



Assessing Translocation Release Methods for Desert Bighorn Sheep Restoration

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If you were to imagine the North American western frontier and the wildlife that inhabits it, there is no doubt that bighorn sheep (*Ovis canadensis*) are one of the species you picture. This mountain-dwelling mammal is a flagship species for the western continental states and is appreciated by many outdoor enthusiasts.

They were once widespread throughout the western states but have diminished immensely following westward expansion. Population estimates show bighorn sheep have declined from roughly 500,000 historically to roughly 35,000 individuals today.

Desert bighorn sheep (*O. c. mexicana*) are one of the three recognized subspecies

of bighorn sheep and are native to the deserts of the United States intermountain west and northwestern Mexico. In Texas, they occur throughout the Trans-Pecos eco-region and historically were distributed throughout 16 mountain ranges with an estimated population of 1,000–1,500 individuals during the 1800s.

By the 1930s the population was estimated at approximately 300 individuals, and their distribution had diminished to only four mountain ranges (Baylor, Beach, Carrizo and Sierra Diablo). By the 1940s, their population estimate had dropped to 35 individuals; and, by the 1960s, it is believed that desert bighorn sheep had been extirpated from Texas.

Their extirpation has been attributed to multiple factors such as competition with domestic livestock (primarily domestic sheep and goats), diseases, habitat fragmentation, predation and over-hunting. It has been acknowledged that desert bighorn sheep struggle when in proximity to livestock by direct competition for limited resources such as water and forage. Habitat fragmentation caused by the introduction of livestock has been suggested to be detrimental, as it restricts movements, exposes



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vulnerability and limits resource access for desert bighorn sheep.

Another challenge presented by the presence of domestic sheep is disease; pneumonia (*Mycoplasma ovipneumoniae*) has been a leading cause for desert bighorn sheep and Rocky Mountain bighorn sheep decline throughout North America. While pneumonia has not been detected in Texas, it is still considered a high concern and is monitored intensely.

To initiate Texas restoration efforts, the Texas Parks and Wildlife Department began desert bighorn sheep translocations by bringing 16 individuals from Arizona to Texas' Black Gap Wildlife Management Area in 1957. Translocations continued well through the next several decades and have produced a population estimate of approximately 1,500 desert bighorn sheep statewide today.

While translocations have been used for restoration efforts, they inversely have the potential to fail due to capture myopathy, disease, post-release predation and dispersal. Despite the challenges, continuous efforts have been made to improve translocation success.

Advances in radio telemetry and global positioning system (GPS) collar technology has allowed wildlife professionals to accurately monitor individuals regularly and better evaluate translocation strategies that might promote success or help identify deficiencies and/or failures. Fitting individuals with GPS collars has shown to be an effective method for monitoring survival rates and determining cause-specific mortality for desert bighorn sheep populations, as well as other desert big game species such as pronghorns and mule deer.

As part of translocation management strategies, desert bighorn sheep may be released post-translocation by either hard-release, where animals are released directly onto the landscape or soft-release, where animals are released into an enclosure to acclimate before being released onto the landscape. The soft-release method allows individual acclimation to the release site and has the potential to increase site fidelity for various species, whereas a hard-release



does not have an acclimation period but saves time and money, because there is no need to build a high-fence enclosure.

A soft-release is usually preferred because it is thought to aid in post-release survival, although it has been documented that some species have in fact shown a decrease in survival post-release. Previous restoration efforts have utilized both hard- and soft-release techniques for big game mammals, but research

was limited by radio-collar technology at the time and has not had simultaneously collared residents to compare with translocated individuals.

The lack of knowledge pertaining to release methods for translocated individuals has the potential to reduce restoration success and negatively affect desert bighorn sheep populations throughout the Trans-Pecos. To ensure that these issues are avoided, 37 resident





desert bighorn sheep were captured and radio-collared at Black Gap Wildlife Management Area during October 2017. Following that, in December 2017, 70 desert bighorn sheep were captured, radio-collared, and translocated to Black Gap Wildlife Management Area. Of the 70 desert bighorn sheep translocated, 28 were hard-released and 42 were soft-released. We monitored survival and cause-specific mortality post-release for two years.

Resident individuals showed the highest overall annual survival which was expected given their familiarity with the landscape. However, contrary to our hypothesis, we have found that soft-released individuals had roughly three times the amount of mortalities over the study's duration compared to hard-released individuals. As for translocated desert bighorn sheep, the hard-released individuals, again, showed higher overall annual survival rates when compared to the soft-released individuals. Preliminary results indicate that soft-release for translocated desert bighorn sheep is not necessarily beneficial to survival.

Based on our results, the time of year (season) had the biggest effect on mortality rates of desert bighorn sheep. The information gathered from this study is a key attribute when considering release methods for desert bighorn sheep translocation. The results will aid wildlife professionals in decision-making for future desert bighorn sheep restoration in Texas. ©

