

Population Survey of Male Northern Elephant Seals at the Piedras Blancas  
Rookery during the Breeding Season

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## **Abstract**

This study examines the location and numbers of northern male elephant seals at the Piedras Blancas rookery which includes nine beaches during the breeding season. Counts were taken on male northern elephant seals, classifying them as adult or subadult using the Año Nuevo age classification system, with a few minor alterations. A non-invasive approach was used to perform the counts, from areas of public access. Three counts, at two week intervals, covering the major portion of the 2015 breeding season were conducted. This study should be repeated in three consecutive years to identify trends. The number of subadult males counted were typically lower on beaches with higher numbers of adult males, except for VP2 and VP4 Middle Beach. VP3 South and VP4 Middle Beach showed on average the highest numbers of adult male seals, whereas the Cove South of VP3 showed the lowest. The total number of adult male elephant seals counted each observation day were not significantly different, based on a one-way ANOVA. As the number of females on the beach observed at each count were declining, the male populations remained relatively constant. Distribution patterns of the males during this breeding season were compared to previously obtained counts from the male molting season, and differences in population numbers of males on certain beaches were noted.

## **Introduction**

Northern Elephant Seals are found at rookeries all along the coast of California and Baja California. Since northern elephant seals spend a majority of their life out at sea it is difficult to determine what their exact population is and where/when individuals migrate. Many studies have been done to determine the number of females and pups in the rookeries every year, but fewer studies have been done to look at the number of males present during the breeding season. Many of these studies have been performed at the Año Nuevo rookery and their findings (Lowry, et.al.,2014) have been assumed to be representative for seals located at other rookeries including Piedras Blancas. In order to study whether or not these findings are representative, a comprehensive survey of nine beaches in the Piedras Blancas rookery was performed to assess the population of adult and subadult male elephant seals.

The molting season for subadult and adult male northern elephant seals is June through August. A study conducted by Craig Brown and William Goodger determined population numbers of male northern elephant seals at nine beaches along the Piedras Blancas rookery during male molting season (Brown and Goodger, 2014). This breeding season survey is a natural follow-up study to compare and contrast population numbers of male northern elephant seals. In addition to this comparison, a major objective of this survey was to determine how many males are available for breeding the large number of females.

## **Materials and Methods**

The counts were performed on January 30, February 13 and February 28. The same method was used each day. The counts started at about 7 AM and were finished at approximately 12 PM. Male counts were taken at the various rookeries between the Piedras Blancas Motel and Arroyo Laguna (Fig. 1). The observations began at Piedras Blancas Lighthouse Beach (35.665°N, 121.280°W), which stretches from South Point to Point Piedras Blancas. Next, counts were taken at Vista Point 3 (VP3) South beach (35.659°N, 121.254°W to 35.662°N, 121.256°W). Vista Point 3 is divided into North and South beaches. The Cove South of VP3 was counted after VP3 south beach was surveyed (35.658°N, 121.253°W). After leaving Cove South of VP3, counts were obtained from Arroyo del Corral, which includes the slender beach behind the Piedras Blancas Motel and the larger, sandy beach just south of the motel (35.683°N,

121.286°W to 35.688°N, 121.289°W). Next, counts were taken at Vista Point 1 (VP1), also known as Arroyo Laguna, (35.652°N, 121.223°W to 35.648°N, 121.214°W). VP4 to Middle Beach was the next beach observed, and the only way to gain access to this beach is to hike on a trail provided (35.665°N, 121.275°W to 35.664°N, 121.262°W). Since this beach is so sheltered, the public does not view it as much as other beaches. From VP4 Middle Beach, we traveled to VP3 North, which corresponds to the northern beach of VP3 (35.664°N, 121.262°W to 35.663°N, 121.259°W). Surfer's Beach was surveyed next, and is just north of the lighthouse and Piedras Blancas Beach (35.667°N, 121.284°W to 35.675°N, 121.286°W). The last beach where counts were obtained was Vista Point 2 (VP2) (35.655°N, 121.249°W to 35.652°N, 121.227°W), which is the beach just north of Arroyo Laguna. This beach is separated into a north and south region from the parking lot, but counts from each region were summed into one total number.

