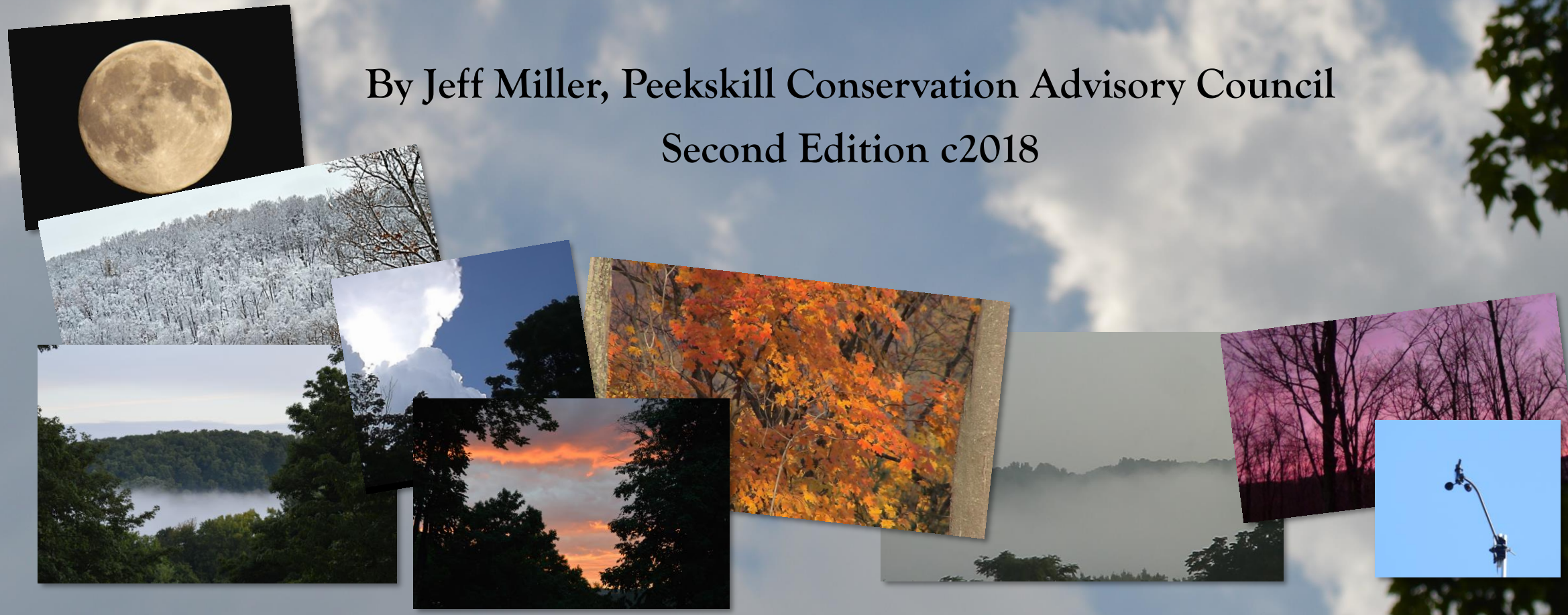
Peekskill Weather Book

By Jeff Miller, Peekskill Conservation Advisory Council

Second Edition c2018



About this book and the weather station

Data analysis about Peekskill's weather is presented for general information as well as for consideration and guidance in long-term planning decisions.

Dedicated to Jerome S. Thaler, author of "The Westchester Weather Book," c1977, and volunteer weather observers in the region, the following information is intended to continue Thaler's discussion and promote sharing of weather information specifically for Peekskill, New York. In his book, Thaler included mean temperatures and rainfall totals by month for Peekskill from between 1945 and 1975, as well as much more detailed weather information for Scarsdale, Bedford, Westchester County Airport, Carmel and other towns. High and low temperatures and extremes, wind data and snow measurements were not provided for Peekskill at that time.

This digital book will review the most recent data for Peekskill, compiled daily by its author for the years 2009 to 2017 and compare results against historical and regional trends. The observation station used for Peekskill is 1 mile north of downtown at 150 feet above sea level. The previous station referenced in Thaler's book was 1 mile northeast of town and 400 feet above sea level. While it would be ideal for our city's station to be place downtown, Puglsey Park would be perfect, the current location does reflect "where people live" and the conditions for the majority of our residents. The only observable differences have occurred under certain nighttime conditions, where cooler air descends from the Peekskill Hollowbrook canyon and has caused a lower temperature reading than what is evident downtown. Most notably, it has affected a "first freeze" date, whereas downtown and the riverfront experienced a first freeze up to two weeks later. Any other nuances are negligible.

