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Wildlife Damage Management Protection Efforts on a Mule Deer Population in Eastern Nevada: 2003 thru 2005

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ABSTRACT: In September 2003, the Nevada Board of Wildlife Commissioners directed the Nevada Department of Wildlife (NDOW) to contract with the USDA APHIS Wildlife Services Program (WS) to conduct wildlife damage management (WDM) activities for the protection of mule deer in eastern Nevada. Responding to the Commission's directive, NDOW requested WS to initiate wildlife damage management efforts to protect a population of adult and juvenile mule deer in Lincoln County. The coyote was the only predator targeted for removal from the project area by various removal methods. WS personnel also collected coyote mandibles from the project area, and the cementum aging process was used to determine the age structure of coyotes prior to and during the ongoing WDM protection efforts. Results from the tooth aging analysis indicate that the average age of coyotes dropped somewhat during the second year of removal, although not significantly. Mule deer fawn and adult populations are monitored by NDOW to determine what effect(s) coyote removal is having on the mule deer population located in the protection area. The protection area is mainly comprised of public lands managed by the Bureau of Land Management and the U.S. Forest Service, and nearly all WDM activities were conducted on these public lands. This is an ongoing 5-year mule deer protection project. As an added dimension of the resource protection efforts, WS collected blood samples from coyotes removed during WDM activities to permit the monitoring of various wildlife diseases by the Centers for Disease Control (CDC) and Washoe County Vector Control.

KEY WORDS: Bureau of Land Management, *Canis latrans*, cementum aging technique, Centers for Disease Control, coyote, Forest Service, mule deer, Nevada Department of Wildlife, *Odocoileus hemionus*, Washoe County Vector Control, wildlife damage management, Wildlife Services

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INTRODUCTION

In September 2003, the Nevada Board of Wildlife Commissioners directed the Nevada Department of Wildlife (NDOW) to contract with the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Wildlife Services program (WS) to conduct Wildlife Damage Management (WDM) activities for the protection of mule deer (*Odocoileus hemionus*) in eastern Nevada.

The mule deer protection area consists of NDOW's Big Game Management Unit 231. The protection area is located in northeastern Lincoln County, Nevada. This is a semi-remote wilderness area consisting of primarily BLM lands with elevations from 6,000 to 9,000 ft. A small percentage of the protection unit is private lands and is utilized primarily for the production of agricultural crops such as alfalfa. This protection area contains excellent mule deer habitat, and it has historically supported a healthy and productive mule deer herd. However, the deer population in this area showed a downward trend since the late 1980s (Russell Woolstenhulme, NDOW, pers. commun.). The mule deer in the study area are thought to have 171 fawns per 100 does under normal conditions, similar to desert areas in Colorado (Pojar and Bowden 2004). In November 2003, NDOW requested WS to initiate WDM activities to protect juvenile and adult mule deer from coyote (*Canis latrans*) predation within the protection area. In November 2003, WS initiated WDM activities within NDOW's hunt unit 231, targeting only coyotes that inhabited the protection area. No other predator species (e.g., mountain lions) were removed, per NDOW's request. WS

concentrated coyote removal efforts in areas where mule deer were thought to be most vulnerable to coyote predation (e.g., fawning areas and winter ranges). WS also focused WDM efforts on older age-class coyotes.

Nevada has a robust population of coyotes with an estimated 180,000-200,000 breeding pair. During the pup-rearing season (May and June), there may be as many as 700,000 coyotes at one time inhabiting the state.

Spencer (2004) indicated that prior to initiation of any lethal control work for the protection of wildlife or other natural resources, a number of questions must be addressed. Thus, in this instance, we asked: What was the justification to commence WDM? When should WDM be conducted? What tools and methodologies should be used? What is the goal of the project? WDM activities were initiated because mule deer fawn recruitment was below desired levels, and the goal was to help alleviate coyote predation to better allow the mule deer population to grow.

