in western Alaska spend the nonbreeding season in the Hawaiian Islands (P. Bruner, unpubl.), often forming large flocks. Additional samples could potentially be obtained at sites on Oahu.

*Sample demographics*: Adults will be sampled during migration in the spring and at breeding sites. Juveniles occur fairly regularly but in sparse numbers in autumn at coastal sites in western Alaska.

*Methods of capture*: The sample goal of 200 can most easily be achieved through live trapping (e.g., baited walk-in trap, noose mats, mist nets) and/or collection of fecal samples from birds at sites during spring and fall migration. Smaller numbers of samples could be obtained from lethal capture (~20–40 birds).

*Other targeted species*: At the proposed primary sampling sites it will be possible to sample small to moderate numbers of Pacific Golden-Plovers, Bar-tailed Godwits, Long-billed Dowitchers, Dunlin, and Rock Sandpipers.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management (May–June, Barrow)

*Contact:* Richard Lanctot

Izembek National Wildlife Refuge (July–September, Izembek Lagoon)

*Contact:* Kristine Sowl

Alaska Maritime National Wildlife Refuge (July, Pribilof Islands)

*Contact:* Jeff Williams

U.S. Geological Survey

Alaska Science Center – Shorebird Project

*Contact:* Robert Gill

U.S. Department of Agriculture (July, Pribilof Islands)

*Contact:* David Sinnett

**Literature Cited**

Alaska Shorebird Group. 2006–2010. A Conservation Plan for Alaska Shorebirds. Unpublished report, Alaska Shorebird Group. Available through U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska. XX pp.

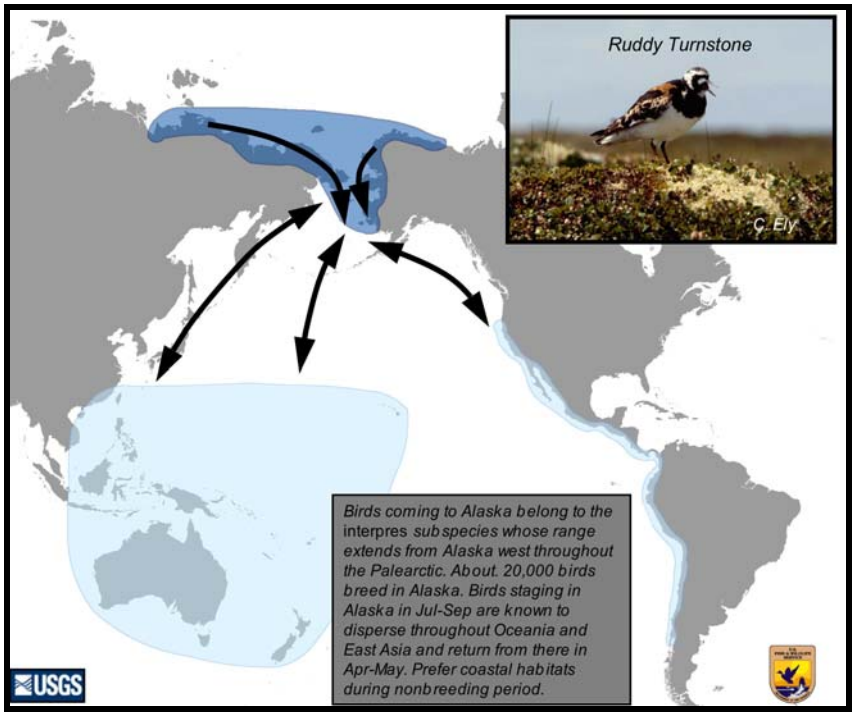
Bamford, M., D. Watkins, W. Bancroft, and G. Tischler. 2006. Migratory shorebirds of the East Asian-Australasian Flyway: population estimates and important sites. Wetlands International Oceania. (In press).

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U. S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences. Manomet, MA.

Thompson, M. C. 1974. Migratory patterns of ruddy turnstones in the central Pacific region. Living Bird 12:5–23.

Asian H5N1 ranking criteria for Ruddy Turnstone, *Arenaria i. interpres*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 3 | 2 | 2.5 | 2.5 | 3 | 13 |
| Portion of w. Alaska nesting to s.e. & e. Asia; population nesting in Chukotka moves to w. Alaska in autumn before returning to s.e. & e. Asia | On migration stops in c. & e. Asia (Yellow Sea, Korea, Japan) | Breeds upland tundra; migration/nonbreeding coastal (rocky intertidal, sand beaches and mudflats) | >35% of North American pop. (~20,000 birds) in Alaska, plus historically large numbers visit (>20,000 on Pribilof Is. From Chukotka) | Unless postbreeding concentrations found (e.g., Pribilof Is) could be difficult to meet target sample | |



## Taxon: Pectoral Sandpiper (*Calidris melanotos*)

**Justification:** Pectoral Sandpipers are among the high priority species because small numbers winter regularly in Southeast Asia and the Australasia (mainly Australia and New Zealand), and then migrate through eastern Asia (e.g., Philippines, Taiwan, and Japan) on route to their breeding areas in Siberia. These birds then interact with a much larger number of Pectoral Sandpipers (roughly 50% of the entire population) that later migrate through Alaska and the Western Hemisphere in general to reach their primary nonbreeding grounds in southern South America.

**Background:** Roughly half of the world's population of 400,000 Pectoral Sandpipers (Brown et al. 2001) breeds in Siberia, and the remainder breeds throughout western and northern Alaska east to Central Canada (Holmes and Pitelka 1998). The majority of Pectoral Sandpipers begin their migration southward from their breeding areas in mid-summer (males: early to mid-July; females and young: late July to August); they travel east and then south through the Great Plains and across the Gulf of Mexico to South America, arriving beginning late August and early September. Most of the Siberian breeding birds are thought to migrate eastward through Alaska to join the common migration route used by the North American breeding birds. However, a small number of birds (possibly dispersing juveniles) migrate south from Siberia to areas throughout Polynesia, Australia and New Zealand. The reverse migration happens in spring in both the Western Hemisphere and Asia. In Alaska, birds are observed migrating through Cook Inlet/Anchorage and the Yukon-Kuskokwim Delta (YKD) in mid-May, presumably on their way to Siberia. Pectoral Sandpipers that stop in Alaska to breed typically do so in mid-May to early June.

*Breeding*

The highest breeding densities occur along the arctic coastal plain of northern Alaska and east-central Siberia. Lower densities occur in more inland locations or peripheral parts of their breeding range (i.e., west coast of Alaska; Holmes and Pitelka 1998). The abundance of the species within any one breeding area fluctuates dramatically from year-to-year. In an 11-year period between 1955 and 1965, the number of territorial males ranged from 7 to 37/km$^2$ in Barrow, Alaska (Holmes and Pitelka 1998). Similar changes in density have been recorded in recent years (B. Kempenaers and R. Lanctot, unpubl.). Breeding Pectoral Sandpipers are found in good numbers throughout the National Petroleum Reserve – Alaska (NPR-A) and east to the Canadian border. Moderate densities of birds have been reported at Barrow, Teshekpuk Lake, and Prudhoe Bay (Troy and Wickliffe 1990, R. Lanctot, unpubl. data; J. Liebezeit, unpubl. data); nest densities in these areas average between 5.4 and 11.5 nests/km$^2$. Additional areas within the NPR-A also have high densities based on surveys conducted in the late 1990s and early 2000s (J. Bart, unpubl.).

*Pre-breeding*

Thousands to tens of thousands migrate through the central YKD in mid-May. These birds are suspected of being migrants on their way to Siberia to breed.

*Post-breeding*

Male Pectoral Sandpipers depart their breeding areas quickly, with the majority moving south to subarctic wetlands in the northern prairie regions. Females and their offspring, in contrast, congregate in tundra habitats near the coast of the Arctic Ocean where they may stay for several weeks (Connors et al. 1979). Juveniles are present in western Alaska in small flocks from September to mid-October where they occur in coastal habitats, frequently with Sharp-tailed Sandpipers.

**Ranking score:** 13

**Methods:**

*No. of samples*: 400 (200 each from the North Slope and YKD).

*Sampling locations*: Breeding Pectoral Sandpipers will primarily be sampled on the North Slope at established camps at Barrow, Teshekpuk Lake, Prudhoe Bay, Canning River, and surrounding areas. Secondary sampling will be conducted during pre- and post-breeding periods on the north and central YKD and during post-breeding on the North Slope.

*Sampling timeframe*: Pre-breeding birds will be sampled during May on the central YKD, breeding birds will be sampled during June on the North Slope, and post-breeding birds will be sampled from July through early September on the North Slope and August–September on the north and central YKD.

*Sample demographics*: Adults will be sampled during pre-breeding and breeding, and adults and juveniles will be sampled during fall staging.

*Methods of capture*: Birds breeding on the North Slope will have fecal samples collected or will be live-trapped on nests using bow traps. Pre- and post-breeding birds on the central YKD will be live-trapped using bow traps, walk-in traps, mist nets, and/or rocket nets. Fecal sampling will occur at both pre- and post-breeding areas at high tide roosts or from areas where birds were observed feeding. Large numbers of birds could be collected at any of these sites if needed.

*Ability to capture birds:*

Breeding locations: As part of an intensive study of Pectoral Sandpipers at Barrow, 96 and 187 adults were captured in 2004 and 2005, respectively (B. Kempenaers and R. Lanctot, unpubl.). We anticipate similar numbers of birds can be captured in the coming year at this site, and that comparable numbers can be captured at Teshekpuk Lake, Prudhoe Bay, and the Canning River. The ability to collect fecal samples should also increase our sample size as males traditionally defecate on hummocks that are used in territorial displays.

Pre-breeding locations: No attempt has been made to capture Pectoral Sandpipers at this time of the year. Given their sheer numbers, it is suspected these birds could be captured with a variety of traps or, at a minimum, collected.

Post-breeding locations: This species was captured inadvertently on the central YKD as biologists attempted to capture Sharp-tailed Sandpipers during the 2005 field season.

*Other targeted species:* At the proposed primary breeding sites it will be possible to sample small to moderate numbers of Dunlin, Long-billed Dowitchers, and Buff-breasted Sandpipers. On the pre-breeding locations on the YKD, it will be possibly to sample (Long-billed Dowitcher). At the proposed post-breeding location on the YKD, it will be possible to sample Dunlin and Sharp-tailed Sandpipers.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service
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  - *Contact:* Richard Lanctot
- Yukon Delta NWR
  - *Contact:* Brian McCaffery
- Arctic NWR
  - *Contact:* Steve Kendall

U.S. Geological Survey
- Alaska Science Center
  - *Contact:* Robert Gill

**Literature cited:**


Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

Connors, P.G., J.P. Myers, and F.A. Pitelka. 1979. Seasonal habitat use by arctic Alaskan shorebirds. Studies in Avian Biology 1:307-315.

U.S. Interagency Strategic Plan. 2006. Final Draft: An early detection system for Asian H5N1 highly pathogenic avian influenza in wild migratory birds.

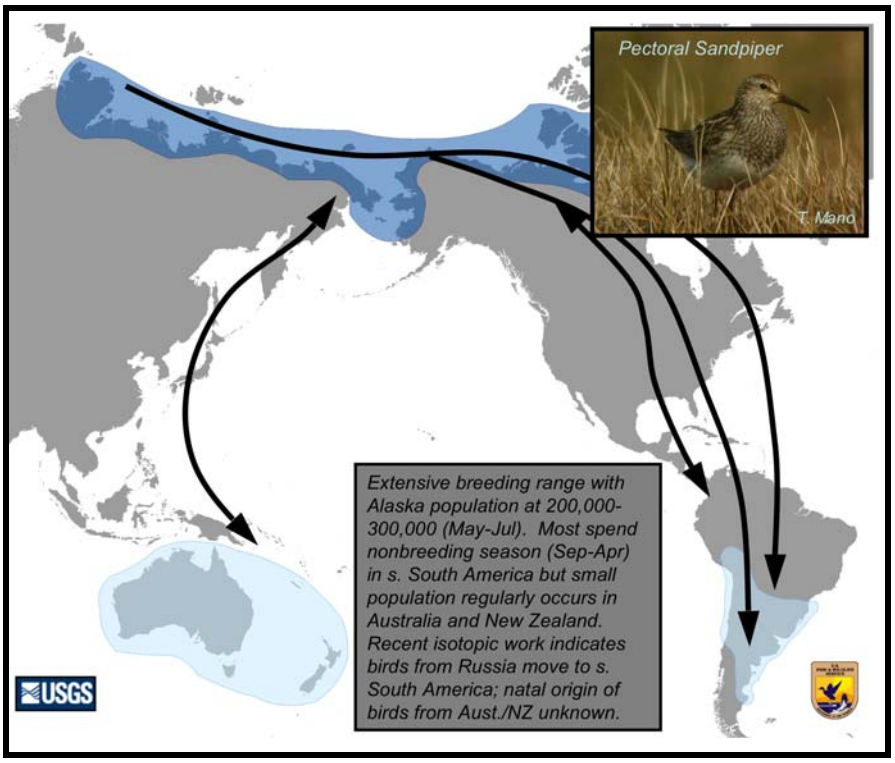
Holmes, R.T., and F.A. Pitelka. 1998. Pectoral Sandpiper (*Calidris melanotos*). *In* The Birds of North America, No. 348 (A. Poole, and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Taylor, A.R., A.N. Powell and R.B. Lanctot. In press. Pre-migratory movements and physiology of shorebirds staging on Alaska's North Slope. OCS Study MMS 2006-xxx, Annual Report No. 11, Federal Fiscal Year 2005, pages xxx-xxx.

