

by Russell D. Jeffers

# The Mystery of the Dying Eagles



**American coots (above) and bald eagles (opposite page) were the first species of birds observed to suffer from the disease now known as Avian Vacuolar Myelinopathy.**

*Photos by Tom Augspurger*

**D**uring the winter of 1994-1995, DeGray Lake, Arkansas, was the scene of a grave situation; 29 bald eagles (*Haliaeetus leucocephalus*) were found dead. Wildlife officials desperately tried to determine the cause. The die-off did not repeat the following winter (1995-1996), but it did occur again in the winter of 1996-1997 when an additional 26 eagles died. Officials also observed aberrant neurologic signs in the wintering population of American coots (*Fulica americana*) at the lake. Eagles and coots were collected and sent to the U.S. Geological Survey's National Wildlife Health Center (NWHC) in Wisconsin for examination. Pathologists determined that all of the eagles and some of the coots had strange lesions, or vacuoles, in the white matter of their central nervous system. These vacuoles have now been confirmed in five different southern states in both coots and eagles as well as three species of migratory waterfowl.

Because the disease was discovered in bald eagles and coots, it was first referred to as Coot and Eagle Brain Lesion Syndrome (CEBLS). However, the discovery of the disease in other waterfowl species in 1999 prompted a change; the disease is now called Avian Vacuolar Myelinopathy, or AVM. Scientists of the University of Georgia's Southeastern Cooperative Wildlife Disease Study (SCWDS), along with numerous other officials, have sampled for diseased birds at 36 sites in 15 different states. As a result, AVM has been confirmed in birds from nine different southern reservoirs, including three in Arkansas, one in Texas, one in Georgia, one in North Carolina, and three in South Carolina. The disease has

caused the deaths of at least 69 bald eagles, hundreds of coots, and a small number of other waterfowl since 1994. In addition, records from North Carolina suggest that AVM could have occurred in that state as early as 1990. Currently, more AVM die-offs are being reported this season.

The information gathered so far suggests that a synthetic or naturally occurring toxicant is the most probable cause of the disease. The toxicant specifically targets the central nervous system, creating vacuoles that are apparent only through microscopic examination of very fresh brain tissue. Several compounds are known to cause similar lesions, but none have been detected in the affected birds. Pathologists have found that the condition occurs due to separation of myelin, a fat-rich nerve coating that surrounds and protects the nerves of the central nervous system, causing spaces in what should be a tightly compacted layer of cells. As the myelin layers separate, nerves lose their normal capacity to transmit and receive electrical impulses. This evidence is consistent with observations of affected birds in the field.

Eagles suffering from AVM have been seen overflying stoops and flying into trees and rock ledges. Affected waterfowl show reluctance to fly, erratic flight, or even an inability to fly. While swimming, birds may often show signs of partial paralysis on one side. This may result in the bird swimming with one leg extended behind the body, swimming in circles, or swimming upside down. On the ground, waterfowl and eagles may seem disoriented or lethargic, and may stumble and wobble as they move. These clinical signs,

however, may not always be apparent. Epidemiological studies have confirmed AVM lesions in coots exhibiting no apparent signs of abnormality. Impaired and dead AVM-positive birds have generally been observed between October and March, with a peak from mid-November through early December.

Federal and state agencies, as well as numerous academic institutions, have joined to find the cause of AVM and its route of exposure. Inventories of plant and animal food items are being compiled to determine if a naturally occurring plant toxin or contaminated food/water is the source of the disease. In addition, food items from AVM sites are being fed to surrogate bird species in an attempt to isolate a source.

Scientists are analyzing water and sediments as well. The Army Corps of Engineers, Environmental Protection Agency, Fish and Wildlife Service, Ross Foundation, Henderson State University, the University of Georgia and others are involved in these studies.

Because the behavior and habits of a bird influence where, when, and how it will forage, natural history studies provide valuable information on potential routes of exposure. Arkansas State University has used radio-telemetry to monitor bald eagle movements and feeding behavior on AVM reservoirs. The feeding ecology of American coots has also been studied by Texas A&M University and the Savannah River Ecology Laboratory (SREL). The SREL, Corps of Engineers, Arkansas Game & Fish Commission, and Ouachita Baptist University have tagged and released hundreds of coots to monitor their movement patterns at AVM sites. A Geographical Information System database is also being compiled. Additionally, sentinel birds have been released by the NWHC and the Fish and Wildlife Service on AVM sites to gain a more controlled approach at studying the disease.

Although a specific cause of AVM has not yet been isolated, many of the gaps are beginning to fill. Since the initial description of the disease in 1994,



a great deal of information has been uncovered. We now know that the situation in Arkansas was not an isolated incident and that AVM has a wide distribution in the southern U.S. We also now believe that AVM existed prior to the 1994 Arkansas incident. It has been determined that AVM is not a prion-related disease, like “mad-cow disease,” but is more likely the result of exposure to a synthetic or naturally occurring toxicant. We suspect that AVM is acquired at specific sites and that the onset of the disease can be fairly rapid. Therefore, birds that move into an AVM site may relatively quickly be affected by the disease.

If anyone has additional information or suspects that AVM may have struck again, please contact the National Wildlife Health Center at 608-270-2448.

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***Dr. Nancy J. Thomas of the USGS National Wildlife Health Center in Madison, Wisconsin, examines a dead bald eagle.***