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Viral hemorrhagic septicemia (VHS) is a serious disease of marine and freshwater fish species. Primarily a marine organism, it has attacked freshwater trout farms in Europe, is managed against within the hatchery systems of the Pacific Northwest and is now an emerging disease within the Great Lakes basin. The pathogen responsible, VHSv, is a rhabdovirus (the same type of virus as rabies) affecting fish but does not pose any threat to human health. Other fish rhabdoviruses cause infectious hematopoietic necrosis and spring viremia of carp.

The host and geographic range includes many marine species from Japan, the west coast of North America, North Sea, Baltic Sea and Atlantic coast of Canada. Historically, VHS has been known in Europe as the most serious viral disease of introduced rainbow trout. Information suggests that VHSv adapted to the freshwater environment in Europe when it was common for wild caught herring to be fed raw to rainbow trout. Great Lakes isolates are most closely related to those found along the East coast of Canada. Most probable vector of introduction is ballast water or migratory fish.

The low genetic diversity of the Great Lakes isolates (<1 nt) suggest a recent introduction. The earliest recorded appearance of VHSv is 2003 in a muskelunge from Lake St. Clair, Michigan. In 2005, a freshwater drum mortality event occurred in the Bay of Quinte, Lake Ontario, Ontario. Multiple fish kills
Viral Hemorrhagic Septicemia (continued from Pg. 1)

from VHS occurred in 2006. These af-
tected musky and yellow perch in Lake St.
Claire, musky and gizzard shad in the
Detroit River, freshwater drum, white
bass and yellow perch in Lake Erie, round
goby in Lake Ontario and musky in the
St. Lawrence River. As of January 2007,
VHSv has been isolated from Chinook,
walleye and whitefish in Lake Huron.
Clinical signs of VHS are hemorrhaging of
the liver, spleen, and intestines. The
swim bladder is also congested with hem-
orrhages, giving the otherwise transparent
membrane a mottled appearance.
Externally, severe hemorrhaging in the
skin can produce large red patches, par-
ticularly on the sides and anterior portion
of the head. However, infected fish may
only exhibit very minor external hemorrhaging (petichia) or no external
signs at all.

The prognosis for the Great Lakes will be
many years of significant die-offs of sus-
ceptible species during spring spawning
events; especially for aggregate spawners
and trailer boaters are encouraged to abide by the following guidelines:
- Remove all mud, aquatic plants and
animals from all gear, boats, motors
and trailers before leaving a body of
water;
- Drain your live well, bilge and bait
tanks before leaving the water you
are fishing or boating on. Anglers or
boaters using any waterbody known

ring primarily in younger age classes.
Density of some species may never re-
cover as VHS may cause mortality at
some critical population level. Eventually,
as resistance builds in the genotypes,
VHS will become less explosive in most
years.

What can be done to prevent the
spread of VHSv?
VHS is an obligate pathogen. This envel-
oped RNA virus is unstable in water but
will persist longer in tissue or organic
matter. It has been demonstrated to
survive in plain water up to 14 days. If
bound to organic matter, in sediment or
in dead fish, survival of two months has
been realized.

To reduce the likelihood of spreading
VHSv in the Great Lakes, anglers and

The states (in red) affected by the
restrictions.

USDA-APHIS Federal Order Prohibits Importation of
Certain Species of Live Fish

Due to the potential adverse effects of
this disease to fish populations and the
desire to prevent or delay its spread to other states, the Animal and Plant Health
Inspection Service (APHIS) issued a Federal Order on
October 24, 2006, that
prohibits the importation of
certain species of live fish
from Ontario and Quebec
and interstate movement of
the same species from eight
states bordering the Great
Lakes, effective immediately. The states
included are Illinois, Indiana, Michigan,
Minnesota, New York, Ohio, Pennsyl-
vania and Wisconsin.

Fish species included in the federal prohi-
bition are: Atlantic Cod, Black Crappie,
Bluegill, Bluntnose Minno-
now, Brown Bullhead,
Brown Trout, Burbot,
Channel Catfish, Chi-
nook Salmon, Coho
Salmon, Chum Salmon,
Emerald Shiner, Fresh-
water Drum, Gizzard
Shad, Grayling, Haddock,
Herring, Japanese Floun-
der, Largemouth Bass,
Muskellunge, Pacific
Cod, Pike, Pink Salmon, Pumpkinseed,
Rainbow Trout, Redhorse Sucker, Rock
Bass, Rockling, Round Goby, Smallmouth
Bass, Sprat, Turbot, Walleye, White Bass,
White Perch, Whitefish, Yellow Perch.

Additional fish may be added to the or-
der as they are confirmed to be carriers
of this disease. Additional information on
the Federal Order can be found on the
APHIS website www.aphis.usda.gov/vs/aqua/.