Troy, D.M. and J.K. Wickliffe. 1990. Trends in bird use of the Pt. McIntyre Reference Area 1981-1989.Unpubl. report by Troy Ecological Research Associates for BP Exploration (Alaska) Inc.

Asian H5N1 ranking criteria for Pectoral Sandpiper, *Calidris melanotos*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 3 | 1 | 4 | 3 | 2 | 13 |
| Greater than 50% of population nests in Russia west to e. Taimyr Penin. | No known use of AI-infected areas | Breeds marshy/grassy tundra; postbreeding uses brackish ponds freshwater marshes | Est. 200,000 – 300,000 | Could be difficult to obtain target number | |



## Taxon: Red Knot (*Calidris canutus rogersi & roselaari*)

**Justification:** Red Knots are a high priority species because those in Alaska either co-occur with birds coming from Australasia or are part of a population whose breeding range extends to Asia (Wrangel Island).

**Background:** Three subspecies of Red Knots occur in the Australasian flyway. Those breeding on Wrangel Island and likely in northwestern Alaska are recognized as *C. c. roselaari* (Engelmoer and Roselaar 1998). Their nonbreeding range was formerly thought to be Florida but recent work with stable isotopes (P. Atkinson et al. unpublished) suggests their range is likely along the eastern coast of the Pacific from southern California to Central America. The total population of *roselaari* is estimated at fewer than 50,000 birds (Alaska Shorebird Group, unpublished). The only place in Alaska where they are known to occur in numbers is on the outer Yukon-Kuskokwim Delta in May (Gill and Handel 1981, 1990). Sixteen birds collected there in May have been identified as putative *roselaari* (P. Tomkivich and T. Piersma, pers. obs.). The subspecies *C. c. rogersi* (numbering about 220,000 birds; Bamford et al. in press) also occurs in the flyway, with nesting restricted to Chukotka, Russia (Tomkovich 2001). Their nonbreeding range encompasses Australasia, primarily Australia and New Zealand. Movement to and from the breeding and nonbreeding grounds entails prolonged stays in coastal East Asia, primarily on estuarine habitats. Five of the 16 knots from the YKD in May had isotopic signatures mapping reasonably well with those of birds from New Zealand and Australia, suggesting that *rogersi* co-occurs with *roselaari* on the YKD in spring. Whether or not this is an annual phenomenon or one dictated by events such as conditions on the breeding grounds is unknown. A third, recently described subspecies (*C. c. piersmai*; Tomkovich 2001) also occurs in the flyway. These birds breed throughout the New Siberian Archipelago of central Siberia and spend the nonbreeding period in Australasia, possibly in New Zealand (P. Battley pers. comm.). It is unlikely that they occur in Alaska during any season.

**Ranking score:** 12.5 (with fecal sampling score for "Can samples be obtained" would change from 2 to 3 and thus the overall score from 12.5 to 13.5)

**Methods:**

*No. of samples*: Total 200 from Alaska. Additional samples could be collected from birds sampled at staging sites used during northward migration, primarily in central East Asia but also from the nonbreeding grounds in North and Central America if such sites are identified.

*Sampling locations*: The primary location is the central YKD (coastal sites from Hooper Bay to Hazen Bay). Secondary locations include known breeding areas (Brooks Range and Wrangel Island) and autumn staging areas (coastal estuaries between Norton Sound and the central Alaska Peninsula). In 2006, birds would be sampled at secondary cites only incidental to other sampling efforts.

*Sampling timeframe*: During May and August–September on the YKD; during June at known breeding areas (Baird, DeLong, Endicott, and Philip Smith mountains of the Brooks Range); during June on Wrangel Island; during August–September on coastal estuaries of western and southwestern Alaska.

*Sample demographics*: Adults will be sampled during spring. There are no known areas where adults concentrate in Alaska following nesting. Sparse numbers of juveniles occur fairly regularly in autumn on most estuaries in western Alaska.

*Methods of capture*: The sample goal of 200 can most easily be achieved through fecal sampling and/or live-trapping of birds at on-shore roost sites in spring, particularly on the central YKD near Tutakoke and Old Chevak. Smaller numbers of samples could be obtained from lethal capture (~20–40 birds).

*Other targeted species:* At the proposed primary sampling sites it will be possible to sample small to moderate numbers of Bar-tailed Godwits, Dunlin, and Rock Sandpipers.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Yukon Delta NWR (May–June and possibly August–October)

*Contact:* Brian McCaffery

U.S. Geological Survey

Alaska Science Center - Shorebird Project

*Contact:* Robert Gill

**Literature cited:**

Bamford, M., D. Watkins, W. Bancroft, and G Tischler. 2006. Migratory shorebirds of the East Asian-Australasian Flyway: population estimates and important sites. Wetlands International Oceania. (In press).

Engelmoer, M., and C. Roselaar. 1998. Geographical variation in waders. Kluwer Academic Publishers, Dordrecht, The Netherlands.

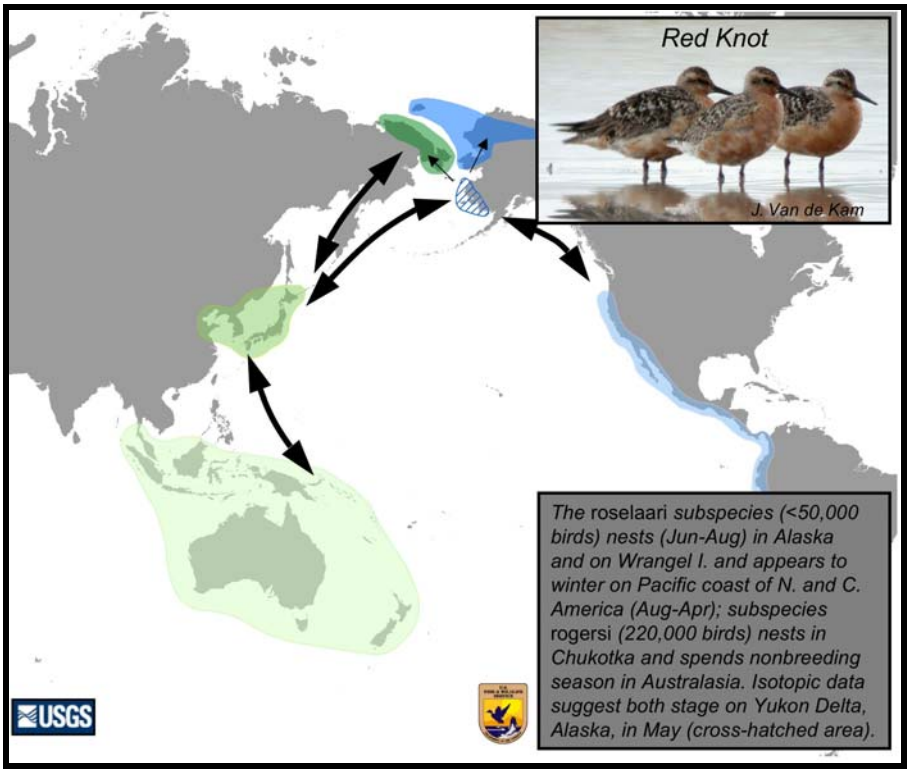
Gill, R. E., Jr., and C. M. Handel. 1981. Shorebirds of the eastern Bering Sea, p. 719–738. *In* D. W. Hood and J. A. Calder (eds.) The eastern Bering Sea shelf: Oceanography and resources. Vol. 2. Univ. of Washington Press, Seattle.

Gill R. E., Jr., and C. M. Handel. 1990. The importance of subarctic intertidal habitats to shorebirds: a study of the central Yukon-Kuskokwim Delta, Alaska. Condor 92:702–725.

Tomkovich, P. S. 2001. A new subspecies of Red Knot *Calidris canutus* from the New Siberian Islands. Bull. B.O.C. 12:257–263.

Asian H5N1 ranking criteria for Red Knot, *Calidris canutus rogersi & roselaari*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 4 | 2 | 2 | 2.5 | 2 | 12.5 |
| *roselaari* pop. nests Wrangel Is & w. Alaska and winters Pacific coast of Americas. r*ogersi* nests Chukotka /New Siberian Is. and winters Australia/New Zealand, passing through c.e. Asia | On migration *rogersi* passes through areas where H5N1 identified | Estuarine | *roselaari* <50,000 *rogersi* 220,000 thought to stop in Alaska in spring but numbers unknown (possibly several 10,000s) | Could be difficult to obtain target numbers | |



## Taxon: Long-billed Dowitcher (*Limnodromus scolopaceus*)

**Justification:** Nearly all the Long-billed Dowitchers that breed in Asia migrate through Alaska en route to non-breeding areas in North and Central America. These birds mix during migration and breeding with other waterfowl and shorebird species from parts of Asia with recent outbreaks of Asian H5N1.

**Background:** The Long-billed Dowitcher is a common breeding shorebird at high-latitude coastal wetlands in Alaska, Canada, and the Russian Far East (Takekawa and Warnock 2000). About one-third of all Long-billed Dowitchers breeds in Asia, with the majority of these Asian-breeding dowitchers passing through Alaska during both spring and fall migration (Alaska Shorebird Group 2006–2010). Nearly all Long-billed Dowitchers spend the non-breeding season at sites in North and Central America (Takekawa and Warnock 2000), with the remainder wintering in Japan (Wild Bird Society of Japan 1982). The non-breeding range of the Long-billed Dowitcher in Asia is near sites of recent Asian H5N1 outbreaks, and during migration and on Russian breeding grounds dowitchers likely mix with other species of birds that frequent outbreak sites (e.g., Bar-tailed Godwits, Dunlin, Sharp-tailed Sandpipers). These different breeding and non-breeding groups intermix during spring and fall migration in Alaska, making the Long-billed Dowitcher a potential vector of Asian H5N1 virus in North America.

**Ranking Score:** 12

**Methods:**

*No. of sample:*. Total of 200 from Alaska.

*Sampling locale:*. Primary sample locations include sites around Cook Inlet (Anchorage Coastal Wildlife Refuge, Susitna Flats State Game Refuge), Yukon-Kuskokwim Delta (YKD; coastal and inland sites adjacent to Hazen Bay and St. Michael), and the North Slope (Barrow, Canning River, Prudhoe Bay, Teshekpuk Lake).

*Sampling timeframe*: During May at Anchorage Coastal Wildlife Refuge, Susitna Flats State Game Refuge, and YKD. During this period, sampling will focus on shallow freshwater ponds adjacent to coastal mudflats where dowitchers gather during migration. Samples obtained in June on the breeding grounds would be collected on the North Slope. During fall staging/migration (July–August), samples will be collected on YKD (Tutakoke River).

*Sample demographics*: Adults will be sampled during migration in the spring and at breeding sites. Juveniles occur regularly but in sparse numbers in autumn at coastal sites in western Alaska.

