SAMPLING FOR HIGHLY PATHOGENIC ASIAN H5NI AVIAN INFLUENZA IN MIGRATORY BIRDS IN ALASKA

Results of 2009 Field Season

U.S. Fish and Wildlife Service, Region 7 (Alaska)
U.S. Geological Survey, Alaska Science Center
U.S. Geological Survey, National Wildlife Health Center

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Executive Summary

One of the primary objectives of the Department of the Interior (DOI) in the *National Strategy for Pandemic Influenza* is to conduct surveillance activities for the early detection of Highly Pathogenic Avian Influenza (HPAI) in North America by sampling and testing high priority migratory bird species. This report summarizes the HPAI surveillance activities 2009 accomplishments of the U.S. Fish and Wildlife Service – Region 7, the U.S. Geological Survey (USGS) – Alaska Science Center (ASC) and the National Wildlife Health Center (NWHC), and our partners, for activities conducted in Alaska.

In 2005, a U.S. Interagency Strategic Plan was developed to sample wild bird species in North America that have the highest risk of being exposed to or infected with HPAI; specifically those birds that migrate directly between Asia and North America. One main geographic focus of this plan is Alaska as it represents a unique crossroads where migratory flyways from Asia and North America overlap. Since then, Koehler et al. (2008) reported a direct link in the genetic lineage of avian influenza viruses between Alaska and Asia. By analyzing the whole genome of low pathogenic avian influenza viruses isolated from Northern pintails in Alaska, researchers demonstrated intercontinental virus exchange in this species.

Using criteria in the U.S. Interagency Strategic Plan (for details on ranking criteria, species selection, and the final ranking scores visit [http://alaska.usgs.gov/science/biology/avian_influenza/monitoring.html]), an interagency committee developed a suite of high priority species which have been sampled during the spring subsistence and fall harvest, through a live bird sampling strategy, and from mortality investigations. As the program has evolved and data analyzed from previous years (Ip et al. 2008; Koehler et al. 2008; Flint et al. 2009; Pearce et al. 2009; Pearce et al. 2010), a sampling strategy has been adapted to target species and geographic areas that provide the broadest, most appropriate state-wide coverage for HPAI surveillance. In 2008, six "species of concern" were added based on published reports of low pathogenic avian influenza viruses in Green-winged Teal, Greater White-fronted Goose, Mallard, Northern Shoveler, Common Murre, and Thick-billed Murre.

In 2006, 2007, and 2008 16,807, 8,671, and 11,595 Alaska samples, respectively were analyzed for HPAI: the results of these efforts can be found at http://alaska.usgs.gov/science/biology/avian influenza/monitoring. In 2009, 10,129 samples were collected from 77 species of wild birds (Table iia): this total comprised 4,599 samples from hunter harvested birds, and 5,530 live bird samples. In addition, Alaska did not have any large mortality events but 24 individual birds found dead were evaluated, 22 at NWHC and 2 at the Alaska Environmental Health Laboratory.

Oral-pharyngeal (OP) and cloacal (CL) swabs were collected from each bird and preserved separately in the field. Collected samples were stored in liquid nitrogen vapor shippers or in -80 freezers until being shipped to the NWHC for testing. Samples were screened via RT-PCR for the presence of avian influenza viruses: pooled results represent laboratory combined oral-pharyngeal and cloacal swabs from each bird. Cloacal swabs were also analyzed independently. All positive samples from the screening test, as well as a subset of negative samples (30% of the total sample size) were further tested using virus isolation techniques.

In 2009, avian influenza viruses were detected in 16 of the species collected, although none of the samples were positive for HPAI. Analysis of the different matrices (laboratory pooled vs cloacal only) yielded slightly different results with 0.027% and 0.024% of the pooled and cloacal samples testing positive for avian influenza viruses, respectively. Results from the 2007, 2008, and 2009 virus isolation analyses when complete are available through the NWHC.

Table iia: Summary of 2009 results from the Department of the Interior's Highly Pathogenic Avian Influenza (HPAI) Surveillance Program in Alaska. Samples were analyzed via RT-PCR for the presence of avian influenza viruses: pooled results represented analysis of a combined oral-pharyngeal swab and a cloacal swab sample. Cloacal (CL) swabs were also analyzed independently.

Species	**Samples Collected**			**AI Positive**		**Total Prevalence**	
Target Species	Live	Harvest	Total	Pooled	CL only	Pooled	CL only
Steller's Eider	396	0	396	7	8	0.018	0.020
Northern Pintail	1178	167	1345	127	117	0.094	0.087
Lesser Snow Goose	0	454	454	0	1	0	0.002
Emperor Goose	229	16	245	0	1	0	0.004
Spectacled Eider	49	2	51	0	1	0	0.020
Black Brant	144	357	501	0	1	0	0.002
Lesser Sandhill Crane	0	90	90	0	0	0	0
Tundra Swan	516	89	605	7	7	0.011	0.011
Long-tailed Duck	198	28	226	2	2	0.009	0.009
Pacific Common Eider	59	108	167	0	0	0	0
King Eider	0	428	428	1	1	0.002	0.002
Dunlin	666	4	670	0	0	0	0
Sharp-tailed Sandpiper	54	0	54	0	0	0	0
Bar-tailed Godwit	13	17	30	0	0	0	0
Ruddy Turnstone	12	2	14	0	0	0	0
Pectoral Sandpiper	134	13	147	0	0	0	0
Red Knot	5	0	5	0	0	0	0
Long-billed Dowitcher	21	5	26	0	0	0	0
Rock Sandpiper	217	0	217	0	0	0	0
Pacific Golden-Plover	31	1	32	0	0	0	0
Buff-breasted Sandpiper	46	1	47	0	0	0	0
Glaucous Gull	0	16	16	0	0	0	0
Sub Total Target Species	**3,968**	**1,798**	**5,766**	144	139	0.025	0.024
Species of Interest							
Green-winged Teal	450	99	549	82	52	0.149	0.095
Greater White-fronted Goose	478	1105	1583	16	18	0.010	0.011
Mallard	60	122	182	24	25	0.132	0.137
Northern Shoveler	0	36	36	3	3	0.083	0.083
Common Murre	38	162	200	1	1	0.005	0.005
Thick-billed Murre	146	4	150	0	0	0	0
Sub Total Species of Interest	**1,172**	**1,528**	**2,700**	126	99	0.046	0.036
Total Non-target species	390	1,273	1,663	3	3	0	0
*Mortalities			24	NA	NA		
Total	**5,530**	**4,599**	**10,129**	273	241		

*Mortality samples are not included in the Highly Pathogenic Avian Influenza Early Detection Data System (HEDDS) results.

Acknowledgments

We appreciate continuing support for the Highly Pathogenic Avian Influenza Surveillance Program from management in the U.S. Fish and Wildlife Service, and the U.S. Geological Survey. We especially thank all the dedicated biologists and technicians who participated in the 2009 interagency sampling effort of migratory birds. We appreciate the efforts of native subsistence hunters from villages across Alaska who provided hunter shot birds for sampling. Collection of these samples would not have been possible without participation of the Yukon Kuskokwim Health Corporation and Kawerak, Inc. We also thank personnel with the Alaska Department of Fish and Game and sport hunters who provided samples from live and hunter shot waterfowl. In addition, several non-government organizations participated in sampling, and we extend our gratitude to them. We would like thank Lynda Leppert and Cathy Acker at the National Wildlife Health Center for their help with tracking samples and their results. We thank Beth Pattinson and Michelle St. Peters for thier amazing skills with logistics and planning; John Terenzi for his help with creating the species sampling location maps, and Jennifer Wiley and Ely Bair for their assistance in the laboratory. Finally, this year's sampling effort and completion of the report would not have been so thorough without the tireless efforts of Yvette Gillies and Jennifer Wiley.

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

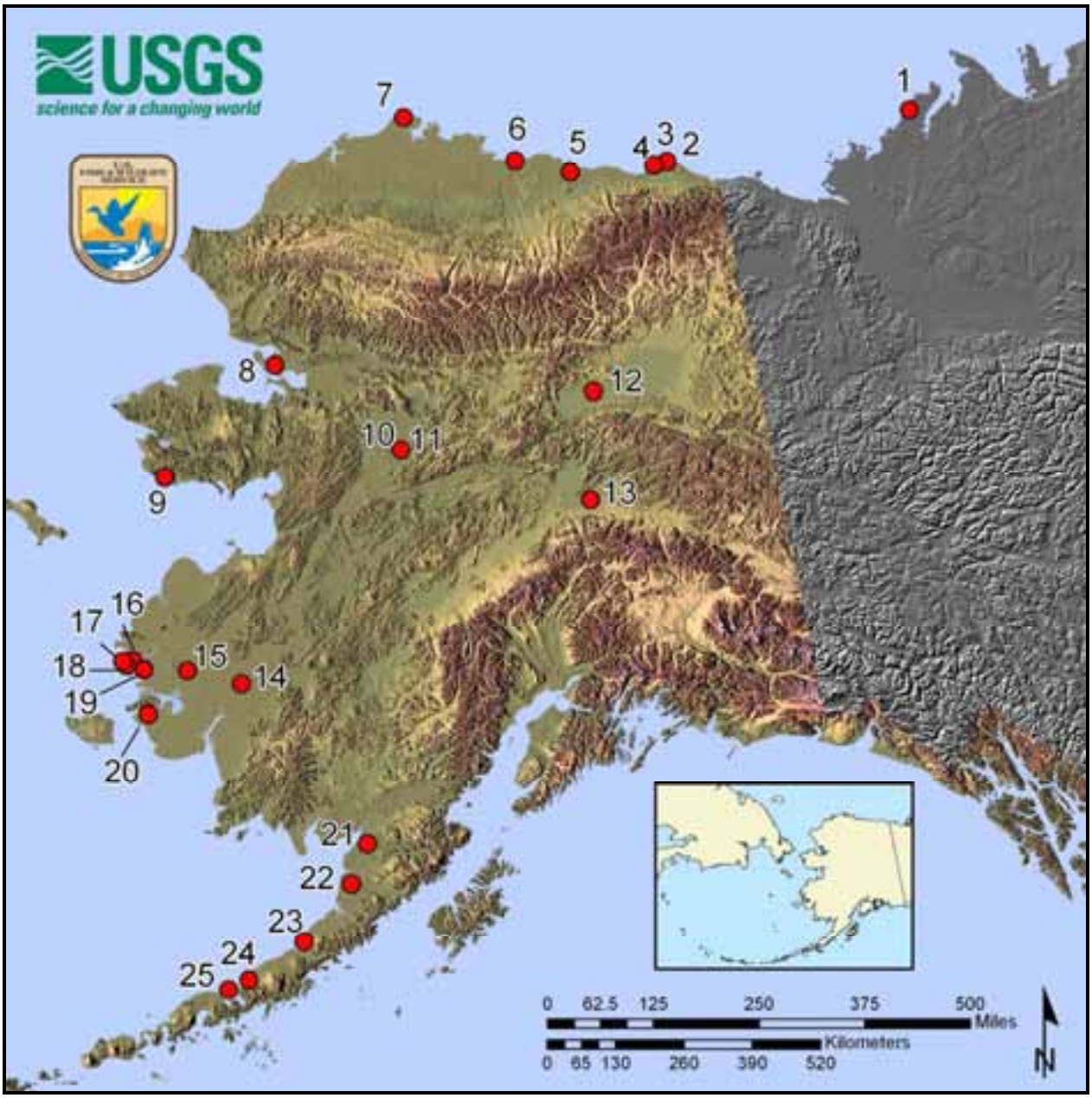
INTRODUCTION

Highly pathogenic avian influenza (HPAI) type A of the subtype H5N1 has spread widely from Southeast Asia into Europe, the Middle East, Africa, China, South Korea, Japan, and Russia (Webster et al. 2006, WHO 2006). Over 60 countries have experienced H5N1 outbreaks, and the virus is now endemic in several Asian countries (http://www.who.int/csr/disease/avian_influenza/en/). Much debate centers on whether HPAI is spread by wild migratory birds, or through movement of domestic poultry and smuggled birds (Chen et al. 2005, Normile 2005, Van Borm et al. 2005, Kilpatrick et al. 2006, Muzaffar et al. 2006). Clearly, this disease occurs in wild birds, but the observed die-offs indicate that wild birds suffered high mortality and thus were not likely efficient carriers (Chen et al. 2005). However, recent data suggest that apparently healthy, wild birds are carriers of HPAI H5N1 (Gilbert et al. 2006), 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 Strait 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 2006). Therefore, in 2006, the Alaska Interagency HPAI Bird Surveillance Working Group developed a sampling protocol for testing migratory birds in Alaska for HPAI (Alaska Interagency HPAI Bird Surveillance Working Group 2006, Ip et al. 2008). Since then, Koehler et al. (2008) have reported a direct link in the genetic lineage of avian influenza viruses between Alaska and Asia. By analyzing the whole genome of low pathogenic avian influenza viruses isolated from Northern pintails in Alaska, these researchers demonstrated inter-continental virus exchange in this species. From 38 isolates, they reported that 44% had at least one gene segment that was more closely related to Asian than North American strains of low pathogenic avian influenza. Conversely, several Asian isolates more closely resembled North American pintail isolates than other Asian viruses. This study and more recent genetic research focused on pintails and shorebirds (Pearce et al. 2009; Flint et al. 2009; Pearce et al. 2010), provides evidence that intercontinental transfer of influenza viruses occur and that Alaska is a plausible route of H5N1 introduction into North America, should the virus arrive via migratory birds.

Here, we report the 2009 results of the HPAI surveillance program of migratory bird species in Alaska by the U.S. Fish and Wildlife Service, U.S. Geological Survey, and their partners. Sampling of live birds occurred throughout the state (Fig. 1, pg. 2) and hunter harvest samples were collected in regions that traditionally participate in spring (Fig. 24, pg. 87) and fall subsistence harvest (Fig. 25, pg. 93). The report is separated into the following sections: introduction, sampling methods, species sampled, number of samples secured within a geographic area, and the avian influenza test results.

Figure 1. Live bird sampling locations for H5N1 Avian Influenza in Alaska, 2009. For information on species samples and specific locations see key following map.



Site #	Species	General location	Specific location
1	Long-tailed Duck	Northwest Territories, Canada	McKinley Bay
2	Pectoral Sandpiper	Arctic NWR	Jago River Delta
2	Dunlin	Arctic NWR	Jago River Delta
3	Buff-breasted Sandpiper	Arctic NWR	Okpilak River Delta
4	Dunlin	Arctic NWR	Arey Island

Site #	Species	General location	Specific location
4	Ruddy Turnstone	Arctic NWR	Arey Island
5	Buff-breasted Sandpiper	North Slope	Prudhoe Bay
5	Dunlin	North Slope	Prudhoe Bay
5	Long-billed Dowitcher	North Slope	Prudhoe Bay
5	Pectoral Sandpiper	North Slope	Prudhoe Bay
6	Tundra Swan	North Slope	Colville River Delta, Miluveach River, Kalubik Creek
7	Buff-breasted Sandpiper	North Slope	Barrow
7	Dunlin	North Slope	Barrow
7	Long-billed Dowitcher	North Slope	Barrow
7	Pectoral Sandpiper	North Slope	Barrow
8	Tundra Swan	Kotzebue Sound	Buckland River, Kobuk Delta, Noatak Delta
9	Pacific Golden-Plover	Seward Peninsula	Nome Region
10	Northern Pintail	Northern Innoko NWR	Northern Innoko NWR, Kaiyuh Flats
11	Northern Pintail	Koyukuk NWR	Koyukuk NWR, Willow Lake
12	Northern Pintail	Yukon Flats NWR	Mallard Lake
13	Northern Pintail	Interior	Minto Flats State Game Refuge, Minto Lakes
14	Tundra Swan	Yukon Delta NWR	Pikmiktalik River, Nunavakpak Lake, Nashak Lake
15	Northern Pintail	Yukon Delta NWR	Kgun Lake
16	Emperor Goose	Yukon Delta NWR	Old Chevak
16	Tundra Swan	Yukon Delta NWR	Old Chevak
16	Black Brant	Yukon Delta NWR	Old Chevak
17	Black Brant	Yukon Delta NWR	Tutakoke
18	Bar-tailed Godwit	Yukon Delta NWR	Punaorat Point
18	Dunlin	Yukon Delta NWR	Punaorat Point
18	Pacific Golden-Plover	Yukon Delta NWR	Punaorat Point
18	Pectoral Sandpiper	Yukon Delta NWR	Punaorat Point
18	Red Knot	Yukon Delta NWR	Punaorat Point
18	Rock Sandpiper	Yukon Delta NWR	Punaorat Point
18	Ruddy Turnstone	Yukon Delta NWR	Punaorat Point
18	Sharp-tailed Sandpiper	Yukon Delta NWR	Punaorat Point
19	Dunlin	Yukon Delta NWR	Manokinak River
19	Emperor Goose	Yukon Delta NWR	Manokinak River
20	Black Brant	Yukon Delta NWR	Kigigak Island
20	Common Eider	Yukon Delta NWR	Kigigak Island

20	Emperor Goose	Yukon Delta NWR	Kigigak Island
20	Spectacled Eider	Yukon Delta NWR	Kigigak Island
Site #	**Species**	**General location**	**Specific location**
21	Tundra Swan	Northern Alaska Peninsula	Naknek River Drainage
22	Tundra Swan	Northern Alaska Peninsula	Bear Lake, Pike Lake
23	Pacific Golden-Plover	Northern Alaska Peninsula	Port Heiden
24	Pacific Golden-Plover	Northern Alaska Peninsula	Lower Big Sandy
25	Steller's Eider	Alaska Peninsula	Nelson Lagoon, Walrus Island

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.

Ranking score: 15

Background: The Pacific population of Steller's Eiders, currently estimated at approximately 80,000 birds, 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 April 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 juvenile birds likely return to Alaska in October.

Important molting areas include Izembek Lagoon and Nelson Lagoon. Molting eiders congregate in large dense flocks, which may facilitate transmission of disease amongst individuals by concentrating birds from a number of different breeding locations into relatively small areas.

More than 390 birds were sampled from Nelson Lagoon (Fig. 2). Final tables with analytical results are presented at the end of this section.

Nelson Lagoon

Steller's Eiders were captured, sampled, and released on Walrus Island in Nelson Lagoon, a shallow bay sheltered by a series of barrier islands about 150 km northeast of Cold Bay, Alaska. There, Steller's Eiders occur as single-species flocks of flightless, molting birds during September and October.

Capture Methods: Boats and equipment were staged out of the remote village of Nelson Lagoon and eider capture operations were based from the village and a remote campsite on Deer Island, approx. 25 km southeast of the village. Flocks of flightless Steller's Eiders were herded onto the beach of barrier islands and into a holding pen using trap nets, motorboats, kayaks and by persons wading in shallow water. All birds were banded with #7A incoloy metal leg bands.

Results: A total of 413 molting Steller's Eiders was captured and banded on Walrus Island during two successful drives. Cloacal and oral-pharyngeal samples were collected from 396 Steller's Eiders (Table 1). Of those, 42 were adult females, 350 were adult males, and four were juvenile males.

AI Results: Of the 396 samples collected from Nelson Lagoon Steller's Eiders, 7 of the pooled samples and 8 of the cloacal samples tested positive for avian influenza. None of the samples were H5 or N1 positive. The pooled samples represent a 1.8% prevalence of avian influenza in the Nelson Lagoon birds. The cloacal samples represent a 2.0% prevalence of avian influenza in the Nelson Lagoon birds.

Table 1. Birds captured and both cloacal and oral-pharyngeal swabs collected from molting Steller's Eiders at Nelson Lagoon, September 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Nelson Lagoon, Walrus Island	413	42	354	395	394	396

Other Accomplishments: Of the 413 captured eiders, sixty-seven were "recaptures" (i.e., birds banded in prior years), all of which were banded in previous years at Nelson Lagoon or Cold Bay. Excessively worn bands were replaced with new bands on 22 of these recaptures; therefore, new bands were placed on a total of 346 eiders. All 2009 data on new and recaptured birds will be added to the important and growing Steller's Eider database for further analyses. Blood samples were collected from 116 Steller's Eider for analysis to determine seroprevalence of avian influenza antibodies.

Table 2. Avian influenza analytical results for Steller's Eiders collected September 2009: pooled cloacal and oral-pharyngeal samples.

Location	Total samples	Total AI Pooled positive	Prevalence
Nelson Lagoon	396	7	0.018

Table 3. Avian influenza analytical results for Steller's Eiders collected September 2009: cloacal only samples.

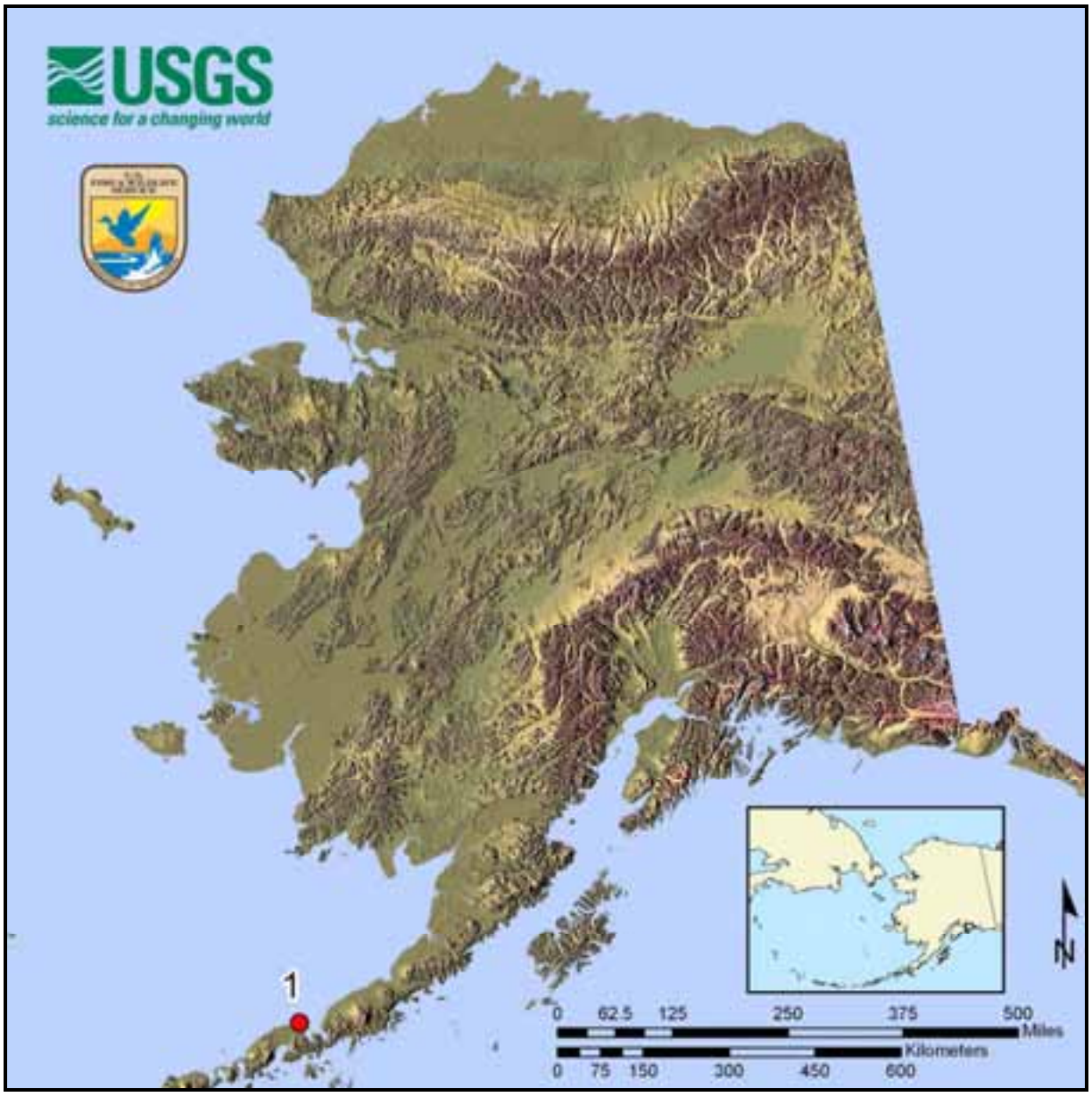
Location	Total samples	Total AI Cloacal positive	Prevalence
Nelson Lagoon	396	8	0.020

Table 4. Comparative avian influenza results for Steller's Eiders collected September 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Total
Negative	Negative	387
Positive	Positive	7
Negative	Positive	1
Positive	Negative	0
Negative	No swab	1
Total samples tested		396

Jeff Wasley, USGS ASC

Figure 2. Live bird sampling locations for Steller's Eiders in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Alaska Peninsula	Nelson Lagoon, Walrus Island	396

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.

