

Counting Sheep: Bighorn Sheep and Mountain Lions in the American West

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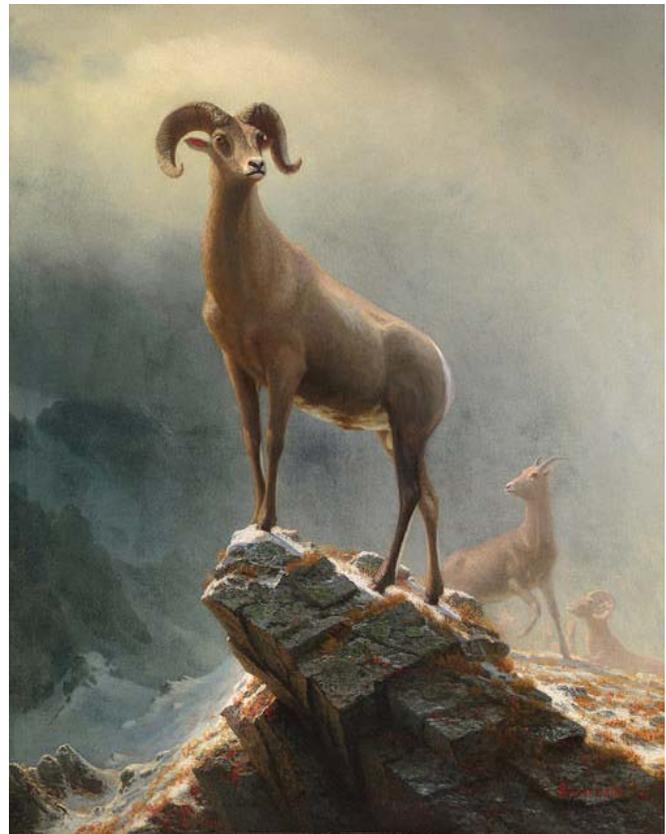
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Part I – Background

During the Pleistocene, the American bighorn sheep (*Ovis canadensis*) crossed the Bering land bridge and migrated south through Canada and into the southern Rocky Mountains, Great Basin Desert, and Sierra Nevada Mountains. Over time, the geographic isolation of these populations caused them to become genetically distinct (Wehausen and Ramey 2000). Human impact on the Sierra Nevada bighorn sheep began soon after the gold rush, with the grazing of domestic sheep in the high sierras and the advent of bighorn sport hunting (Sierra Nevada Bighorn Sheep Foundation). By the 1870s, populations began to decline, and continued to decline despite a California State ban on bighorn sport hunting (Meadows 1999, Steinhart 2000).

Biologists began official bighorn population estimates in the 1940s, at which time the total population was estimated to be fewer than 400 individuals found in five isolated populations (Jones, F. in Steinhart 2000). Bounties on the bighorn's primary natural enemy, the mountain lion (*Puma concolor*), were removed in 1963. Nine years later, the drops in bighorn numbers prompted the State of California to list the bighorn sheep as an endangered species (Rauber 2001). The same year, California banned sport lion hunting and the first livestock depredations by mountain lions were recorded. By the late 1970s, only 250 bighorn sheep remained in two subpopulations, so biologist John Wehausen began carrying out bighorn translocations from the larger of the two populations into historic bighorn ranges (Steinhart 2001).

While these translocations were at first successful, the herds stopped growing in the late 1980s due to increased mountain lion depredation and behavioral changes wrought by the increased lion presence (Wehausen 1996). Bighorn sheep live at high elevations, above 10,000 feet for most of the year, but must retreat to lower elevations to forage during the winter. Herds experiencing heavy lion depredation abandoned the better foraging grounds during winter to avoid contact with lions, causing many sheep to starve or experience decreased fertility the following spring (Wehausen 1980, 1986). The increase in mountain lion attacks on bighorns is widely thought



to be attributed to population declines and range shifts of the lion's primary prey, the mule deer (*Odocoileus hemionus*) (Schaeffer et al. 2000, Kamler et al. 2002, Rosas-Rosas et al. 2003, Holl et al. 2004).

Because of this population decline, biologist John Wehausen began implementing experimental lion culling. At one subpopulation, one lion was killed each year for three years and a subsequent bighorn population recovery was observed (Bleih et al. 1991, Chow 1991). However, lion culling was halted in 1990 when California voters passed Proposition 117. This law prohibits the killing of mountain lions except in cases where a lion threatens or harms livestock, pets, or humans. The California Fish and Game Commission (FGC), the governmental body responsible for working with biologists to implement the mountain lion culling, fought the law throughout the 1990s by introducing new ballot initiatives or bills in the state legislature. These efforts were largely unsuccessful. The Mountain Lion Foundation and others against lion culling invited the state to relocate lions known to kill bighorns, but FGC declined due to the liabilities it would accrue for the behavior of any lion it relocated (Mountain Lion Foundation).

