
STATUS OF BIGHORN SHEEP IN CALIFORNIA, 1989 AND TRANSLOCATIONS FROM 1971 THROUGH 1989

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POPULATION STATUS

Three subspecies of bighorn sheep occur in California: California bighorn (*Ovis canadensis californiana*; $n = 300$) in the Sierra Nevada of eastern California; Peninsular bighorn (*O. c. cremnobates*; $n = 600$) in the Peninsular ranges of southwestern California; and Nelson bighorn (*O. c. nelsoni*; $n = 3,800$) in suitable habitat throughout the eastern Sonoran Desert, the eastern Mojave Desert, the Transverse ranges, and the Great Basin of Mono and Inyo counties. California and Peninsular bighorn are classified as threatened by the California Fish and Game Commission and all populations, except 2 populations of Nelson bighorn, are fully protected by state law.

HUNTING

Since bighorn sheep hunting was authorized by the California Legislature in 1986, 3 hunting seasons have been held. Nine permits were issued in each year from 1987 to 1989. Two hunters in 1988 were unable to complete their hunts, but all others were successful. Hunting is restricted to Old Dad Peak and the Kelso Mountains (30 km SE Baker, San Bernardino Co.), and the Marble Mountains (110 km W Needles, San Bernardino Co.). Animals shot during annual hunts have ranged from 6 to 13 years of age; 8 qualified for the Boone and Crockett Records Book. No difference exists between the ages of sheep taken on an annual basis (Kruskall-Wallis 1-way analysis of variance, $\chi^2 = 3.113$, 2 df, $P = 0.222$) or between the scores of sheep taken on an annual basis (Kruskall-Wallis 1-way analysis of variance, $\chi^2 = 1.234$, 2 df, $P = 0.539$). Similarly, no differences exist between the ages of sheep taken in either hunt zone (Mann-Whitney U-test, $Z = 1.557$, $P = 0.119$). Animals shot in the Marble Mountains were larger than those taken at Old Dad Peak (Mann-Whitney U-test, $Z = 2.066$, $P = 0.039$). The harvests in both hunt zones are dominated by large, old rams.

A legal mandate required the California Department of Fish and Game (CDFG) to prepare a comprehensive environmental document

to assess the anticipated effects of the proposed 1990 bighorn sheep hunting season. This is the first time that a state wildlife management agency has been required to prepare the equivalent of an environmental impact report for hunting. The CDFG prepared a comprehensive document designed to address and fully disclose the potential impacts of a limited harvest of mature male bighorn sheep on the local (hunted) populations and on the statewide population. The document complied with mandates of the California Environmental Quality Act, and has not been challenged.

State law limits the number of tags to be issued to $\leq 15\%$ of the mature rams (≥ 2 yr old) actually counted in each hunt zone on an annual basis. Because of the variance inherent in aerial survey from year to year, it is anticipated that the number of tags similarly will vary on an annual basis. For hunting purposes, legal rams are those possessing $\geq \frac{3}{4}$ curl. Six permits have been proposed for the 1990 season: 5 at Old Dad Peak, 1 in the Marble Mountains, and 1 special fundraising (auction) tag, to be valid in either zone. Hunting of bighorn sheep in California will terminate 31 December 1992, unless legislation authorizing the continuation of hunting is passed in 1992.

During each of the past 3 seasons, hunters have experienced some problems with individuals affiliated with the anti-hunting and animal-rights movements. Tactics of those protesters have centered largely around attempting to scare bighorn sheep out of the range of hunters through the use of airhorns or other noise-making devices. Such activities have been largely ineffective and in ≥ 2 cases have facilitated the harvest of large rams that were diverted toward hunters.

In 1988, the California Legislature passed a hunter harassment law that became effective on 1 January 1989. The law makes it an infraction for persons to willfully interfere with the legal take of game species by individuals appropriately authorized to do so. Conviction of such an infraction carries a fine of $\geq \$100 \leq \500 . Upon conviction of an individual of a first offense, such a violation becomes a misdemeanor, carrying with it a fine of $\geq \$100 \leq \$1,000$, and/or imprisonment for ≤ 1 year in county jail. The law was in effect for the bighorn sheep season for the first time during 1989.

During the 1989 season no citations were issued and hunt protesters seemed unwilling to challenge the new law. However, CDFG wardens identified 8 protesters during the 1989 season: 2 were on probation for civil disturbances, and ≥ 3 had been arrested several times for disturbing the peace, interfering with a peace officer, or assault. Seven warnings were issued to protesters. Given the past records of these individuals, the law appears to have been successful in curtailing hunter harassment. Furthermore, there appears to be declining interest on the part of the media in the potential for confrontations to develop between sportsmen and those with hopes of disrupting lawfully sanctioned activities. As media coverage declines or becomes less sensational, we expect a concomitant decline in the illegal activities of animal-rights activists.

