A JOINT PROJECT BETWEEN

USDA APHIS WILDLIFE SERVICES

AND

INDIANA DNR DIVISION OF FISH AND WILDLIFE

Indiana Wildlife Disease News

Volume 5, Issue 2 May 2010

Special points of interest:

- Botualism in wildlife
- White-nose Syndrome in Bats now in Midwest
- BOAH makes move to new location in Indianapolis
- New publication available on Tularemia available from download from the National Wildlife Health Center

Inside this issue:

Disease in Focus

Botulism in wildlife

Description

Botulism is a paralytic condition brought on by the consumption of a naturally occurring toxin produced by the bacterium *Clostridium botulinum*. It is an intoxication rather than an infectious disease. The bacterium is widespread in soils in North America and elsewhere in the world. The toxin produced during growth of the bacterium is one of the most poisonous substances known. We recognize two forms of botulism, type C and type E, affecting wildlife in Michigan.

Distribution

Type C botulism - Type C botulism occurs principally in waterfowl and other birds living in an aquatic environment and causes tremendous losses, most notably in waterfowl in the western United States. In addition to North America, it has been reported in birds in Europe, South Africa, Uruguay, and Australia. In the Great Lakes region, it was first identified in 1936 in ducks on Green Bay of Lake Michigan and, in 1941, in Monroe County marshes along Lake Erie. In Michigan, outbreaks occur in ducks and shorebirds whenever conditions are favorable for botulism. There have been reports of botulism along both coasts of the lower peninsula and on many inland lakes. Devastating outbreaks have occurred in game farm pheasant flocks in the U.S. and Canada, though not yet in Michigan.

Type E botulism - Type E botulism is connected with consumption of fish and occurs mainly in gulls and loons, to a lesser extent in mergansers, mute swans, grebes, and shorebirds. It now appears that any birds or mammals susceptible to botulinal toxin run a risk of becoming poisoned if they scavenge dead fish. Evidence for this lies in the fact that type E toxin has been identified in a bald eagle, wood ducks, and muskrats

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Wildlife Disease Update

WNS Spreads into Midwestern United States

Likely WNS symptoms at Breathing Cave, Bath County, Virginia, late February 2009. Photo: Wil Orndorff, Virginia DCR - Division of Natural Heritage

White-nose syndrome (WNS) continues to be a problem for bat populations in the eastern United States, and the occurrences of this syndrome appears to be increasing in geographic scope. The Wildlife Health Bulletin below is from the USGS National Wildlife Health Center, which is one of the primary investigators in the team working to identify, monitor, and manage this condition. This brief article is to provide an update on WNS and it's current geographic distribution (introductory paragraph by Joe Caudell, co-editor Indiana Wildlife Disease News).

The USGS National Wildlife Health Center (NWHC) has detected the genetic signature of the fungus Geomyces destructans, the likely cause of

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Botulism in wildlife (continued from pg 1)

having fish remains in their digestive tracts in Michigan.

Geographically, the disease has been recognized in wildlife only in the Great Lakes Region, specifically about Lakes Michigan and Huron, and more rarely on inland waters of Michigan. It has been diagnosed in Ontario, Ohio, Pennsylvania, and New York on Lakes Ontario and Erie.

Transmission and Development

Botulism is a food poisoning. The toxin-producing bacterium, *C. botulinum*, is common in surface soils of both the terrestrial and the aquatic environment. Toxins are produced only when conditions favor growth and multiplication of the bacterium.

Type C toxin occurs in carcasses of dead invertebrates, in the flesh of birds dying of botulism, and in maggots feeding on toxic carcasses. In a type C botulism outbreak the sequence of events are: aquatic invertebrates ingest the bacterium when feeding and a lowering of water levels or an increase in water temperature causes large numbers of the invertebrates to die. The carcasses of the invertebrates provide a good medium for growth of the bacterium with subsequent production of toxin. Ducks feeding on the toxic dead invertebrates found in the bottom sediments become poisoned and die. Maggots infesting the duck carcasses become toxic and are eaten by ducks and other species of birds, thus increasing bird mortality in an explosive manner. Outbreaks among captive pheasants appear to stem from a few maggot-infected pheasant or other animal carcasses, and expand to explosive proportions as toxic maggots become available to the general flock.

