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Indiana Wildlife Disease News, Volume 4, Issue 1 – February 2009

A JOINT PROJECT BETWEEN

USDA APHIS WILDLIFE SERVICES

AND

INDIANA DNR DIVISION OF FISH AND WILDLIFE

Indiana Wildlife Disease News

Volume 4, Issue 1 February 2009

Special points of interest:

- Starvation and malnutrition in deer
- New test at ADDL can test for starvation and/or malnutrition in wildlife
- Avian Influenza symposium at the University of Georgia
- White-nose syndrome update
- WBII Information Node

Inside this issue:

Disease in Focus

Starvation and Malnutrition in Wildlife

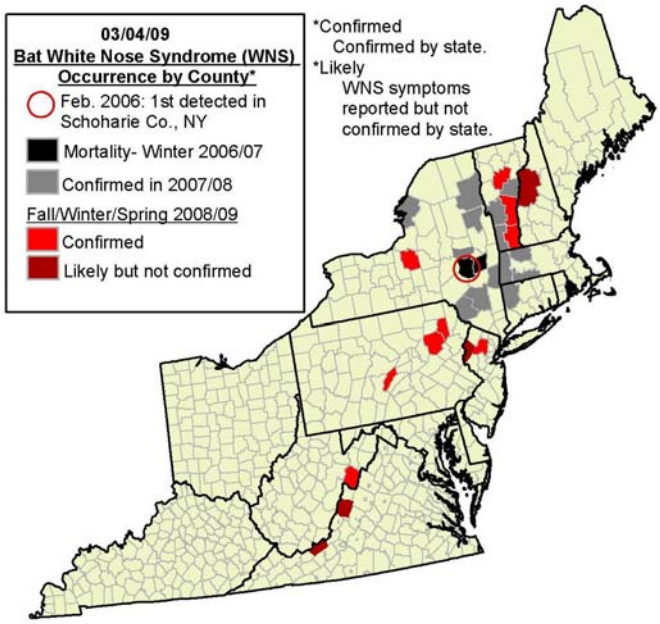
Description

The terms malnutrition and starvation are used interchangeably, when in reality, there are specific definitions for each. Malnutrition is the inadequate intake of any of the required nutrients. This can even occur in an animal receiving large amounts of food, but is not able to ingest, digest, absorb, or utilize this food. Causes for this inability are injuries, poor teeth, parasitism, disease, foreign bodies in the digestive tract, tumors, or an increased motility of the digestive tract. Malnutrition can also occur if the food is inadequate in one or more of the required nutrients. If an animal is not able to obtain food for an extended period of time either for the above reasons or due to an unavailability of food or insufficient energy intake, this is defined as starvation. Malnutrition and starvation can be caused by diseases, injuries, the range the animal lives on, or the environmental conditions it must live in. Starvation and malnutrition occur in several wildlife species and routinely eliminates the young, old, weak, and sick animals. Winter is when mortality usually occurs due to the negative energy balance brought about by the cold weather, deep snow, increased energy demands, snow covered food, and human and predator induced stress.

Historically, in Michigan the number of species diagnosed at the Laboratory as dying from malnutrition and starvation are second only to those dying from traumatic injuries. Numerous bird and mammal species annually (depending on the severity of the winter) die Continued on pg. 2

White-nose Syndrome Update

White-nose syndrome (WNS) continues to be a problem for bat populations in the northeast, and the occurrences of this syndrome appears to be increasing in geographic scope. The map below is the most recent information on the spread of the disease and includes several counties in Pennsylvania that are confirmed or suspected of WNS. There is also one county in Virginia where the disease is likely, but not confirmed.



Current known distribution of WNS in bats. Map courtesy Cal Butchkoski, PA Game Commission.

Malnutrition and Starvation (continued from pg. 1)

from insufficient nutrition. Currently we have 3 primary species that die from malnutrition or starvation: white-tailed deer, mute swan, and wild turkey. The majority of the animals have come from the Upper Peninsula and the northern half of the Lower Peninsula with mortality occurring almost exclusively during the winter when food availability is at its lowest.

Malnourished deer due to CWD. Photo Wisconsin Department of Natural Resources.

