

Results of the 2016 bighorn sheep helicopter survey in the Peninsular Ranges of southern California

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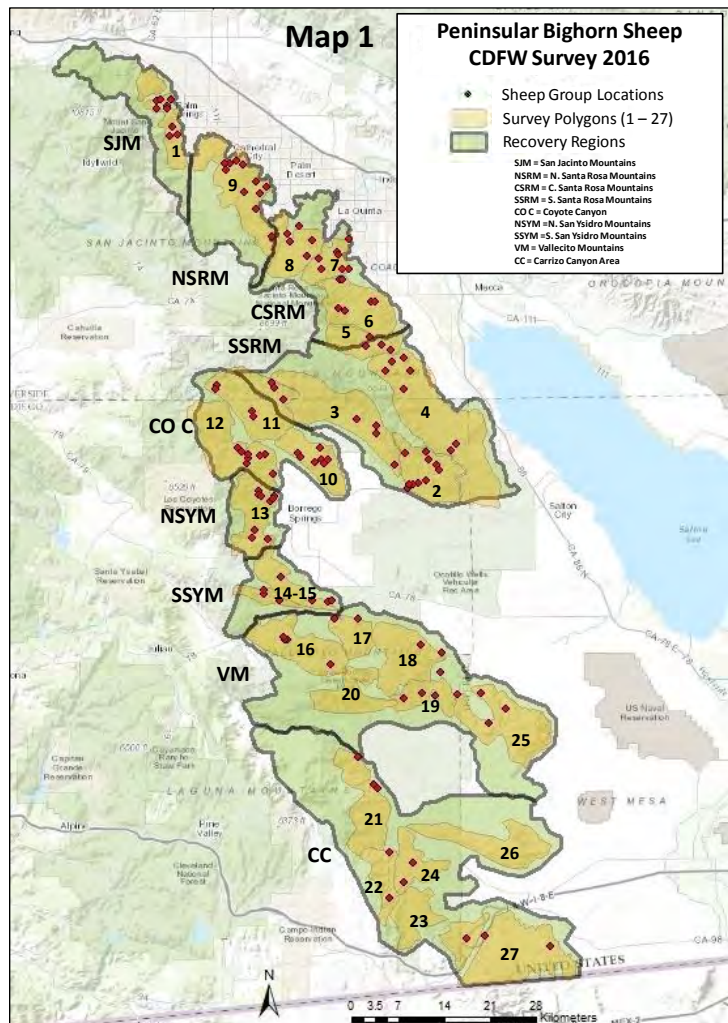
December 22, 2016

Bighorn sheep helicopter surveys were conducted in the Peninsular Ranges of San Diego, Riverside and Imperial Counties during November 7-15, 2016. Surveys were coordinated and funded by the California Department of Fish and Wildlife (CDFW). Logistical support was provided by the California Department of Parks and Recreation (CDPR) and the Bureau of Land Management (BLM). Participants included Randy Botta, Janene Colby, Christine Thompson, Amanda Eigner, Ken Devore (CDFW - Region 5), Kevin Brennan, Chanelle Davis, Jeff Villepique (CDFW - Region 6), Tim Glenner, Lora Konde (CDFW - WIL), and Dave Everson (Shasta Rotor and Wing).

The bighorn sheep habitat surveyed ranged from the south side of Chino Canyon in the San Jacinto Mountains south to the Jacumba Mountains at the U.S. border with Mexico. Twenty-six of twenty-seven predetermined polygons were surveyed; Polygon 26 (Coyote Mountains) was not flown due to time constraints, and polygon 15 was combined with polygon 14 (Map 1).

Weather during the surveys ranged from clear with temperatures in the mid 80° F and calm winds to clear with temperatures in the low 90° F and light winds. Locations of all observed bighorn sheep were recorded with a Garmin Montana 650t GPS unit while flight paths were recorded using a Samsung Galaxy Note 8.0 and the topographic software program Gaia GPS. All sheep groups observed were photographed using a hand-held digital camera with stabilizing lens.

