Point Blue Report

White Shark Research at Southeast Farallon Island 2017

Report to the Shark Trust

February 2018

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Conservation science for a healthy planet

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Suggested Citation

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Cover photo credit/caption*: White shark and western gulls by J.R. Tietz*

White sharks (*Carcharodon carcharias*) are highly mobile animals, and due to the vastness of their environment, it is logistically difficult to monitor their populations (Baum et al. 2003). However, because mature white sharks show site fidelity and feed on the surface, it is possible to monitor the frequency of their predation events, and this may provide an index to populations of sharks that utilize discreet foraging areas. The large pinniped haul-out and rookery provided by the Farallon Islands has made this a world-renowned location for viewing sharks. For the past 29 years, Point Blue (formerly PRBO) biologists have been conducting standardized surveys from the lighthouse to record white shark predation events. Long-term datasets, such as these, are important for assessing annual variation and potential trends in white shark predation.

Following protocols described by Tietz (2014), we conducted 576 hours of standardized shark surveys from 1 Sep to 28 Nov 2017, which was a 1% increase from the long-term mean (Figure 1). Due to occasionally inclement weather and fluctuating numbers of biologists available to conduct shark surveys, the average number of observation hours per day varied over the season (Figure 2). The lowest number of shark watch hours occurred during the first half of Oct and again at the end of that month, when fog and wind exceeded protocol. Good coverage occurred through most of Sep, the third week of Oct, and the first half of Nov.

The first shark predation event of the season occurred on 20 Aug, before shark surveys began on 1 Sep. During the survey period of 1 Sep to 30 Nov, a total of 13 shark feeding events were noted around the island (Figure 3). From the lighthouse, we recorded 10 of the 14 shark predation events during our standardized shark watch surveys, while two were seen incidentally from the island, and two others were seen from a shark research boat while we were not conducting shark surveys. Numbers of attacks peaked in Nov, with 31% occurring in Sep, 8% in Oct, and 62% in Nov (Figure 3). The attack rate per survey effort was similar to the overall number of attacks (Figure 4).

DISCUSSION

After three years of slightly increasing shark predation rates, this year showed a decline and perpetuated the overall declining trend in shark predation events on pinnipeds since 2000 (Fig. 5 & 6). In fact, the 14 confirmed shark predation events in 2017 is the 4th fewest attacks in the history of the project and is 66% below the 30-year mean of 41 per year. This year follows four years of very low predation numbers around the island. Although there were few attacks this year in Sep, as has been the case the past few years, we were at least seeing one per week. Oct is usually the peak month for shark attacks at the Farallones with 19.2 (SD = 7.3) attacks on average since 1987; the single attack we documented in 2017 was the fewest ever recorded within our dataset for this month. Nov is also a month that generally has a relatively large number of shark attacks, and although the eight we documented were substantially greater than the previous two months, that number is still less than half the average of 16.5 (SD = 10.2).

Brown et al. (2010) found that the total number of pinnipeds, especially elephant seals, counted during weekly surveys is the most important factor in determining annual variation in the number of shark attacks at SE Farallon Island. California sea lion numbers were mostly average throughout the season, but there were a few population spikes at least one standard deviation above the previous 10-year mean, with one in mid Oct and one in mid Nov. Northern elephant seals, however, averaged 48% below the previous 10-year mean over the entire fall season, and were at least one standard deviation below the mean throughout the fall. The low numbers of elephant seals almost certainly contributed to the overall low predation rate in 2017. A few reasons may explain the low numbers of elephant seals. Over the past several years, the numbers of California sea lion hauling out along the south side of the island have increased, which has made counting elephant seals more difficult because the gulches where they haul out requires a close approach to get an accurate count – sea lions are easily prone to disturbance, so we need to count these gulches as best we can from the lighthouse or a distant blind. This explanation may account for some of the decline, but not for the >100 that seem to be missing. Another reason for reduced numbers is that the breeding population at SEFI is declining as larger storms due to climate change have washed away the sandy beaches and finer rocky material that allowed the seals to more easily access these site. Moreover, tag data showed this year that the southward migration of elephant seals from their feeding grounds in the Gulf of Alaska to coastal California was delayed (B. Block, pers. comm.). The reasoning for this delayed migration is unknown, but may have been caused by unproductive feeding conditions in the Gulf of Alaska. With the reduced numbers of elephant seals at the Farallones, the white sharks may have shifted their diet to consume more sea lions, which would make spotting the predation events more difficult as sea lion blood is darker and the prey sinks rapidly causing the event to be less detectable.

