

“No Kings 2” San Diego, October 18, 2025: Crowd Size

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Summary

Estimating crowd sizes for large protests is essential for gauging their scale and societal impact. However, estimates are frequently made subjectively, leading to conflicting estimates and public distrust. Two recent developments, however, have improved the accuracy and the reproducibility of these estimates: 1) The wide availability of aerial video footage, cell phone video and photos and measurements of crowd movement allows production of crowd size estimates with visual and quantitative documentation, and; 2) Academic research using geospatial analysis offers independent approaches to estimate crowd size and verify organizer claims.

For the San Diego Waterfront Park “No Kings” march on October 18, 2025, we have used flow rate of the crowd to generate a conservative mean estimate of 48,639 participants (with a 95% confidence interval of 44,888 – 52,390).

A separate report, which includes all of the known “No Kings” rallies around San Diego County, [will be available here](#), and includes at least 33,000 additional participants for a county-wide total of over 80,000 marchers.

Two static methods (ground and aerial counts) were also computed, but represent underestimates (34,770 and 33,200 respectively) of the crowd size, as they were made prior to the 10:40am start of the march, and did not include participants who arrived later, and/or who were positioned in areas not captured in those specific images. These estimates may explain some of the early and much lower reports of crowd size, but are significant underestimates of the actual level of participation.

The code and methods for generating this estimate are described below so that others can validate these numbers. This procedure has also been submitted to [The Crowd Counting Consortium](#), a public interest and scholarly project hosted by Harvard University to document protests in the U.S., for review and input.

Estimating crowd size continues to be a complex process, particularly for marches, where participants’ movements create a constantly changing array of densities and flow rates, and where the quality and availability of high quality images can vary. Improvements will occur only through ongoing collaboration between researchers and the public in identifying best practices.

Methods

We evaluated three different methods for evaluating crowd size. Ultimately, we relied on the flow rate assessment (Method 2 below) as the most accurate, as it included the peak level of participation in the

march, as opposed to estimates made earlier in the day which excluded a significant number of participants.

- 1) Initial pre-march static estimate of Waterfront Park capacity based upon Jacobs density assessments and described by Choi-Fitzpatrick, A. and T Juskauskas, 2015.
- 2) Flow rate assessment using a fixed location video camera that captured the entire march
- 3) Aerial video frame capture of the beginning of the march when the bulk of the crowd was tightly packed from Waterfront Park up to the head of the march using Jacobs method.

Method 1: Waterfront Park pre-march estimate: The static estimate of Waterfront Park's maximum capacity is 73,356 people (Figure 1, Table 1). It was derived using Google Earth to measure the area where participants were expected to gather. Based on assessments of the crowd density and the area covered by the crowd, there were approximately 34,770 people assembled in Waterfront Park at 10:00am (Table 1). This estimate does not include people who arrived between 10:00am and the 10:40am start of the march, and does not include participants lined up along Harbor Drive and other nearby sidewalks.

Figure1. Waterfront Park, San Diego. Main turfgrass areas where participants are expected to gather.



Table 1. Pre-march static measurements taken at 10:00 am prior to the start of the march. Participants continued to arrive throughout this area over the next hour and are therefore not included in this assessment. In addition, the data below only evaluates participants within the park, and not those lined up along Harbor Drive, or approaching the park in multiple directions. The maximum number of people who could potentially fit into Waterfront Park is 73,356, if they were densely packed throughout the area. The actual density of participants at 10am, however, was more moderate, resulting in the estimate of 34,770 at 10am.

		Density sq ft per person		
		DL 1	DL2	DL3
Waterfront Park Areas (south to north)	Sq ft	10	4.5	2.5
1	37,101	3,710	8,245	14,840
2	24,414	2,441	5,425	9,766
3	16,443	1,644	3,654	6,577
Fountain	10,331	1,033	2,296	4,132
4	17,375	1,738	3,861	6,950
5	26,699	2,670	5,933	10,680
6	51,028	5,103	11,340	20,411
		18,339	40,754	73,356

		Time of observation (provide DL 1, 2, 3 or count)			
Quadrat		A	B	C	D
1		2	2	2	1
2		2	2	2	2
3		3	3	2	2
Fountain		3	3	3	3
4		1	3	3	0
5		1	0	0	0
6		1	0	0	0

		Time of observation (provide DL 1, 2, 3 or count)				Average
Quadrat		A	B	C	D	
1		8,245	8,245	8,245	3,710	7,111
2		5,425	5,425	5,425	5,425	5,425
3		6,577	6,577	3,654	3,654	5,116
Fountain		4,132	4,132	4,132	4,132	4,132
4		1,738	6,950	6,950		5,213
5		2,670				2,670
6		5,103				5,103
Total =						34,770

