

ATTACHMENT 2

Migratory Bird Flyways in Asia and North America

Figure 2-1: Asian Migratory Bird Flyways

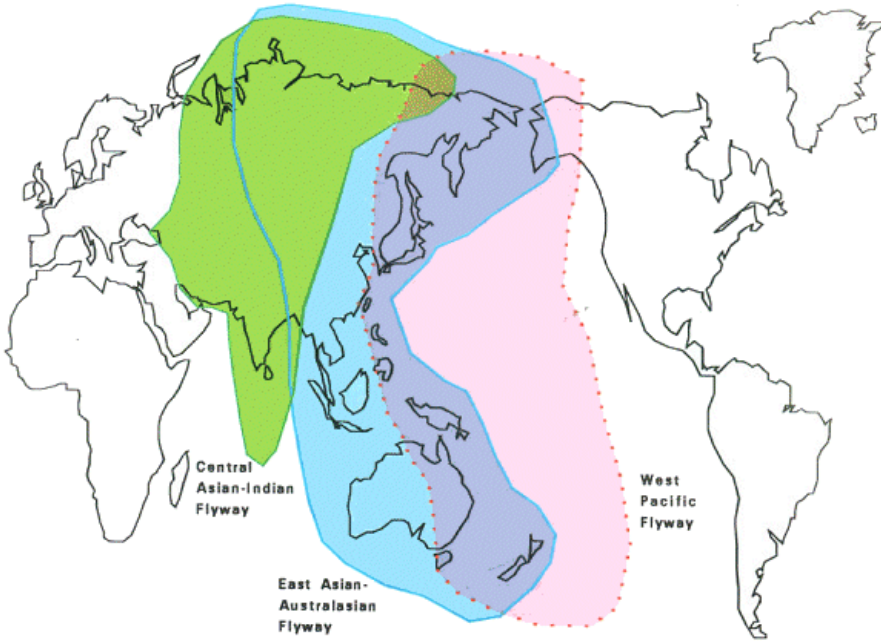
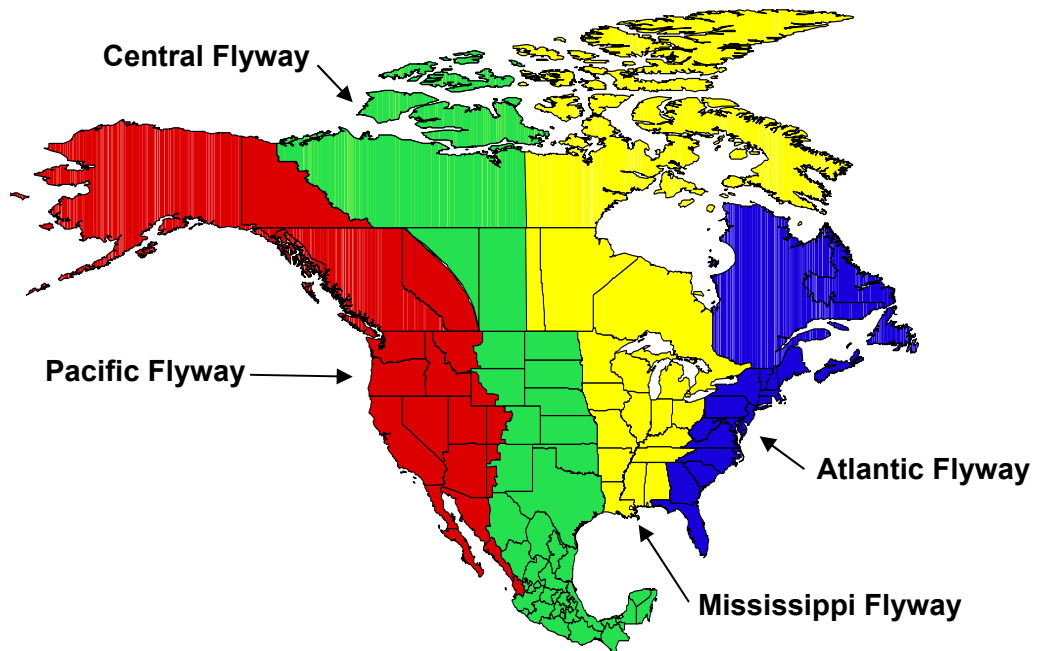


Figure 2-2. North American Migratory Bird Flyways



ATTACHMENT 3

Investigation of Morbidity and Mortality Events in Wild Birds

Overview

The systematic investigation of morbidity and mortality events in wild birds to determine if the highly pathogenic H5N1 avian influenza subtype of avian influenza (AI) is playing a role in causing illness and death offers the highest and earliest probability of detecting the virus if it is introduced by migratory birds into the United States. There is increasing evidence that highly pathogenic H5N1 avian influenza virus is capable of killing wild birds which is not the usual characteristic of AI viruses. As such, the documentation of the movement of the virus through Asia and into Europe has been discovered in part, through the investigation of mortality events of wild migratory birds. Benefits gained from conducting disease investigations of wildlife mortality events are not unique to AI. Many other important diseases have been discovered and described after initial detection through the wildlife disease investigation process (e.g. West Nile Virus). The investigation of wildlife diseases operates with consistent procedures while maintaining enough flexibility to accommodate the unique characteristics of specific disease agents involved. The initial detection of a mortality event is strongly dependent upon well-trained and observant field personnel. These people in turn communicate with an experienced staff of disease investigation specialists that obtain the maximum amount of information surrounding the event. Depending upon the significance and intensity of the mortality event, these highly trained investigators may visit the site of the mortality event to conduct field investigations so as to obtain further information first hand. In addition to determining a cause of death, disease investigation specialists provide useful management recommendations to potentially reduce further morbidity and mortality.