Another cause for reduced numbers of attacks could be that fewer sharks were present at the island. Killer whale (*Orcinus orca*) attacks on white sharks have happened in the past, which displaced the remaining Farallon white shark population and caused the total number of white shark predation events on pinnipeds around the island to be greatly reduced (Pyle et al. 1999, Jorgensen et al. in review). However, according to the Tagging of Pelagic Predators (TOPP) researchers, who were tagging and resighting white sharks around the Farallon Islands during Oct-Nov, they confirmed the presence of at least a dozen individuals, and never failed to find a white shark when they came out to the island (S. Anderson, pers. comm.). Hence, it seems as though white sharks were present around the island, but may have been having difficulty finding their prey as indicated by our low number of shark predation sightings. If this is true, then this result could have been caused by either the reduced number of elephant seals (as discussed above), or because the clear water around the island this year allowed the prey to see and avoid the white sharks (Pyle et al. 1996). Either way, it would be interesting to

determine if the individuals that traditionally spent most of their time foraging at the Farallon Islands are making more trips to the mainland to find food.

LITERATURE CITED

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FIGURES

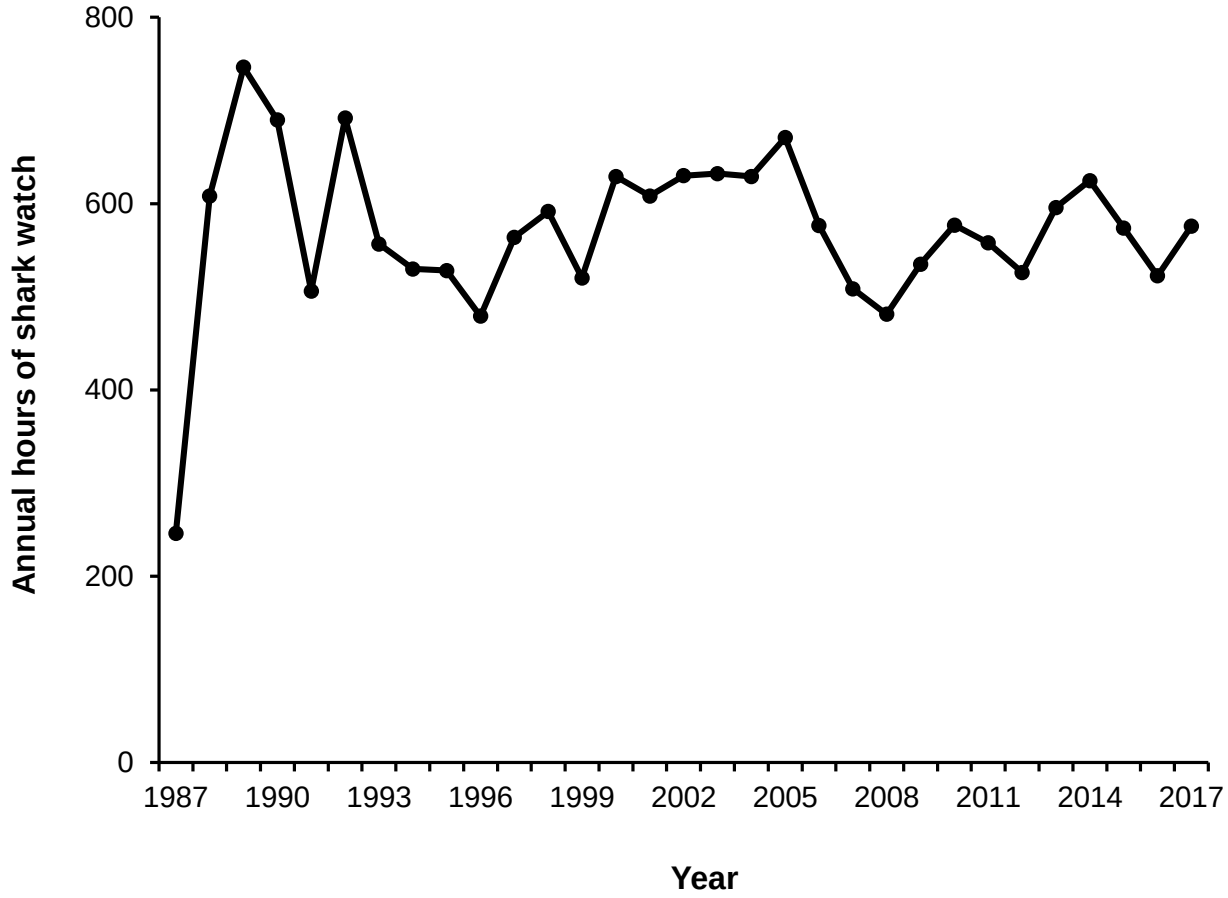

Figure 1. Annual hours of standardized observation conducted at the lighthouse from 1987 to 2017 on Southeast Farallon Island, CA.

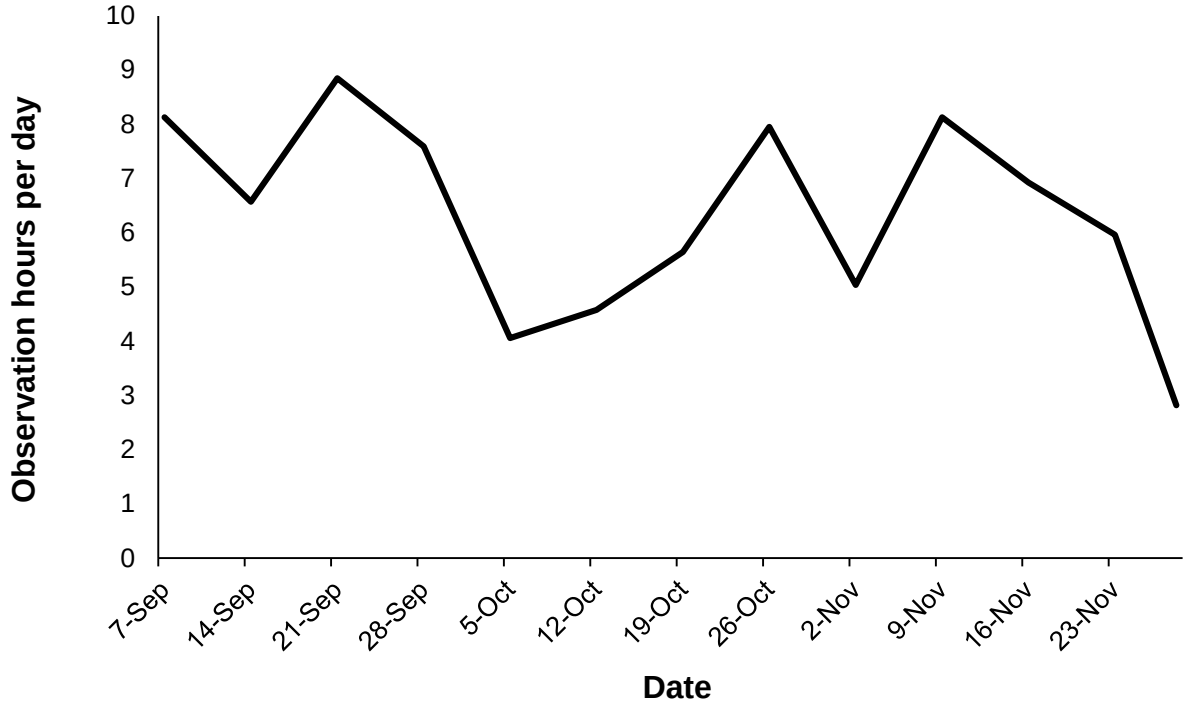

Figure 2. Average numbers of standardized daily observation hours during 2017 averaged by weekly periods. Standardized observations were conducted from the lighthouse on Southeast Farallon Island, CA.

