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SIERRA NEVADA BIGHORN SHEEP: 1998 SURVEY RESULTS

John D. Wehausen
Karl D. Chang

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I. Mount Langley Population

In 1996, we accounted for 3 ewes, 1 female lamb, 1 2-yr old ram, and 9 older rams surviving in this population. Last year, we accounted for these same sheep, including the lamb as a yearling ewe, and we found one additional adult ram. However, we also found a yearling ram with our usual female group that could not be accounted for as a lamb in 1996. This meant that an additional ewe also existed. Tracks of one ewe and one lamb seen in 1996 on the Major General were likely from this missing ewe and lamb.

This past winter we documented sheep on low elevation winter ranges on five occasions: (1) 2 adult rams in Carroll Creek on February 7; (2) 1 ewe and 1 lamb in Diaz Creek on February 10; (3) 2 ewes, 1 yearling ewe, 1 lamb, 1 yearling ram, 1 3-yr old ram in Diaz Creek on March 1; (4) 1 ewe in Carroll Creek on April 9; and (5) 1 ewe and 1 large female lamb in Carroll Creek on April 18. The ewe in the last two groups was the same one, thus her lamb was probably simply hidden from view on April 9. Totaling the sheep in these three ewe groups gives the same total documented this summer; thus they were probably different groups.

This year on June 26 we found all the ewes in this population in a single group in upper Diaz Creek for the first time. The group consisted of 5 ewes, 3 yearling ewes, 1 lamb, and 1 2-yr old ram. On June 30, 7 adult rams were seen in Diaz Creek. A couple of attempts to document more rams during summer failed. We hope to document more during the next year. Census work on this population beginning in 1996 has documented a doubling of the reproductive base from 4 ewes to 8 in two years. This has occurred because all 5 lambs known to be born in that time period have survived to adulthood, and 4 of these have been female. Because 3 of these are currently yearlings, the reproductive base for the next year will probably be only 5 ewes, which are expected to produce 4 lambs in 1999.

Early this past winter, a young, radio-collared mountain lion that dispersed from Round Valley was documented from the air to be living near the mouth of Diaz Creek. On February 5, this lion crossed through bighorn winter range in Carroll Creek and the south fork of Lubken Creek. Although 2 rams were in Carroll Creek two days later, there is no indication that this lion killed any bighorn. Indeed, after February 5 this lion was never documented in this area again, and we did not encounter lion tracks during our later census work. We did find skulls of past lion kills low in the Diaz Creek winter range, where a citizen had reported them. It is noteworthy that the largest sheep group seen this winter was in the middle of the opening in Diaz Creek that was created for them through pinyon pine removal at the beginning of this decade. The recent trend of this population is very encouraging,

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and it probably has adequate genetic diversity to recover entirely on its own if mortality rates remain low and winter ranges continue to receive use. This appears to be consistent with the apparent decline in mountain lion numbers in the Owens Valley region.

II. Mount Williamson Population

This winter we again did not find any bighorn in the traditional low elevation winter ranges. There has been no documentation of use of these winter ranges since 1985. Two trips into the summer range were taken this year. Based on last year's work, these were oriented toward the north ridge of Mount Williamson. Diamond Mesa was also investigated in each trip, and it was documented that deer utilize the top of Diamond Mesa in summer. No sheep were seen this summer, but important evidence of sheep was again documented. During the first trip, two sets of fresh tracks, probably from rams, were found in the lower Williamson Lakes basin. During the second trip, a set of three beds, also probably from rams, was found mid slope on the Mount Williamson north ridge above the top of Williamson Creek. There was no evidence that the female group living on this ridge system crossed over west to the Williamson Creek side this summer in that area as they did last year. However, we found clear evidence of this group just east of the ridge top, and fecal pellets indicated that it contained two different lambs. The evidence on this group for the past two summers suggests that it contains three ewes that bear lambs every other year. Fecal DNA work could confirm the composition of this group.

III. Mount Baxter Population

Black Mountain Deme

We documented no ewes from this deme during winter, but a mature ram was found in Onion Valley in spring. For the first time since 1995, we observed females from this deme in summer, consisting of 4 ewes and 1 yearling ewe. An automated video camera set up on Black Mountain recorded no sheep, thus provided no additional data. The last census for this deme occurred in the summer of 1995, when we documented 6 ewes and 3 lambs. This group of females clearly persists, but may have dropped from 6 to 5.

Sand Mountain Deme

As has been a consistent pattern for many years, we again documented 4 different ewes using the Sand Mountain winter range. This past winter they arrived as four different groups as follows: (1) 1 light colored ewe, 1 light colored small lamb, 1 dark brown 6+-yr. old ram on December 10 at Black Canyon; (2) 1 light colored ewe and 1 dark colored lamb at Black Canyon on February 4 and February 18 (they had clearly been there for the intervening 2 weeks); (3) 1 ewe accompanied by 5 and 8-yr old rams not previously seen at Black Canyon on February 24; and (4) 1 ewe with 2 lambs (one clearly male) on the south side of Sawmill Creek on March 4, March 8, and March 30. This totaled 4 ewes, 4 lambs, and 3 rams seen over the winter. This high lamb count is notable given that these 4 ewes have had only a total of 3 lambs with them during the previous 3 winters. Recent increases in the use of this winter range may play a role in this year's lamb count.