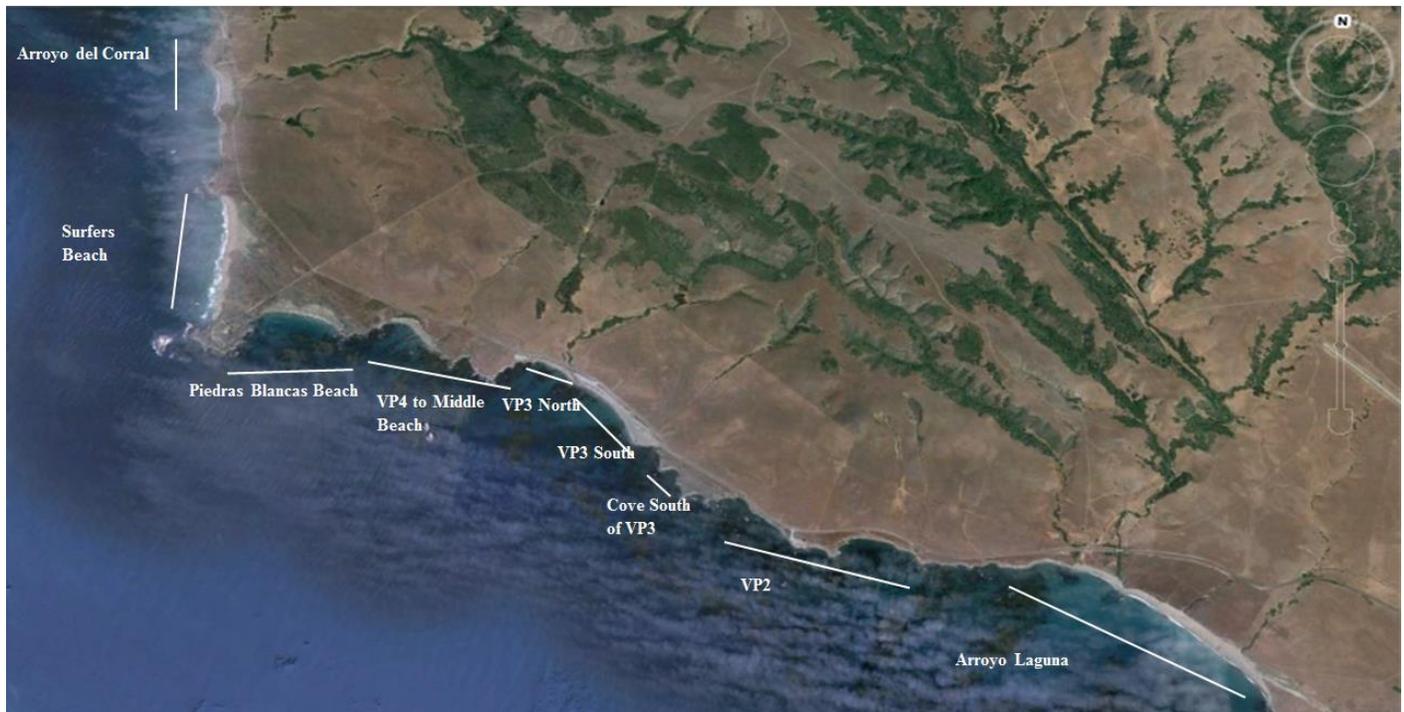


Figure 1. This figure shows the nine beaches along the Piedras Blancas rookery that was covered while surveying population movements and numbers of male Northern Elephant Seals.

