West Nile carriers flourish in coal bed methane ponds

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The mosquito that carries West Nile virus thrives in the ponds that have sprung up with the development of coal bed methane in northern Wyoming, says Montana State University entomologist Greg Johnson. The ponds, in fact, produced more mosquitoes this year than natural ponds and irrigated agricultural areas did.

Melissa Doherty holds a restraint cage with a hen pheasant. The cage kept the bird motionless during the night. (Photo courtesy of Greg Johnson).

"One reason is that the ag areas didn't need to irrigate hay pastures this summer because of normal rainfall," said Johnson who conducted a two-summer study between Gillette and Sheridan. "Whereas, the coal bed methane ponds kept pumping water out, creating habitat for mosquitoes."

Johnson started researching the spread of West Nile virus in Montana in 2003 and learned, among other things, that the Culex tarsalis mosquito is its primary carrier in Montana. Johnson crossed the state line in 2004 after learning that West Nile virus was killing sage grouse around the coal bed methane ponds of Wyoming.

His field work began in 2004 and ended this past summer, Johnson said. Melissa Doherty, his graduate student, is now analyzing, processing and writing up the results. He doesn't know yet how many mosquitoes were trapped or their infection rates, Johnson said, but he knows that northern Wyoming provided some happy homes to the Culex tarsalis.

"That coal bed methane development down there is phenomenal," Johnson said. "The coal bed methane ponds are producing the vectors for West Nile virus."

The chemical makeup of the ponds wasn't a factor in his results. Johnson said. Neither were the properties of coal or methane. Mosquitoes simply had more water for breeding because of the growing number of ponds.

Jim Bauder, MSU professor and Extension Soil and Water Quality Specialist, estimated that the northern part of the Powder River Basin project in Wyoming currently has 200 to 300 ponds associated with coal bed methane. That's a conservative figure, he said, predicting that as many as 1,000 to 2,000 more ponds could be constructed there over the next 10 years. The ponds range in size from half an acre to six acres.

Coal bed methane, the primary source of natural gas, is found in coal seams, according to a web site run by Bauder and others at MSU's Department of Land Resources and Environmental Sciences. Since the coal seams are often saturated with water and water pressure holds the methane in place, workers pump out the water to get to the methane. The number of holding ponds grows as development expands.

To study the mosquito-pond relationship, Johnson and Doherty placed caged pheasants near a coal bed methane pond and an agricultural site in northern Wyoming. The Culex tarsalis mainly flies between 10 p.m. and 1 a.m., so the researchers set the cages out in the evenings and retrieved them in the mornings, Johnson said. After each of three weeks, the researchers sent the pheasants to the Wyoming State Veterinary Laboratory in Laramie for testing. The lab kept the pheasants for two weeks to see if infection developed. If it did, Johnson and Doherty tested the blood of the mosquitoes they had saved from a particular cage. The cages were designed so mosquitoes could enter a cage, but couldn't leave it. With only

one pheasant per cage, the researchers could match mosquitoes to a specific bird.

The study used hen pheasants since sage grouse are not easily raised in pens and pheasants were readily available through a state bird farm in Sheridan, Wyo., Johnson said. Pheasants, like sage grouse, dwell on the ground. The hen pheasant and sage grouse are about the same size.

Johnson said he hopes the companies that produce coal bed methane will use his study to build ponds that are less likely to produce mosquitoes. He has heard of some interest in stocking the ponds with fish that feed on mosquito larvae and pupae.

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