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Avian Vacuolar Myelinopathy
An Unexplained Neurologic Disease

"A mysterious brain disease is killing birds in the southeastern United States and scientists can't find the cause." (CNN Web Site)

An unusual neurological disease has caused the deaths of at least 85 bald eagles, thousands of coots and a small number of waterfowl and other species wintering in 5 southern states. Affected birds have a very uncoordinated flight and appear intoxicated. Eagles have been observed flying into rock walls; water birds have been seen trailing a wing or leg while swimming, lying on their backs in the water or crash landing.

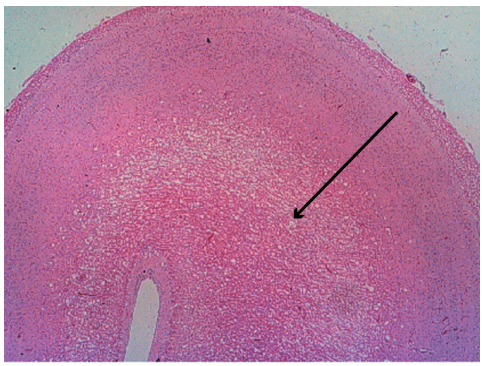
The disease, termed Avian Vacuolar Myelinopathy (AVM), was first detected in 1994, when 29 bald eagles were found dead during the fall and winter at De Gray Lake in southwestern Arkansas. USGS National Wildlife Health Center scientists described the disease, which had never before been documented in wildlife.

Affected coot.
Photo courtesy of T. Augspurger, USFWS.

It is believed that a man-made or naturally occurring toxin is the most probable cause of this disease. However, tests for a wide range of toxins – including those previously associated with vacuolar myelinopathy in other species – have been unsuccessful.

The most consistent finding across species, locations and years is a microscopic change or "lesion" in the brain and spinal cord of affected birds. This disorder is diagnosed by microscopic examination of very fresh brain tissue. It appears as open spaces in the white matter (myelinated areas) of the central nervous system in affected birds. Using electron microscopy, USGS pathologists have determined that the spaces are caused by separation of the myelin layers that surround and protect the nerves. The route of exposure to the toxin is not known at this time. This is not thought to be a prion- related disease, based on the lesion, laboratory testing and consultation with prion experts.

In 1996-97, an eagle die-off occurred again on De Gray Lake and two other southwestern Arkansas lakes; at least 26 eagles died and American coots were also found to be affected with AVM. In 1997-1998, the disease was detected outside of Arkansas for the first time in coots on lakes in Georgia and North Carolina. In 1998-1999, USGS and Southeastern Cooperative Wildlife Disease Study (SCWDS) scientists detected the disease for the first time in waterfowl: small numbers of mallards, bufflehead and ring-necked ducks from North Carolina.



The small white dots represent spaces between the myelin layers surrounding the nerves.

Bald eagles from Georgia, North and South Carolina also died, and affected coots were found at new sites in South Carolina, Georgia and Texas in a SCWDS research project. During

the fall and winter of 2000-2001, the disease recurred in coots in North Carolina and coots and approximately 16 bald eagles on a lake on the Georgia - South Carolina border. SCWDS investigators also confirmed AVM in several new species including Canada geese, great horned owls and killdeer.

The USGS National Wildlife Health Center, in conjunction with multiple State and Federal agencies, is continuing collaborative field, laboratory and research efforts to determine the cause of the disease. Studies of wing-clipped sentinel birds (mallards and coots) placed on a lake with recurrent AVM outbreaks have demonstrated that exposure to the causative agent of AVM is site-specific and seasonal (fall/winter). Feeding trials, using food materials collected from lakes with AVM outbreaks, are ongoing. This work may help to narrow the search for the causative agent.

Wildlife biologists and managers are being encouraged to report observations of sick eagles, waterfowl and coots to the USGS National Wildlife Health Center.

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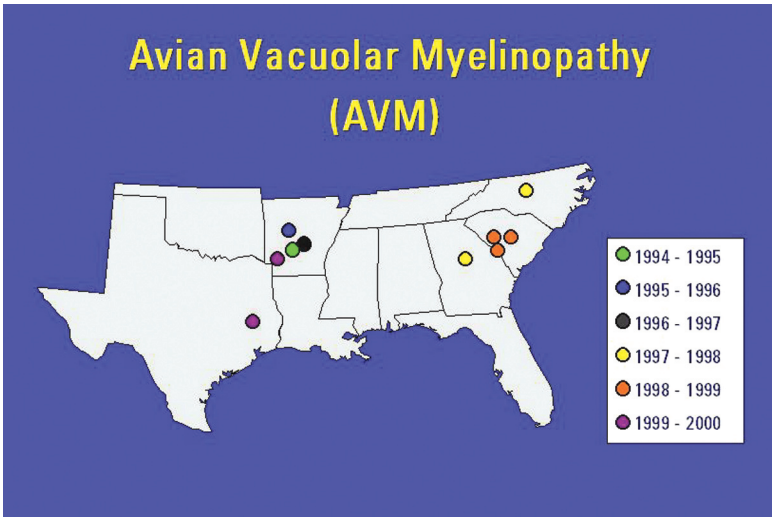

Map of the southeastern United States showing mortality locations. The dots represent the year mortality was first documented at each location.