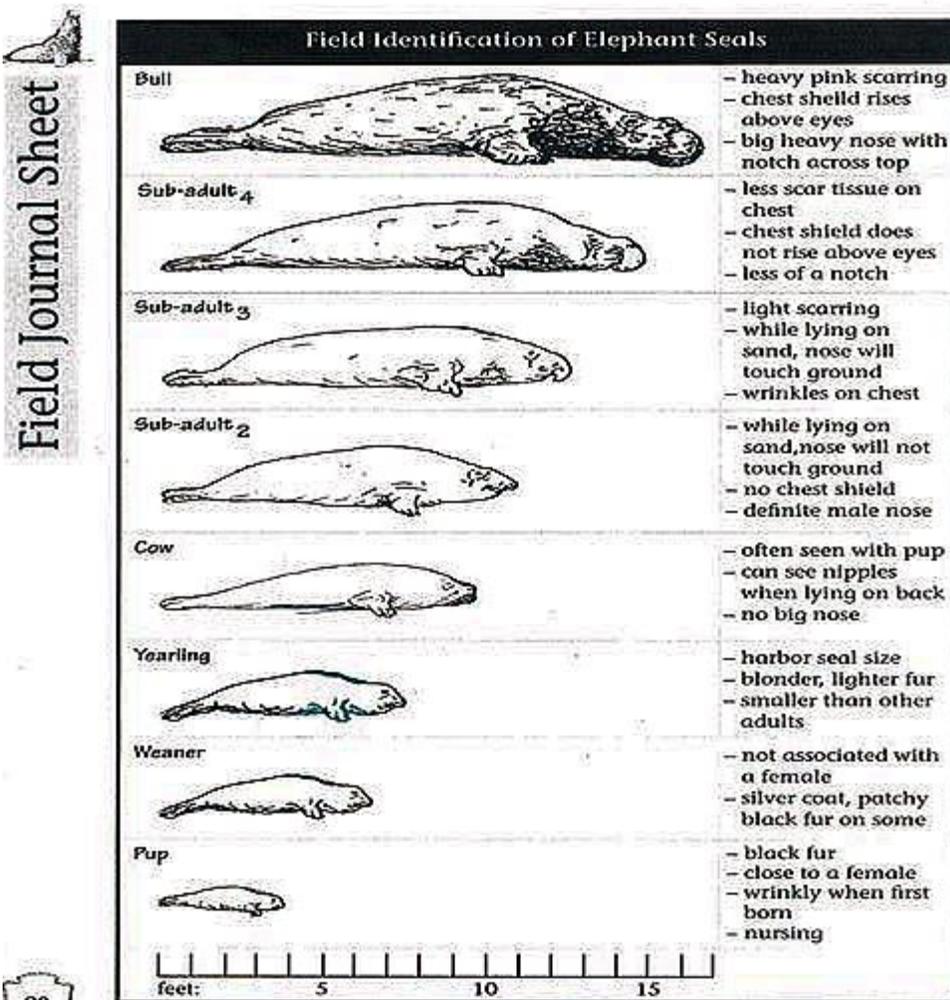


Figure 2. Año Nuevo age classification system of male Northern Elephant Seals.

At each beach the males were separated into two categories: adults and subadults. Año Nuevo's rookery created a classification system for the Northern Elephant Seals that was used in this study to distinguish categories of males seen on the beaches (Fig. 2). Adults were identified by a chest shield that expands at or above the eye-line, as well as a full size nose. Subadults were identified by a chest shield that extends half way up the neck but not above the eye-line, and a nose that either had a slight droop, a nose droop similar to an Adult, or a full size nose.

The characteristics listed above that was used to determine whether the animal was adult or subadult. In most cases the subadult males were also smaller in stature, which assisted in the identification of seals that were difficult to view. The different categories of subadults were not distinguished in this study. At each beach binoculars were used to see the elephant seals clearly. Once counts were finished, they were compared among the three investigators. Each investigator's counts had to be within five percent of the others in order to determine the final number of males. If the counts were more than five percent apart then the beach was recounted.

Once the final numbers were determined they were averaged. The average was the number that was used as the data point in the result table and figures.

Using the statistical analysis program JMP, a one-way ANOVA test was performed to compare the total number of adult male northern elephant seals from each observation day. The test was run with an alpha value of  $\alpha = 0.05$ .

## Results

The one-way ANOVA showed there was no significant difference between the total population numbers of adult male northern elephant seals at each observation day (F-statistic = 0.1200, df = 2, p-value = 0.7877). The number of subadults compared to the number of adults was consistently lower at each beach, with the exception of VP2 and VP4 Middle Beach (Table 1). VP3 South and VP4 Middle Beach had the highest adult male counts at each observation day, however VP4 Middle Beach had the highest total counts of both male and subadults combined for each observation day.

Furthermore, both VP3 South and VP2 declined in subadult male populations as the observation days progressed. In addition, VP2 had a decline of over 10 adult male seals after the first observation day (Table 1). Other beaches remained relatively constant throughout this study: Arroyo del Corral, Piedras Blancas Beach, VP4 Middle Beach and VP3 North (Fig. 3). Some beaches had very low numbers of males present for each observation: Cove South of VP3 and Surfer's Beach.

**Table 1.** This table displays the number of subadult and adult male northern elephant seals counted during each day of observation. The total number of subadult and adult males for each day are shown in the very last row. "U" stands for unclassified, which corresponds to males who could not be identified as either subadult or adult.

