

Message to 2019 sheep count volunteers

I would like to personally thank all of you for withstanding hot conditions for 3 days in order to help ABDSP with their 49th annual sheep count. The data collected by all of you for ABDSP are also utilized by California Department of Fish and Wildlife (CDFW). Your count data are used by CDFW as an indicator (index) of abundance within the local areas surrounding the count sites. Because ABDSP sheep count is the longest running and consistent count within the peninsular ranges, it allows us to track long-term trends in ewe abundance, lamb survival and lamb recruitment within the recovery regions where count sites are located. As the CDFW sheep biologist, it is my responsibility to monitor, year-round, the status of all radio-collared sheep throughout their range (San Jacinto Mountains to the US/Mexico border). It is a daunting task for one person to perform and becomes even more difficult during the hot summer months especially at very remote sites such as Rattlesnake Springs. Therefore, I cannot begin to express my appreciation for the invaluable information all of you provide on sheep status, health (and specifically the health of radio-collared sheep) and on water availability at this critical time of year! I enjoyed visiting some of the count sites and found a very diverse and interesting group of people that devoted their valuable time to this effort. The following information is a sample of how CDFW uses the ABDSP sheep count data. I look forward to seeing all of you next year!

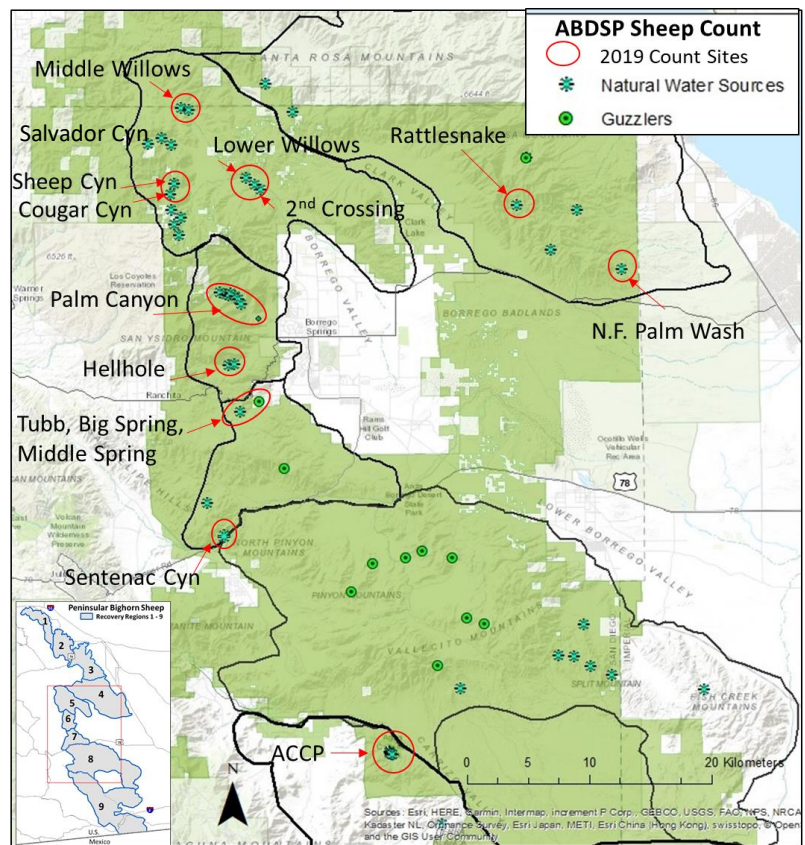
With Gratitude, Janene Colby CDFW biologist

Background Information - Map 1 shows the known water sources and the 2019 count site locations within 6 of the 9 peninsular bighorn sheep recovery regions (boundaries defined by U.S. Fish and Wildlife Service in the peninsular sheep recovery plan). Not every water source within each recovery region is counted (Map 1); therefore, the numbers of sheep counted is not a census of the total population but rather a representative sample of the greater population.