*Methods of capture*: The sample goal of 200 can most easily be achieved through live trapping (e.g., walk-in traps, noose mats, mist nets) and/or collection of fecal samples from birds in spring. Smaller numbers of samples could be obtained from lethal capture (~20–40 birds). While breeding, Long-billed Dowitchers nest at low densities and are very difficult to capture on the nest, but can likely be captured post-hatch by utilizing chick distress playback calls.

*Other targeted species:* It will be possible to sample small to moderate numbers of Bar-tailed Godwits, Ruddy Turnstones, Dunlin, and Rock Sandpipers at the proposed sampling sites.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management (May, Barrow)

*Contact:* Richard Lanctot

Yukon Delta NWR (May, July–August)

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U.S. Geological Survey

Alaska Science Center - Shorebird Project

*Contact:* Robert Gill

**Literature Cited:**

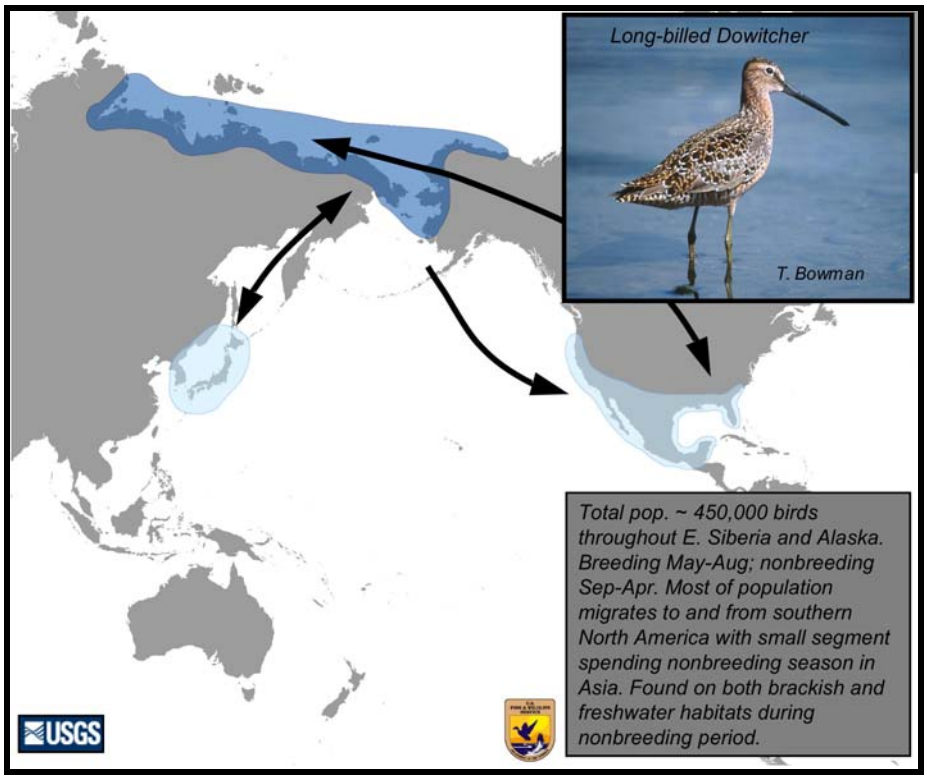
Alaska Shorebird Group. 2006–2010. A Conservation Plan for Alaska Shorebirds. Unpublished report, Alaska Shorebird Group. Available through U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska. XX pp.

Wild Bird Society of Japan. 1982. A field guide to the birds of Japan. Wild Bird Society of Japan. Tokyo.

Takekawa, J. Y., and N. Warnock. 2000. Long-billed Dowitcher (*Limnodromus scolopaceus*). *In* The Birds of North America, No. 493 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Asian H5N1 ranking criteria for Long-billed Dowitcher, *Limnodromus scolopaceus*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 3 | 1 | 3 | 3 | 2 | 12 |
| >30% of pop. breeds in Russia where range expanding w. to Taimyr Penin., >95% of entire pop. winters in N. & C. America. Unknown numbers winter in Asia (Japan) | No known use of AI-infected areas | Breeds coastal lowlands in wet, grassy freshwater meadows; uses estuarine and managed wetlands during migration and winter | North American pop. 450,000 (>90% of this is in Alaska during migration) | Could be difficult to obtain target number | |



**Taxon: Rock Sandpiper (*Calidris ptilocnemis tschuktschorum*)**

**Justification:** This high priority subspecies provides a major migratory link between Asia and North America; about 10,000 birds nest in western Siberia and migrate directly to Alaska in fall.

**Background:** The *tschuktschorum* subspecies of the Rock Sandpiper (*Calidris ptilocnemis*) breeds in coastal mountains and uplands in eastern Russian (Chukotka Peninsula) and western Alaska (from n. Seward Peninsula south throughout Alaska Peninsula) (Gill et al. 2002). The current population is estimated at 50,000 birds with about 10,000 of them nesting in Russia. During post-breeding (Jul–Oct), the entire population migrates to coastal staging areas in western Alaska (Yukon Delta and Bristol Bay) where they molt associate closely with a variety of other shorebirds, including two other subspecies of Rock Sandpiper. The population then spends the remainder of the annual cycle (November–April) at coastal sites in the Pacific Northwest from southeast Alaska to northern California.

**Ranking score:** 11.5

**Methods:**

*No. of samples*: Total of 400 cloacal swabs; 300 from adults and 100 from juveniles.

*Sampling locations*: Primary locations will be coastal lagoons, bays, and exposed shorelines on the Yukon-Kuskokwim Delta (e.g., Angyoyaravak Bay, Hazen Bay, Kuskokwim Shoals). Secondary locations will be northern Bristol Bay (e.g., Chagvan and Egegik bays), Safety Sound on the Seward Peninsula, and more southerly lagoons and bays on the Alaska Peninsula (e.g., Izembek Lagoon, Cold Bay).

*Sampling timeframe*: Sampling will occur throughout the post-breeding season (late Jul–early Oct).

*Sampling demographics*: Adults and juveniles of both sexes.

*Methods of capture*: Birds will be live captured, swabbed, and released. Capture methods that have proven effective for this species include: 1) rocket nets, mist nets, and noose mats set near roost sites and 2) walk-in and bow traps set near feeding and roosting sites. In excess of 2,000 Rock Sandpipers have been trapped and marked by USGS-ASC Shorebird Project personnel since 1978, including hundreds annually during targeted efforts and lesser numbers when capturing other species (i.e., Dunlin *C. alpina* and Western Sandpipers *C. mauri*). For example, 170 Rock Sandpipers were captured on the YKD in autumn 2004 and 2005 during efforts to trap Dunlin and Sharp-tailed Sandpipers (*C. acuminata*). Because Rock Sandpipers form large communal roosts during high tide it is relatively easy also to collect fecal samples from individuals.

*Other targeted species*: Other priority species available for capture during fall at Rock Sandpiper sampling locations on the central YKD and northern Bristol Bay include: juvenile Sharp-tailed Sandpipers, adult and juvenile Dunlin (*C. alpina articola*), juvenile Long-billed Dowitchers, and adult and juvenile Bar-tailed Godwits. In addition, several populations of shorebirds that are not currently ranked as high priority for virus sampling are known to associate closely with *tschuktschorum* in fall and are often captured incidentally during Rock Sandpiper captures [e.g., Black Turnstone, Dunlin (*C. a. pacifica*)]. It would be possible to

collect and archive samples from these populations in the event that further investigation into Asian H5N1 distribution in wild bird populations becomes warranted.

**Principal Investigators:**

U.S. Fish and Wildlife Service
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  - *Contact:* Richard Lanctot
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  - *Contact:* Brian McCaffery
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- Togiak NWR
  - *Contact:* Rob MacDonald
- Alaska Maritime NWR
  - *Contact:* Jeff Williams
- Izembek NWR
  - *Contact:* Kristine Sowl

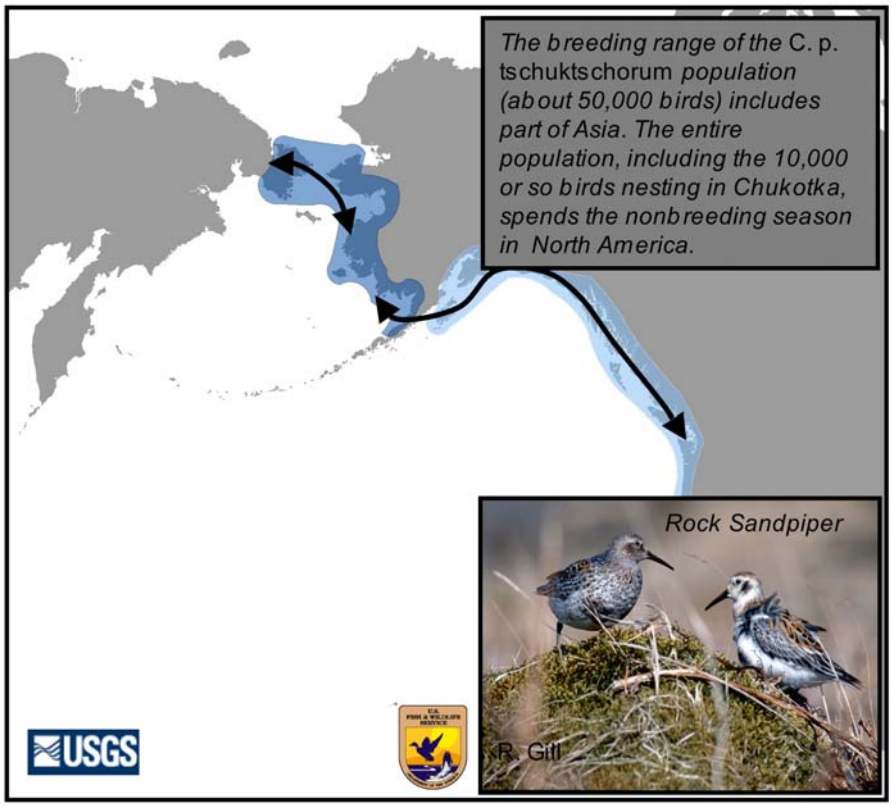
U.S. Geological Survey
- Alaska Science Center - Shorebird Project
  - *Contact:* Robert Gill

**Literature cited:**

Gill, R. E., P. S. Tomkovich, and B. J. McCaffery. 2002. Rock Sandpiper (*Calidris ptilocnemis*). *In* The Birds of North America, No. 686 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Asian H5N1 ranking criteria for Rock Sandpiper, *Calidris ptilocnemis tschuktschorum*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 3 | 1 | 2.5 | 2 | 3 | 11.5 |
| Approx. 23-30% of population nests in Chukotka | No known use of AI-infected areas | Nests upland tundra; postbreeding use estuarine areas | Total pop. 50,000. ~20,000 nest in Chukotka but all return to Alaska enroute to nonbreeding areas in Pacific Northwest | Easy to trap on nest and during postbreeding flocking | |



## Taxon: Pacific Golden-Plover (*Pluvialis fulva*)

**Justification:** This high priority species could potentially carry Asian H5N1 to Alaska via three different routes: 1) birds that spend the nonbreeding season in east central Asia—some in Asian H5N1 "hotspots"—migrate through Alaska in spring *en route* to Siberian breeding areas, 2) birds that nest (or hatch) in Siberia migrate directly to coastal stopover sites in Alaska in fall (adults and juveniles arrive in two different pulses), and 3) Alaska-breeding birds return to Alaska in spring after co-mingling on nonbreeding areas with other *fulva* that have frequented Asian H5N1 "hotspots."

**Background:** Pacific Golden-Plovers breed in tundra habitats from north central Siberia to western Alaska (Johnson and Connors 1996). The global population is estimated to be 170,000–220,000 birds (Wetlands International 2002). Two of three main breeding populations have links to North America. One population (ca. 100,000 birds) nests in Siberia and spends the nonbreeding season in East and Southeast Asia (The Philippines, Thailand, Malaysia, and Indonesia), Australia, and Oceania (Bamford et al. 2006, Wetlands International 2002). During both north and south migrations, an unknown portion of this population passes through Alaska. Another population (ca. 16,000 birds) breeds in Alaska and spends the nonbreeding season in Oceania (Johnson and Connors 1996), particularly in Hawaii (Johnson et al. 2004), where it associates (forages and flocks) with *fulva* that have recently arrived from Asian H5N1 "hotspots." Whether these Alaska breeders can be infected with Asian H5N1 by association with infected birds is unknown.

