



*An outdoor enthusiast's guide to*

# WILDLIFE-RELATED DISEASES



This guide is designed to provide you with basic information about actual or potential wildlife diseases of New England. We hope that this knowledge will enhance your enjoyment of New Hampshire's great outdoors. On the following pages you'll find:

- Basic facts about Avian Influenza, Rabies, Lyme Disease, EEE, West Nile Virus, Chronic Wasting Disease and fish diseases.
- Disease prevention guidelines.
- N.H. Fish and Game and USDA-Wildlife Services monitoring efforts.
- Information resources.

NEW HAMPSHIRE FISH AND GAME DEPARTMENT

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[www.WildNH.com](http://www.WildNH.com)

# AVIAN INFLUENZA

**A**vian influenza is a virus that infects birds. Waterfowl and shorebirds can carry any of 144 different strains of avian influenza (AI). Most of these occur naturally in wild birds and can spread to domestic birds. These strains generally pose little threat to bird or human health.

One strain of avian influenza, called highly pathogenic H5N1 (HP-H5N1), is in the news because it represents a human health

risk. Scientists are concerned that HP-H5N1 could mutate and become able to spread quickly from human to human, so it is being closely monitored. Although the HP-H5N1 virus does not usually infect people, more than 300 human cases have been reported worldwide since 2003. Most people who have become sick or died from HP-H5N1 have had extensive, direct contact with infected poultry. This strain is deadly to domestic fowl.

HP-H5N1 is spread by the saliva, nasal secretions and feces of infected birds that come into contact with other animals or humans. Outbreaks of the virus in poultry and wild birds have been linked to movement of domestic birds and poultry products.

## Monitoring for Bird Flu

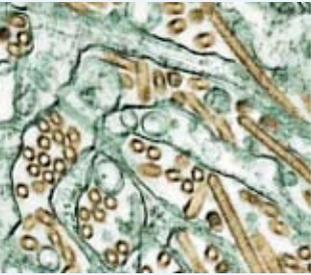
There is conflicting evidence of the role migratory birds have played in the spread of HP-H5N1. The strain has killed some wild birds, including migratory species, in Asia,

Europe and Africa. These events and the spread of the virus to new regions have raised concerns that it could be carried to North America by migratory birds. As a result, Canada and the U.S. have established an early detection surveillance plan for testing wild migratory birds across North America.

In 2006, biologists sampled more than 33,000 wild migratory birds in the Atlantic Flyway for the H5N1 strain. In New Hampshire, the state Fish and Game Department and the U.S. Department of Agriculture's Wildlife Services work cooperatively on monitoring efforts. In 2006, 1,100 wild birds were sampled; future plans call for sampling 750 birds annually. As of 2007, HP-H5N1 has not been detected anywhere in North America.

## Precautions for handling wild birds:

- Do not handle sick birds or those found dead.
- Keep game birds cool, clean and dry.
- Avoid contact between hands, mouth and eyes.
- Wear rubber gloves when cleaning birds.
- Wash hands with soap and water after handling birds.
- Wash all tools and work surfaces immediately with soap and water, then disinfect with 10% chlorine bleach solution.
- Cook meat thoroughly to an internal temperature of 165° F.
- Report dead waterfowl and shorebirds to USDA-Wildlife Services at 603-223-6832.



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*H5N1 Avian influenza virus*



© USFWS / DONNA DEWHURST

*Thousands of migratory birds, such as Canada geese, have been tested for avian flu as part of an early detection plan.*



*As of 2006, HP-H5N1 avian flu had not been detected in migratory birds moving along flyways in North America.*



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# RABIES

**R**abies is one of the oldest recorded viral diseases, yet it remains a significant challenge for public health and wildlife-management officials. Rabies affects the central nervous system of mammals. Exposure to the virus usually occurs through the bite of an infected animal. Non-bite exposures to rabies are rare, but can occur when open wounds or mucous membranes, such as your nose, mouth or eyes, come into contact with the saliva or brain tissue of an infected animal. If not treated, rabies is almost always fatal, however, timely treatment is highly effective in preventing rabies in humans who have been exposed. Vaccination against rabies protects our pets.

Different strains of the rabies virus are maintained and spread by specific wildlife species. Currently, mammals such as raccoons, skunks, bats and foxes account for most of the reported rabies cases in New Hampshire.

