Wild Birds and Avian Influenza

Avian Influenza
Principal Investigators Meeting
February 6-7, 2008

Wild Birds and Avian Influenza:

- Global Perspective
  - Overview of World Situation
  - What We Have Learned
- The Alaska Perspective
  - Surveillance Program Review
  - Results of 2006-2007

The Global Perspective: HPAI H5N1

61 countries world wide*

26 countries in Europe

11 countries – African Region

8 countries – Near East Region

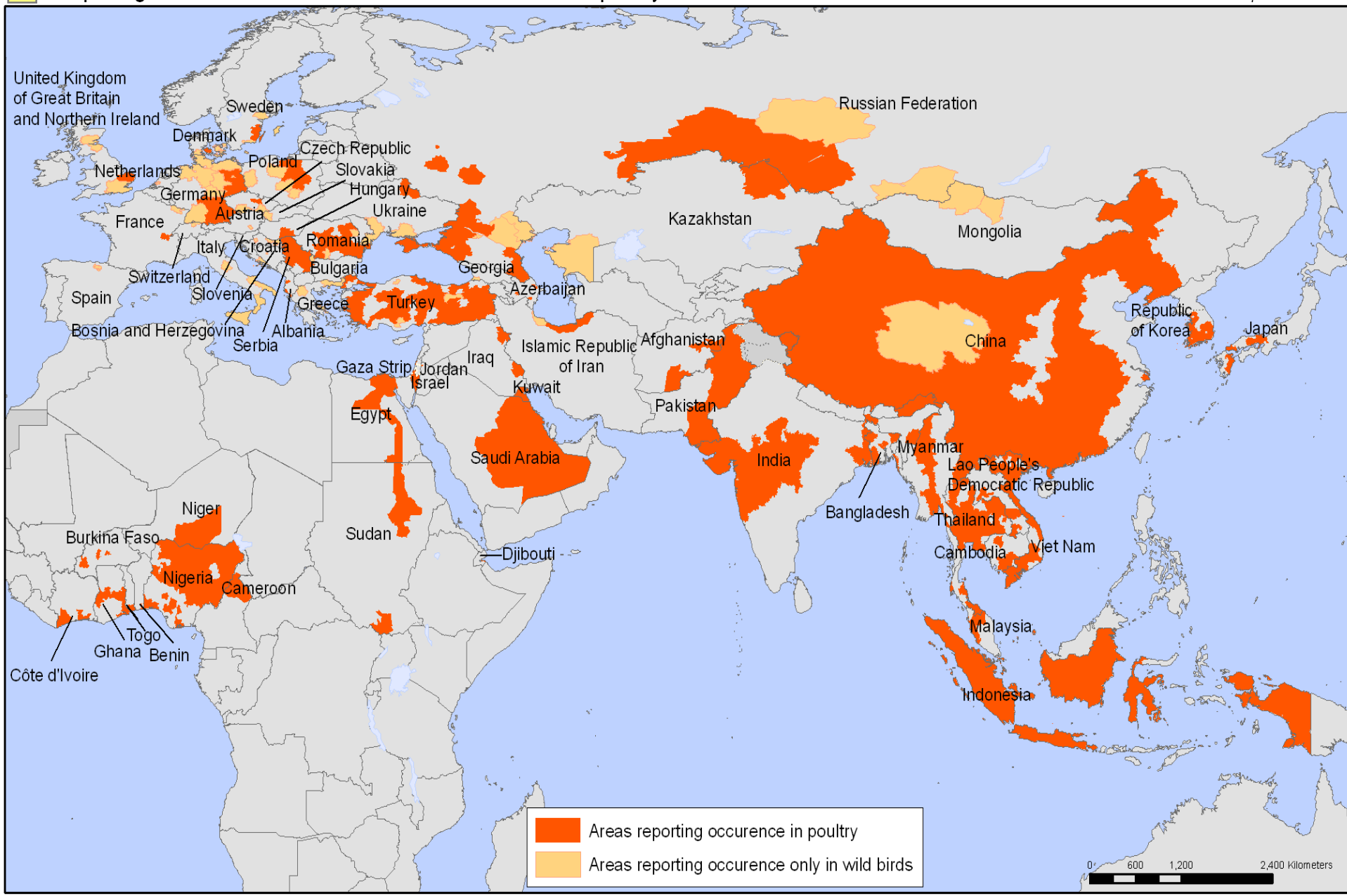
16 countries – Asian Region

No cases of HPAI H5N1 have been reported in North America

*as of Jan 2008

Areas reporting confirmed occurrence of H5N1 avian influenza in poultry and wild birds since 2003