Type E toxin is found primarily in decaying fish. The bacterium, *C. botulinum* type E, is found in bottom mud, in aquatic invertebrates, and in the gut of fish taken from Lakes Michigan and Huron. The bacterium is picked up by feeding invertebrates; fish ingest the bacterium either directly from bottom mud, or from eating invertebrates arising from it. Carcasses of dead fish provide a good medium for growth of the bacterium and production of toxin. Birds and mammals become poisoned from feeding on toxic dead fish. In this manner, bird and mammal die-offs coinciding with fish die-offs are easily explained. Botulism mortality of loons and other birds in late fall in the absence of a coincidental fish die-off are probably the result of lake turnover with invertebrates being ingested by the birds.

Clinical Signs

Though outbreaks are characterized by the presence of dead birds in varying numbers, the investigator can usually find a few sick individuals by careful searching. The only meaningful sign of botulism is the loss of strength due to muscular paralysis. The degree of paralysis is related to the dose and time of exposure and the amount of toxic material consumed. Gulls show wing-droop and difficulty in getting air-borne in mild intoxications. In more advanced cases, gulls are unable to stand, ducks are unable to hold up their heads. Consciousness is retained, and it is common to find gulls completely immobile but showing apprehension when approached (see illustration). Loons and mergansers are rarely discovered sick, and appear to die on the water and drift ashore after death.

Pathology

Botulism leaves no characteristic tissue lesions. The toxin chemically blocks nerve transmission at the site where the nerve endings meet the muscle fibers, and causes no detectable cellular changes. Death is attributed to paralysis of respiratory muscles, or in the case of birds on the water, to drowning from being unable to hold their heads up. Birds with sublethal levels of toxin may make a full recovery.

Diagnosis

Diagnosis is based on field evidence, flaccid muscular paralysis in sick birds, and detection through laboratory methods of botulinal toxin in tissues of sick and dead animals. The laboratory test involves infecting a group of laboratory mice with blood or other fluids extracted from carcasses of animals under investigation. Half of the mice are given protective doses of antiserum to the toxin being tested; the other half are unprotected. If toxin is present in the blood or carcass fluid, all the unprotected mice will die; if it is the type neutralized by the specific antiserum, the mice given antiserum will survive, thus identifying the toxin involved.

Treatment and Control

Birds with sublethal doses of toxin will recover if removed from the source of toxin and given shelter, fresh water, and food. Use of antiserums is not feasible. They are not readily available in quantities needed, and their value when administered after signs of botulism become apparent is questionable, though some workers have claimed increased recoveries in ducks injected with type C antiserum.

Control procedures remain more theoretical than practicable to wildlife managers at this time. It would seem that type E botulism might be effectively controlled if accumulations of dead fish can be avoided. Large-scale outbreaks of type C botulism often are associated with periods of hot weather, high water temperature, low water levels, or changing water levels. Outbreaks of botulism are initiated by die-offs of water invertebrates; therefore stabilization of water levels and temperatures in late summer would reduce the potential for an outbreak. For pheasants maintained in high populations under game farm con-

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WNS Spreads into Midwestern US (Continued from pg 1)

white-nose syndrome (WNS), in skin samples collected from little brown bats submitted for testing from a cave in Pike County, Missouri and from White Oak Blowhole Cave in the Great Smoky Mountains National Park. In addition, the Quebec Minister of Natural Resources has announced that WNS was detected in the Outaouais region of Quebec, and this finding was confirmed by the NWHC.

The Missouri and Great Smoky Mountain National Park sites are currently considered "presumptive positive" for WNS because the fungus was visible on the skin of bats and was confirmed by a molecular test (PCR), but there was no microscopic evidence of clinical fungal infection in the bats examined.

The case definitions that the NWHC uses to diagnose WNS include clinical signs associated with WNS, detection of Geomyces destructans by PCR and/or culture, and confirmation of WNS by histopathology.

The detection of the fungus in Missouri represents significant movement westward, and the White Oak Blowhole Cave is the largest known Indiana bat hibernaculum in Tennessee. The Indiana bat is a federally listed endangered species which has undergone population declines in the Northeastern United States due to WNS.

The Missouri Department of Conservation confirmed the state's first signs of WNS in an April 19 release titled MDC monitoring new bat disease in Missouri.

The National Park Service reported that a Great Smoky Mountains National Park Bat Tests Positive for White Nose Syndrome Fungus on April 19.

If you observe the following signs in or around bat winter hibernation sites, please report them to your state natural resource agency or the NWHC contacts listed below:

Bats with white or gray powdery fungus seen around the muzzle, ears, wings, limbs, and/or tail.

