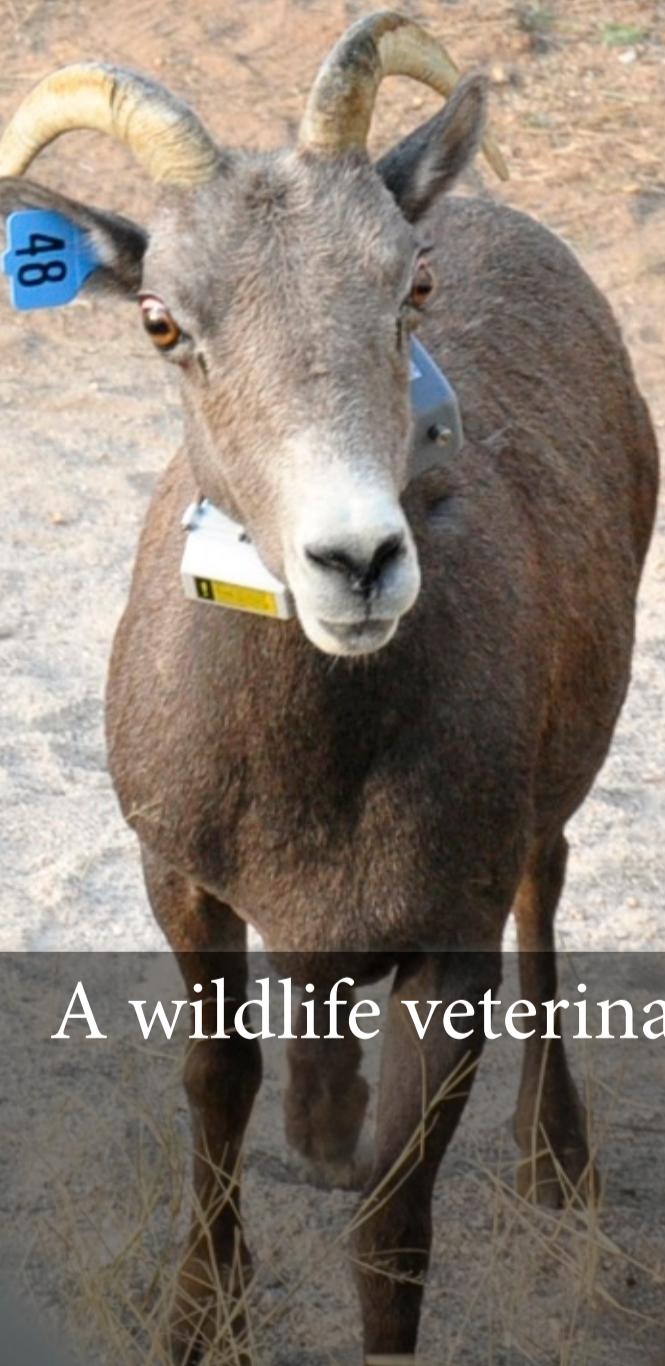


On the Horns of a **DILEMMA**



A wildlife veterinarian reflects on the challenges of
Bighorn Sheep conservation

BY SUSAN E. SWANBERG

A BIGHORN SHEEP PAUSES AFTER BEING RELEASED,
PRESUMABLY BEFORE BOLTING INTO THE CATALINAS. I NEED A BETTER CAPTION.

PHOTOGRAPH BY CATHY ROSENBERG



A BIGHORN SHEEP IS FITTED WITH A GPS TRACKING COLLAR PRIOR TO ITS REINTRODUCTION INTO THE SANTA CATALINA MOUNTAINS.

PHOTOGRAPH BY CATHY ROSENBERG

The killing of three recently released desert bighorn sheep by mountain lions in the Pusch Ridge Wilderness Area near Tucson focused attention on predation as a threat to re-establishing a viable herd in the Santa Catalina Mountains. Reintroducing bighorn sheep raises other concerns as well, including the impact of disease. Between predation and disease, a small herd of bighorn can be wiped out in a matter of weeks.

Walter M. Boyce, D.V.M., M.S., Ph.D., has researched and written about the conservation of bighorn sheep and mountain lions for more than 30 years. Boyce is a wildlife veterinarian and professor at the University of California, Davis, where he studies the interface of wildlife, domestic animals and people. Here, Boyce explains some of the challenges faced when developing conservation strategies for bighorn sheep.

How did you first become interested in bighorn sheep?

My interest started in 1981, when I took a position at the University of Arizona studying bighorn sheep in northern Arizona. I worked with Paul Krausman, a wildlife biologist who was intimately involved with research on the Pusch Ridge bighorn. I ended up at the University of California, Davis, where I started a bighorn sheep research program. I've studied both bighorn sheep and mountain lions almost continuously since 1988. I like wild places, and that's where bighorns live. It was a good fit.

What can you tell us about managing the balance between bighorn sheep and mountain lions?

There's no way that you're going to totally eliminate mountain lion predation on bighorn sheep. The goal is to reach a balance where both populations can exist without constant, active management by people.

I'm not a fan of killing lions, even though it may be scientifically defensible, especially at the beginning when you're trying to establish a new bighorn population with a small number of animals. It's painful. You've exercised a value judgment where you say one native species is more important than another.