CDFW groups count sites by recovery region (Table 1). Within a recovery region, there may be one or several groups of sheep. We are particularly interested in ewes because they are solely responsible for raising their lambs and teaching their lambs how to survive for the first year of their lives. A group of ewes that live within the same geographic area, use the same resources, and have similar seasonal patterns of movement are referred to as a ewe group. Rams live within the same areas as ewe groups, but their social and physiological requirements are different from ewes. Most ewes may live their entire lives within the same ewe group, whereas rams may move between ewe groups especially during the breeding season. It is more informative to break up the count numbers by recovery regions so that we can

closely examine how each group is doing. When all groups are lumped together, it may wash out important differences or changes in numbers that may be occurring in one ewe group but not in another group. For more detailed information on ewe groups within each recovery region refer to CDFW Peninsular bighorn sheep annual reports found at:

<https://www.wildlife.ca.gov/Conservation/Mammals/Bighorn-Sheep/Desert/Peninsular>



Map 1. ABDSP Annual Water hole count sites within Recovery regions 4 (southern Santa Rosa Mountains: SSRM), 5 (Coyote Canyon), 6 (northern San Ysidro Mountains: NSYM), and 7 (southern San Ysidro Mountains: SSYM). In 2019, sheep were also counted in Sentenac Canyon (recovery region 8) and at Agua Caliente County Park (recovery region 9).

Table 1 shows how CDFW groups count site totals in order to assess abundance indices, lamb survival and lamb recruitment by recovery region. Lamb:ewe ratios (number of lambs ÷ number of ewes observed) provide an index of the percentage of lambs that survived their first 6 months of life (Lamb survival). Most lambs that get pneumonia will die prior to the sheep count; therefore, the number counted in July gives us a good idea of how many lambs were able to survive the first six months of life. If these lambs can obtain enough nutrition, they will hopefully live to become yearlings and adults. Yearling:ewe ratios (number of male and female yearlings ÷ number of ewes observed) provide an index of how many lambs survived the previous year (Lamb recruitment). Because female yearlings are often misidentified as adult ewes (especially when viewing through a spotting scope), we assume that lamb recruitment indices at all count sites are underestimated in most cases.

There are numerous factors that may influence the number and composition (sex and age) of sheep observed at water holes each year including an increase/decrease in sheep births/deaths, immigration/emigration, counting errors, the number of sites counted per recovery region, topography at count sites (sightability), and environmental conditions. We have yet to dig deep into the data to attempt to tease out which factors may be most responsible for changes in numbers in any given year; however, environmental conditions probably account for the largest amount of fluctuation. Figures 1 – 3 show the numbers of sheep counted, ewes counted, and lamb:ewe ratios for the past 20 years in recovery regions 4 – 7. While the number of ewes, lambs, and yearlings, within each recovery region may fluctuate each year based on waterhole count numbers, when combined the long-term trends have remained stable overall (Figure 4).

Table 1. Number of sheep observed by water hole site and by recovery region for ABDSP 2019 Sheep count. Two new count sites were added: Sentenac Canyon in Recovery region 8 and Agua Caliente County Park in Recovery region 9. Numbers and percentages may differ from the official ABDSP total due to the difference in how CDFW grouped or separated count sites.

Region	Area	Ewes	Lambs	Yearling		Rams	unk	Total	lamb:ewe ratio	yrling:ewe ratio	ram:ewe ratio	% collared observed
				M	F							
4-SSRM	Rattlesnake	20	20	2		4		46	100%	10%	20%	
4-SSRM	NF Palm Wash	5	1			0		6	20%	0%	0%	
	SSRM Total	25	21	2	0	4	0	52	84%	8%	16%	100%
5-Coyote Cyn	Upper Middle Willows							0				
5-Coyote Cyn	Middle Willows	14	8	1	1	4		28	57%	14%	29%	
5-Coyote Cyn	Cougar Canyon					3		3	0%	0%	0%	
5-Coyote Cyn	Sheep Canyon					1	1	2	0%	0%	0%	
5-Coyote Cyn	lower Willows	4			1			5	0%	25%	0%	
5-Coyote Cyn	2nd crossing	10	4		1	9		24	40%	10%	90%	
	Coyote Cyn Total	28	12	1	3	17	1	62	43%	14%	61%	75%
6-NSYM	Lower hellhole	7	2		1	6		16	29%	14%	86%	
6-NSYM	Upper hellhole					1		1	0%	0%	0%	
6-NSYM	4th Grove PC	2				4	6	12	0%	0%	200%	
6-NSYM	3rd Grove PC	8		4	1	14		27	0%	63%	175%	
6-NSYM	2nd Grove PC	9	4	1	2	11	1	28	44%	33%	122%	
6-NSYM	1st Grove PC	9	2	1	2	9		23	22%	33%	100%	
6-NSYM	Pupfish pond	1				5		6	0%	0%	500%	
	NSYM Total	36	8	6	6	50	7	113	22%	33%	139%	70%
7-SSYM	Big Spring					0		0	0%	0%	0%	
7-SSYM	Middle Spring					1		1	0%	0%	0%	
7-SSYM	Tubb Canyon overlook					7		7	0%	0%	0%	
	SSYM Total	0	0	0	0	8	0	8	0%	0%	0%	0%
	Total for Regions 4 - 7	89	41	9	9	79	8	235	46%	20%	89%	86%
New Count Sites												
8-VM	Sentenac Canyon					4		4	0%	0%	0%	0%
9-Carrizo	Agua Caliente County park	21	6		3	4		34	29%	14%	19%	100%