**Ranking score:** 11.5

**Methods:**

*No. of samples*: 200 adults, 200 juveniles. In Alaska, Pacific Golden-Plovers breed in low densities and rarely form large flocks at any time of year, thus most samples will be collected from pairs on breeding territories or from individual migrants and small flocks at stopover sites. In Hawaii, nonbreeding Pacific Golden-Plovers defend traditional foraging territories providing repeated opportunities to capture 10s of birds. Birds in Hawaii (nonbreeding residents and pre-migrants) also concentrate at nighttime roosts and could potentially be captured there.

*Sampling locations*: Primary locations will be on the Seward Peninsula (Shishmaref Inlet, and interior locations along the road system), and Oahu, Hawaii. Secondary locations will be along the coast in Bristol Bay (Nushagak Bay, Kvichak Bay, and Egegik Bay) and other islands and other seasons in the Hawaiian Archipelago.

*Sampling timeframe*: Spring migration (April) at Hawaii. Breeding (May–June) at Seward Peninsula. Post-breeding (late July–late August) at Shishmaref Inlet and coastal sites in Bristol Bay. Nonbreeding (November–December) at sites throughout Hawaii.

*Sampling demographics*: Adult and juveniles, both sexes.

*Methods of capture*: Birds will be live captured, swabbed, and released. In Alaska, birds will be captured either with bow traps on nests or mist nets and noose mats set at roosting and foraging sites. In Hawaii, birds will be captured with mist nets on foraging territories or by using spotlights (to dazzle them) and mist nets at roost sites. Since it will likely be difficult to capture 100s of Pacific Golden-Plovers in

Alaska, it will be necessary to collect fecal samples opportunistically from individuals at all sites in all seasons.

*Other targeted species*: Other priority species available for capture during fall at Pacific Golden-Plover sampling sites include: juvenile Sharp-tailed Sandpipers, adult and juvenile Dunlin (*Calidris alpina articola*), juvenile Long-billed Dowitchers, and adult and juvenile Bar-tailed Godwits. Pacific Golden-Plovers breed sympatrically with Bar-tailed Godwits on the Seward Peninsula and central YKD, however, both species occur in low densities at these sites and few samples are likely to be obtained during breeding. Ruddy Turnstones could be captured in Hawaii at the same sites as Pacific Golden-Plovers.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service
- Migratory Bird Management
  - *Contact:* Richard Lanctot
- Yukon Delta NWR
  - *Contact:* Brian McCaffery
- Alaska Peninsula-Becharof NWR
  - *Contact:* Susan Savage
- Togiak NWR
  - *Contact:* Rob MacDonald

U.S. Geological Survey
- Alaska Science Center - Shorebird Project
  - *Contact:* Robert Gill

**Literature cited:**


Bamford, M., D. Watkins, W. Bancroft, and G Tischler. 2006. Migratory shorebirds of the East Asian-Australasian Flyway: population estimates and important sites. Wetlands International Oceania. (In press).

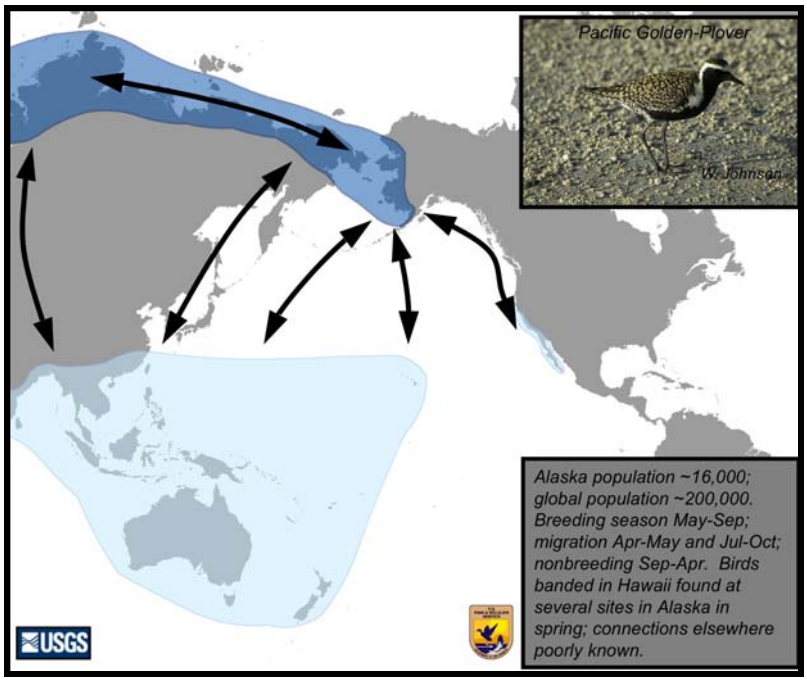
Johnson, O. W., and P. G. Connors. 1996. Pacific Golden-Plover (*Pluvialis fulva*). *In* The Birds of North America, No. 202 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Johnson, O. W., C. D. Adler, L. A. Ayres, M. A. Bishop, J. E. Doster, P. M. Johnson, R. J. Kienholz and S. E. Savage. 2004. Radio-tagged Pacific Golden-Plovers: Further insight concerning the Hawaii-Alaska migratory link. Wilson Bull. 116: 158–162.

Wetlands International. 2002. Waterbird population estimates–Third Edition. Wetlands International Global Series No. 12, Wageningen, The Netherlands.

Asian H5N1 ranking criteria for Pacific Golden-Plover, *Pluvialis fulva*

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 3 | 2 | 2.5 | 2 | 2 | 11.5 |
| Nesting occurs w. & s.w. Alaska, n. Siberia & Chukotka. Interchange known between Asia & Alaska. Alaska nesting birds disperse to Oceania, Pacific coast of N. & C. America. | Birds in Oceania likely in contact with birds from c. Asia | Nests upland tundra; migration and nonbreeding in coastal habitats | Est. 16,000 | Could be difficult to obtain target number | |



## Taxon: Buff-breasted Sandpiper (*Tryngites subruficollis)*

**Justification:** Buff-breasted Sandpipers are a high priority species because a small portion of the population breeds in Asia on Wrangel Island and western Chukotka mainland and then migrates through Alaska to its nonbreeding grounds in southern South America. The species would need to interact with other birds traveling through Asian H5N1 virus infected areas to come in contact with the virus, and then bring the virus back to Alaska in the fall.

**Background:** A small proportion (tens to hundreds) of the world's population of 15,000 Buff-breasted Sandpipers (Brown et al. 2001) breeds on Wrangel Island and the western Chukotka mainland; the remainder breeds throughout northern Alaska east to Central Canada (Lanctot and Laredo 1994). The majority of Buff-breasted Sandpipers begin their migration southward from their breeding areas in mid-summer (males: mid-June to early-July; females and young: late July to early September). Their route takes them east and then south through the Great Plains and across the Gulf of Mexico to South American where they begin arriving by early September. Smaller portions of the population migrate south along the Pacific and Atlantic coasts. The Chukotka breeding birds are thought to migrate eastward through Alaska to join the common migration route used by the North American breeding birds. The reverse migration happens in the spring, although birds are more restricted to the central flyway areas of the United States and Canada.

*Breeding*

There are few known high concentration sites for this species in the Arctic. In addition, abundance fluctuates dramatically from year-to-year at any one site (Lanctot and Laredo 1994). However, Buff-breasted Sandpipers were found in reliable and fairly good numbers near the Sagavanirktok River near Deadhorse (Lanctot and Weatherhead 1997). Study plots located close by had breeding densities that ranged from 0 to 10 birds/km$^2$ during 1971-1974 (Bergman et al. 1977) and between 0.5-14.0 from 1981 to 1989 (average =- 5.7; Troy and Wickliffe 1990). Moderate densities of birds have also been reported at the Ikpikpuk and Canning rivers (Garner and Reynolds 1986, R. Lanctot, unpubl).

*Spring and fall migration*

There are no known post-breeding concentration sites for this species in the Arctic. However, the species is known to aggregate at specific sites in Nebraska, Kansas, and Texas during both spring and fall migration.

**Ranking score:** 10

**Methods:**

*No. of samples*: We plan to obtain 200 samples.

*Sampling locations*: Breeding birds will primarily be sampled on the North Slope at established camps at Prudhoe Bay. Smaller numbers will be sampled at

other locations such as Barrow, Teshekpuk Lake, and the Canning River. Secondary, spring and fall migrants will be sampled in the Central United States, including the Rainwater Basin in Nebraska, and the Cheyenne Bottoms and Quivira NWRs in Kansas.

*Sampling timeframe*: Breeding birds will be sampled during June and early July; spring migrants will be sampled during April and May, and fall migrants will be sampled in August through September.

*Sample demographics*: Adults will be sampled during spring migration and breeding, and adults and juveniles will be sampled during fall migration.

*Methods of capture*: Birds breeding on the North Slope will be live-trapped on nests using walk-in and bow traps, and with mist nets at lek locations. Spring and fall migrants in the Central United States will be live-trapped using walk-in traps, mist nets, and/or rocket nets. Fecal sampling will occur at lek locations where adult males establish territories, and at migration sites where birds stage are observed feeding.

*Ability to capture birds:*

Breeding locations: As part of an intensive Buff-breasted Sandpiper study at Prudhoe Bay, 224 adults were captured in 1992-1994 (Lanctot and Weatherhead 1997). We anticipate that we could capture about 70 adults at this one site in 2006, and gather another 50-100 fecal samples. Biologists at other breeding sites are likely to be able to capture another 30 birds and fecal sample 40-80 more.

Spring and fall migration: No effort has been made to capture migratory Buff-breasted Sandpipers in the past. The goal of the ecotoxicology study is to sample 80 birds at the migration sites (B. Sandercock, unpubl.).

*Other targeted species:* At the proposed primary breeding sites it will be possible to sample small to moderate numbers of Dunlin, Long-billed Dowitchers, and Pectoral Sandpipers.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service
Migratory Bird Management
*Contact:* Richard Lanctot
Yukon Delta NWR
*Contact:* Brian McCaffery

**Literature cited:**

Bergman, R.D., R.L. Howard, K.F. Abraham, and M.W. Weller. 1977. Waterbirds and their wetland resources in relation to oil development at Storkersen Point, Alaska. U.S. Fish and Wildlife Service Research Publication 129. Washington, D.C.

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

Garner, G.W. and P.E. Reynolds. 1986. Final report baseline study of the fish, wildlife, and their habitats. U.S. Dept of Interior, U.S. Fish and Wildlife Service, Anchorage, Alaska

Johnson, J.A., R.B. Lanctot, B.A. Andres, J.R. Bart, S.C. Brown, S.J. Kendall, and D.C. Payer. In review. Distribution of breeding shorebirds on the Arctic Coastal Plain of Alaska. *Arctic*.

Lanctot, R.B. and C.D. Laredo. 1994. Buff-breasted Sandpiper (*Tryngites subruficollis*). *In* The Birds of North America, No. 91 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

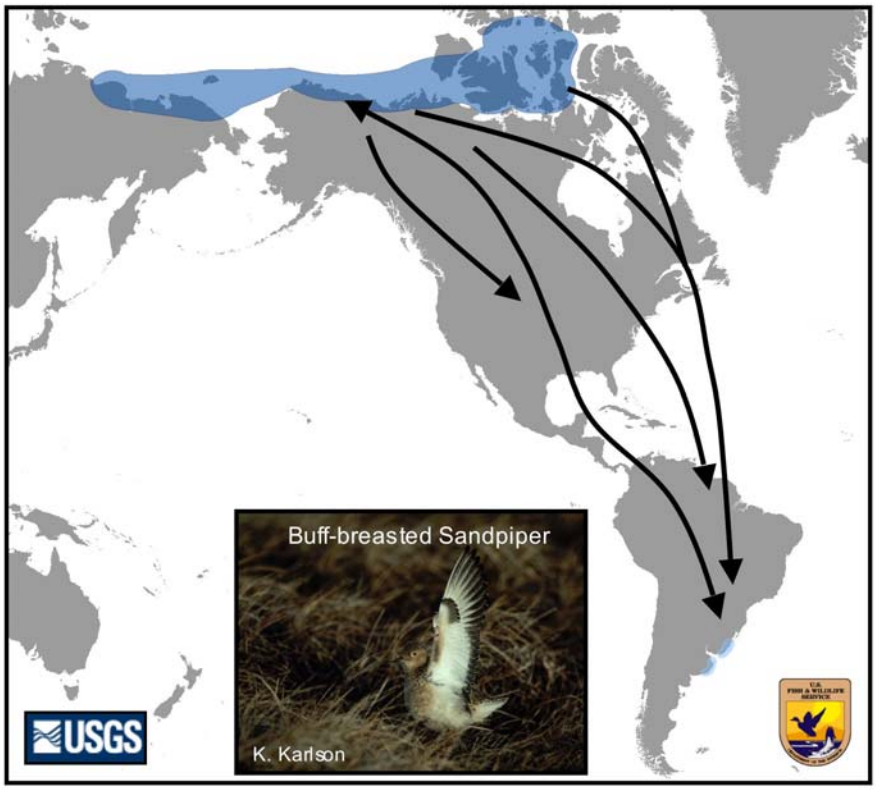
Lanctot, R.B. and P.J. Weatherhead. 1997. Ephemeral lekking behavior in the Buff-breasted Sandpiper, *Tryngites subruficollis*. Behavioral Ecology 8:268-278.

