Diseases • How They Could Impact The Future of Big-Game Hunting

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In a time when many North American big-game species are falling victim to a variety of serious diseases, sportsmen begin to question the fate of big-game populations and the future of hunting. Recently, wildlife diseases have gained regular coverage in media horror stories and talk of impending crises is common. The facts, as projected by the media, seem to change daily with state and federal agencies grasping for solutions. Research is needed to gain more knowledge of these diseases, their modes of action and transmission, and their potential to cross between species. With the recent emergence of chronic wasting disease (CWD) and realization that bovine tuberculosis (bovine TB) and brucellosis are established in some areas, hunters, wildlife managers, and other conservationists are left searching for answers.

Captive elk showing symptoms of chronic wasting disease. Symptoms include deteriorating body condition, drooping head and ears, and increased salivation.

Chronic wasting disease, bovine TB, and brucellosis are appearing, reappearing, and spreading across North America. All three of these diseases may pose serious threats to wildlife and domestic livestock, and have the potential to impact populations for years to come. A curious mind naturally questions why, at this time of healthy and abundant deer and elk populations, are diseases becoming so prominent. Is it related to the management paradigm of the last 50 years of continually striving for high wildlife population densities? Is it possibly due to big-game species being raised commercially as commodities to be bought, sold, and transported around the continent? Is it due to existing big-game populations being sustained with artificial bait and feed at unnaturally high densities on diminishing fragments of habitat? Our goal is to describe and discuss these three diseases that are currently impacting our big-game herds. After examining each separately, we discuss common human practices that may play roles in creating disease epidemics and a variety of strategies that could prove helpful in disease management and control.

The Diseases

Chronic wasting disease has recently become a serious threat to deer and elk. It is a transmissible spongiform encephalopathy (TSE) transmitted by prions. Prions are thought to be abnormal, heat-, enzyme-, and chemical-resistant forms of normal proteins synthesized in the central nervous system. Chronic wasting disease was first recognized in 1967 at a research facility in northeastern Colorado, and was identified in wild deer and elk herds in Colorado and Wyoming in the early 1980s. Until recent wide-scale testing, infection rates in natural populations were believed to be quite low and concerns were minimal.

However, since the mid-1990s, captive and wild herds of mule deer, whitetailed deer, and elk in other states have tested positive and the issue has come to the forefront. Recent incidences of CWD in southcentral Wisconsin, and other states, have hunters concerned about the fate of deer populations and safety of consuming venison.

In advanced stages of the disease, infected animals commonly show substantial weight loss, listlessness, lowering of the head and ears, and an increase in drinking and urination, followed by death. Chronic wasting disease is related to, but distinct from other TSE diseases: bovine spongiform encephalopathy (BSE or "Mad Cow Disease"), which infects cattle; scrapie, which infects sheep and goats; and Creutzfeldt-Jakob disease (CJD), which infects humans. Although currently there is no evidence that CWD is transmissible to humans, the concern remains due to the lack of knowledge about the disease. To determine the possibility of transmission to livestock, researchers have housed cattle, sheep, and goats with CWD-infected deer and elk for longer than six years with no signs of transmission across these species. Much research is being initiated and is underway to learn more about CWD, its implications, and how to protect our big-game populations.