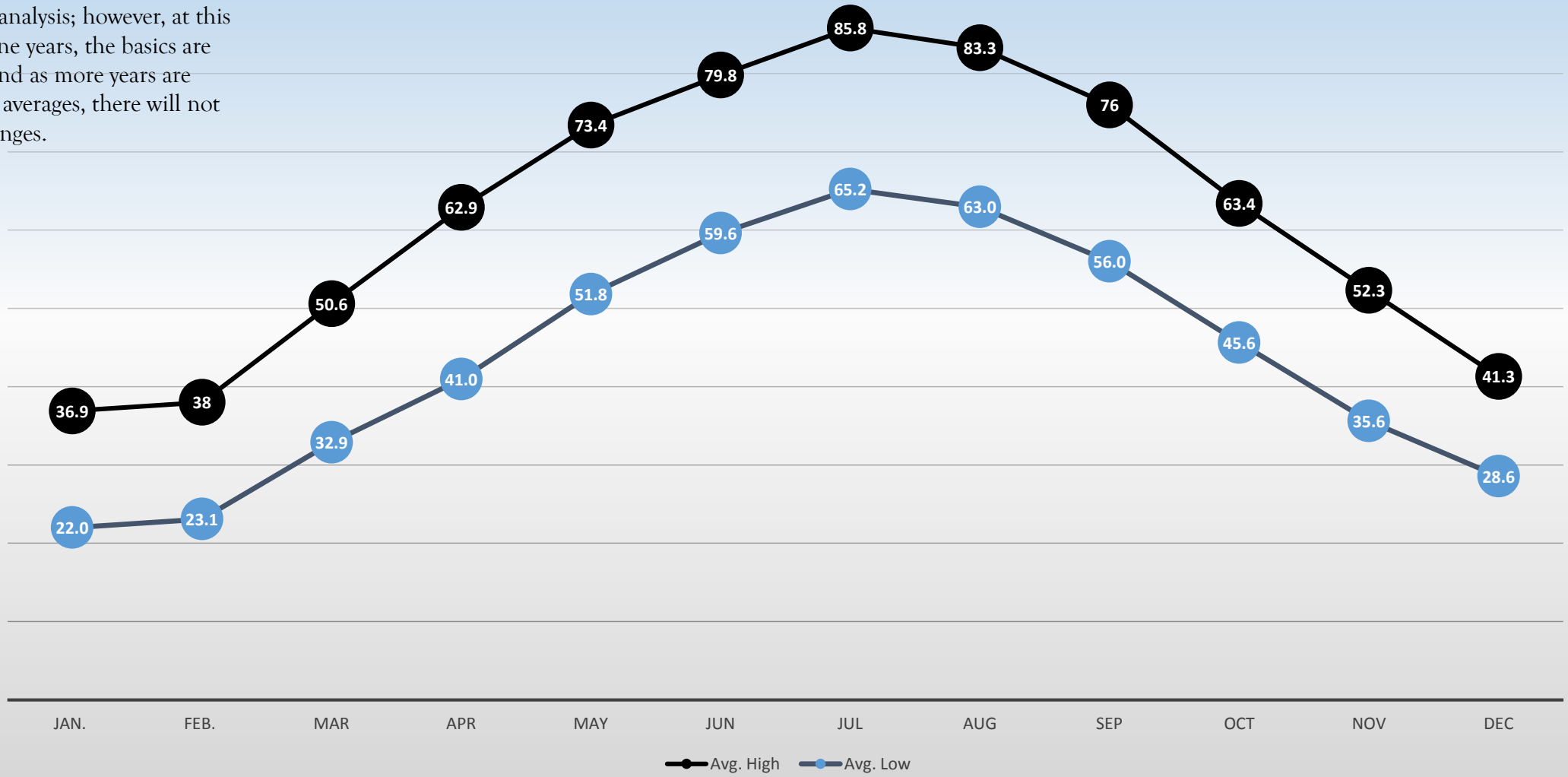
Within the first month of installing this station in March 2009, the anemometer was struck by lightening and the equipment and computer were fried. So, since April 2009, the anemometer resides approximately 45 feet above the ground, however, there are some trees 150 feet to the west that may have limiting affect on wind gusts from the west, especially in severe weather. The temperature and rainfall measuring equipment meets regulation and location standards.

The author has been observing microclimate environments for more than 30 years and due to the proliferation of weather apps and crowd reporting, it is his view that localized, detailed and accurate data are more important than ever before. Is there anything more frustrating to a weather watcher than downloading an app, tuning into Peekskill only to find the data displayed is actually from Stewart or Westchester airports? This station is displayed online and through the wunderground app (KNYPEEKS2) and from any apps that draw upon the AAPRS / MADIS network (DW2797).

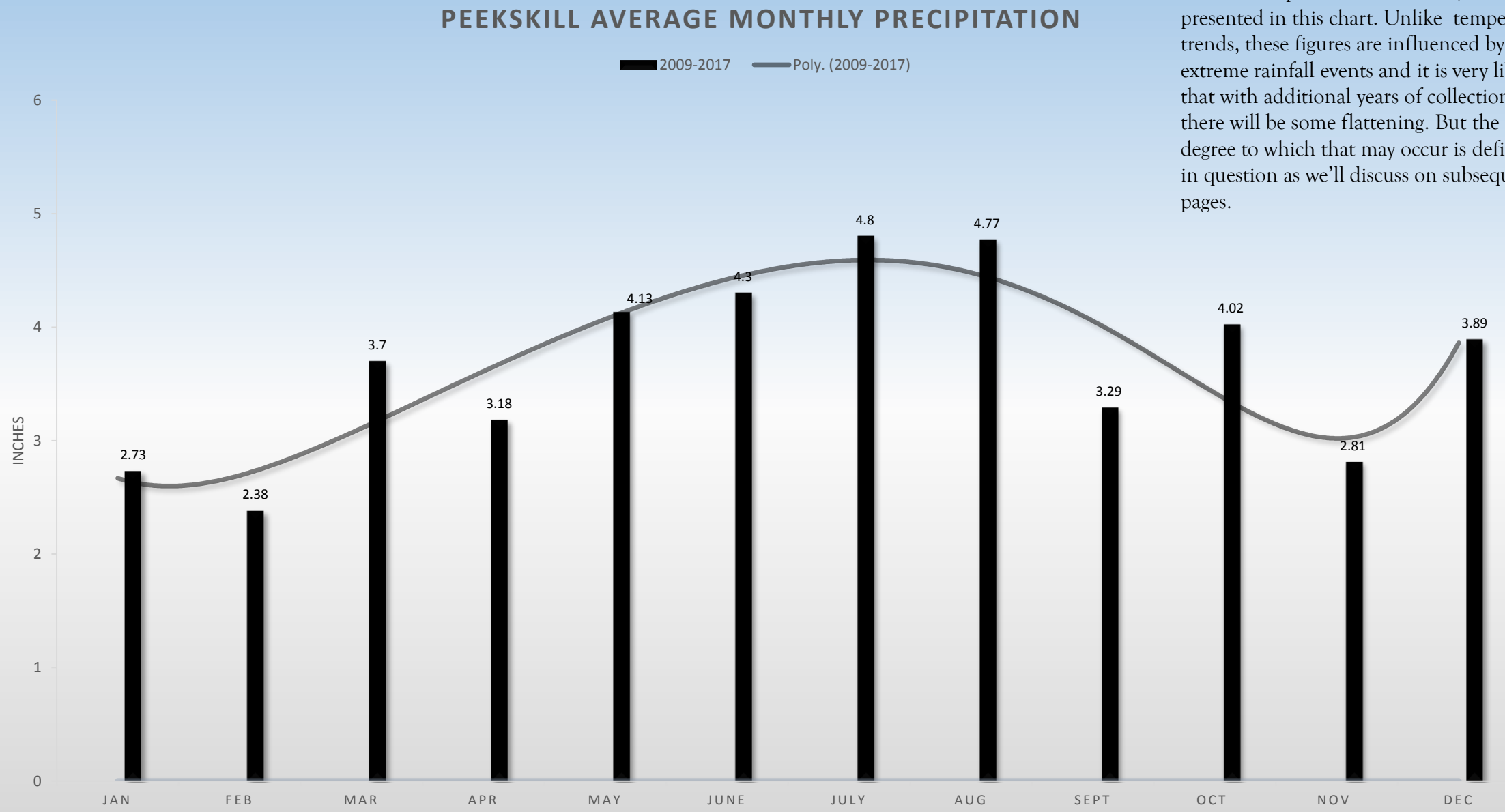
Fun facts about Peekskill's microclimate will be addressed in the final segment of the book and the beginnings of a "Calendar of Extremes" will be presented, carried forward from Thaler's information and incorporating more recent data. This book is intended to be a work in progress so expect additional versions in the future. This first version will not dive deeply into snowfall information due to limited historical information and missing data.