Troy, D.M. and J.K. Wickliffe. 1990. Trends in bird use of the Pt. McIntyre Reference Area 1981-1989.Unpubl. report by Troy Ecological Research Associates for BP Exploration (Alaska) Inc.

U.S. Interagency Strategic Plan. 2006. Final Draft: An early detection system for Asian H5N1 highly pathogenic avian influenza in wild migratory birds.

Asian H5N1 ranking criteria for Buff-breasted Sandpiper, *Tryngites subruficollis*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 2 | 1 | 3 | 2 | 2 | 10 |
| Small portion of population nests Wrangel Is & Chukotka then returns to nonbreeding area in southern S. Ameria | No known use of AI-infected areas | Variable but generally dry upland tundra | ~3,000 including ~1,000 from Chukotka/Wrangel Is, stopping on southward migration | Could be difficult to obtain target number | |



## Taxon: Aleutian Tern (*Sterna aleutica*)

**Justification:** Aleutian terns are a high priority species because virtually all birds breeding in Alaska migrate to Australasia via the East Asia Flyway. They winter along the coast and roost on beaches and estuaries along the western Pacific Ocean.

**Background:** The Aleutian tern breeds only in Alaska and eastern Siberia, nesting coastally in dispersed colonies (North 1997). Their breeding range extends from southeast Alaska to the western Aleutian Islands and as for north as the Chukchi Sea. In Russia they breed in the Bering Sea, Sea of Okhotsk and the Kamchatka Peninsula. In winter all breeding birds appear to move south west along the Pacific coast of Asia to Japan and the Indonesian islands and as far as Java, Bali, and Sulawesi (Harrison 1983, Armstrong 1995, Hill and Bishop 1999, ASIS 2006). Little banding of this species has been done and therefore knowledge of winter distributions has been gathered from observations of birds. About 9,500 birds nest in Alaska, the largest colony of about 1,700 birds nest at Yakutat in the Gulf of Alaska (USFWS 2006).

**Ranking score:** 13

**Methods:**

*No. of samples*. Total 200 to 300 from Alaska.

*Sampling locations*: The primary locations are western Alaska and the Gulf of Alaska. Samples will be taken from Yakutat and Amchitka Island and perhaps Good News Bay and the Copper River Delta.

*Sampling timeframe*: During the early portion of the breeding season in May and June

*Sample demographics*: Adults will be sampled during summer.

*Methods of capture*: The sample goal of 200-300 can most easily be achieved through fecal sampling and/or live-trapping of birds at colonies or on-shore roost sites. Smaller numbers of samples could be obtained from lethal capture (~20–40 birds) if necessary.

*Other targeted species:* At the proposed primary sampling sites in the Aleutian Islands it will be possible to sample small to moderate numbers of Glaucous-winged Gulls and Common Eiders.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management

*Contact:* David Irons

Alaska Maritime NWR

*Contact:* Jeff Williams

**Literature cited**:


Armstrong, R.H. 1995. *Guide to the Birds of Alaska.* Alaska Northwest Books, 4th Ed., Anchorage, Alaska.

ASIS. 2006. Alaska seabird information Series, Aleutian Tern. 2006. U.S. Fish and Wildlife Service, Migratory Bird Mgmt. Rep., U.S. Fish and Wildlife Service, Anchorage, Alaska.

Hill, N.F. and D.K. Bishop. 1999. Possible Winter Quarters of the Aleutian Tern? Wilson Bull. 111 (4) 559-560.

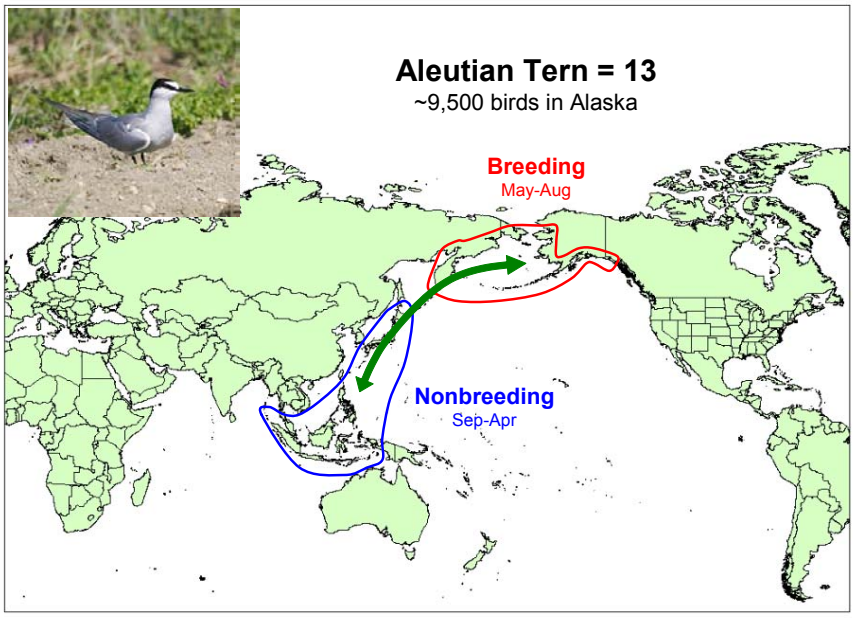
Harrison, P. 1983. Seabirds an identification guide. Houghton Mifflin, Boston.

North, M.R. 1997. Aleutian Tern *(Sterna aleutica). In* The Birds of North America, No. 291 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

U.S. Fish and Wildlife Service, 2006. Beringian Seabird Colony Catalog -- computer database and Colony Status Record archives. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.

Asian H5N1 ranking criteria for Aleutian Tern, *Sterna aleutica*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 5 | 1 | 2 | 2 | 3 | 13 |
| Winters in coastal areas of se Asia, Indonesia | No known use of AI-infected areas | Estuaries | Approximately 9,500 | Location of breeding colonies known | |



## Taxon: Glaucous-winged Gull (*Larus glaucesens*)

**Justification:** Glaucous-winged Gulls are a high priority species because those in western Alaska migrate to Australasia, winter along the coast and feed in land fills and scavenge dead birds.

**Background:** The Glaucous-winged Gull is abundant in bays, harbors, estuaries and rivers throughout the year. It is also common in coastal cities and towns. These gulls take advantage of opportunities to forage at landfills and fish processing plants (Verbeek 1993). This species breeds from Oregon to Russia, but most nest in Alaska. They breed coastally throughout southern Alaska from Southeast to the west end of the Aleutian Islands. In Russia they breed only on the Commander Islands and the Kamchatka Peninsula. In winter birds from the western end of their range move south along the Pacific coast of Asia as far as Japan and birds in the eastern end of their range winter as far south as Baja California (Harrison 1983, Armstrong 1995, ASIS 2006). Little banding of this species has been done and therefore knowledge of winter distributions has been gathered from observations of birds. About 250,000 birds in 825 colonies nest in Alaska. The largest colony has 12,500 birds at Middleton Island in the Northern Gulf of Alaska (USFWS 2006). If all birds in the western Aleutians (the Near Islands and Rat Islands) move southwest in winter then about 12% of the population winters in Asia, and if the remaining Alaska population moves southeast then 88% would winter in North America.

**Ranking score:** 10.5

**Methods:**

*No. of samples*. Total 200 to 300 from Alaska.

*Sampling locations*: The primary location is the western Aleutian Islands. Samples will be taken from Attu and Buldir and perhaps Amchitka.

*Sampling timeframe*: During the breeding season in June to August.

*Sample demographics*: Adults will be sampled during summer.

*Methods of capture*: The sample goal of 200-300 can most easily be achieved through fecal sampling and/or live-trapping of birds at colonies or on-shore roost sites. Smaller numbers of samples could be obtained from lethal capture (~20–40 birds) if necessary.

*Other targeted species:* At the proposed primary sampling sites it will be possible to sample small to moderate numbers of Aleutian Terns and Common Eiders.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management – Seabird Project

*Contact:* David Irons

Alaska Maritime NWR

*Contact:* Jeff Williams

**Literature cited:**


Armstrong, R.H. 1995. *Guide to the Birds of Alaska.* Alaska Northwest Books, 4th Ed., Anchorage, Alaska.

ASIS. 2006. Alaska seabird information Series, Glaucous-winged Gull. 2006. U.S. Fish and Wildlife Service, Migratory Bird Mgmt Rep., U.S. Fish and Wildlife Service, Anchorage, Alaska.

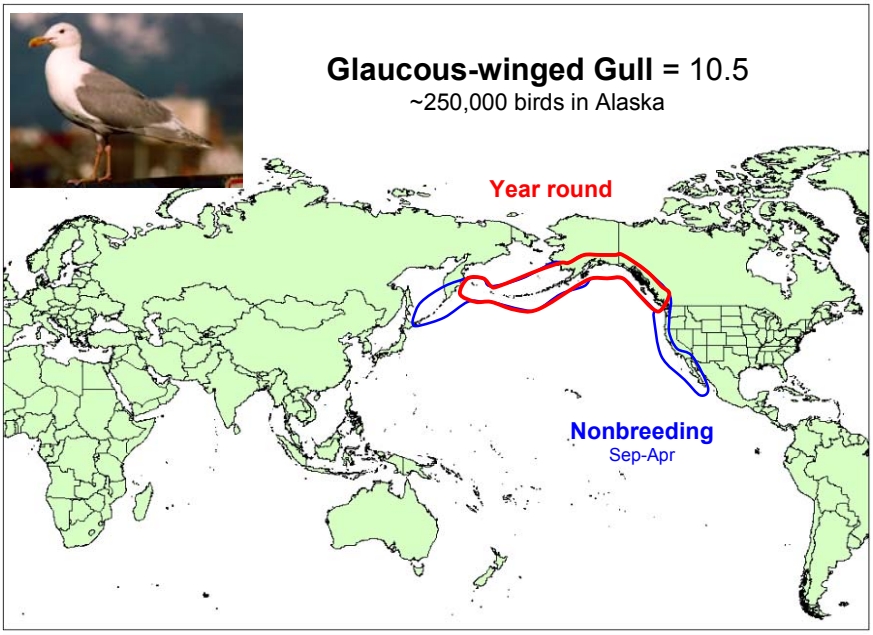
Harrison, P. 1983. Seabirds, an identification guide. Houghton Mifflin, Boston.

U.S. Fish and Wildlife Service, 2006. Beringian Seabird Colony Catalog -- computer database and Colony Status Record archives. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.

Verbeek, N. A. M. 1993. Glaucous-winged Gull (*Larus glaucescens). In* the Birds of North America, No. 59 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Asian H5N1 ranking criteria for Glaucous-winged Gull, *Larus glaucesens*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 1 | 1 | 2.5 | 3 | 3 | 10.5 |
| Estimate 10% winters in Asia | No known use of AI-infected areas | Estuaries and adjacent terrestrial areas; garbage disposal sites | Approximately 250,000 | Location of breeding colonies known | |



## Taxon: Glaucous Gull (*Larus hyperboreus*)

**Justification:** Glaucous Gulls are a high priority species because those in western Alaska migrate to Australasia, winter along the coast and feed in land fills and scavenge dead birds.

