

Establishment of a desert bighorn sheep population to the Fra Cristobal Mountains, New Mexico, USA

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Introduction

Desert bighorn sheep (*Ovis canadensis mexicana*) were once prolific in New Mexico, occupying most arid mountain ranges in the southern part of the state. Over-hunting and disease transmission from livestock are two primary reasons for the dramatic decline in bighorn sheep numbers throughout the West during the early 1900s; desert bighorn sheep in New Mexico responded similarly. In 1980, the desert bighorn sheep was placed on New Mexico's endangered species list (Goldstein & Rominger, 2003). That led to a concerted recovery effort that included re-introduction projects to establish populations throughout southern New Mexico, including the Fra Cristobal Mountains. Efforts to establish desert bighorn to the Fra Cristobal Mountains in southwestern New Mexico began in 1995 as a collaboration between the New Mexico Department of Game and Fish (NMDGF) and the Armendaris Ranch (owned by conservationist and philanthropist Ted Turner) (Goldstein and Rominger 2003).

That year 13 rams and 24 ewes were translocated from the fenced bighorn refuge managed by NMDGF to the Fra Cristobal Mountains. The releases marked the beginning of the only effort in New Mexico to establish the species on private land. In 1997 an additional seven radio-collared rams were released in the Fra Cristobals.



Desert bighorn sheep at Eagle Rock

Goals

- Goal 1: Restore a self-sustaining population of desert bighorn sheep to the Fra Cristobal Mountains that is large enough to persist over a long period of time (≥ 100 years) with little or no human intervention.
- Goal 2: Manage the restored herd to accommodate a

recreational fee hunt that generates funds to offset the cost of the restoration project.

- Goal 3: Publish important findings from the restoration project to advance the science of restoration ecology.

Success Indicators

- Indicator 1: Presence of a collaborative working relationship with the state of New Mexico in which roles and responsibilities are defined.
- Indicator 2: Re-introduction of an adequate number of desert bighorn sheep to catalyze population establishment.
- Indicator 3: Establishment of a monitoring and research framework that is adequate to support adaptive management of the restoration project to maximize the probability of success.



Desert bighorn sheep translocation

Project Summary

In 1997 the Turner Endangered Species Fund (TESF) took a leadership role in the desert bighorn restoration project. In the ensuing 15 years TESF worked collaboratively with the Armendaris Ranch and NMDGF to monitor bighorns and cougars and their interactions on a near daily basis. TESF also spearheaded several research projects that aimed to advance sheep population establishment. Diseases, acquired primarily from domestic sheep, had for more than a century dominated the documented and suspected causes of extinction of wild bighorn from causes other than hunting (Singer *et al.*, 2001). But the mid-1990s it became known that the proximate cause of most mortalities leading to extinction of small populations of desert bighorn turned out to be not disease but predation. mountain lions (*Puma concolor*), or cougars, emerged as the main predator (Goldstein & Rominger, 2003).



**Release in the Fra Cristobal Mountains in
Armendaris Ranch, New Mexico**

In New Mexico cougar predation dominated among the factors responsible for the demise or poor performance of five desert bighorn populations that the state had actively managed from 1992 through 2002. In several other southwestern locations, biologists also recognize cougar predation as a major impediment to bighorn herd re-establishment and replenishment (Rominger *et al.*, 2004). Six of the seven radio-collared rams

released in the Fra Cristobal Mountains in 1997 were killed by cougars within 18 months. Curiously, few bighorn biologists prior to the 1980s had thought cougar predation very important as a desert bighorn mortality factor (Geist, 1971).

While the circumstances that led to cougar predation becoming an important factor affecting the persistence of desert bighorn sheep populations are not well understood, the importance of the factor is undeniable. From this simple fact we designed a restoration scheme that focused on cougar monitoring and removal, using lethal means, to minimize cougar predation of sheep that inhabited the Fra Cristobal Mountains. The intensity of cougar control was inversely related to the perceived threat represented by the animal(s) in question. Adult females with dependent young that restricted movements to the Fra Cristobal Mountains represented a pronounced threat to sheep and were immediately targeted for removal. In contrast, wide-ranging adult males were identified as a modest threat and only targeted for removal if they restricted movements to areas frequented by sheep.

