

## **Santa Catalina Bighorn Sheep Restoration Project**

The Arizona Game and Fish Department (Department) uses wildlife translocations as the primary tool to establish, relocate, reintroduce, or augment existing wildlife populations into historical ranges. In 2007, the Department conducted its one hundredth bighorn sheep transplant, having moved some 1,874 bighorn sheep in total. The goal the Santa Catalina Bighorn Sheep Restoration Project is to restore a healthy, viable and self-sustaining population of desert bighorn sheep to the range that coexists with an equally healthy native predator population in a naturally functioning ecosystem.

### **History of Bighorn Sheep in the Catalinas**

Bighorn sheep historically were a natural component of the Santa Catalina Mountain ecosystem. The historical presence of bighorn sheep in the Catalinas has been well documented (Allen 1895, Mearns 1907, Hornaday 1914, Seton 1929, Dice and Blossom 1937, Buechner 1960). This was the last population of wild sheep found in close proximity to a major metropolitan area in Arizona (Purdy 1981). In the year 1885, Mearns (1907) ascertained that mountain sheep occurred in the Santa Rita and Catalina mountains, and that several were killed in those mountains during the winter of 1884-1885 and the meat sold in the markets of Tucson, Arizona. Allen (1895) reports mountain sheep were not uncommon on the bare rocky spurs of the Catalina Mountains, where they were seen during 1894. Several were killed in the fall of 1893 by an Indian hunter, and the meat sold to settlers at the foot of the mountains (Allen 1895). In 1928, United States Forest Service records show 220 bighorn sheep for the Catalinas, when that population was presumed to be the largest in the state (Buechner 1960). In 1930, D.T. MacDougal stated that a few still occurred on the lower rocky slopes of the Catalinas, near the mouth of Pima Canyon and elsewhere (Dice and Blossom 1937). In September, 1936, a visual count of 23 rams, 48 ewes, and 12 lambs was made by personnel of the Coronado National Forest during an organized effort to ascertain numbers (Buechner 1960). In the autumn of 1937, Vorhies claimed that 71 bighorn sheep were known to exist in the Catalinas (Cowan 1940). Despite the establishment of a game preserve in 1934, numbers seem to have declined rapidly shortly thereafter (Buechner 1960). An extirpation was thought to have taken place in the Catalina Mountains, until John F. Reed, a student in Wildlife Management at the University of Arizona, saw 3 bighorn sheep, 2 ewes of which were photographed on January 18, 1955 in Finger Rock Canyon (Buechner 1960).

Formal annual bighorn sheep surveys began in the Catalinas in 1962. Surveys in the Catalinas were discontinued after 1999 due to a lack of sheep being observed. The peak of the Catalina bighorn sheep herd is believed to have occurred in the late 1970's and early-mid 1980's. Bighorn sheep in the Catalinas began to decline in the 1980's until eventually disappearing in the late 1990's (Wakeling et al. 2009). Incidental sightings continued in the Catalinas after surveys were discontinued for about a decade.

Multiple factors have been hypothesized as being associated with the decline of desert bighorn sheep in the Catalinas including urban development (i.e., housing development, road construction), human recreation (i.e., hikers, hikers with dogs, trail development), changes in habitat conditions associated with the suppression of wildfires (Etchberger et al. 1989, Czech and Krausman 1997, Krausman et al. 1996, 2000, Papouchis et al. 2001, Krausman et al. 2004), predation (Wakeling et al. 2009), and disease (Brown 1989, deVos 1989, Wakeling et al. 2009). Reduced fitness associated with genetic bottlenecks as described in Ramey et al. (2000) and Whittaker et al. (2004) also warrants merit, however no studies have ever been completed testing this theory in the Catalinas. Today, no conclusive determination has ever been made as to the cause for the decline and eventual extirpation of desert bighorn sheep in the Catalinas (Wakeling et al. 2009).

## **Public Value of Bighorn Sheep in the Catalinas**

The public has been supportive of bighorn sheep restoration and has placed significant value on the presence of bighorn sheep in the Catalinas as a natural component of this ecosystem. This is supported by Purdy (1981), Burgarsky (1986), Harris et al. (1995), and Devers (1999).

We expect widespread support for the overall goal of restoring a viable population of bighorn sheep in the Santa Catalina Mountains. Devers (1999) conducted a human dimensions study to assess public attitudes toward desert bighorn sheep in the Pusch Ridge Wilderness Area (PRWA) within the Catalinas. Their findings were similar to those of other studies (Purdy 1981, Harris et al. 1995) which indicate the public is interested in and supportive of desert bighorn sheep restoration in the PRWA. These studies also indicated that the public was supportive of seasonal closures on recreational activities, banning dogs from the wilderness, fire management to improve habitat conditions, and translocating sheep to re-establish a herd in the PRWA.

Burgarsky (1986) conducted a study of the economic value of bighorn sheep in the Catalina's in the mid 1980's and found that people placed a value of \$1.3 to 2.4 million on the continued existence of those animals, even if they would never see the bighorn sheep. With approximately 100 bighorn sheep on Pusch Ridge in the mid 1980's, each sheep would be worth \$13,000 to \$24,000. If the bighorn sheep could be seen, their value was estimated to be \$2.2 million to 3.9 million, or \$22,000 to \$39,000 per animal.

Given the restoration is in the backyard of Tucson, there are significant benefits to be realized from a watchable wildlife standpoint. This is something local businesses on the fringe of the Catalinas and the AGFD can use to further market the project.

## **Operational Capture, Release and Monitoring Plans**

The first 30 bighorn sheep are planned to be re-introduced to the Pusch Ridge Wilderness this fall, with the overall goal of more than 100 animals after three consecutive years of transplants. The total figure includes anticipated lamb births,

estimated yearling survival rates, and natural mortality. The reintroduced sheep will each be fitted with state-of-the-art satellite Global Positioning System collars that provide real time information about their location and any mortality events that may occur. This intensive monitoring effort will enable managers to make informed management decisions as information from collars becomes available. This technology comes with a cost; currently the overall project cost is estimated at \$600,000 over the next three years. A public and private fund raising effort is currently underway to secure necessary funding to complete the project.