Population Survey of Male Northern Elephant Seals at the Piedras Blancas Rookery during the Molting Season: Year Two

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Abstract:

Sub-adult male (SAM) and adult male northern elephant seals (NES) at the Piedras Blancas rookery were surveyed during the molting season using noninvasive methods. Counts were made from on top of the bluffs using binoculars as a means of investigation that could be performed within full view of the public, without raising concerns about disturbance of the seals. This second survey in a three year study is compared to the previous survey.

Counts from this survey support similar migratory schedules for SAM-3, SAM -4, and adult males. The numbers of seals surveyed on each beach were fairly consistent with the prior year, with the predominant beaches continuing to be those that are south-west facing, somewhat protected, and able to accommodate the seals. This survey, as opposed to last year's survey when we counted SAM-1s and -2s together, shows how the large numbers of SAM-1s counted early in the molting season make it difficult to assess the migratory schedule of the SAM-2s The data in Figure 4b, without the SAM-1s, allowed us to have a better understanding of the SAM-2s migratory schedule. The adult male peak count (207) shows a decrease of 14% from that of the 2014 molting season (241). We will assess this decrease when we count adult males during the 2016 breeding season. The classification criteria distinguishing SAM-3s and -4s were amended to include size and the beginning of a notch (crease) in the proboscis.

Introduction:

This study aimed to provide another chapter in a three year survey of all beaches that comprise the Piedras Blancas rookery where sub-adult and adult male northern elephant seals haul out. This was done to obtain a better understanding of male population movements and numbers at the Piedras Blancas Rookery during the molting season. As this is the second of a three year study, the counts obtained in this paper are compared to the previous study's counts and are used to make more solid conclusions in regards to the normal population numbers for the various age categories of northern male elephant seals. In addition, knowing the numbers of adult males that are available each year for the breeding season will provide some assessment as to their ability to breed the large number of adult females.

This study enhanced the 2014 molting season methodology by improving the classification criteria of sub-adult categories. SAM-1s and SAM-2s were classified into separate categories to better understand the migration schedules of younger sub-adult males. The SAM-1s schedule appeared to be similar to that of the juveniles in the 2014 molting survey. This means the previous study may have

missed the SAM-1 peak as they most likely molt along with the juveniles and females earlier in April/May of the year rather than with the sub-adult categories 2-4 and adult males which appear to molt late June through August. In addition, we looked for a better way to categorize the SAM-3s and SAM-4s as the 2014 molting survey may have been flawed, resulting in a count of more SAM-4s than -3s which is unlikely. This study set out to classify SAM-3s and -4s by more distinct morphological features. The level of unclassified seals in each survey motivated us to double check our methods for the overall count and also to aid in categorization in situations where beach conditions were poor because of weather conditions such as fog or bright sun.

Materials and Methods:

The time horizon for this survey was June through August, the summer male molt. In order to obtain a complete survey of post-puberty male northern elephant seals at the Piedras Blancas Rookery during the molt, this study incorporated the range of beaches between VP-2 and the old Piedras Blancas Motel (Fig. 1).[1] Arroyo Laguna is not surveyed in the molting season because there are no seals present.

