

Bighorn Sheep Die-off in Hay's Canyon 2007/2008

The Hay's Canyon range, a chain of mountains in northwestern Nevada, falls within hunting areas 011 and 013 in Washoe County. The western front of the range rises dramatically from the high altitude alkali flats near Eagleville, CA, to its rugged peak at 7900 feet. The Nevada Department of Wildlife (NDOW) introduced bighorn sheep into this range nearly 20 years ago. Fifteen bighorns (2 young rams, 10 ewes and 3 lambs), were captured near Williams Lake, British Columbia, and released into during the early winter of 1989. Nevada Bighorns Unlimited members were among those who traveled to British Columbia to take part in the capture. Six years later, an augmentation release of another 15 animals occurred. These were local animals captured from the Santa Rosa and Jackson Mountains of Humboldt County.

The fledgling herd grew slowly but steadily over the years and at one point, was considered to have among the highest ewe to lamb ratios in Washoe County. In good years this area has considerable habitat well suited to bighorn sheep (probably more than 100 square miles) and the heavy tree cover in some northern areas of the range can make it difficult to locate animals during a survey. In spite of this, aerial counts over the years have documented expansion of the population, and biologists frequently observed 50 to 70 bighorn in just a few hours of flying. In 2006/07 the herd was estimated to number 110 animals. In April 2007, more than 70 bighorn were observed along the western slope of the range during a routine flight.

The news of a possible disease event in this area came from a 2007 bighorn sheep tag-holder. While driving into Hay's Canyon he observed what appeared to be a sick ewe bedded down under a tree close to the road; the same animal was found dead a few hours later. NDOW Law Enforcement followed up on his report and helped retrieve the carcass which was then transported to Reno for veterinary diagnostic work-up and a thorough necropsy examination. The results of the examination, backed up by various laboratory results, confirmed that the ewe died from severe bacterial pneumonia. Both *Biebersteinia* (formerly *Pasteurella*) *trehalosi* and a common pus-forming bacterium, *Arcanobacterium*, were cultured from the lesions in the lungs. The ewe also showed scarring in the lungs that suggested *Mycoplasma* infection (*Mycoplasma ovipneumoniae*). This particular species of *Mycoplasma* was implicated in the deaths of bighorn sheep in Idaho, Washington and Oregon) in 2006, although in that instance, a host of other factors probably were involved.

NDOW performed an intensive follow-up aerial survey of the Hay's Canyon area (sponsored by NBU, Reno) immediately following the discovery of the first dead ewe. Only seven live sheep were seen. Increasingly intensive ground surveys in October and November followed and during this time, NDOW biologists and dedicated NBU members spent time in the mountains on foot and were able to locate several

decomposed carcasses as well as several sick bighorn sheep. Through the cooperation of NDOW and NBU, a number of valuable samples were obtained from both sick and dead animals.

As expected, bacterial pneumonia was identified in all animals but a very interesting finding consistent among many of these animals was that the pneumonia was apparently caused by *Pasteurella multocida* U⁶. *Pasteurella* is one class of bacteria commonly seen in sheep with pneumonia and it's been well established that certain species can cause disease in bighorns. The species *P. multocida* however is not ordinarily associated with disease in bighorn sheep, but this particular biotype is known to have been a factor in other bighorn die-offs in other areas. For example, the same bug was cultured in high numbers from free-ranging bighorn sheep in the Hells Canyon area of Idaho, Washington, and Oregon during the winter of 1995-96 following a major die-off. Animals captured in Hells Canyon and held in captivity, and their offspring, also harbored *P. multocida* U⁶.

All evidence gathered in the fall of 2007 pointed to a die-off occurring in the area and a second helicopter survey was conducted by NDOW in mid-November covering the entire ridge system and western slope of the Hay's Canyon Range. The survey turned up more carcasses and only two bighorn were seen alive. Several bighorn observed alive during the initial helicopter survey in October were later found dead near or adjacent to water sources.

Additional ground surveys failed to locate any live bighorn; however, three sets of fresh bighorn tracks were observed near the lower big game guzzler in late November. As a result, a remote camera was positioned at the guzzler in an attempt to document the presence of live bighorn; unfortunately, none was photographed during the 5 to 6 week period of observation. Ground surveys continued and focused on south slopes, open areas, and water sources on the western slope of the Hays Canyon Range. No live bighorn were observed but additional carcasses were located including the skull and remains of a 9-year-old ram located by a rancher near a spring source in early December.

Based on our veterinary findings and survey results, NDOW remains convinced that a major disease event has seriously impacted the Hay's Canyon bighorn population. It is likely that the die-off's greatest impact to the population occurred during the late summer, fall and early winter, and our discoveries were made relatively late in the disease process. Of course there is still some hope that a small number of bighorn survived this catastrophic disease event (some sheep may have a genetic resistance to certain diseases) and are still occupying the range. It is also possible that some of the population emigrated to a more hospitable area in response to the severe drought conditions of the past year and were not exposed to the same pathogens. In fact, recent observations of unusual distributions of pronghorn, mule deer, and bighorn occupying other areas of Washoe County are quite possibly the result of recent drought conditions. Reports made to NDOW and the local office of the Bureau of Land

Management (BLM) indicate the presence of live bighorn in the country north of the Hays Canyon Range along the Vya Rim of hunting unit 011 and while the numbers of bighorn here remain low, the animals that have been seen appear to be healthy - apparently unaffected by the disease event that occurred further south.

Unfortunately it may be some time before we have a good understanding of the factors that initiated this disease event or how many resident bighorn survived it. Respiratory disease in bighorn sheep is especially complex, usually involves multiple factors and specific causes can be very difficult to determine. NDOW will continue to investigate this and other bighorn sheep die-offs in Nevada and through collaboration with the Department of Agriculture, BLM, local ranchers and other partners such as the University of Nevada Reno, and NBU we hope soon to be able to shed light on what may have contributed to these disease events.

Since early spring, ground investigations have taken place and several reliable reports of a small number live bighorn sheep have been received. We will continue through the summer months in an effort to further identify any bighorn that remain. Closure of bighorn hunting seasons for bighorn in hunt units 011 and 013 has been recommended until more is known about the status of this herd.