The average monthly high and low temperatures are presented in this graph, collected daily from March 1, 2009 to December 31, 2017.

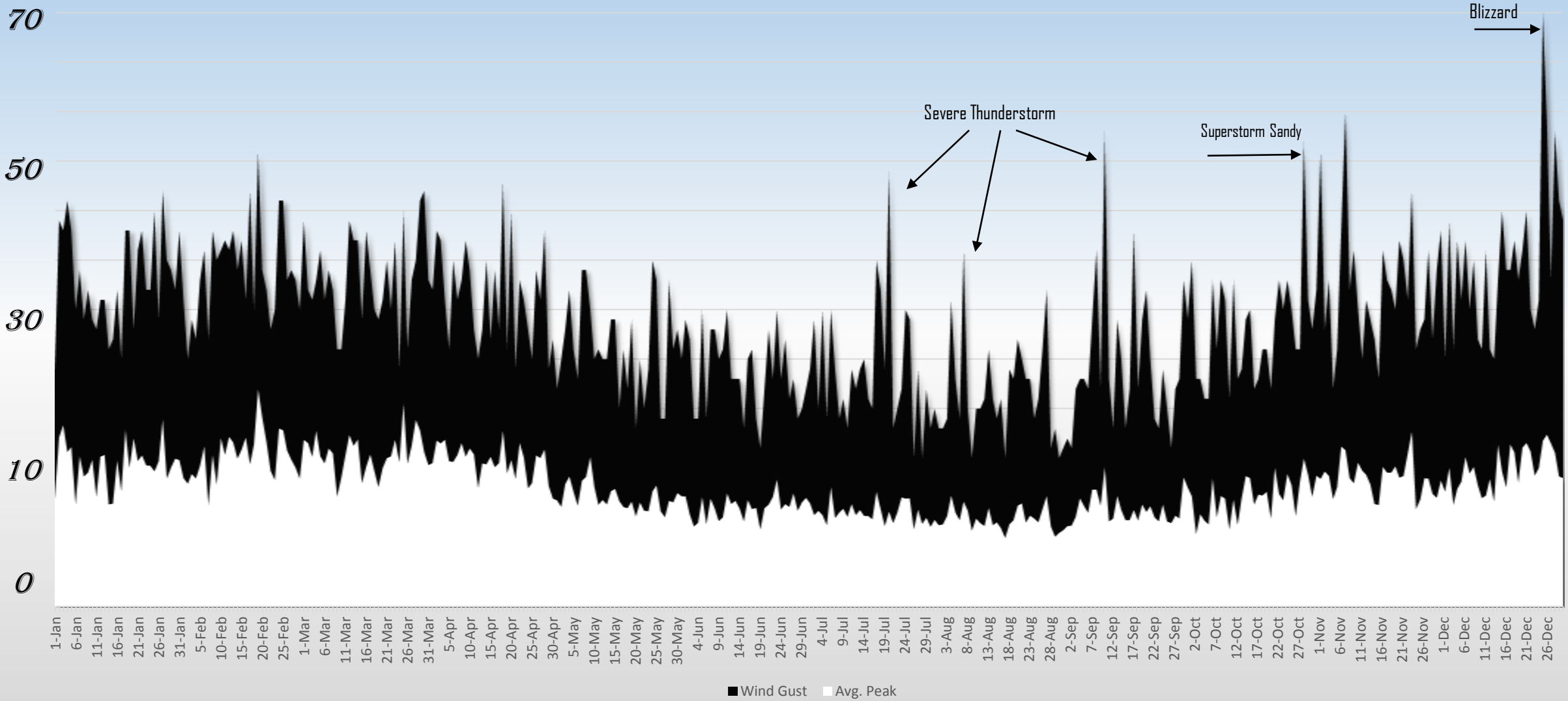
Generally, it is a good measure to collect 10 years' worth of data for temperature analysis; however, at this stage with nine years, the basics are established and as more years are added to the averages, there will not be major changes.



Peekskill's monthly precipitation (rainfall and water equivalent of snowfall) is presented in this chart. Unlike temperature trends, these figures are influenced by extreme rainfall events and it is very likely that with additional years of collection, there will be some flattening. But the degree to which that may occur is definitely in question as we'll discuss on subsequent pages.