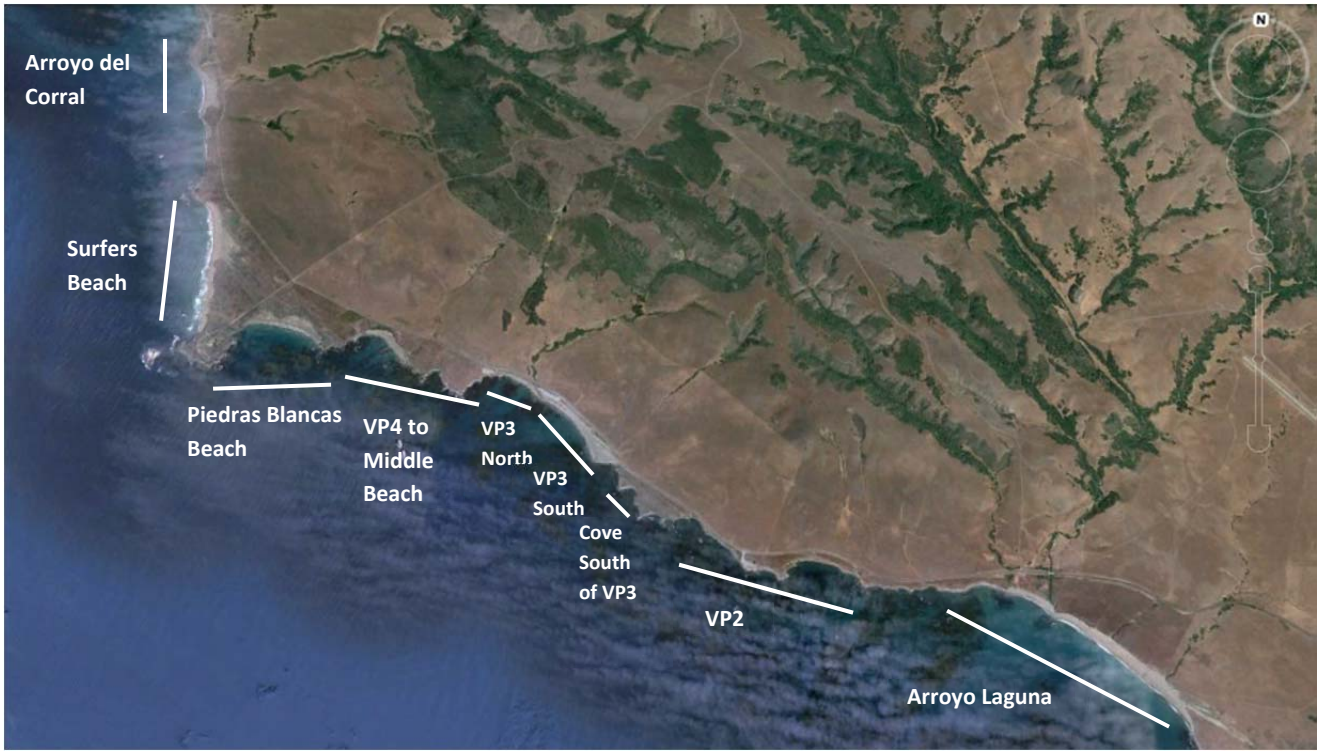

Figure 1. Beaches where population counts were performed.

After personal communication with Richard Condit (Smithsonian Tropical Research Institute) and Patrick Robinson (Año Nuevo Island Reserve Director), classification of male elephant seal sub-adult and adult categories were accomplished using Año Nuevo's field identification system (Fig. 2) with a few

minor alterations. Seals of categories SAM-1 and SAM-2 were distinguished by nose development. SAM-1s were defined as having either no nose droop or slight hanging nose droop that did not touch the sand. SAM-2s had a nose droop that touched the sand. When classification was unclear, size was used to differentiate (Fig 2). This is why, beginning with the June 30 survey, there was a larger total of unclassified seals. As the SAM-1s started to leave the beaches, classification became much simpler and the unclassified count dropped.

SAM-3 seals were classified based on distinct morphological features including that they have a nose droop almost like an adult but neck shield that does not extend to the eye line. In addition, we discovered a helpful method to differentiate SAM-3s versus SAM-4s by noting the beginning of a notch in smaller seals that last year may have been called SAM-2s and this year because of the notch were called SAM-3s. This beginning of a notch was like a small crease across the nose where the notch would be in SAM-4s and adults. SAM-4 seals were classified as having a full size nose and a chest shield that extends halfway up the neck, but not above the eye-line. Complete details of the beaches surveyed (latitude/longitude) and the categorization of sub-adult and adult male northern elephant seals besides the two changes above can be found in reference 1.

