

Sierra Nevada Bighorn Sheep: 2005-06 Status

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This report synthesizes population information for bighorn sheep herds in the Sierra Nevada developed over the past year, beginning in July 2004 as part of the Sierra Nevada Bighorn Sheep Recovery Program lead by the California Department of Fish and Game. We were greatly assisted in the collection of data by Lori Bowermaster, Tammy Branston, Dave German, Dennis Jensen, Heather Johnson, and Cody Schroeder. This report will review prior information where needed to interpret data developed during this time period.

Efforts are made every year to develop some data on every herd in the Sierra Nevada. Over the years these efforts have used knowledge of habitat use patterns of each herd to attempt to count as many sheep as possible when they are most concentrated. Such counts all represent minimum numbers present by population, but those minima can vary in what percentage of the population was accounted for. Recent rapid increases in herd sizes, while very desirable, have made population monitoring more difficult in some situations because each herd has a higher number of sheep that need to be found in a short time period for a complete count. A result is that some counts can be well below actual population levels. The judgment on the completeness of counts is based on recorded numbers and reproduction in previous years tempered by potential mortalities, as well as the proportion of marked sheep seen where they have existed. Better counts in subsequent years also are used to evaluate and correct past counts to minimum numbers present by sex and age categories. These are known as reconstructed populations.

Highlights of the Past Year

The total number of adult and yearling female bighorn sheep in the Sierra Nevada in 2005 was about 160, which was an increase of only 9.6% over the previous year. This fits into a pattern of declining rates of increase evident since 2002. A conservative estimate of the total number of sheep for 2005 was about 380. Notable findings relative to distribution were: (1) use of Tuttle Creek as a winter range by females, which has not been documented since the early 1980s; (2) use of the Goodale Creek winter range by sheep for the second consecutive year; (3) use of Mount Lewis, Mount Wood, and Kuna Crest by the females in the Mount Gibbs herd unit; (4) movements of females across Lundy Canyon in all seasons; (5) adult male bighorn sheep again wintering on the north side of Dunderberg Peak on Kavanaugh Ridge; (6) extensive movement north of Green Creek to the edge of the Bridgeport Valley by an adult male during the rutting season in 2005, and movement by a different male north of Green Creek during spring of 2006; and (7) bighorn sheep wintering on the west side of Excelsior Peak in Yosemite National

Park, where a lamb was born in May 2006.

Mount Langley Herd Unit

Our report a year ago included graphics of the data from the Mount Langley herd unit because relative to the monitoring of female sheep it was the most complete database among the different herd units. This herd increased from 6 adult and yearling females in 1996 to 33 in 2004. Most notable was the more than tripling of the population during 1999-2004 from 10 to 33 females. During that time period this herd made minimal use of low elevation winter ranges and exhibited a classic and steady density-dependent drop in summer ratios of lambs to adult females. By 2004 that ratio had declined to 0.40 – an overall 60% decline. Coincident with that declining ratio, this herd showed a marked increase in the use of low elevation winter ranges beginning in 2004, which continued in 2005, when 41 different sheep could be accounted for between Carroll and Diaz Creek – use that began in mid January and continued through March. The effects of that change in winter habitat use became evident in the summer of 2005, when the lamb:ewe ratio doubled to 0.80.

This pattern parallels what occurred at Wheeler Ridge half a decade earlier. There the sheep also re-colonized low elevation winter range above Round Valley after the lamb:ewe ratio also dropped to about 0.40. At both Wheeler Ridge and Mount Langley there was a time lag of more than a year before the effects of new winter habitat use patterns were seen in lamb:ewe ratios, and in both cases that ratio doubled.

While summer ground efforts in 2005 yielded useful lamb:ewe ratio data, they failed to produce an adequate count of the number of females in the population. The best count totaled only 22 adult and 6 yearling females, compared with 33 total females the previous year.

The winter of 2005-06 saw continued significant use of low elevation winter range by this herd. For the first time since the early 1980s, a female group was documented to use Tuttle Creek as a winter range. The highest count of different sheep using winter ranges in 2006 was 58 (22 adult females, 3 yearling females, 18 lambs, 2 yearling males, and 13 adult males), including a telemetered female killed by a lion in the Diaz Creek winter range. As was the case the previous winter, this indicated that only about two-thirds of the adult and yearling females used low elevation winter ranges. In 2006, 2 of 8 females caught and collared the previous 2 winters remained at high elevation throughout winter.

Mount Williamson Herd Unit

The Mount Williamson population has been notoriously difficult to monitor. Only an occasional sheep has been seen during annual summer monitoring efforts beginning in 1996, while as many as 6 sheep have been documented in a small winter range in Shepherd Creek. However, fecal genotyping documented as many as 7 different lambs each year in 2001 and 2002, and at least 10 females at the end of the previous decade. In the summer of 2004, some verification of those numbers finally occurred when 7 females and 4 lambs were seen in one group on the north ridge of Mount Williamson above North Bairs Creek, while fresh tracks possibly from a couple more females were observed in a neighboring canyon.

