

ERADICATION OF A BOVINE TUBERCULOSIS-POSITIVE CAPTIVE CERVID HERD IN NORTHEAST MICHIGAN

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Abstract: In December 1997, bovine tuberculosis was detected in a white-tailed deer taken at a commercial deer hunting ranch in Presque Isle County, Michigan. Since captive cervidae are considered agricultural livestock in Michigan, the Michigan Department of Agriculture (MDA) ordered the depopulation of the herd. In 1998, USDA, Wildlife Services (WS) entered into a cooperative agreement with MDA to depopulate the herd from the ranch. The facility covered approximately 1500 ac of natural vegetation, including 400 ac of dense cedar swamp. The captive herd was thought to contain approximately 600 animals, most of which were white-tailed deer. This project presented two significant challenges: 1) removing no less than 100% of the deer and, 2) providing verification to MDA that 100% depopulation had been achieved. The depopulation effort began in February 1998 and was completed in March 1999 with the removal of 325 cervids. The successful depopulation strategy which included various shooting techniques, fencing, dogs and helicopters is described as well as the verification efforts.

Key words: bovine tuberculosis, disease, eradication, livestock, *Odocoileus virginianus*, white-tailed deer, wildlife disease

Proceedings of the 10th Wildlife Damage Management Conference. (K.A. Fagerstone, G.W. Witmer, eds). 2003

INTRODUCTION

In 1994, bovine tuberculosis (TB) was diagnosed in a free-ranging white-tailed deer (*Odocoileus virginianus*) taken by a hunter in the Northeast Lower Peninsula. By 1997, in subsequent testing of deer by the Michigan Department of Natural Resources (MDNR), it was clear that deer were not spillover hosts but, in fact, the infection was being sustained in the deer population. While bovine TB had been previously detected elsewhere in wildlife, this was the first time in North America that bovine TB was being sustained in wildlife. While TB had no discernible effect on deer

populations, the deer apparently provided a reservoir of infection for cattle. This posed a serious challenge for the \$1 billion Michigan livestock industry since trade barriers and regulations are imposed by other state departments of agriculture and by the USDA, APHIS, Veterinary Services (VS) on states with a demonstrated prevalence of TB. While there is a human health risk with bovine TB, it is primarily a market access issue.

A captive cervid herd on a commercial hunting facility in Presque Isle County was among the first livestock herds that tested positive for TB in December

1997. Since captive cervidae are considered agricultural livestock in Michigan, MDA ordered the depopulation of the herd. In 1998, WS entered into a cooperative agreement with MDA to depopulate the herd.

THE SITE

The ranch was entirely enclosed with a 10-ft high woven wire fence that contained approximately 1500 ac of well-managed deer habitat. It was dominated by mature hardwoods and conifers which were interspersed with maintained fields. There were approximately 8 mi of unpaved roads that afforded reasonable access to most areas. Included within the ranch were approximately 400 ac of dense cedar swamp and approximately 100 ac of alder swamp.

The facility was estimated to be populated with 600 cervids, mostly white-tailed deer with a few sitka deer (*Cervus nippon*), fallow deer (*Dama dama*) and elk (*Cervus elaphus*). The source of the white-tailed deer was the native deer that were on the facility when it was enclosed in 1991. The exotic deer and the elk that were imported to the property were TB tested prior their introduction and all were diagnosed as negative. Therefore, because the source of the infection was never identified, it is generally presumed that the deer on the property that became foundation stock for the captive herd were infected at the time that enclosure was complete.

CHALLENGES

The depopulation of this ranch presented several serious challenges.

- 1) The only acceptable outcome was the 100% removal of all cervids. The remainder of even one deer would be considered a failure. Since deer are renowned for their ability to avoid threats,

getting the last deer would be extremely demanding.