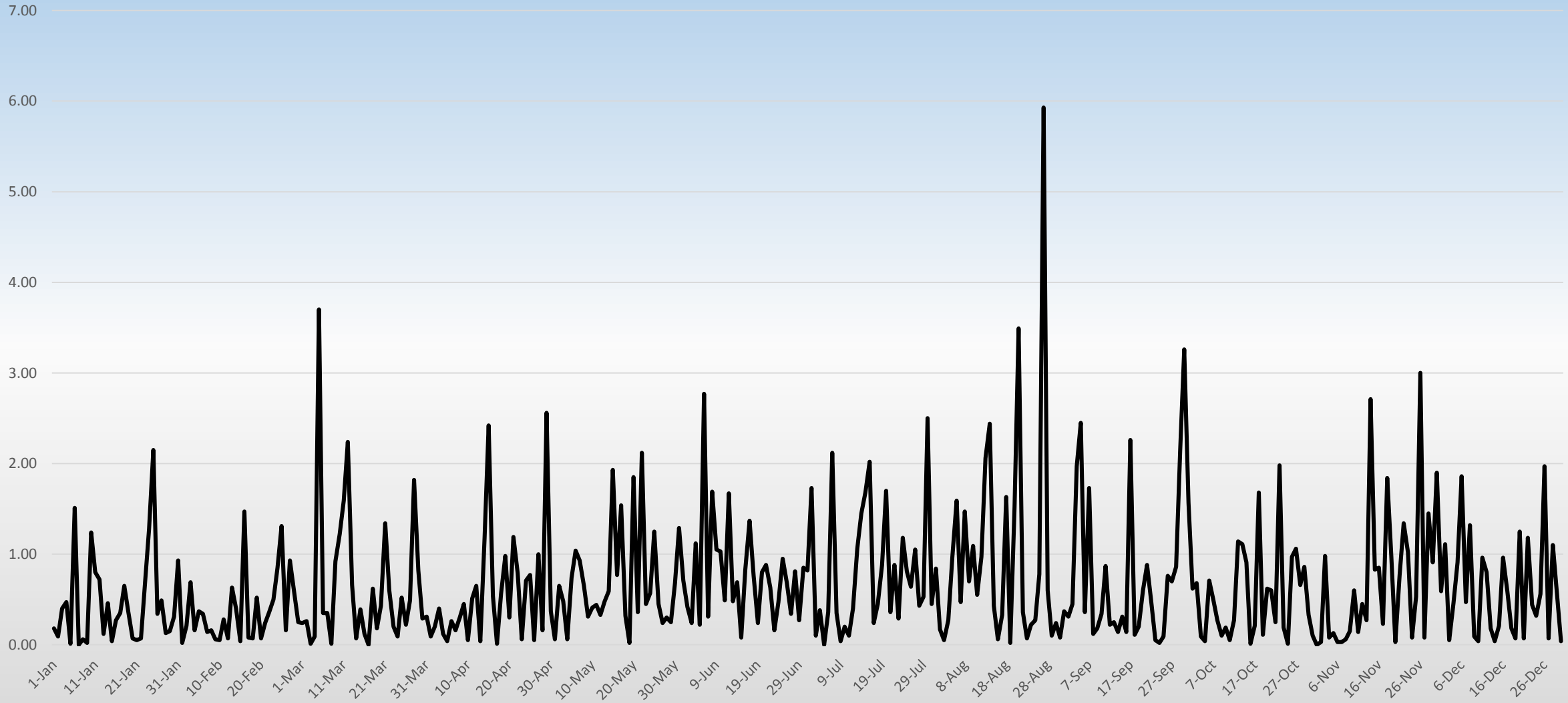


When the Wind Blows...



During this recording period, Peekskill's top wind gust was on December 26, 2010 at 68 MPH from the north during a blizzard.

The Days When it Poured...



This chart shows the top rain totals for each calendar day as collected over the past eight years with highest amount on August 27, 2011 at 5.93 inches.

So far, so good.

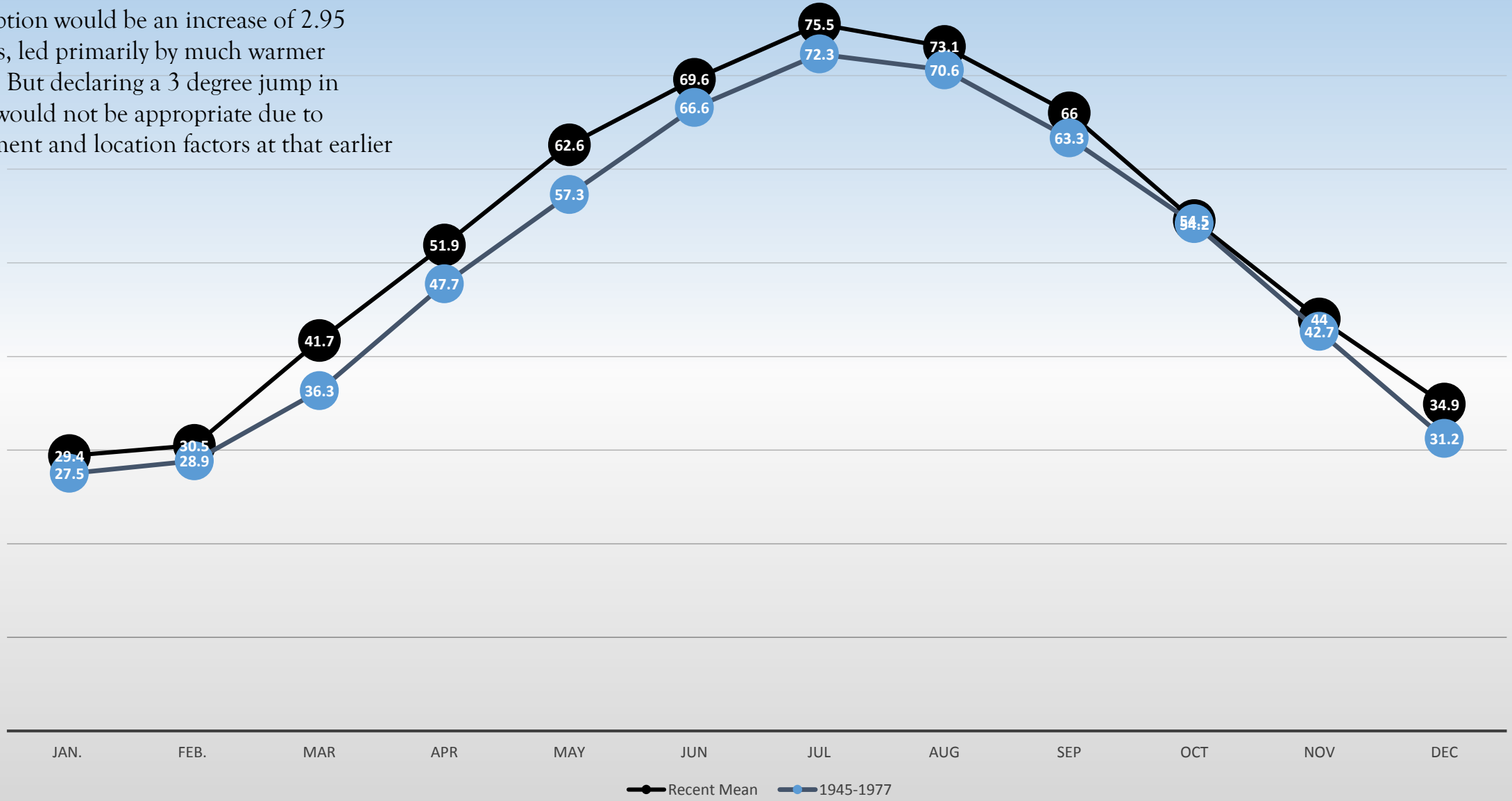
- But how does recent data compare with historical data?
- Has Peekskill become drier or wetter?
- Have temperatures trended cooler or warmer?

No easy answers.

Let's journey through more data, based on Thaler's book, collected for the period from 1945-1975, and from the National Weather Service by examining recent period data from the only two stations remaining from that earlier time.