Ranking score: 15

Background: Approximately 50% of the North American population of Northern Pintails is counted in Alaska each summer. Birds sampled in western Alaska in spring likely represent small proportions of Asian wintering birds. Pintails, captured in late July and August, likely represent some proportion of North American wintering birds returning from Asia. 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.

Over 1,300 birds were sampled from ten geographic locations around the state using a 2-stage stratified design. Of those, 1,178 were live bird samples (Fig. 3) and 167 were hunter killed (see Spring Subsistence and Fall Harvest chapter). Each location is discussed separately and final tables present analytical results at the end of this section.

Innoko NWR and Koyukuk NWR

Northern Pintails were captured, sampled, and released at Kaiyuh Flats and Willow Lake. Kaiyuh Flats is 35 miles southeast of Nulato on the Northern Unit of Innoko NWR. The Kaiyuh Flats are an extensive network of lakes, sloughs, creeks and rivers on the south side of the Yukon River. Willow Lake is a large, shallow lake approximately eight miles east of the village of Huslia on the Koyukuk NWR. Dulbi Slough originates at the north east end of Willow Lake and runs south ending at the confluence with the Koyukuk River.

Capture Methods: Six rolled traps were pre-baited with cracked corn and barley. The traps were set up and left open at the baited sites to allow the birds to get accustomed to their presence. Once trapping began, a two-person crew with the use of an aluminum canoe checked traps twice a day.

Results: Three hundred one Northern Pintails were captured and banded at Kaiyuh Flats and Willow Lake. Cloacal and oral-pharyngeal samples were collected from 301 Northern Pintails (Table 5). Of those, 30 were adult females, 13 were adult males, 171 were juvenile females, 86 were juvenile males, and 1 undetermined for age and sex.

AI Results: Thirty-six of the 301 pooled and 26 of the cloacal samples collected from Northern Pintails tested positive for avian influenza. These samples were not H5 or N1 positive. The pooled samples represent a 12% prevalence of avian influenza in the Kaiyuh Flats and Willow Lake birds. The cloacal samples represent an 8.6 % prevalence of avian influenza in the Kaiyuh Flats and Willow Lake birds.

Table 5. Birds captured and both cloacal and oral-pharyngeal swabs collected from Northern Pintails at Koyukuk and Northern Innoko National Wildlife Refuges, August 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples		Total AI samples
					CL	OP	
Kaiyuh Flats	199	137	62	0	199	102	199
Willow Lake	102	64	37	1	102	102	102
Total	301	201	99	1	301	301	301

Other Accomplishments: Duck banding was initiated on the Koyukuk NWR at Willow Lake in 1989. This was the third banding project conducted on the Kaiyuh Flats. Most of the birds were banded at all sites. In addition, blood was collected for analysis to determine seroprevalence of avian influenza antibodies.

Yukon Delta NWR

Northern Pintails were captured, sampled, and released at Kgun Lake on the YDNWR.

Capture Methods: Cloverleaf swim-in traps were pre-baited with whole-kernel corn on traditional trapping sites in marshy areas along the northwest shoreline of Kgun Lake.

Results: Nine hundred eighty-eight Northern Pintails were captured and banded at Kgun Lake. Cloacal and oral-pharyngeal samples were collected from 200 Northern Pintails (Table 6). Of those, 41 were adult females, 31 were adult males, 72 were juvenile females, and 56 were juvenile males.

AI Results: Thirty-four of the 200 Northern Pintail pooled samples and 33 of the cloacal samples tested positive for avian influenza. None of the samples were H5 or N1 positive. The pooled samples represent a 17.0 % prevalence of avian influenza in the Kgun Lake birds. The cloacal samples represent a 16.5 % prevalence of avian influenza in the Kgun Lake birds.

Table 6. Birds captured and both cloacal and oral-pharyngeal swabs collected from Northern Pintails at Kgun Lake, August 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Kgun Lake	988	113	87	200	200	200

Other Accomplishments: Since 1990, YDNWR has participated in the Northern Pintail banding program established by the USFWS - Division of Migratory Bird Management. All birds banded at Kgun Lake will continue to provide baseline data for a Pacific Flyway management plan. In addition, blood was collected for analysis to determine seroprevalence of avian influenza antibodies.

Minto Lake area

Minto Flats State Game Refuge has been a long-term banding site for both locally produced and migrant ducks, including pintails. Northern Pintails were captured, sampled and released at Minto Flats State Game Refuge.

Capture Methods*:* Captive female ducks and decoy traps were used to capture pre-nesting waterfowl. Welded wire swim-in traps were deployed and baited with barley and corn at Minto Lakes and Minto Flats. Traps were checked at least twice each day. All captured ducks were classified to species, sex, and age, and banded.

Results: Over 500 birds were captured and banded at Minto Flats State Game Refuge. Cloacal and oral-pharyngeal samples were collected from 544 Northern Pintails (Table 7). Of those, 112 were adult females, 82 were adult males, 185 were juvenile females, 162 were juvenile males, 1 juvenile sex undetermined, 1 female age not provided, and 1 undetermined for age and sex.

AI Results: Thirty-one of the 544 Northern Pintail pooled samples and 33 of the cloacal samples tested positive for avian influenza. None of the samples were H5 or N1 positive. The pooled samples represent a 5.7% prevalence of avian influenza in the Minto Lakes area birds. The cloacal samples represent a 6.1% prevalence of avian influenza in the Minto Lakes area birds.

Table 7. Birds captured and both cloacal and oral-pharyngeal swabs collected from Northern Pintails at Minto Flats State Game Refuge, May, June, and August 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples		Total AI samples
					CL	OP	
Minto Lakes area	544	298	244	2	544	543	544

Other Accomplishments: The Minto Lakes area has been the subject of research on avian influenza ecology and prevalence for over 10 years. The USFWS and Alaska Department of Fish and Game facilitated sampling of ducks by University of Alaska Fairbanks for several research projects. In addition, blood was collected for analysis to determine seroprevalence of avian influenza antibodies.

Yukon Flats NWR

Northern Pintails were captured, sampled and released at Mallard Lake on the Yukon Flats NWR. The camp was located on Mallard Lake which is part of the Long Lake complex of lakes approximately 20 miles southwest of Beaver, Alaska.

Capture Methods*:* Walk-in and swim-in traps were baited with cracked corn and situated on the shorelines of Mallard Lake. Captured birds were fitted with a leg band, sexed, aged, and morphological measurements were taken. The project was terminated early due to heavy smoke and ash in the area from wildfires, which resulted in unhealthy working conditions and prevented resupply of food, water, and cracked corn.

Results: One hundred thirty-three Northern Pintails were captured and banded at Mallard Lake. Cloacal and oral-pharyngeal samples were collected from 133 Northern Pintails (Table 8). Of those, 28 were adult females, 2 were adult males, 70 were juvenile females, and 33 juvenile males.

AI Results: Eight of the 133 Northern Pintail pooled samples and seven of the cloacal samples tested positive for avian influenza. None of the samples were H5 or N1 positive. The pooled samples represent a 6.0 % prevalence of avian influenza in the Mallard Lake birds. The cloacal samples represent a 5.3 % prevalence of avian influenza in the Mallard Lakes birds.

Table 8. Birds captured and both cloacal and oral-pharyngeal swabs collected from Northern Pintails at Mallard Lake, July and August 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Mallard Lake	133	98	35	133	133	133

Table 9. Avian influenza analytical results for Northern Pintails collected May through August 2009: pooled cloacal and oral-pharyngeal samples.

Location	Total samples	Total AI Pooled positive	Prevalence
Northern Innoko NWR	199	34	0.171
Koyukuk NWR	102	2	0.020
Yukon Delta NWR	200	34	0.170
Minto Flats State Game Refuge	544	31	0.057
Yukon Flats NWR	133	8	0.060
Total	1178	109	0.092

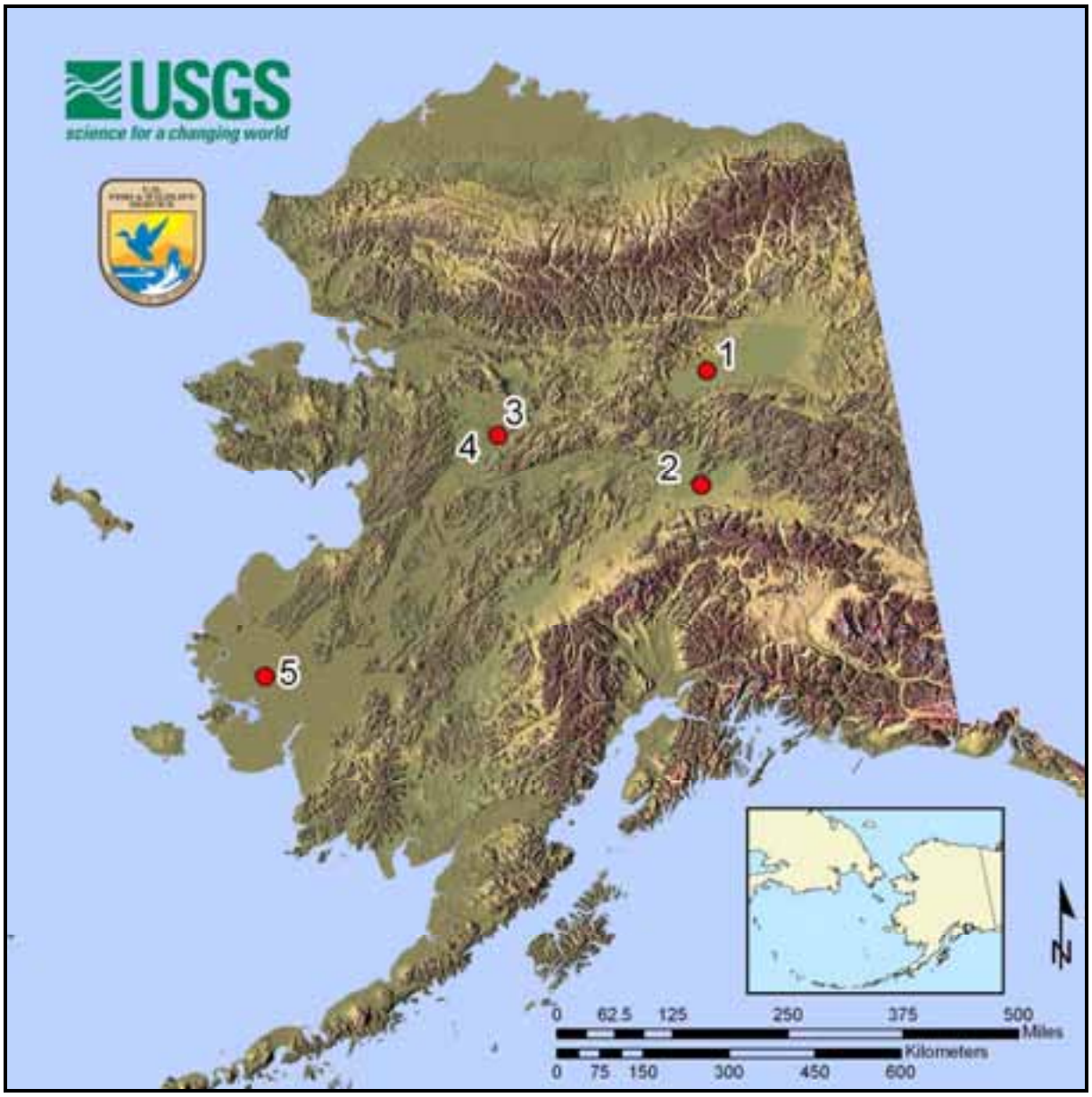
Table 10. Avian influenza analytical results for Northern Pintails collected May through August 2009: cloacal only samples.

Location	Total samples	Total AI Cloacal positive	Prevalence
Northern Innoko NWR	199	24	0.121
Koyukuk NWR	102	2	0.020
Yukon Delta NWR	200	33	0.165
Minto Flats State Game Refuge	544	33	0.061
Yukon Flats NWR	133	7	0.053
Total	1178	99	0.084

Table 11. Comparative avian influenza results for Northern Pintails collected May through August 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	1053
Positive	Positive	83
Negative	Positive	16
Positive	Negative	26
Total samples tested		1178

Figure 3. Live bird sampling locations for Northern Pintails in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Flats NWR	Mallard Lake	133
2	Minto Flats State Game Refuge	Minto Lakes and Minto Flats	544
3	Koyukuk NWR	Willow Lake	102
4	Northern Innoko NWR	Kaiyuh Flats	199
5	Yukon Delta NWR	Kgun Lake	200
	Total		**1178**

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.

Ranking score: 15

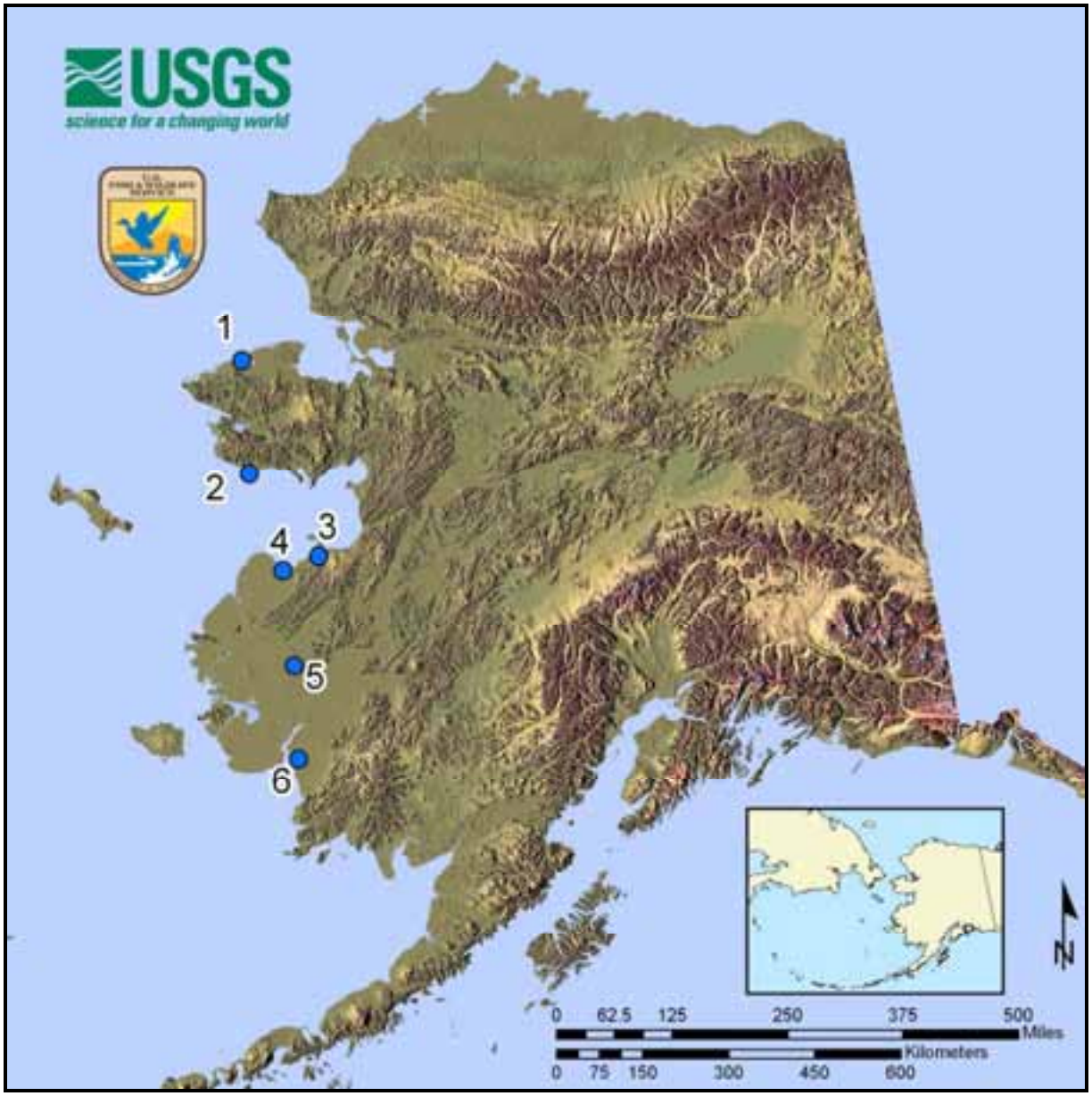
Background: Lesser Snow Geese that nest on Wrangel Island, Russia, migrate through Alaska to wintering areas in British Columbia and California. Wrangel Island Lesser Snow Geese use St. Lawrence Island and the Yukon-Kuskokwim Delta (YKD) in western Alaska as stopover areas during autumn migration (Ely 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. Less than 100 birds are killed annually by sport hunters in southeast Alaska.

Methods: One live capture project focused on Lesser Snow Geese but, due to high predation by bears and foxes, sampling did not occur. Samples were obtained via spring subsistence sampling (Figure 4).

Results: Four hundred fifty-four Lesser Snow Geese samples were collected and analyzed through spring subsistence sampling (see Spring Subsistence chapter).

AI Results: None of the 454 pooled samples collected from Lesser Snow Geese tested positive for avian influenza. One of the cloacal samples tested positive for avian influenza. This represents < 1% prevalence in the spring subsistence birds. These samples were not H5 or N1 positive.

Figure 4. Sampling locations for Lesser Snow Geese in Alaska, 2009. For specific location names see key following map. A total of 454 samples were collected through spring subsistence. Note: No live sampling of this species occurred (spring subsistence = blue dots).



Site #	Geographic Location	Specific Location	Total Samples
1	Seward Peninsula	Shishmaref	14
2	Seward Peninsula	Nome	1
3	Seward Peninsula	Stebbins	268
4	Yukon Delta NWR	Kotlik	168
5	Yukon Delta NWR	Pilot Station	2
6	Yukon Delta NWR	Eek	1
	Total		**454**

Taxon: Emperor Goose (Chen canagica)

Justification: Ninety percent of the world population of Emperor Geese breeds on the Yukon-Kuskokwim Delta.

Ranking score: 13

Background: Most of the global population of Emperor Geese breeds on the outer coast of the Yukon-Kuskokwim Delta (Eisenhauer and Kirkpatrick 1977), with as many as 35,000 nests estimated in some years (Fischer et al. 2005). These geese are not colonial nesters, 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 do not breed, or loose their nest to predation, migrate in early June from the YKD to northern Chukotka in eastern Russia where they molt their flight feathers. The majority of the global population spends spring and fall staging periods on the Alaska Peninsula with Nelson Lagoon having the greatest number. During winter, Emperor Geese are distributed from Kodiak Island to the Commander Islands, Russia, with the majority on the Aleutian Islands (Petersen et al. 1994).

More than 200 birds were sampled from three locations around the state. Of these, 229 were live bird samples (Fig. 5) and 16 were hunter-killed samples (see Spring Subsistence chapter). Each location is discussed separately and final tables present analytical results at the end of this section.

Manokinak River

The lower Manokinak River is a high density nesting area for Emperor Geese on the YKD. Emperor Geese were sampled at the Manokinak River during two stages of the breeding season. Adult females were captured in late June during incubation and adults and goslings of both genders were sampled during brood rearing in early August.

Capture Methods*:* In May and June, Emperor Goose nests were located by systematically searching a ~20 km^2 area on the lower Manokinak River. A subset of nesting females were trapped on nests during late incubation using bow traps.

In August, molting adults and flightless goslings were herded into drive traps at three sites along the lower Manokinak River. Birds were herded into a holding pen on an open mud flat by persons walking in a line through the capture area. Boats were used to keep birds from re-entering the river.

Results: A total of 144 Emperor Geese was captured and banded at Manokinak River. Cloacal and oral-pharyngeal samples were collected from 144 Emperor Geese (Table 12). Of those, 89 were adult females, 32 were adult males, 11 were juvenile females, and 12 were juvenile males.

AI Results: None of the 144 pooled or cloacal samples collected from Manokinak River Emperor Geese tested positive for avian influenza.

Table 12. Birds captured and both cloacal and oral-pharyngeal swabs collected from nesting and molting Emperor Geese at Yukon Delta National Wildlife Refuge, June and August 2009.

Location	Total birds captured	Female	Male	AI Paired samples		Total AI samples
				CL	OP	
Manokinak	144	100	44	144	144	144

Other Accomplishments: Studies of Emperor Geese nesting and brood rearing ecology have been conducted on the lower Manokinak River for more than a decade. Of the 144 captured Emperor Geese all of the 100 adult and juvenile females were banded with stainless steel metal leg bands on one leg and a colored plastic tarsal band with a unique 3-digit alpha numeric code on the other. A total of 145 female Emperor Geese was found incubating nests; of these, 44 were captured and sampled for AI. Thirty adult females were uniquely banded and added to the population of marked birds. All nests were revisited at hatch to mark goslings with webtags. In August, 17 of the molting birds were recaptured individuals (i.e., previously banded); an additional 24 females were given unique tarsal bands. Additionally, feathers and eggshell membranes, and blood were collected from nesting females for stable isotopic analysis and determination of seroprevalence of AI antibodies.

Old Chevak

Emperor Geese were captured, sampled and released in Yukon-Kuskokwim Delta's outer coast, about 20r km SSE of Chevak.

Capture Methods: Brood drives were conducted by biologists and teenage volunteers from the village of Old Chevak. Flocks of flightless Emperor Geese were herded into holding pens by the banding crew walking across the tundra in a coordinated effort. All captured birds were banded with an aluminum leg band.

Results: A total of 35 Emperor Geese was captured and banded during three drives at Old Chevak. Cloacal and oral-pharyngeal samples were collected from 35 Emperor Geese (Table 13). Of those, 15 were adult females, 8 were adult males, 5 were female goslings, 6 were male goslings, and 1 adult was undetermined for sex.

AI Results: None of the 35 pooled or cloacal samples collected from Old Chevak Emperor Geese tested positive for avian influenza.

Table 13. Birds captured and both cloacal and oral-pharyngeal swabs collected from molting Emperor Geese at Yukon Delta National Wildlife Refuge, July and August 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Old Chevak	35	20	14	1	35	35	35

Other Accomplishments: Feathers were collected for stable isotope analysis, and blood was collected for determination for seroprevalence of AI antibodies.

Kigigak Island

Emperor Geese were sampled on Kigigak Island, a high-density nesting location on Yukon Delta NWR.

Capture Methods: Adult female Emperor Geese were captured using a bownet trap and mist nets

Results: A total of 50 Emperor Geese was captured, sampled, and banded at Kigigak Island on the YDNWR. Cloacal and oral-pharyngeal samples were collected from 50 Emperor Geese (Table 14). All were adult females.

AI Results: None of the 50 pooled samples tested positive for avian influenza. One of the cloacal samples collected tested positive for avian influenza. One of the samples was H5 positive. None of the samples were N1 positive. The cloacal sample represents a 2% prevalence of avian influenza in the Kigigak Island birds.

Table 14. Birds captured and both cloacal and oral-pharyngeal swabs collected from nesting Emperor Geese at Yukon Delta National Wildlife Refuge, June 2009.

Location	Total birds captured	AI samples Female	AI samples Male	AI Paired samples CL	AI Paired samples OP	Total AI samples
Kigigak Island	50	50	0	50	50	50

Other Accomplishments: Morphometric measurements and body mass were recorded for all captured individuals.

Table 15. Avian influenza analytical results for Emperor Geese collected May through August 2009: pooled and cloacal only samples.