In the event that highly pathogenic H5N1 avian influenza is detected in wild birds, it will be important to investigate the proximity of domestic poultry and swine operations in order to initiate activities to minimize contact between the wild birds and these other animals. Morbidity and mortality of wild birds is most likely to occur in areas where migratory birds infected with highly pathogenic H5N1 avian influenza mingle with other wild bird species, particularly in wetland habitats. Likewise, early outbreaks of highly pathogenic H5N1 avian influenza would most likely occur in Alaska and along the Pacific Flyway of the United States and Canada, where migratory birds from Asia stage in the summer and early fall and subsequently migrate within North America. However, given that migrants also move from Alaska to other parts of North America, surveillance strategies should include other flyways as well. In this surveillance plan, participating state, Federal and tribal agencies, and cooperators will conduct targeted surveillance for highly pathogenic avian influenza (HPAI) both in response to disease outbreaks in wild

birds focusing intensively in Alaska, the Pacific Flyway, and Oceania, and in response to mortality events in high-priority (i.e., most likely) species throughout the United States.

Methodology

The key to success of this surveillance strategy involves: 1) early detection of morbidity and mortality, 2) rapid reporting and submission of appropriate biological specimens to qualified diagnostic facilities, 3) immediate assessment of the field event (descriptive epidemiology), 4) rapid, accurate, and consistent diagnosis and confirmation, 5) immediate reporting of diagnostic results once confirmed, and 6) pre-planned contingency and response training for the occurrence of HPAI.

Specific steps necessary to orchestrate the early detection of highly pathogenic H5N1 avian influenza include:

- 1) State, Federal, and tribal resource personnel will be instructed to increase vigilance and to establish routine and systematic monitoring of wild bird populations for morbidity and mortality. Standard guidelines will be prepared with the assistance of the U.S. Geological Survey (USGS) - National Wildlife Health Center (NWHC) and the U.S. Department of Agriculture (USDA) - Wildlife Services (WS) to increase uniformity of effort. The most intensive monitoring will occur in Alaska and selected areas of high risk in the Pacific Flyway and Oceania where migratory birds from affected countries are likely to interact with North American bird species.
- 2) A uniform protocol for reporting mortality events and instructions for the safe handling and shipment of specimens to identified diagnostic facilities will be developed. Field and response personnel will be trained. Reporting of mortality events will be through appropriate channels within each state, Federal, or tribal entity to the NWHC, where a centralized database (WDIN) will be maintained, made available to contributors, and summarized in modified form for public dissemination.
- 3) Field personnel or teams designated by respective land management agencies will respond to mortality events by conducting field investigations to determine onset, course, duration, distribution, species, and other environmental conditions associated with mortality events. The NWHC and USDA-WS will assist in developing guidelines and training. In certain circumstances, NWHC and USDA-WS personnel will conduct field investigations or assist other agencies.
- 4) Representative and suitable carcasses and other biological samples and specimens will be submitted to one or more identified diagnostic facilities capable of conducting immediate necropsy and laboratory analyses. Guidelines will be developed to assure that the appropriate number and types of samples are collected to ensure that there is a statistically-based confidence

in the sample size analyzed in response to a mortality event. Necropsies, histology, and laboratory investigations will be utilized to substantiate a diagnosis of highly pathogenic H5N1 avian influenza virus. Virus isolation, hemagglutination inhibition tests, and molecular testing specifically for H5N1 will be performed to detect the presence of the virus in specimens.

- 5) Reporting of results to submitters will be done as early as possible, including preliminary results that may refute or support the presence of HPAI. Highly pathogenic H5N1 avian influenza virus is a CDC/USDA Select Agent, thus the CDC/USDA Select Agent Programs will be notified immediately upon identification of the virus and all Select Agent guidelines will be followed as required. Final results of HPAI tests will be reported immediately to the submitter. As highly pathogenic H5N1 avian influenza is a reportable disease, the State Veterinarian, and the Area Veterinarian in Charge (AVIC) will be informed simultaneously of the discovery. A final report will also be provided to the WDIN. Public release of information will occur only after these final results are thus reported.
- 6) Wildlife disease contingency plans will be established at an appropriate landscape scale to enable rapid deployment of personnel and resources to take action. Disease contingency plans can be developed for general response to a mortality event, with special reference and consideration for highly pathogenic H5N1 avian influenza virus. The NWHC and USDA-WS will assist in providing guidelines and training in the establishment of contingency plans.