**Background:** The Glaucous Gull is often predatory feeding on birds, small mammals, fish and invertebrates (Gilchrist 2001, Bowman et al. 2004). It will also eat garbage and forage on carcasses. This species is circumpolar in distribution. In Alaska it breeds coastally from the central Bering Sea to the Beaufort Sea. In Russia Far East they breed in similar latitudes (Harrison 1983, Armstrong 1995, ASIS 2006). Satellite telemetry has shown that birds breeding in Barrow spend much of their winter in coastal Russia as far south as the Kamchatka Peninsula (Troy Ecological Research Associates 2004). About 100,000 birds nest in colonies and singly in Alaska (Gilchrist 2001, Bowman et al. 2004, USFWS 2006). If other birds nesting along the Beaufort coast, southern Chukchi, and northern Bering seas move southwest in winter like the birds from Barrow, then 30-50% of the population likely winters in Asia.

**Ranking score:** 11.5

**Methods:**

*No. of samples*. Total 200 to 300 from Alaska.

*Sampling locations*: The primary location is northwest Alaska. Samples will be taken from Barrow, St. Lawrence, and the Yukon-Kuskokwim Delta.

*Sampling timeframe*: During the breeding season in June to August.

*Sample demographics*: Adults will be sampled during summer.

*Methods of capture*: The sample goal of 200-300 can most easily be achieved through fecal sampling and/or live-trapping of birds at colonies or on-shore roost sites. Smaller numbers of samples could be obtained from lethal capture (~20–40 birds) if necessary.

*Other targeted species:* At the proposed primary sampling sites it will be possible to sample small to moderate numbers of Aleutian Terns and Common Eiders.

**Principal Investigator(s):**

U.S. Fish and Wildlife Service

Migratory Bird Management – Seabird Project

*Contact:* David Irons

Alaska Maritime NWR

*Contact:* Jeff Williams

Yukon Delta NWR

*Contact:* Fred Broerman

**Literature cited:**


Armstrong, R.H. 1995. *Guide to the Birds of Alaska.* Alaska Northwest Books, 4th Ed., Anchorage, Alaska.

ASIS. 2006. Alaska seabird information Series, Glaucous-winged Gull. 2006. U.S. Fish and Wildlife Service, Migratory Bird Mgmt Rep., U.S. Fish and Wildlife Service, Anchorage, Alaska.

Bowman, T. D., R. A. Stehn, and K. T. Scribner. 2004. Glaucous Gull Predation of Goslings on the Yukon-Kuskokwim Delta, Alaska. Condor 106: 288-298.

Gilchrist, H. G. 2001. Glaucous Gull (*Larus hyperboreus*). *In* The Birds of North America, No. 573 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

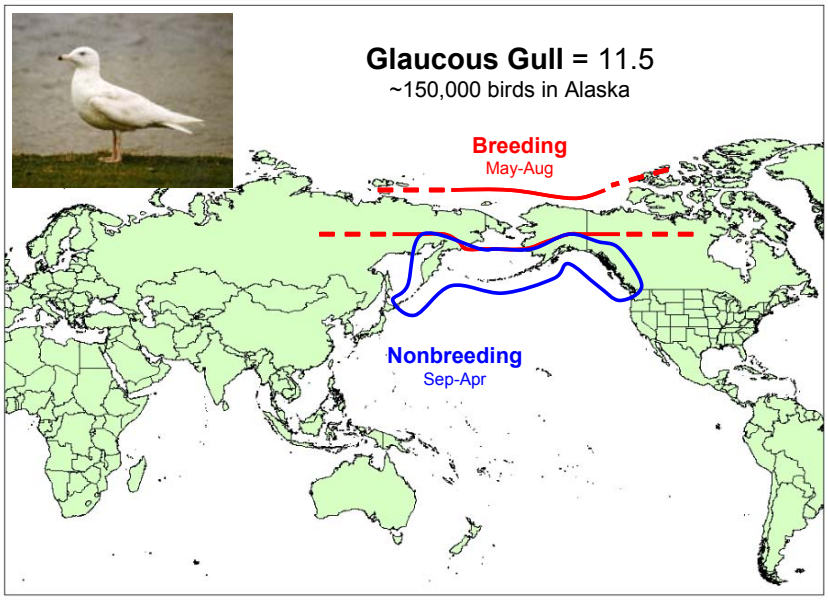
Harrison, P. 1983. Seabirds, an identification guide. Houghton Mifflin, Boston.

Troy Ecological Research Associates. 2004. Movements of Glaucous Gull Trapped at the Barrow Landfill. Results from a 2003 Pilot Study. Troy Ecological Research Associates, Anchorage, Alaska.

U.S. Fish and Wildlife Service, 2006. Beringian Seabird Colony Catalog -- computer database and Colony Status Record archives. U.S. Fish and Wildlife Service, Migratory Bird Management, Anchorage, Alaska.

Asian H5N1 ranking criteria for Glaucous Gull, *Larus hyperboreus*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 2 | 1 | 2.5 | 3 | 3 | 11.5 |
| Estimate 20% winters in Asia | No known use of AI-infected areas | Estuaries and adjacent terrestrial areas; garbage disposal sites | Approximately 100,000 | Easily obtainable at garbage disposal sites; locations of breeding colonies known | |



## Taxon: Gyrfalcon (*Falco rusticolus*)

**Justification:** Gyrfalcons are an appropriate surveillance species for Asian H5N1 because of documented migration between Alaska and Asia and because Gyrfalcons consume large numbers of avian prey, including at least three (and potentially all) high priority surveillance species Eastern Yellow Wagtail (*Moticilla tschutschensis*), Gray-cheeked Thrush (*Catharus minimus*), and Northern Wheatear (*Oenanthe oenanthe*), as well as many species of waterfowl, shorebirds, and seabirds. Gyrfalcons functionally "sample" bird communities in Asia (including domestic fowl) and in North America by preferentially depredating vulnerable prey such as diseased birds. Therefore, a viral sample from one Gyrfalcon functionally represents the viral status of all the birds it has consumed, greatly increasing the breadth and effectiveness of Asian H5N1 surveillance sampling. The Gyrfalcon's Asian migration, avian diet, and propensity to prey on weakened birds predispose the species to early infection, making it a valuable, early bioindicator of Asian H5N1 in Alaska's bird communities.

**Background:** Alaska's Gyrfalcons range widely during the non-breeding season and serve as a potential inter-continental avian influenza vector. Telemetry and banding data document movements between Alaska (Seward Peninsula) and East Russia, the Kamchatka Peninsula, and the Sea of Okhotsk (McIntyre et al. 1994, Kessel 1989) where they may contract Asian H5N1 by eating wild or domestic birds. Half of all birds harnessed with transmitters on the Seward Peninsula wintered in Asia (McIntyre et al. 1994). Additionally, the Yukon-Kuskokwim Delta (YKD) coastline is a massive staging area for many bird species including Asian migrants and represents a potential Asian H5N1 transmission hotspot. Transmittered Gyrfalcons from breeding areas on the YKD spent the fall and early winter in these areas (P. Schempf, unpubl. data), probably feeding on staging birds. The YKD and Seward Peninsula also support high breeding concentrations of the other five priority surveillance bird species, waterfowl, and other bird species that could infect Gyrfalcons. Hence, breeding Gyrfalcons in both study areas are exposed to numerous potential Asian H5N1 transmission pathways during breeding and non-breeding seasons in both Asia and Alaska and, therefore, are appropriate for Asian H5N1 surveillance. Additionally, a recently discovered Saker Falcon (*Falco cherrug*) in Saudi Arabia and Peregrine Falcon (*Falco peregrinus*) in Hong Kong died from Asian H5N1, confirming that falcons are susceptible to the disease.

The YKD and Seward Peninsula contain numerous known historical nest sites marked with GPS locations and annually support 30 and 35 occupied nests, respectively (B. McCaffery and P. Bente, unpubl. data). Collectively, this represents 22% of the approximately 300 known nests in Alaska. Gyrfalcons are regularly surveyed in few other locations in the state (notably the Colville River and Denali National Park). The YKD and Seward Peninsula are the only locations where all six high priority terrestrial bird species regularly occur, with some priority sea birds also present. Additionally, cooperation with the current Gyrfalcon research project on the YKD and use of personnel familiar with both locations will maximize samples collected and make efficient use of shared logistics. Hence, the YKD and the Seward Peninsula are the best locations to sample Gyrfalcons as a bioindicator of Asian H5N1 in terms of likelihood of detection, proximity to concentrations of known Asian migrants, ease of collecting samples, and proportion of Alaska Gyrfalcon nests sampled.

Though considered a ptarmigan (*Lagopus*) specialist, Gyrfalcons regularly consume a wide diversity of avian prey including passerines, waterfowl, seabirds, and shorebirds, sometimes in large numbers (Cade 1960, Nielsen and Cade 1990, Booms and Fuller 2003). Gyrfalcons nesting close to the coast consume more waterfowl than inland breeders; diet in the Askinuk Mountains consisted of 31% waterfowl, 29% shorebirds, 24% ptarmigan, and 16% passerines by number (White and Springer 1965). Birds infected with Asian H5N1 are predisposed to Gyrfalcon predation because their symptomatic weak flight, shakiness, and stupor make them more vulnerable prey than healthy birds. Therefore, sampling Gyrfalcons would extend surveillance for Asian H5N1 to all prey species consumed in a logistically and economically efficient fashion.

There has been some concern about maternal antibodies (immunoglobulins) in nestlings preventing Asian H5N1 infection for 3-4 weeks after hatch. This is only possible if the adult female was previously infected, survived, and had circulating antibodies present when producing an egg. Avian influenza antibody presence in wild birds is exceedingly low (less than 5%) and is likely rare in falcons (Rex Sohn, Wildlife Disease Specialist, National Wildlife Health Center (NWHC), pers. com). Only a small fraction of Gyrfalcon nestlings, if any, may contain maternal antibodies that could prevent an influenza infection. Also, any nestlings that may have antibodies should quickly lose them 21-28 days after hatch (Rex Sohn, pers. com). Therefore, the probability of encountering a nestling with maternal antibodies that prevented an Asian H5N1 infection is exceptionally small. However, we will collect samples from nestling between 30 and 40 days old to maximize the likelihood of detecting Asian H5N1 regardless of antibody status. Sampling after day 40 is not possible because nestlings may prematurely fledge if disturbed. Last, we will also document prevalence of maternal antibodies in nestling blood samples to guide timing and allocation of future sampling efforts.

We will collect swab samples from any adult Gyrfalcons captured as part of the Yukon Delta NWR Gyrfalcon Project. However, attempting to capture adults specifically for surveillance sampling is unwise because adults are difficult to trap. Hence, we will focus sampling efforts on swabs from nestlings and feces from adult perches. Influenza survival in feces exposed to the environment varies between 35 days at 4°C and 6 days at 31° C (World Health Organization); hence, some feces at frequently used perches should be recent enough to yield viable viruses.

**Ranking score:** 8.5

**Methods:** We can safely rappel into and collect samples from an average of 3-4 nests per day based on previous field experience at these sites and including additional time to follow NWHC safety precautions while climbing and working. This equates to 9 days of helicopter flights in both locations. All nestlings will be banded with a USFWS metal band and alpha-numeric color band to support current ongoing Gyrfalcon research by the PI's. We will also collect fecal samples from perches frequented by adults to survey for Asian H5N1 in adults. Personnel will follow NWHC protocols to protect themselves from Asian H5N1 and to collect, store, and ship samples.

Yukon Delta NWR - The draft gyrfalcon AI sampling plan was based on the assumption that Yukon Delta NWR would have funding to operate and staff a gyrfalcon study site as in the last 2 years. We received our final budget on Monday, 13 February, and found that there is not sufficient funding to cover this project. Thus, the refuge is unable to support the crew and the

field camp as originally anticipated. The budget being submitted will reflect the additional support needed to facilitate AI sampling on the refuge.

*Access*: R44 helicopter to survey historical nest cliffs and locate occupied nests.

*No. of Samples:* 135 total, including 75 nestlings (estimating 2.5 nestlings/nest = 25 nestlings from 10 nests in each of the three study areas) and up to 60 adults.

*Sampling timeframe*: June 26 – July 4 (when nestlings are 30-40 days old)

*Sample Types:*

A) Cloacal and tracheal swabs from nestlings as recommended by NWHC and J. Runstadler, University of Alaska Fairbanks (pers. com.).