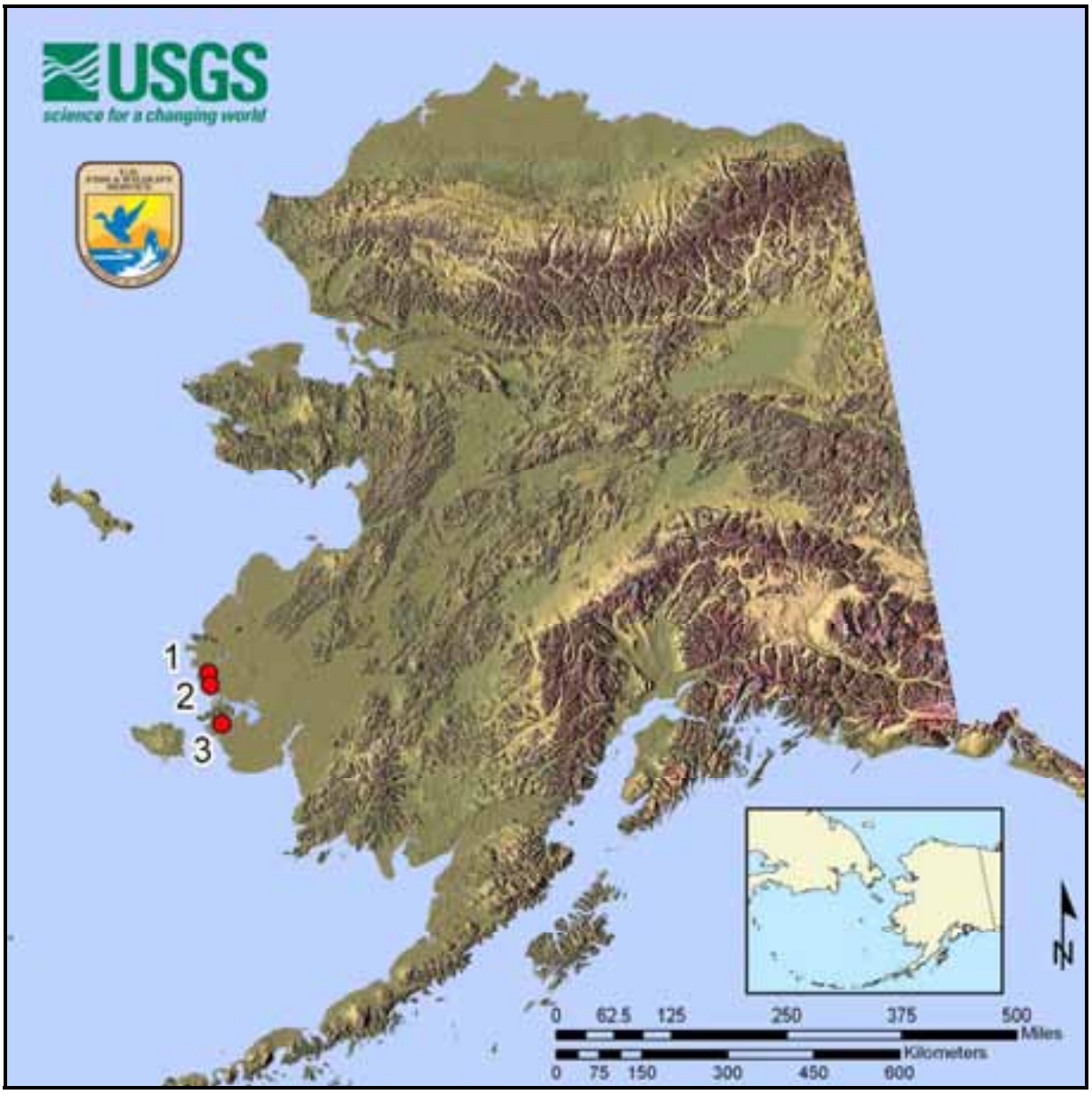
Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Manokinak River	144	0	0	0
Old Chevak	35	0	0	0
Kigigak Island	50	0	1	0.020
Total	229	0	0	0

Table 16. Comparative avian influenza results for Emperor Geese collected May through August 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	228
Positive	Positive	0
Negative	Positive	1
Positive	Negative	0
Total samples tested		229

Patrick Lemons, USGS ASC

Figure 5. Live bird sampling locations for Emperor Geese in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Delta NWR	Old Chevak	35
2	Yukon Delta NWR	Manokinak River	144
3	Yukon Delta NWR	Kigigak Island	50
	Total		**229**

Taxon: Spectacled Eider (Somateria fischeri)

Justification: The vast majorities of Spectacled Eiders breed in East Asia and return to the Bering Sea each fall to over-winter.

Ranking score: 12

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).

Over 50 birds were sampled on the Yukon Delta NWR and St. Lawrence. Of those, 49 were live bird samples (Fig. 6), and two hunter-killed sample (see Spring Subsistence chapter). A final table with analytical results is presented at the end of this section. See discussion below.

Kigigak Island

Spectacled Eiders were captured, banded, and released at Kigigak Island, located along the outer fringe of YDNWR, near the mouth of Baird Inlet. The island is bordered by the Ninglick River and the Bering Sea.

Capture Methods: Bow trap and mist nets were used to capture birds.

Results: Seventy-two Spectacled Eiders were captured and banded at Kigigak Island. Cloacal and oral-pharyngeal samples were collected from 49 Spectacled Eiders (Table 17). Of those, all were adult females.

AI Results: None of the 49 pooled samples tested positive for avian influenza and one of the cloacal samples tested positive. One of the samples tested positive for H5. None were positive for N1. The cloacal sample represents a 2% prevalence of avian influenza in the Kigigak Island Spectacled Eiders.

Table 17. Birds captured and both cloacal and oral-pharyngeal swabs collected from Spectacled Eiders at Yukon Delta National Wildlife Refuge, June 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Kigigak Island	72	49	0	49	49	49

Other Accomplishments: Feathers samples were taken for future DNA and stable isotope analyses. All Spectacled Eider's were marked with a metal leg band and a yellow plastic alphanumeric leg band. Coded nasal disks were also attached. Data will be used in a mark/recapture study to estimate annual survival for Spectacled Eiders in this region.

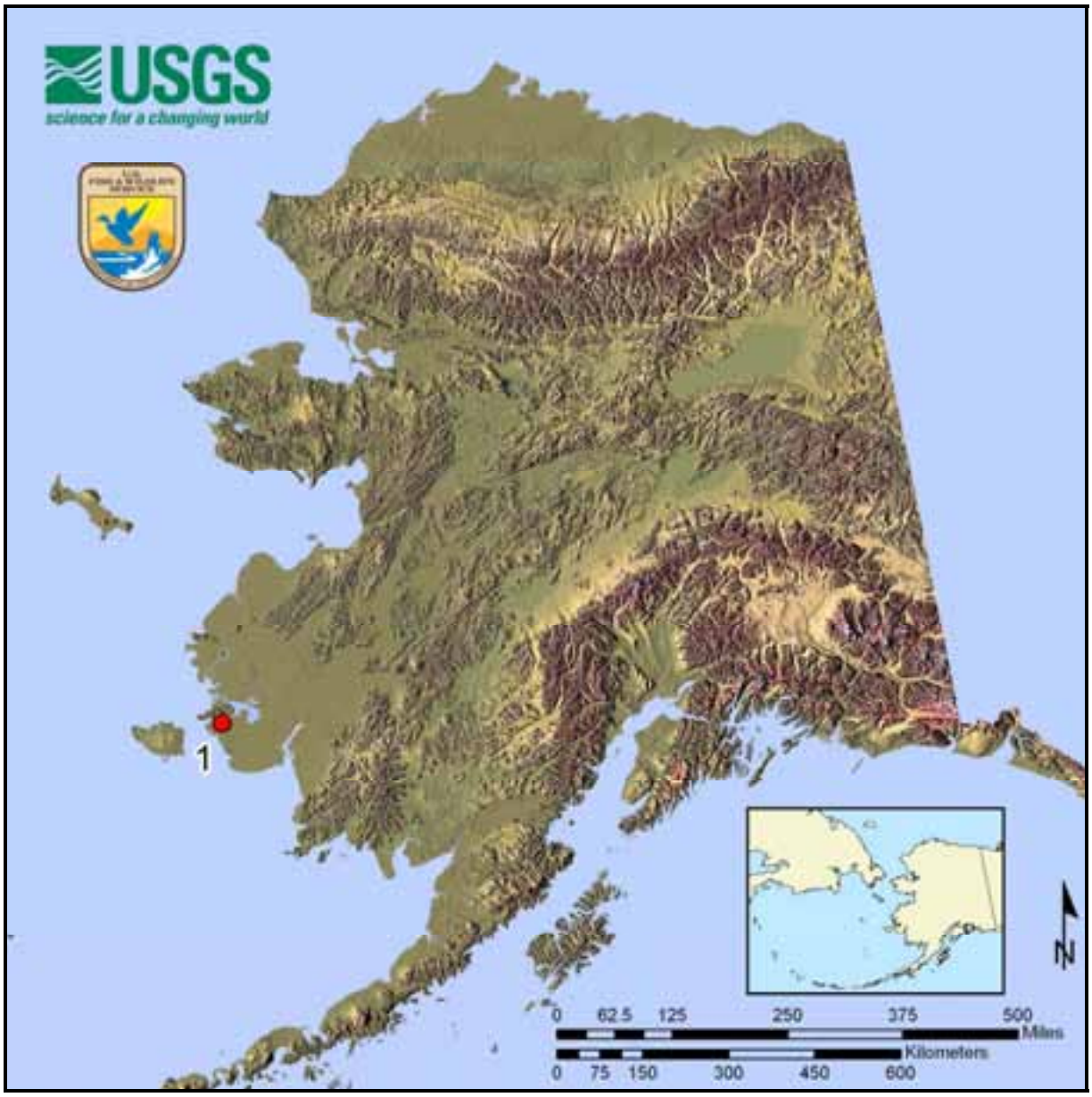
Table 18. Avian influenza analytical results for Spectacled Eiders collected June 2009: pooled and cloacal only samples.

Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Yukon Delta NWR	49	0	1	0.020

Table 19. Comparative avian influenza results for Spectacled Eiders collected June 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	48
Positive	Positive	0
Negative	Positive	1
Positive	Negative	0
Total samples tested		49

Figure 6. Live bird sampling locations for Spectacled Eider's in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Delta NWR	Kigigak Island	49

Taxon: Black Brant (Branta bernicla nigricans)

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

Ranking score: 12

Background: Several thousand Black Brant breed and molt along the arctic coast of Russia. The Russian population winters in North America, Japan, Korea, and northeastern China, near recent outbreaks of the Asian H5N1 virus (e.g., Hong Kong). Mixing of flocks likely occurs between these 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.

Brant nest in high concentrations (colonies) and during brood rearing, molting, and staging, they concentrate in flocks. The YKD is the major breeding area for Black Brant, hosting approximately 80% of the world population. The Teshekpuk Lake area is the most important molting area for brant, smaller numbers molt on the YKD. During the fall staging period at Izembek Lagoon nearly the entire world population of Black Brant comes together.

Over 500 birds were sampled from the Yukon Kuskokwim Delta and Izembek Lagoon using a 3-stage sampling design: arrival/early nesting, brood rearing, and fall staging. Of those, 144 were live bird samples (Fig. 7) and 357 were hunter killed (see Spring Subsistence and Fall Harvest chapter). Each sampling stage and its location will be discussed separately and final tables present the analytical results at the end of this section.

Early Nesting
Sampling of early nesting was conducted in one area of the YKD in June 2009.

Yukon Delta NWR

Black Brant were captured, banded, and released from Kigigak Island, located along the outer fringe of Yukon-Kuskokwim Delta, near the mouth of Baird Inlet. Habitat consists of low coastal tundra, sedges, and grasses.

Capture Methods: Females were captured on nests late in incubation using nest traps. All birds received a metal band and plastic tarsal band.

Results: Sixty-five Black Brant were captured and sampled at Kigigak Island. Cloacal and oral-pharyngeal samples were collected from 65 Black Brant (Table 20). All were adult females.

AI results: None of the 65 pooled or cloacal samples collected from Yukon Delta nesting Black Brant tested positive for avian influenza.

Table 20. Birds captured and both cloacal and oral-pharyngeal swabs collected from brood-rearing Black Brant at Yukon Delta National Wildlife Refuge, July through August 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Kigigak Island	65	65	0	65	65	65

Other Accomplishments: Nest data including initiation dates and clutch sizes were collected and nest were monitored to estimate survival. Plastic tarsal bands were read (to identify previously marked Black Brant) for survival and dispersal analysis. A total of 117 Back Brant nest were located in three nesting concentrations.

Brood-Rearing

Adults were sampled from the major brood-rearing colonies on the Yukon-Kuskokwim Delta.

Yukon Delta NWR

Adults were captured, banded, and released from brood-rearing colonies at Tutakoke and Old Chevak.

Capture Methods: Planes and ground personnel were used to drive birds into corral traps. Most birds were marked with a metal band and a plastic tarsal band. Three successful drives were conducted at Tutakoke and two at Old Chevak.

Results: A total of 79 Black Brant was captured and banded at Tutakoke and Old Chevak. Cloacal and oral-pharyngeal samples were collected from 79 Black Brant adults

and one gosling (Table 21). Of those, 47 were adult females, 31 adult males, and 1 was a juvenile male.

AI results: None of the 79 pooled or cloacal samples collected from Yukon Delta Black Brant tested positive for avian influenza.

Table 21. Birds captured and both cloacal and oral-pharyngeal swabs collected from brood-rearing Black Brant at Yukon Delta National Wildlife Refuge, July through August 2009.

Location	Total birds captured	Female	Male	AI Paired samples CL	AI Paired samples OP	Total AI samples
Tutakoke	37	22	15	37	37	37
Chevak	42	25	17	42	42	42
Total	79	47	32	79	79	79

Other Accomplishments: Blood and feather samples were collected for AI seroprevalence and stable isotope analyses.

Fall Staging

The fall staging samples were from fall harvest birds sampled at Izembek NWR (see Fall Harvest chapter). One of the cloacal samples tested positive for avian influenza. None of the samples were H5 or N1 positive

Tim Bowman, USFWS

Table 22. Avian influenza analytical results for Black Brant collected June through August 2009: pooled cloacal and oral-pharyngeal samples.

Location	Sampling Stages	Total samples	Total AI Pooled positive	Prevalence
Yukon Delta NWR	Nesting	65	0	
Yukon Delta NWR	Brood-rearing	79	0	0
Total		144	0	0

Table 23. Avian influenza analytical results for Black Brant collected June through August 2009: cloacal only samples.

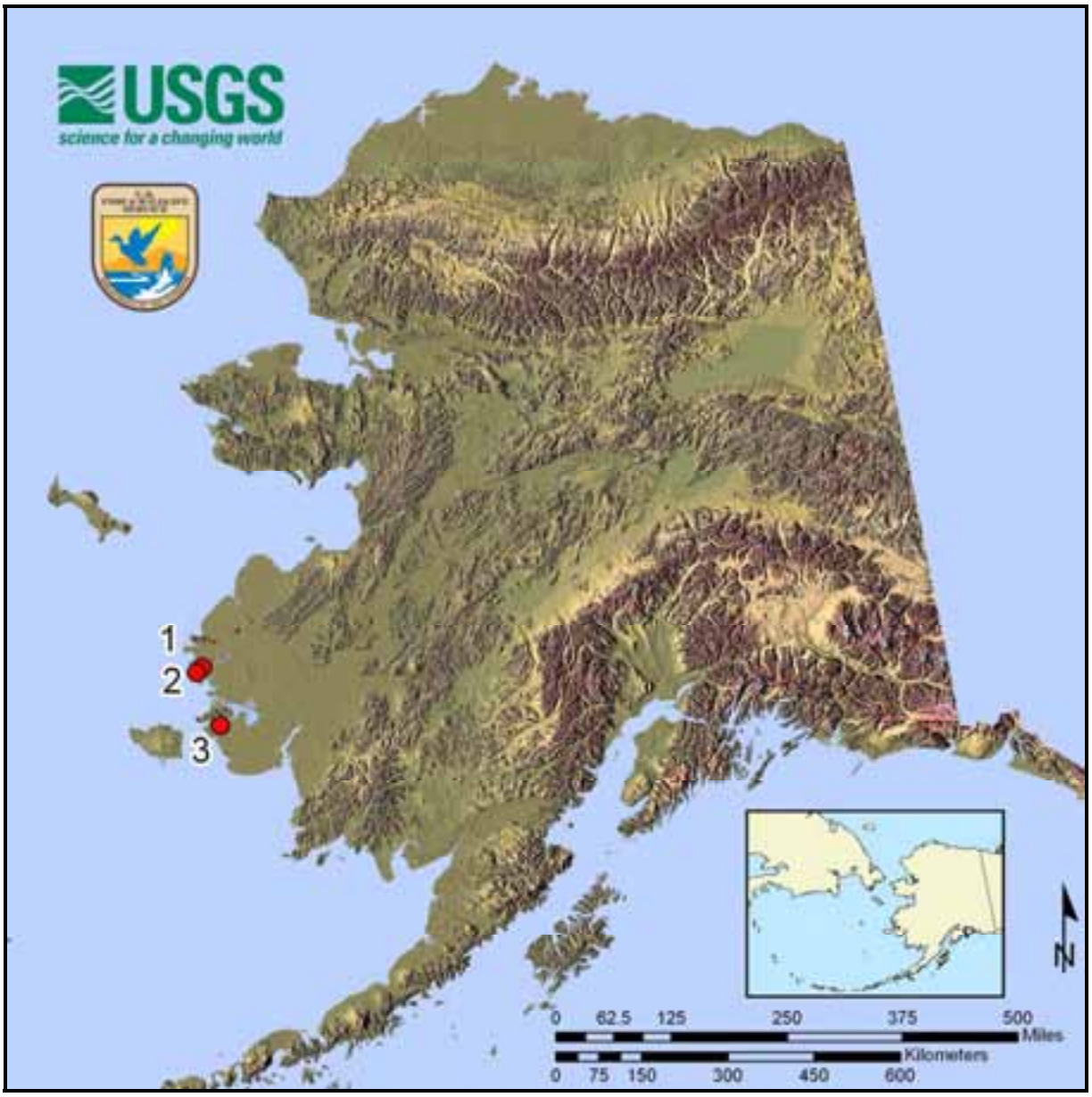
Location	Sampling Stages	Total samples	Total AI Cloacal positive	Prevalence
Yukon Delta NWR	Nesting	65	0	0
Yukon Delta NWR	Brood-rearing	79	0	0
Total		144	0	0

Table 24. Comparative avian influenza results for Black Brant collected June through August 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	144
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		144

Yvette Gillies, USGS ASC

Figure 7. Live bird sampling locations for Black Brant in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Delta NWR	Old Chevak	42
2	Yukon Delta NWR	Tutakoke	37
3	Yukon Delta NWR	Kigigak Island	65
	Total		**144**

Taxon: Lesser Sandhill Crane (Grus canadensis canadensis)

Justification: A significant proportion of the mid-continent population of Lesser Sandhill Cranes migrates through Alaska to and from breeding grounds in eastern Chukotka, Russia. Sandhill cranes are attracted to agricultural areas with domestic poultry.

Ranking score: 11.5

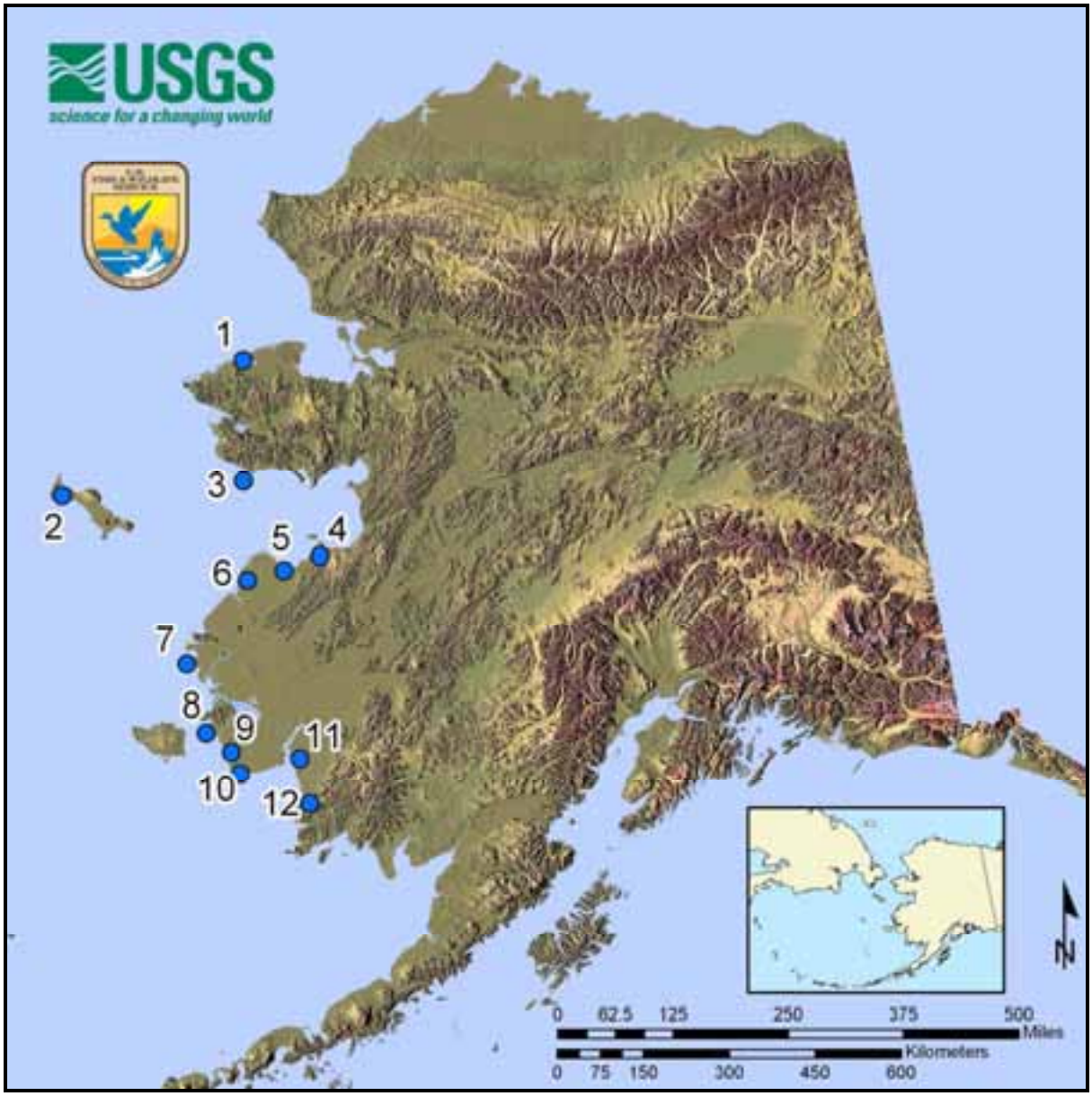
Background: Lesser Sandhill Cranes in Alaska are affiliated with two different populations, the Pacific Flyway Population (PFP) and the Mid-continent Population (MCP), based on segregation during breeding, migration and wintering periods (Tacha et al. 1994). MCP cranes breed from Hudson Bay west across Canada and interior Alaska to the YKD. The probability of Lesser Sandhill Cranes being exposed to Asian H5N1 is greater than for many other species of birds because a substantial portion of MCP cranes breeds in Asia and they commingle with Asian species of cranes (Johnsgard 1983) which migrate through areas infected with Asian H5N1. Also, cranes use a variety of natural and agricultural habitats for foraging and roosting, making them more likely than some species to contact Asia H5N1 through domestic poultry and infected sites.

Methods: No live capture project focused on Lesser Sandhill Cranes, but samples were obtained via spring subsistence (Figure 8).

Results: Ninety Lesser Sandhill Cranes were collected and analyzed through hunter harvest sampling (see Spring Subsistence chapter).

AI Results: None of the 90 pooled or cloacal samples collected from Lesser Sandhill Crane tested positive for avian influenza.

Figure 8. Sampling locations for Lesser Sandhill Cranes in Alaska, 2009. For specific location names see key following map. A total of 90 samples was collected through spring subsistence. Note: No live sampling of this species occurred (spring subsistence = blue dots).