First, our “recent” mean 52.83 degrees is higher than the mean of 49.88 as Thaler collected between 1945-1975. The assumption would be an increase of 2.95 degrees, led primarily by much warmer nights. But declaring a 3 degree jump in mean would not be appropriate due to equipment and location factors at that earlier time.

Peekskill Monthly Mean



Thaler's book provided monthly means and only actual average high and low temperatures for the months of January and July. Based on the range of those two months, which is tighter in winter and wider in summer, I estimated the averages for the missing months. Except for the month of March, average high temps are not remarkably different, especially given that the previous station was 200 feet higher in elevation. Nighttime lows, however, were markedly lower in the 1945-1975 period. Some of this difference could be due to elevation and the surrounding landscape. But before drawing an absolute conclusion, we'll review trends elsewhere.

Actual for 2009-2017

Month	High	Low
January	37	22
February	38	23
March	51	33
April	63	41
May	73	52
June	80	60
July	86	65
August	83	62
September	76	56
October	63	46
November	52	36
December	41	29

Based on means from 1945-1975

Month	High	Low	
January	37	19	Actual
February	38	20	Estimate
March	46	27	Estimate
April	61	35	Estimate
May	70	44	Estimate
June	79	54	Estimate
July	84	60	Actual
August	82	58	Estimate
September	74	51	Estimate
October	63	45	Estimate
November	51	35	Estimate
December	39	23	Estimate

There are only two existing "official" National Weather Service (NWS) stations that exist today that also existed in the 1945-1975 period published in Thaler's book. And the changes that have occurred are subtle, but interesting and support Peekskill's changes.

Carmel, NY (roughly 20 miles northeast of Peekskill) is one of the oldest stations in continuous operation since 1895 and has trended cooler recently for Jan. and June-Oct. Carmel's declines in mean are driven by cooler daytimes, which is worth investigating. But also, temperature increases for the spring months are similar to Westchester County Airport's rise.

2009-2016	January	February	March	April	May	June	July	August	September	October	November	December	
Avg. High	32.5	35.4	45.5	58.1	68.0	73.5	79.1	77.0	71.0	59.8	50.5	40.0	
Avg. Low	15.0	17.5	27.3	37.7	49.0	56.4	62.1	60.0	53.3	42.0	32.1	24.8	
1895-1977	-1.42	1.09	1.37	1.34	0.98	-1.34	-0.86	-0.98	-0.65	-1.28	0.56	3.39	0.18
1895-2010	-1.48	0.00	0.72	0.35	0.17	-1.73	-1.03	-1.49	-0.80	-1.20	0.10	2.51	-0.32

Still, there is a different issue at the airport, roughly 20 miles southeast of Peekskill. The mean has increased more than 1 degree from Thaler's period as well as the historic period ending in 2010, calculated by NWS. The greatest increases appear in spring months and again in December. Increases are driven almost equally by warmer days and nights.

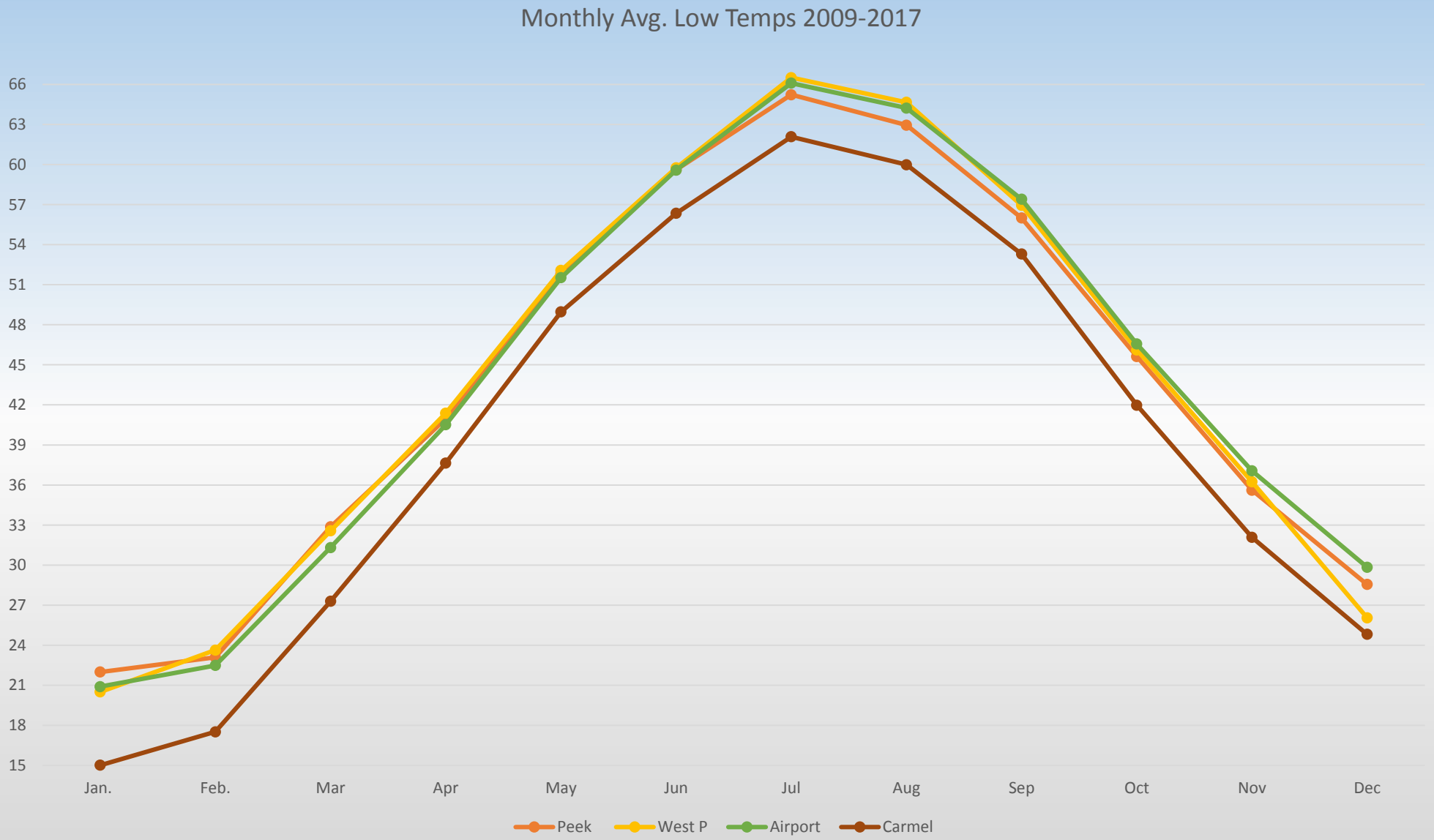
2009-2016	January	February	March	April	May	June	July	August	September	October	November	December	
Avg. High	35.7	38.5	48.7	60.2	70.6	77.5	84.1	82.0	75.6	63.0	53.1	43.4	
Avg. Low	20.9	22.5	31.3	40.5	51.5	59.6	66.1	64.2	57.4	46.6	37.1	29.8	
1952-1977	0.15	0.96	2.76	1.74	2.34	0.12	1.44	0.98	1.53	0.02	1.39	4.22	1.47
1952-2010	0.20	0.14	2.06	1.59	2.18	0.32	1.61	1.18	1.82	0.88	1.32	3.20	1.38