Status as of 18 January 2008
Latest available update

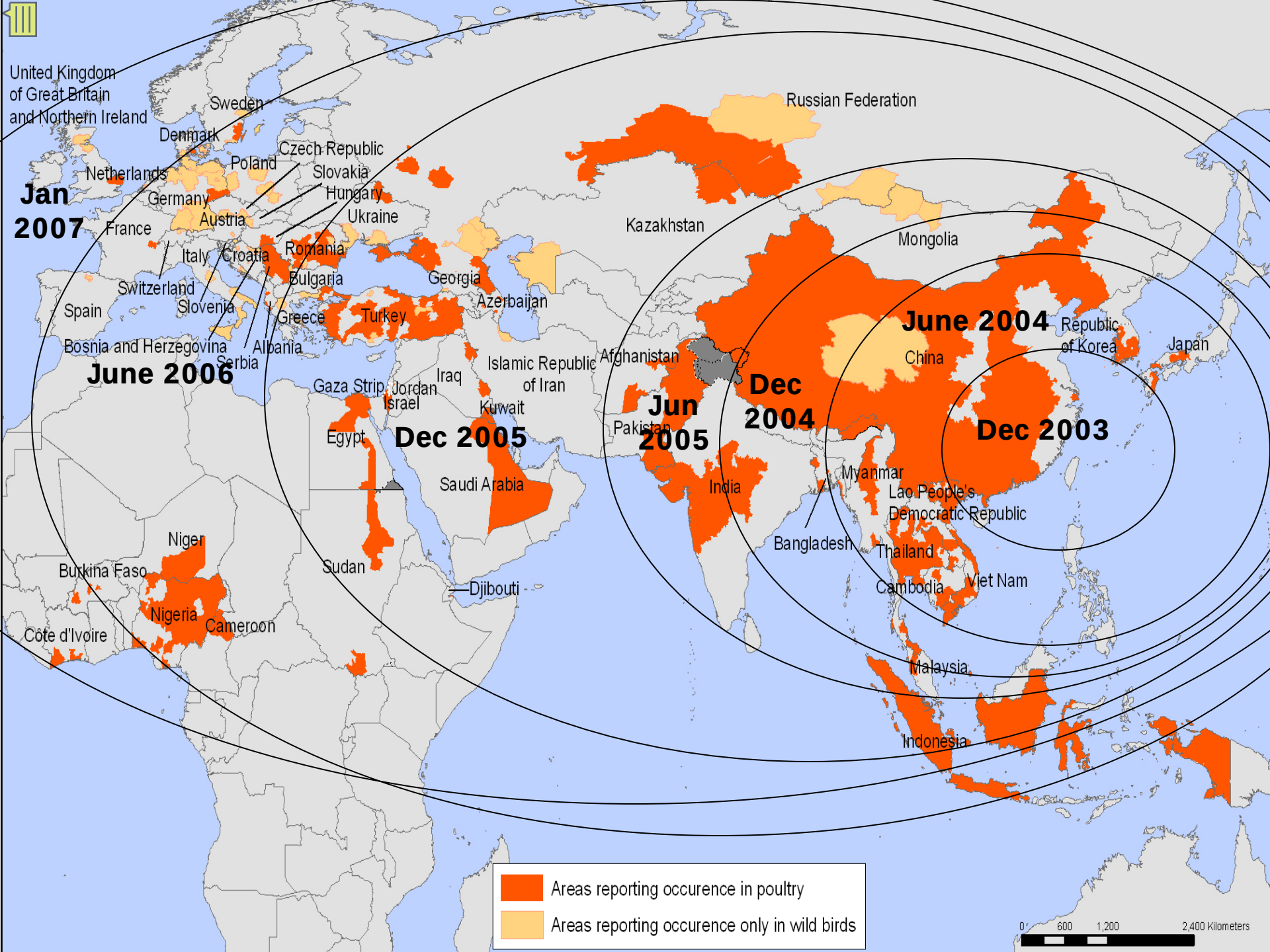


World Health Organization

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

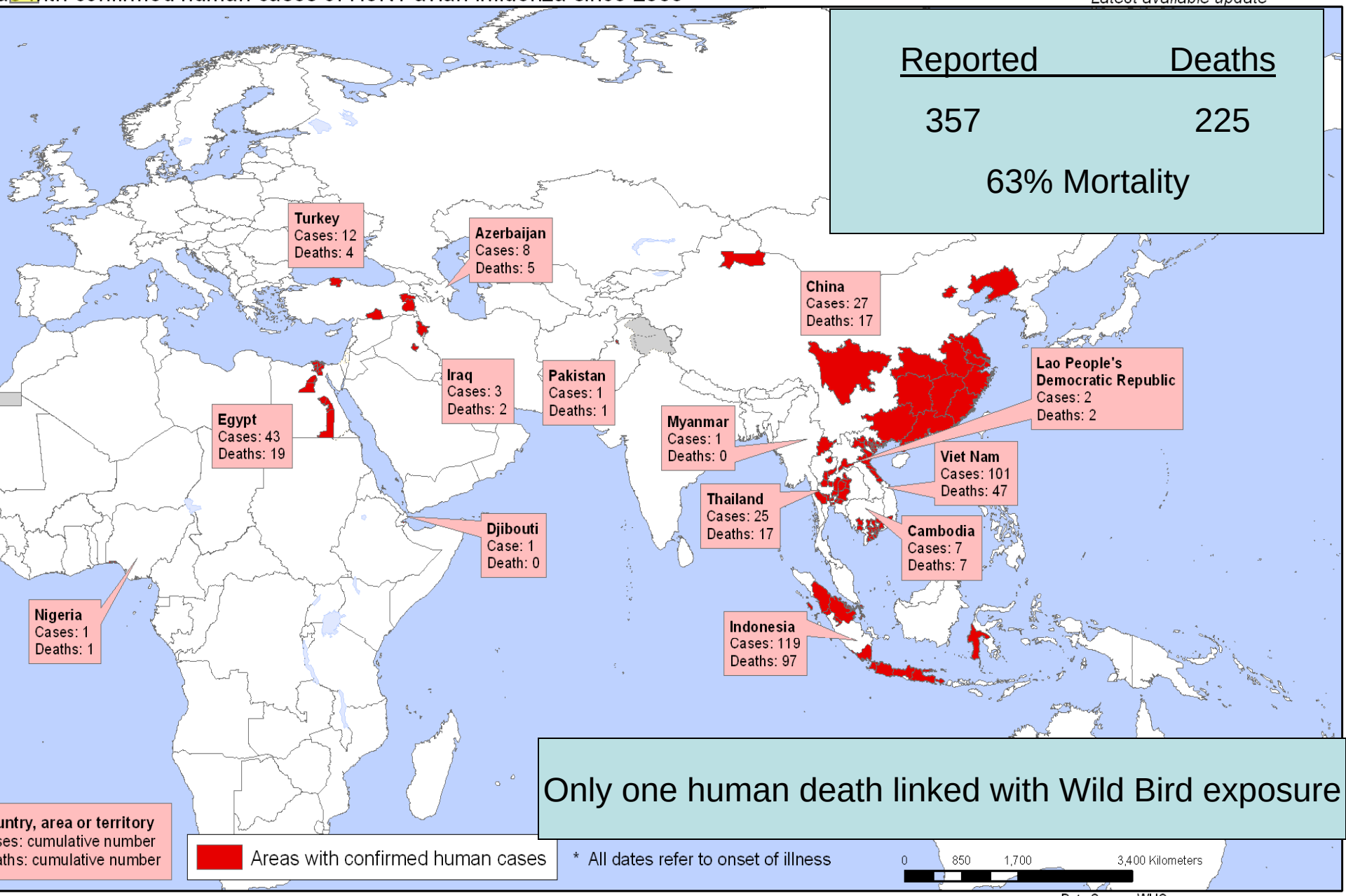
Data Source: World Organisation for Animal Health (OIE) and national governments

Map Production: Public Health Mapping and GIS
World Health Organization


United Kingdom of Great Britain and Northern Ireland
Sweden
Denmark
Netherlands
Poland
Czech Republic
Slovakia
Hungary
Germany
Austria
Ukraine
France
Italy
Croatia
Romania
Bulgaria
Switzerland
Slovenia
Spain
Greece
Turkey
Georgia
Azerbaijan
Bosnia and Herzegovina
Serbia
Albania
Russian Federation
Kazakhstan
Mongolia
China
Republic of Korea
Japan
Afghanistan
Pakistan
Islamic Republic of Iran
Iraq
Gaza Strip
Jordan
Israel
Kuwait
Egypt
Saudi Arabia
India
Myanmar
Lao People's Democratic Republic
Bangladesh
Thailand
Cambodia
Viet Nam
Malaysia
Indonesia
Niger
Burkina Faso
Nigeria
Cameroon
Côte d'Ivoire
Sudan
Djibouti
Jan 2007
June 2006
Dec 2005
Jun 2005
Dec 2004
June 2004
Dec 2003
Areas reporting occurence in poultry
Areas reporting occurence only in wild birds
0
600
1,200
2,400 Kilometers