Site #	Geographic Location	Specific Location	Site #	Geographic Location	Specific Location
1	Seward Peninsula	Shishmaref	7	Yukon Delta NWR	Hooper Bay
2	St. Lawrence Island	Gambell	8	Yukon Delta NWR	Toksook Bay
3	Seward Peninsula	Nome	9	Yukon Delta NWR	Chefornak
4	Seward Peninsula	Stebbins	10	Yukon Delta NWR	Kipnuk
5	Yukon Delta NWR	Kotlik	11	Yukon Delta NWR	Eek
6	Yukon Delta NWR	Emmonak	12	Yukon Delta NWR	Quinhagak

Taxon: Tundra Swan (Cygnus columbianus)

Justification: A segment of the breeding population of Tundra Swans is believed to breed in eastern Asia and winter in North America.

Ranking score: 11

Background: Tundra Swans are polytypic, with three recognized subspecies: the nominate form *Cygnus columbianus columbianus* in North America, *C. c. bewickii* in western Eurasia and *C. c. jankowskii* in eastern Asia. 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).

Over 600 birds from the Alaska Peninsula, Kotzebue Sound, North Slope, and Yukon Delta NWR were sampled. Of those, 516 were from live birds (Fig. 9) and 89 were from spring subsistence harvest birds (see spring subsistence chapter). In 2008, fifty Tundra Swans were outfitted with satellite transmitters in five different breeding populations around the state; these transmitters should remain active until the summer of 2010. To track the latest Tundra Swan movements go to http://alaska.usgs.gov/science/biology/avian_influenza/TUSW/index.html. Each location is discussed separately and final tables present analytical results at the end of this section. In addition, 2 swans were opportunistically sampled along the YK Delta's outer coast at Old Chevak.

Northern Alaska Peninsula

Molting Tundra Swans were captured, sampled, and released on pothole lakes at locations near King Salmon, Bear Lake and Pike Lake on the Northern Alaska Peninsula. The Bristol Bay region may be important for monitoring AI because mixing may occur there between birds migrating up the Aleutian chain from Asia and eastward across the Bering Straits from Chukotka. In 2008, ten satellite transmitters were deployed in the Northern Alaska Peninsula population. Data confirmed the migration routes and wintering areas for the Northern Alaska Peninsula swans.

Capture Methods: Aerial reconnaissance using USFWS aircraft was conducted in three days to search for molting flocks of swans within 100 miles of the Becharof NWR office in King Salmon. Reconnaissance was also conducted during point-to-point travel. Swans were held in place on the lake with a small Zodiac boat and captured from the perimeter of the flock using a dip net from a smaller inflatable raft. Captured swans were

temporarily restrained with electrical tape wrapped around their legs and heads tucked under their wings. Swans were transported to shore for processing by a separate banding crew. On shore, birds were further restrained using swan "vests".

Results: Tundra Swans were captured from three areas on the northern Alaska Peninsula. The majority of molting swans were captured on the Naknek River Drainage. Cloacal and oral-pharyngeal samples were collected from 105 Tundra swans (Table 25). The adult birds were comprised of 62 females and 36 males.

AI Results: Of the 105 samples collected from Alaska Peninsula Tundra Swans, 5 of the pooled samples and 5 of the cloacal samples tested positive for avian influenza. None of the samples were H5 or N1 positive. The pooled and cloacal samples represent a 4.8% prevalence of avian influenza in the Northern Alaska Peninsula birds.

Table 25. Birds captured and both cloacal and oral-pharyngeal swabs collected from molting Tundra Swans at three locations on the Northern Alaska Peninsula, July 2009.

Location	Total birds captured	Female	Male	Unk	Paired AI samples		Total AI samples
					CL	OP	
Bear Lake	21	16	4	1	21	21	21
Naknek River Drainage	72	37	30	5	72	72	72
Pike Lake	12	9	2	1	12	12	12
Total	105	62	36	7	105	105	105

Other Accomplishments: Body measurements were taken on all captured birds. Swans were marked with aluminum leg bands and plastic neck collars. Photos and feather samples were collected from all 105 birds. In addition, blood was collected for environmental toxicology, population genetics, and analysis to determine seroprevalence of avian influenza antibodies. Winter recoveries and resighting of previously marked birds (2006-2008) accounts for 66% of the individual birds marked. These observations will increase information about migratory paths between molting, staging, breeding, and wintering areas of Alaska Peninsula tundra swans and timing of migration for various populations, age groups, and breeding vs. non-breeding birds.

Kotzebue Sound

Molting Tundra Swans were captured, sampled, and released at three locations around Kotzebue Sound.

Capture Methods: Flightless Tundra Swans were captured using aircraft and an inflatable outboard powered boat. Swans were held in place on the lake with a small Zodiac boat and captured from the perimeter of the flock using a dip net from a smaller

inflatable raft. Captured swans were restrained with electrical tape wrapped around their legs and heads tucked under their wings. Swans were transported to shore for processing by a separate banding crew. On shore, birds were further restrained using swan "vests".

Results: Two hundred eight Tundra Swans were captured from three locations around Kotzebue Sound. Cloacal and oral-pharyngeal samples were collected from 208 swans (Table 26). Of those, 127 were adult females and 81 were adult males.

AI Results: None of the 208 pooled or cloacal samples collected from Kotzebue Sound Tundra Swans tested positive for avian influenza.

Table 26. Birds captured and both cloacal and oral-pharyngeal swabs collected from Tundra Swans around Kotzebue Sound, July 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Buckland River	71	45	26	71	71	71
Kobuk Delta	78	52	26	78	78	78
Noatak Delta	59	30	29	59	59	82
Total	208	127	81	208	208	208

Other Accomplishments: Body measurements and photos were taken on all captured birds. Swans were marked with aluminum leg bands and plastic neck collars. Feathers and blood samples were collected for contaminant, genetic, AI seroprevalence, and stable isotope analyses.

Yukon-Kuskokwim Delta

Flightless swans were captured, sampled, and released at three locations on the Yukon-Kuskokwim Delta.

Capture Methods: Tundra Swans were captured using a float plane and an inflatable powered boat. The aircraft kept the swans grouped together while the boat collected swans one at a time using a dip-net and delivering them to crew on shore. All captured birds were banded with an aluminum leg band, and a plastic neck collar.

Results: A total of 101 Tundra Swans was captured on the YDNWR. Of those, 24 were captured near Nashak Lake, 40 were captured near Nunavakpak Lake, and 37 were captured near the Pitmiktalik River. Cloacal and oral-pharyngeal samples were collected from 101 Tundra Swans (Table 27). Of those, 63 were adult females and 38 were adult males.

AI Results: None of the 101 pooled or cloacal samples collected from Yukon-Kuskokwim Delta Tundra Swans tested positive for avian influenza.

Table 27. Birds captured and both cloacal and oral-pharyngeal swabs collected from Tundra Swans on Yukon-Kuskokwim Delta, July 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Nashak Lake	24	12	12	24	24	24
Nunavakpak Lake	40	26	14	40	40	40
Pikmiktalik River	37	25	12	37	37	37
Total	101	63	38	101	101	101

Other Accomplishments: All birds were weighed and measured. Swans were marked with aluminum leg bands and plastic neck collars. Feather samples were obtained for isotopic analysis and blood samples were collected for lead analysis. In addition, head profile photographs were taken.

North Slope

Capture Methods: Flightless birds were caught at three locations in early August on the North Slope. Swans were herded together with a helicopter and then caught using a long-handled net.

Results: One hundred birds were captured and banded. Cloacal and oral-pharyngeal samples were collected from 100 Tundra Swans (Table 28). Of those, 53 were adult females and 47 were adult males.

AI Results: None of the 100 pooled or cloacal samples collected from North Slope Tundra Swans tested positive for avian influenza

Craig, Ely, USGS ASC

Table 28. Birds captured and both cloacal and oral-pharyngeal swabs collected from flightless Tundra Swans on the North Slope, August 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Colville River Delta	34	17	17	34	34	34
Kalubik Creek	24	14	10	24	24	24
Miluveach River	42	22	20	42	42	42
Total	100	53	47	100	100	100

Other Accomplishments: Body measurements and photos were taken on all captured Swans and all were marked with aluminum leg bands. Feathers and blood samples were collected for contaminant, genetic, AI seroprevalence, and stable isotope analyses.

Table 29. Avian influenza analytical results for Tundra Swans collected July and August 2009: pooled cloacal and oral-pharyngeal samples.

Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Northern Alaska Peninsula	105	5	5	0.048
Kotzebue Sound	208	0	0	0
*Yukon-Kuskokwim Delta	103	0	0	0
North Slope	100	0	0	0
Total	516	5	5	0.001

Table 30. Comparative avian influenza results for Tundra Swans collected July through August 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	511
Positive	Positive	5
Negative	Positive	0
Positive	Negative	0
Total samples tested		516

Figure 9. Live bird sampling locations for Tundra Swans in Alaska, 2009. For specific location names see key following map.

Site #	Geographic Location	Specific Location	Total Samples
1	North Slope	Colville Rive Delta, Klaubik Creek, Miluveach River	100
2	Kotzebue Sound	Buckland River, Kobuk Delta, Noatak Delta	208
3	Yukon Delta NWR	Nash Lake, Nunavakpak Lake, Pikmiktalik River	101
4	Yukon Delta NWR	Old Chevak	2
5	Northern Alaska Peninsula	Naknek River Drainage	72
6	Northern Alaska Peninsula	Bear Lake, Pike Lake	33
	Total		**516**

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, Sakhalin Island, and Russia, near areas where Asian H5N1 has been identified.

Ranking score: 10

Background: Long-tailed Ducks breeding in Alaska are dispersed at very low densities throughout the coastal tundra from the Alaska Peninsula and Bristol Bay to the Arctic Coastal Plain. There is exchange between Alaskan breeding females and Asian molting and wintering areas based on satellite telemetry data. Long-tailed ducks have a circumpolar breeding distribution. Previous satellite telemetry studies in northern and western Alaska and western arctic Canada indicate that many long-tailed ducks that breed and molt in western North America spend the winter in coastal waters of eastern Asia, most notably Russia but as far south as Japan and China (M. Petersen, pers. comm., Petersen et al. 2003), and thus could carry Asian HPAI to North America. Significant numbers of long-tailed ducks molt in lagoons and bays along the Beaufort Sea coast of Alaska and western Canada.

A total of 226 birds were sampled from four sites: St. Lawrence Island, Seward Peninsula, Yukon Delta NWR, and Northwest Territories, Canada. Of those, 198 were live bird samples (Fig. 10), and 28 hunter-killed sample (see Spring Subsistence chapter). A final table with analytical results is presented at the end of this section. See discussion below.

McKinley Bay, Northwest Territories, Canada

Long-tailed Ducks were captured, sampled, and released in McKinley Bay, a shallow bay on the Tuktoyaktuk Peninsula, 90 km northeast of Tuktoyaktuk, Northwest Territories, Canada. There, long-tailed ducks occur as single-species flocks of flightless, molting birds during August and September. Although Long-tailed Ducks have been a priority species for Alaska since 2006, we have been unable to find large enough flocks of live ducks to sample during the breeding season. It is likely that mixing of Alaska and Canadian Long-tailed Ducks occur on McKinley Bay, and we could collect a sample size of 200; thus, we sampled this species in Western Canada.

Capture Methods: Flocks of flightless Long-tailed ducks were located by boat. When a flock of sufficient size was located, a lightly weighted, floating gill net was deployed upwind of the flock. The flock was then herded towards the net using small motorboats and kayaks. All Long-tailed Ducks were banded, and a cloacal and oral-pharyngeal sample obtained.

Results: Two hundred eleven Long-tailed Ducks were captured at McKinley Bay. Cloacal and oral-pharyngeal samples were collected from 198 Long-tailed Ducks (Table 31). Of those, 40 were adult females and 158 were adult males

AI Results: Two of the 198 pooled samples and two of the cloacal samples from Long-tailed Ducks tested positive for avian influenza. None of the samples were H5 or N1 positive. The pooled and cloacal samples represent a 1% prevalence of avian influenza in the McKinley Bay birds.

Table 31. Birds captured and cloacal and oral-pharyngeal swabs collected from Long-tailed Ducks at McKinley Bay, Northwest Territories, Canada, August 2009.

Location	Total birds captured	Female	Male	AI Paired samples CL	AI Paired samples OP	Total AI samples
McKinley Bay	211	40	158	198	198	198

Other Accomplishments: As part of an ongoing sea duck migration study in the Beaufort Sea 25 Long-tailed Ducks were marked with satellite transmitters to track their migration. These data will track their migration following molt and indentify migration routes and habitat use.

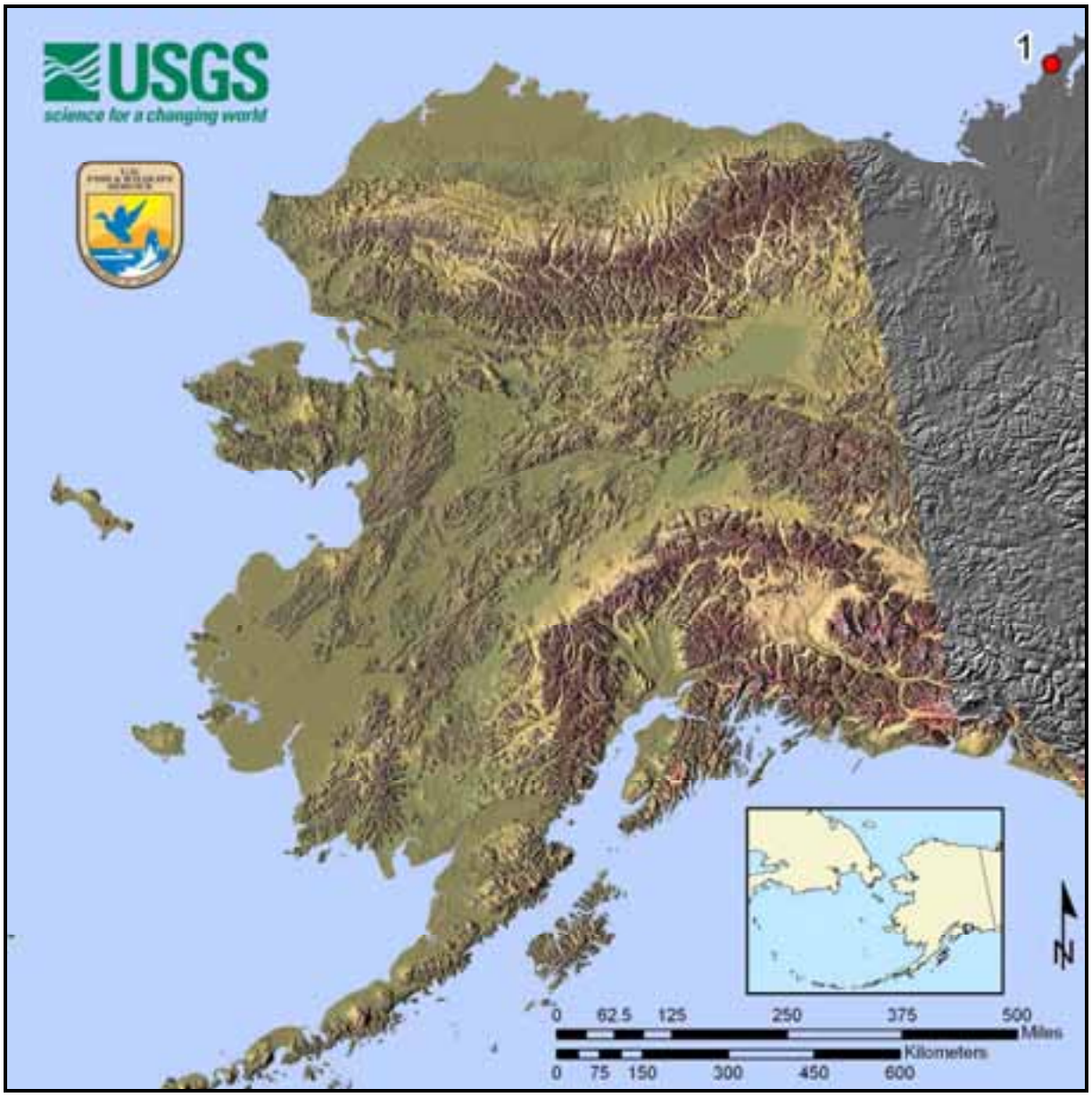
Table 32. Avian influenza analytical results for Long-tailed Ducks collected August 2009: pooled and cloacal only samples.

Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
McKinley Bay	198	2	2	0.010

Table 33. Comparative avian influenza results for Long-tailed Ducks collected August 2009: pooled and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	196
Positive	Positive	2
Negative	Positive	0
Positive	Negative	0
Total samples tested		198

Figure 10. Sampling locations for Long-tailed Ducks in Northwest Territories, Canada, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Northwest Territories, Canada	McKinley Bay	198

Taxon: Pacific Common Eider (Somateria mollissima v-nigrum)

Justification: Over 95% of the 80,000 Pacific Common Eider population that nests on the North Slope of Alaska and northwestern Canada winters in northeast Asia. It is likely that a portion of the 20,000 Common Eiders that nest in the Aleutian Islands winters in northeast Asia along the Kamchatka Peninsula, Russia.

Ranking score: 10

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 (Dement'ev and Gladkov 1967, Kear 2005). 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), which may facilitate transmission of disease amongst individuals by concentrating birds into relatively small areas. Common Eiders nest colonially and birds concentrated in these dense areas may facilitate transmission of HP H5N1. Birds were sampled from multiple locations and each is discussed separately and final tables present the analytical results at the end of this section.

One hundred sixty-seven birds were sampled from St. Lawrence Island, Seward Peninsula and the Yukon Delta NWR. Of those, 59 were live bird samples (Fig. 11) and 108 were hunter killed (see Spring Subsistence chapter).

Yukon Delta NWR

The YDNWR provides some of the most productive subarctic goose habitat including coastal nesting ground for migrating Pacific Common Eiders. Samples were collected from nesting birds on Kigigak Island which is located along the outer fringe of YDNWR near the mouth of Baird Inlet. The island is bordered by the Ninglick River and the Bering Sea. Habitat consists of low coastal tundra, sedges, and grasses. Spring and fall storm tides regularly inundate the island, except for upland areas, which are flooded only during severe storm tides.

Capture Methods: Adult Pacific Common Eiders were captured in two ways: by placing a mist net over the top of females on nests, or by flushing the female off the nest, placing a string-activated trap on the nest, and triggering the trap once the female returned to the nest.

Results: A total of 59 Pacific Common Eiders was sampled at Kigigak Island on the YDNWR (Table 34). Of those, all were adult females.

AI Results: None of the 59 pooled or cloacal samples collected from Yukon Delta Pacific Common Eiders tested positive for avian influenza.

Table 34. Birds captured and both cloacal and oral-pharyngeal swabs collected from nesting Pacific Common Eiders at Yukon Delta National Wildlife Refuge, June 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Kigigak Island	59	59	0	59	59	59

Table 35. Avian influenza analytical results for Pacific Common Eiders collected June 2009: pooled and cloacal samples.

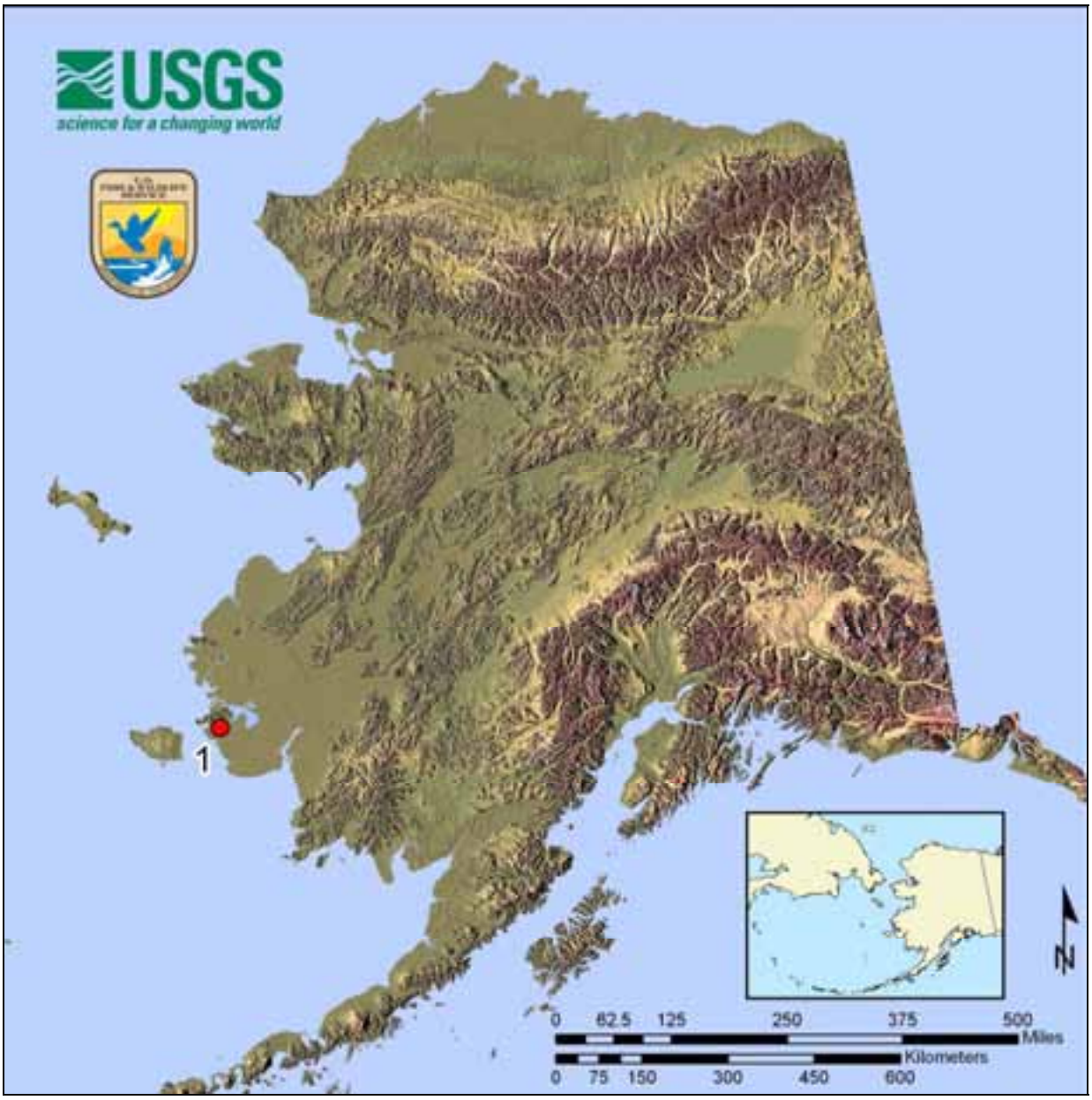
Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Yukon Delta NWR	59	0	0	0

Table 36. Comparative avian influenza results for Pacific Common Eiders collected June 2009: pooled and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	59
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		59

Jason Schulmeister, USFWS

Figure 11. Live bird sampling locations for Pacific Common Eiders in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Delta NWR	Kigigak Island	59

Taxon: King Eider (Somateria spectabilis)

Justification: A major segment of the Pacific population of King Eiders 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 Steller's and Spectacled Eiders.

Ranking score: 10

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 but instead 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 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). The core spring staging area in Alaska appears to be ice-free waters between Cape Lisburne and Point Barrow of northeast Alaska.

Methods: No live capture project focused on King Eiders, but samples were obtained via spring subsistence sampling (Figure 12).

Results: Four hundred twenty-eight King Eider samples were collected and analyzed through hunter harvest sampling (see Spring Subsistence chapter).

AI Results: One of the 428 pooled samples and one of the cloacal samples collected from King Eiders tested positive for avian influenza. None of these samples were positive for H5 or N1.

Laura L. Whitehouse, USFWS

Figure 12. Live bird sampling locations for King Eiders in Alaska, 2009. For specific location names see key following map. A total of 428 samples were collected through spring subsistence harvested birds.