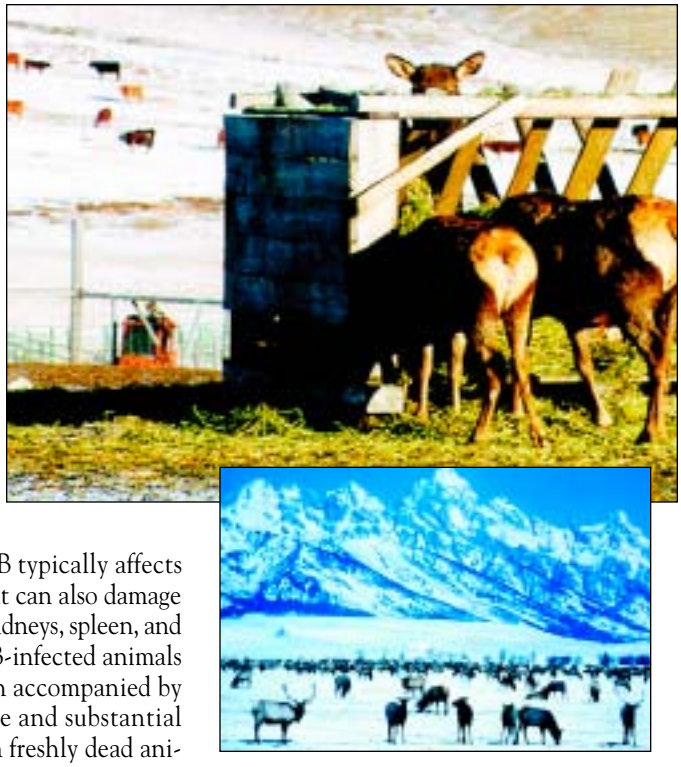
Bovine TB, caused by Mycobacterium bovis bacteria, has re-emerged in wild deer populations in northcentral Michigan and is a source of much concern. There are several bacterial strains of bovine TB that commonly infect cattle, swine, and also humans. Historically in the United States, bovine TB has been maintained only in domestic livestock. Then, in 1975, a wild whitetailed deer in Michigan was diagnosed with the disease, followed by another in 1994. Prior to this, it was thought that bovine TB could not maintain itself in wild deer populations. After the 1994 instance, an extensive wildlife bovine TB surveillance program was initiated across portions of Michigan. Since then, the prevalence of bovine TB in northcentral Michigan's wild deer has remained at less than 5 percent.

Wild and domestic animals may contract the disease through direct contact with infected animals, feeding on infected animals, or through feed contaminated by infected animals. Bovine TB has been found in wild deer, elk, black bears, coyotes, foxes, raccoons, opossums, badgers, bobcats, and other species in North America and has been found in many other species worldwide. The survival of the bacteria is dependent on environmental conditions and has existed up to five months in cow feces during the winter. Transmission of bovine TB to humans was historically through contaminated milk products and has now been virtually eliminated through pasteurization processes. Transmission can also occur through inhaling bacteria while in close contact with infected animals or through open cuts or scrapes while field dressing animals. Persons with compromised immune systems, primarily, are at risk of infection.

In deer, bovine TB typically affects the respiratory system, but can also damage other organs such as the kidneys, spleen, and lymph nodes. Bovine TB-infected animals typically develop a cough accompanied by excessive nasal discharge and substantial weight loss. Diagnosis in freshly dead animals is accomplished through examination and culture of lesions found in the organs mentioned above.

Brucellosis is another disease of concern caused by several strains of Brucella bacteria. Brucellosis can infect cattle, bison, elk, humans, caribou, reindeer, swine, bears, wolves, and many other species, including marine mammals. Brucellosis was historically identified only among livestock in North America, then later in elk and bison. Currently, brucellosis is found in elk, bison, and cattle in and around Yellowstone National Park and in bison within Canada's Wood Buffalo National Park. The majority of interactions within and among these species take place during winter and spring when the animals are food stressed. Food is often found in cattle-grazing allotments or supplemental elk-feedgrounds. These man-made feedgrounds are believed to contribute directly to the maintenance of brucellosis in Yellowstone's wild elk population. As a result of the seasonal movement of bison out of Yellowstone's boundaries and into areas where interactions with cattle would be likely, bison are sometimes culled to avoid possibilities of brucellosis transmission to cattle herds.