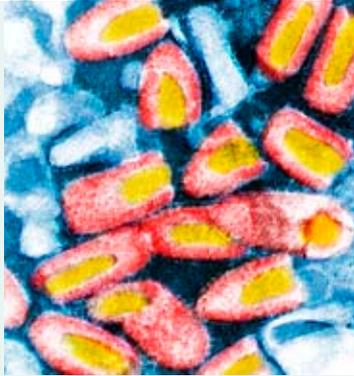
## Recognizing Rabies

Rabid animals are not always easy to identify. Contrary to what you may think, not all rabid animals foam and drool at the mouth. Animals may stagger, appear restless, be aggressive, appear very friendly, exhibit a difference in their barks or howls, seem to be choking – or they may show no signs of the disease at all.

Even helpless-looking young raccoons can have rabies.

Get your pets vaccinated, and keep pets inside if a wild animal is in the yard. If your pet is involved in a fight, it could

*Though they may show no symptoms, baby raccoons – and other wild animals – should not be handled.*



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*Rabies virus*

come home with disease-bearing saliva on its fur. Wear latex or rubber gloves as you examine it; confine your pet while you discuss further action with your vet. If you think you might have been exposed to rabies, contact your doctor.

## Protect against Rabies

- Do not handle wild animals or stray domestic animals.
- Properly vaccinate family pets against rabies.
- Report domestic animals acting strangely to your local animal control officer; report suspected wildlife species to N.H. Fish and Game at 603-271-3361.
- Do not attract wild animals to your yard and dwellings; feed your pets indoors; remove trash and secure garbage cans.
- Keep family pets indoors at night.
- Do not take wild animals into your home.



*Bring your pets indoors at night.*

## Monitoring and Prevention

Wildlife Services, a program within the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, is charged with providing leadership to minimize wildlife damage to agriculture, property and natural resources. Protecting people from health and safety threats posed by wildlife, including wildlife disease management, is an important part of this responsibility.

Rabies vaccinations have been available for domestic animals for many years (and are mandatory for dogs, cats and ferrets in New Hampshire), but until recently no such preventive measure existed to control rabies in wildlife. Wildlife Services is working cooperatively with many states, including New Hampshire, to use oral rabies vaccination in raccoons, coyotes and foxes. The goal is to prevent rabies from spreading to new areas, while continuing to explore strategies for eliminating rabies.



© USDA/AS / TERRY SPRAY

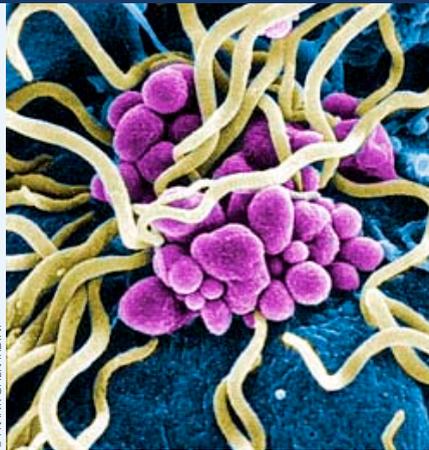
## If You Are Bitten by an Animal

- Wash the wound with warm water and soap for 5 minutes.
- If you think you have been exposed to rabies, seek medical advice immediately! To save an infected person's life, treatment should begin immediately after exposure and before the start of symptoms.
- If a bat has been in a room with a young child or incompetent person and the animal is not available for testing, seek medical advice immediately.
- Contact your local animal control authority to capture the animal if possible. Quarantine or testing of the animal may be used to see if you need treatment.

## LYME DISEASE

**L**yme disease is caused by a bacterium (*Borrelia burgdorferi*) that is transmitted to humans by the bite of blacklegged ticks (*Ixodes scapularis*), commonly referred to as deer ticks.

Symptoms of Lyme disease can include a large circular rash or flu-like symptoms including fatigue, headache, fever, and joint and muscle pain. Untreated, Lyme disease can cause joint, nervous system and heart problems. When promptly identified, antibiotics can be used to successfully treat the disease.



*Lyme disease bacterium (in yellow).*

Reported human cases of Lyme disease in New Hampshire have increased from 39 in 1997 to 671 in 2006. Although the disease

*A bull's-eye rash can be an indicator of Lyme disease.*



occurs throughout the state, during 2006, the greatest number of reports came from residents of Rockingham, Strafford and Hillsborough counties.

Humans typically contract Lyme disease from the bite of immature black-legged ticks, called “nymphs.” Nymphs become infected with bacteria when (as larva) they

feed on infected mice or other small mammals, which serve as reservoirs of the disease. Nymphs are extremely small – about the size of a pinhead – and are most active in June, July and August. This coincides with the period when most Lyme disease cases in New Hampshire (nearly 70%) are acquired, though the disease can be contracted at any time of year.