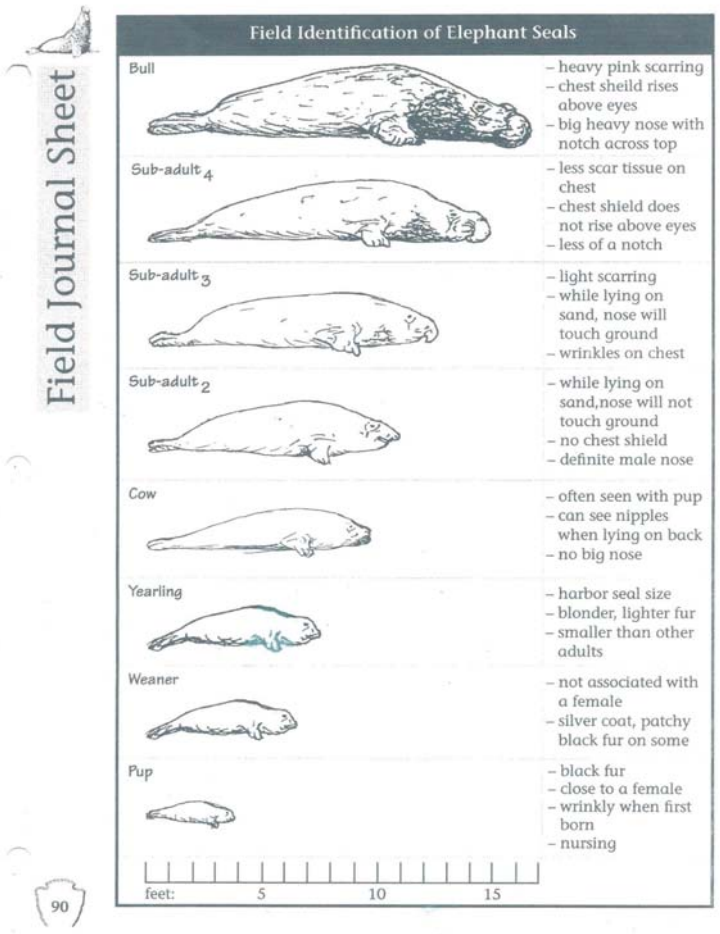

Figure 2. Año Nuevo's age category field identification system. (Obtained from Año Nuevo Interpretive Guide for Docents, 2013)

Counts were made from on top of the bluffs using binoculars as a means of noninvasive investigation that could be performed within full view of the public, without raising concerns about disturbance of the seals. This approach came with some difficulties as ideal viewing angles could not always be accomplished, and the thigmotactic behavior of the elephant seals made identification in large groups challenging. As a result, it was sometimes necessary to use body size as a best estimate for age class when neither chest shield nor nose was visible. If neither body size nor identifying characteristics could be determined, seals were counted as unclassified. At times, dependent upon environmental conditions, seals go into the water or line up facing the horizon near the shore line. To address the classification challenge caused by such behavior and to minimize the number of unclassified seals, counts were performed early in the morning when the majority of the seals were far up the beach and facing towards the bluff. This resulted in a sharp decline in the percent of unclassified individuals after July 28. Counts were made individually by

two observers and then compared; if the number of total seals differed by more than 5%, counts were rejected and performed again. If the observer's recounts differed by less than 5%, they were retained. Each beach was surveyed every other week, beginning on June 16th and ending on August 25th.

Results:

The number of sub-adult males inhabiting the beaches decreased throughout the molting season, to near zero by the end of August (Fig. 3). The earliest sub-adult count, in mid-June, was dominated by the SAM-1s who arrive early in the season and are departing during the early counts. Figures 4a and 4b show that SAM-2 numbers increased at the beginning of the season in large numbers through 7/14, a pattern more similar to the adults, and then decreased to almost zero by 8/11. These figures also show that the older sub-adult and adult males only begin to arrive at the time of this first count, their numbers arising to mid- or late-July and then falling to near zero at the end of August. However, the adults hauled out in larger numbers throughout that time period. The initial numbers of the sub-adult counts differ from the 2014 data reflecting the variability in the timing of their migrations.