Transmission often results when uninfected animals come in direct contact with bacteria-laden genitalia of an infected female shortly after giving birth, fetus, placenta, calf, or contaminated feed. Bacteria are shed in aborted fetuses where they can persist in the environment for several months. Brucellosis typically results in aborted or very weak young, arthritis, high intermittent fever, and decreased milk production. Although rarely fatal in adult animals, its symptoms are long lasting. It is a difficult disease to diagnose based on an animal's physical appearance alone. With respect to prevalence rates in the Yellowstone area, elk often exceed 50% on feedgrounds while rates in non-artificially fed elk remain around 2%. The most severe human strain of the disease is known as Malta fever, and often results in fever, fatigue, and joint pain. Humans can contract brucellosis through direct contact with an infected animal's reproductive fluids via cuts or scrapes or through inhaling or ingesting bacteria. There have been two reported cases of brucellosis transmission to humans through contact with carcasses of infected wild elk.



Potentially infected elk feeding in proximity to cattle increase the possibility of disease transmission between species. INSET: Elk concentrations on supplemental feeding grounds, increases the chance of disease transmission.

The Scenarios

In endemic CWD areas in Wisconsin and bovine TB areas in Michigan, baiting and supplemental feeding of deer were common practices of deer hunters and wildlife viewers. These practices often resulted in large numbers of deer intermingling in small areas, sharing air, space, and feed. Researchers report situations in which infected animals have visited multiple baiting sites within their home ranges, potentially contaminating all the sites

and infecting other deer that used them. Baiting and supplemental feeding can also lead deer to rely on artificial food sources, such as stored grains and silage that is destined to be fed to livestock.

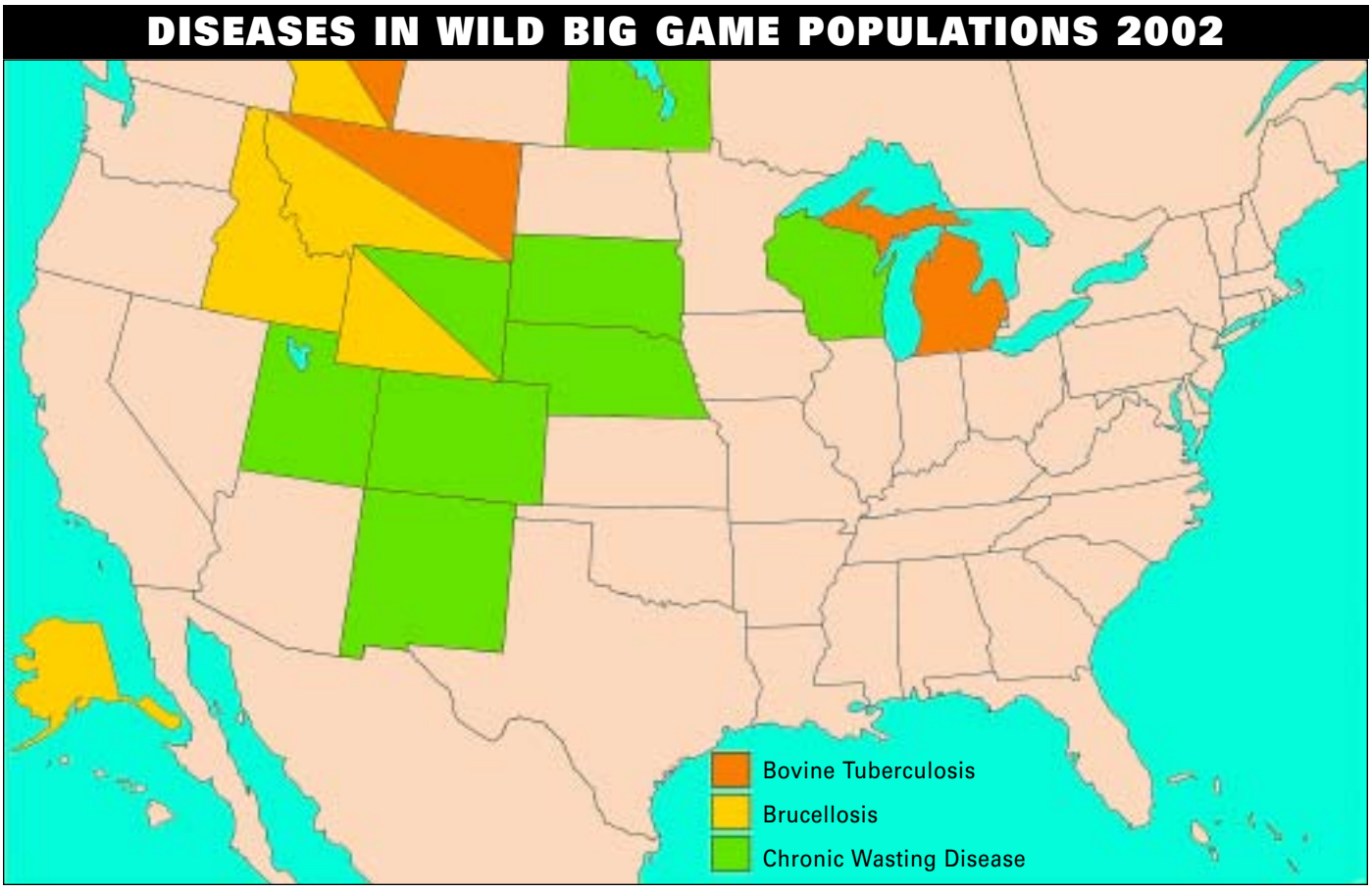
A similar scenario takes place across the West with large-scale supplemental feeding of wintering big-game herds, creating unnatural concentrations of animals on feedgrounds. Carrying capacity, the number of animals an area can support, is artificially increased through supplemental feeding. It is true that, without supplemental feeding, winter mortality may be higher; but biologically, this may not be a more negative consequence of overabundance than disease. Supplemental feeding can also allow for higher reproductive rates. Not only does supplemental feeding adversely impact the ability of habitat to sustain wildlife; but it also increases the probability of a disease spreading. In the long run, the negative impacts of baiting and supplemental feeding are likely to outweigh any human-perceived benefits of these practices.