The World Organization of Animal
Health has categorized VHS as a trans-
missible disease with the potential for
profound socio-economic consequences.
Because of this, they list VHS as a disease
that should be reported to the interna-
tional community as an exceptional epide-
miological (study of diseases in large
populations) occurrence.

Article by Dave Meuninck and
Brian Breidert, IDFW
Indiana Avian Influenza Surveillance Update

The avian influenza surveillance for 2006 concluded at the end of December in Indiana. Below is a summary of surveillance in wild birds and dead birds calls in Indiana.

**Surveillance**

USDA APHIS Wildlife Services and Indiana DNR Division of Fish and Wildlife exceeded their total goal of 1200 cloacal swabs. Wildlife Services collected 1000 environmental samples, bringing the total to 2200 avian influenza samples from throughout Indiana.

Of the cloacal samples, most (1031 birds or 86%) of the samples were collected from hunter harvested birds. The remaining samples consisted of cloacal swabs from 166 live captured birds (14%) and 26 investigations of mortality events (2%). The samples were pooled together in groups of up to 5 swabs for analysis. Approximately 66 samples were positive for native influenza viruses. Only one of the environmental samples was positive for a native avian influenza virus. No samples were positive for either low pathogenic or high pathogenic H5N1 avian influenza.

**Dead Bird Calls**

USDA APHIS Wildlife Services received over 260 calls about dead birds and concern about avian influenza in birds. Table 2 is a summary of the dead bird calls, excluding calls about domestic birds. Calls regarding domestic birds were forwarded to USDA APHIS Veterinary Services.

Table 1. Summary of surveillance efforts in Indiana by USDA APHIS Wildlife Services and Indiana DNR Division of Fish and Wildlife.

<table>
<thead>
<tr>
<th>Species</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>American black duck</td>
<td>7</td>
<td>.3</td>
</tr>
<tr>
<td>American green-winged teal</td>
<td>268</td>
<td>12.1</td>
</tr>
<tr>
<td>American wigeon</td>
<td>30</td>
<td>1.3</td>
</tr>
<tr>
<td>Bufflehead</td>
<td>1</td>
<td>.0</td>
</tr>
<tr>
<td>Blue-winged teal</td>
<td>3</td>
<td>.1</td>
</tr>
<tr>
<td>Canada goose</td>
<td>163</td>
<td>7.3</td>
</tr>
<tr>
<td>Gadwall</td>
<td>9</td>
<td>.4</td>
</tr>
<tr>
<td>Gray-cheeked thrush</td>
<td>8</td>
<td>.4</td>
</tr>
<tr>
<td>Least sandpiper</td>
<td>72</td>
<td>3.2</td>
</tr>
<tr>
<td>Lesser yellowlegs</td>
<td>5</td>
<td>.2</td>
</tr>
<tr>
<td>Mallard</td>
<td>590</td>
<td>26.5</td>
</tr>
<tr>
<td>Northern pintail</td>
<td>22</td>
<td>1.0</td>
</tr>
<tr>
<td>Northern shoveler</td>
<td>11</td>
<td>.5</td>
</tr>
<tr>
<td>Ring-necked duck</td>
<td>2</td>
<td>.1</td>
</tr>
<tr>
<td>Red-necked phalarope</td>
<td>1</td>
<td>.0</td>
</tr>
<tr>
<td>Swainson's thrush</td>
<td>11</td>
<td>.5</td>
</tr>
<tr>
<td>Tundra swan</td>
<td>1</td>
<td>.0</td>
</tr>
<tr>
<td>Environmental samples</td>
<td>1000</td>
<td>45.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2223</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 1. Summary of dead bird calls taken by USDA APHIS Wildlife Services in Indiana.

<table>
<thead>
<tr>
<th>Species Group</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbids (Doves)</td>
<td>18</td>
<td>6.8</td>
</tr>
<tr>
<td>Coots</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Herons</td>
<td>6</td>
<td>2.3</td>
</tr>
<tr>
<td>Passerines</td>
<td>163</td>
<td>61.7</td>
</tr>
<tr>
<td>Raptors</td>
<td>23</td>
<td>8.7</td>
</tr>
<tr>
<td>Shorebirds</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Unknown</td>
<td>5</td>
<td>1.9</td>
</tr>
<tr>
<td>Waterfowl</td>
<td>44</td>
<td>16.7</td>
</tr>
<tr>
<td>Woodpecker</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>264</td>
<td></td>
</tr>
</tbody>
</table>
Bat Rabies in Indiana

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Our objective was to determine rates of rabies infection in bats submitted to the Indiana State Department of Health (ISDH) between species, over time, and in normally behaving bats. Those are important questions for public health reasons and also for protection of bats. Bats were tested by ISDH using the immunofluorescent method. We tested 8,262 bats for rabies at the ISDH from 1966 to 2003, of which 445 (5.4%) tested positive. The 2 most common species, the big brown bat (Eptesicus fuscus; n = 5,584; 173 [3.1%] rabid), and the red bat (Lasiurus borealis; n = 1,512; 169 [11.2%] rabid), accounted for 85.9% of submissions. We found the highest rates of rabies in the hoary bat (L. cinereus; 54 of 178 [30.3%] rabid) and eastern pipistrelle (Pipistrellus subflavus; 41 of 314 [13.1%] rabid).