Date	01/30/15			02/13/15			02/27/15		
	Subadults	Adults	U	Subadults	Adults	U	Subadults	Adults	U
Arroyo del Corral	1	19	0	2	23	0	0	17	0
Surfer's Beach	0	11	0	1	15	0	4	16	0
Piedras Blancas Beach	3	39	0	3	38	1	2	39	0
VP4 Middle Beach	33	48	0	30	39	0	42	54	0
VP3 North	0	18	0	4	15	0	1	16	0
VP3 South	8	51	0	6	66	0	3	49	0
VP2	38	37	0	33	23	1	12	24	1
VP1	1	15	0	2	24	0	1	20	0
Cove South of VP3	1	2	0	1	3	0	0	2	0
<b>Total</b>	<b>85</b>	<b>240</b>	<b>0</b>	<b>82</b>	<b>246</b>	<b>2</b>	<b>65</b>	<b>237</b>	<b>1</b>

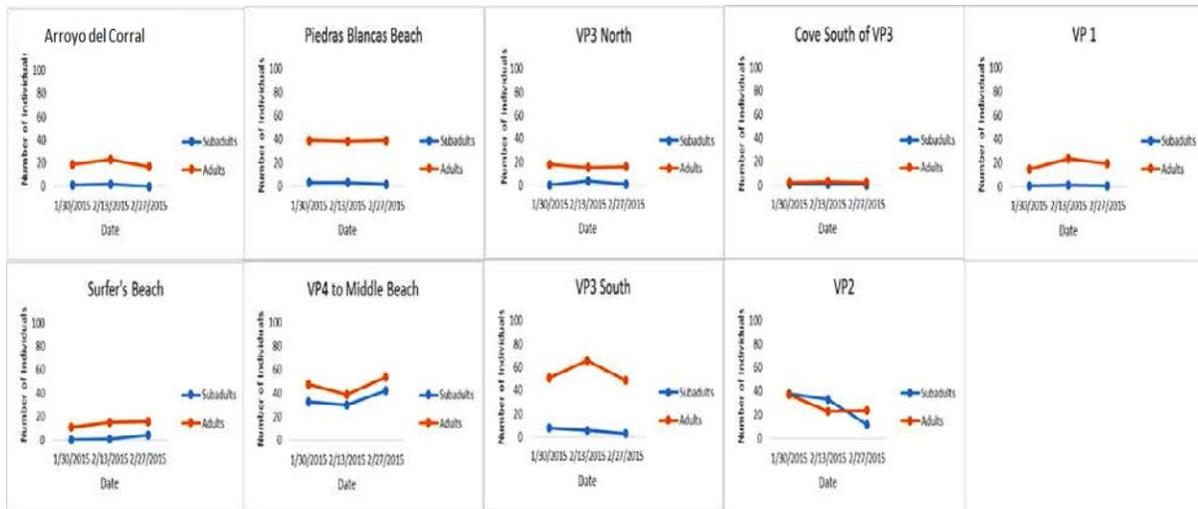


Figure 3. This figure provides the total counts of both subadult and adult male Northern Elephant Seals for each of the nine beaches along the Piedras Blancas rookery. Each graph shows the data from each observation day.