as with confirmed human cases of H5N1 avian influenza since 2003 *

Status as of 21 January 2008
Latest available update

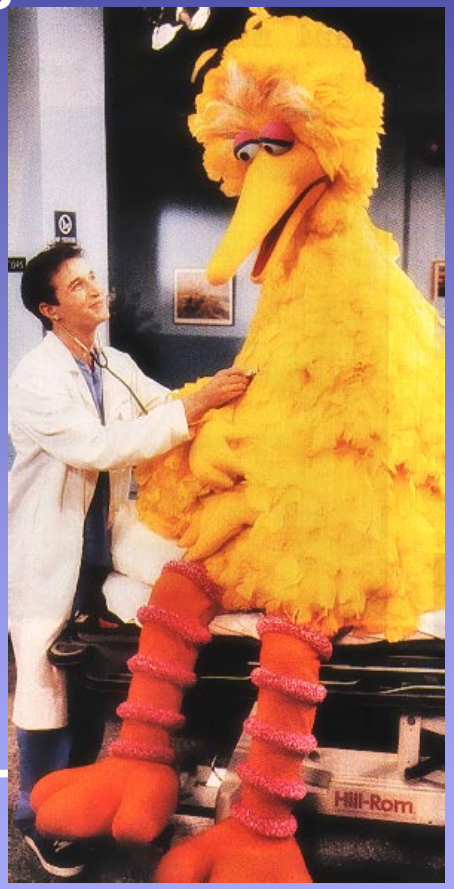


Data Source: WHO
Map Production: Public Health Mapping and GIS
World Health Organization

Historical Perspective

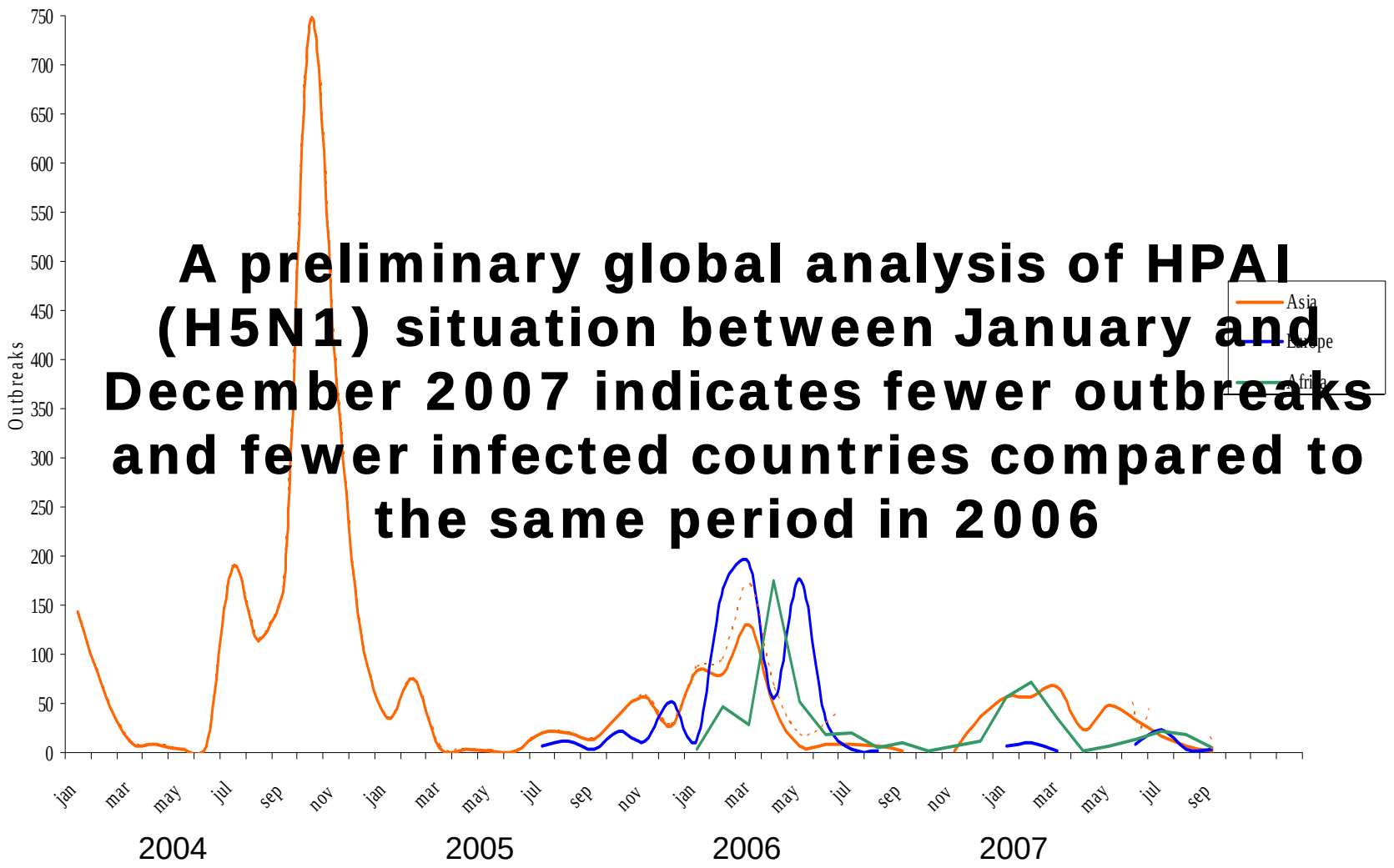
Since 1959 - 24 major HPAI outbreaks

- Generally controlled by culling
- 23 million head of poultry involved
- 400 human cases, 1 death