Rates of rabies in other species ranged from 3.7% in the silver-haired bat (Lasionycteris noctivagans) to zero in Indiana myotis (Myotis sodalis) and evening bats (Nycticeius humeralis). The above data were mostly for incapacitated bats that people found sick or dead rather than normally behaving bats. None of 259 normally behaving big brown bats examined from areas where rabid bats had occurred were rabid. Levels of rabies in the big brown bat remained relatively stable throughout the study period with peak activity during late summer and fall.

Historically, surveillance for tularemia has occurred primarily in the western U.S. However, recently, surveillance has expanded to the eastern U.S. Figure 1 shows the current states where surveillance occurs. In 2006, USDA APHIS Wildlife Services, in cooperation with Indiana DNR Division of Wildlife Resources, initiated tularemia surveillance in Indiana. Samples are collected by the Indiana Wildlife Disease Surveillance Network (IWDSN; see April issue to read about the IWDSN) and sent to Wildlife Services for processing. Surveillance occurs primarily in predators (i.e., coyotes, foxes, etc.) and aquatic mammals, such as muskrats and beaver. If you routinely work with these animals (i.e., research, recreational trapping, nuisance control, etc.) and would like to participate in this surveillance effort, please contact Dr. Joe Caudell, USDA APHIS Wildlife Services Wildlife Disease Biologist at 765-496-3913.


Figure 1. States where Wildlife Services currently conducts surveillance for tularemia (in red).

Tularemia Surveillance (continued from pg 1)

and response that incorporates a broad range of public health partnerships. Wildlife Services has partnered with CDC in establishing nationwide surveillance of wildlife diseases such as tularemia. Other things CDC is doing include: stockpiling antibiotics to treat infected people, creating new education tools and programs for health professionals, the public, and the media, and coordinating a nation-wide program where states share information about tularemia.

An integral facet of the nation-wide sharing of tularemia information is the development of baseline information on where tularemia is occurring, identification and mapping of tularemia types and strains, and notification to health facilities of the local presence of the organism. Routine monitoring of wildlife populations by Wildlife Services provides CDC with information to accomplish these goals. In 2005, CDC initiated a nationwide surveillance for tularemia and asked USDA APHIS Wildlife Services to assist in collecting the blood samples for testing. Wildlife Services collects a small amount of blood on a Nobuto strip from various wildlife species taken during routine operational activities. Information including the species, location, and collector are recorded. The collected Nobuto strips are forwarded to the National Wildlife Research Center in Colorado for processing and then passed on to the CDC diagnostic laboratory in Fort Collins, Colorado for testing and mapping.

The goal of the surveillance program is to develop information on locations where tularemia occurs naturally, type the tularemia for each location, identify the animals involved and see if there is any correlation to human cases. Once this is accomplished it will be much easier for health officials to detect when introduced infections, whether accidentally or purposely (terrorists) introduced, can quickly be identified as not being a “normal occurrence” and determine where it came from.

In 2006, USDA APHIS Wildlife Services, in cooperation with Indiana DNR Division of Wildlife Resources, initiated tularemia surveillance in Indiana. Samples are collected by the Indiana Wildlife Disease Surveillance Network (IWDSN; see April issue to read about the IWDSN) and sent to Wildlife Services for processing. Surveillance occurs primarily in predators (i.e., coyotes, foxes, etc.) and aquatic mammals, such as muskrats and beaver. If you routinely work with these animals (i.e., research, recreational trapping, nuisance control, etc.) and would like to participate in this surveillance effort, please contact Dr. Joe Caudell, USDA APHIS Wildlife Services Wildlife Disease Biologist at 765-496-3913.

Article by J. Caudell, USDA APHIS

Source: TWS - JWM
Midwest Wildlife Disease Update

Minnesota- In July 2006 the Minnesota Department of Health Laboratory confirmed tularemia in a sick gray squirrel that came from St. Cloud in central Minnesota. Homeowners who submitted the squirrel reported observing 6-7 dead squirrels, 6-7 dead cottontail rabbits and 3-4 dead eastern chipmunks over a four week span. A second gray squirrel found dead tested positive as well for Francisella tularensis, the bacterium that causes tularemia. The Southeast Cooperative Wildlife Disease Lab reports that tularemia has been found in more than 200 vertebrate species, most frequently in rabbits and rodents. Tularemia, also known as rabbit fever, is considered a life threatening though rare disease in humans.