From 1997 through mid-year 2011, we used telemetric monitoring and remote camera "traps" to document cougar use of the Fra Cristobals and to instruct removal actions. During this period we removed 34 cougars from the area. Concurrent with this by May 2011 the sheep population had grown to include 200 to 220 animals and had catalyzed (through emigration) a second population on the nearby Caballos Mountains (about 20 km south) that included 65 to 75 sheep. This "meta-population" of 265 to 295 sheep was the largest in New Mexico and included over 40% of all sheep in the desert bighorn sheep in the state. The Fra Cristobals/Caballo mountains meta-population was the principal reason that the New Mexico State Game Commission removed the species from the state list of imperiled species in November 2011.

Just prior to delisting TESH recognized the successful restoration of desert bighorn sheep by approving the removal of 16 ewes from the Fra Cristobal Mountains for conservation purposes. On 30th October 2011 these animals were captured and translocated to suitable habitat elsewhere in New Mexico to advance the species' security. This management action represented the first time in history that desert sheep have been restored to private property and managed so successfully that the herd grew to sufficient size to serve as a "donor population" to support range-wide conservation efforts. Starting in 2012 the Fra Cristobal Mountains desert bighorn sheep population became the target of a recreational harvest of trophy rams.

Given that only a small percentage of rams breed, an annual harvest of a few "trophy" rams can be sustained without affecting population vigor and persistence. During the fall of 2012 six bighorn rams, including five that qualified for the Boone & Crockett record book (www.boone-crockett.org), were harvested. Three of these animals were harvested according to permits issued by NMDGF to the Armendaris Ranch. The ranch was able to sell these permits to hunters for US\$ 165,000. From this total the Armendaris Ranch donated US\$ 55,000 to offset the cost of operating the Beau Turner Youth Conservation Center in Florida.

Cougar management continued in 2012 as well. By mid-December of that year ranch personnel working in tandem with NMDGF had removed five lions from the mountain, including three males and two females. Work plans for 2013 and beyond include continued monitoring and management of cougars to minimize predation on sheep along with recreational, high dollar hunts of trophy rams.

Major difficulties faced

- Blending management actions and research efforts in a manner that informed adaptive management while not compromising the growth capacity of the nascent population of desert bighorn sheep.
- Maintaining a field crew capable of successfully carrying out the chronic monitoring under difficult field conditions to ensure completion of management actions and research efforts necessary to ensure the restoration of a viable population of desert bighorn sheep.
- Maintaining collegial and effective relations



Cougar photographed by remote camera

Mammals

between the state of New Mexico and the owner of the land to which the sheep were released.

- Balancing the tension created by establishing lethal control of cougars as a requisite to desert bighorn sheep restoration.

Major lessons learned

- Predator control, in this case involving cougars, to promote the growth of a prey population, in this case involving endangered desert bighorn sheep, is controversial and has notable potential to create tension within a restoration team and between the general public and the restoration team.
- All members of the restoration team, from field biologists to senior administrators, need to be forever mindful of the difficulty of overcoming the many forces that operate against endangered species restoration efforts including environmental, logistical, fiscal, intellectual, and socio-political.
- It is difficult to blend monitoring activities and research efforts in a manner that does not compromise the project's principal aim - restoring a viable population. This potential to compromise success can create tension within a restoration team over the proper role of research in an endangered species restoration project.

Success of project

Highly Successful	Successful	Partially Successful	Failure
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Reason(s) for success/failure:

- Implementation of a systematic approach to minimize if not completely eliminate cougar predation of desert bighorn sheep.
- An effective collaborative partnership between private non-governmental conservation organizations and the New Mexico Department of Game and Fish.
- A clear understanding that restoration of a viable population of desert bighorn sheep would require an extended period of time over which chronic, near daily fieldwork would be needed to provide current information about sheep and cougars to inform management actions.
- A private landowner deeply committed to endangered species restoration.

References

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