A total of 588 bighorn sheep (including lambs) were observed in 125 groups during a total of 47.88 rotor hours of actual survey time resulting in an overall Catch per Unit Effort (CPUE) of 12.28 sheep per rotor hour (Table 1 & 2). A total of 92 (87 female, 5 male) marked (collared) bighorn sheep were seen out of 149 (141 females, 8 males) present in the range, for an overall observation of 62 percent. Population estimates were generated using Chapman's (1951) modification of the Peterson estimator (Seber 1982). The overall range-wide estimate for females (yearlings and adults) combined was 490 (Table 3)



and individual subpopulation estimates were: San Jacinto Mountains 32, north Santa Rosa Mountains 28, central Santa Rosa Mountains 65, south Santa Rosa Mountains 54, Coyote Canyon 45, north San Ysidro Mountains 29, south San Ysidro Mountains 29, Vallecito Mountains 101, and Carrizo Canyon 169. Additionally, an estimate for adult females only was generated (refer to Table 4). The overall range-wide estimate (yearlings and adult males and females combined but excluding lambs) was 794 (Table 5) and individual subpopulation estimates were: San Jacinto Mountains 56, north Santa Rosa Mountains 37, central Santa Rosa Mountains 119, south Santa Rosa Mountains 83, Coyote Canyon 69, north San Ysidro Mountains 59, south San Ysidro Mountains 42, Vallecito Mountains 163, and Carrizo Canyon 256. The overall lamb:ewe ratio (lambs per adult ewe) was 0.38 (Table 6) and individual subpopulations were: San Jacinto Mountains 0.52, north Santa Rosa Mountains 0.43, central Santa Rosa Mountains 0.52, south Santa Rosa Mountains 0.25, Coyote Canyon 0.46, north San Ysidro Mountains 0.39, south San Ysidro Mountains 0.32, Vallecito Mountains 0.28, and Carrizo Canyon 0.31.

A secondary estimate was also generated using the simultaneous double-count method (Graham and Bell 1989), resulting in an overall estimate (lambs, yearlings, and adult males and females) of 752 in the survey area.

Attached at the end of this report are the data sheets for each polygon flown during the survey (Tables 7-15): data sheets document the composition (ewes, lambs, yearlings, and rams) of each group observed along with the identification of each marked animal.

Table 1 - Summary of Animals Observed

Subpopulation	Lambs	Yrlg Ewes	Adult Ewes	Cl. I (yrlg.) Rams	Cl.II Rams	Cl. III Rams	Cl. IV Rams	Total
San Jacinto Mtns.	11	2	21	5	5	8	2	54
N. Santa Rosa Mtns.	6	2	14	2	1	1	1	27
C. Santa Rosa Mtns.	24	9	46	6	9	11	21	126
S. Santa Rosa Mtns.	9	6	36	4	6	6	7	74
Coyote Canyon	13	9	28	6	7	6	2	71
N. San Ysidro Mtns.	7	1	18	3	4	7	6	46
S. San Ysidro Mtns.	6	3	19	2	3	2	3	38
Vallecito Mtns and Fish Creek Mtns	11	11	39	4	2	8	12	87
Carrizo Canyon and Coyote Mtns	9	10	29	4	5	3	5	65
Total	96	53	250	36	42	52	59	588