Site #	Geographic Location	Specific Location
1	St. Lawrence Island	Savoonga
2	St. Lawrence Island	Gambell
3	Yukon Delta NWR	Hooper Bay
4	Yukon Delta NWR	Toksook Bay
5	Yukon Delta NWR	Chefornak
6	Yukon Delta NWR	Kipnuk

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—spends the non-breeding season mostly in East and South Asia and 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.

Ranking score: 17

Background: Dunlin of the *arcticola* subspecies spend the winter in significant numbers in East Asia as far south as southern China (Wetlands International–Oceania 2004). *Arcticola* Dunlin banded on the North Slope of Alaska have been resighted in Russia, Japan, South Korea, Taiwan, and parts of China (M. Barter, R. Gill, and R. Lanctot, unpubl. data). While on the wintering grounds, Dunlin occupy primarily estuarine habitats. Movement of Dunlin to and from the breeding and non-breeding grounds entails prolonged stays in coastal East Asia. Between March and April *arcticola* Dunlin migrate to their breeding grounds in northern Alaska arriving in early June (Warnock and Gill 1996). During the post-breeding season (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. data). Once on the YKD, *arcticola* Dunlin mix with large numbers of the *pacifica* race of Dunlin before moving to East Asia in September or October (Gill and Handel 1981, Warnock and Gill 1996).

Over 650 birds were sampled from the Arctic National Wildlife Refuge, the North Slope, and the Yukon-Kuskokwim Delta, using a 2-stage sampling design. The 2-stage sampling design is broken into breeding and post-breeding populations (or sampling). Of those, 666 were live bird samples (Fig. 13) and 4 were hunter killed (see Spring Subsistence chapter). Each location is discussed separately and final tables present the analytical results at the end of this section.

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 17 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. data). 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.

North Slope

Breeding Dunlin were captured, sampled and released in the vicinity of Barrow and Prudhoe Bay on the North Slope.

Capture Methods: Crews captured birds in Barrow at six established breeding plots, as well as other parts of the tundra surrounding Barrow using 4-wheelers on the road system. Similary crew captured birds at Prudhoe Bay at or near long-term breeding plots, and accessed these sites by truck via the road system. Dunlin were captured using mist nets during pre-nesting and bow nets during nesting.

Results: A total of 129 breeding Dunlin was captured and banded on the North Slope. Cloacal and oral-pharyngeal samples were collected from 129 Dunlin (Table 37). Of those, 45 were adult females, 51 were adult males. Thirty-three adults were undetermined for sex.

AI Results: None of the 129 samples collected from North Slope breeding Dunlin tested positive for avian influenza.

Table 37. Birds captured and both cloacal and oral-pharyngeal swabs collected from breeding Dunlin on the North Slope, June and July 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples		Total AI samples
					CL	OP	
Barrow	106	45	51	10	106	106	106
Prudhoe Bay	23	0	0	23	23	23	23
Total	129	45	51	33	129	129	129

Other Accomplishments: Feathers were collected for stable isotope studies and blood samples were collected for genetic and methyl mercury studies. All captured birds were banded with a metal band and a unique set of color bands to help document migration pathways. Resightings or re-captures of these marked birds between 2006 and 2009 have provided information on migratory connectivity, including linking the North Slope and Yukon Delta within Alaska, and Alaska to locations in East Asia such as Japan, Taiwan, South Korea and mainland China (M. Barter, Wetlands International – Oceania; unpubl. manuscript). Captured Dunlin were also equipped with radio transmitters and used in a replacement clutch study; many were subsequently tracked to a second nest after we

collected the first nest. Birds banded during this study are also helping us to monitor adult survival, natal philopatry, and site and mate fidelity; reproductive parameters such as these are only available from a few sites in Alaska.

Manokinak River

The lower Manokinak River is located on the Yukon-Kuskokwim Delta and is home to a rather large population of *pacifica* Dunlin. Dunlin were sampled opportunistically using bow nets during nesting.

Results: A total of 30 breeding Dunlin was captured and banded. Cloacal and oral-pharyngeal samples were collected from 30 Dunlin (Table 38). Of those, 14 were adult females and 16 were adult males.

AI Results: None of the 30 samples collected from Yukon-Kuskokwim Delta breeding Dunlin tested positive for avian influenza.

Table 38. Birds captured and both cloacal and oral-pharyngeal swabs collected from breeding Dunlin on the Yukon-Kuskokwim Delta, June 2009.

Location	Total birds captured	Female	Male	AI Paired samples CL	AI Paired samples OP	Total AI samples
Manokinak	30	14	16	30	30	30

Other Accomplishments: Like the Dunlin captured on the North Slope, feathers were collected for stable isotope studies and blood samples were collected for genetic studies.

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 river deltas and coastal sites such as Elson Lagoon at Barrow and the Canning River Delta (Martin and Moitoret 1981, Taylor et al. in press). After leaving the North Slope, most *arcticola* Dunlin migrate to the outer YKD to stage in August and September where 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. data). In

September or early October, *arcticola* Dunlin leave the YKD for Asia and *pacifica* Dunlin leave the YKD for the Pacific Cost of North America.

Arctic National Wildlife Refuge

Post-breeding Dunlin were captured, sampled, and released at Arey Island and the Jago River Delta along the coast of the Arctic National Wildlife Refuge (NWR). Since 2006, a collaborative study investigating shorebird use of river delta and lagoon systems has taken place on the Arctic NWR.

Capture Methods: Birds were primarily captured with mist nets, walk in traps, or noose mats. All captured individuals were banded with a metal band and color bands to uniquely identify each bird.

Results: A total of 13 post-breeding Dunlin was captured and banded at two locations on the Arctic NWR. Cloacal and oral-pharyngeal swabs were collected from 13 Dunlin (Table 39). Of those, 1 was an adult and 12 were juveniles. All were undetermined for sex. Despite having a fairly large effort (i.e., capturing at two field sites), 2009 sampling goals were not reached. The lower numbers of staging post-breeding shorebirds may have been due in part to lower breeding success in 2009. At least two sites on the Arctic Coastal Plain reported very low nest success (R. Gates and J. Liebeziet, pers. communication).

AI Results: None of the 13 pooled or cloacal samples collected from Arctic NWR post-breeding Dunlin tested positive for avian influenza.

Table 39. Birds captured and both cloacal and oral-pharyngeal swabs collected from post-breeding Dunlin at Arctic National Wildlife Refuge, August 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Arey Island	9	0	0	9	9	9	9
Jago River Delta	4	0	0	4	4	4	4
Total	13	0	0	13	13	13	13

Other Accomplishments: Biometric measurements were taken on all birds to assist in determining age, sex, and physiological condition. Color bands were placed on birds in order to evaluate movement and tenure at staging areas and to better document wintering areas. Blood samples were collected to assess stress hormone and fat metabolite levels as an indicator of bird condition.

Yukon-Kuskokwim Delta

Post-breeding Dunlin were captured, sampled, and released at Punoarat Point near Angyoyaravak Bay on the central Yukon-Kuskokwim Delta. Two subspecies of Dunlin: *arcticola* and *pacifica* use this area between July and October.

Capture Methods: Fall migrant Dunlin were sampled in August and September on intertidal mudflats and nearshore ponds on the YKD. Birds were captured using mist nets, rocket nets, and elastically launched "whoosh" nets. All captured birds were banded with a metal band; certain individuals also received color bands.

Results: A total of 494 Dunlin were captured, banded, and sampled at Punoarat Point on the Yukon-Kuskokwim Delta. Cloacal and oral-pharyngeal samples were collected from 494 post-breeding Dunlin (Table 40). Of those, 225 were adult (sex undetermined) and 269 were juvenile (sex undetermined).

AI Results: None of the 494 pooled or cloacal samples collected from YKD post-breeding Dunlin tested positive for avian influenza.

Table 40. Birds captured and both cloacal and oral-pharyngeal swabs collected from post-breeding Dunlin on the Yukon-Kuskokwim Delta, August through September 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Punoarat Point	494	0	0	494	494	494	494

Other Accomplishments: All captured birds were banded to help document migration pathways. In addition, adult Dunlin with culmens ≤34.4 mm were targeted for additional study. Twenty-five such birds were given a year-specific combination of color bands. Additionally, blood samples from each of these birds was collected along with a picture of each bird's spread wing to help identify genetic and morphological differences between *pacifica* and *arcticola* subspecies. This effort was invigorated by the recapture of a Dunlin originally banded in Taiwan in March 2007.

Table 41. Avian influenza analytical results for Dunlin collected June through September 2009: pooled cloacal and oral-pharyngeal samples.

Location	Sampling Stages	Total samples	Total AI Pooled positive	Prevalence
North Slope	Breeding	129	0	0
Yukon Delta NWR	Breeding	30	0	0
Arctic NWR	Post-breeding	13	0	0
Yukon Delta NWR	Post-breeding	494	0	0
Total		666	0	0

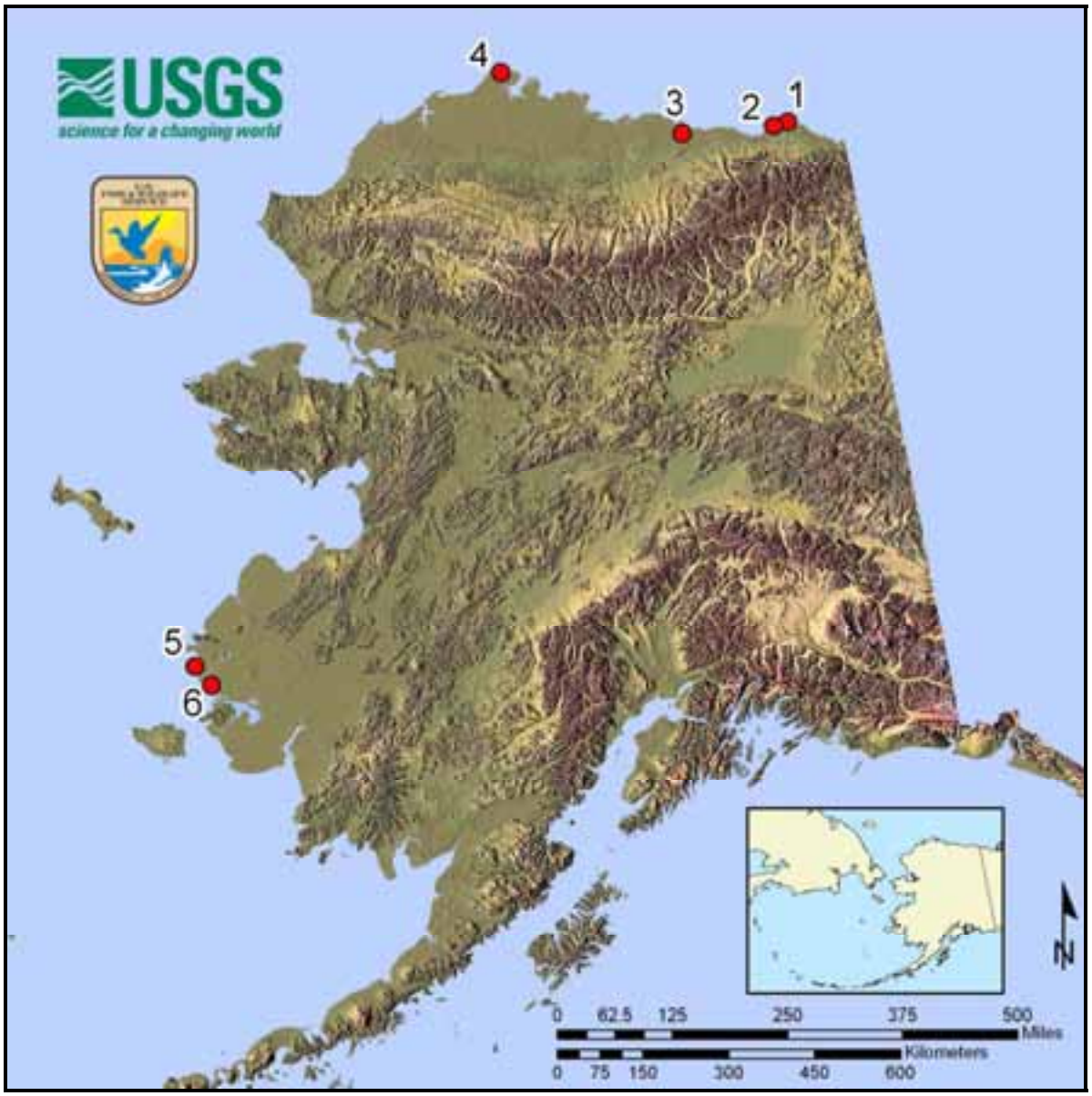
Table 42. Avian influenza analytical results for Dunlin collected June through September 2009: cloacal only samples.

Location	Sampling Stages	Total samples	Total AI Pooled positive	Prevalence
North Slope	Breeding	129	0	0
Yukon Delta NWR	Breeding	30	0	0
Arctic NWR	Post-breeding	13	0	0
Yukon Delta NWR	Post-breeding	494	0	0
Total		666	0	0

Table 43. Comparative avian influenza results for Dunlin collected June through September 2009: pooled and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	666
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		666

Figure 13. Live bird sampling locations for Dunlin in Alaska 2009. For specific location names see key following map.



Site #	Geographic Location	Location	Total Samples
1	Arctic NWR	Jago River Delta	4
2	Arctic NWR	Arey Island	9
3	North Slope	Prudhoe Bay	23
4	North Slope	Barrow	106
5	Yukon Delta NWR	Punoarat Point	494
6	Yukon Delta NWR	Manokinak River	30
	Total		**666**

Taxon: Sharp-tailed Sandpiper (Calidris acuminata)

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

Ranking score: 14.5

Background: The Sharp-tailed Sandpiper nests in northeastern Siberia and spends the non-breeding season in Australasia (Higgins and Davies 1996). Its population was estimated at 160,000 individuals (Bamford et al. 2006). During passage, birds are found regularly in East Asia at sewage ponds and pasturelands but are equally common on intertidal areas. In Alaska, the species is mostly found on coastal salt meadows and on non-vegetated substrates along tidally influenced rivers. The core staging area in Alaska appears to be the central YKD.

Yukon Delta NWR

Fall migrant Sharp-tailed Sandpipers were sampled in August and September on mudflats and nearshore ponds from Punaorat Point near Angyoyaravak Bay on the central Yukon-Kuskokwim Delta (Fig. 14).

Capture Methods: Mist nets, rocket nets, and, whoosh nets were used to capture birds at Punoarat Point. Birds were banded before being released.

Results: A total of 54 Sharp-tailed Sandpipers was captured, banded, and sampled at Punoarat Point. Cloacal and oral-pharyngeal samples were collected (Table 44). All samples were from juvenile birds undetermined for sex.

AI Results: None of the 54 pooled or cloacal samples collected from Yukon Delta Sharp-tailed Sandpipers tested positive for avian influenza.

Table 44. Birds captured and both cloacal and oral-pharyngeal swabs collected from fall migrant Sharp-tailed Sandpipers at Yukon Delta National Wildlife Refuge, August and September 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples		Total AI samples
					CL	OP	
Punoarat Point	54	0	0	54	54	54	54

Other Accomplishments: All captured birds were banded to help document migration pathways.

Table 45. Avian influenza analytical results for fall migrant Sharp-tailed Sandpipers collected August and September 2009: pooled and cloacal only samples.

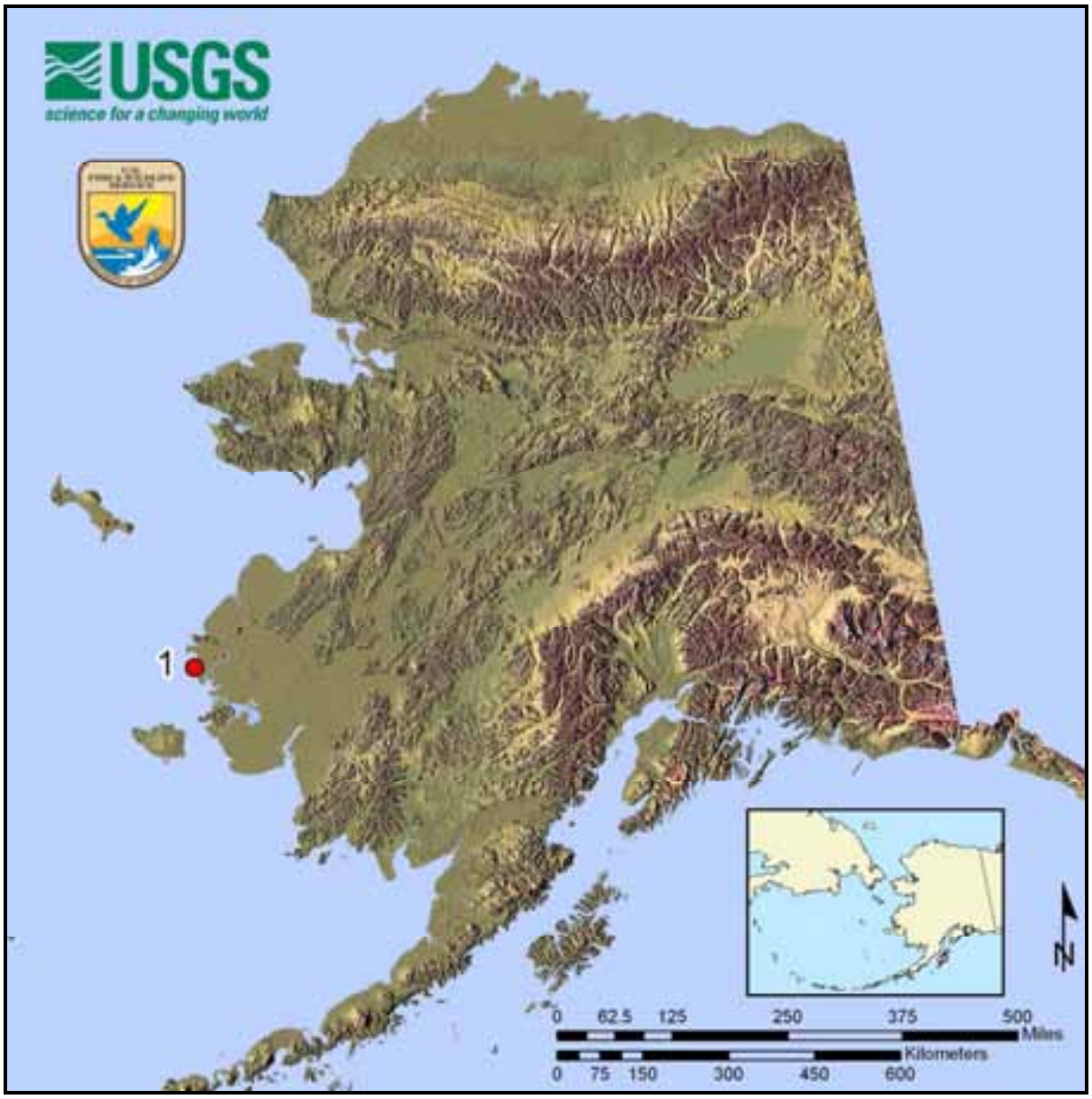
Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Yukon Delta NWR	54	0	0	0

Table 46. Comparative avian influenza results for fall migrant Sharp-tailed Sandpipers collected August and September 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	54
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		54

Robert E. Gill, Jr., USGS ASC

Figure 14. Live bird sampling location for Sharp-tailed Sandpipers in Alaska, 2009. For specific location name see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Delta NWR	Punoarat Point	54

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. The entire population of this species migrates through East Asia and has contact with a known hot spot.

Ranking score: 14

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).

Thirty birds were sampled from Yukon Delta NWR and the Seward Peninsula. Of those, 13 samples were from live birds (Fig. 15) and 17 were hunter killed (see Spring Subsistence chapter). See discussion below and final tables of analytical results at the end of this section.

Yukon Delta NWR

A total of 13 Bar-tailed Godwits was captured, sampled, and released on the Yukon Delta NWR.

Capture Methods: Bar-tailed Godwits were sampled at foraging sites. Cloacal and oral-pharyngeal samples were collected using mist, rocket and whoosh nets.

Results: Thirteen Bar-tailed Godwits were captured, banded, sampled, and released on the Yukon Delta NWR. Cloacal and oral-pharyngeal samples were collected at Punoarat Point (Table 47). Of those, one was an adult and 12 were juveniles. All birds were undetermined for sex.

AI Results: None of the pooled or cloacal samples collected from Yukon Delta Bar-tailed Godwits were positive for avian influenza.

Table 47. Birds captured and cloacal and oral-pharyngeal swabs collected from Bar-tailed Godwits at Yukon Delta National Wildlife Refuge, August and September 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Punoarat Point	13	0	0	13	13	13	13

Table 48. Avian influenza analytical results for Bar-tailed Godwits collected August and September 2009: pooled and cloacal only samples.

Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Yukon Delta NWR	13	0	0	0

Table 49. Comparative avian influenza results for Bar-tailed Godwits collected August and September 2009: pooled and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	13
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		13

Figure 15. Live bird sampling locations for Bar-tailed Godwits in Alaska, 2009. For specific location names see key following map.

Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Delta NWR	Punoarat Point	13

Taxon: Ruddy Turnstone (Arenaria i. interpres)

Justification: A large proportion of the population of Ruddy Turnstones that occurs in Alaska are distributed during the non-breeding season in parts of Asia, which have had recent outbreaks of Asian H5N1.

Ranking Score: 13

Background: Approximately 40,000 Ruddy Turnstones utilize sites within Alaska during the year (Alaska Shorebird Group 2000, unpubl. data). 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 (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 non-breeding season at sites near outbreaks of H5N1 in Asia, but a high proportion of Asian-breeding turnstones stage at sites in western Alaska.

Fourteen birds were sampled from the Arctic NWR, Seward Peninsula, and the Yukon Delta NWR. Of those, 12 samples were from live birds (Fig. 16) and 2 were hunter killed (see Spring Subsistence chapter). See discussion below and final tables present the analytical results at the end of this section.

Arctic National Wildlife Refuge

Two samples were collected from Arey Island on the North Slope.

Capture Methods: Birds were captured using mist nets, walk-in traps or nooses.

Results: Two Ruddy Turnstones were captured, banded, and sampled at Arey Island. Cloacal and oral-pharyngeal samples were collected (Table 50). Of those, both were juveniles, sex unidentified.

AI Results: None of the two pooled or cloacal samples collected from Arctic NWR Ruddy Turnstones tested positive for avian influenza.

Table 50. Birds captured and both cloacal and oral-pharyngeal swabs collected from Ruddy Turnstones in Alaska, August 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Arey Island	2	0	0	2	2	2	2

Other Accomplishments: All captured individuals were banded with a metal band, weighed, and measured.

Yukon Delta NWR

Ruddy Turnstones were sampled from Punoarat Point located on the Yukon Delta NWR.

Capture Methods: Mist nets, rocket nets, and, whoosh nets were used to capture birds. All were measured, weighed, banded, and released.

Results: Ten birds were sampled at Punoarat Point. Cloacal and oral-pharyngeal samples were collected (Table 51). All were juveniles, sex unidentified.

AI Results: None of the 10 pooled or cloacal samples collected from Yukon Delta Ruddy Turnstones tested positive for avian influenza.

Table 51. Birds captured and both cloacal and oral-pharyngeal swabs collected from Ruddy Turnstones in Alaska, August and September 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Punaorat Point	10	0	0	10	10	10	10

Table 52. Avian influenza analytical results for Ruddy Turnstones collected August and September 2009: pooled and cloacal only samples.