Review of 2019 sheep count results by recovery region

SSRM - Volunteers at Rattlesnake Spring stated that every ewe that came over the ridge had a lamb at her side; therefore, lamb survival was 100% for that count site. Combined with the numbers at N.F. Palm Wash tenaja, the total

index of lamb survival for the SSRM recovery region was 84% (anything over 30% is considered very good)! However, the number of lambs that survived through 2018 was not very high based on the yearling:ewe ratio of only 10% at Rattlesnake Spring (no yearlings were observed at NF Palm Wash). The volunteers at Rattlesnake saw 6 collared sheep (3 wearing satellite collars) and the volunteers at NF Palm Wash Tenaja saw 2 collared sheep (1 wearing a satellite collar) for a total of 100% radio-collared sheep observed (refer to satellite maps of sheep locations during the count at the end of this report). While only 2 sites were counted within this recovery region, Rattlesnake Spring provides the highest quantity of water and is the most reliable source for the recovery region; however, in 2001 and in 2017 the spring was dry during the count period.

Coyote Canyon – The lowest number of ewes (28) were observed in Coyote Canyon since 2003 (Figure 2). In contrast, the average number of ewes counted between 2004 and 2018 was 46. In 2019, lamb survival was at 43% and lamb recruitment was 14%. Low numbers of ewes counted can have a greater influence on lamb:ewe and yearling:ewe ratios. The relatively cool weather may have played a role in lower numbers of ewes coming to water during the 2019 sheep count period; however, temperatures in general have increased over time which should result in higher count numbers. We will continue to keep a close watch on this ewe group. Sheep that typically use Lower Willows preferred to obtain water from 2nd Crossing this year. There may be several reasons for this shift, including a change in vegetation availability in Box Canyon and the canyons to the west of Lower Willows and changes in accessibility to the creek. Over the past 49-year sheep count history, the numbers of sheep observed during the count at Cougar and Sheep Canyons have always been low. The ewe group that uses this area during the summer months, has a large variety of water sources (Refer to Map 1) that are virtually inaccessible to humans during the summer months. The creeks within these canyons dry up at the lower ends and are more reliable at the upper, higher elevation sites during the summer months. As a result, it is difficult for sheep count volunteers stationed at the lower ends of Cougar and Sheep Canyons to spot sheep within this ewe group. This is an example of how rough, steep terrain in canyons with many branches may influence sheep “sightability” and does not reflect a lack of sheep within this area. Therefore, sheep counters should be thrilled when they get the opportunity to see even a few sheep within this area.

NSYM – The original raw numbers of sheep observed in Palm Canyon for 2019 were significantly higher than in all other years, yet lamb survival has been very low since 2005. As a result, Mike and I closely examined sheep group composition at each count site, sightings of radio-collared sheep, and times of sheep arrivals at count sites and lowered the official count numbers based on expert knowledge of this ewe group (Table 1). Only 3 of the 6 radio-collared ewes that were present in Palm Canyon during the count were observed, indicating that only 50% of the ewe group came down to water from the slopes above. Also, collared ewe 308 was observed at multiple sites over the course of the count yet few non-collared ewes were recorded as “repeats”; this is further evidence that count numbers were artificially inflated. We do not mean to imply that the volunteers did not do a great job, they did! Rather, due to the behavior of these sheep spending all day near water sources and moving up and down the canyon, and the difficulty in distinguishing unmarked animals, it is very difficult not to double count in this canyon. However, if only one or two sites were staffed with volunteers, sheep may be undercounted. Examination of historical count data show that sometimes sheep were only seen in the upper canyon and other times only seen in the lower canyon. Therefore, it is better to staff all sites and closely examine the data post-survey than to miss sheep all together. In contrast, sheep in Hellhole Canyon have only a few closely located water sources. Therefore, it is logistically easier for 2 count sites to keep the comings and goings of sheep straight. There were 4 radio-collared ewes within Hellhole canyon during the 3-day count and all 4 were observed by count volunteers. Between Hellhole and Palm Canyon, 70% of radio-collared sheep were observed.

