

FIRST QUARTER REPORT OF THE SIERRA NEVADA BIGHORN SHEEP RECOVERY PROGRAM



Photo by Tim Glenner

JANUARY - MARCH 2009

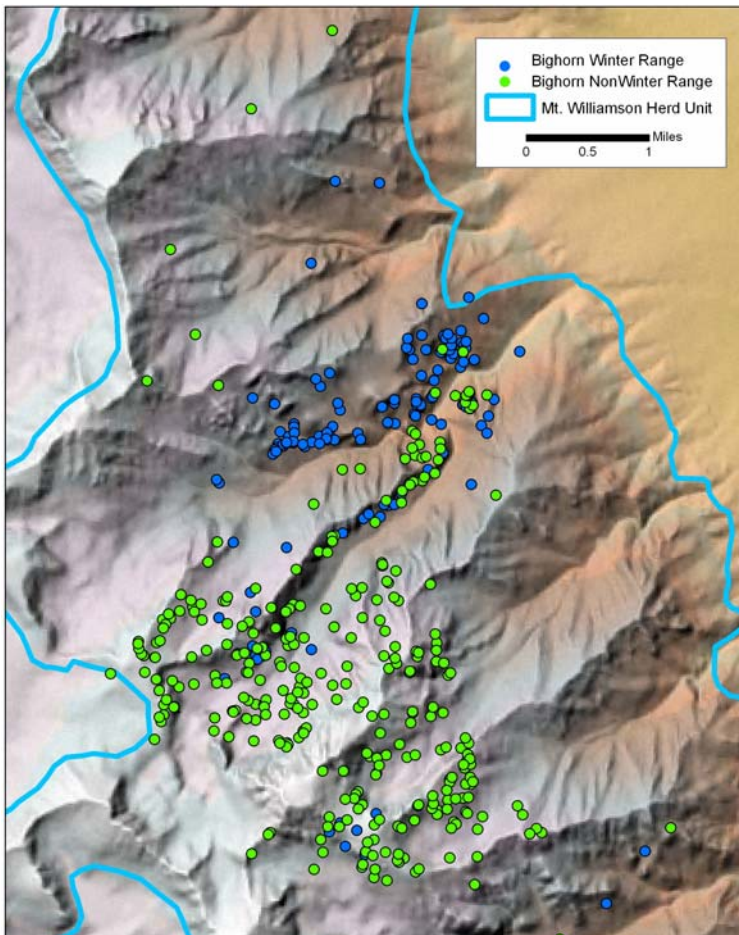
SIERRA NEVADA BIGHORN SHEEP RECOVERY PROGRAM CALIFORNIA DEPARTMENT OF FISH AND GAME

BIGHORN DEMOGRAPHY

The survival rate for bighorn ewes that wore radio-collars during the 1st quarter of 2009 was 88%. Three and 1 radio-collared adult females were preyed upon by mountain lions and a bobcat, respectively, in the Southern Recovery Unit (see related mountain lion article below); 3 additional collared females died in accidents. Ram survival during January – March 2009 was 91%; 1 male was killed by a lion and 2 died of unknown causes.

UNDERSTANDING MT. WILLIAMSON BIGHORN

Bighorn sheep in the Mt. Williamson herd unit largely have been elusive since the formation of the Recovery Program. Until recently, we went years without observing most of the population and relied on analysis of DNA from fecal samples to identify numbers of animals in the population. While we understood the general distribution of this small population, we had limited information about migratory patterns and limiting factors. During the past year we have deployed GPS and radio collars on a sample of male and female bighorn in the Mt. Williamson herd unit. Those collared animals have revealed a tremendous amount of information about movements and cause-specific mortality within the herd. Two collared females died during the winter, 1 fell off of a cliff and the other was preyed upon by a mountain lion. Figure 1 illustrates seasonal movements during the past year as identified using GPS collars. It confirms that while animals did spend some of the winter in the alpine they also used lower elevations to a considerable extent. The majority of low-elevation (<8,000 feet) winter range for the Mt. Williamson



herd is forested with pinyon. While bighorn on this winter range use patches of open habitat within the pinyon forest, they also are using forested habitats to a considerable degree. While we are just beginning to understand this herd in greater detail, we speculate that their use of forested habitats may be a factor in limiting their growth in recent decades. Bighorn sheep are better adapted to use open habitats. Non-forested habitats provide greater forage and bighorn are less vulnerable to predators. Consequently, the occurrence of natural and prescribed fire within the Mt. Williamson low-elevation winter range will benefit this small, but persistent, population.

The Bubbs Creek herd is the only remaining herd where we have yet to deploy radio-collars. This herd has proven particularly elusive because of its remoteness. We hope to eventually collar animals in this herd as well. By collaring animals, we are much better able to understand the factors that may be limiting populations and to direct management actions that will promote recovery.

Figure 1: GPS collar location data showing seasonal movement patterns.

ALPINE MEADOWS AND SIERRA NEVADA BIGHORN SHEEP: WILL CLIMATE CHANGE IMPACT RECOVERY?

Sierra Nevada bighorn sheep spend most, and in some cases all, of the year in the alpine. Sierra bighorn are dependent upon, and well adapted to, a landscape above 11,000 feet during both summer and winter. Vegetation that provides forage for bighorn is limited in the alpine of the Sierra Nevada. The seasonally arid climate characteristic of this range results in minimal precipitation during the growing season. The distribution of meadows is limited in the alpine of the Sierra and in fact they compose about 1% of that landscape, yet they provide an important source of forage biomass and nutrients for bighorn sheep. Many of these alpine meadows are fed by permanent snow fields that are in decline as a result of a warming climate. During the past century, the coverage of glaciers in the Sierra Nevada declined by 50%. Advances in treeline associated with climate warming also may result in the eventual reduction of alpine habitat. Consequently, alpine meadows are at risk of disappearing, as well as drying and senescing earlier in the growing season.