To increase early detection and response capabilities to the extent needed to protect the United States from highly pathogenic H5N1 avian influenza virus, enhancements to current activities will need to include:

- Personnel and resources in the field to intensively monitor for mortality events,
- Systematic methods to detect mortality early in the field,
- Resources to fully investigate all such events, and
- Surge capacity at wildlife disease diagnostic facilities

Wildlife professionals employed by state natural resource agencies and by the U.S. Department of Interior (DOI) Fish and Wildlife Service and National Park Service are the principal authorities positioned to detect and respond to morbidity and mortality events involving wild birds. The DOI Bureau of Land Management, Tribal Nations, and several other state, Federal, and local agencies (including the U.S. Department of Defense) also have authority over lands that they administer and manage. Morbidity and mortality events involving wildlife are often detected by, or reported to these agencies and entities.

Investigations into the causes of wildlife mortality events are dependent on the perceived significance of the event and on the knowledge or availability of disease diagnostic facilities capable of providing assistance. The USGS - NWHC, located in Madison,

Wisconsin, is a full-service wildlife diagnostic and research laboratory that assists Federal, state, and tribal agencies in responding to wildlife disease outbreaks. Together with its Honolulu Field Station, which serves Hawaii and Pacific Trust Territories, the NWHC is the principal facility relied upon by the DOI, as well as by most states, to investigate and diagnose wildlife diseases, including those of migratory birds. Numerous state natural resource agencies in the Pacific Flyway also have established wildlife disease laboratories and programs with staff that respond to wildlife disease outbreaks in their respective states. USDA, state and university diagnostic laboratories, and regional entities such as the Southeastern Cooperative Wildlife Disease Study are also involved in wildlife disease investigations. The NWHC maintains an extensive database on wildlife mortality events across the United States and Canada to which Federal, state, provincial, and tribal agencies contribute. The NWHC also supports and houses the Wildlife Disease Information Node (WDIN), a part of the USGS - National Biological Information Infrastructure (NBII).

Discussion

The primary strength of the strategy of targeted investigations of avian mortality events is based upon the observation that highly pathogenic H5N1 avian influenza kills some species of wild birds. As such, a wild bird die-off serves as a “trigger event” that immediately focuses the investigation to a given area and species. Further, because the current form of the virus circulating in Asia will be new to North America, the hypothesis is that highly pathogenic H5N1 avian influenza will be detected if it is the cause of an observed mortality event. Therefore concentrating on recovering carcasses and samples from wild bird die-offs affords a timely opportunity to detect HPAI. Conversely, live bird surveillance provides the opportunity to detect birds that may shed the virus without ill-effects and offers the possibility of early detection of the arrival and especially, the spread of highly pathogenic H5N1 avian influenza. Due to the size of the country and the number of species of wild birds involved, careful consideration will be needed to identify relevant species and sampling locations for live bird surveillance. Hunter-harvested birds will provide an opportunity to augment live bird surveillance by providing large numbers of birds using a reduced level of field resources. However, as a limited number of species are targeted for hunting, sound scientific judgment should be exercised in choosing species and locations for analysis. All of the strategies described above will require considerably more resources in personnel to be effective, and the greater number of submissions (surge capacity) will require laboratories to be prepared in advance.

Recommendations

Because the primary goal of the process outlined in this plan is the earliest possible detection of highly pathogenic H5N1 avian influenza in wild birds, all of the strategies described are important, but not all strategies are practical to conduct in all areas of the country. The live wild bird surveillance strategy would be a most effective tool to determine the pattern of virus spread subsequent to a die-off attributed to highly pathogenic H5N1 avian influenza. Wild animal die-offs are important to investigate for multiple reasons, however it should be noted that highly pathogenic H5N1 avian

influenza will not be the cause of most of the mortality events investigated through a targeted surveillance strategy. Rather, other bacterial and viral diseases that are either zoonotic or important to agriculture may be detected through these surveillance programs. Mortality event investigation provides the opportunity to obtain the greatest amount of information about health and disease in wild birds without an a priori bias. Supplemental wildlife disease information will be prioritized and gathered as funding and personnel allow. Surveillance for Highly pathogenic H5N1 avian influenza will remain the top priority.

Appendix

Field Personal Safety:

In an area where highly pathogenic H5N1 avian influenza has not been detected, field personnel should follow the recommendations provided in the NWHC Guidelines for Handling Birds

(http://www.nwhc.usgs.gov/publications/wildlife_health_bulletins/WHB_05_03.jsp).

Personal protective equipment (PPE) should include boots, coveralls, and gloves. In addition, the use of goggles and N95 masks are recommended.

In areas where highly pathogenic H5N1 avian influenza has been detected, especially during a mass mortality event, field personnel should follow the latest guidelines of the CDC (<http://www.cdc.gov/flu/avian/professional/protect-guid.htm>). PPE should include complete coveralls, gloves, and boot covers that are either disposable or that can be disinfected. Goggles, N95 masks (NIOSH respirator preferred) as well as a health monitoring plan are required.