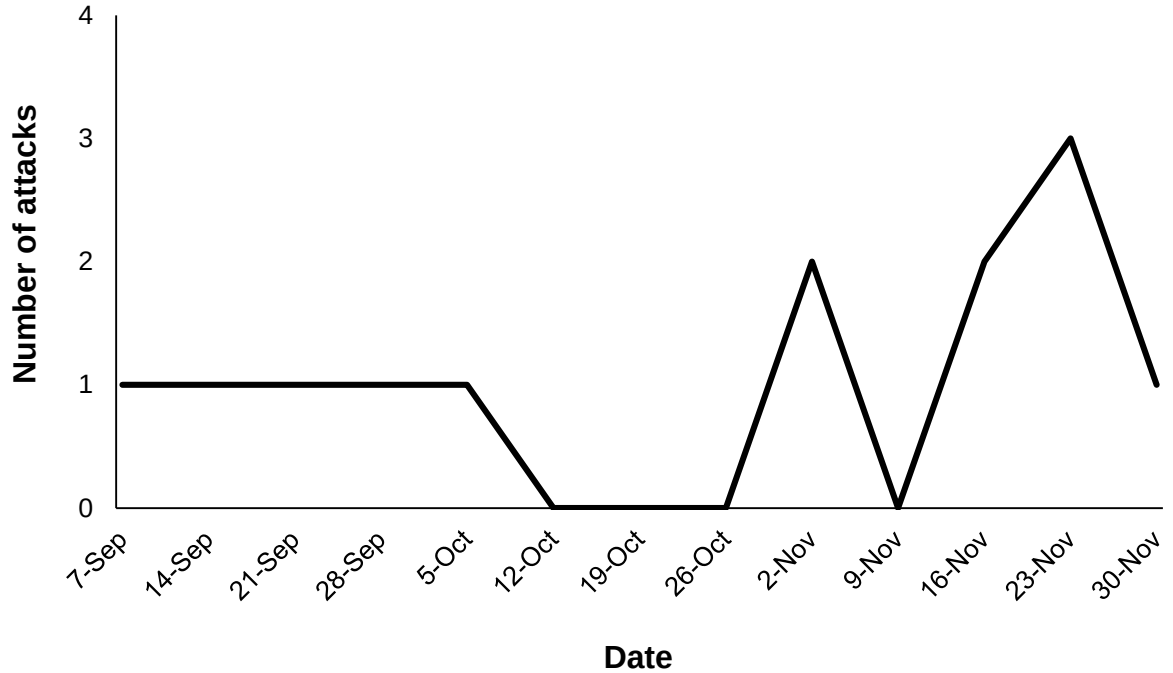

Figure 3. Weekly seasonal distribution of white shark predation events during 2017 at Southeast Farallon Island, CA. This includes both standardized and incidental observations.