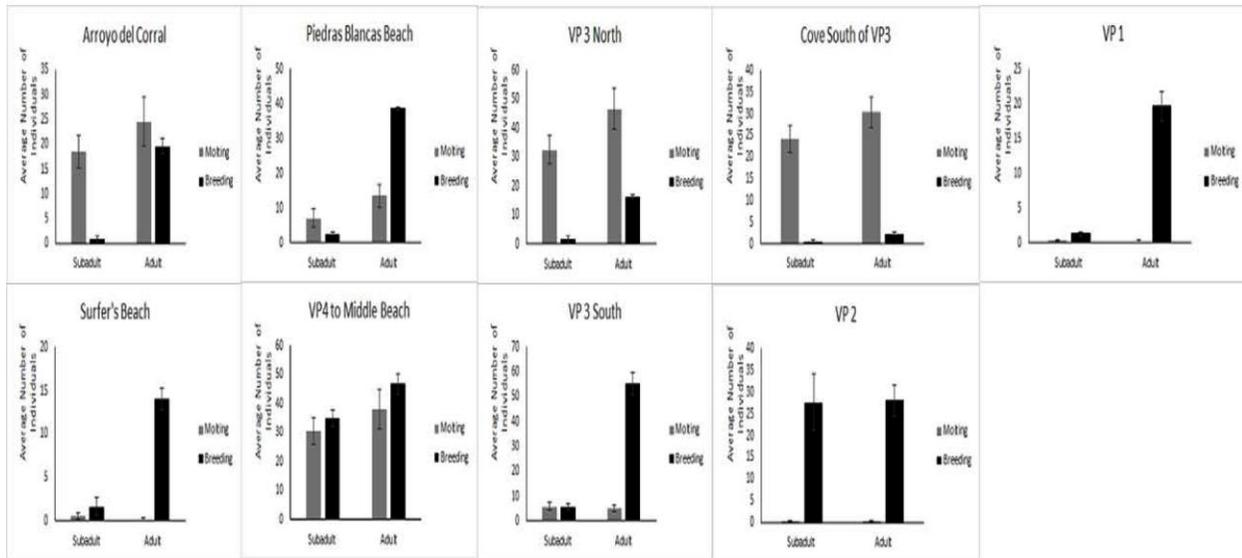
## Discussion

The total number of adult male northern elephant seals for each observation day were not significantly different from one another. These results support the credibility of our non-invasive methods of counting, and the accuracy of our counts. In addition, as seen in the results, a few beaches showed higher population numbers of subadult males, while most show very low population numbers of subadult males. The two beaches where subadult counts were highest, VP4 Middle Beach and VP2, were both beaches that resided a fair distance away from other beaches and are large enough to separate subadult and non-alpha adult males from alpha males. It is possible that these beaches provide areas for subadult males and non-alpha adult males to reside with less risk of fighting an alpha male. In addition, many subadult males were observed practicing their fighting skills with one another in the water and on land; therefore, these areas might be places where males can practice and improve their fighting abilities. Moreover, non-alpha adult males could be resting before making their way to another beach. Many of these adult males may be avoiding combat with alpha males towards the beginning of the breeding season, and then when females begin to wean their pups, these individuals may migrate over to the other beaches in attempt to copulate.

On the last day of observations, February 27<sup>th</sup>, it was noted that the number of females on the beach had decreased substantially due to females beginning to wean their pups. With this decrease in the number of females, the number of adult males counted remained relatively constant. This observation also supports the notion that a majority of males do not leave the beach until the last female has gone. Remaining on the beach until the last female is gone is important for the male in order to obtain every opportunity to breed before the end of the breeding season.

Through the counts of male elephant seals it was clear that there was a distinct difference in the number of males at VP3 South and North when compared to the molting season (Fig. 4). VP3 South is a deeper larger beach, which provides more protection from high tides, therefore it is likely that females prefer to rear pups on this beach rather than the shallower VP3 North beach. Also, this could be an indication that during the breeding season males choose beaches

that females return to having had success weaning their pups the previous breeding seasons (Le Boeuf, et.al. 2011). However, during molting seasons, males do occupy VP3 North in greater numbers. The reason the males prefer VP3 North is unclear. Another contrast between breeding season and molting season was observed at the Cove South of VP3. This beach showed a higher number of males present during the molting season than the breeding season. This could also correspond to the fact that females do not typically reside on this beach, and that the males may move to VP3 South where the females are in abundance.



**Figure 4.** This figure displays graphs of northern male elephant seal counts in the Piedras Blancas rookery and surrounding Beaches. The graphs compare the counts from the molting season and breeding season for both subadults and adults. Error bars represent means  $\pm$  standard error.

Depending on the season, Surfer's Beach and VP1 Beach may be closed or open to the public. During molting season, these beaches are open to the public, whereas for breeding season they are closed to the public. As seen in Figure 4, during the breeding season, there were higher population numbers of males seen at these beaches than during the molting season. Therefore, it is possible that the presence of humans may cause the seals to reside at other beaches.

This study established some preliminary data for establishing the population movements and numbers of adult and subadult males during the breeding season. It will take at least three consecutive years of conducting the same study to create trends that can be used to make more solid conclusions. Since we only have one year of data, the counts that we obtained could be different when compared to other years. Therefore, establishing a trend will help determine what the normal population numbers are for male elephant seals in the Piedras Blancas rookery and surrounding beaches. In addition to repeating the study, the counts for the breeding season may need to start in December and continue through the end of February. Since the first males arrive in December, our counts should begin at this time. It is possible that data collected during this time could add vital information. It was also noted by Brian Hatfield that there were a couple small harems north of the Piedras Blancas Motel and at Arroyo de la Cruz beach. These two beaches will be included in the counts for the upcoming years.

## References

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