The number of ewes observed in the NSYM has increased over the past 20 years and thus far remains stable (Figure 2). In 2019, the lamb:ewe ratio was 22% (lamb survival) and the yearling:ewe ratio was 33% (lamb recruitment). Lamb survival indices were below 30% from 2005 to 2011 and have since improved with survival greater than 30% in 2012, 2014 and 2017 (Figure 3).

SSYM – Only 8 rams were observed among the 3 count sites within the SSYM and no ewes or lambs were observed (Table 1). In the past 20 years, count numbers and group composition (sex and age of sheep) are subject to wild swings from one year to the next due to the timing of movement of sheep to the Tubb Canyon area (Figures 1 & 2). In some

years, ewes were not seen at all or were observed in small numbers, which can have undue influence on lamb:ewe ratios (Figures 2 & 3). The core use area for this ewe group is Pinyon and Yaqui Ridge with approximately ½ of the group moving to the Tubb Canyon area during the summer and fall months (the other half remains on Pinyon Ridge). The timing and duration of their movement to Tubb Canyon is likely dependent on weather conditions and vegetation availability on Pinyon Ridge. Furthermore, there have been changes to Tubb Canyon due to decreasing water availability/accessibility at natural and man-made water sources, flood and fire regimes in recent years, as well as the loss of the count site closer to the Tubb Guzzler on private land. The new Middle Spring count site was added this year so that sheep could be viewed at a closer distance in order to better assess sheep health conditions. Unfortunately, this year most ewes (at least the radio-collared ewes within this ewe group) had not yet moved off the south slopes of Pinyon Ridge to Tubb Canyon. Likely, relatively cool nights at the time of the count, as well as good vegetation on Pinyon Ridge due to spring rains have allowed sheep to remain longer on Pinyon Ridge. In the SSYM throughout the spring, I observed approximately 17 ewes per observation and in May the lamb:ewe ratio was 35%. However, I will continue to keep a close watch on sheep in the SSYM throughout the remainder of the year. As our climate rapidly changes, and weather becomes less predictable, we might start to see more changes in sheep habitat use especially during the summer months.

New Count sites - The numbers obtained from the new count sites at Sentenac Canyon (recovery region 8) and at Agua Caliente County Park (recovery region 9) were not included in my overall count total (Table 1) so that comparison of count numbers could be made with the past 20 years in regions 4 – 7 (Figures 1-3). Likely due to the cool nights during the sheep count, none of the radio-collared ewes in the lizard Wash ewe group moved to Sentenac Canyon to obtain water. However, the volunteers did see some rams that they stated did not go down to drink but were foraging in the area. The volunteers also found a better spot higher on the slope which gave them a better view. Due to the extremely steep slopes in this narrow canyon, sheep sightings are rare even though they frequent this canyon during the summer and fall months. I will often detect their radio frequencies while driving through the canyon but will rarely be able to find them! Please pass the word to others to drive slowly and carefully through this canyon as sheep often cross the highway in this area.

Agua Caliente County Park (ACCP) volunteers were treated with getting to meet Pat, one of my favorite ewes! For those of you that did not attend the orientation, Pat is a ewe that looks and acts like a ram. The number of ewes and rams observed were typical for this time of year with a lamb:ewe ratio of 29% and a yearling:ewe ratio of 14%. I was also able to download the data from ewe 463's GPS collar and a map of her locations during the count is at the end of this report (along with the satellite data from 4 ewes in the SSRM).