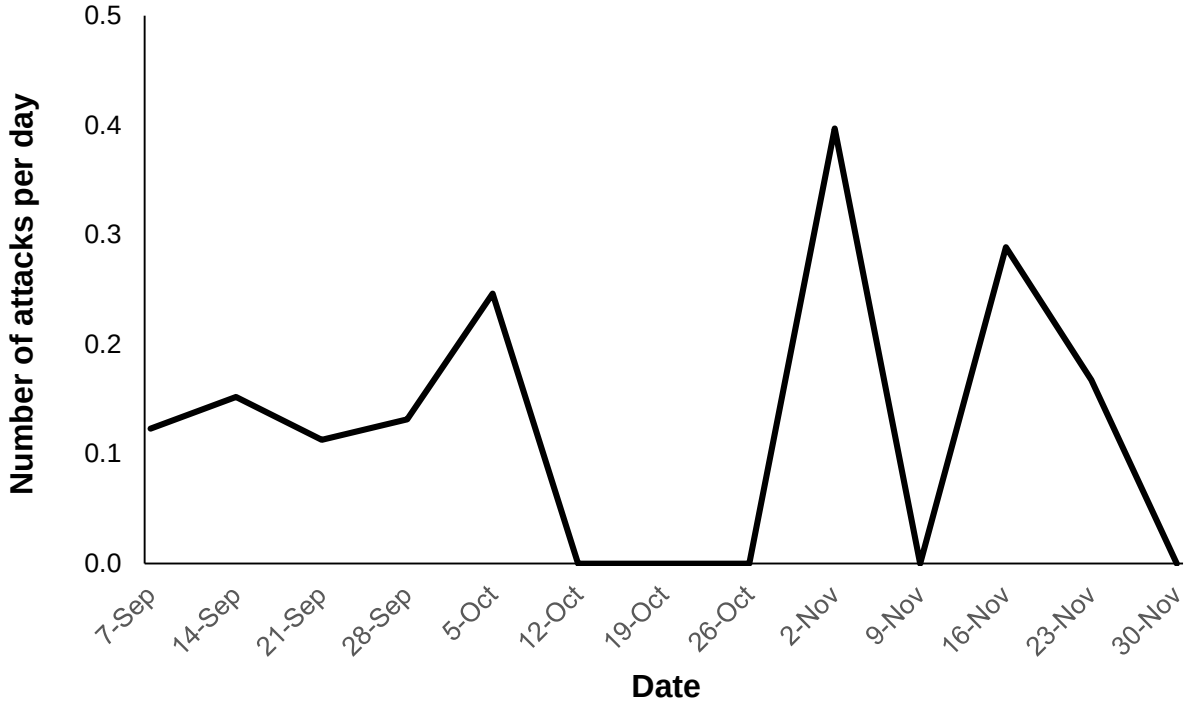

Figure 4. Daily attack rate during 2017 based on average number of standardized observation hours within a given week. Standardized observations were conducted from the lighthouse on Southeast Farallon Island, CA.