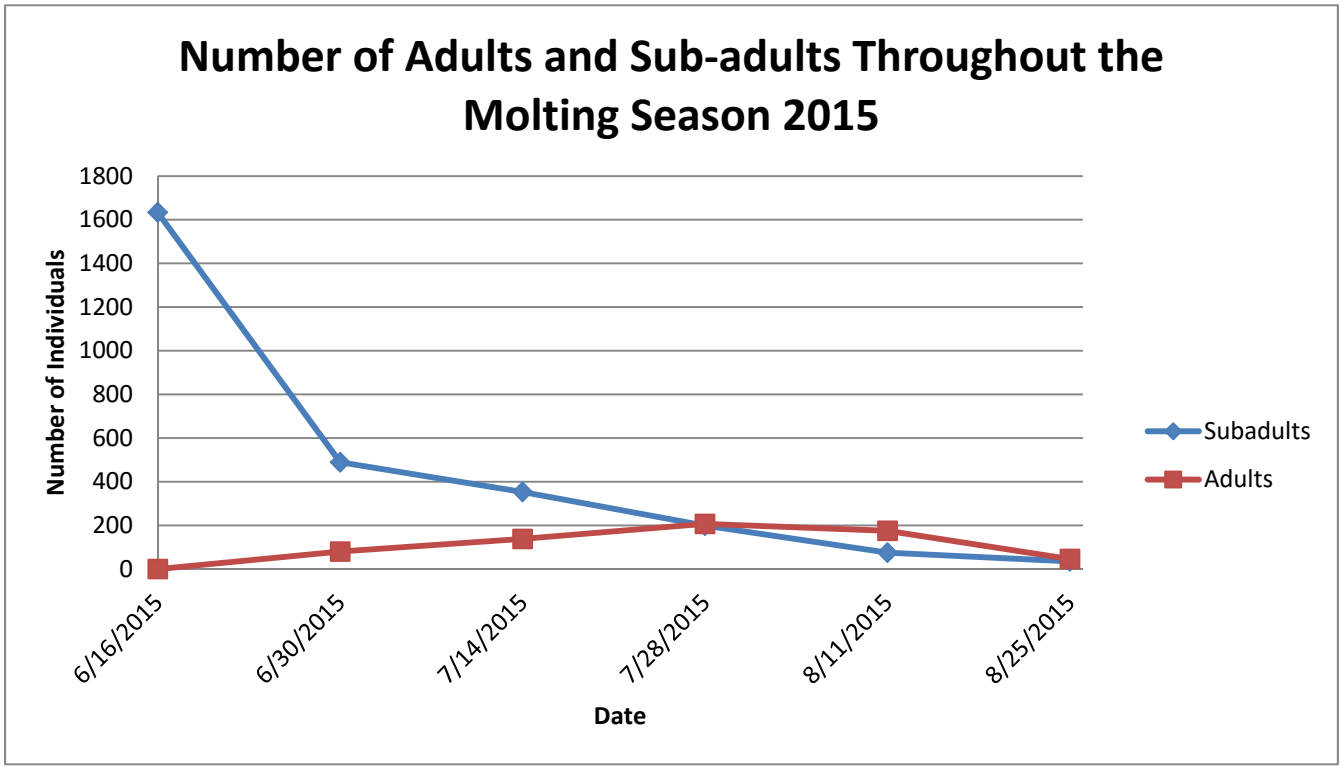

Figure 3. Number of sub-adult and adult male elephant seals throughout the molting season.