- Recent Events:
- Since 1999, > 300 million birds died or culled in an attempt to control H5N1
- 367 human cases, 225 deaths

The Epidemic Curve



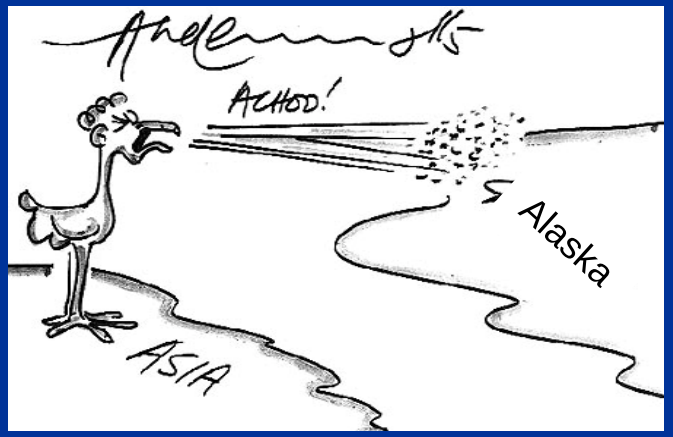
Newman 2008 Victims and Vectors

Wild Birds and Avian Influenza: What Have We Learned

H5N1: Global Disease Transmission

- How the virus is transmitted between domestic and wild birds is poorly understood, but data suggests that the disease can move in both directions

- An H5N1 HPAI wild bird “reservoir” species has not been found



Newman 2008 Victims and Vectors

H5N1:UN-FAO Global Live Bird Surveillance

~350K wild bird samples from Africa, the Americas, Asia, & Europe during 2005-2007 have been negative for H5N1 HPAI virus

- Positive H5N1 HPAI wild birds have been reported
  - Poyang Lake China (6 ducks)
  - Henan province, China (38 tree sparrows)
  - Russia (1 Great Crested Grebe)
  - Egypt (1 grebe and 1 duck)
  - Europe/Asia (Unconfirmed reports of positive birds (n=5)

Newman 2008 Victims and Vectors

H5N1: UN-FAO Wild Birds Found Dead

- Over 90 species from 14 orders of birds have been found to be positive for H5N1

- Mute swans (*Cygnus olor*) are a large, visible, mainly non-migratory species in Europe and parts of East Asia that appear to be susceptible to H5N1 HPAI

Newman 2008 Victims and Vectors

H5N1: Global Wild Bird Mortality Events

- The only reported major die off incident involved over 6,000 migratory wild birds at Qinghai Lake, China (2005)

- In Europe H5N1 was detected in >700 dead wild birds from 13 countries (over a four month period 05-06)

- In Asia – small numbers of dead wild birds with H5N1 have been reported in 12 of 23 countries with H5N1

- In Africa – small numbers of wild birds of very few species have been reported in 5 of 10 countries with H5N1

Newman 2008 Victims and Vectors

HPAI H5N1: Global Conclusions

- 2007 was a general improvement over 2006, but the virus is still spreading geographically

- Areas endemic with H5N1 HPAI; Indonesia, Egypt, Nigeria, Black Sea Basin, & Bangladesh

- Other areas having resurgence of disease; Vietnam, China, Pakistan, Afghanistan

- Infection persists in three continents (Asia, Africa and Europe)