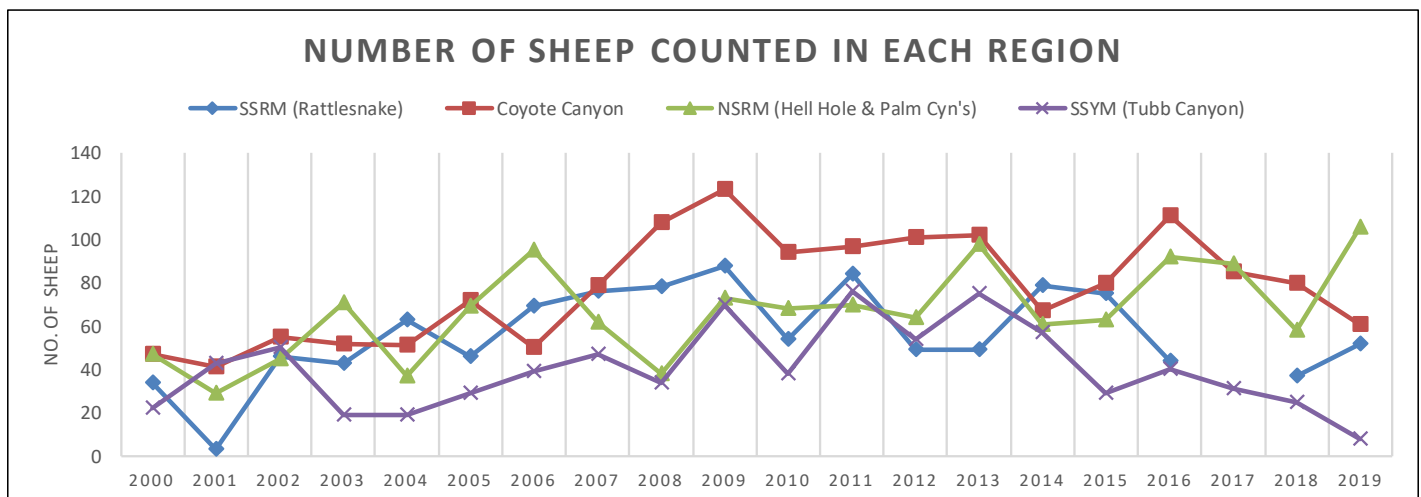


Figure 1. Number of bighorn sheep counted during the 3-day summer ABDSP count within each recovery region for the past 20 years (2000 – 2019). Rattlesnake spring was not counted in 2017 due to no water at the spring

Figures 2 – 4 on following page

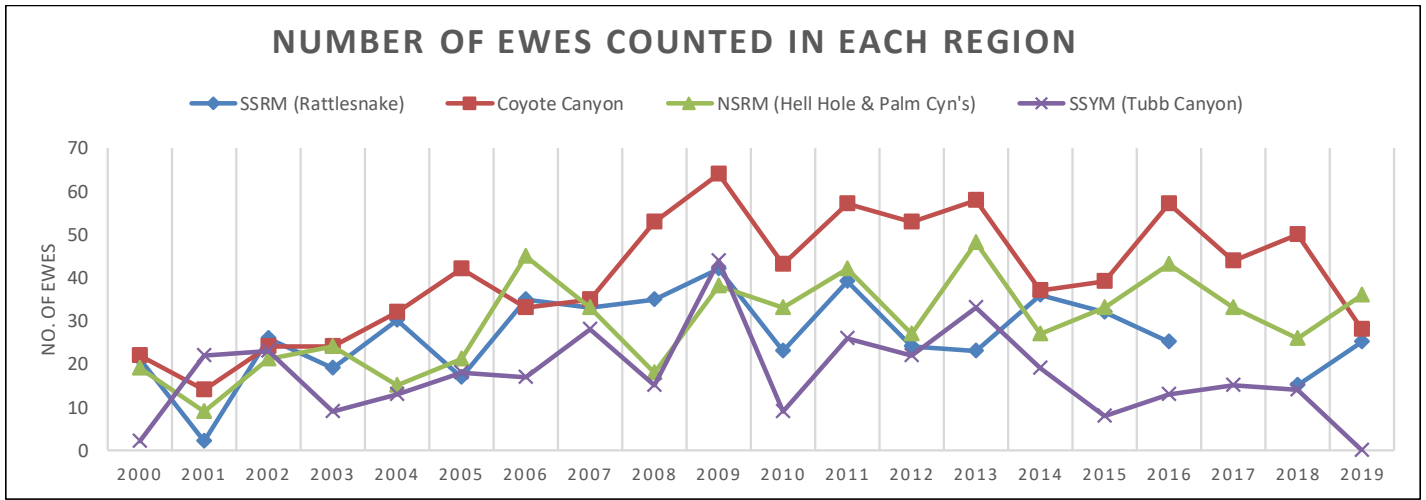


Figure 2. Number of ewes counted during the 3-day summer ABDSP count within each recovery region for the past 20 years (2000 – 2019). Rattlesnake spring was not counted in 2017 due to no water at the spring.