Susceptibility

Susceptibility to starvation and malnutrition usually occurs in the winter and early spring months for wildlife in Michigan. Animals cope with the severe weather and shortage of food in 1 of 3 ways: hibernate (amphibians, reptiles, and several mammals), migrate (most avian species), or remain active and attempt to survive. Juvenile, yearling, and old animals are the age groups most susceptible to starvation and malnutrition because they enter the winter with the smallest fat reserves, the highest nutritional demands, the greatest heat loss, and the lowest position in the social hierarchy. Of the winter starvation deaths observed, 60 to 70% may consist of animals less than 1 year of age. Adult males and females and juveniles of both sexes of various species may have smaller reserves of fat due to breeding activities, rearing of the previous year's offspring, and their growth requirements, respectively. Most wild animals in colder climates undergo an annual fat cycle whereby fat is deposited and then utilized as the physical condition declines. During a severe winter, adult deer may lose as much as 25 to 30% of their body weight and still survive. The loss of weight occurs during the winter because of snow depth, ambient temperatures, and the quality and quantity of the available forage. Because of these factors, the physical condition of animals at the onset of winter is critical to their survival. The adequacy of summer and fall ranges is thereby very important. The duration and severity of the winter is critical to the animal's chances for survival, as it determines the length of time the animal must depend on its body fat reserves and on poorer forage for survival. Deep snow and cold temperatures, especially during the latter part of the winter can result in very high numbers of deaths attributed to malnutrition and starvation. The cover available to the animal is also of utmost importance as this allows the animal to escape from the low temperatures and the wind. Offspring of weakened animals that survive the winter are also susceptible to the effects of starvation as they may be absorbed or aborted as fetuses, or if born, may be improperly cared for.

Avian species are highly mobile and usually migrate, thereby lessening the chances of mass starvation. Extremes of weather (sudden snow or ice storms) may result in birds becoming trapped in inhospitable areas and not having food available. Some species experience mortality of the females due to nesting activities in the early spring, when they are unable to leave the nest to feed. Deaths attributed to malnutrition and starvation are seen in young birds during the hatching season due to parent neglect, or once they are fledged from the nest, the inability to acquire their own food.

Physiology

If an animal is forced into an inadequate plane of nutrition, there are many physiological changes as the animal attempts to satisfy its energy requirements. At the cellular level, catabolism (the breaking down in the body of complex chemical compounds into simpler ones) continues to supply the substances required for anabolism (the usage of nutritive matter and its conversion into living substance) and to continue vital functions. Reserve stores of nutrients contained in the individual are utilized to compensate for the lack of nutritional intake. Energy is generated from the utilization of proteins, fats, and carbohydrates. The most readily usable material, the carbohydrate glycogen, is utilized first. This is derived from glycogen stored in the liver and is exhausted within a few hours. This is followed by stored fat from the various subcutaneous deposits, around the kidney, and in the mesentery and omentum tissue. Fat deposits in the parenchymatous organs are utilized next. The last area of the body to lose its fat deposits is the marrow of the bones. The final source of energy available is the protein comprising the cytoplasm of the cells. It is at this time that ketosis and an increase in nitrogen excretion may occur. Ketosis (a condition in which ketone substances appear in the blood and urine) is commonly seen in malnourished animals. This is because it is necessary for the animal to derive its energy from the stored fat and protein. After all the fat reserves have been exhausted, nitrogen excretion rises due to the protein catabolism which occurs just prior to death. The animal will eventually reach a point where the cells of the body are unable to perform the functions necessary for life. Death results from lack of sufficient blood glucose to provide the energy needs of the brain and hypoglycemic shock occurs.

At the microbial level, inadequate food intake, especially in a ruminant species, results in a rapid decrease in the number of bacteria and protozoa present and in the volatile fatty acid concentration in the stomach. The ruminant obtains approximately 70% of its energy from these fatty acids, so a reduction in the level has a significant impact on the animal. The pH of the rumen becomes more alkaline because of the lack of these fatty acids. Decreasing the microbial populations probably diminishes the animal's ability to digest cellulose (fibrous material).

At the individual level, weight loss of 25 to 30% can occur and the animal may survive, but death is often

Continued on pg. 3

Malnutrition and Starvation (Continued from pg. 3)

the result. Wild ruminant physiology has developed to allow them to withstand dietary deficiencies and obtain energy from the consumption of poor quality forage. Adult ruminants are able to store large amounts of nutrients and fat within their body tissues. They are also able to store minerals and nitrogen in their tissues for secretion into the rumen during the winter months. These fatter, older animals are thereby able to utilize more fat than protein, especially in the early stages of malnutrition and starvation. Young animals, which have smaller fat reserves because of their higher nutritional demands for growth, smaller body size, and position in the social hierarchy, utilize more protein than fat under starvation conditions.