Table 2 - Flight Polygons

Regions and respective polygons (polygon numbers refer to those listed in USFWS recovery plan)	Flight time (hrs)	CPUE (sheep per hour)	Marked sheep present (F,M)	Marked sheep observed (F,M)	Percent marked sheep observed (F,M)
SAN JACINTO MOUNTAINS	2.03	26.60	(10,2)	(7,2)	(70,100)
1. South side of Chino Canyon to Murray Canyon	2.03				
NORTH SANTA ROSA MTNS	2.57	10.51	(11,0)	(6,0)	(55,NA)
9. Highway 74 west to Cathedral Cyn	2.57				
CENTRAL SANTA ROSA MTNS	7.82	16.11	(19,1)	(16,1)	(84,100)
8. Highway 74 east to west side of Bear Creek	1.30				
7 - 6. Bear Creek South to Toro Cyn	3.85				
6, 5, 4. Toro to North Barton Cyn	2.67				
SOUTH SANTA ROSA MTNS	6.1	14.51	(17,1)	(13,1)	(76,100)
4. Big Wash to South Barton Cyn	2.35				
2. Calcite Mine to Rattlesnake Cyn	1.75				
3. Rattlesnake to Rockhouse Cyn	2.00				
COYOTE CANYON	6.59	10.77	(11,1)	(9,1)	(82,100)
10. Coyote Mountain	1.22				
11. Coyote Canyon (NE)	2.47				
12. Coyote Canyon (SW)	2.90				
NORTH SAN YSIDRO MTNS	2.90	15.86	(14,0)	(9,0)	(64,NA)
13. Henderson to Hellhole	2.90				
SOUTH SAN YSIDRO MTNS	2.17	17.92	(12,0)	(9,0)	(75,NA)
14/15.* Tubb Canyon to Pinyon Ridge (*includes most of polygon15)	2.17				
VALLECITO MOUNTAINS and FISH CREEK MOUNTAINS	9.45	9.21	(31,2)	(15,0)	(48,0)
16. NW Vallecito Mtns (Pinyon Mtns)	1.72				
17. Sunset Mtn	1.43				
18. Harper Cyn to Alma Cyn	1.28				
19. Alma Cyn to Split Mtn	1.67				
20. Whale Peak	1.27				
25. Fish Creek Mountains	2.08				
CARRIZO CANYON AREA	8.25	7.88	(16,1)	(3,0)	(19,0)
21. Tierra Blanca Mtns to Rockhouse Cyn	1.43				
22. W. side of Carrizo Wash (Rockhouse to Blackwater)	1.47				
23. Carrizo Gorge	1.13				
24. E. side of Carrizo Wash	1.42				
26. Coyote Mountains	0.00				
27. South of Interstate 8	2.80				
Overall	47.88	12.28	(141,8)	(87,5)	(62,63)

Table 3. Female abundance estimates (Includes yearlings and adult females)^a

Region	2002 (95% CI)	2004 (95% CI)	2006 (95% CI)	2008 (95% CI)	2010 (95% CI)	2016 (95% CI)
San Jacinto Mountains	NA ^d	NA ^d	NA ^d	NA ^d	9.7 (7.7-11.7)	32 (22.8 - 41.2)
N. Santa Rosa Mtns.	NA ^d	NA ^d	NA ^d	NA ^d	51.4 (37.6-65.2)	28.1 (18.1 - 38.1)
C. Santa Rosa Mtns.	NA ^d	NA ^d	NA ^d	NA ^d	70.5 (61.7-81.3)	64.9 (55.0 - 74.7)
S. Santa Rosa Mtns.	NA ^d	NA ^d	NA ^d	NA ^d	84.4 (47.4-121.4)	54.3 (43.5 - 65.1)
Coyote Canyon	23.0 (13.4-32.6)	24.7 (18.6-30.8)	20.7 (8.9-32.5)	31.0 (24.2-37.8)	46.1 (29.9-62.3)	44.6 (35.2 - 54.0)
N. San Ysidro Mtns.	19.0 (19.0-19.0)	27.0 (13.1-40.9)	42.3 (24.5-60.1)	53.6 (40.1-67.1)	40.3 (25.6-55.0)	29.0 (21.8 - 36.2)
S. San Ysidro Mtns.	29.0 (16.8-41.2)	33.0 (33.0-33.0)	22.0 (22.0-22.0)	47.6 (24.2-71.0)	35.7 (28.0-43.4)	28.9 (22.5 - 35.3)
Vallecito and Fish Creek Mtns	56.3 ^b	111.8 (36.9-186.6)	31.4 (25.2-37.6)	102.2 (42.9-161.5)	80.0 (55.1-104.9)	101.0 (72.6 - 129.4)
Carrizo Canyon and Coyote Mtns	85.2 (44.9-125.4)	71.0 ^c (15.0-127.0)	93.9 (68.9-118.9)	395.0 (0.0-797.8)	136.2 (78.9-193.5)	169.0 ^e (45.4 - 292.6)
Overall	225.5 (165.4-285.5)	229.7 (176.8-282.6)	208.1 (177.8-238.4)	394.9 (295.2-494.6)	563.0 (491.1-634.9)	489.5 (436.6 - 542.5)