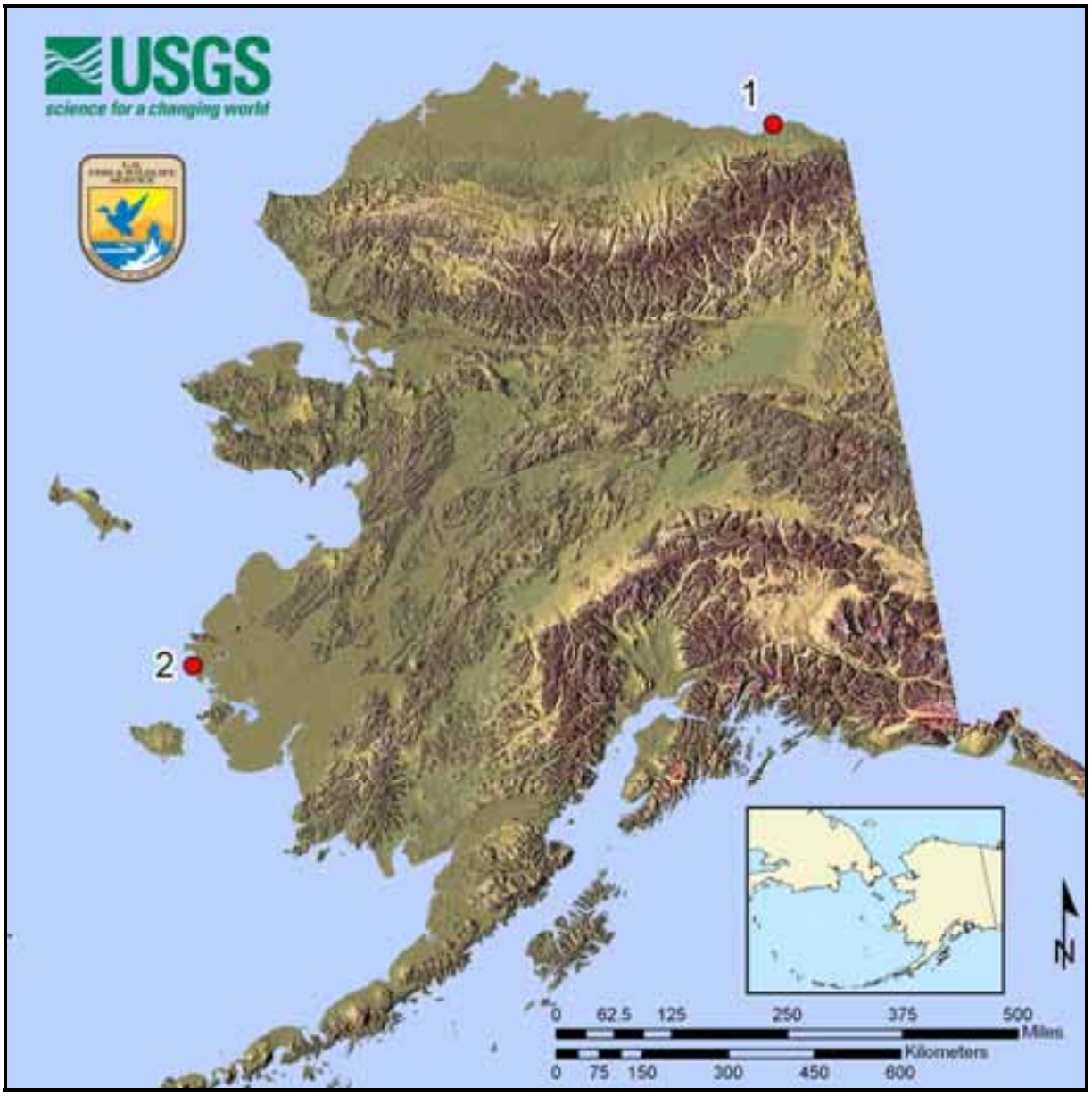
Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Arctic NWR	2	0	0	0
Yukon Delta NWR	10	0	0	0
Total	12	0	0	0

Table 53. Comparative avian influenza results for Ruddy Turnstones collected August and September 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	12
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		12

Tim Bowman, USFWS

Figure 16. Live bird sampling location for Ruddy Turnstones in Alaska, 2009. For specific location name see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Arctic NWR	Arey Island	2
2	Yukon Delta NWR	Punaorat Point	10
	Total		**12**

Taxon: Pectoral Sandpiper (Calidris melanotos)

Justification: Pectoral Sandpipers are among the high priority species because small numbers winter regularly in Southeast Asia and 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.

Ranking score: 13

Background: Roughly half of the world's population of 400,000 Pectoral Sandpipers (Brown et al. 2001) breeds in Siberia; the remainder breeds throughout western and northern Alaska east to Central Canada (Holmes and Pitelka 1998). 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. In Alaska, birds are observed migrating through Cook Inlet in Anchorage and the 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.

Over 140 birds were sampled from Yukon Delta NWR and North Slope (breeding and post breeding). Of these, 134 were live bird samples (Fig. 17), and 13 hunter-killed samples (see Spring Subsistence chapter). Each sampling stage and its location will be discussed separately and final tables present analytical results at the end of this section.

Breeding

The highest breeding densities occur along the Arctic Coastal Plain of northern Alaska and east-central Siberia. Breeding Pectoral Sandpipers are found in good numbers throughout the NPR-A on the North Slope. 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).

North Slope

Breeding Pectoral Sandpipers were captured and sampled throughout the North Slope. Barrow and Prudhoe Bay are located on the northern coastline of Alaska along the Beaufort Sea.

Capture Methods: Birds were captured at two breeding sites. Bow nets were used for incubating birds and some were captured with mist nets.

Results: A total of 131 breeding Pectoral Sandpipers was captured and banded. Cloacal and oral-pharyngeal samples were collected from breeding Pectoral Sandpipers (Table 54). Of those, 69 were adult females and 62 were adult males.

AI Results: None of the 131 pooled or cloacal samples collected from North Slope breeding Pectoral Sandpipers tested positive for avian influenza.

Table 54. Birds captured and cloacal and oral-pharyngeal swabs collected from breeding Pectoral Sandpipers on the North Slope, May through July 2009.

Location	Total birds captured	AI samples		AI Paired samples		Total AI samples
		Female	Male	CL	OP	
Barrow	90	28	62	90	90	90
Prudhoe Bay	41	41	0	41	41	41
Total	131	69	62	131	131	131

Other Accomplishments: Feathers were collected for stable isotope studies and blood samples were collected for genetic studies. All captured individuals had a metal band placed on their legs.

Post-breeding

Male Pectoral Sandpipers depart their breeding areas quickly, while females and their offspring congregate in tundra habitats near the coast of the Arctic Ocean (Connors et al. 1979). Juveniles are present in western Alaska in small flocks from September to mid-October where they occur in coastal habitats.

Arctic NWR and Yukon Delta NWR

Post-breeding Pectoral Sandpipers were sampled at the Jago River Delta located along the coastline of the Arctic National Wildlife Refuge. Two opportunistic samples were collected at Punoarat Point on the Yukon Delta NWR.

Capture Methods: Post-breeding birds were captured with mist nets and walk in traps at both locations. Despite having a fairly large effort (i.e., capturing at two field sites), we did not reach our goals in 2009. Pectoral Sandpipers have dramatic annual variations in breeding ground densities (Lanctot and Laredo 1994, Holmes and Pitelka 1998). It is possible that in 2009, these species nested in lower numbers on the Arctic Coastal Plain resulting in fewer staging post-breeding birds. The prevailing weather patterns at Punaorat Point on the Yukon Delta were noticeably different this fall than in past years and may have affected the timing and abundance of certain shorebird species.

Results: A total of 3 post-breeding Pectoral Sandpipers was captured and banded at Jago River Delta and Punoarat Point. Cloacal and oral-pharyngeal samples were collected from post-breeding Pectoral Sandpipers (Table 55). All were juveniles, undetermined for sex.

AI Results: None of the 3 pooled or cloacal samples collected from post-breeding Pectoral Sandpipers tested positive for avian influenza.

Table 55. Birds captured and cloacal and oral-pharyngeal swabs collected from post-breeding Pectoral Sandpipers on the Arctic NWR and Yukon Delta NWR, August and September 2009.

Location	Total birds captured	Female	Male	Unk	Paired AI samples		Total AI samples
					CL	OP	
Jago River Delta	1	0	0	1	1	1	1
Punoarat Point	2	0	0	2	2	2	2
Total	3	0	0	3	3	3	3

Other Accomplishments: Since 2005, assessment of the abundance, distribution, timing, species composition and habitat requirements of shorebirds staging on coastal areas have been conducted on post-breeding shorebirds on the Arctic National Wildlife Refuge. All captured individuals had a metal band placed on their leg.

Table 56. Avian influenza analytical results for Pectoral Sandpipers collected May through September 2009: pooled and cloacal only samples.

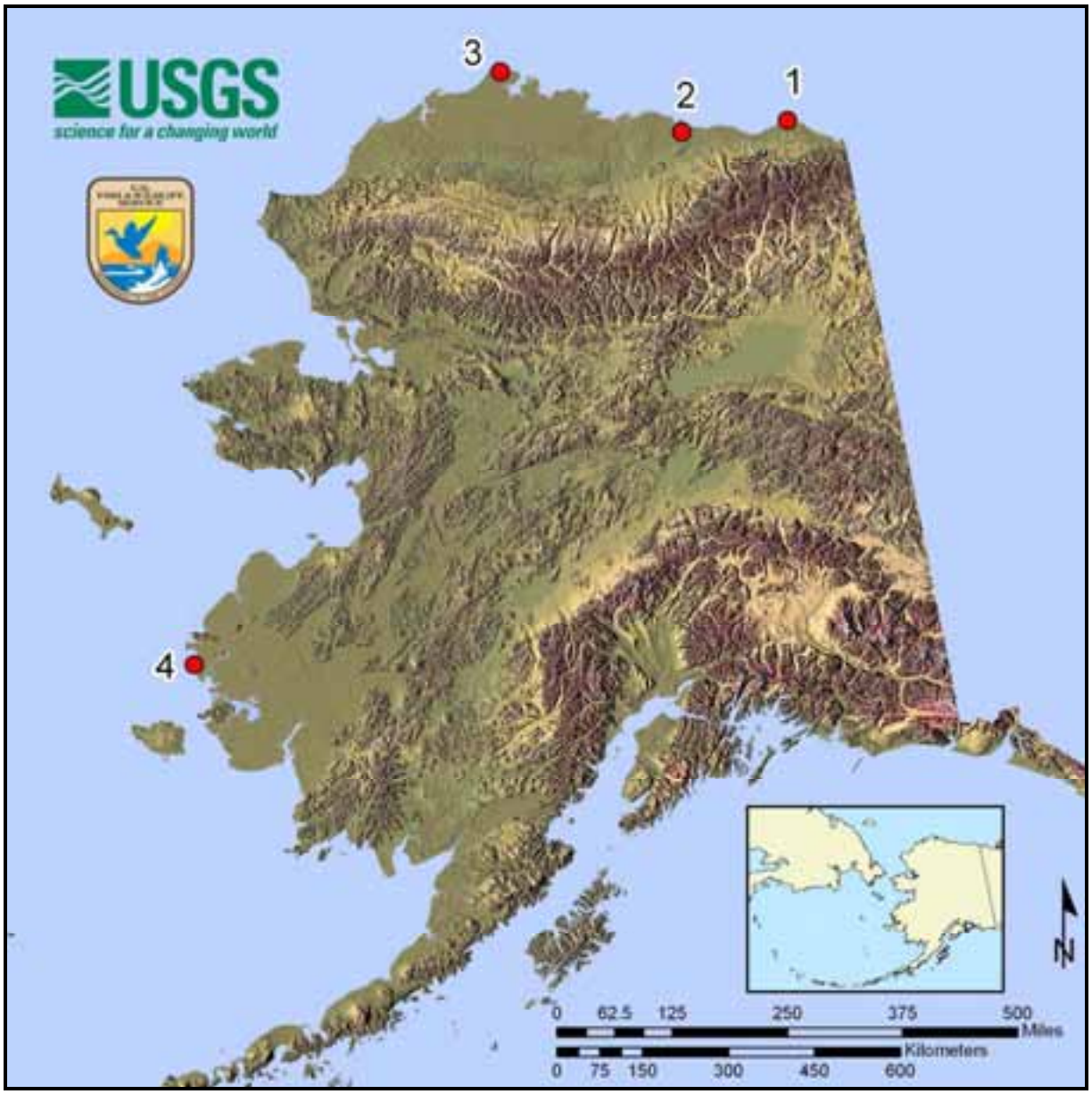
Location	Sampling Stages	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Barrow	Breeding	90	0	0	0
Prudhoe Bay	Breeding	41	0	0	0
Jago River Delta	Post-breeding	1	0	0	0
Punoarat Point	Post-breeding	2	0	0	0
Total		134	0	0	0

Table 57. Comparative avian influenza results for Pectoral Sandpipers collected May through September 2009: pooled and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	134
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		134

Dan Ruthrauff, USGS ASC

Figure 17. Live bird sampling locations for Pectoral Sandpipers in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Arctic NWR	Jago River Delta	1
2	North Slope	Prudhoe Bay	41
3	North Slope	Barrow	90
5	Yukon Delta NWR	Punoarat Point	2
	Total		**134**

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).

Ranking score: 12.5

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* (Enveloper and Roseleaf 1998). The total population of *roselaari* is estimated at fewer than 50,000 birds (Alaska Shorebird Group 2000, unpublished). The only place in Alaska where they are known to occur in large numbers is on the outer YKD in May (Gill and Handel 1981, 1990). Movement of Red Knots to and from the breeding and non-breeding grounds entails prolonged stays in coastal East Asia, primarily on estuarine habitats.

Yukon Delta NWR

A total of 5 Red Knots was captured, sampled, and released on the Yukon Delta NWR (Fig. 18).

Capture Methods: Birds were captured using mist nets, rocket nets and whoosh nets.

Results: Five Red Knots were captured, banded, and released at Punoarat Point. Cloacal and oral-pharyngeal samples were collected from Red Knots (Table 58). Of those, all were juveniles, undetermined for sex.

AI Results: None of the pooled or cloacal samples collected from Yukon Delta Red Knots were positive for avian influenza.

Table 58. Birds captured and cloacal and oral-pharyngeal swabs collected from Red Knots at Yukon Delta National Wildlife Refuge, August 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Punoarat Point	5	0	0	5	5	5	5

Table 59. Avian influenza analytical results for Red Knots collected August 2009: pooled and cloacal only samples.

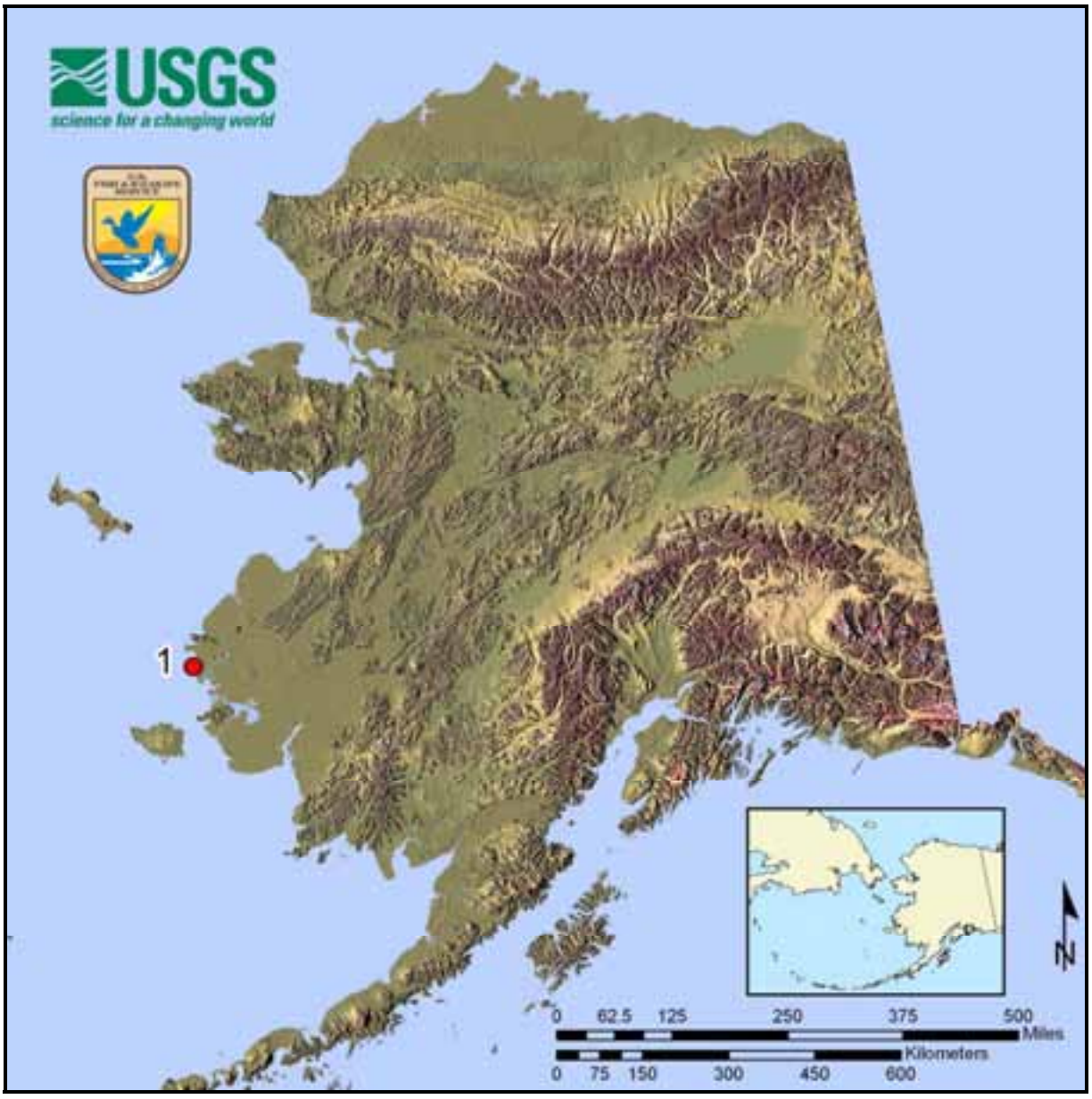
Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Yukon Delta NWR	5	0	0	0

Table 60. Comparative avian influenza results for Red Knots collected August 2009: pooled and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	5
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		5

Robert E. Gill, Jr., USGS ASC

Figure 18. Live bird sampling locations for Red Knots in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Delta NWR	Punoarat Point	5

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.

Ranking Score: 12

Background: The Long-billed Dowitcher breeds 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 breed in Asia, with the majority of these Asian-breeding dowitchers passing through Alaska during both spring and fall migration (Alaska Shorebird Group 2000).

Twenty-six birds were sampled on the Yukon Delta NWR and the North Slope. Of those, 21 were live bird samples (Fig. 19), and 5 hunter-killed samples (see Spring Subsistence chapter). See discussion below and final tables present the analytical results at the end of this section.

North Slope

Long-billed Dowitchers were captured, sampled and released at two sites on the North Slope: Barrow and Prudhoe Bay.

Capture Methods: Birds were captured with mist nets and bow nets while incubating.

Results: A total of 21 Long-billed Dowitchers was sampled at two sites on the North Slope. Cloacal and oral-pharyngeal samples were collected (Table 61). Of those, 7 were adult females, 6 were adult males, and 8 were adults, sex unidentified.

AI Results: None of the 21 pooled or cloacal samples collected from North Slope Long-billed Dowitchers tested positive for avian influenza.

Table 61. Birds captured and both cloacal and oral-pharyngeal swabs collected from Long-billed Dowitchers on the North Slope, June and July 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Prudhoe Bay	8	2	0	6	8	8	8
Barrow	13	5	6	2	13	13	13
Total	21	7	6	8	21	21	21

Other Accomplishments: All captured birds were banded with a metal band. Biometric measurements were recorded for all birds. Feather and blood samples were collected for isotope studies and genetic analysis.

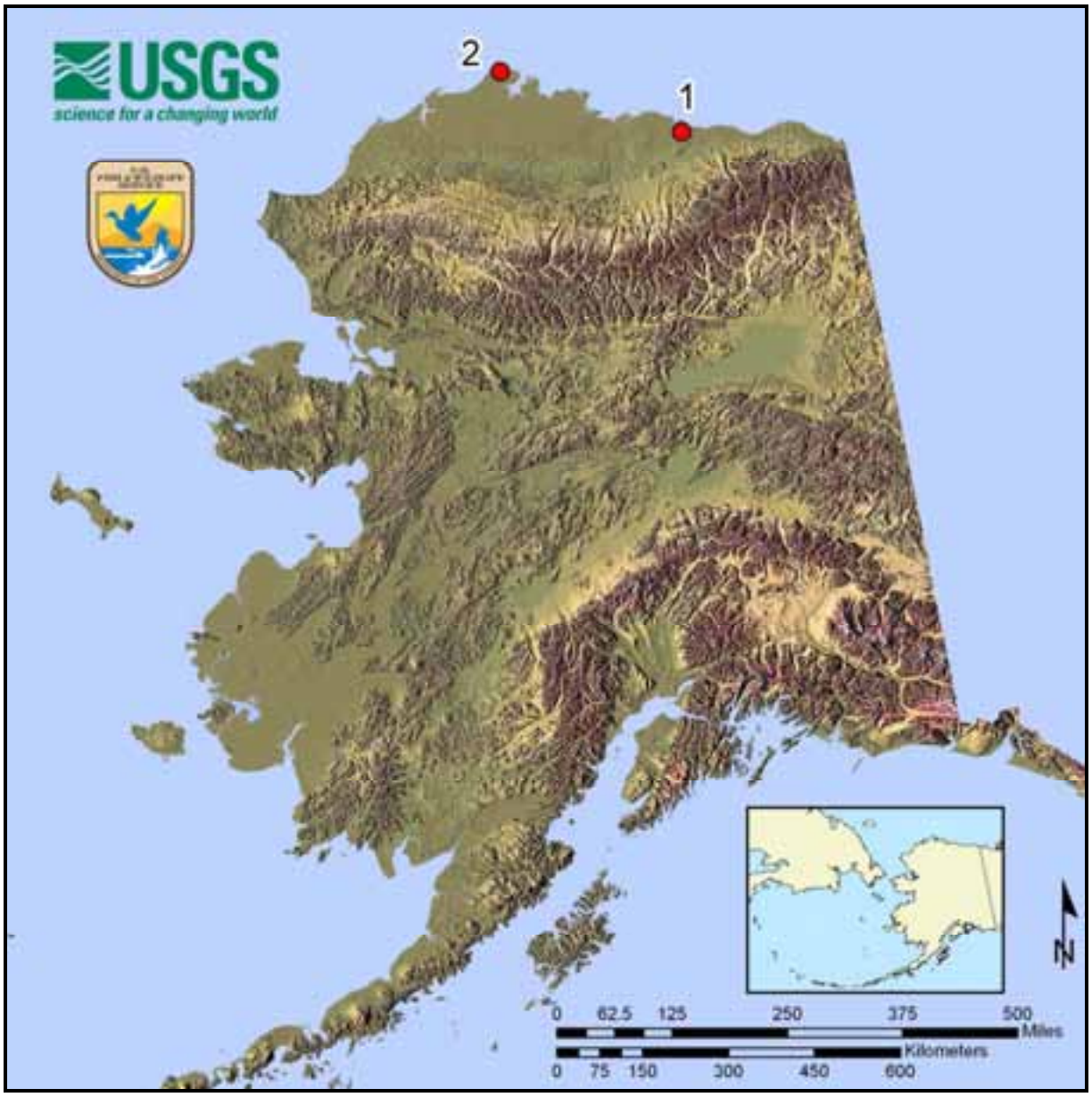
Table 62. Avian influenza analytical results for Long-billed Dowitchers collected June and July 2009: pooled and cloacal only samples.

Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Prudhoe Bay	8	0	0	0
Barrow	13	0	0	0
Total	21	0	0	0

Table 63. Comparative avian influenza results for Long-billed Dowitchers collected June and July 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	21
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		21

Figure 19. Live bird sampling locations for Long-billed Dowitchers in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	North Slope	Prudhoe Bay	8
2	North Slope	Barrow	13
	Total		**21**

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.

Ranking score: 11.5

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

Two hundred seventeen Rock Sandpipers were sampled from the Yukon Delta NWR. All samples were from live birds (Fig. 20). See discussion below and final tables present the analytical results at the end of this section.

Yukon Delta NWR

Rock Sandpipers were captured, sampled, and released at Punoarat Point near Angyoyaravak Bay on the central Yukon-Kuskokwim Delta.

Capture Methods: Post-breeding Rock Sandpipers were captured using mist nets, rocket nets, and, whoosh nets. All birds were measured, weighed, banded, and released.