Photo 1: Bighorn Sheep in meadow within Mt. Langley herd unit during August 2008.

If meadow systems disappear in the alpine, the ability of the Sierra Nevada to support bighorn sheep will decline and recovery may be hampered. We are using geographic information systems, GPS collars, and resource selection function modeling to quantify use of alpine meadows by bighorn sheep in the Sierra Nevada. In many areas, Sierra bighorn show selection for alpine meadows (photo 1). However, given the concentration of nutritious forage provided by meadows, bighorn may only be required to spend a limited amount of time feeding in them and yet receive a disproportionate

amount of nutrients from them with even limited use. We are further examining this hypothesis. Meadows may be particularly important to bighorn during periods such as late summer and autumn when the sparse forage distributed throughout most of the alpine has senesced.

Sierra Nevada bighorn sheep are an umbrella species that represents the health and landscape integrity of the Sierra Nevada; they are dependent upon a contiguous, expansive wilderness landscape. When bighorn sheep existed at historical levels in the Sierra Nevada they also likely functioned as a keystone species that mediated nutrient cycling in vegetation communities and functioned as an important prey species for carnivores and scavengers including mountain lions and wolverines.

MOUNTAIN LION MORTALITY

In the last nine months, the mountain lions monitored by the Recovery Program have sustained a relatively high level of mortality. During autumn and winter two adult male mountain lions were found dead. One of those mountain lions was located west of Big Pine, in the McMurray Meadows area, in a clump of willows. The mountain lion appeared to have backed into the willows before it died. The decomposition of the carcass made it difficult to determine absolute cause of death, but the skull was fractured and, despite this being a popular deer hunting area, there was no sign of a bullet wound, therefore, it is likely that it died as the result of a fight with another mountain lion. In December a mountain lion originally captured in the Lee Vining area, that wore a failed radio collar, was recaptured at the base of Wheeler Ridge. This male scavenged on a dead horse located next to its capture location for several weeks. In January, it too was found dead, and the scene (photo 2) provided evidence that this



male was killed in a fight with another male lion. Shortly afterward an uncollared male was rocked up by hounds in the area, but was not captured. In April an uncollared male was captured just north of the Wheeler Ridge area. That mountain lion was covered with fresh wounds consistent with a fight with another mountain lion. It is unknown if this was the same lion that escaped capture earlier, but it is certainly possible. The wounds on the recently collared male could have been the result of a battle with another male or potentially one of the females that were in the immediate area. It also is possible that the lion responsible for killing the male at Wheeler Ridge also killed the mountain lion in McMurray meadows, and is the same male just collared. This sort of intraspecific aggression and mortality has been reported previously for mountain lions, and may be exacerbated by increased competition for resources as our deer population declines.

Photo 2: Photograph of male mountain lion killed by another male lion.

Additionally, two female mountain lions were found dead in May. The first of these females was located in the Bishop Creek area. The condition of the carcass made confirming cause specific mortality impossible, but the position of the body and her location leads us to suspect she was clipped by an automobile. The second mortality was in a very remote area behind the Glass Mountains east of Crowley Lake. The mountain lion was curled up and appeared to have died of natural causes.

This spring, three male mountain lions were killed in the Southern Recovery Unit for preying upon bighorn sheep. The population of mountain lions in the Eastern Sierra appears to be increasing. This may be contributing to an increased level of predation on Sierra bighorn.

BOBCAT PREDATION ON SIERRA NEVADA BIGHORN SHEEP

S59, an eight year old ewe in the Sawmill Canyon herd unit, was detected on mortality by means of her stationary radio-collar on January 3, 2009. On January 10, 2009, Recovery Program personnel investigated the mortality site. A bobcat was observed near the carcass. The carcass was located in upper Division Creek at an elevation of about 11,000 ft. The ewe was relatively intact (photo 3), with some feeding noted on the right rear leg and loin. Hair was licked and plucked during feeding. Blood stains were noted on adjacent rocks, indicating trauma as the cause of death. The terrain was inconsistent with falling as a cause of death.



Photo 3: Bighorn ewe killed by bobcat.

S59's head and neck were examined closely for evidence of predation. A large wound was identified on the top of the neck. The eyes and face were bloodied, with multiple small lacerations.

Detailed necropsy revealed that S59 was missing a strip of skin and hair about 2.5" wide by 5" long, over the back of the neck. Her head, neck and throat had many small punctures, cuts and scratches, and large cuts over both eyes that had obviously bled before she died.

Significant bruising, punctures and trauma were noted on the head neck and throat (photo 4). The back of the neck had been chewed and bitten with deep bruising (not fed on, but bitten and chewed) apparently when attacked. All evidence indicates that S59 was killed by a bobcat. The bites, cuts, punctures, and bruises are consistent with bobcat predation on adult deer, which is not uncommon. The blood wounds in photo 4 are probably where the bobcat was hanging on to the ewe while she struggled. Bobcats usually cannot kill large prey quickly. They get a grip on the head and neck, then bite, claw and hang on until the larger prey animal dies. As a result, there is extensive small trauma to the head, neck, and throat, as well as blood stains on the ground near the carcass that occurred prior to death.



Photo 4: Puncture wounds resulting from bobcat predation.

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