By 1995, 300 incidences of livestock depredation by mountain lions had been recorded in California (Rauber 2001). An all-time bighorn population low of no more than 100 individuals was recorded in 1997 and 1998, a fact which spurred the United States Fish and Wildlife Service to give the California bighorn sheep emergency Endangered Species status in February 1999.

Now it is September 1999, and it is your job as members of the California State Senate to debate and vote on Assembly Bill 560, which pertains to our conflict at hand.

Part II – Debate

Having passed through the California House of Representatives last week, Assembly Bill 560 now goes before the California Senate. The bill will alter the Wildlife Protection Act to authorize the California Department of Fish and Game to kill mountain lions that are perceived to be a threat to the Sierra Nevada bighorn sheep. In this fictional debate, imaginary advocates for each side of the conflict present opposing arguments upon which you will base your decision. You will first hear from Mark Anderson, a fictional wildlife biologist, and then from Mary Smith, the director of an NGO (non-governmental organization) that seeks to protect large predatory cats in the Western United States.

Mark Anderson: Honorable senators, the increases in the mountain lion population during the late 1980s are directly correlated to the drop in bighorn numbers during that time. In scientific studies conducted to assess the influence of mountain lion depredation on bighorn sheep populations, my colleagues found that populations exhibiting no evidence of lion depredation grew in number, while populations that did experience lion depredation decreased in number.[1] Furthermore, for the three years directly preceding Proposition 117, one lion was killed each year at one subpopulation, and consequently bighorn numbers in that subpopulation increased. The evidence that selective mountain lion culling is an effective tool in restoring bighorn populations is there. Unfortunately, since the passage of Proposition 117 in 1990, there has been a precipitous drop in bighorn numbers. Last year the population reached an all-time low of around 100 individual bighorn sheep spread throughout four isolated populations. My colleague, John Wehausen, has said that “if current trends in sheep numbers and behavior continue, populations of these sheep could begin to disappear within a few years.”[2] He has also pointed out that “if we had had the authority to control mountain lions four or five years ago, we wouldn’t be in this situation.”[3] The harm to mountain lion populations from culling will be insignificant, most likely totaling around a dozen individuals each year, compared to the over 250 permits issued to ranchers to remove lions threatening their livestock. It is unethical to prioritize a species that is neither rare nor endangered over a species that is listed as Endangered in the state of California, and therefore I urge you to vote for this measure authorizing state officials to cull mountain lions known to threaten bighorn sheep survival.

1. Wehausen, J.D.

2. Petition for emergency endangered species status, as quoted by Paul Rauber, p.2.

3. Steve Torres of FGC, as quoted by Robin Meadows, p.1.

Mary Smith: Ladies and gentlemen, California's mountain lion population is critical to the maintenance of ecological balance in our mountain ecosystems. As the top predator in the Sierra Nevadas, they control deer and other herbivore populations, as well as the populations of smaller predators such as foxes and coyotes. Our foundation, an organization dedicated to protecting mountain lions, has made many important strides towards full protection for this majestic species. The most influential of these, Proposition 117, was an initiative put forth through 100% volunteer effort in 1989 to ban mountain lion trophy hunting. In 1990, the citizens of California proved their commitment to mountain lion protection by passing 117, and continued to show support in 1996 by rejecting an initiative by hunters to overturn it. In spite of the clear fact that "the people of California have made it clear that they don't want to see mountain lions hunted and killed,"[4] the California Department of Fish and Game has repeatedly made efforts through the legislature and through ballot initiatives to remove the ban on lion hunting. My colleague Lynn Sadler said that "Fish and Game's science has proved highly suspect in the past, and I believe that could certainly be the case here. The bighorn's problems didn't start with mountain lions, and they don't end with them. Overhunting, domestic livestock diseases and habitat loss are far more pressing problems."[5] "Now is not the time to experiment with the removal of predators in the hopes that it will solve the problem."[6] I urge you to consider the strength of public opinion in this case, and vote against a bill that would allow the needless killing of California's mountain lions.