Table 4. Female abundance estimates (adult females only)^a

Region	2016 (95% CI)
San Jacinto Mountains	29.3 (21.0 - 37.5)
N. Santa Rosa Mountains	24.7 (16.3 - 33.1)
C. Santa Rosa Mountains	54.3 (46.4 - 62.2)
S. Santa Rosa Mountains	46.6 (37.6 - 55.5)
Coyote Canyon	33.8 (27.0 - 40.6)
N. San Ysidro Mountains	27.5 (20.8 - 34.2)
S. San Ysidro Mountains	25.0 (19.8 - 30.2)
Vallecito and Fish Creek Mtns	79.0 (58.2 - 99.8)
Carrizo Canyon	126.5 (35.5 - 217.5)
Overall	404.0 (362.2 - 445.8)

Table 5. Female and male abundance estimates (includes yearlings and adult male and females but excludes lambs)^a

Region	2002 (95% CI)	2004 (95% CI)	2006 (95% CI)	2008 (95% CI)	2010 (95% CI)	2016 (95% CI)
San Jacinto Mtns	NA ^d	NA ^d	NA ^d	NA ^d	16.1 (11.9-20.3)	56.2 (41.9 - 70.5)
N. Santa Rosa Mtns	NA ^d	NA ^d	NA ^d	NA ^d	89.9 (59.4-120.4)	36.7 (22.8 - 50.6)
C. Santa Rosa Mtns	NA ^d	NA ^d	NA ^d	NA ^d	132.8 (102.2-163.4)	119.2 (100.6 - 137.7)
S. Santa Rosa Mtns	NA ^d	NA ^d	NA ^d	NA ^d	149.4 (81.7-217.1)	82.6 (66.1 - 99.1)
Coyote Canyon	35.0 (17.7-52.3)	46.8 (42.5-51.1)	42.3 (17.1-67.6)	51.7 (36.0-67.4)	65.5 (40.2-90.8)	68.7 (54.8 - 82.7)
N. San Ysidro Mtns	47.0 (34.1-59.9)	49.8 (22.8-76.8)	79.0 (43.9-114.1)	81.7 (62.0-101.4)	72.1 (43.0-101.2)	59.0 (41.3 - 76.7)
S. San Ysidro Mtns	41.0 (24.2-57.8)	47.0 (47.0-47.0)	38.0 (38.0-38.0)	57.3 (32.4-82.2)	55.3 (38.3-72.3)	41.9 (31.7 - 52.1)
Vallecito & Fish Creek Mtns	154.8 ^b	183.6 (71.9-295.3) 149.5 ^b	77.4 (54.9-99.9)	214.6 (80.8-348.4)	141.9 (89.6-194.2)	162.6 (112.3 - 213.0) 188.5 ^f
Carrizo Canyon & Coyote Mtns	127.3 (66.0-188.6)	101.0 ^c (21.0-181.0)	144.6 (105.2-184.0)	563.0 (0.0-1139.4)	232.2 (132.1-332.3)	255.5 ^e (64.3 - 446.7) 136.5 ^f
Overall	405.0 (296.0-513.9)	378.7 (289.9-467.5)	382.0 (319.5-444.5)	626.4 (468.0-784.8)	980.8 (842.0-1119.6)	794.2 (704.9 - 883.4)

^a Population estimates were generated using Chapman's (1951) modification of the Peterson estimator (Seber 1982). Estimated $N = [(n1+1)(n2+1)/(m2+1)] - 1$, where $n1$ is the number of collared animals in the sampling area, $n2$ is the total number of animals observed, and $m2$ is the number of collared animals observed. Confidence intervals (95%) were calculated as $N + 1.96$ (variance of N)^{0.5}, with the variance defined as: $var = [(n1+1)(n2+1)(n1-m2)(n2-m2)] / [(m2+1)^2(m2+2)]$ (Seber 1982:60).