Economic impacts of disease on big-game populations can be and have already been quite substantial. With uncertainties in modes of disease transmission and possibility of transmission to humans, there is concern of the safety of consuming potentially-infected wild game. Though the popular media may have blown this out of proportion, to the point of creating hysteria among the public, this concern is quite real and justified. If hunter participation decreases drastically in core areas of disease, local economies that rely heavily on the revenue brought in by hunting will suffer. State wildlife management agencies that rely on hunters to help manage herds through harvest will face challenges in reducing populations and generating revenue. The economic impact of diseases on game farmers, dairy farmers, and cattle ranchers must also be considered. Cattle herds, as well as captive elk and deer herds, are routinely destroyed when individuals in a herd are found disease positive, leaving operators in uncomfortable predicaments.

Strategies to Control Disease

For any disease-control strategies to be effective there must first be a true understanding of the endemic areas and prevalence rates. Wildlife agencies are finding that as disease testing for CWD, for example, becomes more widespread, the endemic area boundaries are expanding. Is this due to the spread of the disease, or the possibility that testing for disease has only recently begun outside the endemic areas? Problems with potential bias due to preferences for harvesting specific sex or ages of animals may also lead to an incomplete view of prevalence rates. Hunting as a sampling and population control method may become less effective if safety issues regarding venison consumption surface and hunter participation declines. We may reach a time when hunters are requested to submit tissue or blood samples from all the game animals they harvest. Although the laboratory analyses would be expensive, we would gain a more complete understanding of overall big-game health. Surveillance for diseases through post-mortem examinations is generally the extent of testing in wild populations, due to difficulties associated with testing adequate numbers of live individuals. Although a live-testing method for CWD in mule deer has been developed, it is not yet practical for wild populations. State and federal agencies are improving their facilities and abilities to quickly test samples provided by hunters.