- 2) It was necessary to prove that the depopulation was complete to MDA and VS. This would be necessary to initiate the 12-month quarantine period, during which no deer could be on the ranch. At the conclusion of the quarantine, the property owner would be allowed to restock and resume commercial activity.
- 3) The ranch contained considerable heavily forested areas including dense cedar and alder swamps into which deer would instinctively flee when pursued. In these areas, deer would have significant advantages to avoid being taken.
- 4) WS in Michigan had a very small staff of only three employees capable of participating in these activities.

THE STRATEGY

Because full-scale hunting operations had not begun at the facility, the captive cervids were quite naive with respect to hunting. This was an advantage that was extremely important to maintain as long as possible. Therefore, selective sharpshooting was the initial technique used. This was conducted at night using suppressed weapons and spotlights from vehicles or at baited blinds. Emphasis is placed on taking deer with head or neck shots which is not only more humane, but allows for the removal of more than one animal from a group. This is achieved because animals shot in this manner drop immediately instead of running or struggling which tends to alarm and put into flight nearby animals. Typically, deer were encountered in a family group (i.e., a dominant doe, one or two subordinate does and several fawns). By

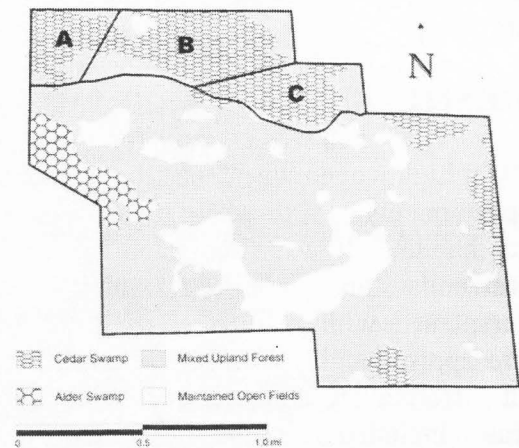
intentionally shooting the dominant doe first in the prescribed manner, often the entire group would remain still, allowing for the removal of every animal. Because such a premium was placed on the avoidance of sensitizing the deer, there were instances in which deer within range were deliberately not shot. Examples of such instances would be if a clear shot was not possible on the dominant doe or if too many deer were in the immediate vicinity.

Because the cedar swamps were quite large and so densely vegetated, it became necessary to exclude as many deer from them as possible. This was accomplished by a 10-ft woven wire fence that was installed in the summer of 1998 at the owner's expense. That enclosure was divided into three smaller units referred to as A, B, and C to allow for systematic incremental removal activities (Figure 1). To further minimize the number of deer in these units, a deer drive was attempted in September 1998. Approximately 112 people, mostly volunteers with a few MDNR and WS employees, systematically walked through units A, B, and C in an attempt to push as many deer as possible through open gates back onto the ranch-at-large. As a result, most but not all the deer were driven from the units. Approximately 20 deer could not be pushed from the swamp even though the drivers were less than 20 ft apart, giving evidence to the tenacious, evasive skill of these animals.

Under arrangement with MDA, the ranch client hunts were allowed to continue as scheduled in the fall of 1998. Consequently, WS was allowed to remove does and fawns only, leaving the bucks for clients. In addition, ranch personnel shot deer as the opportunities presented themselves.

The project was initiated in February 1998 with a projected completion date of sometime during the winter of 2000-01.

Figure 1. The Muy Grande Ranch with enclosure units (A-C) constructed in August 1998.



IMPLEMENTATION

Phase 1 - The first depopulation effort began on February 25, 1998 when 10 WS employees from MI, WI and OH removed 58 does and fawns by sharpshooting by March 12. Many more deer could have been removed during this period but, because no bucks were to be shot, obtaining certain identification in the field at night proved to be difficult. In addition, 42 deer that were confined to pens were removed. All deer heads were submitted for TB testing and the carcasses were deposited in nearby landfills. Removal activities were halted when leaves emerged in April because visibility was significantly impaired and partly in recognition that killing does late in pregnancy and spotted fawns could be very provocative to the public.