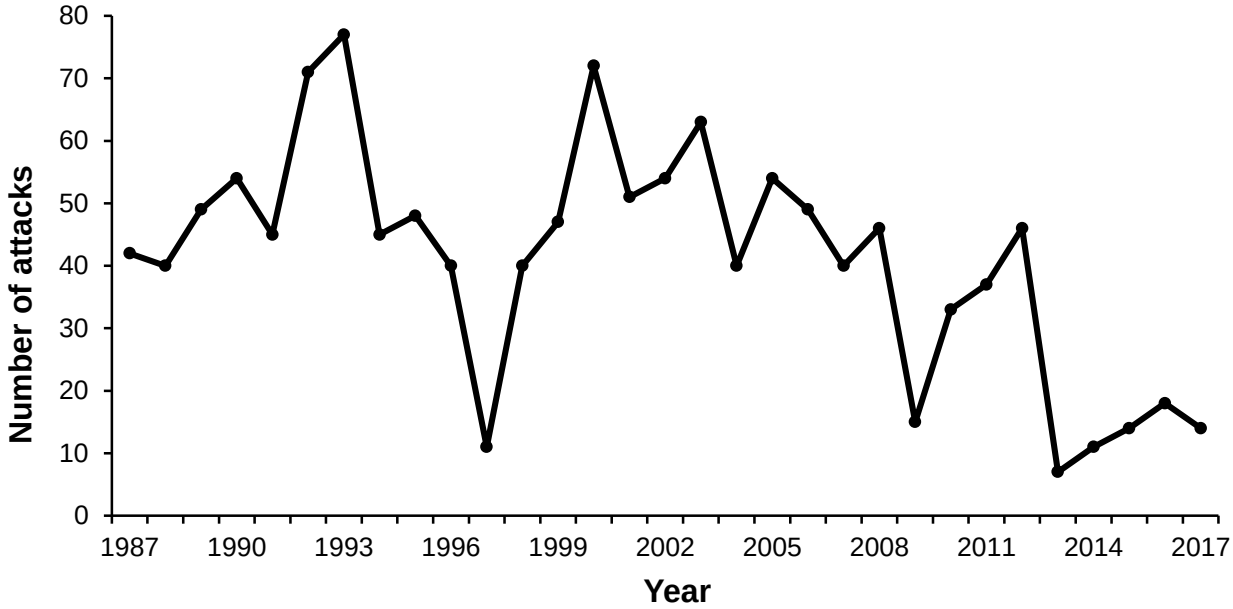

Figure 5. Total number of white shark predation events seen at SE Farallon Island, CA by year from 1987 to 2017. This includes observations seen during standardized shark watches and incidental observations, but does not include unconfirmed attacks that may have been scavenging events.

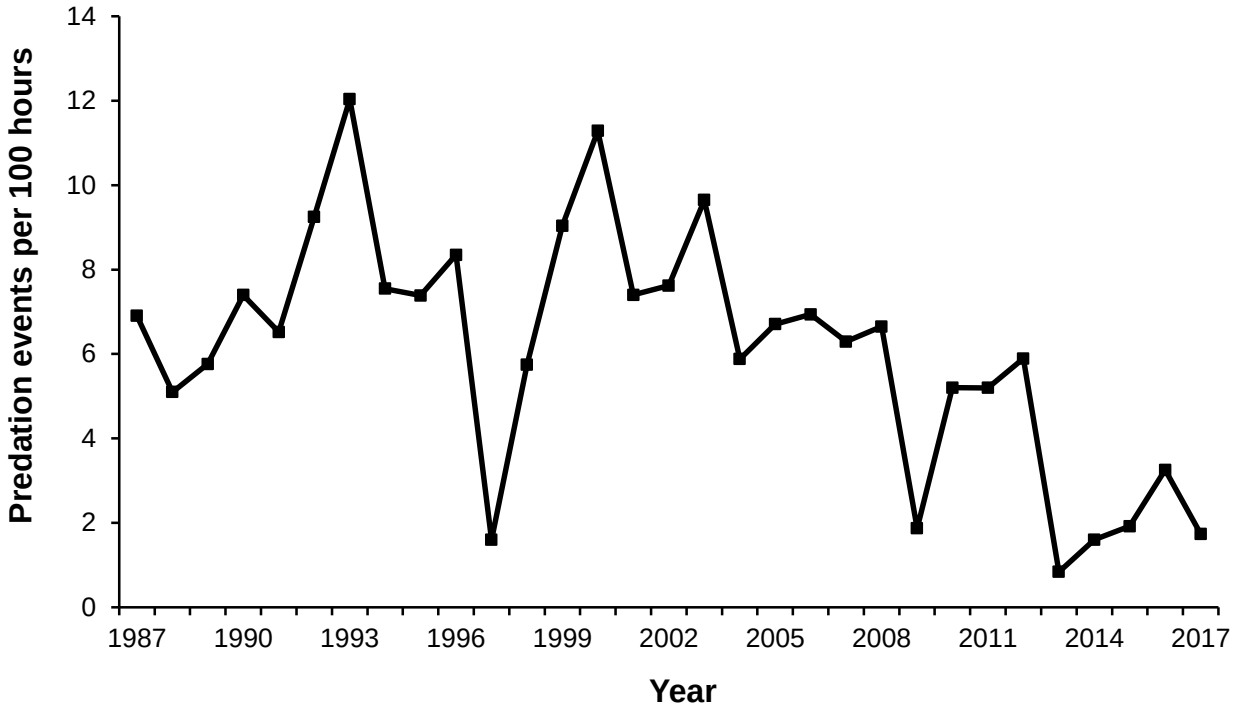

Figure 6. Frequency of white shark predation events at SE Farallon Island, CA by year from 1987 to 2017. Data used to create this figure were restricted to standardized shark watches conducted from the lighthouse between September 1st and November 30th.