Wild Birds and Avian Influenza: The Alaska Perspective

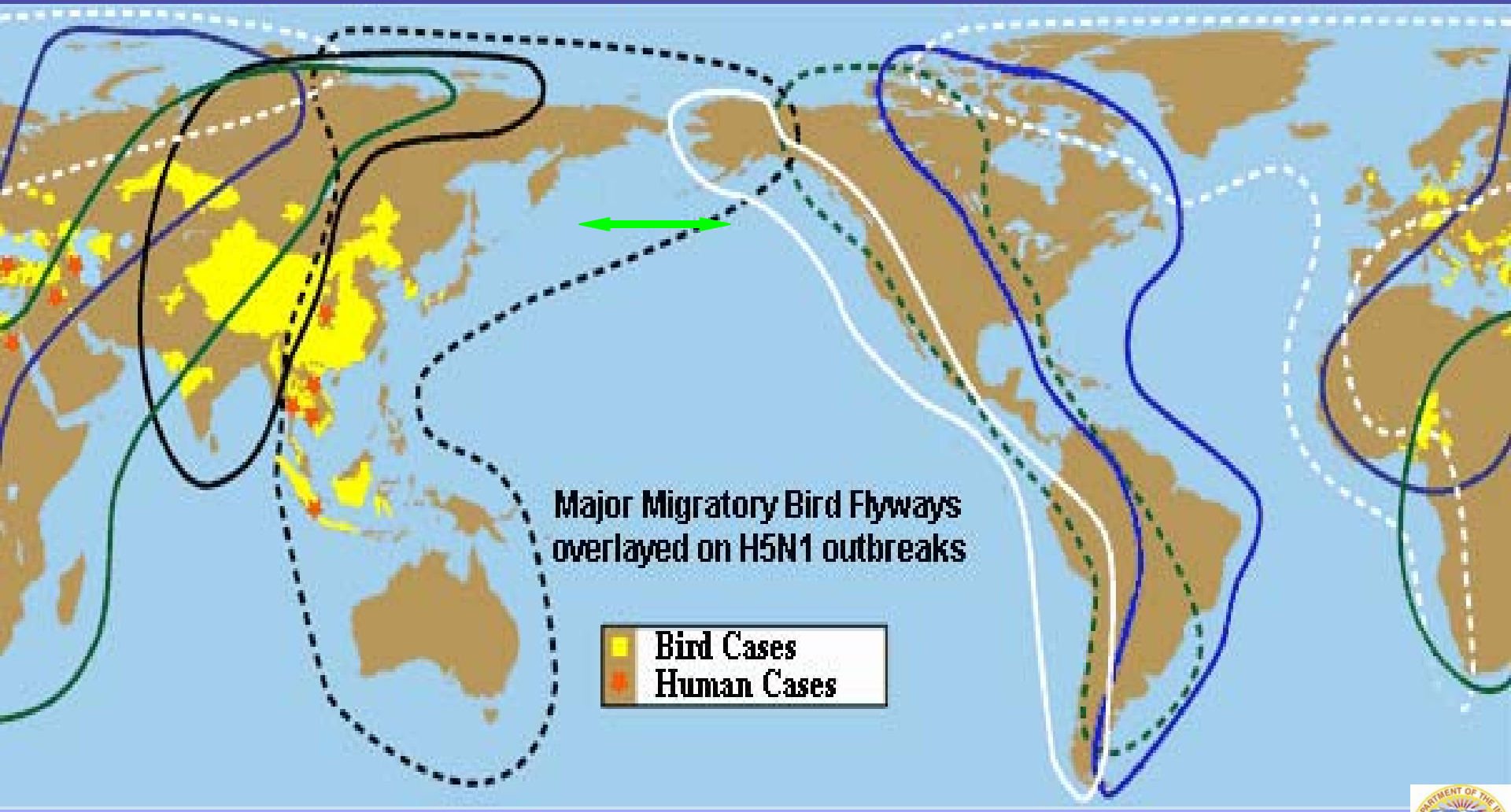
Interagency Strategic Plan to Detect Highly Pathogenic Avian Influenza in Wild Birds: 2006-2007

U.S. Interagency Strategic Plan

Recommended Strategies

- Live-bird surveillance
- Hunter harvest surveillance
- Investigation of bird morbidity/mortality
- Sentinel animals
- Environmental sampling

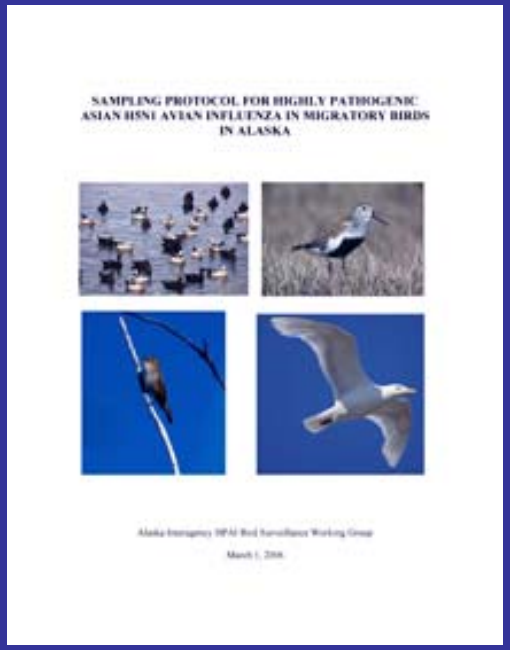
Why Alaska is a Priority



Over 6 million birds from > 32 species migrate between Alaska and Asia

Early Detection and Monitoring Activities in Alaska

- **Spring Subsistence Harvest**
  - Partners with AK Native agencies and others
- **Live Birds**
  - USGS, USFWS, ADF&G
- **Fall Harvest**
  - ADF&G and USFWS
- **Morbidity/Mortality Events**



Criteria for Primary Target Species in Alaska

- Proportion of population occurring in Asia
- Contact with a known hotspot
- Habitat use contributes to likelihood of exposure
- Population size occurring in Alaska
- Can we obtain a representative sample

Annual Range and Migration Corridor

Priority Species

Gulls and Terns

- Aleutian Tern
- Glaucous-winged Gull
- Glaucous Gull

Landbirds

- Lesser Sandhill Crane
- Eastern Yellow Wagtail
- Arctic Warbler
- Gray-cheeked Thrush