CWD- According to a news story in the Milwaukee Journal Sentinel by John Fauber, researchers have found virus-like particles in the brain tissue of animals infected with so-called prion diseases like Chronic Wasting Disease.

Continued on pg. 6

USDA APHIS Wildlife Services
National Wildlife Disease Surveillance and Emergency Response Program

Goals and Philosophy
The goal of the National Wildlife Disease Surveillance and Emergency Response Program is the proper development and implementation of a nationwide system to survey for wildlife diseases and respond to a variety of emergencies including natural disasters and disease outbreaks. The system, which is managed by the Wildlife Services (WS) unit in the U.S. Department of Agriculture’s (USDA) Animal and Plant Health Inspection Service (APHIS), is designed to provide assistance to Federal, Tribal, and State agencies with wildlife disease threats. Partnerships have been developed with other APHIS programs (including Veterinary Services and International Services), with other Federal entities (including the U.S. Department of the Interior and the U.S. Department of Health and Human Services), and with Canadian and Mexican agriculture, health, and natural resources agencies.

The nationally coordinated wildlife disease surveillance system will support existing programs with the collection of samples, facilitate information exchange among the programs, ensure that samples are adequately collected, and provide additional laboratory infrastructure. The program is implemented through a national coordinator and wildlife disease biologists assigned to APHIS field offices. These biologists conduct monitoring and surveillance activities and collect biological samples through a variety of techniques (e.g., trapping, mist netting, lethal means, etc.). To maximize efficiency, efforts are made to obtain samples in coordination with existing WS operational (e.g., protection of livestock, airports, and aquaculture, urban wildlife management, etc.) and research activities. Wildlife disease biologists are available to respond quickly to assist with disease outbreaks and other such emergencies requiring program participation. In the event of an emergency, biologists are required to immediately mobilize and arrive at the emergency site within 48 hours of notification.

In addition to providing assistance to the many different cooperators, WS is focusing on strengthening emergency preparedness and response and managing issues related to the health of U.S. animal resources and conflicts between humans and wildlife. The strategies to accomplish these objectives include developing a more robust, nationally coordinated pest and disease-surveillance system. An international border disease-surveillance system will proactively reduce the likelihood of terrorist attacks on agriculture, wildlife, and humans. The international partnership will allow for better implementation of a border disease-surveillance program in both livestock and wildlife.

Research Activities
An important component of the program is science-based knowledge provided by research on disease organisms, their reservoirs, their transmission cycles, and ways to block the transmission. WS’ National Wildlife Research Center supports the program by conducting research on reservoir populations, methods to control diseases, and diagnostic and epidemiologic support.

Locations of WS’ Wildlife Disease Biologists
At present, biologists are stationed in Alabama, Arizona, California, Colorado, Georgia, Illinois, Indiana, Maine, Maryland, Michigan, Missouri, Nebraska, New Jersey, New York, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Wisconsin, and Wyoming.

Some Diseases of Interest
- Avian influenza
- Bovine tuberculosis
- Chronic wasting disease
- Classical swine fever
- Plague
- Pseudorabies
- Rabies
- Swine brucellosis
- Tularemia
- West Nile virus

Additional Information
You may obtain more information about wildlife diseases by contacting Dr. Joe Caudell at 765-496-3913.

Source: USDA
The mission of the Division of Fish and Wildlife is to professionally manage Indiana’s fish and wildlife for present and future generations, balancing ecological, recreational, and economic benefits. Professional management is essential to the long term welfare of fish and wildlife resources, and providing for human health and safety. Communication between agency professionals and educating the public are important aspects of professional management.

Indiana BVD Testing - In November 2006 biologists and Purdue vet students collected 700 samples from white-tailed deer at DNR deer check stations around the state. Lymph glands and ear notches were collected to test for a relatively common viral disease of ruminants called Bovine Viral Diarrhea (BVD). Dr. Roman Pogranichniy, a diagnostic virologist at Purdue Animal Disease Diagnostic Lab, coordinated the effort and reports that only two positive samples were collected, one from lymph tissue and one from ear tissue. With so few positives, one could conclude that BVD is rare in our wild deer herd, and that deer are a minimal risk factor in spreading the disease to domestic ruminants.

TB Update from Michigan - In January and February 2007, Michigan DNR field tested a method for detecting TB in free-ranging deer. Deer are captured and a sample of blood is tested. Deer that test negative for TB are released in approximately 15 minutes. Positive deer are euthanized and transported to a lab for further testing. More about this project can be found at http://www.thealpenanews.com/stories/articles.asp?articleID=381#.

Column by D. Zimmerman, IDNR