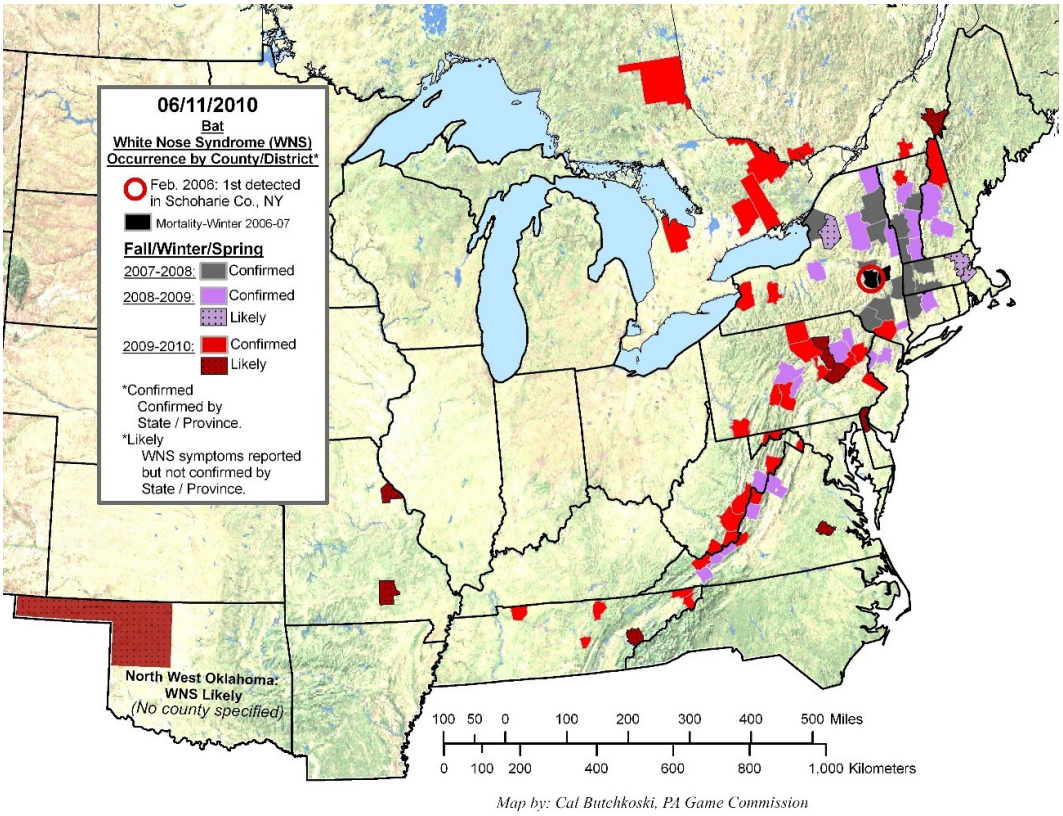
Excessive/unexplained bat mortality at a hibernation site.

Aberrant bat behaviors (bats found on ground inside or outside the hibernaculum, bats roosting near hibernaculum entrance, increased bat activity outside the hibernaculum during cold weather, delayed arousal from torpor following disturbance).

More information on WNS in bats can be found at:
U.S. Fish and Wildlife Service, Northeast Region
USGS National Wildlife Health Center
WNS Sampling Methods
USGS Fort Collins Science Center

To report or request assistance for wildlife mortality events or health issues, visit the reporting page or contact Dr. Anne Ballmann, 608-270-2445, aballmann@usgs.gov (Eastern Region), Dr. LeAnn White, 608-270-2491, clwhite@usgs.gov (Central Region), Dr. Krysten Schuler, 608-270-2447, kschuler@usgs.gov (Western Region), or Jennifer Bradsby, 608-270-2443, jbradsby@usgs.gov.

Source: USGS Wildlife Health Bulletin 2010-3. The Wildlife Health Bulletins are distributed to natural resource/conservation agencies to provide and promote information exchange about significant wildlife health threats in their geographic region. If you would like to be added to or removed from the mailing list for these bulletins, please contact Gail Moede Rogall at 608-270-2438 or e-mail: nwhcoutreachdb@usgs.gov.



Map courtesy Cal Butchkoski, PA Game Commission.