A number of factors could be involved in the decline of a mule deer herd. These include, but are not limited to, drought, disease, predation, and competition of other ungulate species. Studies have shown that it is not uncommon for predators to account for 50% or more of mule deer fawn mortality. One study in the central Sierra Nevada in California found that predation was the largest cause of fawn loss, resulting in the death of 50.6% of all fawns during the first 12 months of life. In this instance, mountain lions were the main predator; however, coyotes still accounted for 27% of all predation (Neal 1990). Hamlin *et al.* (1984), in a study of mule deer fawn mortality in Montana, observed that a minimum of 90%

of the summer mortality of fawns was a result of coyote predation. Trainer *et al.* (1981) reported that heavy mortality of mule deer fawns in Oregon during late fall and winter was limiting the ability of the deer population to maintain itself or increase. Other ungulate species and livestock may also realize a benefit from coyote removal: Spencer (2004) noted that while protecting a relocated antelope population in western Nevada, winter sheep losses were also minimized because of the antelope protection efforts that were conducted in that area.

WS' professional experience indicates that older, territorial coyotes are more efficient than other coyotes at preying on larger species such as mule deer. Coyote research conducted at the UC Hopland Research and Extension Center in California concluded that alpha coyotes were far more likely than transient coyotes to kill sheep and lambs (Sacks *et al.* 1999). This is also supported by evidence that alphas are the principle killers of wild ungulates (Gese and Grothe 1995, Gese 1999).

Coyotes are opportunistic predators that take advantage of the vulnerable prey species; those with established territories are thought to have great insight regarding where prey species such as mule deer occur. Connolly *et al.* (1976) exposed captive coyotes to sheep and concluded that yearling males and unpaired females did not attack sheep, but that paired coyotes attacked sheep more frequently. Their conclusion was that most coyotes can kill sheep without previous experience, but that some are more likely to do so than others. It was also assumed by WS that removing older age-class coyotes from established coyote territories would allow younger age-class coyotes to inhabit the vacant territories. This younger age class of coyotes, it was reasoned, should be more of a transient-type coyote that relies on smaller food sources such as rodents, and not on larger ungulate species.

To help address the theory that older territorial coyotes were inhabiting the protection area and were the main culprits in fawn consumption, WS personnel collected lower coyote mandibles during WDM activities. A lower canine tooth was extracted from each mandible and sent to a lab (Matson's Laboratory, Milltown, MT), where the cementum aging process was used to estimate the age of the coyote.

COYOTE REMOVAL METHODS

After spending a significant amount of time in the protection area, WS determined by responses received from voice howling that it was inhabited by a well established, older-age-class population of coyotes. These older, aggressive coyotes were suspected of making a significant impact on the local mule deer population. To remove coyotes from this protection area, WS used several methods, including soft-catch leghold traps, trail snares, decoy dogs, calling, shooting, and aerial hunting. The M-44 device was not used, because the label only allows its use for livestock protection and not for wildlife protection. (The authors believe that the M-44 label should be amended so that this effective tool can be used to protect mule deer and other species of concern.) The use of the electronic calling system, better known as the "Chuck Box", was also implemented in the protection

area, and it proved highly effective at locating and calling in coyotes (Miller *et al.* 2006)

Soft-Catch Traps

Soft-catch leghold traps are constructed with padded jaws for the purpose of holding a captured coyote with minimal injury. These traps also have Paws-I-Trip pan tension devices to minimize the risk of capture to non-target species. WS has had high success placing these traps near water holes during the vulnerable fawning season. During the first winter of WDM activities, the protection area had above-average precipitation and water in the protection area was readily available, but by the summer and fall months, water was again scarce and mule deer were concentrated around available water. Soft-catch traps were placed at the advantageous areas of water, but care was exercised in how close to water traps were placed. Coyotes captured in traps near water holes could scare mule deer away, so WS placed equipment far enough away to prevent potential problems.