We set up an automated video camera on Baxter Pass during late summer that recorded sheep on four different days from September 18 through October 23. Numbers of sheep recorded increased steadily from 2 to 6, and recorded the same identifiable individuals repeatedly. The total different individuals were 3 ewes, 1 yearling ewe, 1 lamb, and 1 2-yr old ram. Thus, of the 4 lambs seen in winter, we have documented only 1 yearling so far. However, one ewe remains to be accounted for and could have multiple yearlings accompanying her.

Sawmill Canyon Deme

Two ewes and 1 lamb occupied the east end of the Sawmill winter range and were seen on February 4, 8, 18, 24 (1 ewe, 1 lamb), and March 8 (1 ewe, 1 lamb) this year. The previous winter we accounted for 6 ewes, 3 lambs, 2 yearling rams, and 1 2-yr old ram in this winter range. There was no sign of these other sheep this past winter. During summer the ridge system south and west of the Woods Lake Basin was searched for sheep and their sign during one trip. A separate trip to the Woods Lake Basin investigated Mount Cedric Wright and the west slope of Mount Perkins. The consistent finding of these two summer investigations was the near absence of evidence of bighorn use in these areas of traditional summer range of ewes. Our last good census of this deme in 1995 found 7 ewes, 1 lamb, and 1 2-yr. old ram using these summer ranges. We also found considerable evidence of use of this summer range by ewes and lambs in 1997. The near absence of evidence of its use this summer, coupled with the small number of sheep recorded in winter range this past year is concerning, but further investigations are needed.

Rams

In addition to the rams noted above, we found 6 mature rams at least 5 years old on the 60 Lakes Basin trail on September 9. We received a reliable report of 7 rams in this same area a year earlier. The 2-yr old recorded by the camera on Baxter Pass this summer is an additional ram, and there are probably more young rams in the Mount Baxter population, based on ones seen in recent years.

IV. Wheeler Ridge Population

This population is monitored closely during winter and spring in Pine Creek. This past winter this occurred on 18 days beginning November 27, 1997. In 1996 we could account for 8 ewes, 4 lambs (2 of each sex), and 4 rams (1 older and 3 2-3 yr. olds) for a total of 16. The following winter this total increased to 21, comprised of 8 ewes, 1 yearling ewe, 5 lambs, 2 yearling rams, and 5 older rams (one clearly missed the previous year).

This past winter we totaled only 20 sheep: 7 ewes, 5 lambs, and 8 rams. This reflects the pattern of their appearance on the Pine Creek winter range, which did not include a group containing all ewes. However, it is likely that we actually observed 9 different ewes. The ages of rams seen was 3 yearlings, 2 2-yr. old, 2 3-yr. olds, and 1 4-yr. old. This means that a few older rams were never seen, one of which was reported to have wintered a considerable distance north near Swall Meadows. We also received a report in spring that 3 ewes had been seen above Wells Meadows in winter, which

is the first record of ewes in that winter range in many years. The young ages of rams observed suggests regular good recruitment.

During a single day of field work this past summer a bedding site was found that suggested 12 adults and 6 lambs in a group. It is probable that this population contained at least 25 sheep this past winter. With apparently growing numbers, this population will become increasingly difficult to track, as this past winter has exemplified. Using the current methodology, we will depend on the occasional day when all or most ewes appear low in Pine Creek. Placing temporary or permanent markings on some ewes could greatly enhance our census results. Alternatively, fecal DNA analysis could track this population with high accuracy. The Wheeler Ridge population may now be the largest one in the Sierra Nevada.

V. Lee Vining Canyon Population

Tioga Crest Deme

In summer 1997, we accounted for 3 ewes, 1 yearling ewe, 1 lamb, and 1 yearling ram in this deme. This year on March 7, 3 ewes, 1 young ram, and 2 large lambs were recorded high on Tioga Peak. This group was last seen on April 26, at which time the lambs were not seen. Since only a single lamb was known in this deme during summer, the presence of 2 lambs in winter and spring opens questions of either sheep movement from Mt. Warren, or a misclassification of a yearling female. In the past, there was regular interchange of females between this ridge system and Mount Warren in the fall. This has not been evident since the population collapse in 1995. However, this fall, we documented our remaining collared ewe from Mount Warren with her male lamb on Dore Pass, indicating that interchange still occurs to some extent. During repeated census efforts this summer, we were impressed by the decline in sign of sheep on Tioga Crest including Mount Scowden, and were able to document only 1 ewe and 1 2-yr. old ram remaining.