B) Fecal samples collected from perches representing up to 60 adults.

C) 1.0 cc blood from each nestling to screen for maternal antibodies and to analyze for genetics to support Yukon Delta NWR Gyrfalcon research goals.

Seward Peninsula Study Area - Gyrfalcon phenology on the Seward Peninsula is approximately 10 days later than the YKD (Peter Bente, pers. com). Peter Bente will have conducted an occupancy survey of the study area north of Nome in mid-June as part of his annual monitoring effort; occupied Gyrfalcon nests will be identified at that time and revisited for Asian H5N1 surveillance sampling in July. Samples will be collected by T. Booms and P. Bente following methods outline above.

*Access*: R44 helicopter to predetermined occupied nest sites.

*No. of Samples*: 157 total, including 87 nestlings (estimating 2.5 nestlings/nest from 35 nests) and fecal samples representing up to 70 adults.

*Sampling timeframe*: July 10-18 (when nestlings are 30-40 days old)

**Principle Investigators:**

U.S. Fish and Wildlife Service
- Office of Migratory Birds
  - *Contact:* Phil Schempf
- Yukon Delta NWR
  - *Contact:* Brian McCaffery, Fred Broerman

Alaska Department of Fish and Game
- *Contact:* Peter Bente

University of Alaska – Fairbanks
- *Contact:* Travis Booms

University of Wisconsin - Stevens Point
- *Contact:* Josh Spice

**Literature Cited:**

Booms, T., and M. Fuller. 2003. Gyrfalcon diet in Central West Greenland during the nesting period. Condor 105:528-537.

Cade, T. 1960. The ecology of the Peregrine and Gyrfalcon populations in Alaska. Univ. California Publications in Zoology 63:151-290.

Clum, N. J. and T. J. Cade. 1994. Gyrfalcon (*Falco rusticolus*). *In* The Birds of North America, No. 114 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Kessel, B. 1989. Birds of the Seward Peninsula, Alaska. University of Alaska Press, Fairbanks, Alaska.

McIntyre, C., L. Adams, and R. Ambrose. 1994. Using satellite telemetry to monitor movements of Gyrfalcons in northern Alaska and the Russian Far East. Journal of Raptor Research 28:61.
Nielsen, O. and T. Cade. 1990. Seasonal changes of food habits of Gyrfalcons in NE Iceland. Ornis Scandinavica 21:202-211.
White, C. and H. Springer. 1965. Notes on the Gyrfalcon in western coastal Alaska. Auk 82:104-105.

Asian H5N1 ranking criteria for Gyrfalcon, *Falco rusticolus*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 1 | 1 | 3.5 | 1 | 2 | 8.5 |
| 15% of birds breeding in Alaska winter in w. Russia | No known use of AI-infected areas | Terrestrial. Open areas where prey (birds) are concentrated such as wetlands, lakes, or agricultural areas. Will take domestic fowl. | Approximately 1,500 | Approximately 300 nest locations known. Could collect feces from adults or nestlings at nest sites | |

## Taxon: Eastern Yellow Wagtail (*Motacilla tschutschensis*)

**Justification:** The Eastern Yellow Wagtail is the highest ranking bird for early detection of the Asian H5N1 virus in North America. It overwinters in the epicenter of Asian H5N1 outbreaks in southeast Asia and Indonesia where it uses open areas with water, is often associated with agriculture and domestic animals, and congregates into flocks of thousands of birds at evening roots. Eastern Yellow Wagtails are thus likely to become infected with Asian H5N1 through direct contact with both wild and domestic birds in Asia and carry it to Alaska where an estimated 1,400,000 individuals of the species breeds.

**Background:** In Alaska, the Eastern Yellow Wagtail is a common breeder on the coastal uplands of western Alaska and the northern foothills of the Brooks Range where they co-occur with other Paleotropic migrants that rank high for surveillance of Asian H5N1, most notably Bluethroat (*Luscinia svecica*) and Northern Wheatear (*Oenanthe oenanthe*). One location with high densities and a successful history of capture work on Eastern Yellow Wagtail, Bluethroat, and Northern Wheatear is Cape Romanzof in the Askinuk Mountains. Moore (2000) monitored at this site an average of 26 nesting pairs of Eastern Yellow Wagtails annually from 1996–1999 and captured and banded most nesting adults in 1997 and 1998. Also, McCaffery et al. (1998) captured 43 juvenile Eastern Yellow Wagtails that were staging during fall migration in the same area in 1997. Each of these studies was conducted with a crew of 3–4 people. Thus two crews of four people could capture a total of 100 adults and 100 juveniles of Eastern Yellow Wagtail in the Askinuk Mountains to contribute to surveillance of Asian H5N1 in North America in 2006. Based on past work at the site (McCaffery et al. 1998, Guzy and McCaffery 2002), up to 50 adult and 60 juvenile Bluethroats and 30 adult and 30 juvenile Northern Wheatears could be captured incidental to the work on Eastern Yellow Wagtails in 2006 at little to no additional cost in field sampling.

**Ranking score:** 17.5

**Methods:** We will capture a target sample of Eastern Yellow Wagtails at the western- and eastern-most ends of the Askinuk Mountains at Cape Romanzof and Kawialik Lake, respectively. The emphasis of this study will be on Eastern Yellow Wagtail due to high breeding densities of this species in the area (Moore 2000); however, both Bluethroats and Northern Wheatears will be captured and sampled incidentally to work on wagtails. One field crew of four will be stationed at Cape Romanzof Long Range Radar Site and work out of the residential facilities there. A second field crew of four will be stationed at a remote field camp at Kawialik Lake, part of the Yukon Delta NWR. We will conduct field work beginning on about 21 May, as wagtails arrive on breeding territories, through 15 August, near the end of the autumn migration of wagtails through the Askinuk Mountains (McCaffery et al. 1998). Capture efforts will be directed towards two separate periods of the wagtails' annual cycle, nesting and fall migration which will sample adults and juveniles, respectively.

During the nesting season, which lasts from late May to mid-July, we will search for territorial wagtails and follow them back to their nests at both Cape Romanzof and Kawialik Lake. We will temporarily position 2–3 mist nets around each nest to capture both adult male and female wagtails visiting the nest to incubate eggs or feed young. During fall migration, which lasts from mid-July to mid-August, we will work solely out of Cape Romanzof and operate two mist-net

arrays of 15 mist nets each at the mouths of Nilumat and South creeks. These are locations where staging wagtails have been previously captured during fall migration (McCaffery et al. 1998). Nets will be operated daily for 8–10 hours beginning at local sunrise. During nesting and migration, all captured wagtails and other target species will be aged, sexed, swabbed for actively shedding avian influenza virus, measured, banded, and released. A 50 µl of blood will be collected from the brachial vein of each bird upon request by the National Wildlife Health Center (NWHC). Additionally, all other non-target species of birds captured in mist nets incidentally to capture of wagtails will be similarly handled and sampled. Personnel will follow the protocols of the NWHC to protect themselves from Asian H5N1 and to collect, store, and ship samples. Cloacal swabs will be sent to the NWHC through Anchorage or Bethel for screening for Asian H5N1. Cloacal swabs from non-target species will be stored by the U.S. Fish and Wildlife Service in Anchorage and will be made available to the NWHC for screening upon request.

To obtain samples representative of wagtails from across the Asian wintering range of this species, sampling should also be conducted at additional sites in Alaska where the species reaches high breeding densities. Thus, work on Eastern Yellow Wagtails using the same methods as in the Askinuk Mountains will be conducted off of the road system on the Seward Peninsula in 2006. Additional surveillance among Eastern Yellow Wagtails will be considered for 2007 at Cape Pierce, Togiak National Wildlife Refuge; Kotzebue Sound; and the northern foothills of the Brooks Range along the Colville River. For the latter of these sites, Eastern Yellow Wagtail, Bluethroat, and Northern Wheatear may be captured incidental to sampling of Arctic Warbler in 2006 (see Arctic Warbler protocol).

*No. of samples*: 100 adult and 100 juvenile Eastern Yellow Wagtails
*Sampling locations*: Askinuk Mountains, Alaska. Cape Romanzof (1st preference) and Kawialik Lake (2nd preference).
*Sampling timeframe*: 21 May–15 August
*Sample demographics*: Adults and juveniles, males and females.
*Methods of capture*: Live capture, release.
*Other targeted species*: Bluethroat; Northern Wheatear; Wilson's Warbler; Savannah and Golden-crowned sparrows; Common and Hoary redpolls.

**Principal Investigators:**

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U.S Geological Survey
Alaska Science Center
*Contact:* Colleen M. Handel
U.S. Air Force.
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**Literature cited:**

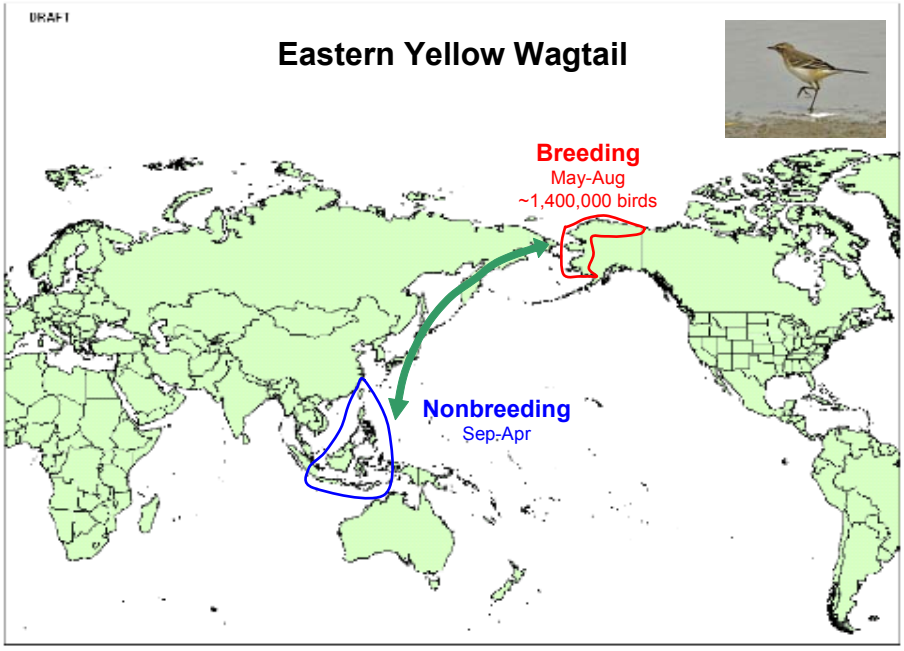
GUZY, M. J., AND B. J. MCCAFFERY. 2002. Bluethroat (*Luscinia sveccica*). *In* The Birds of North America, No. 670 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

MCCAFFERY, B.J., C.M. HARWOOD, AND H. MOORE. 1998. Results of the 1997 avifaunal inventory, Cape Romanzof Long Range Radar Site, Alaska. Final report for Department of Defense Legacy project 97611CES001. Prepared for U.S. Air Force, 611th Air Support Group, Civil Engineer Squadron/Environmental Flight, Elmendorf Air Force Base, Alaska. U.S. Fish and Wildlife Service Report, Bethel, Alaska.

MOORE, H. 2000. Nesting biology and population ecology of Yellow Wagtails breeding at Cape Romanzof, Alaska. Thesis. Cornell University, New York.

Asian H5N1 ranking criteria for Eastern Yellow Wagtail, *Motacilla tschutschensis*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 5 | 2 | 3.5 | 4 | 3 | 17.5 |
| Winters in Taiwan, Indonesia, Sunda Isles, and Moluccas | s.e. Asia and Indonesia | Terrestrial. Open areas with water, sugarcane fields, rice fields, sparse grasslands, cassava plots; usually in assoc. with wild and domestic grazing mammals | Approximately 1,400,000 | Breeding concentrations identified. Easy to capture during breeding and migration | |



## Taxon: Arctic Warbler (*Phylloscopus borealis kennicotti*)

**Justification:** The Alaska subspecies of Arctic Warbler is the second highest ranking bird for early detection of the Asian H5N1 virus in North America. It overwinters in the epicenter of Asian H5N1 outbreaks in southeast Asia and Indonesia, where it is abundant in shrub and forest habitats around farms and homes. Arctic Warblers are thus likely to become infected with Asian H5N1 through direct contact with both wild and domestic birds in Asia and carry it to Alaska where the entire subspecific population of 2,700,000 birds breeds.