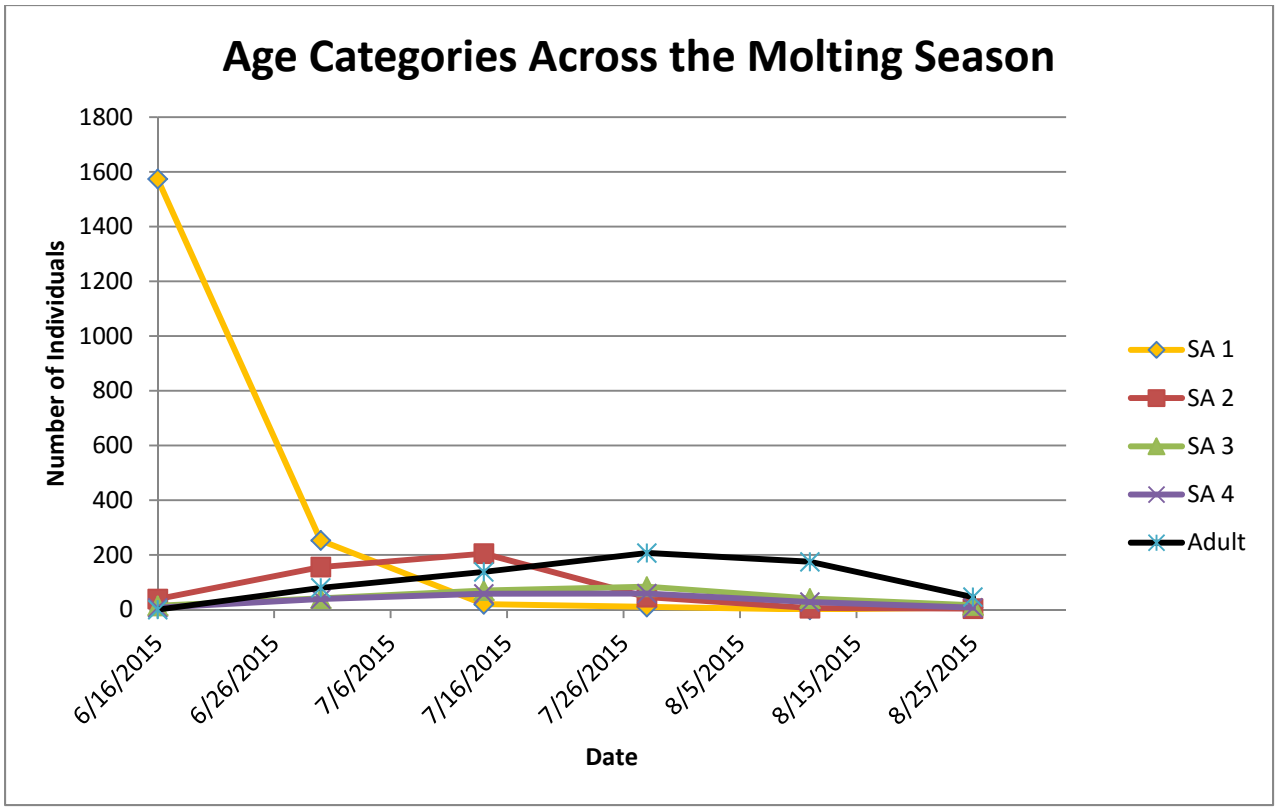

Figure 4a. Number of individuals within each age class throughout the molting season.

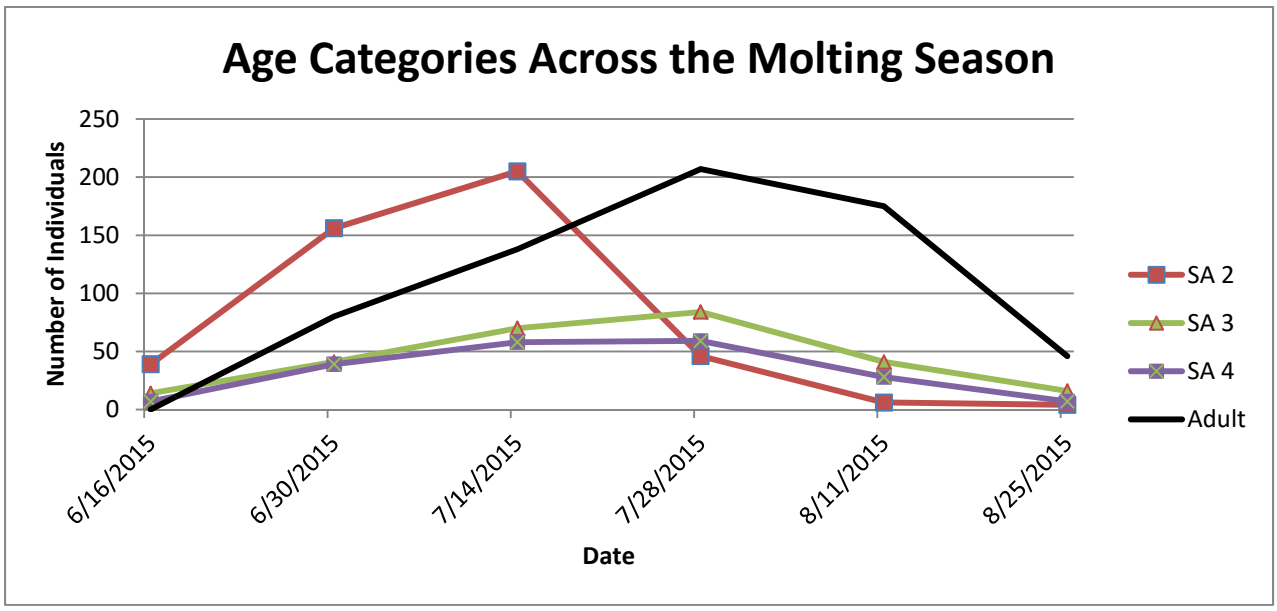

Figure 4b. Number of individuals within each age class throughout the molting season without SAM-1s to clarify SAM-2 , -3, and -4 and adult populations numbers over time.

The contribution of SAMs to the early season count in 2015 is much clearer than in the 2014 data due to the separation of SAM-1s and -2s. When the other sub-adults and adults peak, the SAM-1's have already left the beach to forage. Figure 4b also shows that the SAM-3s are present in greater numbers than the SAM-4s for every count.