Mount Warren Deme

Last year we accounted for at least 9 ewes, 3 yearling ewes, 6 lambs, and 12 rams in this deme; but it probably contained 12 ewes, 6 yearlings, 8 lambs, and 12-13 rams. Following an early snow storm, a dozen sheep were documented on November 30, 1997 in the Lee Vining Canyon winter range, including numerous rams in the rut. These sheep left this winter range shortly after that and remained at high elevations until early March, when Lee Vining canyon was again used. During winter fixed-wing flights in this area, the high ridges and plateaus were consistently blown free of snow, despite considerable snow fall. The two radio-collared ewes remained north of Mount Warren on these high slopes until a flight on February 26, when both had moved south of Mount Warren. Shortly thereafter, sheep began appearing on the winter range in Lee Vining Canyon beginning March 6, at which time they were already able to walk on top of the snowpack there without falling through. During the period from March 6 to April 20, we documented a total of 6 different sheep using this winter range, comprised of 4 ewes (incl the 2 radio collars), 1 yearling ewe, and 1 2-yr. old ram. During this time period we baited them with alfalfa for capture and monitored them carefully. However, we failed to capture any.

On April 20, evidence of a lion in the form of tracks in mud along the Tioga Pass Road in the winter range was noted. Within an hour the signal of ewe 159.230 changed to mortality mode and she was quickly found to be a fresh lion kill on Big Springs cliffs, where past lion predations have been documented. This kill was monitored daily until the lion finished eating it. The other sheep in Lee Vining Canyon moved high following this kill, but returned to the canyon within a few days. The other collared ewe bore a lamb in the Lee Vining Canyon winter range on May 1, and remained there with some other sheep until the end of June. Most of the sheep known to exist the previous summer were never seen in the winter range in 1998.

Similar to Tioga Crest, we noted a decline in bighorn sign in the Mount Warren region during summer census work. During our annual group census effort of this region on July 8 and 9 we recorded only 5 ewes, including the remaining collared one and a younger (yearling or 2-yr old) light colored one, 2 lambs, and 2 rams (3 and 4 yrs. old). An automated video camera was set up on the plateau south of Gilcrest Peak and recorded these ewes and lambs and a young ram. We also observed this same group again accompanied by a couple of 3-yr. old rams. While we could find no other ewes and lambs after repeated summer efforts, photographs taken by a tourist along the Tioga Pass Road in early October indicated the existence of an additional ewe and lamb with our known group, bringing the total to 6 ewes and 3 lambs.

We found a group of 9 rams on the east slope of Mount Warren on August 6, which included the young rams recorded earlier. This occurred after efforts had been made to find missing sheep in peripheral areas. Two ram carcasses were located this summer south of Mount Warren. One was a full skeleton of a 6-yr. old that had died this past winter/spring. The other was only the skull of a 4-yr. that appeared to be an earlier mortality. The carcass of a ewe was reported to us in the Dore Pass area of Tioga Crest, but was apparently picked up by a hiker before we received the report. Otherwise, we could find no remains of the many sheep that apparently disappeared this past winter/spring, despite specific searches of likely avalanche chutes.

Bloody Canyon Deme

In 1997 this deme had grown to 1 ewe, 1 yearling ewe, and 1 male lamb, but we could find only two adult rams, one of which was the 3-yr. old offspring of the adult ewe. This year we documented the overwinter survival of all of these sheep. We also recorded an additional older ram that we could not locate the previous year, for a total of 6 sheep. This is the first year since 1993 that the adult ewe has not had a lamb. This reproductive output is indicative of the population growth potential of this deme. With an increased reproductive base, annual gains in recruited sheep could exceed other existing populations.

VI. Synthesis

The current total reproductive base for Sierra Nevada bighorn appears to contain at least 38 ewes based on 1998 census results. Uncertainties lie essentially with the Sawmill Canyon and Wheeler Ridge demes, each of which could contain about 5 more ewes. From our work this year it appears that at least 40 rams exist in the Sierra Nevada. There could be an additional 4 each at Mount

Langley, Mount Baxter, and Wheeler Ridge, setting a reasonable upper limit at 52. This gives an upper limit for the total number of adults in the Sierra Nevada at 100. There appear to be as few as 13 total lambs present this summer, although there is some uncertainty relative to some demes of the Mount Baxter population.

Overall this represents a notable population decline over the past year, largely due to the collapse of the Lee Vining Canyon population over winter. The current figures also represent a decline from what existed following the winter of 1995, which was the previous low figure for Sierra Nevada bighorn. However, it is important to note that while an overall decline has occurred this past year, there are also gains occurring in some populations or demes at the same time. These are largely in the Owens Valley region, where there is evidence of a coincident recent decline in the mountain lion population and increases in winter range use by some of the sheep.

From the standpoint of conservation strategies, the collapse of the Lee Vining Canyon population is serious in that it was the one remaining hope for a wild source of future reintroduction stock. Its collapse this year dictates the immediate need for a captive breeding program.