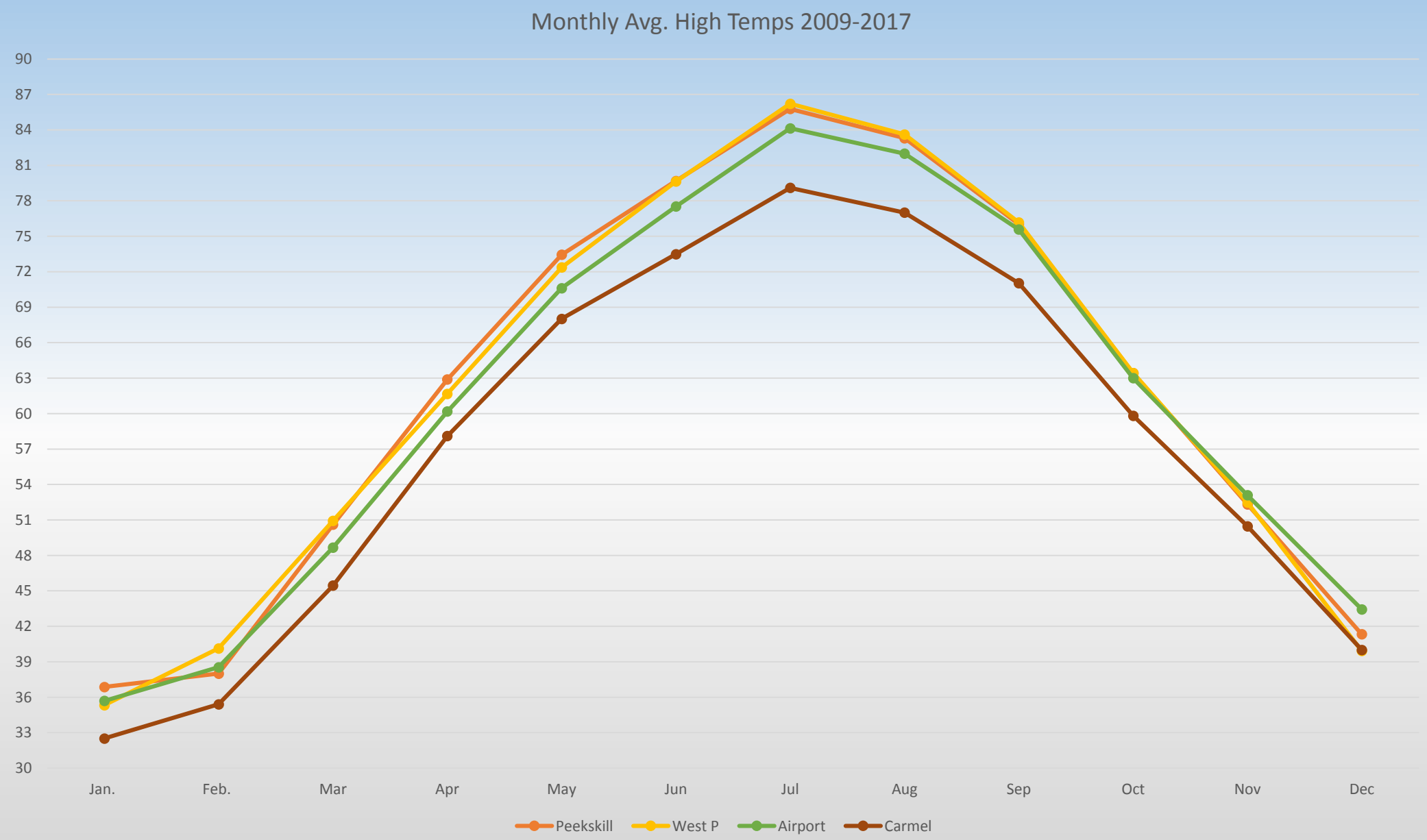
Lastly, we look northwest, about 10 miles away to West Point. Thaler did not include the campus in his book since it is in Orange County, but the elevation is similar to Peekskill. Unfortunately, West Point has not provided consistent data over the past century, but the NWS established norms that are useful for comparable periods against Carmel and the airport. Like the airport, West Point's mean has also increased better than 1 degree from its norms (1981-2010), with a noticeably warmer spring and July and overall slightly warmer nights throughout the year.

2009-2016	January	February	March	April	May	June	July	August	September	October	November	December	
Avg. High	35.3	40.1	50.9	61.7	72.4	79.6	86.2	83.6	76.2	63.4	52.5	39.9	
Avg. Low	20.5	23.6	32.6	41.4	52.1	59.8	66.5	64.7	57.0	46.1	36.2	26.1	
Norms	0.42	1.38	3.25	1.03	1.72	0.19	1.87	1.14	1.56	0.78	0.86	-0.02	1.18

Given the temperature information presented, I believe Peekskill's "norms" below are a good benchmark going forward. If we were to make an assumption about increased temperatures between 2009-2016 against a prior period of 30 years, Carmel's unchanged overall mean or West Point's 1 degree increase would make sense for Peekskill, rather than the nearly 3 degrees initially observed in the data comparison to Thaler's. It is also safe to assume our nighttime temperatures are slightly warmer than historical trends more so than having experienced dramatically warmer daylight hours.