After the enclosure fence around the cedar swamp was completed in August 1998, WS employees cleared shooting lanes and roads in Areas A, B, and C to facilitate shooting efforts. From September 15 through December 5, WS employees intermittently attempted sharpshooting in

Areas A, B, and C, removing 15 deer. During this same approximate period, ranch client hunts and ranch personnel removed 140 deer from the ranch-at-large.

The next large-scale effort by WS occurred in January 1999. WS employees from MI, WI and OH employed the standard sharpshooting method with marginal success. It appeared that deer had become quite wary, perhaps as a result of being regularly exposed to shooting. It also appeared that deer seemed surprisingly scarce, especially since only 235 animals had been removed from a herd that was initially estimated to be approximately 600 animals. As a result, the standard sharpshooting methods were augmented with deer drives and dogs. Both were intended to have the same effect of pushing deer from deep cover into more vulnerable locations. Success improved a small degree but after 10 days, only 31 deer had been removed.

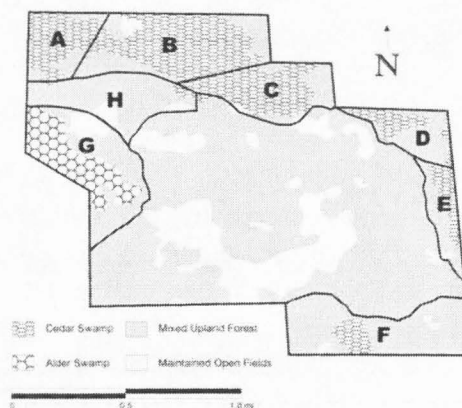
As with most wildlife damage situations, there were human dimensions that overlay biological factors. Up until this point, the ranch owner had been extremely cooperative and patient with the progress of the depopulation effort. However, with so little apparent progress made in the January 1999 effort, and with the prospect that another year's fawn crop being added to the population in a couple months, it appeared that the depopulation effort would not be complete for years. This caused considerable concern for the owner and jeopardized his continued cooperation. In order to avoid a contentious confrontation, a more productive approach of deer removal was necessary.

Phase 2 – The depopulation effort was continued with the use of aerial gunning from a helicopter. A private contractor in Michigan was located with experienced pilots and crew who had aerial hunted deer

in New Zealand. A USDA, APHIS contract was awarded to them by the end of February to assist in completion of the depopulation of the ranch.

This company shared the same conviction that getting the last deer was of paramount importance. At their suggestion, additional fence was erected to exclude deer from additional areas of heavy cover. This would provide two benefits: 1) it would restrict the deer to the more open areas of the ranch where shooting would be easier, and 2) it would allow for a more systematic process of verifying that the depopulation was complete. Beginning on March 1, 1999, the contractor installed four mi of 10-ft fence in five days, creating areas D, E, F, G, and H (Figure 2). Prior to the closing of the new exclosures, deer drives were conducted in each area with drivers on foot using pyrotechnics and air horns in coordination with the helicopter.

Figure 2. The Muy Grande Ranch with original (A-C) and additional exclosure units (D-H) completed by March 1999.



The final measure before commencing an aerial gunning operation involved capturing four deer (two does and two fawns) with a net gun from the helicopter. They were fitted with radio-collars on loan from MDNR and released into the ranch-at-large to act as "Judas deer". The expectation was that deer would

congregate together when stressed and the "Judas deer" could continually lead the shooters to other deer that could be shot.

Aerial gunning operations started on March 7 and by March 12, 27 deer had been removed, included one collared fawn that appeared to be failing physically. At that point, no other non-collared deer were found and it was decided that it would be advantageous to give the deer a period to settle down, so aerial operations were halted. When aerial operations were resumed on March 21, it was clear that only three collared deer remained. Those deer were then shot and the depopulation was presumed to be complete.

VERIFICATION

Phase 1 - The first effort in verifying that the depopulation was complete involved conducting extensive searches for deer or deer tracks after fresh snow. The search combined a systematic sweep of the ranch-at-large and areas A through H that combined the helicopter with personnel on foot using pyrotechnics and air horns. The helicopter not only provided extra visibility and harassment, but it enabled the foot patrol to remain together in line as they marched across the ranch. This survey was to be conducted twice.

