Desert Bighorn Sheep - Western Desert of Arizona

By Chris Meachum

Saddle Mountain

Saddle Mountain is a small isolated mountain complex located adjacent to Interstate 10 and more than 20 miles from both the Eagletail and Gila Bend ranges. A water catchment was constructed in 1995. The population of bighorn sheep increased and stabilized, and a survey conducted in 2003 supported the expansion of hunting opportunities in management unit 41W to include Saddle Mountain. At present there are as many as 50 bighorn sheep existing in this range. Long term survival here now depends primarily on the sheep's ability to travel between neighboring populations to insure genetic diversity. (J.Gunn AZGF 2009, C.Meachum FoSM 2011, Singer, F. J., L. C. Zeigenfuss, and L. Spicer. 2001,BLM RMP Draft 2011)

Management of small wildlife populations is a growing concern to wildlife managers globally as human-related infrastructure such as highways, power lines, power plants, dams and aqueducts, and urban expansions fragment habitats and wildlife populations into smaller, discreet units, which in turn increases the risk of a species' extinction (Gilpin and Soulé 1986, Shaffer 1987, Soulé 1987, Pimm et al. 1988, Belovsky et al. 1994). Lynch et al. (1995) attributes the increased risk of extinction to 3 risk factors related to small populations—random changes in birth or mortality rates, random extremes in critical environmental factors such as extreme droughts or hurricanes, or genetic problems such as accumulation of deleterious mutations or inbreeding depression.

There has been a relentless decline in the distribution and numbers of bighorn sheep throughout their range. Many extant populations are isolated from occupied ranges that were once connected (Buechner 1960). Cooperrider (1985) estimated that about 1 million bighorn sheep occupied North America prior to European settlement. Fewer than 12,000 persisted after more than a century of human-caused declines (Monson and Sumner 1980). Russo (1956) summarized historic records for bighorn sheep and reported this species occurred in most mountainous regions of Arizona, but by the mid 1950s were absent from the San Francisco Peaks and Bill Williams Mountains(northern Arizona), most of the Verde River drainage (central Arizona), and many isolated mountains in southern Arizona. **Through aggressive conservation activities and translocation over the past forty years, the trend in bighorn numbers and distribution have experienced a dramatic reversal.** The threat, however, to introduced and native bighorn sheep populations continues to exist as evidenced by the extirpation occurring in the Santa Catalina Mountains as recently as the mid-1990s.

As a result of these declines and a rapidly expanding human population in Arizona, most bighorn sheep populations are small (<100; AGFD, unpublished data; Table 1), isolated from other contiguous populations, and at risk of extirpation due to small size. There are 42 herd units identified by the AGFD—only 4 of these have total populations greater than 300 animals. The effective population size for these populations is small and should be considered as populations at risk.

Can small desert bighorn sheep populations persist? After evaluating 122 bighorn sheep populations, Berger (1990) concluded that 100% of populations with <50 individuals went extinct within 50 years and that populations with >100 individuals persisted for up to 70 years. Krausman et al. (1996a) followed methods of Berger (1990) and conducted an assessment of the importance of population size on persistence of Arizona bighorn sheep populations.

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They found no significant difference in persistence times between populations >100 and those <50. Wehausen (1999) followed similar methods to re-evaluate California bighorn sheep populations (as did Krausman and Etchberger (1993)). He could not support the hypothesis posed by Berger (1990) regarding the disproportionate extinction rate for populations <50 animals. **Although there was disagreement between the above studies regarding the actual number of bighorn sheep required to ensure survival, it is important to point out that all of these studies documented extinctions occurring in small, isolated, bighorn sheep populations.** Belovsky et al. (1994) point out that the debate on the actual population size is moot because the dynamics of small populations is well documented and there is no guarantee of persistence.

Further, Diamond (1972) suggested that patch size and patch isolation were the most important variables in determining the rate of population collapse. Bighorn sheep are at risk because of small population size and the small, isolated habitat patch sizes they occupy (Epps et al. 2004).

Although the focus of concern over management of small populations has been on decreased genetic diversity (Frankham 1996), undesirable mutations can build up over many generations when effective population size is less than 100 individuals (Lynch et al. 1995). Singer et al. (2001) and McKinney et al. (2004) noted that patch size is also an important factor for population persistence.

Undoubtedly, decreased genetic diversity, reduced patch size caused by habitat fragmentation, and inability of animals to move between isolated populations increase pressures on typically small, isolated bighorn sheep populations. As many studies suggest, increased management efforts are required to avoid population extinctions (Berger 1990, Belovsky et al. 1994, Krausman et al. 1996b). Soulé et al. (1979) reported that benign neglect (lack of active management) will lead to faunal collapse. Given the changes that have occurred in the Southwest including increasing desertification, increasing habitat fragmentation, and the resulting decreasing net effective size of most bighorn sheep populations, benign neglect is a management approach that will undoubtedly result in continued extirpations of local bighorn populations.

We agree with one of the conclusions from Soulé et al. (1979:269): "The loss of this living heritage would be a tragedy and a human disgrace."

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