Unfortunately, efforts in the summer of 2005 produced no further sightings. Genotyping of fecal pellets collected in 2005 at a very recent bedding site in the North Bairs cirque yielded 6 adult sheep and 2 lambs. A lamb sample collected in South Bairs Creek was from a different lamb, indicating a different group of sheep and at least one more adult female. Additionally, three fecal samples collected for us by Elizabeth Wenk just south of Vacation Pass were from 3 additional sheep (males). Thus, fecal genotyping accounted for 13 different sheep in 2005, which was based on limited sampling. An attempt will be made to add to that figure in 2006.

During the past winter, 2 sheep were seen from a helicopter in the Shepherd Creek winter range; but a ground survey to that location shortly after that flight yielded neither sheep nor sign of them.

Bubbs Creek Herd Unit

This group of sheep was assigned its own herd unit in the final draft of the Sierra Nevada bighorn sheep recovery plan since the last monitoring report. A helicopter survey in late March of 2006 produced the highest count of this herd to date: 20 sheep composed of 7 adult females, 1 yearling female, 5 (2005) lambs, 6 adult males, and one unclassified sheep. While this was the most sheep seen to date in that herd unit, that total was greatly influenced by the adult males seen. The number of adult and yearling females was 2 fewer than seen a year earlier.

Mount Baxter Herd Unit

This herd has shown increasing use of low elevation winter ranges for a few years, including Sand Mountain, where most of the sheep translocated during 1979-88 were caught. During the high snowfall winter of 2004-05, a particularly good count was obtained on these winter ranges, totaling 54 sheep (22 adult females, 4 yearling females, 14 lambs, 5 yearling males, and 9 adult males). Those data indicated that the number of females in this herd had approximately quadrupled since 1998.

This past winter also saw extensive winter range use by this herd spanning a period of 3.5 months. A good minimum count also was obtained during that time period: 26 adult females, 5 yearling females, 16 lambs, 2 yearling males, and 6 2-3 year old males, for a total of 55. Among those were two adult females translocated from Wheeler Ridge the previous winter, and a yearling male caught and ear tagged as a large lamb in the winter range of the Sawmill Canyon herd the previous year. He was also observed with females in the Mount Baxter herd range during the summer of 2005. After subtracting the 2 translocated females, the count this winter accounted for only 24 of 26 potential adult females (92.3%) from the 2005 count. The 2 missing females may be dead (a 7.7% mortality rate). More concerning is the large discrepancy between the 14 lambs seen in 2005 and the 7 yearlings seen this winter, one of which is an immigrant. One of those 2005 lambs (a male) was killed by a mountain lion the previous spring, but the fate of the others is unknown. With winter lamb:adult ewe ratios of 0.62-.64 the past two years, and this apparent low survivorship of lambs to yearling age, the recent increase rate for this herd appears well below its potential. This herd contained as many as 76 females in the late 1970s, thus is nowhere near carrying capacity density, especially given the excellent winter and summer

precipitation and resultant forage growth for the past two years.

Sawmill Canyon Herd Unit

The Sawmill Canyon herd also has been showing increasing use of low elevation winter ranges. In 2003-04, 13 different adult and yearling females could be accounted for between summer and winter counts. In the 2004-05 winter, sheep were found in the Goodale Creek winter range for the first time since the mid 1980s, and the total count for this herd unit was 11 adult females, 2 yearling females, 6 lambs, and 2 adult males (21 total). This past winter provided another good count of 31 different sheep – 18 in Sawmill Canyon and 13 in Goodale Creek (12 adult females, 3 yearling females, 11 lambs, 3 yearling males, 2 adult males). Three of the adult females were animals translocated from Wheeler Ridge to Sand Mountain in 2005 that wintered in Goodale Canyon. After excluding them, the 12 total females accounted for in the Sawmill Canyon herd was 1 fewer than accounted for in each of the previous 2 years.

This herd also appears not to be increasing up to its potential. In 1978, 32 total females were counted in the Sawmill Canyon winter range; thus, the current population also is well below its total carrying capacity. However, the lamb:adult female ratio of 0.92 recorded this winter is a major increase over the ratio of 0.54 recorded the previous winter and may result in a population increase. That lamb:ewe ratio change may have been influenced by the translocated females, all of which bore lambs.

Wheeler Ridge Herd Unit

In the winter of 2003-04, a minimum of 36 adult and yearling females existed in the Wheeler Ridge herd. The following winter, excellent conditions allowed a count of 40 different females (36 adult and 4 yearling), 22 lambs, 9 yearling males, and 32 adult males, for a total of 103 sheep. Five of the adult females were removed for translocation to Sand Mountain.

