Avian Influenza
Avian Influenza: Preparedness & Monitoring in Wild Birds in Maryland 2005-2006

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Richard D. Slemons, DVM, Ph.D. OSU
Dennis A. Senne USDA
# HA-NA Combinations by Host

<table>
<thead>
<tr>
<th>Host</th>
<th>Combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Humans</strong></td>
<td>H1N1, H2N2, H3N2 (Since 1997: H5N1, H7N2, H7N7, H7N3, H9N2)</td>
</tr>
<tr>
<td><strong>Swine</strong></td>
<td>H1N1, H3N2, H1N2 (H3N1, H4N6, H5N1, H9N2)</td>
</tr>
<tr>
<td><strong>Equine</strong></td>
<td>(H7N7), H3N8</td>
</tr>
<tr>
<td><strong>Marine</strong></td>
<td>Cetaceans: H13N9, H13N2, H1N3</td>
</tr>
<tr>
<td><strong>Mammal</strong></td>
<td>Pinnipeds: H7N7, H4N5, H4N6, H3N3</td>
</tr>
<tr>
<td><strong>Poultry</strong></td>
<td>Many HA-NA combinations recovered</td>
</tr>
<tr>
<td></td>
<td>Not all HA and NA subtypes recovered</td>
</tr>
<tr>
<td><strong>Wild birds</strong></td>
<td>Numerous HA-NA combinations recovered</td>
</tr>
<tr>
<td></td>
<td>All HA and NA subtypes recovered</td>
</tr>
</tbody>
</table>
Fin Whale Necropsy

Stranding Network Members – at risk?
Wild Bird Reservoirs & Migratory Routes
Avian Reservoirs: Shorebirds & Waterfowl
Major Waterfowl Flyways

Overlap between US Flyways and Asian & European Flyways

Situation on 30 August 2005

Sources: AI outbreaks: OIE, FAO and Government sources.
Flyways: Wetlands International
Intercontinental Migrations

- **Atlantic Flyway**
  - 9 species have significant European contact (CWS)
  - >5 species move between Canada - Greenland
  - US Fish and Wildlife Service analysis in progress

- **Pacific Flyway**
  - 146 species are covered in Russia/Japan/US Treaty
  - 32 are migratory or more numerous than casuals (AK-FWS)

Royse Photo

USGS
Major Waterfowl Flyways

No HPAI positives in over 10 years of wild bird migrations

Situation on 30 August 2005

Sources: AI outbreaks: OIE, FAO and Government sources.
Flyways: Wetlands International
Routes of Introduction to North America

Smuggled / illegal imports of poultry products:

2005 – 2 month period:
- 165,000 pounds illegal poultry products entered the U.S [en route to LBM]

- September 2005
  - California: 820 cases of eggs (120 eggs each) on ship, no permits, not listed on manifest (USDA-APHIS)
  - New York: poultry labeled as *lily flowers & prunes*

- October-November 2005
  - Port Elizabeth, NJ; ship: 27,000 lbs poultry
  - Brooklyn, NY; ship: 30,000 lbs preserved duck eggs
  - Philadelphia, PA; warehouse: 3,000 lbs squab, goose parts
  - Chicago, IL; restaurants: squab and goose parts
  - Chicago, IL; grocery store: chicken and duck feet
Wild Bird AI Monitoring and Surveillance & Early Detection of H5N1
### AIV isolations DE Bay 2000-2002

<table>
<thead>
<tr>
<th>HA subtype</th>
<th>Number isolations</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2</td>
<td>34</td>
<td>23%</td>
</tr>
<tr>
<td>H4</td>
<td>1</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>H5</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>H6</td>
<td>10</td>
<td>7%</td>
</tr>
<tr>
<td>H7</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>H9</td>
<td>12</td>
<td>8%</td>
</tr>
<tr>
<td>H10</td>
<td>40</td>
<td>27%</td>
</tr>
<tr>
<td>H11</td>
<td>31</td>
<td>21%</td>
</tr>
<tr>
<td>H12</td>
<td>17</td>
<td>11%</td>
</tr>
</tbody>
</table>

Dunlin, Red Knot, Sanderling, Semipalmated sandpiper, Ruddy turnstone

150 AIV isolates
Chesapeake Bay – Home to highest wintering waterfowl concentration on East Coast

Extremely high density of poultry farms

MDA is equipped with RRT-PCR to test for AI and END [one unit supplied by MD DNR through DHMH DHS grant]
Surveillance Efforts 2000-2006

- AI Collaboration with Dr. Richard Slemons, Ohio State University since 2000
  - Mallards; environmental sampling of ponds