Results: Two hundred seventeen Rock Sandpipers were captured and banded at Punoarat Point. Cloacal and oral-pharyngeal samples were collected (Table 64). Of those, 195 were adults and 22 were juveniles. All were unidentified for sex.

AI Results: None of the 217 pooled or cloacal samples collected from Yukon Delta Rock Sandpipers tested positive for avian influenza.

Table 64. Birds captured and both cloacal and oral-pharyngeal swabs collected from Rock Sandpipers at Punoarat Point, August and September 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Punoarat Point	217	0	0	217	217	217	217

Table 65. Avian influenza analytical results for Rock Sandpipers collected August and September 2009: pooled and cloacal only samples.

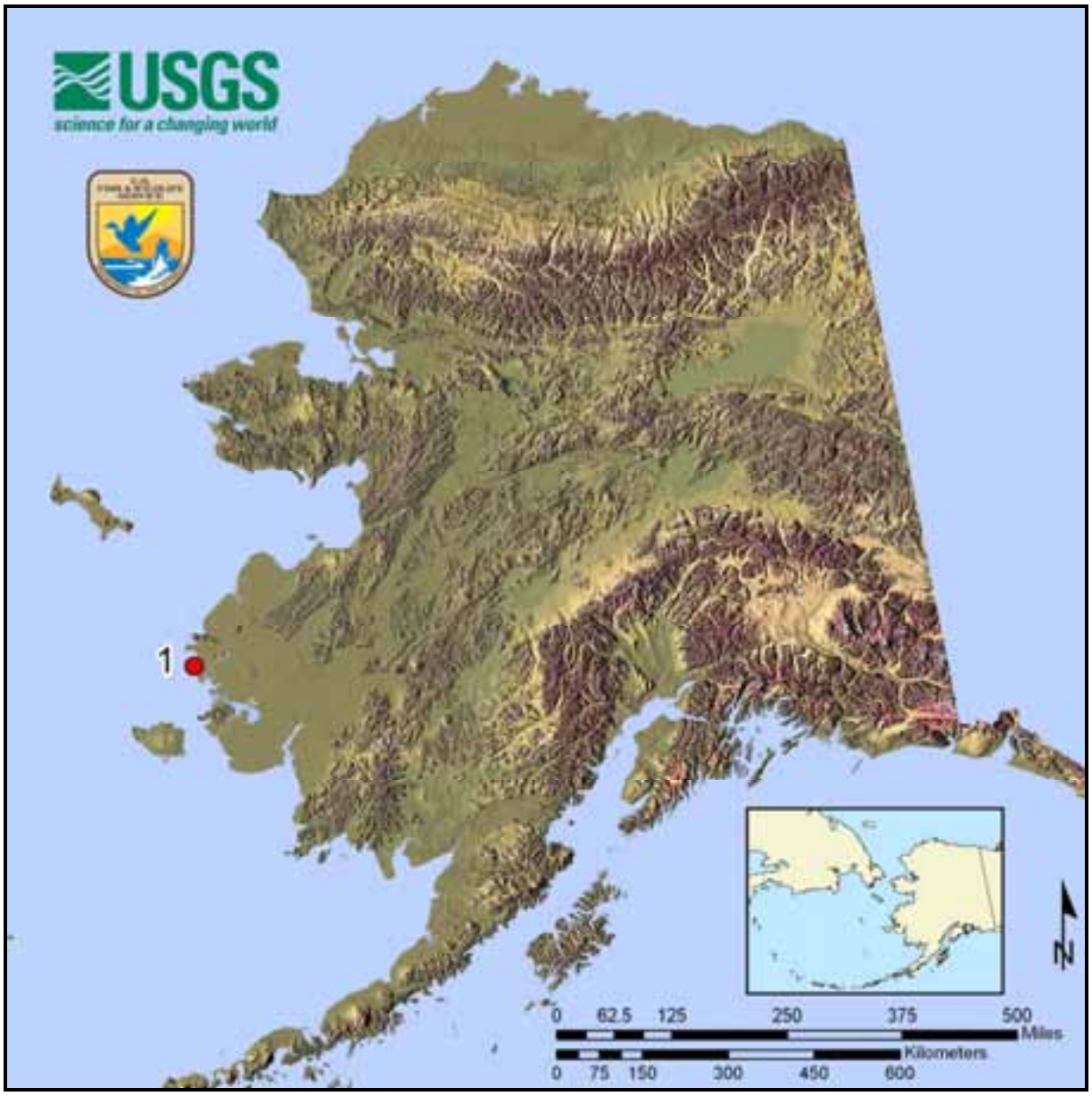
Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Punoarat Point	217	0	0	0

Table 66. Comparative avian influenza results for Rock Sandpipers collected August through September 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	217
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		217

Donna Dewhurst, USFWS

Figure 20. Live bird sampling location for Rock Sandpipers in Alaska, 2009. For specific location name see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Yukon Delta NWR	Punoarat Point	217

Taxon: Pacific Golden-Plover (Pluvialis fulva)

Justification: Pacific Golden-Plovers could potentially carry Asian H5N1 to Alaska via three different routes: 1) birds that spend the non-breeding 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 non-breeding areas with other *fulva* that have frequented Asian H5N1 "hotspots."

Ranking score: 11.5

Background: Pacific Golden-Plovers breed in tundra habitats from north central Siberia to western Alaska (Johnson and Connors 1996). One population (ca. 100,000 birds) nests in Siberia and spends the non-breeding season in East and Southeast Asia, 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 breeds in Alaska and spends the non-breeding season in Oceania (Johnson and Connors 1996), particularly in Hawaii (Johnson et al. 2004), where it associates with plovers that have recently arrived from Asia.

A total of 32 birds were sampled from three locations: Alaska Peninsula, Seward Peninsula, and the Yukon Delta NWR. Of those, 31 were live bird samples (Fig. 21), and one hunter-killed sample (see Spring Subsistence chapter). Each location is discussed separately and final tables present the analytical results at the end of this section.

Yukon Delta NWR

Pacific Golden-Plovers were sampled from Punoarat Point located on the YDNWR.

Capture Methods: Mist nets and rocket and whoosh nets were used to capture birds. All were measured, weighed, banded, and released. The passage of Sharp-tailed Sandpipers was noticeably delayed by one to two weeks compared to previous years at the same site.

Results: Four birds were sampled at Punoarat Point. Cloacal and oral-pharyngeal samples were collected (Table 67). All were juveniles, sex unidentified.

AI Results: None of the 4 pooled or cloacal samples collected from Yukon Delta Pacific Golden-Plovers tested positive for avian influenza.

Table 67. Birds captured and both cloacal and oral-pharyngeal swabs collected from Pacific Golden-Plovers at Punoarat Point, September 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	OP	Total AI samples
Punoarat Point	4	0	0	4	4	4	4

Seward Peninsula

Pacific Golden-Plovers were sampled from the Nome region located on the Seward Peninsula.

Capture Methods: A trap based on the "luchock" design, a self triggering clap-net, was used to capture birds. All were measured, weighed, banded, and released.

Results: Twenty birds were sampled in the Nome area. Cloacal and oral-pharyngeal samples were collected (Table 68). Of those, 3 were adult females, one juvenile female, 15 adult males, and one juvenile male.

AI Results: None of the 20 pooled or cloacal samples collected from Seward Peninsula Pacific Golden-Plovers tested positive for avian influenza.

Table 68. Birds captured and both cloacal and oral-pharyngeal swabs collected from Seward Peninsula, June 2009.

Location	Total birds captured	Female	Male	AI Paired samples CL	OP	Total AI samples
Nome Region	20	4	16	20	20	20

Other Accomplishments: Feathers for isotope analyses were collected from all birds and all males were equipped with a geolocator. Data collected together from the geolocators and isotope analyses will help determine wintering ground connectivity for Pacific Golden-Plovers nesting on the Seward Peninsula.

Alaska Peninsula

Pacific Golden-Plovers were sampled at Port Heiden and Lower Big Sandy on the Alaska Peninsula.

Capture Methods: Hoop traps were used to capture individual birds on the nest. All were measured, weighed, banded, and released.

Results: Seven Pacific Golden-Plovers were sampled on the Alaska Peninsula. Cloacal and oral-pharyngeal samples were collected (Table 69). Of those, two were adult females, one juvenile female, 3 adult males, and one juvenile male.

AI Results: None of the 7 pooled or cloacal samples collected from Alaska Peninsula Pacific Golden-Plovers tested positive for avian influenza.

Table 69. Birds captured and both cloacal and oral-pharyngeal swabs collected from Alaska Peninsula, May 2009.

Location	Total birds captured	Female	Male	AI Paired samples CL	AI Paired samples OP	Total AI samples
Lower Big Sandy	2	1	1	2	2	2
Port Heiden	5	2	3	5	5	5
Total	7	3	4	7	7	7

Other Accomplishments: Birds were color-banded so that any recovered or resighted birds would provide information regarding plover movements and possibly link breeding and wintering areas. Feathers were collected for genetic and isotopic studies.

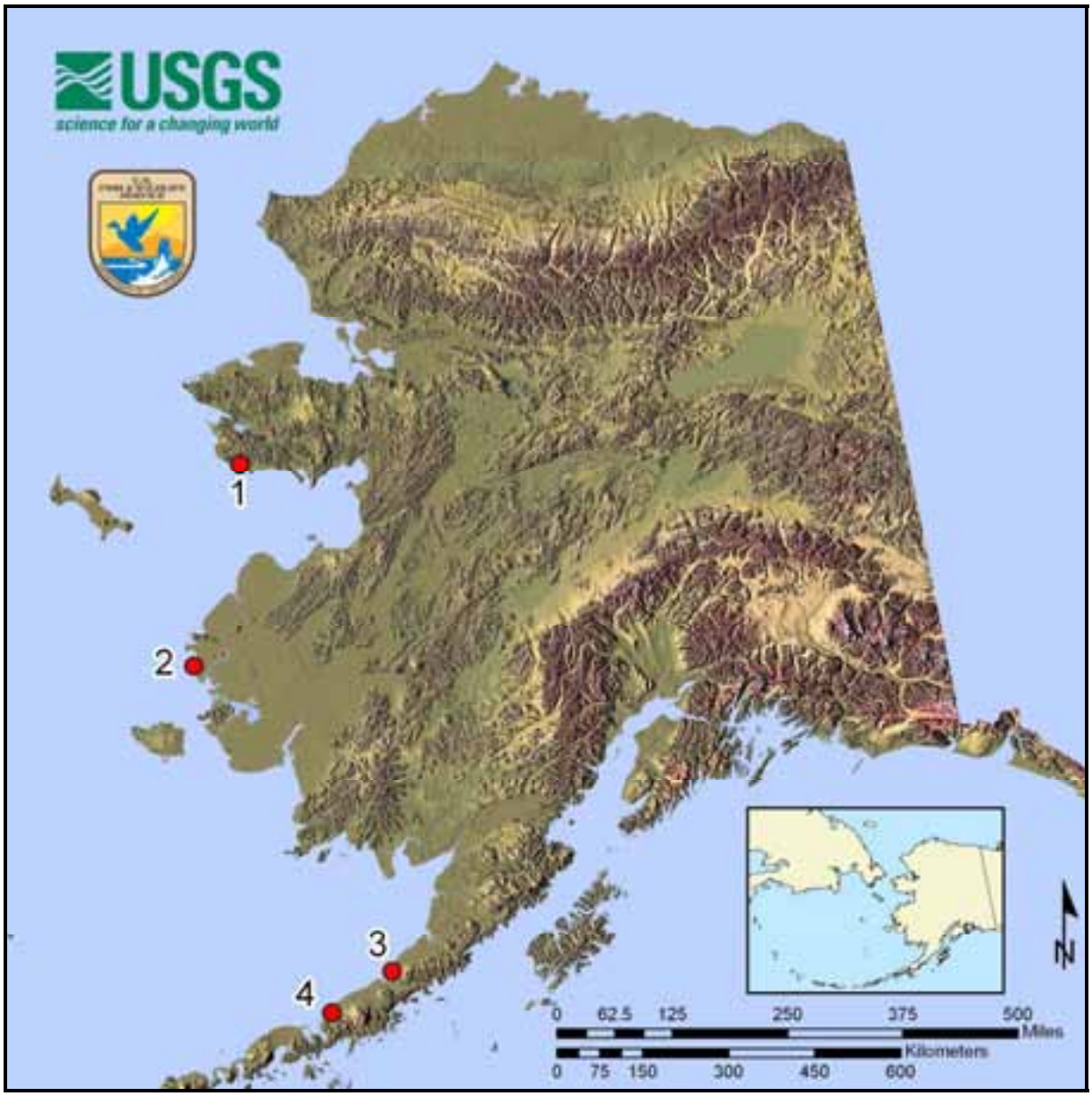
Table 70. Avian influenza analytical results for Pacific Golden-Plovers collected May, June, and September 2009: pooled and cloacal only samples.

Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Yukon Delta NWR	4	0	0	0
Seward Peninsula	20	0	0	0
Alaska Peninsula	7	0	0	0
Total	31	0	0	0

Table 71. Comparative avian influenza results for Pacific Golden-Plovers collected May, June, and September 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Totals
Negative	Negative	31
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		31

Figure 21. Live bird sampling location for Pacific Golden-Plovers in Alaska, 2009. For specific location name see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Seward Peninsula	Nome	20
2	Yukon Delta NWR	Punoarat Point	4
3	Alaska Peninsula	Lower Big Sandy	2
4	Alaska Peninsula	Port Heiden	5
	Total		**31**

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 non-breeding grounds in southern South America.

Ranking score: 10

Background: A small proportion 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). 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.

A total of 47 birds were sampled from three sites on the North Slope. Of those, 46 were live bird samples (Fig. 22), and one hunter-killed sample (see Spring Subsistence chapter). A final table with analytical results is presented at the end of this section. See discussion below.

North Slope and Arctic NWR

Buff-breasted Sandpipers were captured, sampled, and released from two sites on the North Slope and one site on the Arctic NWR. Barrow, Prudhoe Bay, and Okpilak River Delta camps are all located on the northern coastline of Alaska along the Beaufort Sea.

Capture Methods: Birds were captured using bow nets, mist nets, walk-in traps or nooses.

Results: On the North Slope, 42 Buff-breasted Sandpipers were captured and banded at Prudhoe Bay and two were captured and banded at Barrow. A total of two Buff-breasted Sandpipers was captured and banded at Okpilak River Delta on the Arctic NWR. Of those, five were adult females, 12 were adult males, 27 were adults, sex unidentified, and 2 were juveniles, sex undetermined. Cloacal and oral-pharyngeal samples were collected from 46 birds (Table 72).

AI Results: None of the 46 pooled or cloacal samples collected from the North Slope and Arctic NWR Buff-breasted Sandpipers tested positive for avian influenza.

Table 72. Birds captured and both cloacal and oral-pharyngeal swabs collected from Buff-breasted Sandpipers on the North Slope and Arctic NWR, June through August 2009.

Location	Total birds captured	Female	Male	Unk	AI Paired samples CL	AI Paired samples OP	Total AI samples
Okpilak River Delta	2	0	0	2	2	2	2
Prudhoe Bay	42	3	12	27	42	42	42
Barrow	2	2	0	0	2	2	2
Total	46	5	12	29	46	46	46

Other Accomplishments: Biometric measurements were taken on all birds to assist in determining age, sex and physiological condition.

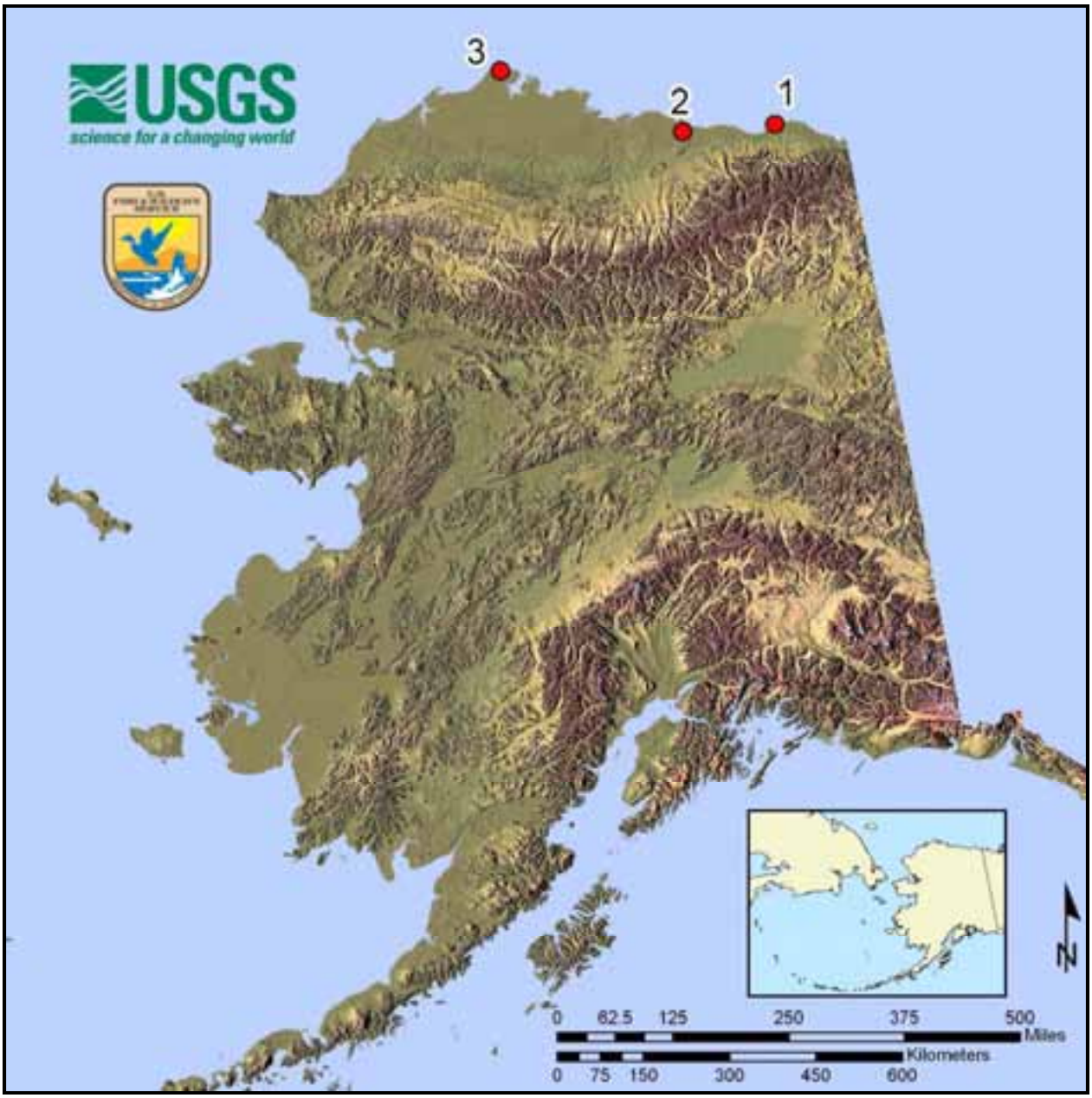
Table 73. Avian influenza analytical results for Buff-breasted Sandpipers collected June through August 2009: pooled and cloacal only samples.

Location	Total samples	Total AI Pooled positive	Total AI Cloacal positive	Prevalence
Arctic NWR	2	0	0	0
North Slope	42	0	0	0
North Slope	2	0	0	0
Total	46	0	0	0

Table 74. Comparative avian influenza results for Buff-breasted Sandpipers collected June through August 2009: pooled results and cloacal swab results.

Pooled results	Cloacal swab results	Total
Negative	Negative	46
Positive	Positive	0
Negative	Positive	0
Positive	Negative	0
Total samples tested		46

Figure 22. Live bird sampling locations for Buff-breasted Sandpipers in Alaska, 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location	Total Samples
1	Arctic NWR	Okpilak Delta	2
2	North Slope	Prudhoe Bay	42
3	North Slope	Barrow	2
	Total		**46**

Taxon: Glaucous Gull (Larus hyperboreus)

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

Ranking score: 11.5

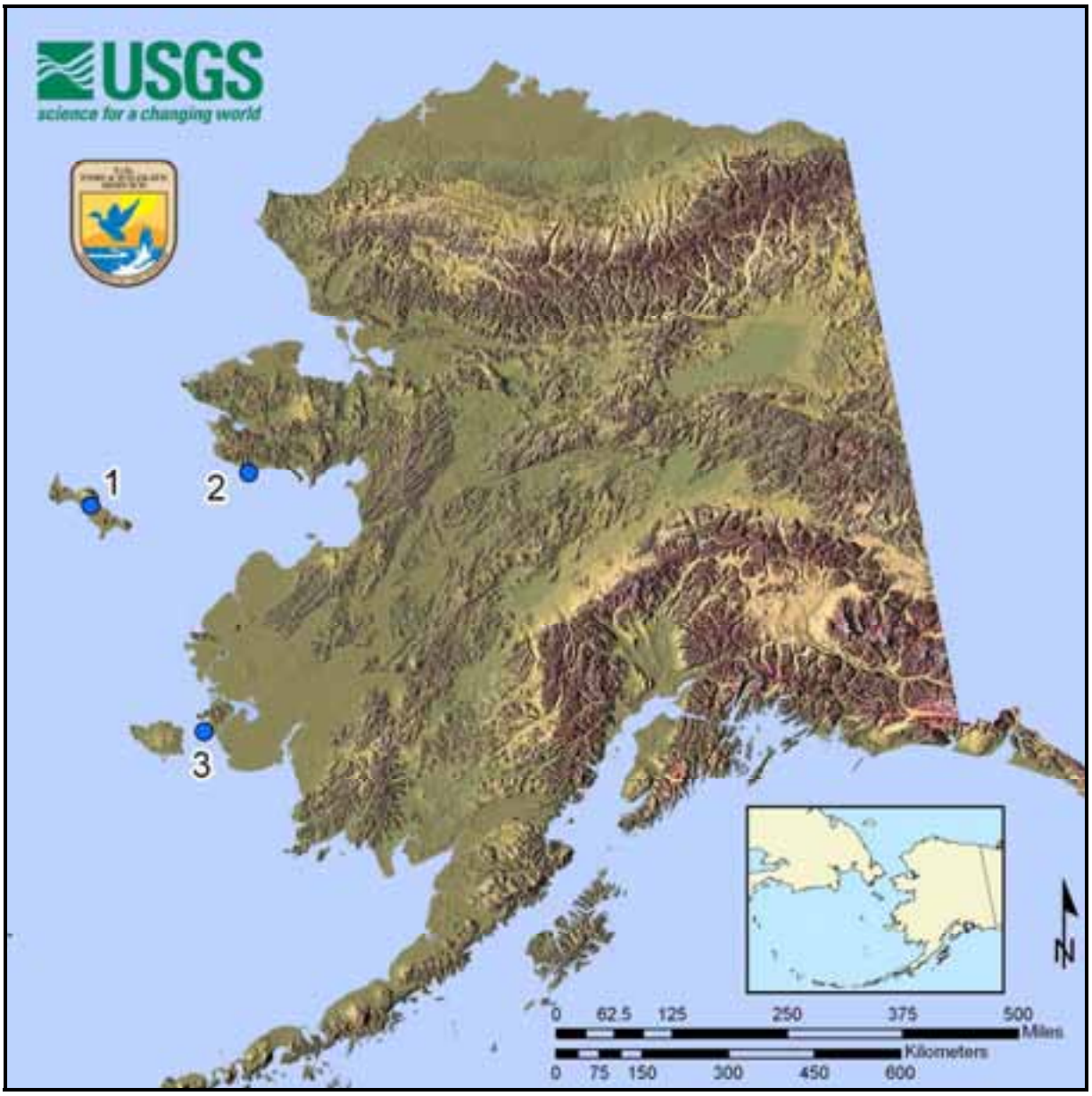
Background: The Glaucous Gull is often predatory, feeding on birds, small mammals, fish and invertebrates (Gilchrist 2001, Bowman et al. 2004). This species is circumpolar in distribution. In Alaska it breeds coastally from the central Bering Sea to the Beaufort Sea. In Russia Far East they breed in 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).

Methods: No live capture project focused on Glaucous Gulls, but samples were obtained via spring subsistence sampling (Figure 23).