Bone marrow fat analysis can aid in diagnosising starvation. Photo: Michigan DNR Wildlife Disease Manual.

Prevention

Supplemental feeding of starving wildlife is an alternative to allowing wildlife species to die. This, however, involves a philosophical question of maintaining wildlife populations at a level above their normal carrying capacity, interfering with nature's checks and balances on populations and encouraging transmission of diseases (bovine tuberculosis). It may also be cost prohibitive. If a feeding program is to be used to maintain a high plane of nutrition it needs to be started early in the winter, continued throughout, and a surplus of food must be provided. If food is not provided (especially in ruminants) until malnutrition is in its advanced stages, the animal will probably die anyway. This is because once food is made available, the ruminant must be able to live in a negative energy balance for up to 2 weeks, before its digestive tract can adjust to the new diet and change to a positive energy balance. Generally, starved ruminants do not eat large quantities of food when sudden access to unlimited food occurs. However, due to an altered microbial population in the stomachs, it is possible to observe mortality in deer when shelled corn is overeaten. The reason for this is that lactic acid from the fermentation of starch accumulates to toxic levels. High quality palatable feed is essential in a feeding program: feed which contains readily available carbohydrates, roughage, minerals, and vitamins. Pelleted formulated feeds are the best ration that can be provided for ruminants. Elk can survive on high quality second or third cutting alfalfa but deer have greater difficulty in obtaining adequate energy from roughages like this that are high in fiber. If baled hay is all that is provided for deer, it must be high quality alfalfa fed at a level where the deer do not have to consume anything but the leaves and small stems.

Supplemental feeding of birds is usually only cone for songbirds but does occur with waterfowl species and turkeys under certain circumstances. The feeding of waterfowl during the winter may encourage alterations of normal migration patterns and possibly be of disease importance. Avian species respond faster to the providing of food once physical condition has been affected. Consequently, if the necessity arises, supplemental feeding can be started at anytime and probably be successful.

Significance

The plane of nutrition animals are on in the winter influences the severity of mortalities due to starvation, the reproductive success of the females, and the animal's resistance to disease, parasitism, and predation. Deaths attributable to starvation may have a great and persistent effect on a population, not only due to the loss of individuals, but also due to the disruption of fertility and reproductive success. In mammals, the effects of starvation on a pregnant female and her fetus(es) may be seen in utero, or after birth. Pregnant females catabolize their own fat and protein reserves during periods of food deprivation. The fetus is protected by these actions and continues its development. If a pregnant female is forced to withstand prolonged malnutrition, however, the fetus may die and be absorbed or aborted. A fetus that is not absorbed or aborted, but survives and continues its development to term, may be born small and have a reduced chance of surviving. This is especially true if malnutrition occurs during the third trimester of the pregnancy. These small offspring will probably have difficulty in suckling and the female may not permit them to do so, thus rejecting them. It is, however, possible that a malnourished pregnant ruminant will maintain its pregnancy until it dies from starvation.

Supplemental feeding is controversial because it can increase populations temporarily beyond carrying capacity, increase their vulnerability to predators, and spread disease. Photo: USDA

The ability of the malnourished animal to resist bacterial and parasitic infection is markedly reduced when the body's immunological system has been compromised by the animal's malnourished condition.

In conclusion, malnutrition and starvation can be significant influences on a population of animals, but usually this effect is short term and the population returns to its normal level.

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 February 10, 2009).

Recent Wildlife Disease Activity

New Test at the Indiana Animal Disease Diagnostic Lab may aid in the Diagnosis of Starvation in Wildlife

Diagnosing the cause of death in wildlife can be difficult. With pets or domestic animals, the owners can often provide information about the history of the animal, allowing the veterinarian to look for specific causes of death. With wildlife, any additional information that is provide to the diagnostician is often limited to what the collector can observe. The necropsy and diagnostic tests are important for discovering the cause of death. The Indiana Animal Diagnostic Lab has a new test available to them that will allow veterinarians to determine if the animal was malnourished.

Summary:
Definitive diagnosis of animal malnutrition can be challenging. The Analytical Toxicology section has developed a quantitative test which can help in the diagnosis of malnutrition. By measuring the amount of fat in the bone marrow and comparing it to the normal amounts, the percentage of bone marrow fat can be determined and be used to support necropsy diagnosis.