- MD DNR pro-active surveillance in wild birds began Summer 2005 (targeted and opportunistic surveillance – ongoing)
  - Mainly waterfowl, also some colonial waterbirds, other birds
    - Live sampling & banding; hunter cooperative sampling
  - To date over 1000 samples collected
    - No HPAI detected
    - Several LPAI strains documented
      - Species include: S. geese, C. Scoters, W.W. Scoters, L.T. Ducks

- Following national surveillance guidance [USFWS, AFWA, USDA, USGS]
Counties Tested and Location of Positives

- Counties Tested
- Counties Positive

2005 – 2006 MD DNR AI Sampling

DE = 100
LPAI Surveillance in Maryland: 2005
# MD Species Tested for AI: 2005

## Hunter Killed Waterfowl

<table>
<thead>
<tr>
<th>SPECIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SNGO</td>
<td>RUDU</td>
</tr>
<tr>
<td>LTDU</td>
<td>ABDU</td>
</tr>
<tr>
<td>WWSC</td>
<td>MALL</td>
</tr>
<tr>
<td>COSC</td>
<td>NOPI</td>
</tr>
<tr>
<td>CAGO</td>
<td>GADW</td>
</tr>
<tr>
<td>MUSW</td>
<td>SCAU</td>
</tr>
</tbody>
</table>

## WL Rehabilitator & Captive Birds

<table>
<thead>
<tr>
<th>SPECIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CAGO</td>
<td>WWSC</td>
</tr>
<tr>
<td>BLDU</td>
<td>LTDU</td>
</tr>
<tr>
<td>GBHE</td>
<td>SUSC</td>
</tr>
<tr>
<td>GHOW</td>
<td>GBHE</td>
</tr>
<tr>
<td>BAEA</td>
<td></td>
</tr>
<tr>
<td>OSPR</td>
<td></td>
</tr>
<tr>
<td>RTHA</td>
<td></td>
</tr>
<tr>
<td>GBHE</td>
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</tr>
</tbody>
</table>

## Live Captured Birds

<table>
<thead>
<tr>
<th>SPECIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BRPE</td>
<td></td>
</tr>
<tr>
<td>CAGO</td>
<td></td>
</tr>
<tr>
<td>WODU</td>
<td></td>
</tr>
<tr>
<td>ABDU</td>
<td></td>
</tr>
<tr>
<td>MALL</td>
<td></td>
</tr>
</tbody>
</table>

*CAGO 133 tested (all sources) – all negative

2005 Total all species = 514 (457 WF; 57 other)

Waterfowl biologists at risk?
## MD Species Tested for AI: 2006

<table>
<thead>
<tr>
<th>SPECIES</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Hunter Killed Waterfowl</td>
<td>WL Rehabilitator &amp; Captive Birds</td>
</tr>
<tr>
<td>SNGO</td>
<td>CAGO</td>
</tr>
<tr>
<td>LTDU</td>
<td>BLDU</td>
</tr>
<tr>
<td>WWSC</td>
<td>GBHE</td>
</tr>
<tr>
<td>COSC</td>
<td>GHOW</td>
</tr>
<tr>
<td>CAGO</td>
<td>GBHE</td>
</tr>
<tr>
<td>MUSW</td>
<td>OSPR</td>
</tr>
<tr>
<td>CBDU</td>
<td>RTHA</td>
</tr>
<tr>
<td>AGWT</td>
<td>GBHE</td>
</tr>
<tr>
<td>BWTE</td>
<td>PEFA</td>
</tr>
<tr>
<td>SUSC</td>
<td>BCNH</td>
</tr>
</tbody>
</table>

**Live Captured Birds**
- Round-up banding
  - CAGO = 140

**Mist-net banding**
- Shorebirds: Sandpipers; yellowlegs = 30
  - Misc

*CAGO 140 tested (all sources) – all negative*

2006 - Total all species = 610 (438 WF; 172 other)
## LPAI Positive in Maryland: 2005-2006

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>N</th>
<th># +</th>
<th>%</th>
<th>H</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2005</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snow Goose</td>
<td>76</td>
<td>7</td>
<td>9</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Long Tail Duck</td>
<td>26</td>
<td>1</td>
<td>13</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>White-wing Scoter</td>
<td>16</td>
<td>1</td>
<td>6</td>
<td>?</td>
<td>8</td>
</tr>
<tr>
<td>Common Scoter</td>
<td>4</td>
<td>1</td>
<td>100</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total positives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td><strong>2006</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BW Teal</td>
<td>5</td>
<td>1</td>
<td>20</td>
<td></td>
<td>being processed</td>
</tr>
<tr>
<td>GW Teal</td>
<td>32</td>
<td>1</td>
<td>3</td>
<td></td>
<td>being processed</td>
</tr>
<tr>
<td><strong>Total positives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