Botulism (Continued from pg. 2)

ditions, strict policing to keep carcasses of dead pheasants and other animals picked up, as well as observing other sanitation practices, is essential since carrion of any sort is always a potential source of botulinal toxins.

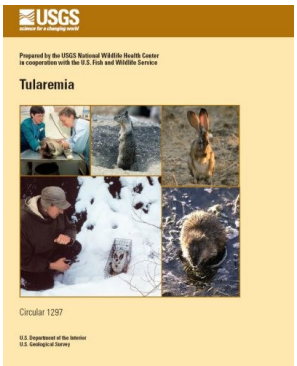
Significance

Botulinal toxins are highly fatal to many animals, including man. Variations in incidence of poisonings among different species are generally attributable to differences in feeding habits, rather than to variations in susceptibility. In wildlife, botulism primarily impacts bird populations. The bacterium persists in lakes and marshes where botulism is endemic, and poses a serious threat to waterfowl populations using these areas. Poisonings in humans from type E botulinal toxins usually are associated with eating uncooked, imperfectly canned and improperly preserved fish and marine animal products. Since fish-eating birds normally are not eaten by people, and thorough cooking destroys the toxin, this wildlife source of type E toxin is not a serious public health problem.

Public health workers do not implicate type C toxin in human poisonings, though this is not to say it could not be fatal if *C. botulinum* is ingested. Since the toxin is destroyed by heat, it appears that no problem with botulism will result from eating cooked waterfowl.

Source: Michigan DNR Wildlife Disease Manual found at http://www.michigan.gov/dnr/0,1607,7-153-10370_12150_12220---,00.html (last accessed on May 8, 2010).

Publication on Tularemia Now Available from the USGS National Wildlife Health Center



The USGS National Wildlife Health Center is pleased to announce the publication of Circular 1297 -- Tularemia. This book was prepared in cooperation with the U.S. Fish and Wildlife Service. Major funding support was provided by the U.S. Fish and Wildlife Service, Division of Federal Assistance, Administrative Grant No. AP95-017. This publication can be downloaded from http://www.nwhc.usgs.gov/publications/tularemia/

BOAH in New Location and New Contact Information

The Indiana Board of Animal Health has recently moved its office and has a new address and phone numbers. Their new primary phone number is 317-544-2400. Please check the following website for additional contact information as well as a listing of staff, their specialty, email, and contact information: http://www.in.gov/boah/files/Directory5.pdf

Midwest Wildlife Disease Update

May 2010

No TB Found in Indiana Deer Sampled- More than 400 white-tailed deer heads were collected from seven counties during opening weekend of firearms hunting season in Indiana to test for bovine TB (TB). This step was taken in the areas around the three positive farmed-cervid herds to determine if the disease had spread into the wild deer population. Exactly 431 heads were sampled from the following counties: Dearborn, Fayette, Franklin, Harrison, Randolph, Union and Wayne. Animals with lesions were sampled and submitted for further testing by USDA laboratories. Chad Stewart, DNR Deer Biologist, reports that all samples came back negative for TB. Stewart advised that Franklin and Fayette Counties will be sampled again the fall of 2010. (Source- BOAH Newsletter, April 7, 2010; IN Div. Fish and Wildlife Management and Research Note: 2009 Bovine Tuberculosis Surveillance and Monitoring Summary, April 8, 2010, by Chad Stewart, edited.)

New BOAH Contact Information- The Indiana Board of Animal Health has recently moved its office and has a new address and phone numbers. Their new primary phone number is 317-544-2400. Please check the following website for additional contact information as well as a listing of staff, their specialty, email, and contact information: http://www.in.gov/boah/files/Directory5.pdf (Source- BOAH homepage- www.in.gov/boah/)

Indiana Cervid Testing- Effective January 1, 2010, cervids moving intrastate will be required to test for bovine tuberculosis (TB) within 90 days of their movement. The board approved the rule at the October board meeting. The action comes as a result of the recent TB cases in three Indiana farmed-cervid herds. A copy of the new rule, with further explanation, can be found on the BOAH Web site, www.boah.in.gov. (Source- BOAH Newsletter, April 7, 2010)

Close-up of little brown bat with fungus on muzzle. New York, October 2008. Photo: Ryan von Linden New York Dept. of Environmental Conservation.