^b The 2002 estimate for the Vallecito and Fish Creek Mountains was not generated using the above methods because of the low proportion of radiocollared animals observed. For comparison the 2004 estimate was generated using Chapman's (1951) modification of the Peterson estimator (Seber 1982) and a "markless" population estimator.

^c During the 2004 survey Carrizo Canyon and Coyote Mountains contained a "marked" sample of only three radiocollared females and polygons 21 and 26 were not surveyed due to wind.

^d The 2002 -2008 surveys and resulting abundance estimates for the San Jacinto, North Santa Rosa, Central Santa Rosa, and South Santa Rosa Mountain subpopulations were flown and reported separately from the Coyote Canyon, North San Ysidro Mountain, South San Ysidro Mountain, Vallecito/Fish Creek Mountain, and Carrizo Canyon/Coyote Mountain subpopulations and thus not included in this report.

^e The Coyote Mountains were not surveyed in 2016 due to lack of survey time.

^f Due to the small number of marked animals observed during the survey a second estimate was obtained using the Simultaneous Double Count Estimate (Graham, A., and R.B. Bell. 1989. Investigating observer bias in aerial survey by simultaneous double-counts. *J.Wildl.Manage.* 53(4):1009-1016).

Table 6. Ratios observed

Subpopulation	Lambs/Ewe ^a	Lambs/Ewe ^b	Yearlings/Ewe ^c	Rams/Ewe ^d	Rams/Ewe ^e
San Jacinto Mtns.	0.52	0.48	0.33	0.71	0.87
N. Santa Rosa Mtns.	0.43	0.38	0.29	0.21	0.31
C. Santa Rosa Mtns.	0.52	0.44	0.33	0.89	0.85
S. Santa Rosa Mtns.	0.25	0.21	0.28	0.53	0.55
Coyote Canyon	0.46	0.35	0.54	0.54	0.57
N. San Ysidro Mtns.	0.39	0.37	0.22	0.94	1.05
S. San Ysidro Mtns.	0.32	0.27	0.26	0.42	0.45
Vallecito Mtns and Fish Creek Mtns	0.28	0.22	0.38	0.56	0.52
Carrizo Cyn and Coyote Mtns	0.31	0.23	0.48	0.45	0.44
Overall	0.38	0.32	0.36	0.61	0.62

^a lambs per adult ewe.

^b lambs per ewe (yearling and adult females combined)

^c yearlings per adult ewe (male and female yearlings combined).

^d adult ram per adult ewe (excludes yearling females and yearling males).

^e includes yearling ewes and yearling rams

Simultaneous Double Count Estimate

Observer Summary

Left Side of Helicopter (For determining correction factor)

Number of groups seen by:	<u>Front Only</u> S_1	<u>Back Only</u> S_2	<u>Both</u> B
	17	11	30
Total number of groups seen by: <u>Back Left</u>	<u>Back Right</u>	<u>Total groups observed by</u>	
<u>back observers</u>	49	69	102

Average Group Size = (588 bighorn sheep observed)/(125 groups observed) = 4.70

Population/Survey Estimates

Let P_2' = the probability of a group seen by the rear observer.
 S_1 = the number of groups seen by the front observer only = 17
 S_2 = the number of groups seen by the rear observer only = 11
 B = the number of groups seen by both observers = 30

then $P_2' = B / S_1 + B = 30 / (17 + 30)$

$P_2' = 0.638$

If Y = Number of groups observed by rear observers
 Y_A' = adjusted number of groups or estimated actual number of groups that were present to be seen by rear observers

then $P_2'(Y_A') = Y$

therefore, $Y_A' = (Y) / P_2' = 102 / 0.638 = 159.8$

and, the Number of individual sheep present in visibility polygons = $159.8 \times \text{Average Group Size (4.70)} = 751.7$

References

Chapman, D. G. 1951. Some properties of the hypergeometric distribution with applications to zoological sample censuses. University of California Publication in Statistics 1(7):131-160.