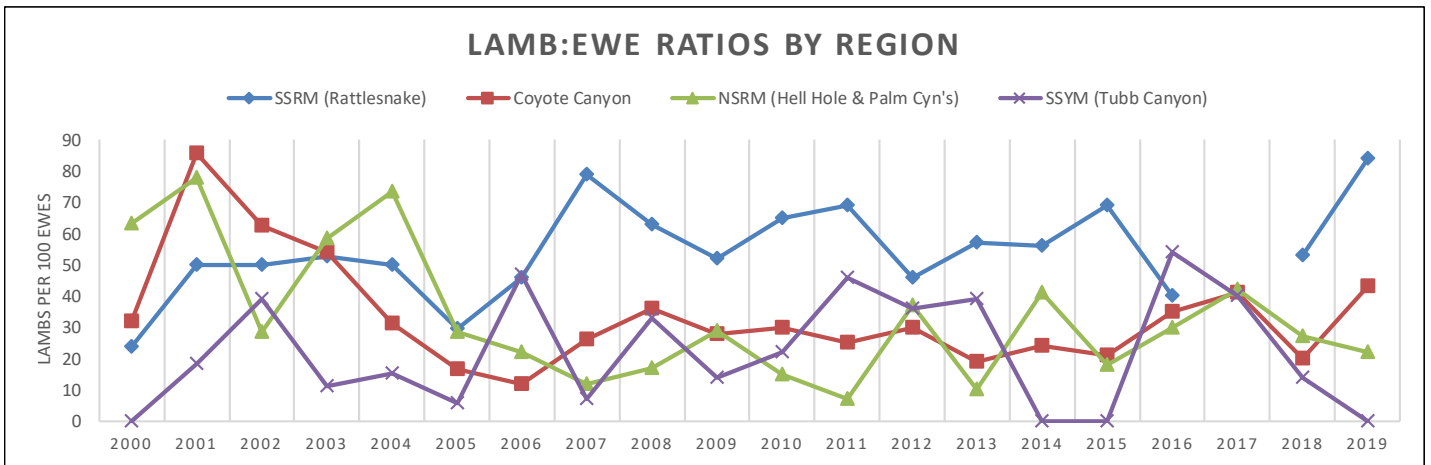


Figure 3. Lamb:ewe ratios (lamb survival to 6 months) by recovery region from ABDSP water hole count data from 2000 to 2019. No lambs were observed in SSYM in 2000, 2014 and 2015 and no ewes or lambs were observed in 2019.