Indiana Man Dies of Rabies- A Clark County Indiana man died from rabies in October 2009 at a Louisville, KY hospital. He was the first human death since 2006, and only the second death since 1959. The 43 year old man "had not reported any exposures of concern," but a family member reported he "likely had been bitten by a bat." He was admitted to a hospital on October 9 and died October 20. Testing by the CDC indicated the source of infection was a bat. Health officials advise that bats should never be handled.
Indiana's rabies lab identified 39 positive bats in 2009. While the raw number is higher than most years, the percentage of positives (about 10 percent) is about average. Worldwide an estimated 55,000 people die of rabies each year. (Source- indy.com article, October 28, 2009, edited)

Missouri Has CWD Positive in Captive Herd- The Missouri Department of Agriculture (MDA) reported on February 25, 2010, that Chronic Wasting Disease (CWD) had been confirmed for the first time in the state. The positive animal was a captive white-tailed buck at a private shooting enclosure in Linn County in the north-central part of the state. On March 19, the MDA and the Missouri Department of Conservation (MDC) reported that CWD was not detected in 50 additional captive deer that had been destroyed and tested on the 800-acre tract. As part of a cooperative response plan, the MDC collected samples from 153 free-ranging white-tailed deer within a 5-mile radius of the affected captive facility to determine whether CWD was present in the wild animals sampled. Samples also were tested from 72 wild deer harvested by hunters in Linn and surrounding counties during the 2009-2010 deer hunting seasons. Testing has been completed, and no evidence of CWD has been detected among any wild deer sampled in Missouri. (Source- SCWDS Briefs Newsletter, April 2010)

A bat from a cave in northwest Oklahoma has tested positive for the fungus associated with WNS. According to Director of the U.S. Geological Survey's National Wildlife Health Center in Madison, Wisc., Dr. Jonathan Sleeman, laboratory tests detected the genetic signature of the fungus in a single bat submitted from Oklahoma. He noted the presentation on the Oklahoma bat was not typical of the way WNS has been observed in bats in the eastern United States. This is the first discovery of the fungus in the state and is the most western report of the fungus - about 450 miles from the nearest cave in Missouri having bats with the fungus. This is the first time the fungus has been found in the cave myotis bat (Myotis velifer), which ranges throughout the Southeast and into Mexico.

Indiana Continues To Be CWD Free- During the 2009 calendar year, the state of Indiana collected and tested 827 usable retro-

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Indiana Wildlife Disease News

A joint project between:

Indiana DNR
Division of Fish and Wildlife

and

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

to provide information on wildlife diseases in Indiana and surrounding states.

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Submissions or Participation
If you would like to submit a wildlife disease related article, ideas, comments, or other information, please contact one of the editors.

We welcome individuals or agency representatives to act as reviewers or to provide assistance in the production of this newsletter. To assist, please contact one of the editors.

Providing information on wildlife diseases in Indiana and surrounding states

Indiana Department of Natural Resources Division of Fish and Wildlife

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.

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USDA APHIS Wildlife Services

NATIONAL WILDLIFE DISEASE SURVEILLANCE AND EMERGENCY RESPONSE PROGRAM

The mission of the National Wildlife Disease Surveillance and Emergency Response Program is to provide Federal leadership in managing wildlife disease threats to agriculture, human health and safety, and natural resources by assisting Federal, State, Tribal, and Local governments, private industry, and citizens with management of zoonotic and other wildlife diseases of concern.

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Midwest Wildlife Disease Update (Continued from pg. 6)

pharyngeal glands through its active surveillance program (hunter harvested and road-kill deer). Six (6) deer were additionally euthanized through its targeted surveillance program. Analyses on the 833 samples have been completed, with none of the samples detecting the presence of CWD prions (Table 1). Since monitoring began in 2002, over 10,400 samples have been collected by the DNR with no sample testing positive for CWD prions. (Source- IN Div. Fish and Wildlife Management and Research Note: 2009 CWD Surveillance and Monitoring Summary, April 8, 2010, by Chad Stewart)

Illinois CWD Positives in Decline- The Illinois DNR confirmed 28 deer taken during the 2009-10 deer seasons were positive for CWD. This is the fourth year in a row of seeing fewer CWD positives after a high of 51 in 2004 and 2006. CWD was found in only five counties including: Winnebago (13), Boone (9), DeKalb (3), McHenry (2), and Stephenson (1). No new counties were added to the CWD positive list, and new confirmations were close to the core area. The Stephenson positive was the only exception and was a few miles west of the previously western most positive in Illinois. (Source- Dean Zimmerman review of Illinois DNR website)

Column by D. Zimmerman, IDNR