2005-2006: 952 Processed 16 Positive 1.5 % = low prevalence
Long Tailed Duck H3 N8/ WW Scoter H11 N9
- only 2\textsuperscript{nd} report from these species (Sinnecker 1983; Europe)

Common Scoter H3 N8: 1\textsuperscript{st} report from this species

Snow Geese H6 N1: 1\textsuperscript{st} report for this species
Future Efforts

• Our future surveillance will include waterfowl, gulls, shorebirds

• LPAI viruses still here – have been historically

• Wildlife agencies, agriculture agencies, poultry industry and human health community need to desensitize the public to wild bird AI findings
State of Maryland AI Efforts

To inform state partners, industry, public about AI efforts we developed the following:

- Comprehensive AI ppt presentation on AI in wild birds – for DPI, wildlife rehabilitators, wildlife biologists, SART, State & County Health Departments; IAAAM; AVMA

- Wildlife “AI Q&A” sheet & “What Hunters Should Know” on MD DNR website

- MD DNR AI sampling protocol

- Draft MD DNR AI phone response protocol

- Statewide Wild Bird AI Surveillance Plan with USDA WS & Ohio State Univ.

- CSTE supported training Fall 2007 for first responders

- MD DNR Draft Response Plan for Free-ranging Wild Birds
  - Basic “ring” response, surveillance; no depopulation of free-ranging wild birds
MD DNR, USDA WS, USGS / NWHC
New Findings

- MD DNR, USDA WS & USGS/ NWHC investigating AI positives in *mammals*
  - Raccoons, nutria, fallow deer
- Anne Arundel County – raccoons positive
  {Georgia raccoons – negative}
- USDA NVSL conducting subtyping
“Early Detection” USDA WS Asian H5N1 Surveillance in Maryland 2006

DNR Wildlife and Heritage Service
800 samples (live-captured or hunter-harvested)

USDA Wildlife Services
800 samples (live-captured or hunter-harvested) plus 1,000 fecal samples
Live Bird Sampling 2006
Maryland DNR

- 100 Greater Scaup
- 100 Tundra Swan
- 200 Lesser Scaup
- 200 Canvasback
Hunter-harvested Birds Sampling 2006
Maryland DNR

- 100 Long-tailed Duck
- 100 Atlantic Brant

Additional Sampling
- Mute Swan
- Greater Snow Goose
- Wild Mallard
- Resident Canada Goose
LPAI – Fall 2006 Findings
Recent Findings – H5N1 (LPAI)

**August 2006**
- Michigan: H5N1 (LPAI) detected in wild mute swans

**September 2006**
- Maryland: H5N1 (LPAI) detected in mallard RSA environmental sampling  
  \( RSA = \text{Regulated Shooting Area} \)
- Western Pennsylvania: H5N1 (LPAI) detected in routine waterfowl surveillance (mallard)
- Second H5N1 (LPAI) detected in mallards in SE Pennsylvania – routine waterfowl surveillance
- Montana: H5N1 (LPAI) detected in a wild northern pintail – routine surveillance
- Many more states positive for LPAI…….

*All wild birds sampled were healthy/ normal when examined*

*Trade embargo: Mexico & Russia ceased trade with U.S. …now – reported on website only*
Due to increased surveillance – more H5N1 is being detected, though the above documentation verifies that H5N1 LPAI has been in North America for decades.
LPAI – National Findings

• USGS – 13,000 birds sampled in 2006

• No HPAI in wild birds - NONE

• Remember – HPAI H5 N1 in Asia since 1997

• Therefore – in 10 years no HPAI through migratory birds to U.S.
Pandemic Threat?

**Reality Check:**

- To date – approximately **~200 people have died** from HPAI H5N1 Type A Influenza virus in Eurasia out of the approximately 350 infected **and millions exposed**
- Yearly - **U.S. alone over 30,000 people die** from the seasonal flu
- **Poultry = associated with human deaths** in Asia, Africa & Europe; wildlife questionable
- **HPAI occurs rarely in the U.S.** and has only been associated with poultry (last outbreak – 2004 TX?)
- **Wild birds have not spread HPAI to poultry or people in the U.S.** people spread the virus by lapses in biosecurity
- **Since 1997 - 10 YEARS – no migratory bird HPAI / H5N1 - transmission to the U.S.**
Know Where to Go for Information

www.pandemicflu.org
www.cdc.gov/ncidod/EID
www.cdc.gov
www.nwhc.usgs.gov
www.usda.gov
www.scwds.org
www.fws.gov
www.wda.org
www.avma.org
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Thanks for Your Attention