Management of wildlife disease outbreaks can be facilitated with the use of both lethal and non-lethal strategies. The most common reaction from wildlife management agencies to a disease outbreak is to reduce the population of the host species through lethal means. Though population reduction may be necessary given the current state of knowledge of a specific disease, it is this drastic reaction that many sportsmen fear. Potential



impacts of sizable population reductions include reduced hunter participation, revenue loss, and a rapid decrease in food sources for predators and scavengers.

Practical non-lethal approaches include a variety of tools to exclude potentially-infected animals from healthy ones. Although we do not advocate the widespread use of high fences, several fence designs allow for the selection of a suitable fence for a specific situation based on the level of risk of disease transmission. To eliminate the potential for disease transmission between wild and captive big-game populations, a double fence is necessary to eliminate nose-to-nose contact and minimize contaminant inhalation. Problems in creating a true game-proof fence arise from the ability of the animals, especially when motivated, to go over, through, or under a fence. Whitetailed deer, for example, are capable of jumping an eight-foot fence from a stand still and a ten-foot fence may not impede a motivated, running animal. Deer are also capable of pushing through or under a gap in a fence as small as eight inches. Further, even the strongest of fences may not be able to withstand a herd of moving elk.

Other non-lethal approaches include devices designed to elicit fear (frightening devices). Such devices vary from simple scarecrows to sophisticated game-activated pop-up mannequins accompanied by lights and frightening sounds. Success with frightening devices can be maximized by incorporating stimuli that are activated only in the presence of offending animals. Dogs specifically trained to exclude potentially-infected big-game animals from stored livestock feed or other attractants could also be part of a comprehensive plan. Livestock protection dog breeds, such as the Great Pyrenees, have potential to protect against the co-mingling of the livestock they accompany and wildlife.

Changes in practices of supplemental feeding and baiting must take place for effective disease control; several states have already banned baiting wildlife as a result of these disease outbreaks. Unless the public is educated, these bans are enforced, and offenders are prosecuted, the activities will likely continue. Restrictions have also been implemented concerning the transportation of specific animal parts, such as entire heads or bones, out of endemic areas to avoid the inadvertent spread of disease.

More research into the modes of transmission, probable disease hosts and reservoirs, and their potential to cross between species is needed for effective control of bovine TB and CWD. There is potential for development and administration of vaccines for wildlife through the use of bio-bullets, vaccine-injecting darts, and medicated feed. However, there are difficulties in treating free-ranging big game and this area requires much research. In big game disease situations, population reductions, non-lethal exclusion strategies, surveillance, modification and enforcement of baiting and feeding restrictions, animal and carcass transportation regulations, and public education are all necessary to efficiently combat disease.

The Future

Wildlife managers have brought big-game populations from the low, unhuntable levels of the first half of the 20th century to the record high populations we have enjoyed in recent years. However, high big-game populations are associated with serious crop damage, substantial ecological damage to natural habitats, increasing collisions with vehicles, and enhanced opportunities for transmitting and contracting diseases. In order to control these negative consequences, management objectives must change. Big game should be managed at levels that ensure the health of populations and their habitats, based on current knowledge. To achieve this will require an emphasis on reducing densities and increasing harvest of females, a trend that has already begun. The philosophies and management strategies associated with Quality Deer Management, which are becoming popular in whitetailed deer country, lend themselves well to this paradigm shift. By managing for healthy populations and habitats, we will be managing to reduce the prominence and transmission of disease.

We have entered a time when we need to contemplate the effects of our actions and decide how highly we value our big game resources. Our demands and actions of the past have created many of the problems we are presently dealing with; now it is our responsibility to promptly find and enact solutions. Through gaining a thorough knowledge of CWD, bovine TB, and brucellosis, state and federal agencies will be able to improve big-game management and the general public will have a better understanding of the reasons for the changes. For wildlife agencies to effectively confront the problems, we must make personal changes and accept new big-game management goals and regulations. Through research, education, and cooperation, we can prevent these diseases from seriously impacting our herds. As hunters, we need to support our state and federal agencies and play an active role in helping to control these diseases. ■