If lions are to be killed, it has to be done right. You should kill as few lions as possible, and only those that are killing sheep. It's really important and valuable that any lion killing be treated as a scientific experiment so we can learn from it. If lions have to continually be killed to maintain a viable population of bighorns, then the whole thing needs to be reconsidered.

Caption needed.

PHOTOGRAPH BY CATHY ROSENBERG

How are bighorn sheep related to domestic sheep?

A. Bighorn sheep are native to North America and belong to the same genus as domestic sheep, but domestic sheep are not native. They were introduced during the European settlement of North America. Bighorns and domestic sheep can't interbreed and produce fertile offspring.

What role did disease play in the bighorn sheep decline in North America over the last century?

When domestic sheep were introduced, they brought with them a whole suite of pathogens. There were tremendous population declines of bighorn sheep associated with domestic sheep grazing.

Is it possible for bighorns to survive close to urban areas?

There's nothing good about sheep living near people. We build houses near them. We have domestic animals that might transmit disease or harass them, as in the case of dogs. The odds are somewhat stacked against the sheep in the Pusch Ridge Wilderness Area. They've lost a significant amount of habitat, especially at lower elevations, and they're never going to get that back. I do think it's worth trying to reestablish them, but it's an experiment without a guaranteed outcome. It will be a continuing struggle that will require an ongoing effort.

How do the number, sex and age of bighorns affect the probability of survival of a reintroduced population?

All sheep are not created equal. The adult ewes are the most important because they will be the ones to keep the population stable or increasing. Nearly all adult ewes in the wild will conceive, and as long as about 30 percent of the lambs survive each year, the population will remain stable. If more survive, the population will grow. If fewer survive, the population will decline. At some point, the whole population can blink out pretty quickly. That point is probably between 15 and 30 adult females in a group. You're already starting at that critical point at Pusch Ridge.

How many bighorn sheep should be reintroduced at any given time for the herd to have the best chance of survival?

Our modeling efforts show that you're much better off doing periodic reintroductions within the range of what they're doing now (about 30 animals, mostly adult ewes) rather than reintroducing a much larger number all at once. What you hope is that nearly all of your adult ewes survive and produce lambs each year and that on average more than 30 percent of those lambs survive. Over a period of years the balance has to work out, or you have major problems. If you lose too many adult ewes, it's really hard for a population to make it. This is at least one argument for eliminating lions at the beginning. Once you have enough adult ewes, the loss of a few to lions each year isn't as critical.

Is there any scientific evidence that diseases can be transmitted from domestic livestock to bighorn sheep?

Yes, especially from domestic sheep. This makes sense because domestic sheep are so closely related to bighorns.

Which diseases might be transmitted to bighorn sheep by domestic sheep?

A. Asking which diseases might be transmitted has made many scientific careers, but the questions are still not answered. Bighorn sheep are very susceptible to pneumonia. There doesn't appear to be a single cause. Pneumonia, whether caused by bacteria or viruses, is the

outcome. Sometimes it appears to be one pathogen and sometimes another. Bighorn sheep can die of pneumonia even if they're not associated with domestic sheep.

Why are bighorn sheep so susceptible to the diseases of domestic sheep?

I've spent more than 30 years trying to figure that out. There's no simple answer. It's partly because bighorn sheep in North America evolved in the absence of pathogens common in domestic sheep in Eurasia. A comparison, and it's a fair one, is the Native Americans who were decimated by diseases brought by Europeans during the colonization of North America. The same thing happened with domestic and bighorn sheep. The bighorn sheep that persisted after the introduction of domestic sheep survived because they were isolated in rugged areas where domestic sheep weren't grazed. Contact between bighorn and domestic sheep poses a real problem — an entire population of bighorn sheep can die off in a matter of weeks.

What increases the likelihood of contact between domestic sheep and bighorns?

When the female domestic sheep are in heat, bighorn rams are attracted to them because they're evolutionarily related. Rams will try to go over, through or under fences. The more bighorn sheep you have in the mountains, the more likely it is that a wandering ram will contact domestic sheep. It could be devastating if a ram contacts domestic sheep and brings a pathogen back to the herd.

Caption needed.

PHOTOGRAPH BY CATHY ROSENBERG

What can we do to minimize the spread of disease when bighorn rams wander?

Ideally, you won't have domestic sheep housed or grazed anywhere near bighorn sheep— certainly no closer than 15 kilometers [9.3 miles.] It's been proposed that if a bighorn ram has contact with domestic sheep, the ram should be killed. That's scientifically defensible.

In places like Pusch Ridge, where there are domestic sheep nearby, you should do public education. Reaching out to the domestic sheep owners, whether they have one or two sheep or an entire herd, and encouraging them to do whatever they are able or willing to do to

decrease the likelihood of contact would be good. One example is double fencing — to keep domestic sheep in and bighorn out. Having domestic sheep near the bighorn will pose both a short-term and a long-term problem for success at Pusch Ridge.

Why should we try to re-establish bighorn sheep in the Pusch Ridge Wilderness Area?

I'm a supporter of wild animals in the wild. From a sociological perspective, however, it's of great value to have them near urban areas. You can see bighorn at the Arizona-Sonora Desert Museum, but it's not the same as sharing the environment with them. At the end of the day, the only way we can protect wild animals is to protect the land they live on. Having charismatic animals like bighorn sheep and mountain lions near urban areas helps us do that.

CAPTION NEEDED.

PHOTOGRAPH BY CATHY ROSENBERG