January	February	March	April	May	June	July	August	September	October	November	December
36.9	38.0	50.6	62.9	73.4	79.7	85.8	83.3	76.0	63.4	52.3	41.3
22.0	23.1	32.9	41.0	51.8	59.6	65.2	63.0	56.0	45.6	35.6	28.6





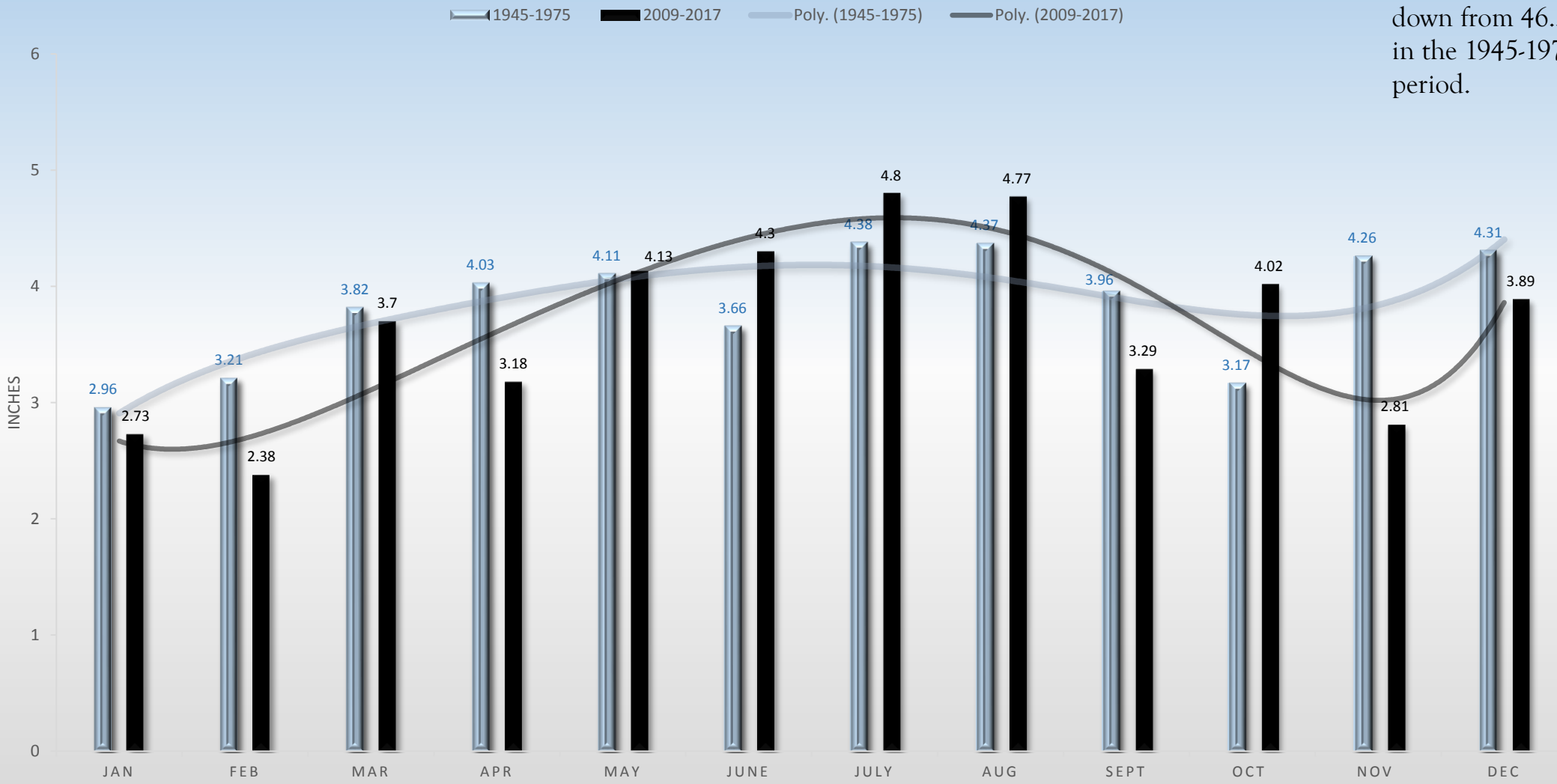
Analysis: There are many ways to interpret the data using just a single mean temperature but is that data useful?

The mean temperature in Manhattan, for example, is higher than all its suburbs; however, that figure alone doesn't tell the whole story for Peekskill, or anywhere else, for that matter. Longtime observers in the area have explained to me that (near sea level) river towns of New Windsor, Cornwall, Beacon, Cold Spring, West Point, Peekskill, Stony Point and Croton represent the state's "hot zone" and experience the warmest average daytime temperatures in July, all with an average high of about 86.

Therefore, as far as Peekskill is concerned, it is important to take into consideration ways for which to mitigate the "heat island effect" from our city streets, other surfaces and the roofs of buildings. It is highly unlikely that our efforts would reduce what is natural for our microclimate; however, encouraging tree shade, roof gardens, etc., in and around city center will help lower surface heat retention in summertime.