VP3 North remained the most populated beach for the majority of the season, but was surpassed once in July by VP4 to Middle Beach (Fig. 5). In addition, Arroyo Del Corral had a similar total number of seals and the Cove south of VP-3 a slightly reduced number by comparison. Surfers' Beach and VP2 were by far the least inhabited of the beaches, with one seal at each beach at the start of the study, and none after June. A gradual decrease in the total number of seals was observed at all beaches throughout the molt season (Fig. 5.). Most followed the sub-adult and adult trends mentioned above, but VP2 and Surfer's beach were anomalous, dropping sharply to only a small number of seals (Fig. 5). In 2015 adult males appeared to prefer the Cove South of VP3, VP3 North, and Arroyo del Corral beaches (Fig. 6). In 2015 sub-adult males preferred VP-3 North, VP-4 to middle, and Arroyo Del Corral. In 2014 VP3 North; VP4 to middle beach; cove south of VP3 South beach had greatest numbers of adult males and sub-adult males (Fig.6).

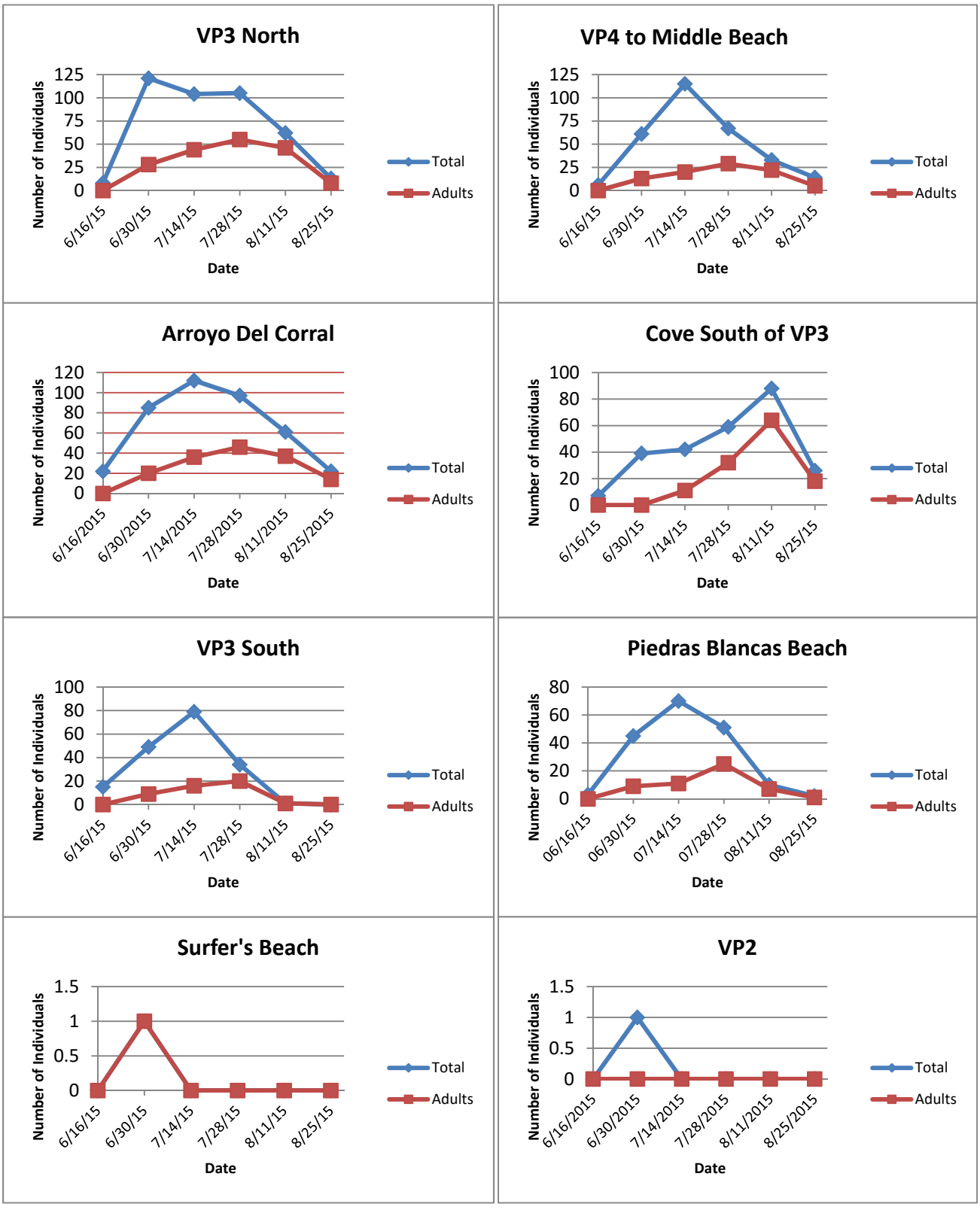

Figure 5. Number of adults and total number of seals (without SAM-1s) at each beach during 2015 molting season.