Graham, A., and R.B. Bell. 1989. Investigating observer bias in aerial survey by simultaneous double-counts. J.Wildl.Manage. 53(4):1009-1016.

Seber, G. A. F. 1982. The Estimation of Animal Abundance. Charles Griffin and Company, Limited. London, England.

Table 7. Coyote Canyon

Grp #	Time	Grp Size	Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group				# with collars	IDs
			Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear		
1	0818	1			1					1				1	347
2	0824	6	1	1	3			1		1	1		1	1	399
3	0848	1				1				1			1		
4	0851	3			2		1			1				1	215
5	0900	2			2					1	1			1	348
6	0902	1							1		1		1		
7	0904	5	1	3	1					1	1	1			
8	1015	1						1					1		
9	1018	9	3	1	3		1	1		1	1		1		
10	1053	2	2							1	1				
11	1112	3			2	1				1	1				
12	1128	4		2		1	1			1	1				
13	1130	4	1		1		1	1		1					
14	1331	4	1		2	1				1	1	1		1	396
15	1331	2	1		1					1	1			1	392
16	1335	2			2					1			1	1	448
17	1422	6		1	2	1	1	1		1	1		1	1	318
18	1507	3			3					1		1		2	400, 393R
19	1607	1				1						1			
20	1611	1						1					1		
21	1617	7	3	1	2		1			1					
22	1622	3			1		1		1	1	1				
Total		71	13	9	28	6	7	6	2	18	10	3	9	9F/1M	

Table 8. Northern San Ysidro Mountains

			Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group					
Grp #	Time	Grp Size	Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear	# with collars	IDs
23	0740	22	6	1	9	2	1	2	1	1	1	1	1	3	308, 315, 312
24	0748	7			1		2	3	1		1	1	1		
25	0752	5	1		3		1			1				2	309, 310
26	0755	1							1				1		
27	0811	3			1			1	1	1	1	1	1	1	199
28	0815	2							2	1	1				
29	0938	4			3			1					1	2	447, 316
30	1000	1				1							1		
31	1047	1			1					1	1			1	185
total		46	7	1	18	3	4	7	6	5	5	3	6	9F	

Table 9. Southern San Ysidro Mountains

			Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group					
Grp #	Time	Grp Size	Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear	# with collars	IDs
32	1130	3	2			1					1				
33	1200	5			4		1			1	1	1	1	2	380, 381
34	1214	3			1	1	1			1			1		
35	1218	11	2	2	4		1	1	1		1				
36	1245	8			7			1					1	5	389, 269, 387, 391, 388
37	1251	2		1					1	1	1		1		
38	1258	6	2		3				1	1				2	379, 390
Total		38	6	3	19	2	3	2	3	4	4	1	4	9F	

Table 10. Vallecito Mountains

			Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group					
Grp #	Time	Grp Size	Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear	# with collars	IDs
39	1433	3			1				2	1				1	372
40	1438	16	4	2	7	1			2	1	1			3	341, 340, 370
41	1510	1						1					1		
42	1524	1							1			1	1		
43	0737	1					1				1				
44	0801	18	1	3	11	2			1	1		1	1	4	343, 377, 342, 345
45	0908	4			3			1			1				
46	0919	5		1	2		1	1		1	1	1	1	1	324
47	0940	9	2	1	5				1	1		1	1	1	366
48	1101	1		1							1				
49	1112	2			1				1	1				1	177
50	1128	11	3	2	3	1		1	1				1	2	321, 328

Table 11. Carrizo Canyon Region

			Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group					
Grp #	Time	Grp Size	Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear	# with collars	IDs
55	1027	20		3	13	1	1		2	1			1	1	335
56	1220	1	1							1					
57	1242	8	1	1	3	1			2	1		1	1		
58	1358	1							1	1		1	1		
59	1444	16	3	2	6	1	1	3		1	1	1	1	1	333
60	1457	2			2						1			1	298
61	0832	9	4	3	1		1				1				
62	0919	1					1			1		1	1		
63	1304	2			2					1					
64	1416	5		1	2	1	1			1		1			
Total		65	9	10	29	4	5	3	5	8	3	5	5	3F	