Method 2 - Flow rate: Figure 2 illustrates the start of the march. The No Kings march flow rate was estimated using a stationary camera that covered the width of Harbor Drive (Figure 3), and the cumulative flow rate passing by the camera is documented in Figure 4. The video used for these calculations [is available here](#). Due to the large crowd size, it was not possible to hand count the entire population of the march. Instead, the individuals at the edge of the march nearest the camera were scored as they passed out of the camera field. Each edge-individual counted was used to represent the population of marchers extending across the 72 ft wide section of street between the current and next edge-individual, and each edge individual represented 40 participants. The duration of the high density marchers was 31 minutes. The flow rate of the crowd averaged 1569 participants/min for 31 min to generate a conservative mean estimate of 48,639 participants (with a 95% confidence interval of 44,888 – 52,390). (Table 2).

Figure 2. Start of the march passing the stationary camera. Image is a frame grab from the video of the entire march:



Figure 3. Fixed location of the video camera used to capture march flow rate. The arrow indicates the direction in which the camera was pointed. Image from 6/24/2025 report (https://takeactionsandiego.org/docs/20250614_NoKings_SanDiego.pdf). The same location was used for the 10/18/2025 flow video.



Figure 4. Cumulative flow of march participants passing by a static video camera.

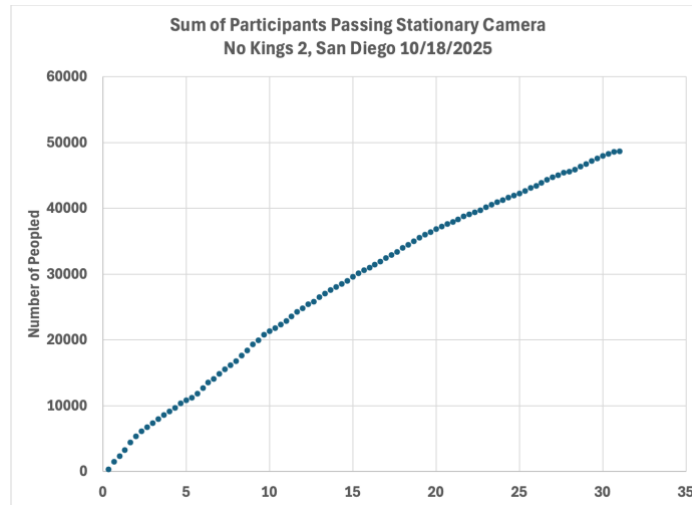
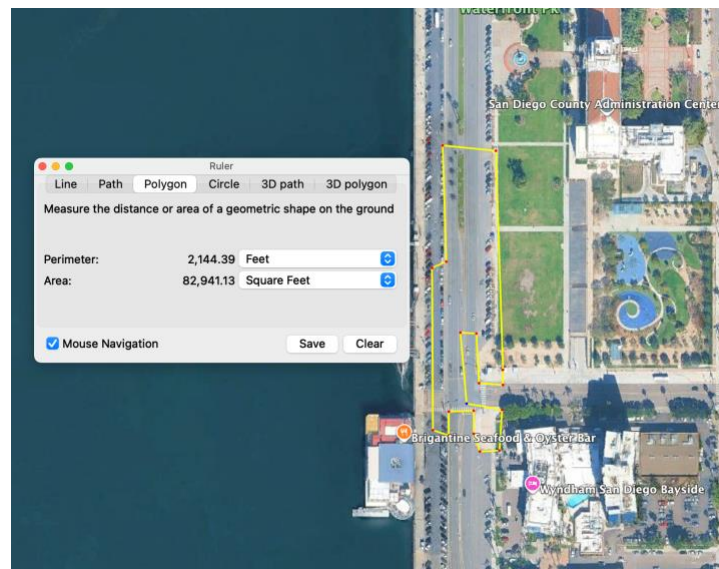


Table 2. Computation of participant flow rate range. Total march duration 31 minutes.

Flow Rate marchers/min Descriptive Statistics	
Count	93
Mean	1569
Standard Deviation	591
Standard Error	61
95% Confidence Interval	1448 - 1690

Method 3 – Aerial Video Frame Capture- North Harbor Dr. and W. Ash St. The approximate area where the most densely accumulated crowd was located represented about 83,000 sq ft (See Google Earth polygon area measurement, Figure 5). At the highest density level of 2.5 sq ft per person, about 33,200 people were accumulated immediately prior to the march in this area. This area does not capture the thousands of people scattered through Waterfront Park. Screen capture from ABC News 10, San Diego YouTube video of No Kings protests around San Diego (<https://www.nbcsandiego.com/news/local/no-kings-protest-saturday-near-me-san-diego/3917243/>):

Figure 5. Static crowd estimate taken at the start of the march when most marchers were accumulating densely near the corner of North Harbor Drive and W. Ash St. Google Earth polygon measurement tool was used to estimate the area occupied by the marchers gathered just prior to the march kickoff.