Trail Snares

Trail snares are constructed with 1/16-inch, 1 × 19-strand crucible cable. This is a braided cable that combines great strength with the benefit of small size (Bowers 2004). The local citizens in this area have been trapping this area for many years, and it was observed that coyotes were very trap shy; several coyotes collected in trail snares were missing feet and toes. Many of these coyotes were older in age and were wise to traditional trapping methods, but with the use of trail snares, trap-shy coyotes were removed with little effort.

Aerial Hunting

Aerial hunting played a very important role in the success of this project. The first two winters of the project brought above-average precipitation, making ground access very difficult. The mule deer fawning grounds are often located at high elevations, and at times aerial operations were conducted at 8,000-ft. levels. WS was able to continue protection efforts during this time with its aerial hunting capabilities. Aerial hunting is a highly selective and environmentally friendly method of removing offending coyotes. In combination with an experienced ground crew, aerial hunting can be a very productive method for removing coyotes. The aerial crew flew fawning locations in the spring and around the wintering grounds, the two times when juvenile mule deer are the most vulnerable. The aerial crew also located dozens of coyote dens from the air and reported their findings to the ground crew.

Call Box

WS has been utilizing call boxes on this project throughout its entirety; it has been used to call coyotes to stands as well as to trail snare locations. During aerial operations, the call box was used to locate territorial coyotes, and at times was left in the field for the aerial crew to visit and remove offending coyotes called to the unit. Previously, WS had high success rates with the call box using the "fawn in distress" sounds around known fawning areas (Miller *et al.* 2006).

CEMENTUM AGING

Cementum aging is a technique used to estimate the age of a variety of wild mammalian species. This process is based on the fact that cementum is deposited in bands on the roots of teeth annually. This enables the bands to be counted; however, unlike the rings in trees, cementum bands are not affected by changes of physiological state or habitat conditions (Bookhout 1996). The standard tooth used for most carnivores, including coyotes, is the canine.

RESULTS AND DISCUSSION

During the first year of the project (November 2003 through October 2004), 138 coyotes were removed from the protection area using a wide variety of methods. Cementum age analysis of a subset totaling 60 coyotes estimated their average age to be 2.85 years. The following year, 143 coyotes were removed from the protection area, and cementum analysis of a subset of 68 coyotes showed their average age to be 2.68 years. While we had suspected that older-age coyotes originally inhabited the protection area, a statistical test of comparing the age of the coyotes removed in first year vs. the second year did not support our hypothesis that a significant decline in age had occurred.

NDOW biologists conducted fall fawn counts in 2002 and 2003 (before coyote removal), observing 40 fawns/100 does and 60 fawns/100 does, respectively. The fawn-to-doe ratios after WDM activities were 55 fawns/100 does in 2004, and 87 fawns/100 does in 2005. Fall counts indicate success in fawns' surviving their first 6 weeks of life, when they are most vulnerable to predation. Pojar and Bowden (2004) found for mule deer fawns in Colorado that 76% of mortality from all sources occurred by July 31. For the study area, approximately 34 fawns per 100 does are required to sustain this mule deer population, and 38-40 fawns per 100 does should result in population growth (Mike Cox, NDOW, pers. commun.).

The results of this project are still ongoing, and it will take time to examine measured responses. If WDM efforts are professionally administered over time, then improved fawn survival should continue in the protection area. With the recent success of fawn survival, the deer population in this protection area should approach carrying capacity, and the influence of coyote predation on fawns will be less significant at the population level.

DISEASE TESTING

As an added dimension to the resource protection efforts, WS collected blood samples from coyotes removed during WDM activities to allow the monitoring of various wildlife diseases by the Centers for Disease Control and Washoe County Vector Control. If plague antibodies are detected in an unusually high percentage of coyotes in an area, Washoe County Vector Control may conduct further testing to identify the focus of the infection. During the period from December 2003 to March 2006, a total of 181 blood samples were collected from coyotes in the protection area, and 18.2% of the coyotes tested positive for plague antibodies. This is high, in comparison to the statewide average of 7.73%

animals positive from 2003-2005 (Washoe County Vector Control, pers. commun.).

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