This past winter again provided excellent counting conditions in 2 different periods. Females and associated sheep were counted in the second week of December shortly after they moved to low elevation winter ranges, while an excellent count of males occurred in early April. The total count came to 113 sheep (12 more than the previous year despite the removal of 5 and some lion kills), composed of 35 adult females, 10 yearling females, 18 lambs, 4 yearling males, and 46 adult males. The count in 2004-05 clearly missed at least 5 adult males, which raises the minimum total for that year to 108.

During the early spring of 2006, every adult female less than 10 years of age in the herd was documented to bear a lamb, but some of those lambs appeared to have been lost following spring snowstorms.

Mount Gibbs Herd Unit

In 2002 and 2003, the female component of this herd unit contained 3 adult females, 1 lamb, and 1 yearling male. In 2003, 5 adult males also were known to exist. In 2004 there were 3 adult females, 1 yearling female, 1 lamb that appeared to be female, and 5 adult males.

The small size and predictable summer habitat use patterns of this herd have allowed excellent demographic information to be obtained easily most summers for many years. That changed in 2005 after a female was caught and collared on Mount Gibbs in May using a helicopter. During the summer that followed, this group of sheep avoided Mount Gibbs, where they had been predictably found for years. Instead, they mostly lived on Mount Lewis, but were also documented on Kuna Crest one day in September. The result was that, despite a radio collar to aid in locating them, it took 7 attempts before this group was finally observed in late September. It consisted of 3 adult females and 1 lamb. Four adult males also were found during this effort. The female group spent the winter on Mount Wood and all were documented to be alive in early spring of 2006.

Males have used Mount Lewis extensively for years, and females also were recorded there during of the earlier years of this herd. The apparent expanded range used by this group in 2005 may prove to be beneficial in providing a larger resource base. One of the hopes regarding this group has been range expansion to the south, which clearly has occurred. It is possible that some regular use of Mount Lewis has been previously undetected because of the lack of telemetry collars.

Mount Warren Herd Unit

For a couple of years it has been known that sheep have been moving back and forth between Mount Warren and the north side of Lundy Canyon, and the Mount Warren herd unit was redefined to reflect this. The past year was no exception and saw considerable movement of sheep across Lundy Canyon.

During the summer of 2003, a minimum total of 28 sheep could be accounted for in the Mount Warren herd unit. The following summer that total dropped by 1 (7 adult females, 1 yearling female, 5 lambs, 2 unidentified females or yearlings, and 9 males), bringing the Mono Basin total to 37 for 2004. During the following heavy winter, 3 adult males were known to die, which would put the total at 34 in early spring of 2005.

During summer 2005, counts from Mount Warren, Tioga Crest, and the north side of Lundy Canyon totaled 5 adult females, 2 yearling females, 1 lamb, 2 yearling males, and 7 adult males (all radio collared). Further survey work in September and early October identified 4 additional adult males (all uncollared) on the north side of Lundy Canyon. Additionally, a winter survey on Dore Pass found 3 lambs (2 more than seen in summer), which would have been accompanied in summer by at least 2 additional adult females. In total, the minimum count for the Mount Warren herd unit comes to 26 sheep as a result, and 34 total sheep in the Mono Basin.

While the number of sheep in the Mono Basin declined between the summers of 2004 and 2005, that decline was small given the harsh conditions most of these sheep encountered living at high elevation during the severe intervening winter. It seems clear that use of low elevation winter ranges in Lundy and Lee Vining Canyons will be necessary for that herd unit to increase significantly in size.

Synthesis

Table 1 summarizes the data from the past year by herd unit. Where counts of rams have been lacking or incomplete, a conservative estimate was produced using a ratio of 7 rams for every 10 adult and yearling ewes. A conservative 10 females has been estimated for the Mount Williamson herd until further data are available. For the Mount Langley herd, 33 females and 11 lambs were documented in the 2004 count that probably missed none. Of those 11 lambs, 6 were documented in 2005 as yearling females in an incomplete count. On the assumption that there was some mortality of females between years and that all the yearling females may not have been seen, an estimate of 38 females was used for 2005 until better data exist. The number of lambs estimated for that population applied the lamb:adult ewe ratio of 0.80 to 31 adult females. The unidentified sheep in the Mount Warren herd unit was probably a female and was treated as such in the female totals in Table 1.

The estimated total bighorn sheep population in the Sierra Nevada comes to 382 (Table 1). In some ways that total is a conservative figure since it is based on minimum counts and a conservative estimate of the number of rams where adequate counts for that class are lacking. However, until more solid information exists for other estimated numbers, it would be unwise to round that figure up. The population clearly was approaching 400 in 2005, and should finally cross 400 with the 2006 lamb crop.