References

- Choi-Fitzpatrick, A, T. Juskauskas and B. Sabur. 2018. All the protestors fit to count: using geospatial affordances to estimate protest event size. *Interface*. 10:297-321. Retrieved <https://www.interfacejournal.net/wordpress/wp-content/uploads/2018/12/Interface-10-1-2-Choi-Fitzpatrick-et-al.pdf>
- Choi-Fitzpatrick, A. and T Juskauskas. 2015. Up in the Air: Applying the Jacobs Crowd formula to Drone Imagery. *Procedia Eng.* 107:273-281. https://www.sciencedirect.com/science/article/pii/S1877705815010358?utm_source=chatgpt.com
- Wikipedia contributors. (2023). 'Crowd counting.' *Wikipedia, The Free Encyclopedia.* Retrieved 4/7/2025 https://en.wikipedia.org/wiki/Crowd_counting

Appendix 1. R script used to score each person directly adjacent to the video camera as they move out of the frame.

```
1. # Protest Flow Rate Logger
2. # Logs keypresses every X seconds, computes flow statistics, and saves graph & summary
3.
4. # Load required package
5. if (!require("ggplot2")) install.packages("ggplot2", dependencies = TRUE)
6. library(ggplot2)
7.
8. # === CONFIGURATION ===
9. log_interval <- 10 # Set your logging interval in seconds here
10. # =====
11.
12. # Initialize variables
13. count <- 0
14. interval_count <- 0
15. start_time <- Sys.time()
16. last_log_time <- start_time
17. flow_log <- data.frame(Time = character(), Count = integer())
18.
19. # Output filenames with timestamp
20. timestamp_base <- format(start_time, "%Y-%m-%d_%H-%M-%S")
21. flow_file <- paste0("FlowLog_", timestamp_base, ".csv")
22. summary_file <- paste0("FlowSummary_", timestamp_base, ".txt")
23. plot_file <- paste0("FlowGraph_", timestamp_base, ".png")
24.
25. cat(sprintf("Press Enter to count a person. Type '1' then Enter to stop.\nLogging flow every %d
    seconds...\n", log_interval))
26.
27. repeat {
28.   input <- tryCatch(readline(prompt = ""), error = function(e) "")
29.
30.   if (input == "1") {
31.     # Final log if interval not yet passed
32.     if (interval_count > 0) {
33.       flow_log <- rbind(flow_log, data.frame(
34.         Time = format(Sys.time(), "%Y-%m-%d %H:%M:%S"),
35.         Count = interval_count
36.       ))
37.     }
38.     break
39.   }
40.
41.   if (input == "") {
42.     count <- count + 1
43.     interval_count <- interval_count + 1
```

```

44.  cat(sprintf("\rTotal count: %d", count))
45.  flush.console()
46. }
47.
48. # Check if it's time to log
49. now <- Sys.time()
50. if (difftime(now, last_log_time, units = "secs") >= log_interval) {
51.   flow_log <- rbind(flow_log, data.frame(
52.     Time = format(now, "%Y-%m-%d %H:%M:%S"),
53.     Count = interval_count
54.   ))
55.
56.   cat(sprintf("\nLogged %d people at %s\n", interval_count, format(now, "%H:%M:%S")))
57.   interval_count <- 0
58.   last_log_time <- now
59. }
60. }
61.
62. # Save flow log
63. write.csv(flow_log, flow_file, row.names = FALSE)
64.
65. # Clean and formatted summary stats
66. desc_stats <- summary(flow_log$Count)
67. stat_labels <- c("Min", "1st Quartile", "Median", "Mean", "3rd Quartile", "Max")
68. summary_table <- sprintf("%-15s : %5.1f", stat_labels, as.numeric(desc_stats))
69.
70. # Additional statistics
71. std_dev <- sd(flow_log$Count)
72. variance <- var(flow_log$Count)
73.
74. summary_text <- c(
75.   sprintf("Flow Rate Summary (people per %d seconds)", log_interval),
76.   strrep("-", 50),
77.   sprintf("Total time: %.1f seconds", as.numeric(difftime(tail(flow_log$Time, 1), start_time, units =
78.     "secs"))),
79.   sprintf("Total people counted: %d", sum(flow_log$Count)),
80.   "",
81.   "Descriptive Statistics:",
82.   paste(summary_table, collapse = "\n"),
83.   sprintf("\n%-15s : %5.2f", "Std Deviation", std_dev),
84.   sprintf("%-15s : %5.2f", "Variance", variance)
85. )
86. writeLines(summary_text, summary_file)
87.
88. # === PLOTTING FLOW RATE PER MINUTE ===