Shorebirds

- Dunlin
- Sharp-tailed Sandpiper
- Bar-tailed Godwit
- Ruddy Turnstone
- Pectoral Sandpiper
- Red Knot
- Long-billed Dowitcher
- Rock Sandpiper
- Pacific Golden-Plover
- Buff-breasted Sandpiper

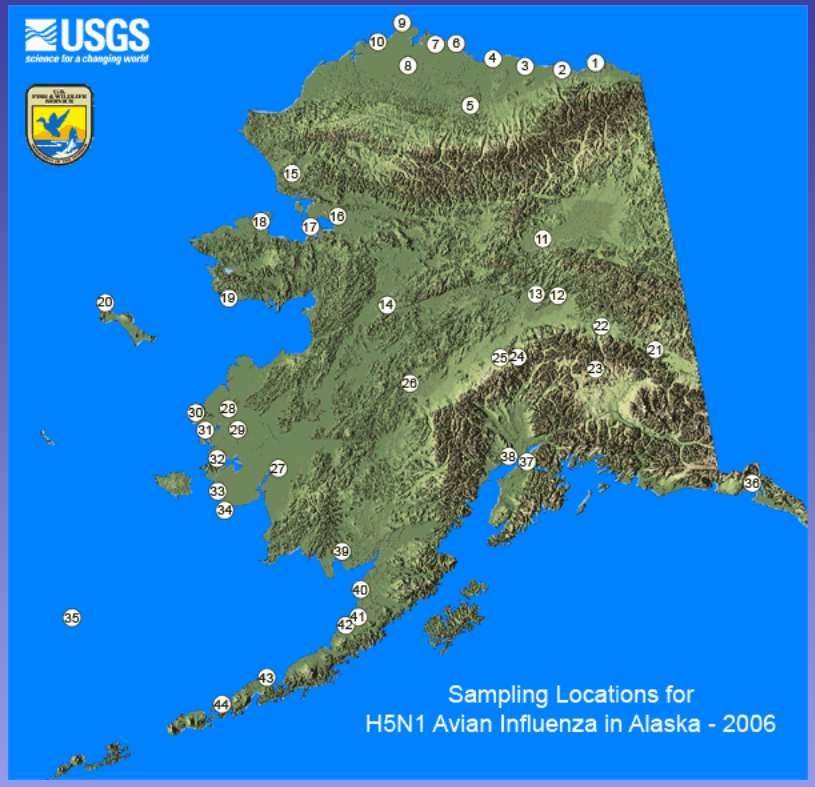
Waterfowl

- Steller's Eider
- Northern Pintail
- Lesser Snow Goose
- Emperor Goose
- Spectacled Eider
- Black Brant
- Tundra Swan
- Long-tailed Duck
- Aleutian Cackling Geese
- Pacific Common Eider
- King Eider

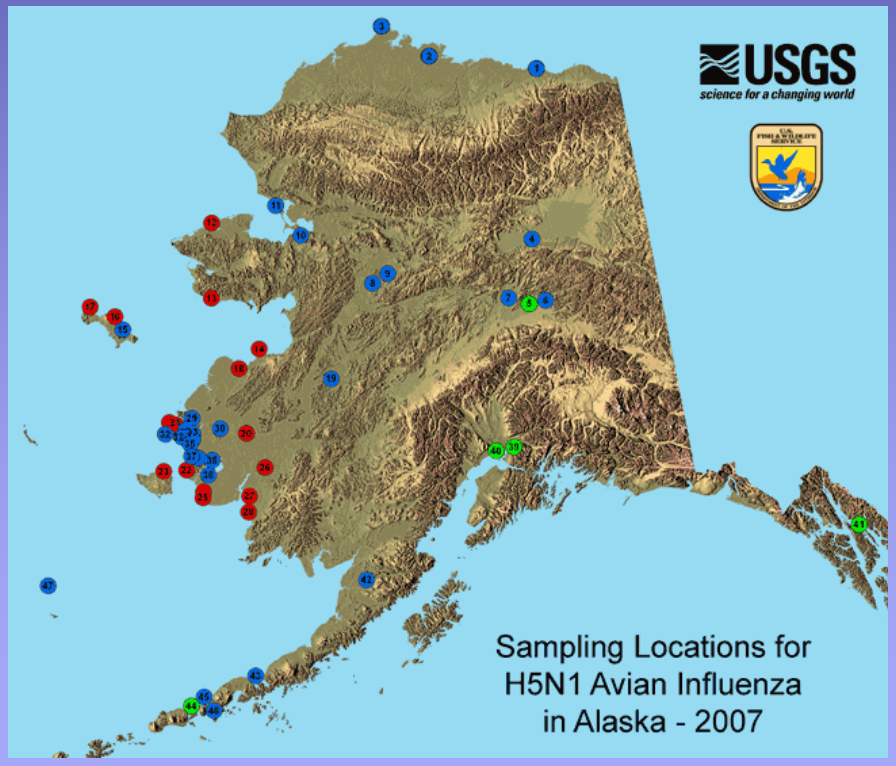
Priority Species

Species	Alaska Score	Pacific Flyway Ranking	Central Flyway
Eastern Yellow Wagtail	17.5		
Dunlin	17		
Arctic Warbler	17		
Steller's Eiders	15		
Northern Pintail	15	1	1
Gray Cheeked Thrush	15		
Sharp Tailed Sandpiper	14.5		
Lesser Snow Geese	14	1	2
Bar Tailed Godwit	14		
Emperor Goose	13		
Ruddy Turnstone	13	1	
Pectoral Sandpiper	13		1