© CDC / JAMES GATHANY

*Black-legged tick, the species responsible for Lyme disease.*

## Protect against Lyme Disease

To prevent Lyme disease, avoid tick-infested areas (overgrown brush and tall grasses); use insect repellents containing 20-30% DEET; wear protective clothing – hat, long-sleeved shirt and long pants tucked into boots or socks. Daily tick checks are especially important, since it takes a feeding tick more than 24 hours to transmit bacteria to its host.

If you find a tick, remove it promptly! Use tweezers to grasp the tick's mouthparts at the surface of the skin and gently pull the tick straight out with a steady motion. Be alert for symptoms of illness over the next 30 days. Consult with your doctor if you have questions or concerns.



© NHFG / VICTOR YOUNG ILLUSTRATION

# DISEASES SPREAD BY MOSQUITO BITES

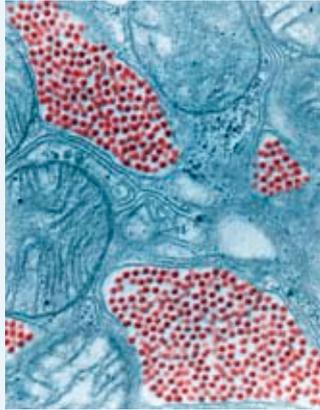
**E**astern Equine Encephalitis (EEE) and West Nile virus (WNV) are mosquito-borne viral diseases – viruses that can be spread through the bite of an infected mosquito.

## EASTERN EQUINE ENCEPHALITIS

EEE virus occurs in the eastern U.S., where it is known to affect horses, some bird species and, rarely, humans. Though EEE is a rare disease, because of its high mortality rate, it is considered one of the most serious mosquito-borne diseases in the U.S. From 2005 to 2007, 10 New Hampshire residents have been diagnosed with EEE.

Mosquitoes identified with carrying the virus are usually found near freshwater and hardwood swamps.

Mosquitoes become infected when they bite an infected bird. Birds infected with the virus will often show no evidence of illness. Humans and horses can become infected after being bitten by an infected mosquito, but they do not spread the disease.



*EEE virus (red)*

© CDC / FRED MURPHY & SYLVIA WHITFIELD

## Protect yourself from mosquito bites

Common precautions can help to protect you from EEE, West Nile virus and other mosquito-borne diseases:

- When outside, especially during the evening, nighttime or dawn hours, wear protective clothing such as long pants, long-sleeved shirts and socks.
- Use a repellent with DEET, permethrin (only on clothing), picaridin or oil of lemon eucalyptus. Follow instructions carefully; do not use DEET on infants or concentrations of DEET greater than 30% on older children. Do not use oil of lemon eucalyptus on children under age three.
- Make sure window and door screens are intact and tight fitting.



© CDC / JAMES GATHANY

*Mosquitoes can be carriers of EEE or West Nile virus.*

## Symptoms and Treatment

Often the first symptoms of EEE or WNV are a high fever, headache, stiffness in the neck and lack of energy. These symptoms usually show up three to 14 days after being bitten by an infected mosquito. Encephalitis (inflammation and swelling of the brain) is the most serious complication from these diseases and can progress quickly. There is no known treatment for EEE or WNV. Some people infected with EEE or WNV will experience flu-like symptoms. The severe form of EEE is fatal about a third of the time; those that survive are often left with severe neurological side effects. WNV is usually less severe, with 80% of people infected showing no signs of illness.



© CDC / JAMES GATHANY

*Mosquito larvae thrive in any standing water.*

## WEST NILE VIRUS

West Nile virus (WNV) was first detected in the U.S. in New York City in the fall of 1999 and has spread across the nation. This mosquito-borne virus was first detected in New Hampshire in 2001. Between 2001 and 2007, three New Hampshire residents were diagnosed with the disease. WNV has been detected in New Hampshire throughout the summer months, peaking from mid-July through September.

Neither EEE nor WNV are spread from person-to-person contact such as touching or caring for someone who is infected. The elderly and some people with underlying health conditions are more likely to develop severe disease if they become infected.



*West Nile virus*

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## Reduce Mosquito-breeding Sites

In warm weather mosquitoes can breed in any puddle that lasts more than 4 days! To minimize exposure, eliminate standing water and other mosquito-breeding locations:

- Remove all tires from your property and ask your neighbors to do the same.
- Remove containers that hold water, like tin cans, plastic pots or wheelbarrows.
- Check plastic tarps for trapped water.
- Drill holes in recycling containers left outside, so they can drain.
- Make sure gutters are clean and drain properly.
- Turn over wading pools when not in use.
- Aerate garden ponds or stock them with fish.
- Clean and chlorinate your pool or hot tub.



