

Appendix J.
Desert NWR
Bighorn Sheep Discussion

Desert Bighorn Sheep Population Objectives

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The refuge-wide desert bighorn sheep population objective, as listed in the Refuge Management Plan, Part II (1987) and draft Sheep Management Plan (1990), is 2000. Based on helicopter survey data gathered during the fifteen year period between 1974 and 1988, the refuge-wide desert bighorn population was at or very near the objective level (see Table 1.).

During the last fifteen years, 1989-2003, the refuge-wide desert bighorn population is approximately 1000 individuals below the objective level (see Table 2.). Therefore, a 100% increase or doubling of the population is required to reach the objective level. Most of the shortfall is accounted for by declines in the Sheep Mountains sub-population and the smaller, more transitory sub-population of the adjunct East Desert Mountains.

Table 1. Fall helicopter survey results by mountain range on DNWR, 1974-1988.

Year	No. of Bighorn Recorded Per Mountain Range					
	Las Vegas	Sheep*	E. Desert	Desert	Pintwater	
1974	111	172	97	70	50	
1975	89	183	83	17		
1976						
1977	79	331	91	102	114	
1978	73	239	41	30	82	
1979	21	403	29	10	75	
1980		436			28	
1981	46	297	65	37	37	
1982	27	146			68	
1983	45	346	49	17	120	
1984		205				
1985	38	436	87	38	94	
1986	34	361	73	29	75	
1987	39	280	19	85	104	
1988	11	215	54	48	104	
<u>Total:</u>	613	4050	688	483	951	
<u>Average:</u>	51.1	289.3	62.5	43.9	79.3	
(1)						
<u>Ave. Est. Pop:</u>	194	1096	174	220	300	<u>Grand Total:</u> 1984

*Smaller sample sizes during 1974, 1975, 1978, 1982 & 1984 are directly correlated to reductions in survey hours. Because no adjustment was made for those years when survey hours were reduced, the average estimated population is skewed downward.

Table 2. Fall helicopter survey results by mountain range on DNWR, 1989-2003

Year	No. Bighorn Recorded Per Mountain Range				
	Las Vegas	Sheep*	E. Desert	Desert	Pintwater
1989	46	146	15	28	51
1990	53	146	10	62	67
1991	33	78	31	46	72
1992	55	66	25	57	60
1993	87	61	21	47	92
1994	39	38	20	28	76
1995	65	60	19	35	56
1996	41	37	29	34	67
1997	34	39	4	26	57
1998	65	42	14	28	47
1999	43	70	10	27	64
2000	70	59	25	8	63
2001		16	17	72	68
2002	51	50	13	41	46
2003	53	57	6	48	67
<u>Total:</u>	735	965	259	587	953
<u>Average:</u>	49.0	64.3	17.3	39.1	63.5
(1)					
<u>Ave. Est. Pop.:</u>	186	244	48	196	241
					<u>Grand Total: 915</u>

*Smaller sample sizes during 1996, 1997, 2001 & 2002 may be partially correlated to reductions in survey hours. Because no adjustment was made for those years when survey hours were reduced, the average population estimate may be skewed slightly downward.

(1)Footnote: Population estimates derived by dividing the average no. of sheep recorded by the observation rate or visibility factor (all ranges = 40%) and the percentage of habitat surveyed (Las Vegas, Sheep & Pintwater Ranges = 66%; Desert Range = 50%; East Desert Range = 90%)

As a result of the biological review conducted in April, 2003, there was a recommendation to establish a population objective for each mountain range/sub-population. It was further recommended that a threshold level (minimum sub-population size) be set for each mountain range. Decline below the threshold level would trigger an “all-out”, immediate strategy(s) to reverse the trend.

The suggested objectives and thresholds are presented in the following table. All objectives are based on data presented in Table 1., except the Spotted Mountains. The Spotted Mountains resident herd is a relative young sub-population, established by trans-locations in 1993 and 1996, with only three years of helicopter data. Empirical evidence indicates that small desert bighorn populations, those with fewer than 50 individuals, may be susceptible to extinction (Berger 1990, 1991, Krausman et al. 1993, Krausman et al. 1999). This was the basis for using 50 as the threshold level for all ranges except the Sheep Mountains. Fifty desert bighorn in the expansive habitat of the Sheep Mountains would represent an extremely low/unacceptable density; thus, its threshold was set at a higher level.

Table 3. Population objectives and thresholds by mountain range on DNWR.

Mountain Range	Objective	Threshold
Las Vegas	200	50
Sheep	1000	150
East Desert	100*	50
Desert	250	50
Pintwater	300	50
Spotted	150	50
<u>Total:</u>	2000	

*The average population for the East Desert Mountains in Table 1. is believed to be inflated by high numbers of migrants from the Sheep Mountains. The East Desert Range is relative small with only two man-made water developments; therefore, a more realistic resident, bighorn population objective is 100.

Literature Cited

Berger, J. 1990. Persistence of different sized populations: an empirical assessment of rapid extinctions in bighorn sheep. *Conservation Biology* 4:91-98.

Berger, J. 1999. Intervention and persistence in small populations of bighorn sheep. *Conservation Biology* 13:432-435.

Desert National Wildlife Range, Refuge Management Plan, Part II. 1987. U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Desert National Wildlife Range, Draft Sheep Management Plan. 1990. U.S. Fish and Wildlife Service. Las Vegas, Nevada.

Krausman, P. R., Etchberger, R. C., and R. M. Lee. 1993. Mountain sheep population persistence in Arizona. *Conservation Biology* 7:219.

Krausman, P. R., Sandoval, A. V., and R.C. Etchberger. 1999. Natural history of desert bighorn sheep. Page 139-179 in R. Valdez and P. R. Krausman, eds. *Mountain sheep of North America*. University of Arizona Press, Tucson.