Results: Sixteen Glaucous Gull samples were collected and analyzed through hunter harvest sampling (see Spring Subsistence chapter).

AI Results: None of the 16 pooled or cloacal samples collected from Glaucous Gulls tested positive for avian influenza.

Figure 23. Sampling locations for Glaucous Gulls in Alaska, 2009. For specific location names see key following map. A total of 16 samples were collected through spring subsistence harvested birds. Note: No live sampling of this species occurred. (spring subsistence = blue dots).



Site #	Geographic Location	Specific Location
1	St. Lawrence Island	Savoonga
2	Seward Peninsula	Nome
3	Yukon Delta NWR	Toksook Bay

HUNTER HARVEST SAMPLING

Background: Surveillance of hunter harvested birds was one of three sampling strategies set forth in the Alaska Interagency Sampling protocol for HPAI in wild birds. In 2009, we employed a strategy similar to 2008 which included spring subsistence harvested birds and fall hunter harvested birds. The significant annual harvest of migratory birds in Alaska presents an important opportunity to conduct surveillance sampling for AI from spring through early winter. Alaska subsistence hunters take over 350,000 migratory birds annually, mostly in rural western and northern Alaska (Paige and Wolfe 1998). The overall proportion of subsistence bird harvest taken from spring to midsummer is about 55%, and as high as 76% in major bird harvest regions (Wolfe et al. 1990). This harvest includes birds arriving from wintering areas in Asia to breed in Alaska. The species composition of spring harvested birds is very diverse and includes shorebirds, seabirds, and waterfowl; the composition and timing of harvests are highly variable among regions. Subsistence hunting also occurs from late summer into winter; most significantly in regions south of Bristol Bay, representing birds returning from breeding and molting areas in Asia, as well as birds migrating to wintering areas in southern Alaska and the Pacific Coast.

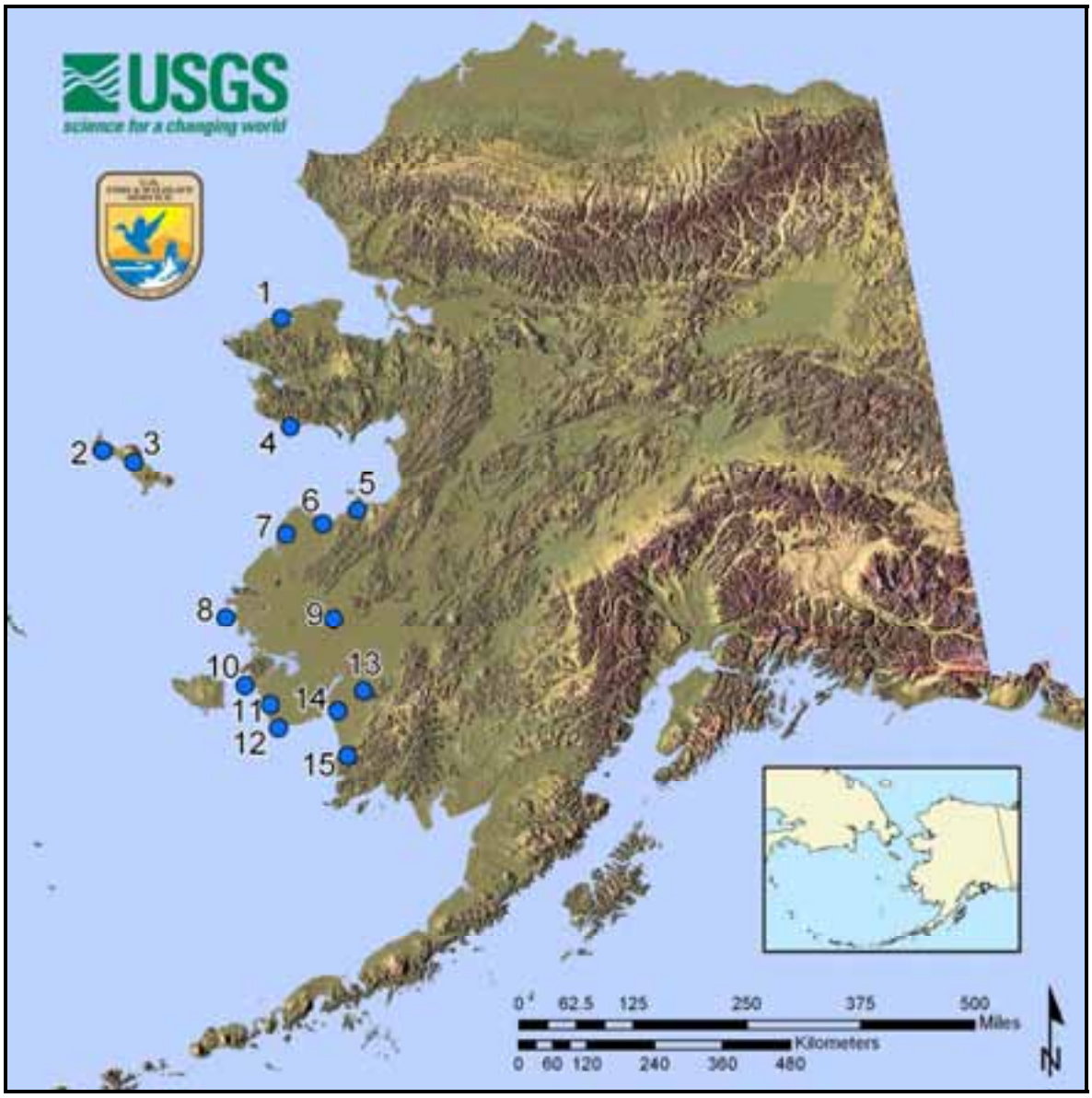
The primary value of sampling birds harvested in fall is detection of AI in birds migrating south from Alaska through Canada, all four North American flyways, and Mexico. In addition, some species of sea ducks return from Asia to winter in Alaska. The species composition and timing of fall harvest over the season are affected by the phenology of migration which is influenced by weather (e.g., winds and temperature patterns), local habitat conditions, and hunter activity. Seasonal variation in harvest (and access to AI samples) can be significant, especially with species such as pintail that have differential migrations by age and sex classes (i.e., adult males begin migration in August, females and young follow).

Spring Subsistence Sampling

Methods:

Spring Subsistence Sampling—Sampling locations (Fig. 24) for the spring subsistence harvest were chosen based on migratory routes and timing of priority species, past subsistence harvest information, and the ability to obtain samples from Native subsistence users. The YKD was the primary focus for obtaining samples from subsistence harvested birds because of the species composition and volume of the harvest. The Yukon Kuskokwim Health Corporation (YKHC) coordinated the sampling effort at ten villages (Chefornak, Eek, Emmonak, Hooper Bay, Kipnuk, Kotlik, Kwethluk, Pilot Station, Toksook Bay, Quinhagak), with each village contributing up to 300 samples of harvested birds. The USFWS contracted with Kawerak, Inc. to collect samples in three locations on the Seward Peninsula (Nome, Stebbins, and Shishmaref) and two locations on St. Lawrence Island (Gambell and Savoonga), with each location providing up to 300 spring harvested birds. In all locations, subsistence users were encouraged, through various outreach methods, to provide harvested birds to sample coordinators.

Figure 24. Spring subsistence sampling locations for H5N1 Avian Influenza in Alaska, 2009. For specific locations see key following map.



Site #	Village	Site #	Village
1	Shishmaref	9	Pilot Station
2	Gambell	10	Tooksook Bay
3	Savoonga	11	Chefornak
4	Nome	12	Kipnuk
5	Stebbins	13	Kwethluk
6	Kotlik	14	Eek
7	Emmonak	15	Quinhagak
8	Hooper Bay		

Species, age, and sex were provided in most cases, as well as an estimate of how long the bird had been dead. Samples were stored in nitrogen vapor shippers and air freighted to Anchorage on a regular basis. The majority of target species sampled during spring subsistence harvest were from King Eider and Lesser Snow Geese. However, samples from numerous other species were also collected.

Results

Yukon-Kuskokwim Delta: A total of 2,928 samples was collected and analyzed from 40 different species, 16 of which were priority species. Eighteen of the pooled and 21of the cloacal samples tested positive for avian influenza (Table 75). One Cackling Goose sample and 2 Greater White-fronted Goose samples tested positive for H5. None of the samples were N1 positive.

Craig Ely, USGS ASC

Table 75. Avian influenza results for cloacal and oral-pharyngeal swabs obtained from spring subsistence harvested birds on the Yukon Delta National Wildlife Refuge, Alaska 2009. Priority species are bolded.

Species	Samples Taken	AI Positive		Prevalence	
		Pooled	CL Only	Pooled	CL Only
American Golden-Plover	1	0	0	0	0
American Wigeon	9	0	0	0	0
Arctic Tern	1	0	0	0	0
Bar-tailed Godwit	4	0	0	0	0
Buff-breasted Sandpiper	1	0	0	0	0
Black Brant	110	0	0	0	0
Black Scoter	33	0	0	0	0
Black Turnstone	2	0	0	0	0
Bufflehead	1	0	0	0	0
Cackling Goose	579	1	1	0.002	0.002
Canvasback	4	0	0	0	0
Common Eider	85	0	0	0	0
Common Goldeneye	6	0	0	0	0
Common Merganser	17	0	0	0	0
Dunlin	3	0	0	0	0
Emperor Goose	14	0	0	0	0
Eastern Yellow Wagtail	1	0	0	0	0
Glaucous Gull	13	0	0	0	0
Greater Scaup	88	0	0	0	0
Greater White-fronted Goose	999	14	16	0.014	0.016
Glaucous-winged Gull	5	0	0	0	0
Green-winged Teal	8	0	0	0	0
King Eider	422	1	1	0.002	0.002
Lapland Longspur	2	0	0	0	0
Long-billed Dowitcher	5	0	0	0	0
Lesser Scaup	6	0	0	0	0
Lesser Snow Goose	171	0	1	0	0.006
Long-tailed Duck	21	0	0	0	0
Mallard	31	0	0	0	0
Mew Gull	1	0	0	0	0
Northern Pintail	68	0	0	0	0
Northern Shoveler	17	0	0	0	0
Pacific Golden-Plover	1	0	0	0	0
Pectoral Sandpiper	13	0	0	0	0
Ruddy Duck	1	0	0	0	0
Sandhill Crane	81	0	0	0	0
Sabine's Gull	7	0	0	0	0
Surf Scoter	13	0	0	0	0
Tundra Swan	80	2	2	0.025	0.025
Willow Ptarmigan	4	0	0	0	0
Total	**2928**	**18**	**21**		

Seward Peninsula: A total of 691 samples was collected and analyzed from 27 different species, 11 of which were priority species. Two of the pooled and two of the cloacal samples tested positive for avian influenza virus (Table 76). None of the samples were H5 or N1 positive.

Table 76. Avian influenza results for cloacal and oral-pharyngeal swabs obtained from spring subsistence harvested birds on the Seward Peninsula, Alaska 2009. Priority species are bolded.

Species	Samples Taken	AI Positive		Prevalence	
		Pooled	CL only	Pooled	CL only
American Wigeon	20	0	0	0	0
Arctic Tern	6	0	0	0	0
Bar-tailed Godwit	13	0	0	0	0
Black Brant	39	0	0	0	0
Cackling Goose	34	0	0	0	0
Common Eider	18	0	0	0	0
Common Snipe	43	0	0	0	0
Dunlin	1	0	0	0	0
Emperor Goose	2	0	0	0	0
Glaucous Gull	1	0	0	0	0
Greater Scaup	5	0	0	0	0
Greater White-fronted Goose	106	1	1	0.009	0.009
Green-winged Teal	8	0	0	0	0
Lesser Snow Goose	283	0	0	0	0
Long-tailed Duck	6	0	0	0	0
Mallard	4	0	0	0	0
Northern Pintail	22	1	1	0.045	0.045
Northern Shoveler	6	0	0	0	0
Red-breasted Merganser	17	0	0	0	0
Red-necked Grebe	2	0	0	0	0
Red-throated Loon	2	0	0	0	0
Ruddy Turnstone	2	0	0	0	0
Sandhill Crane	7	0	0	0	0
Slaty-backed Gull	10	0	0	0	0
Short-eared Owl	1	0	0	0	0
Tundra Swan	9	0	0	0	0
Unidentified Gull	1	0	0	0	0
Unidentified Shorebird	22	0	0	0	0
Whimbrel	1	0	0	0	0
Grand Total	**691**	**2**	**2**		

St. Lawrence Island: A total of 461 samples was collected and analyzed from 22 different species; 8 of which were priority species. Two of the pooled and two of the cloacal samples were positive for avian influenza (Table 77). None of the samples were H5 or N1 positive.

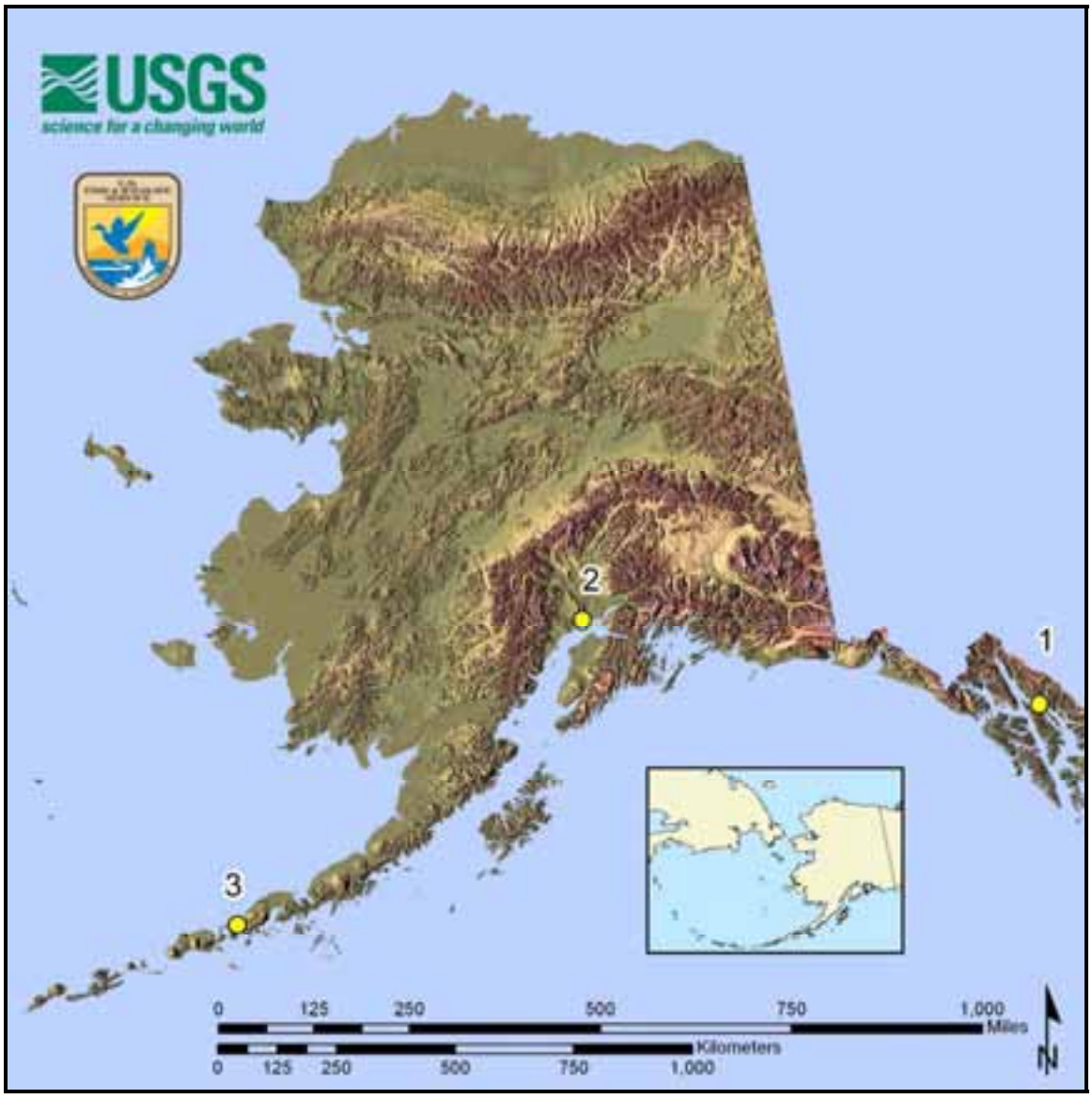
Table 77. Avian influenza results for cloacal and oral-pharyngeal swabs obtained from spring subsistence harvested birds on St. Lawrence Island, Alaska 2009. Priority species are bolded.

Species	**Samples Taken**	**AI Positive**		**Prevalence**	
		Pooled	**CL only**	**Pooled**	**CL only**
Bean Goose	2	0	0	0	0
BLBR: Black Brant	1	0	0	0	0
Cackling Goose	1	0	0	0	0
Common Eider	5	0	0	0	0
Common Murre	162	1	1	0.006	0.006
Crested Auklet	197	0	0	0	0
Dovekie	1	0	0	0	0
Glaucous Gull	2	0	0	0	0
Green Sandpiper	2	0	0	0	0
Ivory Gull	1	0	0	0	0
King Eider	6	0	0	0	0
Least Auklet	4	0	0	0	0
Long-tailed Duck	1	0	0	0	0
Northern Pintail	3	0	0	0	0
Northern Shoveler	1	0	0	0	0
Pelagic Cormorant	7	0	0	0	0
Red-necked Phalarope	21	0	0	0	0
Red-throated Loon	1	0	0	0	0
Sandhill Crane	2	0	0	0	0
Spectacled Eider	2	0	0	0	0
Thick-billed Murre	4	0	0	0	0
Unidentified Duck	1	1	1	1.000	1.000
Unidentified Gull	4	0	0	0	0
Unidentified Shorebird	3	0	0	0	0
Whiskered Auklet	27	0	0	0	0
Grand Total	**461**	**2**	**2**		

Fall Harvest Sampling

Fall Harvest Sampling—Sampling locations (Fig. 25) were chosen to maximize contacts with hunters for access to adequate samples of harvested birds. Thus, sampling was focused on primary access points during peak periods of hunting at Izembek NWR, Cook Inlet state game refuge, and Mendenhall State Game Refuge in Juneau. Hunters were informed about AI sampling and asked for cooperation through agency media releases, local flyers, and brochures about the surveillance program. Hunters were contacted in the field by agency personnel. Cloacal and oral-pharyngeal samples and bird data were obtained from whole carcasses or field dressed birds deemed suitable for sampling. In some cases, field technicians were not skilled in age and sex determination of birds, or encountered very busy periods when supplemental data could not be obtained. A total of 519 fall harvest samples were collected from three geographic location, Cook Inlet, Izembek National Wildlife Refuge, and Southeast Alaska. Each location is discussed separately and final tables present analytical results below.

Figure 25. Fall harvest sampling locations in Alaska 2009. For specific location names see key following map.



Site #	Geographic Location	Specific Location
1	Mendenhall Wetlands State Game Refuge	Mendenhall Wetlands
2	Cook Inlet	Susitna Flats and Palmer Hay Flats
3	Alaska Peninsula	Izembek NWR

Results

Mendenhall Wetlands

Mendenhall Flats, along Gastineau Channel, is one of the largest intertidal marshes in Southeast Alaska and a staging area for fall migrant waterfowl. This area is mostly within Mendenhall Wetlands State Game Refuge inside the city of Juneau and is an important fall hunting area. Average annual harvest includes about 4-5,000 ducks, some Canada Geese, and sea ducks that use the surrounding marine waters. The relatively small area and intertidal character of Mendenhall Flats resulted in lower duck harvest rates. Pintails comprised only a small proportion of the harvest, with Green-winged Teal and American Wigeon representing the primary dabbling ducks in early September.

Results: A total of 88 samples was taken from harvested birds on the refuge (Table 76). Of those, sixteen of the pooled and 18 of the cloacal samples tested positive for avian influenza. The pooled samples represent a prevalence of 18.2 % for avian influenza in the samples from the Mendenhall Wetlands fall hunter harvest samples. The cloacal samples represent a prevalence of 20.4 % for avian influenza in the Mendenhall Wetlands fall hunter harvest samples. None of the samples were H5 or N1 positive.

Table 78. Avian influenza results for cloacal and oral-pharyngeal swabs collected from hunter-shot birds on Mendenhall Wetlands State Game Refuge, September 2009. Priority species are bolded.

Species	**Samples Taken**	**AI Positive**		**AI Prevalence**	
		Pooled	**CL only**	**Pooled**	**CL only**
American Wigeon	12	0	0	0	0
Green-winged Teal	56	10	12	0.178	0.214
Mallard	11	5	5	0.454	0.454
Northern Pintail	5	0	0	0	0
Northern Shoveler	3	1	1	0.333	0.333
Ring-necked Duck	1	0	0	0	0
Grand Total	**88**	**16**	**18**		

Cook Inlet: Susitna Flats State Game Refuge, within 40 km of Anchorage is one of the most heavily hunted waterfowl areas in Alaska and hosted hundreds of hunters over a 3-day opening weekend. Historically, this area annually produce about 15,000 ducks, including pintails early in the season and primarily mallards later. The species composition of ducks in the early season is quite variable by year. In 2009, hunter success on Cook Inlet marshes was average to poor depending on specific location. The majority of samples were obtained from the Cottonwood Creek access area on Palmer Hay Flats State Game Refuge. Hunter success on Susitna Flats State Game Refuge was poor and hunter activity was minimal, therefore the total target goal of 200 samples was not reached.

Results: A total of 181 AI samples was obtained from the Cook Inlet refuge (Table 77). Twenty-seven of the pooled and 28 of the cloacal samples collected from the Cook Inlet refuges birds tested positive for avian influenza. The pooled samples represent a prevalence of 15.0 % for avian influenza in the Cook Inlet fall hunter harvest birds. The cloacal samples represent a prevalence of 15.5 % for avian influenza in the Cook Inlet fall hunter harvest birds. None of the samples were H5 or N1 positive.

Table 79. Avian influenza results for cloacal and oral-pharyngeal swabs obtained from hunter-shot birds on Cook Inlet Coastal Marshes, September 2009. Priority species are bolded.

Species	**Samples Taken**	**AI Positive**		**AI Prevalence**	
		Pooled	**CL only**	**Pooled**	**CL only**
American Wigeon	15	1	1	0.066	0.066
Barrows Goldeneye	1	0	0	0	0
Canvasback	3	0	0	0	0
Gadwall	13	0	0	0	0
Greater Scaup	7	0	0	0	0
Lesser Scaup	4	0	0	0	0
Green-winged Teal	20	1	1	0.05	0.05
Mallard	76	17	18	0.224	0.237
Northern Pintail	33	6	6	0.182	0.182
Northern Shoveler	9	2	2	0.222	0.222
Grand Total	**181**	**27**	**28**		

Izembek NWR: A total of 250 AI samples was obtained from Cold Bay during September and October (Table 78). Of those, twelve of the pooled and 13 of the cloacal samples collected from Northern Pintails tested positive for avian influenza. The pooled samples represent a prevalence of 4.8 % for avian influenza in the Izembek NWR fall hunter harvest samples. The cloacal samples represent a prevalence of 5.2 % for avian influenza in the Izembek NWR fall hunter harvest samples. Three of the samples collected from Northern Pintails tested positive for H5. None of the samples were N1 positive.

Table 80. Avian influenza results for cloacal and oral-pharyngeal swabs obtained from hunter-shot birds on Izembeck National Wildlife Refuge, September and October 2009. Priority species are bolded.

Species	**Samples Taken**	**AI Positive**		**AI Prevalence**	
		Pooled	**CL only**	**Pooled**	**CL only**
Black Brant	207	0	1	0	0.005
Green-winged Teal	7	1	1	0.143	0.143
Northern Pintail	36	11	11	0.305	0.305
Grand Total	**250**	**12**	**13**		

Morbidity and Mortality

There were no morbidity or mortality events in Alaska in 2009. In total, 24 individual carcasses were tested; twenty-two were sent to the NWHC for necropsy and HPAI testing and two were sent to the Alaska Environmental Health Laboratory. None of these birds were positive for avian influenza.

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