New Hampshire waters have over 60 species of fishes. These are generally healthy and moderate consumption poses no public health issues. (For consumption guidelines, visit [www.FishNH.com](http://www.FishNH.com).) However, many fish may contain naturally occurring organisms, such as viruses or “grub” or “worm” parasites, which can be harmful to the fish.

## Grubs

Often observed when cleaning fish, grubs can be found on the skin of fish, or sometimes in the flesh and occasionally in organs. Pin-head-sized lumps or cysts are white to yellow or black in color. Is the fish safe to eat? Yes. Properly cooking fish will kill the grubs. The most commonly infected fish are perch, pickerel, sunfish and bass.



© NHFG / VICTOR YOUNG

*Grubs can even occur in baitfish, as seen in this black-nosed dace.*

## Worms

Worms found in the flesh or organs of fish are most commonly either flat, white ribbon-shaped tapeworms or small, round white- or red-colored nematodes. Again, they are nothing new to New Hampshire waters. Worms are seen throughout the year, but peak in the spring in cold-water fish and during summer in warmwater fish. Unlike grubs, on rare occasions these parasites can be problematic to public health. Humans and other mammals can occasionally become ill when these parasites are consumed in raw or undercooked fish, however, worms will eventually be excreted. Properly cooking fish will kill worms, so be sure to thoroughly cook fish before eating.

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*Yellow perch are a common host for worm infestation.*



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### **Largemouth Bass Virus**

Largemouth bass virus (LMBV) is one of more than 100 naturally occurring viruses in fish. Fish with largemouth bass virus are safe to handle and eat, as the virus does not infect warm-blooded animals, including humans.

Largemouth bass virus was first detected in Florida in 1991. In 2007, smallmouth bass collected during the summer from Lake Winnepesaukee by N.H. Fish and Game tested positive for LMBV. While this is not good news, the virus is unlikely to pose a serious threat to the long-term health of New Hampshire's bass resources.

Scientists are unsure as to how LMBV is transmitted or how it is activated into disease. There is currently no cure or preventative for the virus, and it can live in water for up to seven days. It may be transmitted through water, by fish consuming infected prey, or through direct and indirect contact in boat live wells.

### **Viral Hemorrhagic Septicemia**

Viral Hemorrhagic Septicemia, or VHS virus, is not a threat to people who handle or eat infected fish, but it can kill more than 25 fish species. It is a serious pathogen of fresh- and saltwater fish that is an emerging disease in the Great Lakes region of the United States and Canada. It has proven to be the most significant fish disease problem in the U.S. in the last 50 years, with the potential to devastate freshwater fish populations. Vermont, New York and the Province of Quebec in Canada have already set up regulations to prevent the spread of the virus into those and neighboring states. To date there have been no VHS virus-infected fish collected in New Hampshire, but there is a real and looming threat that the virus will eventually reach New Hampshire waters. *If you suspect VHS virus or see a fish kill, immediately report it to N.H. Fish and Game at (603) 744-5470.*

*Symptoms of VHS are variable, but can include hemorrhaging (below) or bulging eyes.*



© NYDEC PHOTO



© ADOBE STOCK PHOTO

### **Guidelines for Anglers**

Anglers can help reduce any health risk as well as the incidence of grubs or worms by properly disposing of entrails after cleaning their fish and always thoroughly cooking their fish. Never throw entrails back in the water.

### **Prevent the spread of LMBV and VHS virus.**

- *It is illegal to move sport fish from one waterbody to another.* Recreational fishing, tournaments, competitions, fishing derbies or other types of contests where individuals catch, compare and release live fish have the potential to spread the diseases.
- *Do not release unused dead or live baitfish into a waterbody.* The use and movement of live bait also has the potential to spread these viruses.
- *Disinfect live-wells and equipment after use:* Drain water from bilge and live wells and clean live wells, boats, trailer and other equipment between fishing trips with a bleach and water solution and let air-dry. For the bleach solution, place 1/8 cup (2.5 Tablespoons) of bleach into a clean gallon milk jug and fill to top with water; use a spray bottle to administer the solution to your live well. You may rinse live well with fresh water after bleaching if there is not time to open and air-dry.