4. Lynn Sadler, Executive Director of the Mountain Lion Foundation, as quoted by Glen Martin.

5. *ibid.*

6. Lynn Sadler, Executive Director of the Mountain Lion Foundation, as quoted by Paul Rauber.

References

Scientific Literature

- Berger, J., and Wehausen, J.D. 1991. Consequences of a mammalian predator-prey disequilibrium in the Great Basin Desert. *Conservation Biology* 5: 244–248.
This study demonstrates that human livestock grazing practices have caused mule deer and then mountain lion population irruptions, which have resulted in drastic changes to community dynamics.
- Holl, S.A., Bleich, V.C., and Torres, S.G. 2004. Population dynamics of bighorn sheep in the San Gabriel Mountains, California, 1967–2002. *Wildlife Society Bulletin* 32: 412–426.
An analysis of the long-term bighorn sheep population dynamics suggests that declining mule deer populations have led to increased mountain lion predation on bighorn sheep.
- Kamler, J.F., Lee, R.M., deVos, J.C., Ballard, W.B., and Whitlaw, H.A. 2002. Survival and cougar predation of translocated bighorn sheep in Arizona. *Journal of Wildlife Management* 66: 1267–1272.
This paper suggests that mule deer population declines may be responsible for increases in mountain lion depredation on bighorn sheep.
- Rominger, E.M., Whitlaw, H.A., Weybright, D.L., Dunn, W.C., and Ballard, W.B. 2004. The influence of mountain lion predation on bighorn sheep translocations. *Journal of Wildlife Management* 68: 993–999.
This study on mountain lion predation takes place in New Mexico. It finds that the ultimate cause of mortality of desert (rather than Sierra Nevada) bighorn sheep is mountain lions, which do not decrease in number following decreases in native ungulate populations.
- Rosas-Rosas, O.C., Valdez, R., Bender, L.C., and Daniel, D. 2003. Food habits of pumas in northwestern Sonora, Mexico. *Wildlife Society Bulletin* 31: 528–535.
This study analyzes the diet of Puma concolor and concludes that a high percentage of the diet is bighorn sheep, which correlates to a decline in mule deer populations in the region of study.
- Schaeffer, R.J., Torres, S.G., and Bleich, V.C. 2000. Survivorship and cause-specific mortality in sympatric populations of mountain sheep and mule deer. *California Fish and Game* 86: 127–135.
This study investigates causes of mortality in sympatric populations of bighorn sheep and mule deer, and finds that impacts by mountain lions on bighorn sheep populations occur only in areas where sheep and deer occur together.
- Wehausen, J.D. 1996. Effects of mountain lion predation on bighorn sheep in the Sierra Nevada and Granite Mountains of California. *Wildlife Society Bulletin*, 24: 471–479.
This study investigates the effects of mountain lion predation on two bighorn mountaintop populations. One of the populations experienced heavy losses to lions until lion pressure abated and the sheep population recovered. At the other population, lion depredation resulted in behavioral changes in the sheep, causing them to overwinter at higher altitudes and experience diminished fertility the following spring.
- Wehausen, J.D., and Ramey, R.R. 2000. Cranial morphometric and evolutionary relationships in the northern range of *Ovis canadensis*. *Journal of Mammalogy* 81: 145–161.
This paper provides the evidence for the genetic distinctness of the Sierra Nevada bighorn sheep from the Rocky Mountain and Desert bighorn sheep.

Popular Articles

Steinhart, P. Bighorn's Last Stand. *California Wild*, Spring 2000.

A longer news article detailing the history of the bighorn sheep population decline as well as a short personal history of John Wehausen.

Martin, G. 1998. Cougars wiping out sierra bighorn sheep, scientists say. *San Francisco Chronicle*.

This article provides many useful quotes as well as a short newspaper description of the conflict. It may be used as a pre-case, outside-of-class reading.

Meadows, R. Sierra Nevada Bighorn Sheep. *Smithsonian National Zoological Park's Zoogoer* publication. May–June 1999.

This article provides many interview quotes from both sides of the sheep-lion conflict.

Rauber, P. The lion and the lamb. *Sierra Club Magazine*, March–April 2001.

The author of this article spent time camping and bighorn-observing with biologist John Wehausen, and provides a nice description of bighorn natural history as well as the point of view of Wehausen and other biologists working towards the implementation of mountain lion culling.

Videorecording

Green, Frank (producer.) 2004. "Counting sheep: Restoring the Sierra Nevada Bighorn." Videorecording: DVD video (60 min.). San Francisco, CA: Green TV.

Winner of two Emmy Awards for Best Documentary and Best Camerawork, 2005/2006, this film explores measures taken to protect California's Sierra Nevada bighorn sheep and profiles the efforts of two men in particular, biologist John Wehausen and his unlikely ally, a mountain lion tracker named Jeff Davis. Available for purchase from the Yosemite Store (see <http://www.yosemitestore.com/>). The Yosemite Store is operated by the non-profit Yosemite Association, which donates revenues from sales to the National Park Service in Yosemite for educational, research and environmental programs.

Web-Based Resources

Sierra Nevada Bighorn Sheep Foundation

<http://www.sierrabighorn.org> Last Accessed: April 3, 2009.

This website provides a useful overview of the history of the Sierra Nevada Bighorn Sheep, as well as recent population counts and current political controversies related to bighorn conservation.

Mountain Lion Foundation

<http://www.mountainlion.org> Last Accessed: A.9002 ,3 lirp

This is a good resource for researching the point of view of the Mountain Lion Foundation, primary proponents of Prw siht nihtiw knil lufesu A .gnilluc noil fo stnenoppo dna 711 noitisopoebsite is the "History" link, which provides a timeline of events and laws passed surrounding the lion controversy.

Image credit: Rocky Mountain Sheep by Albert B.)38-2881(tdatsrei

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