MANAGEMENT AND TRANSLOCATIONS FROM 1971 THROUGH 1989

The management objectives of CDFG are to maintain, improve and expand bighorn sheep habitat; reestablish bighorn sheep populations on historic ranges; increase bighorn sheep populations so that all subspecies become numerous enough to no longer require classification as threatened or fully-protected; and provide for aesthetic, educational, and recreational uses of bighorn sheep.

In 1972, approximately 3,700 bighorn sheep occurred in California. In 1989, that estimate is 4,700. In some cases, population increases were realized in areas formerly deficient in water through the implementation of an aggressive and effective water development program (Bleich 1983). Population increases also may have occurred because of good forage production resulting from greater than normal rainfall in some locations (Bleich 1986, Wehausen 1989). At least 4 populations of bighorn sheep not known to exist prior to 1985 have been discovered recently, bringing the total number of populations of bighorn sheep in California to 61. Management direction in California emphasizes the importance of populations of mountain sheep, in lieu of total numbers, to the continued well-being of this species (Schwartz et al. 1986; Wehausen et al. 1987; Bleich et al. 1990).

Table 1. Summary of mountain sheep translocated within California from 1979 through 1989. Numbers in parentheses are additional animals removed from the source populations as mortalities during the capture efforts. Animals translocated from Sand Mountain and Sawmill Canyon are California bighorn; all others are Nelson bighorn.

Date	Source ^a	Females			Males			Moved to ^b
		Ad	Yearling	Lamb	Ad	Yearling	Lamb	
Mar 79	SC	4	0	0	0	1	2	WC
Mar 79	SM	0	0	0	2	0	0	WC
Mar 80	SM	7	0	1	0	1	1	WC
Mar 80	SC + SM	6	0	1	4	0	0	ML
Mar 80	SC + SM	3	1	2	2	0	2	WA
Mar 82	SC	5	0	1	3 (1)	0	0	ML
Apr 82	SM	0	0	0	6	0	0	ML
Apr 82	SM	0	0	0	4	0	0	WC
Jul 83	MM	8 (1)	0	2	1	1	0	WM
Jul 83	OD	2	3	0	1	1	2	WM
Nov 83	LC	11 (1)	6	1	1	2	1	PF
Dec 83	MM	7	1	0	0	0	0	EC
Dec 83	MM	0	0	0	2	0	0	WM
Dec 83	OD	5	0	4	3	1	4	EC
Nov 84	MM	8	0	2	0	2	1	WM
Nov 84	OD	6 (3)	2 (1)	2	4	1	1	WM
Nov 84	OD	7	0	0	3	0	1	SH
Jul 85	MM	11	1	2	2	2	1	WM
Jul 85	OD	4 (1)	1	2	1	1	0	WM
Jul 85	OD	8	1	3	2	0	2	SH
Dec 85	CC	15 (1)	1	0	4	1	0	SR
Mar 86	SM	2	1	0	0	1	0	WC
Mar 86	SM	13 (1)	0	2	3	4	5	LV
Sep 86	OD	16 (2)	3	2	5	0	2	AR
Jan 87	CC	13 (2)	3 (1)	0	6 (1)	0	0	SR
Oct 87	OD	7	2	2	3	1	1	EC
Mar 88	SM	7	1	0	3	0	0	LV
Mar 88	LT	4	1	1	0	2	2	SC
Dec 89	OD	28	9	0	2	4	0	CM
Totals		207 (12)	37 (2)	30	67 (2)	27	27	

^aSC = Sawmill Canyon, Inyo Co.; SM = Sand Mountain, Inyo Co.; SC + SM = Sawmill Canyon and Sand Mountain combined; MM = Marble Mountains, San Bernardino Co.; OD = Old Dad Peak, San Bernardino Co.; LC = Lytle Creek, San Bernardino Co.; CC = Cattle Canyon, Los Angeles Co.; LT = Lone Tree Canyon, Mono Co.

^bWC = Wheeler Crest, Inyo Co.; ML = Mt. Langley, Inyo Co.; WA = Warner Mtns., Modoc Co.; WM = Whipple Mtns., San Bernardino Co.; PF = Prairie Fork, Los Angeles Co.; EC = Eagle Crags, San Bernardino Co.; SH = Sheephole Mtns., San Bernardino Co.; SR = San Rafael Peak, Ventura Co.; LV = Lee Vining Canyon, Mono Co.; AR = Argus Range, Inyo Co.; SC = Silver Canyon, Inyo Co.; CM = Chuckwalla Mtns., Riverside Co.