Method:
In this method, the fat content is determined from the bone marrow of the right femur using a modification of the AOAC published procedure for crude fat analysis. This procedure involves drying the sample *in vacuo* and extracting the bone marrow fat using pentane.

Normal Values:
The average bone marrow fat content for normal adult cattle, dogs, sheep, pigs, and horses is greater than 80%.

Submission:
To submit a sample for analysis, submit a whole femur from the affected animal.

Article by: C. Wilson, Head Toxicology Section, K. Meyerholtz, Assistant Chemist

Upcoming Conference

7th International Symposium on Avian Influenza

The 7th International Symposium on Avian Influenza will be held at the University of Georgia Center for Continuing Education, Athens, Georgia, USA, on April 5-8, 2009. Oral and poster presentations will focus on poultry and wild birds including pathobiology, virus reservoirs and ecology, molecular basis of virulence, vaccines and diagnostics, phylogenetics and molecular epidemiology, risk assessment, transmission, national and international control strategies, economics, updates on recent highly pathogenic avian influenza outbreaks and impact on human health with a focus on occupational and exposure risks.

For more information and to register, visit the UGA Continuing Ed Center website at: http://www.georgiacenter.uga.edu/conferences/2009/Apr/05/avian.phtml

7th International Symposium on Avian Influenza:
Avian Influenza in Poultry and Wild Birds

April 5-8, 2009

In Focus

Steve Hooser, Director, Indiana Animal Disease Diagnostic Lab

Dr. Hooser received his bachelor's degree in Zoology from Eastern Illinois University, Charleston, IL. He received his veterinary degree from the University of Illinois in 1982. Following a brief stint in a small animal practice in Charleston, he returned to the University of Illinois in 1983 for a residency in Toxicology and a Ph.D. in Pathology which he received in 1989. Also in 1989, he passed the examinations for the American Board of Veterinary Toxicologists. After receiving his Ph.D. in May, 1989, he began post-doctoral studies in Toxicology at the University of Arizona. In 1993, he was able to spend an additional post-doctoral year at the TNO Food and Nutrition Research Center, in Zeist, The Netherlands. In 1994, he accepted his current position as Head of the Toxicology Section at the Animal Disease Diagnostic Laboratory and Assistant Professor of Comparative Pathobiology at Purdue University. In 2001, he became the Assistant Director of the ADDL (in addition to being the Head of Toxicology) and in 2008, he was promoted to Full Professor. On August 1st, 2008, he was appointed as the Director of the Indiana Animal Disease Diagnostic Laboratory at Purdue University. He, and the State of Indiana, are fortunate to have diagnostic laboratory sections within the ADDL lead by faculty members who are extremely capable, energetic and enthusiastic individuals, all of whom are also leaders in their respective fields. Those sections are staffed by equally able and dedicated staff, who also diligently serve the community. Over the coming years, the ADDL will continue in its objective of, "Providing accurate and prompt diagnostics service to veterinary practitioners, animal producers, companion animal owners, wildlife conservationists, animal researchers and state/federal regulatory officials."

Steven Hooser, DVM, Ph.D.

Article by: D. Zimmerman, IDNR

Wildlife Disease Resources in Focus

NBII Wildlife Disease Information Node

The Wildlife Disease Information Node (WDIN) is a collaborative project of the National Biological Information Infrastructure (NBII), www.nbii.gov. WDIN is working towards creating tools that help to bring together the most up-to-date wildlife disease data and information for a range of wildlife professionals and members of the general public. In addition, WDIN fosters a community in which relevant information and expertise can be more easily shared among wildlife professionals.

Tools and Resources

The speed at which globalization is occurring means that access to frequently updated wildlife health information is essential for making decisions wildlife professionals are faced with each day. Recognizing this need, the Wildlife Disease Information Node provides a variety of freely available tools to help members of the wildlife health community stay up-to-date on wildlife health news, and quickly access information relevant to their work.

Wildlife Disease News Digest

The Digest is one mechanism available to wildlife professionals who need to keep up-to-date on breaking wildlife health news. WDIN staff search science and news media for stories and press releases relevant to wildlife health, which are then assembled into the Wildlife Disease News Digest. In addition, recent wildlife health related publications are included in the Digest in order to spotlight the latest wildlife health research.