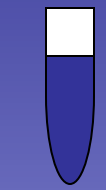
Sampling Locations in Alaska



Target n = 200/spp/population



Cloacal Swabs Only (2006-2007)



Matrix PCR

AI Virus Isolation

Subtyping

Sequencing

Combined Swabs for 2007 Surveillance Season & HEDDS

Oral-Pharyngeal Swab (O/P)

Combined Swabs (O/P+C)
(at NWHC)

Matrix PCR, H5 & H7 RT PCR

HEDDS: Results Database

Cloacal Swab (C)

Overall Results: 2006 vs 2007

	2006	2007
Samples to NWHC	16,836	8,671
# Species	129	66
AI Positive	292 (1.7%)	68 (0.8%)
H5N1 Positive	None	None

Live vs Harvest Sample #'s

	2006	2007
Samples to NWHC	16,836	8,671
Live	11,624 (134)	5,735 (46)*
Harvest	5,212 (158)	2,936 (22)*

(# of AI Positive)
* # of AI Positive cloacal samples

Samples Collected Varied by Spp, Sampling Scheme, Yr

Target Spp	Sampling	2006	2007
Black Brant	Live Bird	1 (1768)	0 (879)
Black Brant	Harvested Bird	7 (311)	0 (514)
Northern Pintail	Live Bird	56 (961)	33 (1,417)
Northern Pintail	Harvested Bird	29 (440)	0 (133)
Tundra Swan	Live Bird	1 (363)	0 (339)
Tundra Swan	Harvested Bird	6 (222)	0 (53)

AI Positives (# samples collected per spp)

Live Bird Sample Numbers: Similar Pattern by Region

Sample Scheme	Region	# Samples (2006)	# Samples (2007)
Live Bird (Target)	YKD	5048	3071
	AK Peninsula	1222	450
	Aleutian Islands	76	2
	Interior	379	464
	NW AK	656	729
	North Slope	2011	602
	Seward Penin	453	3
	SLI	182	10
	SE AK	302	0
Sub-total		10,329	5,322

Subsistence Similar on YKD: Sport Harvest Similar by Yr

Sample Scheme	Region	# Samples (2006)	# Samples (2007)
Spring Subsistence	YKD	2886	2121
	SLI/North Slope	1186	174
	Seward Pen	884	221
Sub-total		4,956	2,516
Sport Harvest	Southcentral	307	150
	SE AK	15	104
	AK Peninsula	118	166
Sub-total		440	420

AI Results Similar for Live Birds Across Yr

Sample Scheme	Region	AI Positive (2006)	AI Positive (2007)*
Live Bird (Target Sp)	YKD	30	4
	AK Peninsula	8	13
	Aleutian Islands	0	0
	Interior	11	25
	NW AK	36	4
	North Slope	1	0
	Seward Penin	4	0
	SLI	1	0
	SE AK	1	0
Total		92 (0.9%)	46 (0.9%)

AI Positives Decrease in Subsistence and Harvest Birds

Sample Scheme	Region	#AI + (2006)	# AI + (2007)*
Spring Subsistence	YKD	86	6
	SLI/North Slope	19	2
	Seward Pen	13	0
Sub-total		118 (2.4%)	8 (0.3%)
Sport Harvest	Southcentral	20	6
	SE AK	1	5
	AK Peninsula	19	3
Sub-total		40 (9.0%)	14 (0.7%)

2006-2007 Conclusions

- No HPAI H5N1 has been detected in Alaska
- Overall AI prevalence in AK was lower in 2007, which coincides with the global pattern of lower H5N1 prevalence
- Overall AI prevalence in target live bird was similar between years; lower in harvested birds in 2007

2006-2007 Conclusions

- 2007 focused more directly on target spp than did 2006
- Overall 52% fewer samples than in 2006
- Important to increase subsistence sampling on North Slope, SLI/Seward Peninsula: 81% fewer samples in 2007

What Does all this Mean for 2008?

Questions for this Mtg:

- How should we focus efforts for 2008?
- Re-rank Species?
- Add species?
- Change criteria?
  - based on logistics
  - ability to get samples
- Emphasize certain criteria?
  - e.g. Asia connection
- Standardized sampling locations
  - ex: will always collect pintails from current locations