# CHRONIC WASTING DISEASE

**N**ot yet known to occur in New Hampshire, chronic wasting disease (CWD) is a fatal disease of the nervous system that affects members of the deer family (cervids), including white-tailed deer, mule deer, elk and moose. It is one of a group of diseases collectively known as transmissible spongiform encephalopathies (TSEs). Other diseases in this group include scrapie in sheep and bovine spongiform encephalopathy (BSE or “mad cow disease”) in cattle. TSEs are believed to be caused and spread by abnormal proteins called prions (pronounced pree-ons) that lead to destruction of brain and other nervous tissue and ultimately result in death. Transmission is most likely through animal-to-animal contact such as licking and grooming or through the environment, for example, by contaminated feed or soil. The abnormal prion proteins occur primarily in the brain, spinal cord, eyes, lymph nodes, tonsils and spleen, so boning out the meat is an efficient way to avoid them.

Infected animals may take months to years before they show symptoms of the disease. These symptoms can include emaciation (severe weight loss), drooping head and ears, excessive salivation or drooling and unusual behavior, including staggering or standing in an unusual posture. Symptomatic animals may live for weeks to several months, but CWD is inevitably fatal; there is no treatment or cure.

## CWD Monitoring and Protection

The New Hampshire Fish and Game Department began CWD monitoring and surveillance efforts in 2002 and tests about 400 deer a year as part of a nationwide effort. No efficient live-animal test for CWD is available. Either brain tissue or lymph nodes from dead animals are submitted to a federally certified laboratory for testing. “Sick”-looking deer and moose are likely dealing with other injuries and illnesses, but an animal that is clearly

emaciated, drooling, exhibits drooping head and ears and is unaware or unafraid should be reported to N.H. Fish and Game for evaluation and possible CWD testing.

CWD has existed in the western U.S. for decades, but in 2002 jumped east to Wisconsin and has since been detected as far east as New York and West Virginia. Wildlife management agencies around the country are concerned about the long-term effects that CWD could have on the deer and moose populations.

Fish and Game’s primary objective is to prevent the disease from reaching our state. As a result, *regulations*

*restrict the transport of both hunter-killed and live cervids into New Hampshire.* If you hunt any U.S. state or Canadian province where CWD has been found, be sure to check their regulations and New Hampshire’s importation regulations (visit [www.HuntNH.com](http://www.HuntNH.com)); they are designed to help keep our state CWD free.



*New Hampshire actively monitors for CWD, a fatal disease for deer.*

The Chronic Wasting Disease Alliance sponsors a website that serves as a national resource for the best scientifically based CWD information: [www.cwd-info.org](http://www.cwd-info.org).

## CWD Safeguards

At present, there is no evidence that CWD is transmissible to humans, but public health officials recommend that hunters take some basic disease-prevention precautions:

- Don’t shoot, handle or consume game that is behaving abnormally or looks sick.
- When field dressing and processing game, wear rubber gloves and avoid contact with the brain, spinal cord and lymph nodes; bone out the meat, and, if removing the skull cap and antlers, use a saw designated for that purpose only.

# WILDLIFE-RELATED DISEASE INFORMATION SOURCES

## N.H. Department of Health and Human Services

N.H. Department of Health and Human Services  
[www.dbhs.state.nh.us](http://www.dbhs.state.nh.us)

Public health inquiries  
603-271-4496 or 800-852-3945

West Nile virus and EEE Information Hotline  
1-866-273-6453

## N.H. Fish and Game Department

[www.WildNH.com](http://www.WildNH.com)

Wildlife diseases: 603-271-2461

Fish diseases: 603-744-5470

## Other Resources

Center for Disease Control and Prevention  
[www.cdc.gov](http://www.cdc.gov)

World Health Organization  
[www.who.org](http://www.who.org)

The Center for Food Security & Public Health,  
Iowa State University  
[www.cfsph.iastate.edu/DiseaseInfo/factsheets.htm](http://www.cfsph.iastate.edu/DiseaseInfo/factsheets.htm)

Avian Influenza: [www.pandemicflu.gov](http://www.pandemicflu.gov) or  
[www.usda.gov/birdflu](http://www.usda.gov/birdflu)

Avian Influenza – Information for hunters  
[www.avianflu.alaska.gov/hunting/default.htm](http://www.avianflu.alaska.gov/hunting/default.htm)

Rabies: [www.cdc.gov/ncidod/dvrd/rabies](http://www.cdc.gov/ncidod/dvrd/rabies) or  
[www.apbis.usda.gov/ws/rabies/index.html](http://www.apbis.usda.gov/ws/rabies/index.html)

Lyme disease  
[www.cdc.gov/ncidod/dvbid/lyme/index.htm](http://www.cdc.gov/ncidod/dvbid/lyme/index.htm)

Chronic Wasting Disease: [www.cwd-info.org](http://www.cwd-info.org)

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