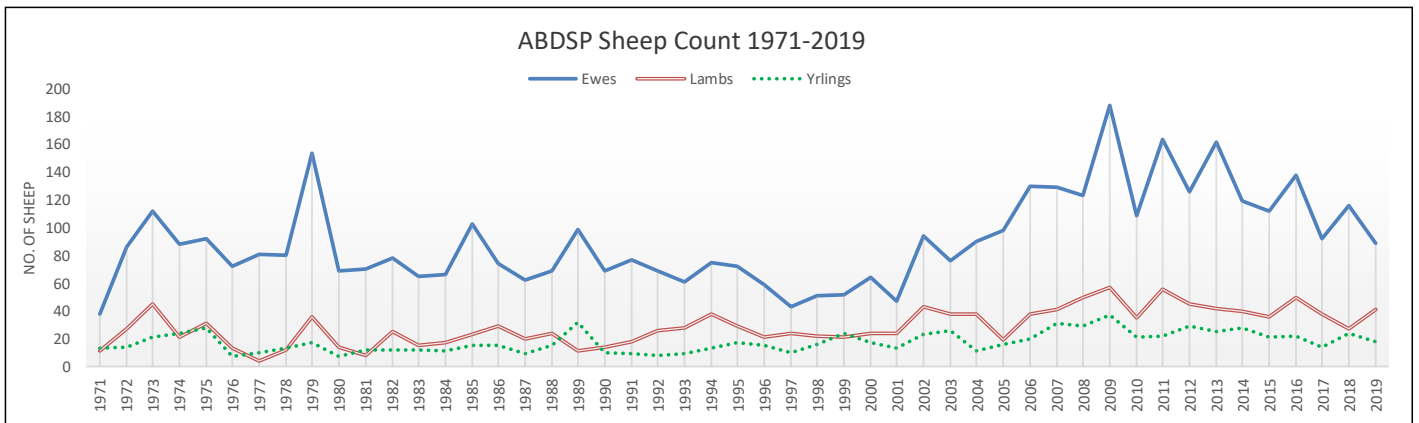


Figure 4. Raw numbers from sheep count data combined from all sites in regions 4 – 7 over 49 years. The 49-year average number of ewes, lambs, and yearlings observed is 46, 16, and 9 respectively.