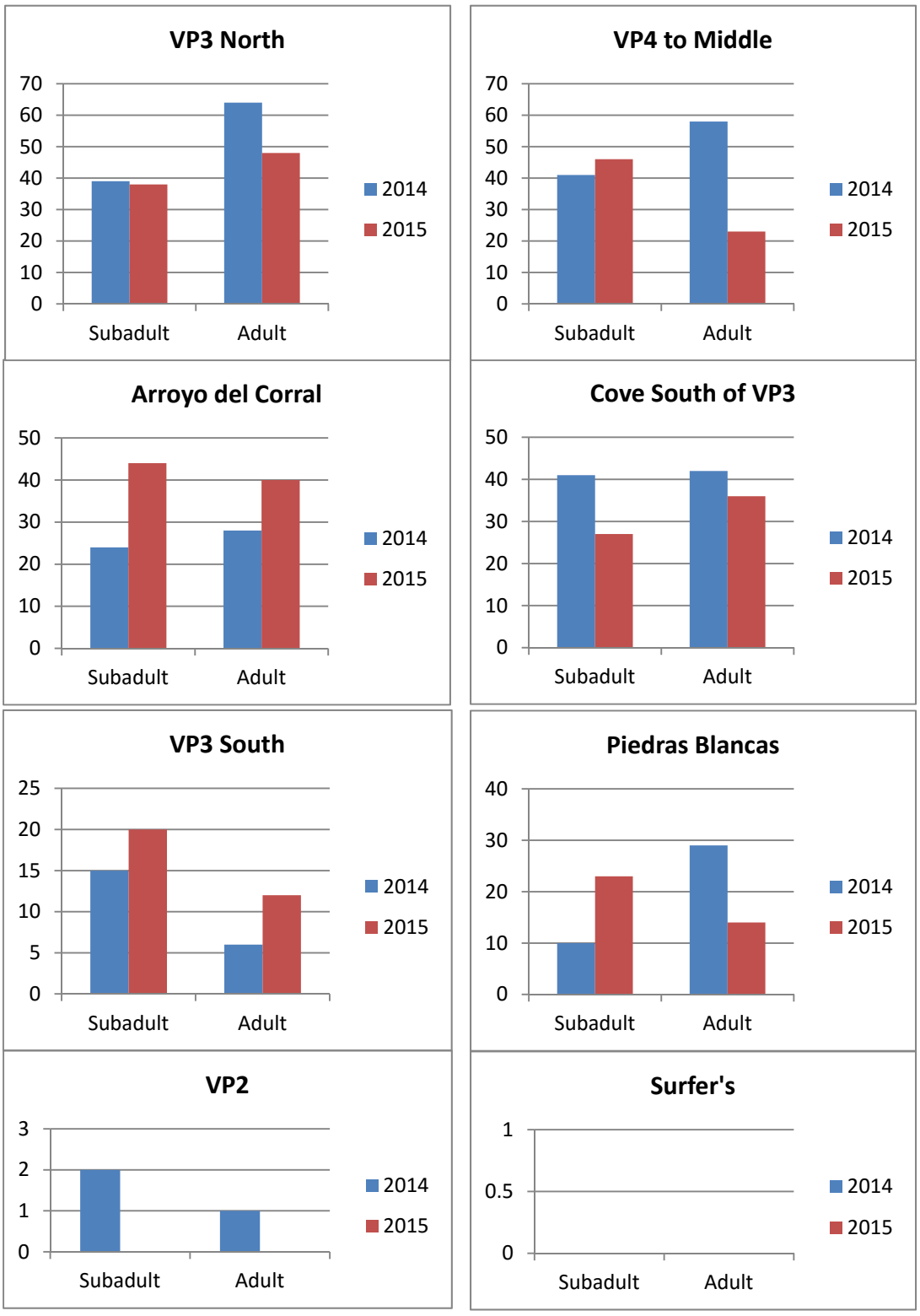

Figure 6: Comparison of male sub-adult and adult male northern elephant seals peak counts between the molting season of 2015 and 2014 by beach. Note:peak counts were calculated using the survey dates(7-14;8/11) surrounding the peak survey count on 7/28/2015 [2]

Discussion:

When compared with data from the 2014 study, counts from this study supported similar migratory schedules for SAM-3s and -4s and adult males, as the counts for these categories stayed rather consistent. The migratory schedules of the SAM-1 and -2 categories were clarified by counting them separately unlike the 2014 study in which the SAM-1s and -2s were counted together. The main point from these data is the discovery that the SAM-1 molt strongly overlaps with that of the juveniles and the adult females. The SAM-1s leave the rookery to forage in late June when all other sub-adult and adult males are beginning to haul out. With this new understanding of the SAM-1s migratory schedule, we were able to remove the SAM-1s from several of the graphs (fig. 4b, fig. 5) to better view the migratory schedule of the SAM-2s which, unlike older males, peaks in mid-July .