Fortunately, three to four inches of snow fell the night of March 21, the night the last radio-collared deer was taken. Consequently, verification efforts began immediately. On March 22 and 23, enclosures A through H and the ranch-at-large were surveyed with the helicopter crew of two and a foot patrol of eight. The first verification was completed with no deer or deer tracks observed. Good fortune continued when two to three inches of snow fell on the night of March 23, allowing a second survey to be conducted on March 24

and 25. The second verification was completed with no deer or deer sign found.

Based on two extensive, systematic searches conducted in fresh snow, it was concluded that the ranch had been depopulated on March 21, 1999. This date marked the beginning of a mandated 12-month quarantine period during which the ranch was to remain free of deer. After this period, the quarantine would be lifted and deer could be reintroduced to the property.

Phase 2 - The second verification effort involved the use of dogs. The use of dogs to hunt deer is legal in some states where the dogs detect deer by scent and chase the deer from cover. That "scent-and-chase" behavior was deemed to be useful in confirming the presence or absence of deer on the ranch. On May 12 and 13, 1999, a WS employee from South Carolina brought six deer hunting dogs to search for deer. Combinations of up to four dogs were released into each enclosure area A through H and the ranch-at-large for a period of 16 total hours. Each time the dogs were released, four employees were strategically positioned within the area to detect and, possibly, shoot deer.

In the course of this phase, no deer were observed. Moreover, the dog handler observed that at no time did the dogs give any indication that a deer was scented. Therefore, it was concluded that the ranch was absent of deer.

Phase 3 - The third and final verification effort occurred in February 23 and 24, 2000. It was essentially a duplication of the first effort without the helicopter. Eight personnel conducted systematic sweeps of each enclosure area A through H and the ranch-at-large after new snow. No deer or deer tracks were observed.

With this last verification that the ranch was vacant of deer, the project was

concluded. The 12-month quarantine was lifted.

RESULTS

Instead of the estimated 600 cervids that reportedly were on the ranch at the onset of the project, the depopulation effort was completed with the removal only 325 animals. Cervids were removed with the following methods:

WS personnel	148
Ranch culling operations	115
Ranch client hunts	32
Helicopter contractor	<u>30</u>
TOTAL CERVIDS	325

The most likely explanation for the enormous discrepancy between the reported and actual population is that the initial estimate was very inaccurate. The initial estimate was not as the result of scientific census technique but more of an optimistic expectation. Because all cervids that were demonstrated as having been on the ranch were eligible for indemnity by MDA, it is not likely that the ranch removed animals without reporting it. The ranch had a 10-ft fence around the entire perimeter such that the egress of that many animals was not likely.

The cost of the depopulation effort was as follows:

Depopulation	\$ 123,920
Helicopter contractor	176,000
Verification	<u>13,414</u>
TOTAL COST	\$ 313,334

ACCOMPLISHMENTS

There were three significant accomplishments of this project. They were 1) the elimination of a potential source of infection of bovine TB for wild deer, privately-owned cervids or livestock; 2) provision of a significantly earlier

resumption of commercial activity by the ranch owner, and 3) the development of effective partnerships with MDA, MDNR, WS, VS and the helicopter company.

CONCLUSION

First of all, a successful plan to depopulate a large captive cervid ranch is possible with the combination of selective sharpshooting, strategic use of fencing and aerial hunting with the use of "Judas deer." Secondly, it is believed that this process could be expedited, if necessary, with an early application of aerial hunting.

ACKNOWLEDGMENTS

We wish to acknowledge the outstanding support, including funding, for this project by MDA, especially Dr. Michael Vanderklok. The ranch owner and ranch staff are commended for their cooperation. Doug Leitch and his employees are recognized for their extremely professional contribution. Dave Marks, WS-MI, is credited for creating the graphics. Lastly, we are deeply indebted to the many WS employees of MI, OH, WI, IL, NJ, and SC who participated so effectively in many difficult and harsh conditions.