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## Controlling Wildlife Vectors of Bovine Tuberculosis and Rabies

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### National Wildlife Research Center Scientists Examine Risks of Bovine Tuberculosis and Rabies Transmission Among Wildlife, Domestic Animals, and Humans

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research organization devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and acceptable methods, tools, and techniques.

As increased urbanization leads to a loss of traditional wildlife habitat, the potential for conflicts between people and wildlife increases. Such conflicts can take many forms, but recently the potential for the transmission of diseases among wildlife, livestock, and humans has received greater attention.

Diseases such as West Nile virus, hantavirus, bovine tuberculosis, and rabies can infect people as well as animals, while other diseases, such as pseudorabies and foot-and-mouth disease, have the potential to negatively impact livestock.

In 2000, the United States Secretary of Agriculture enacted Declarations of Emergency for bovine tuberculosis (TB) and rabies, citing threats to livestock, and public health and safety. In 2001, NWRC initiated research that could reduce or eliminate the transmission of these diseases.



### Applying Science & Expertise to Wildlife Challenges

**Rabies**—Always fatal if left untreated, rabies is an acute, viral encephalomyelitis of mammals most often transmitted through the bite of a rabid animal. While human deaths from rabies are rare in the United States, the disease remains a public and animal health problem that results in 50,000 to 70,000 human deaths world-wide, annually. Over the past 100 years, rabies in the United States has changed dramatically. Prior to 1960, the majority of rabies cases in the United States were reported in domestic dogs. Today, however, more than 90 percent of all animal cases reported to the Centers for Disease Control (CDC) occur in wildlife with the principal rabies hosts being wild carnivores (raccoon, skunk, fox, coyote, and bats). The estimated public health costs associated with rabies detection, prevention, and control have risen to more than \$300 million annually. If rabies strains such as those transmitted by raccoons, gray foxes, and coyotes are not prevented from spreading to new areas of the United States, the health risks and costs associated with the disease



**Major Research Accomplishments:**

- WS identified techniques, including use of fencing, guard dogs, and scare devices to decrease interaction between deer and cattle in Michigan where TB is endemic in white-tailed deer.
- WS found new bait designs that will more effectively deliver oral rabies vaccine to wildlife, including skunks and raccoons.
- WS determined that coyotes may be an acceptable sentinel species to use to monitor the prevalence and spread of TB.

are expected to increase substantially as broader geographic areas of the United States are affected.

In order to stop the spread of rabies, WS is actively participating in a major prevention and oral rabies vaccination (ORV) effort, WS provides technical and operational assistance to a number of State health departments who are distributing oral rabies vaccines throughout targeted areas. WS also has been active in rabies surveillance through the collection of animal specimens. While the rabies vaccination program is ongoing, several participating States have already noticed a significant drop in the number of reported rabies cases.

**Bovine Tuberculosis**—Tuberculosis (TB) is a contagious, bacterial disease of both animals and humans. Bovine TB can be transmitted from livestock to humans and to other animals. The significance of the disease is reflected in APHIS' efforts to eradicate TB from the United States. The eradication program, which began in 1917, has made significant progress over the years. By the mid-1990's, only a few known infected cattle herds remained, suggesting that the eradication of the disease in the United States was forthcoming. However, Michigan remains infected. Between 1975 and 1998, bovine TB was documented in Michigan white-tailed deer with increasing prevalence, and scientific evidence revealed that infected deer transmitted the disease to some of Michigan's cattle. Consequently, Michigan's Accredited-Free Status, which allows for

unrestricted interstate movement of cattle, was suspended by APHIS on August 13, 1998. NWRC scientists are conducting research to:

1. Define species susceptibility, transmission routes, and interactions among wildlife species, and between wildlife and cattle.
2. Evaluate sentinel species, such as coyotes, to monitor the prevalence and spread of TB.
3. Develop effective and economical barriers to wildlife movement to reduce the interaction between wildlife and cattle.
4. Model the ecology of bovine TB in Michigan's wildlife and cattle.
5. Develop vaccines and delivery systems for free-ranging wildlife.

**Surveillance of Bovine TB Reservoirs in Michigan**—Bovine TB infections in Michigan have been found primarily in white-tailed deer and cattle. Although cases of bovine TB have been found in other domestic and wild species, other reservoirs have not been identified in Michigan. Ongoing research by NWRC scientists seeks to identify potential hosts and vectors of bovine TB in Michigan and to examine the flow of TB through the ecosystem. This research involves intensive surveillance of various wildlife species and potential environmental reservoirs for TB in the outbreak area of northern Michigan. If new reservoirs are identified, additional studies will be conducted to further define the role of the particular wildlife species or environmental factor responsible for the transmission and maintenance of bovine TB in Michigan.

**ORV Bait and Vaccine Delivery**—NWRC scientists are conducting laboratory and field research to find the most effective bait for delivery of the Oral Rabies Vaccine (ORV) to raccoons, striped skunks, and gray fox. One such study involves a multi-state effort to evaluate various baits to be used for striped skunks once an ORV program is initiated for skunks. A study is also underway in Texas to learn more about the ecology of gray fox to assist the ORV program there. Research is also being conducted to determine the efficacy of the rabies vaccine, V-RG, over time (18 months) when given a single or double dose to raccoons. The goal is to be able to more effectively vaccinate wildlife against rabies.

#### Groups Affected by This Problem:

- Wildlife and natural resource managers
- U.S. citizens
- Livestock producers and farmers
- Sporting organizations
- Consumers
- Meat processors

#### Major Cooperators:

- Auburn University
- Michigan Department of Agriculture
- Michigan Department of Natural Resources
- Michigan State University
- Ohio State University
- Pennsylvania State University
- State Departments of Public Health
- Texas A&M University
- University of Northern Arizona
- USDA Veterinary Services
- WS operations personnel

#### Selected Publications:

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- Deliberto, T. J.; Smith, H.; Stevenson, J. 2002. Home range of coyotes in the northern lower peninsula of Michigan. Carnivores Conference, 16-20 November 2002; Denver, CO. Defenders of Wildlife. Denver, CO.
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