Table 12. Southern Santa Rosa Mountains

			Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group					
Grp #	Time	Grp Size	Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear	# with collars	IDs
65	0730	14	2		8	1		1	2	1			1	2	436, xxx?
66	0740	10	1	1	4		1	2	1				1	4	433, 382, 398R, 434
67	0841	3	1		1				1	1					
68	0852	1		1								1	1		
69	0954	10	1	2	5	1			1				1		
70	1011	5		1	3		1			1		1	1	2	383, 440
71	1027	11	1	1	4	1	2	1	1			1	1	1	439
72	1132	5	2		2	1				1	1				
73	1135	1			1								1		
74	1316	2			1			1			1			1	406
75	1319	1			1					1				1	404
76	1332	1							1				1		
77	1344	1			1								1		
78	1418	3			2			1		1	1			1	437
79	1433	1					1					1			
80	1440	5	1		3		1					1		2	286, xxx?
Total		74	9	6	36	4	6	6	7	6	3	5	9	13F/1M	

Table 13. Central Santa Rosa Mountains

Grp #	Time	Grp Size	Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group				# with collars	IDs
			Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear		
81	832	3			2				1	1					
82	851	4			1		1	2			1				
83	902	2					1	1		1					
84	919	8	1	1	3	1		1	1	1	1	1	1	2	413, 418
85	956	6	1	1	3				1		1			1	409
86	1002	5	1	1	2		1				1	1		1	408
87	1010	2			1	1							1		
88	1013	1			1					1		1			
89	1030	3		1	2					1	1		1	1	417
90	1037	1					1						1		
91	1206	6		1	2	2	1			1		1	1	1	415
92	1236	2							2	1		1	1		
93	1259	9			3		1	2	3	1			1		
94	1315	4		1	1			1	1	1	1			1	414
95	1436	4	4								1	1			
96	1451	8	3		1			1	3				1	1	411
97	1500	13	3	1	6	1			2	1			1	2	416, 410
98	1523	1			1					1	1			1	CSR10
99	1534	1							1	1	1				
100	1552	1							1				1		
101	1640	34	9	2	15	1	3	3	1	1	1			5	419, 355, 351, 349, 350
102	1348	3	1		2					1					
103	1356	1	1										1		
104	1411	3							3	1			1		
105	1423	1							1	1				1	357R
Total		126	24	9	46	6	9	11	21	16	10	6	12	16F/1M	

Table 14. San Jacinto Mountains

Grp #	Time	Grp Size	Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group				# with collars	IDs
			Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear		
106	0902	1						1			1				
107	0918	5			3			1	1		1		1	3	430R, 234, 427
108	0928	3	1		1	1						1	1		
109	0929	8	4		1	1	1	1			1			1	426R
110	0930	5		1	1	2		1					1		
111	0940	11	2		6	1	1	1		1	1		1	2	429, 428
112	0950	8	3		4		1						1	2	431, 237
113	1007	4			1		2	1					1		
114	1010	9	1	1	4			2	1			1	1	1	432
Total		54	11	2	21	5	5	8	2	1	4	2	7	7F/2M	

Table 15. Northern Santa Rosa Mountains

Grp #	Time	Grp Size	Group composition-enter the # of sheep in the group that belongs in each of the following categories							Enter a 1 in the box for each observer who saw the group				# with collars	IDs
			Lamb	Yrlg Ewe	Adult Ewe	Cl. I Ram	Cl. II Ram	Cl. III Ram	Cl. IV Ram	Left Front	Left Rear	Right Front	Right Rear		
115	1143	1			1								1	1	(BI sheep)
116	1145	4	3		1							1	1		
117	1151	2		1	1								1	1	422
118	1156	1			1					1		1	1	1	266
119	1205	2			1	1					1			1	451
120	1247	1			1							1		1	421
121	1250	5	2		1			1	1				1		
122	1308	2		1		1							1		
123	1315	3	1		2								1	1	423
124	1405	4			4					1	1		1		
125	1441	2			1		1						1		
Total		27	6	2	14	2	1	1	1	2	2	3	9	6	