Satellite and GPS-collared sheep data on following 2 pages

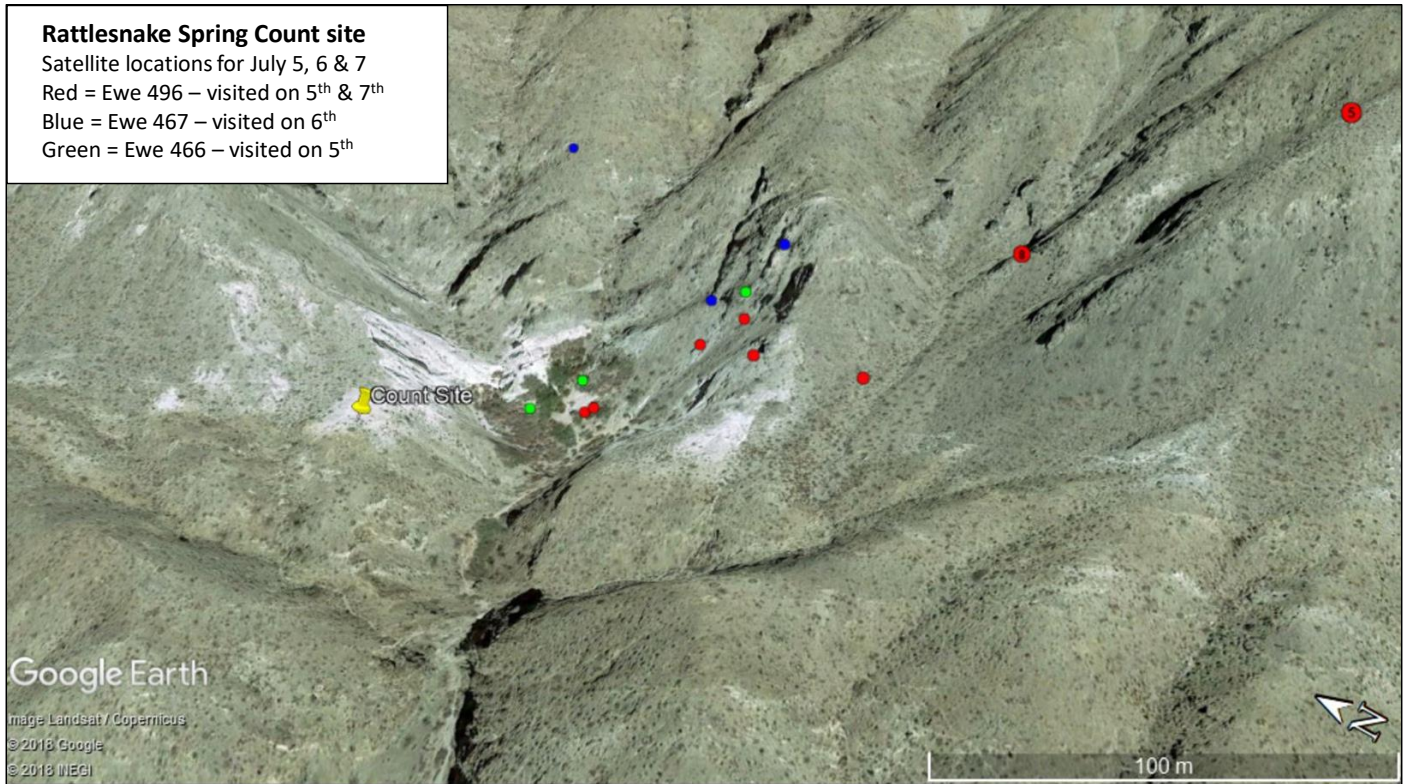
Rattlesnake Spring Count site

Satellite locations for July 5, 6 & 7

Red = Ewe 496 – visited on 5th & 7th

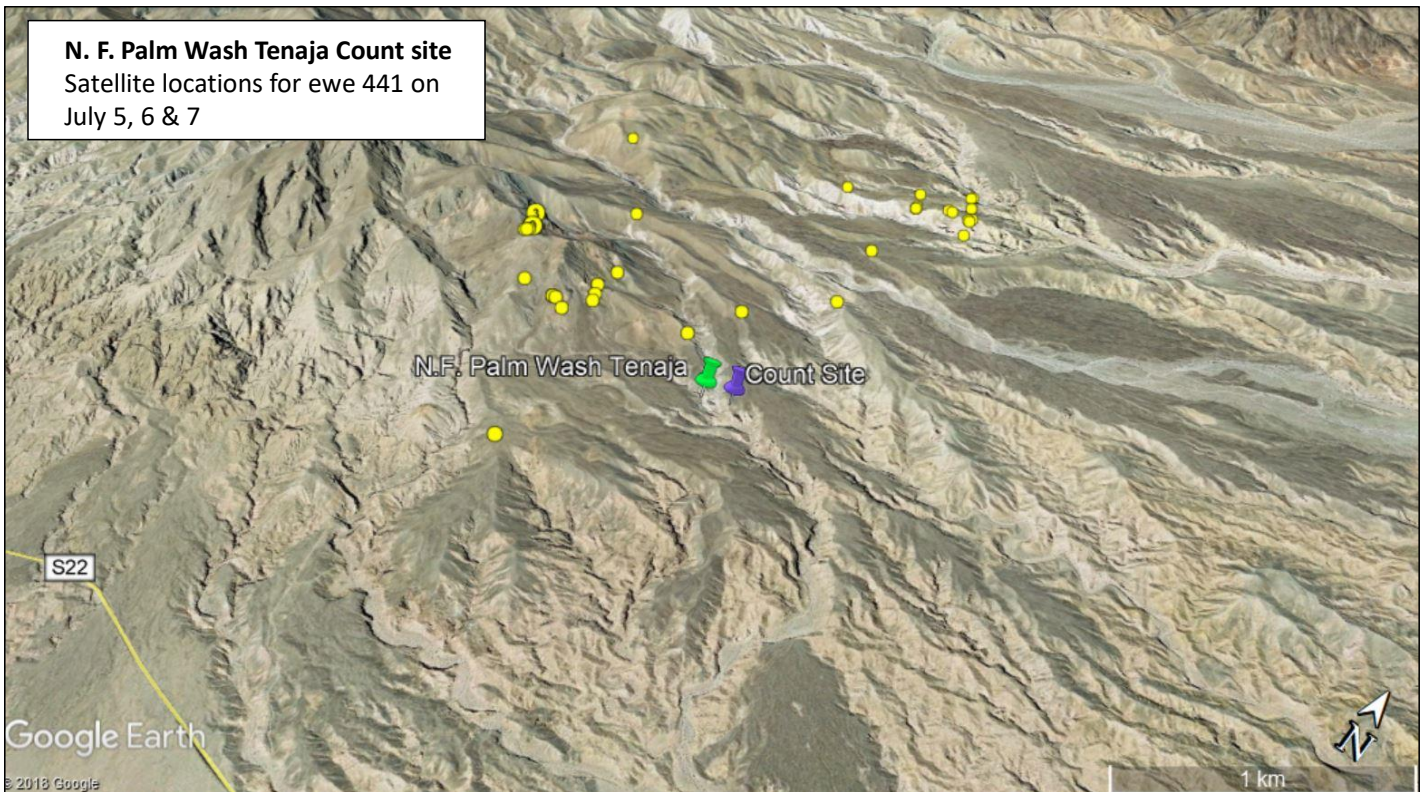
Blue = Ewe 467 – visited on 6th

Green = Ewe 466 – visited on 5th



N. F. Palm Wash Tenaja Count site

Satellite locations for ewe 441 on
July 5, 6 & 7



Agua Caliente County Park Count site
GPS locations for ewe 463 on July 5
(red), 6 (orange) & 7 (green).