The News Digest, complete with brief excerpts, images, and links to news stories and related media, is available in a variety of formats to suit busy professionals. Delivery options include a daily e-alert, a weekly news summary, website, RSS feed, and personal homepage gadget. For more information or to subscribe, please visit <http://wildlifedisease.nbii.gov/wdindiseasenews.html>

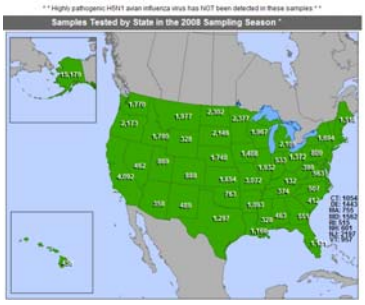
Global Wildlife Disease News Map

The spatial distribution of wildlife disease is key to achieving a greater understanding of disease spread. The Global Wildlife Disease News Map provides an at-a-glance picture of where wildlife disease is making news. Select news stories from the Wildlife Disease News Digest that focus on disease outbreak and/or spread are represented on the map.

The Map is built upon the familiar and intuitive Google Maps interface for ease of use. The Map is flexible to suit varying information needs. Filter functions allow the mapped news to be limited to a particular disease or species of interest. In addition, advanced mapping features allow map makers to use the Global Wildlife Disease News Map as a layer in their own maps. Visit the Global Wildlife Disease News Map here: http://wildlifedisease.nbii.gov/wdinNewsDigestMap.jsp. Check out the "About Map" tab for additional information.

Guided Search

The Guided Search is a gateway to the collection of resources offered by the WDIN website. Offering a wide range of filtering options, the guided search helps users quickly pinpoint the type of resources needed. Filters include resource type (journal article, map, website), disease type, specific disease, and species affected, to name a few. These filters can be combined with a keyword search to further customize the search. Give the Guided Search a try here: http://wildlifedisease.nbii.gov/search.jsp?searchtype=guided&jsSupported=0



Wildlife disease surveillance maps is one of the products that can be found at the WDIN website.

Forums

The NBII Wildlife Disease Information Node works to bring together a range of wildlife professionals to foster a community. The listservs WDIN offers allow wildlife health professionals to receive updates from WDIN, as well as providing an opportunity for communication between members. Mailing topics include job announcements, general discussions, and specific questions related to wildlife health and disease ecology. Currently, WDIN offers three listservs: WildlifeHealth, Implanters, and Wildlife Health Informatics. To learn more or subscribe, visit: <http://wildlifedisease.nbii.gov/wdinhealthlist.html>

Working to strengthen the wildlife health community

The NBII Wildlife Disease Information Node collaborates with an assortment of partners to bring members of the wildlife health community tools and resources that help them better manage wildlife disease. In our efforts to develop a useful and comprehensive collection, WDIN welcomes suggestions from the community. If you have favorite wildlife health related web sites, on-line databases, or other web-based resources that you find particularly useful, please tell us about them. Your colleagues will appreciate learning about tools and services on the Internet that can help them in their day-to-day efforts to control and prevent disease outbreaks. In addition, we always appreciate feedback on WDIN products and services, because they shape our future development plans. Send questions and comments to Cris Marsh at cmarsh@usgs.gov .

Article by: Cris Marsh, Erica Schmitz, and Megan Hines, NBII Wildlife Disease Information Node

Midwest Wildlife Disease Update

Midwest Wildlife Disease Update
February 2009

Minnesota Bovine TB Surfaces Again
The Minnesota Board of Animal Health announced in early December 2008 that three mature cows tested positive for Bovine tuberculosis during routine slaughter surveillance. The cows came from within their TB Management Zone in Beltrami County.

The Minnesota DNR reports testing approximately 1250 deer this past fall (2008) in or near the TB Management Zone during their hunting season with no obvious cases. Final results will be available in early 2009. The number of TB infected deer found since 2005 remains at 24 cases. The Minnesota DNR has been working to reduce the deer population in the infected area. (Source- ProMed, 12/03/08, edited)

Kentucky Rabies Cases Up
As of mid-February 2009, five rabies cases have been reported in the Lexington-Fayette County area of Kentucky. This is one more than all of last year. To date three skunks, a fox and a horse have tested positive for the disease. Authorities have asked that any suspect animal be reported to local authorities. (Source- ProMed, 02/22/09, edited)