**Background:** In Alaska, the Arctic Warbler is one of the most abundant birds in shrub habitats on the Seward Peninsula, northern Bristol Bay, and central Alaska and central Brooks ranges. Areas used by Arctic Warblers on the Seward Peninsula and central Brooks Range also have some of the highest breeding densities of Eastern Yellow Wagtails (*Moticilla tschutschensis*), Bluethroats (*Luscinia svecica*), and Northern Wheatear (*Oenanthe oenanthe*), all of which are among the highest ranking species for detection of Asian H5N1 in North America. Thus several priority species could be sampled incidental to work focused on Arctic Warblers. Furthermore, the shrub habitat used by Arctic Warblers support some of the highest densities and greatest numbers of species of breeding passerines in the state. Thus, the potential is high for the spread of Asian H5N1 from infected Arctic Warblers to co-occurring breeding bird species that migrate through the Americas, such as Gray-cheeked Thrush (*Catharus minimus*), another high ranking species for detection of Asian H5N1 that reaches its highest breeding densities in these habitats.

Where abundant, both adult and juvenile Arctic Warblers have been commonly captured and banded in mist-netting efforts aimed at estimating annual survival and productivity in Alaska. For example, from 1992–2001 a mist-netting station run in Denali National Park and Preserve (Denali NPP) as part of the Monitoring Avian Productivity and Survivorship program (MAPS) captured an average of approximately 27 adult and 12 juvenile Arctic Warblers per year. Similarly, a recent study of Arctic Warblers in the central Alaska Range by the Alaska Bird Observatory captured 40 adults in 2005. Thus, a crew of 2 technicians operating five MAPS stations placed in appropriate habitats could capture approximately 140 adult and 60 juvenile Arctic Warblers during a single breeding season in a single geographic area (e.g., Denali NPP). Multiplying this effort across five road-accessible areas with high densities of breeding Arctic Warblers (Dillingham, Nome, Denali NPP, Denali Highway, and c. Brooks Range), five crews could capture in a single breeding season approximately 700 adult and 300 juvenile Arctic Warblers for sampling of actively shedding Asian H5N1.

Such sampling would not only provide 95% power of detecting Asian H5N1 in approximately 1.5% of the population of adults and juvenile Arctic Warblers for each geographic area, but also ensure robust sampling of adults returning from throughout the species wintering range in southeast Asian and Indonesia. Furthermore, incidental capture of Gray-cheeked Thrushes, Eastern Yellow Wagtails, Bluethroats, and Northern Wheatear would help achieve sampling goals for early detection of Asian H5N1 for these species in Alaska. Incidental captures of Gray-cheeked Thrush in particular would likely result in sampling of $\geq 200$ breeding adults and juveniles at no additional costs in sampling.

**Ranking score:** 17

**Methods:** We will capture a target sample of 140 adult and 70 juvenile Arctic Warblers at each of five road-accessible areas where the species reaches its highest breeding densities in Alaska. This will result in an estimated 700 adults and 300 juveniles captured and sampled for actively shedding Asian H5N1 in 2006. Geographic areas for sampling will include, in order of preference Denali Highway, Denali NPP, Nome, Dillingham, and central Brook Range. In each geographic area one crew of 2–3 people will operate five stations, each with 15 mist nests distributed in appropriate habitats over a 10-ha area, from 10 June–8 August 2006. Following the protocols of the MAPS program, mist nests at each station will be open for 6 h starting at 0500 (or local sunrise if later) during one day for each of six consecutive 10-d periods. All captured Arctic Warblers will be aged, sexed, swabbed for actively shedding avian influenza virus, measured, banded, and released. Additionally, all other species of birds captured in mist nets incidentally to capture of Arctic Warblers will be similarly handled and sampled. Personnel will follow the protocols of the National Wildlife Health Center (NWHC) to protect themselves from Asian H5N1 and to collect, store, and ship samples. Cloacal swabs from Arctic Warblers and other target species captured incidentally to work on Arctic Warblers will be sent directly to the NWHC for screening for Asian H5N1. Cloacal swabs from non-target species will be stored by the U.S. Fish and Wildlife Service in Anchorage and will be made available to the NWHC for screening upon request. This work will be coordinated with other capture work on Eastern Yellow Wagtail, Bluethroat, and Northern Wheatear in the Askinuk Mountains, Alaska.

*No. of samples:* 700 adults, 300 juveniles
*Sampling locations:* Denali NPP, Denali Highway, Nome, Dillingham, central Brooks Range
*Sampling timeframe:* 10 June–8 August
*Sample demographics:* Adults and juveniles, males and females
*Methods of capture:* Live capture, release
*Other targeted species:* Eastern Yellow Wagtail; Bluethroat; Northern Wheatear; Gray-cheeked Thrush**;** Swainson's Thrush; Orange-crowned, Blackpoll, and Wilson's warblers; American Tree, Fox, and White-crowned sparrows; Common and Hoary redpolls (target species for surveillance of Asian H5N1 included in bold)

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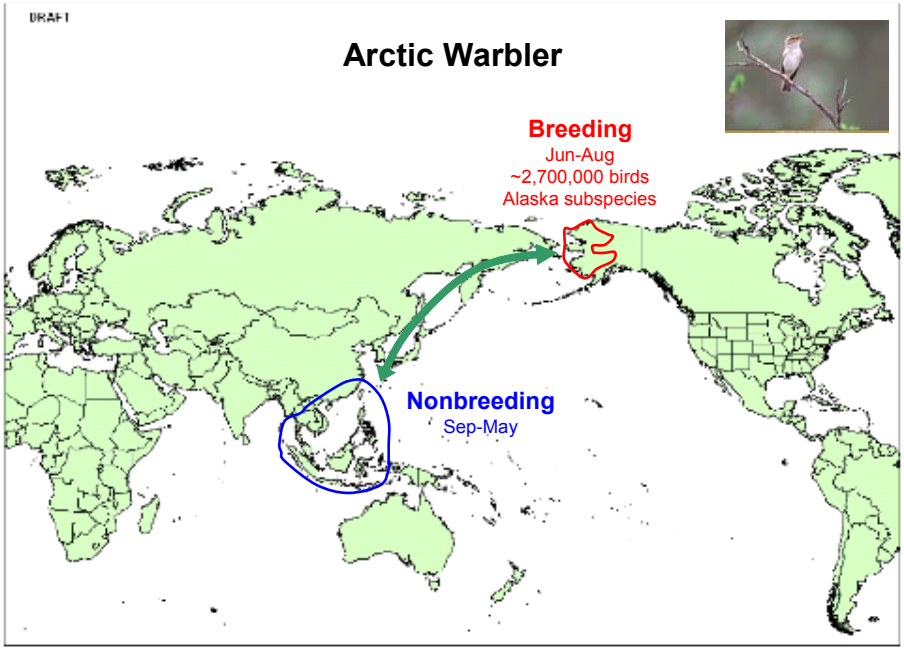
Asian H5N1 ranking criteria for Arctic Warbler, *Phylloscopus borealis kennicotti*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 5 | 2 | 3 | 4 | 3 | 17 |
| Winters in Myanmar, Thailand, Philippines south to Andaman Is, Malay Penin, and Indonesia east to Moluccas | s.e. Asia and Indonesia | Terrestrial. Wooded habitats, cultivated areas, grasslands, gardens, and mangroves | Approximately 2,700,000 | Most abundant breeding bird in many locations. Very easy to capture during breeding and migration. Already capture 30-45 birds per year during breeding | |



## Taxon: Gray-cheeked Thrush (*Catharus minimus*)

**Justification:** The Gray-cheeked thrush has been proposed as a species for early detection of the Asian H5N1 virus in North America. In spring it migrates from wintering areas in South America to breeding sites across the boreal zone of North America. However, approximately 1.2 million birds migrate through Alaska and onto breeding areas in northeastern Siberia where they may become infected with Asian H5N1 through contact with infected birds that wintered in or migrated through areas with outbreaks in Asia. After breeding in Siberia, infected Gray-cheeked Thrushes would then migrate through Alaska thus carrying the virus to North America.

**Background:** In Alaska, the Gray-cheeked Thrush is a common breeder and migrant in shrub habitats throughout Alaska where they co-occur with other Paleotropic migrants that rank high for surveillance of Asian H5N1, most notably Arctic Warbler (*Phylloscopus borealis kennicotti*). Adult and juvenile Gray-cheeked Thrushes are commonly captured in fall mist-netting efforts aimed at monitoring populations of terrestrial birds. For example, a total of approximately 100 individuals are captured annually during fall migration at monitoring stations currently operated in Denali National Park and Preserve (Alaska Natural History Institutes, Alaska Bird Observatory, National Park Service), Fairbanks (Alaska Bird Observatory), and Tok (U.S. Fish and Wildlife Service and Alaska Bird Observatory). Additionally, approximately 60 Gray-cheeked Thrushes were captured during fall migration in Bethel in 2000. Thus with a modest increase in existing effort, approximately 200 individual Gray-cheeked Thrushes could be captured and contribute to early surveillance of Asian H5N1 in North America in 2006.

**Ranking score:** 12

**Methods:** We will capture a target sample of 200 fall staging Gray-cheeked Thrushes across 4 sampling stations in Alaska: Bethel, Denali National Park and Preserve, Fairbanks, and Tok. Stations in Denali, Fairbanks, and Tok will already be operated as part of ongoing monitoring programs. However, the re-establishment of previous migration monitoring stations in Bethel and an expanded effort in Denali will be needed to reach the target sample of 200 birds in 2006. An unknown proportion of these birds will have bred or been born in Siberia in 2006. At each station, birds will be captured from 20 July–30 September in arrays of 10–30 mist nets. Mist nets will be operated daily for a minimum of 6 hours, generally starting at sunrise; however, nets will be closed during periods of inclement weather. All captured Gray-cheeked Thrushes and Arctic Warblers will be will be aged, sexed, swabbed for actively shedding avian influenza virus, measured, banded, and released. Additionally, all other non-target species of birds captured in mist nets incidentally to work on Gray-cheeked Thrushes will be similarly handled; however, samples of fresh feces will be collected for virus screening rather than cloacal swabs. This will save considerable time when processing large numbers of birds at these stations. Personnel will follow the protocols of the National Wildlife Health Center (NWHC) to protect themselves from Asian H5N1 and to collect, store, and ship samples. Cloacal swabs will be sent to the NWHC for screening for Asian H5N1. Feces from non-target species will be stored by the U.S. Fish and Wildlife Service in Anchorage and will be made available to the NWHC for screening upon request. This work will be coordinated with other surveillance sampling of Gray-cheeked Thrushes and Arctic Warblers in Alaska.

*No. of samples*: 200 Gray-cheeked Thrushes (mixed adults and juveniles).
*Sampling locations*: Bethel, Denali, Fairbanks, Tok. Preference of sampling is 1) existing stations, 2) one new station in Bethel, 3) one new station in Denali, 4) second new station in Bethel.
*Sampling timeframe*: 20 July–30 September.
*Sample demographics:* Adults and juveniles, males and females.
*Methods of capture:* Live capture.
*Other targeted species*: Alder Flycatcher; Black-capped and Boreal chickadees; Arctic Warbler; Ruby-crowned Kinglet; Hermit, Swainson's, and Varied thrushes; American Robin; Orange-crowned, Yellow-rumped, Blackpoll Yellow, and Wilson's warblers; Northern Waterthrush; American tree, Savannah, Lincoln's, Fox, and White-crowned sparrows; Dark-eyed Junco; Rusty Blackbird; Common and Hoary redpolls.

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Asian H5N1 ranking criteria for Gray-cheeked Thrush, *Catharus minimus*.

| Total or partial contact with Asia[1] | Contact with known "hot spot"[2] | Habitat used in Asia[3] | Pop. in Alaska[4] | Can samples be obtained?[5] | Score |
|---|---|---|---|---|---|
| 1 | 1 | 3 | 4 | 3 | 12 |
| 20% of birds in Alaska migrate through the state and breed in eastern Siberia | No known use of AI-infected areas | Terrestrial. Shrubs often in riparian habitats | Approximately 5,000,000 | Most abundant breeding bird in many locations. Very easy to capture during breeding and migration. Already capture 100 birds per year at fall banding stations | |