The change in classification rules for SAM-3 and -4 in 2014 compared to 2015 made a noticeable difference in the results. The 2015 categorization used the beginning of a notch in the proboscis (small crease) as an additional criterion, along with size. This helped to more reliably distinguish the SAM-3s from SAM-2s and assisted our ability to obtain a more reliable count of SAM-3s when compared to SAM-4s. This resulted in the number of SAM-3s being larger than that of the SAM-4s. In addition, the data suggests the SAM-3s and -4s have migratory schedules similar to that of the adults (Fig.4b).

Interestingly, the SAM-2s began hauling out in large numbers in June in a somewhat similar pattern as the adults. This pattern involved noticeably larger numbers than the SAM-3s and -4s. This migratory pattern of the SAM-2's may have been coincidental with the adults through 7/14, however at the next scheduled survey 7/28 the numbers dropped at all beaches dramatically by 78%. It would appear that the SAM-2's who have not hauled out to molt in many seasons with the adult males, and with 7/28 being the peak of adult male seals on all beaches, that maybe they were intimidated by the adults and chose to leave early. The adults on the other hand begin to haul out on a schedule similar to that of the SAM-3s and -4s except that the adult peak is disproportionately larger in late August. This may be due to some individual adult male seals having to stay longer to forage in Alaska to regain the weight lost in breeding season which meant their haul out numbers were spread over more time rather than beginning to decrease in numbers a month earlier(July 28th) as the SAM-3s and -4s did.

The comparison of adult male NES peak counts between the molting season of 2014 and 2015 by beach allowed us to assess the size of the male adult population. The number of adults counted in 2014 at their peak was 241 seals. This number was further substantiated in the breeding season count in 2015 when 246 seals were counted at the peak[3]. However, during the molting season in 2015 we counted 207 adult seals which was a decrease of 14%. If we take the average around the peak using the data collection time before and after the peak numbers above, the difference is greater, about 20% less in 2015. Some of the difference could have been due to the fact in 2014 we counted weekly and in 2015 we counted every two weeks. Then if we compare 2014 and 2015 counted every 2 weeks the decrease is back to 14%. The only way that we can assess this as a decrease possibly due to adult males molting at other beaches or a decrease in the adult male population is to repeat our breeding season count in

2016. However, Le Boeuf in unpublished observations noted that sexually mature males molt at the same location where they were bred.[4]

The 2015 survey of seal numbers at various beach locations had some interesting differences. The surfer's beach and VP2 had very few seals throughout the molting period which may have been due to surfers being present at the surfer's beach and VP2 initially having lots of SAM-1s which left at the beginning of the molting season. The Piedras Blancas beach was not as populated with adults and the VP3 South beach was more populated than in previous years which demonstrate the variability of the locations that seals choose. When compared to the 2014 data involving the different beach locations, the most populated beaches (VP3 North; Cove south of south beach; VP-4 to Middle beach; and Arroyo del Corral) continue to be those that are south west facing, protected somewhat, and have enough room to handle the number of seals present.

References:

1. Brown, C. and Goodger W. 2014 Population Survey of Male Northern Elephant Seals at the Piedras Blancas Rookery during the molting season. http://www.elephantseal.org/fordocents.html FES and Ano Nuevo research reports. Pp. 1-11.
2. Richard Condit, personal communication.
3. Hannah, S. Wolfer, K. and Goodger, W. 2015 *Population Survey of Male Northern Elephant Seals at the Piedras Blancas Rookery during the Breeding Season.* http://www.elephantseal.org/fordocents.html, FES and Ano Nuevo research reports. Pp. 1-8
4. Le Boeuf, B., Ainley, David G., and T.J.Lewis 1974 Elephant Seals on the farallones:Population Structure of an incipient breeding colony. Journal Of Mammology, Vol. 55,No. 2;Pp.370-385.