Indiana Beef Herd Tests Negative For TB
A Southeastern Indiana beef herd has tested negative for bovine tuberculosis (Mycobacterium bovis). The herd is linked to a cow that tested positive for the disease in late November 2008 through routine testing at a meat processing facility in Pennsylvania. The investigation will continue. Indiana has held a bovine tuberculosis-free status since 1984 with the USDA. (Source- Indiana Board of Animal Health news release, 12/18/08)

Illinois Wild Turkey Tests Positive for Avian Pox
In mid-November 2008 a lone wild turkey was observed several days eating spilled corn around bins at a farmstead 6.5 miles north of Vermillion, Illinois in Edgar County. The bird lacked normal fear of humans and appeared in poor condition. Gross lesions on the head were present and obvious. The turkey was euthanized and delivered to the Veterinary Medicine Diagnostic Lab at the University of Illinois by Illinois Dept. of Conservation authorities. The diagnostic lab reported "the oral cavity has multifocal, proliferative, raised, soft white to yellow nodules." Similar lesions were noted on the hard and soft palates and tongue. The diagnostic lab made the diagnosis of Avian Pox. (Source- Personal communication Illinois DOC Wildlife Biologist Paul Brewer)

New Research on Chronic Wasting Disease Released
New research funded by the Canadian Wildlife Federation shows that chronic wasting disease in wild and farmed deer and elk will likely spread across North America and there is little wildlife managers can do about it. The report "Both Sides of the Fence: A Strategic Review of Chronic Wasting Disease Management Costs and Benefits" was prepared for the Canadian Wildlife Federation by Dr. Paul C. James, a research fellow from the Canadian Plains Research Center, University of Regina.

The Canadian Wildlife Federation is encouraging governments, agriculture and wildlife organizations to review the report and reassess their approaches to managing chronic wasting disease. The report provides a much needed full socio-economic analysis of the issue to facilitate informed management choices by everyone involved. According to the report, despite the expenditure of millions of dollars fighting CWD, there is still much unknown about the disease, it has not been contained and it is now firmly established in the wild, so it will likely continue to spread. For a copy of the 25-page report, please e-mail Canadian Wildlife Federation Conservation Researcher Leigh Edgar at leighe@cwf-fcf.org. (Source- Canadian Wildlife Federation news release, 02-13-09)

Indiana and Ohio Remain CWD Free
This past fall (2008) the Indiana Div. of Fish and Wildlife collected 862 samples from mostly hunter killed deer to test for Chronic Wasting Disease (CWD). No CWD was detected. Since 2002 over 10,000 samples have been tested without a single positive.

CWD surveillance in Indiana's hunter-harvested deer.

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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.

Subscriptions
The Indiana Wildlife Disease News is only published in electronic format. To add or remove you name from the mailing list, please send an e-mail to jcaudell@aphis.usda.gov

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.

USDA APHIS Wildlife Services
Purdue University, SMTH Hall, 901 W. State Street
West Lafayette, IN 47907-2089
Phone: 800-893-4116
Website: www.wildlifehotline.info

Midwest Wildlife Disease Update (Continued from pg. 6)

In Ohio, the Division of Wildlife, along with the Dept. of Agriculture, completed collecting and testing 1,021 samples last fall from hunter-harvested deer around the state, mostly from the firearm season. They found no evidence of the disease anywhere in Ohio. Both Indiana and Ohio have begun sampling road-killed deer to boost surveillance. (Source- Wildlife Disease News Digest, 02/21/09, and Indiana DNR 2008 Deer Season Summary, edited)

Dead Bats Appearing at Wind Farms
For a time, researchers were puzzled why numerous bat carcasses were being found at wind farms with no apparent injuries. This past August researchers at the University of Calgary reported that 90 percent of dead bats felled near one wind farm were due to barotrauma, or fatal internal hemorrhaging of the lungs due to drops in air pressure near the spinning blades. The condition affects bats more because bird lungs are more rigid and can withstand sudden changes in air pressure, according to the study.

In Illinois it is estimated three times as many bats (93) as birds (31) died during a year at the 33-turbin Crescent Ridge Wind Farm in Bureau County. Illinois is expected to increase the number of wind farms dramatically in coming years. The state has mandated that 25 percent of its electricity be generated by renewable resources by 2025, with about 75 percent of that to come from wind energy. The toll taken on bats highlights a delicate balance facing the wind industry – how to be "green" without causing other unintended environmental consequences.
(Source- Wildlife Disease News Digest, 03/01/09, edited)

Column by D. Zimmerman, IDNR