Currently occupied herd units in the Sierra Nevada can be combined to define populations that are geographically separate (Figure 1). Two of those (Mount Williamson and Mono Basin) have been static at low numbers and can be expected to continue that trend until low elevation winter use is re-established. Dynamics in the other three have driven the overall population recovery that began in the late 1990s (Figure 1). In our report for 2004-05, we emphasized the declines in lamb recruitment that have become evident in recent years in some herds, correlated with increasing population densities. We noted that this was affecting the annual rate of increase of the total population. For all adult and yearling females that rate declined from 20.2% between the summers of 2002 and 2003 to 11.5% from 2003 to 2004. That trend continues, with the 2004 to 2005 increase at only 9.6%. The decline in this rate is clearly not linear, and there are reasons to expect that declining pattern to level or reverse its trend. The doubling of the summer lamb:ewe ratio in the Mount Langley herd between 2004 and 2005 will work against further erosion of that increase rate as those lambs become yearlings in 2006. Similarly, the notable jump in the lamb:ewe ratio for the Sawmill Canyon herd also should work to stem that declining rate. In addition, 2 consecutive years of high winter range use by the Mount Baxter herd may result in an elevated lamb:ewe ratio in 2006, which would affect the rate of increase of the female population in 2007. Nevertheless, the steep decline in the rate of population increase points to the current importance of translocating sheep to unoccupied locations to keep the overall population increasing.

Table 1. 2005-06 data summary for Sierra Nevada bighorn sheep. Figures are minimum counts and conservative estimates where counts are lacking (marked by ~; see text).

<u>herd unit</u>	<u>adult ewes</u>	<u>yrlyg ewes</u>	<u>total ewes</u>	<u>lambs</u>	<u>yrlyg rams</u>	<u>adult rams</u>	<u>total rams</u>	<u>unid.</u>	<u>total</u>
Langley		≥6	~38	~25			~27		~90
Williamson			~10	≥3			~7		~20
Bubbs	7	1	8	5		6	6	1	20
Baxter	26	5	31	16	2		~22		69
Sawmill	12	3	15	11	3		~10		36
Wheeler	35	10	45	18	4	46	50		113
Gibbs	3	0	3	1		4	4		8
Warren	7(8)	2	9(10)	3	2	11	13	1(ewe?)	26
Total			160	82			139		382

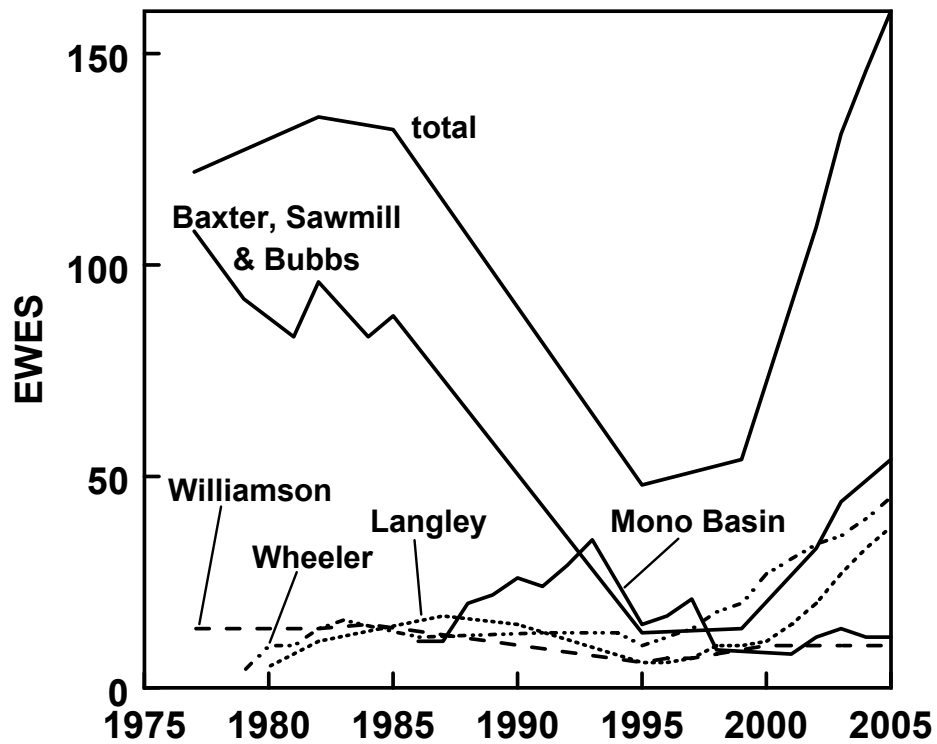


Figure 1. Dynamics in the number of ewes in bighorn sheep populations in the Sierra Nevada.