From 1971 through 1989, 11 California bighorn sheep were translocated to California from British Columbia ($n = 10$) and Nevada ($n = 1$). Additionally, 411 mountain sheep were captured from 7 native California populations, and 395 of those were translocated to 12 historical ranges; 16 animals died during capture. We summarize the two initial efforts to reestablish mountain sheep (*O. c. californiana*) in north-eastern California in an effort to provide a complete translocation history to date.

The first translocation of bighorn sheep in California occurred in 1971, when 8 female and 2 male California bighorn sheep were captured in British Columbia, and released at Lava Beds National Monument, Siskiyou County (Blaisdell 1972, Weaver 1972). In 1972, 1 Lava Beds ram was shot and killed; a second ram was thought to have been shot at the same time, and died several weeks later (Blaisdell 1974, 1975). As a result of the loss of those males, a ram was captured at the Charles Sheldon National Wildlife Refuge, Nevada, and translocated to the Lava Beds (Blaisdell 1974).

Subsequently, in February 1980, 1 male and 3 females from the apparently healthy population at the Lava Beds were translocated to the Warner Mountains, Modoc County, as part of an effort to reestablish bighorn sheep (Sleznick 1980). In March 1980, 10 sheep from the Sand

Mountain population in the Sierra Nevada of Inyo County also were translocated to the Warner Mountains to increase the biotic potential of that newly founded population (Camilleri and Thayer 1982).

During summer 1980, all of the sheep at Lava Beds succumbed to pneumonia. Circumstantial evidence implicated domestic sheep as the source of the pathogens involved (Foreyt and Jessup 1982, Weaver 1983). Similarly, the entire Warner Mountains population was extirpated in 1988 by pneumonia attributed to pathogens transferred to the wild sheep from domestic sheep (Weaver and Clark 1988). That incident, thus, eliminated the remaining wild sheep in northeastern California.

Beginning in 1979, the CDFG, in cooperation with the U.S. Forest Service, the National Park Service, the Bureau of Land Management, and the City of Los Angeles, initiated an effort to reestablish California bighorn sheep in historically occupied areas of the Sierra Nevada in Inyo and Mono counties (Wehausen et al. 1987). In 1983, the first translocation of desert-dwelling mountain sheep took place (Clark 1983) and, since that time, the CDFG has carried out an active translocation program with cooperating land management agencies (e.g., the U.S. For. Serv., Bur. Land Manage., and Dep. Defense). The results of these efforts, excluding the initial translocation of mountain sheep to the Lava

Beds and the subsequent translocation of 4 sheep from the Lava Beds to the Warner Mountains in 1980, are presented in Table 1.

The CDFG currently is finalizing plans for 2 additional translocations: bighorn sheep will be reintroduced into the Bullion and Bristol mountains, San Bernardino County in cooperation with the Department of Defense and the Bureau of Land Management, respectively. A third effort, to reestablish bighorn sheep on the Great Western Divide in Sequoia-Kings Canyon National Park will begin when translocation stock are available from the Sierra Nevada.

The CDFG is mandated to complete management plans for each population of bighorn sheep by 31 December 1992. To date, 17 of approximately 60 plans have been completed. All plans should be completed before legislation authorizes the extension of bighorn sheep hunting.

FUNDING

Funding for bighorn sheep management in California has been relatively consistent over the past 6 years. The Legislature has provided approximately \$270,000/year from the special automobile license plate fund; those dollars are spent to maintain bighorn sheep populations, to investigate diseases and other limiting factors, and for reintroduction purposes. One-third (\$90,000) of the annual \$270,000 appropriation is given to the Bighorn Institute.

Additional revenues from the sale of bighorn hunting applications, permits, and the sale of the special fundraising permit are deposited in a special bighorn sheep account established by the Legislature. Those funds have totaled approximately \$250,000 since the inception of bighorn sheep hunting in California, and represent a significant portion of the funding available to CDFG on an annual basis.

The public is instrumental in bighorn sheep management projects (Bleich et al. 1982; Bleich 1990). Volunteer programs are a popular facet of California's overall management effort, and are involved primarily with habitat management projects. Since its inception in 1970, participants in the Volunteer Desert Water and Wildlife Survey have donated approximately \$2,000,000 worth of labor, materials, and services to the CDFG. These cooperative efforts are helping to achieve the CDFG's goals for bighorn sheep management.

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