```

```

89. flow_log$Time <- as.POSIXct(flow_log$Time, format = "%Y-%m-%d %H:%M:%S")
90. flow_log$ElapsedMin <- as.numeric(difftime(flow_log$Time, start_time, units = "mins"))
91.
92. p <- ggplot(flow_log, aes(x = ElapsedMin, y = Count)) +
93.   geom_line(color = "black") +
94.   geom_point(color = "blue") +
95.   labs(title = "Flow Rate Outer Row (People per Minute)",
96.        x = "Time (min)",
97.        y = "People Counted") +
98.   theme_bw()
99.
100.  ggsave(plot_file, plot = p, width = 8, height = 4)
101.
102.  cat("\n\n=== Summary Complete ===\n")
103.  cat(sprintf("Flow log saved to: %s\n", flow_file))
104.  cat(sprintf("Summary saved to: %s\n", summary_file))
105.  cat(sprintf("Plot saved to: %s\n", plot_file))

```

Appendix 2. Raw flow rate data and flow rate conversion. Counts were collected ever 10 seconds with the video running at 2x speed.

Minutes	Count	Width (people)	Flow/20 sec	Sum	flow/min
0	8	40	320	320	960
1	30	40	1200	1520	3600
1	20	40	800	2320	2400
1	23	40	920	3240	2760
2	30	40	1200	4440	3600
2	23	40	920	5360	2760
2	19	40	760	6120	2280
3	16	40	640	6760	1920
3	16	40	640	7400	1920
3	15	40	600	8000	1800
4	16	40	640	8640	1920
4	12	40	480	9120	1440
4	14	40	560	9680	1680
5	17	40	680	10360	2040
5	12	40	480	10840	1440
5	10	40	400	11240	1200
6	16	40	640	11880	1920
6	21	40	840	12720	2520
6	20	40	800	13520	2400
7	15	40	600	14120	1800
7	19	40	760	14880	2280
7	17	40	680	15560	2040
8	16	40	640	16200	1920
8	15	40	600	16800	1800
8	20	40	800	17600	2400
9	21	40	840	18440	2520
9	22	40	880	19320	2640
9	16	40	640	19960	1920
10	21	40	840	20800	2520
10	14	40	560	21360	1680
10	12	40	480	21840	1440
11	13	40	520	22360	1560
11	14	40	560	22920	1680
11	16	40	640	23560	1920
12	17	40	680	24240	2040
12	15	40	600	24840	1800
12	15	40	600	25440	1800
13	10	40	400	25840	1200
13	17	40	680	26520	2040

13	14	40	560	27080	1680
14	12	40	480	27560	1440
14	13	40	520	28080	1560
14	11	40	440	28520	1320
15	11	40	440	28960	1320
15	16	40	640	29600	1920
15	13	40	520	30120	1560
16	12	40	480	30600	1440
16	10	40	400	31000	1200
16	12	40	480	31480	1440
17	11	40	440	31920	1320
17	13	40	520	32440	1560
17	13	40	520	32960	1560
18	11	40	440	33400	1320
18	16	40	640	34040	1920
18	11	40	440	34480	1320
19	13	40	520	35000	1560
19	14	40	560	35560	1680
19	11	40	440	36000	1320
20	10	40	400	36400	1200
20	11	40	440	36840	1320
20	10	40	400	37240	1200
21	10	40	400	37640	1200
21	8	40	320	37960	960
21	10	40	400	38360	1200
22	10	40	400	38760	1200
22	9	40	360	39120	1080
22	8	40	320	39440	960
23	7	40	280	39720	840
23	12	40	480	40200	1440
23	9	40	360	40560	1080
24	9	40	360	40920	1080
24	9	40	360	41280	1080
24	9	40	360	41640	1080
25	7	40	280	41920	840
25	9	40	360	42280	1080
25	10	40	400	42680	1200
26	10	40	400	43080	1200
26	8	40	320	43400	960
26	12	40	480	43880	1440
27	11	40	440	44320	1320
27	11	40	440	44760	1320

27	8	40	320	45080	960
28	8	40	320	45400	960
28	5	40	200	45600	600
28	8	40	320	45920	960
29	11	40	440	46360	1320
29	9	40	360	46720	1080
29	13	40	520	47240	1560
30	8	40	320	47560	960
30	10	40	400	47960	1200
30	9	40	360	48320	1080
31	7	40	280	48600	840
31	1	40	40	48640	120