National Wildlife Research Center Supports Wildlife Disease Surveillance and Emergency Response in the United States

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research organization devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and socially responsible methods, tools, and techniques. As part of those efforts, the NWRC also supports a national wildlife disease monitoring and surveillance program.

The National Wildlife Disease Program (NWDP) consists of a core team of researchers and coordinators at the NWRC headquarters office in Fort Collins, Colorado, as well as a network of 33 wildlife disease biologists working in 40 states, Guam and Puerto Rico. These individuals promote safe agricultural trade by protecting the health of people, animals, plants and ecosystems through wildlife disease surveillance and emergency response. The NWDP works cooperatively with other Federal, State, Tribal and local agencies. Its efforts emphasize sharing information and techniques, such as animal sampling, wildlife disease surveillance methods, and laboratory practices. When possible, the program also works to develop infrastructure—increasing available knowledge, techniques, and expertise—to respond not only to current, but also new and emerging animal diseases.

WS’ parent agency—the Animal and Plant Health Inspection Service (APHIS)—is an emergency response agency that operates under the National Response Framework, a comprehensive guide on how the nation deals with emergencies. In addition to collecting samples from wildlife for disease monitoring purposes, NWDP experts serve as APHIS’ first responders in wildlife-related emergencies, such as disease outbreaks, floods, oil spills, and other natural disasters.

Applying Science and Expertise to Wildlife Challenges

HPAI Surveillance in Wild Birds. — Nearly 10 years ago, NWDP and its State and Federal partners designed, developed, and carried out the largest-ever national avian influenza surveillance effort in wild birds. NWDP wildlife disease biologists and their partners collected more than 400,000 wild bird and environmental samples from across the United States to try to detect the HPAI H5N1 strain that had been decimating domestic poultry flocks in Asia and Europe. At the time, no one had ever attempted to conduct such a comprehensive wildlife disease surveillance program. Although neither the H5N1 strain nor any other HPAI strain was found at the time, NWDP employees set the gold standard for such efforts. Their work resulted in the largest database of avian influenza samples in the United States. NWRC scientists and others have tapped into it to learn more about the prevalence and ecology of avian influenza and to develop more strategic surveillance plans. Fast forward to more recent times and the value of those efforts becomes apparent. In 2015, APHIS responded to an HPAI outbreak that was the largest animal health emergency in the country’s history. The spread of HPAI H5N2, H5N8, and H5N1 viruses in commercial poultry and backyard flocks in the spring of 2015 affected nearly 50 million domestic birds, cost over $800 million, and required the expertise of more than 600 APHIS employees and 2,700 contractors and Federal partners. As the first signs of the outbreak in domestic poultry in British Columbia, Canada, were unfolding in November 2014, NWDP biologists and their State and Federal partners increased surveillance of wild birds near the U.S.-Canada border and other locations in the Pacific Flyway. This led to the first detections of the novel Eurasian lineage of HPAI H5N8 and reassorted HPAI H5N2 viruses in wild birds in North America. It also eventually led to a much larger national surveillance effort. From July 2015 to March 2016, NWDP and its State and Federal collaborators collected nearly 41,000 samples from apparently healthy wild birds in targeted areas throughout the United States. This work was based on guidance provided by the Interagency Steering Committee for Surveillance for HPAI in Wild Birds, which included experts from APHIS’ WS and Veterinary Services programs, U.S. Geological Survey, U.S. Fish and Wildlife Service, Centers for Disease Control and Prevention (CDC), and the National Flyway Council.

Disease Monitoring in Feral Swine. — Feral swine are known to carry over 30 diseases and 37 parasites that can be transmitted to livestock, people, pets, and wildlife. To better understand the prevalence of some of these pathogens in feral swine, NWDP biologists and partners collected serum
samples from 3,213 feral swine in 32 States in fiscal year (FY) 2016. The table below shows results of surveillance for six diseases in FY 2016. Classical swine fever only infects swine. Pseudorabies virus can infect swine and a few other species of animals. Swine brucellosis, influenza A virus, toxoplasma, and leptosira are zoonotic diseases, meaning they can infect people as well as animals. These results are all from antibody testing of serum or organ tissues and indicate previous exposure. The tests do not detect current infections.

Researchers conclude that feral swine are a potential reservoir for several endemic diseases found in domestic pigs and several zoonotic agents that can impact people.

Prevalence of Newcastle Disease Virus in Wild Birds. — Avian paramyxovirus serotype 1 (APMV-1), also referred to as Newcastle disease virus (NDV), infects and causes disease in both wild and domestic birds. Because NDV is a reportable foreign animal disease, sampling for the virus is conducted by state and federal agencies when death or disease occurs in cormorants, pigeons, doves, or pelicans. To calculate the prevalence of the virus in apparently healthy wild birds, NWRC researchers and USDA colleagues collected swab and serum samples from more than 3,500 wild birds representing 8 orders (Suliformes, Pelecaniformes, Anseriformes, Columbiformes, Accipitriformes, Charadriiformes, Gruiformes, and Passeriformes). Antibody prevalence was highest in double-crested cormorants (Suliformes, 45 percent) followed by pelicans (Pelecaniformes, 24 percent), waterfowl (Anseriformes, 23 percent), and pigeons/doves (Columbiformes, 12 percent). Results suggest that wild birds are commonly exposed to NDV, but active viral shedding in apparently healthy birds is relatively uncommon. Consequently, the risk to poultry appears low.

NWDP Surveillance Accomplishments. — Each year, NWDP conducts and coordinates wildlife disease monitoring and surveillance throughout the United States. Below is a summary of its 2016 efforts.

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Percent Positive FY 2016</th>
<th>Average Percent Positive FY 2008-2015 (Range)</th>
<th>Disease or Illness Caused</th>
</tr>
</thead>
<tbody>
<tr>
<td>classical swine fever virus</td>
<td>0</td>
<td>0</td>
<td>classical swine fever</td>
</tr>
<tr>
<td>pseudorabies virus</td>
<td>19.2</td>
<td>12-20</td>
<td>pseudorabies (a type of herpesvirus)</td>
</tr>
<tr>
<td>swine brucellosis</td>
<td>5.3</td>
<td>4-10</td>
<td>brucellosis</td>
</tr>
<tr>
<td>influenza A virus</td>
<td>4.8</td>
<td>4-9</td>
<td>influenza</td>
</tr>
<tr>
<td>toxoplasma gondii*</td>
<td>22.9</td>
<td>6-28</td>
<td>toxoplasmosis</td>
</tr>
<tr>
<td>leptospirosis*</td>
<td>53.1</td>
<td>23-54</td>
<td>leptospirosis</td>
</tr>
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</table>

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Selected Publications:


Major Accomplishments:

- WS disease surveillance in 2016 included sampling for the following pathogens/diseases in wildlife: avian influenza, bluetongue virus, classical swine fever virus, eastern equine encephalitis, epizootic hemorrhagic disease, La Crosse virus, leptospirosis, Maguari virus, plague, Powassan virus, pseudorabies virus, tularemia, West Nile virus, Salmonella, St. Louis encephalitis virus, swine Brucellosis, Toxoplasma gondii, and Turlock virus.

- WS emergency responders assisted in APHIS efforts to address disease outbreaks related to New World screwworm in Florida and highly pathogenic avian influenza in Indiana.