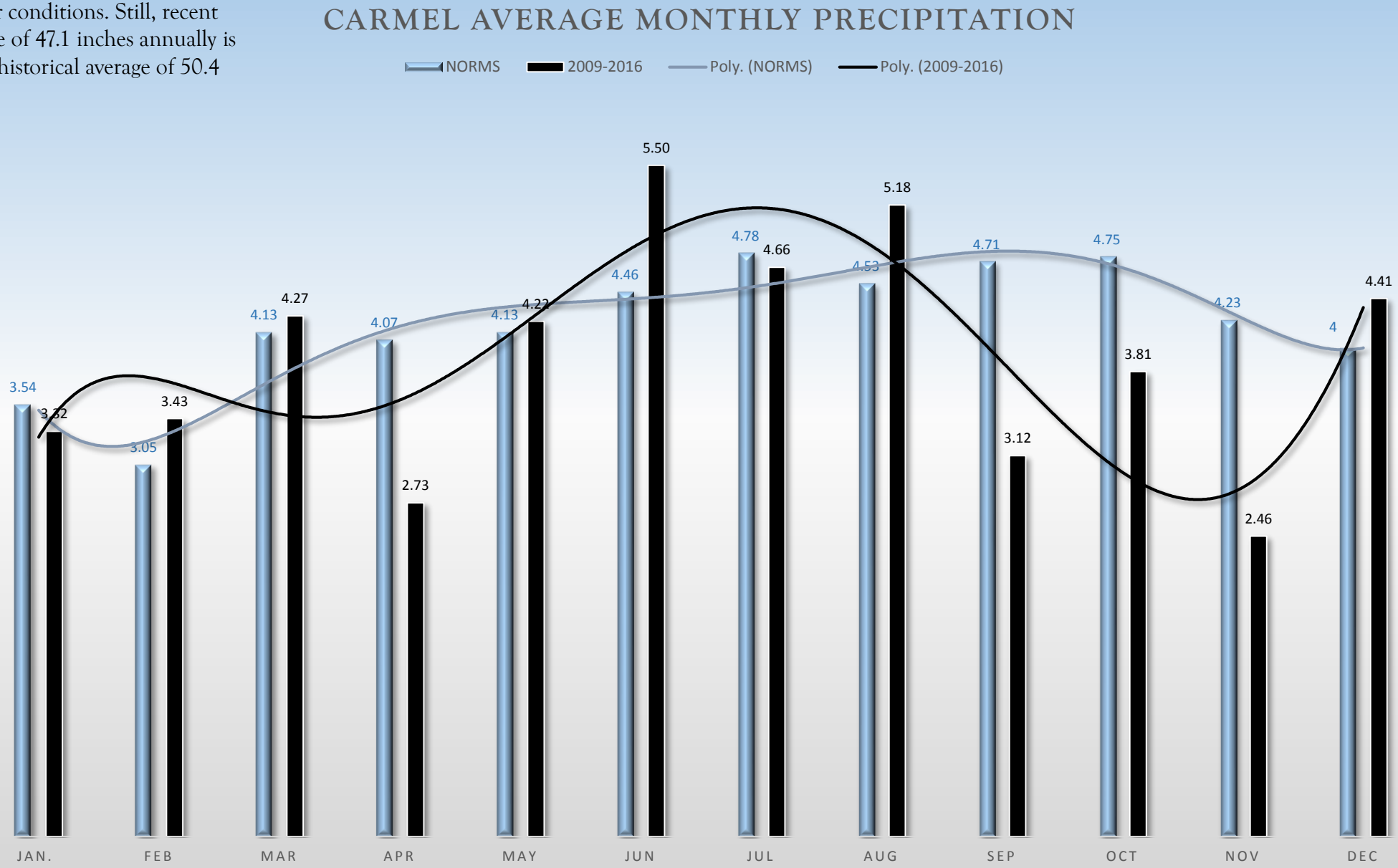
Rainfall trends appear to favor slightly wetter summers and drier springs and falls. But before drawing that conclusion, we'll check patterns from nearby stations for the same periods in pages ahead.

PEEKSKILL AVERAGE MONTHLY PRECIPITATION



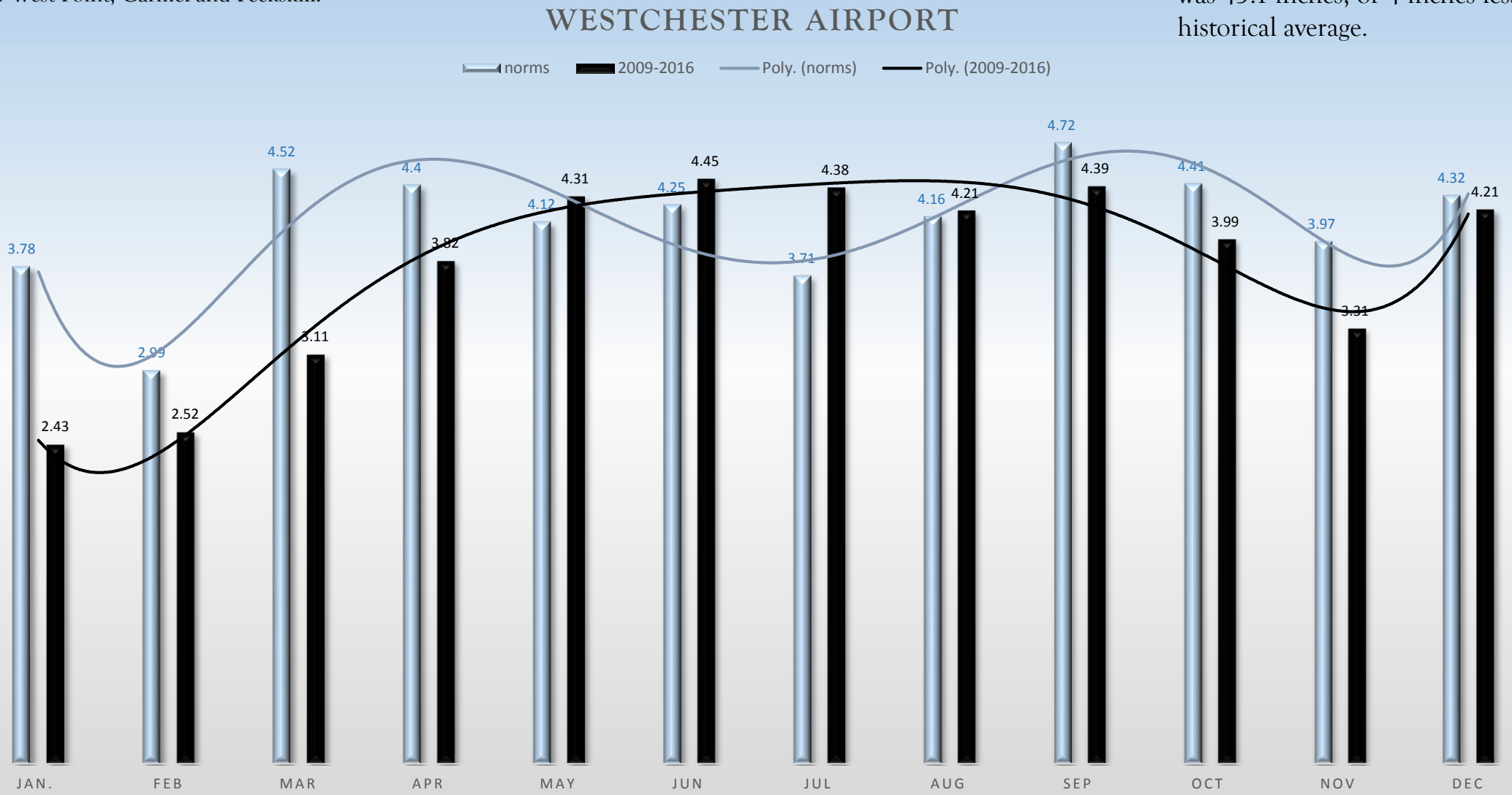
Recent average annual total is 44.4 inches, down from 46.3 inches in the 1945-1975 period.

Carmel's spring and fall appear trending drier, while summer and Dec. have favored wetter conditions. Still, recent period average of 47.1 inches annually is down from a historical average of 50.4 inches.

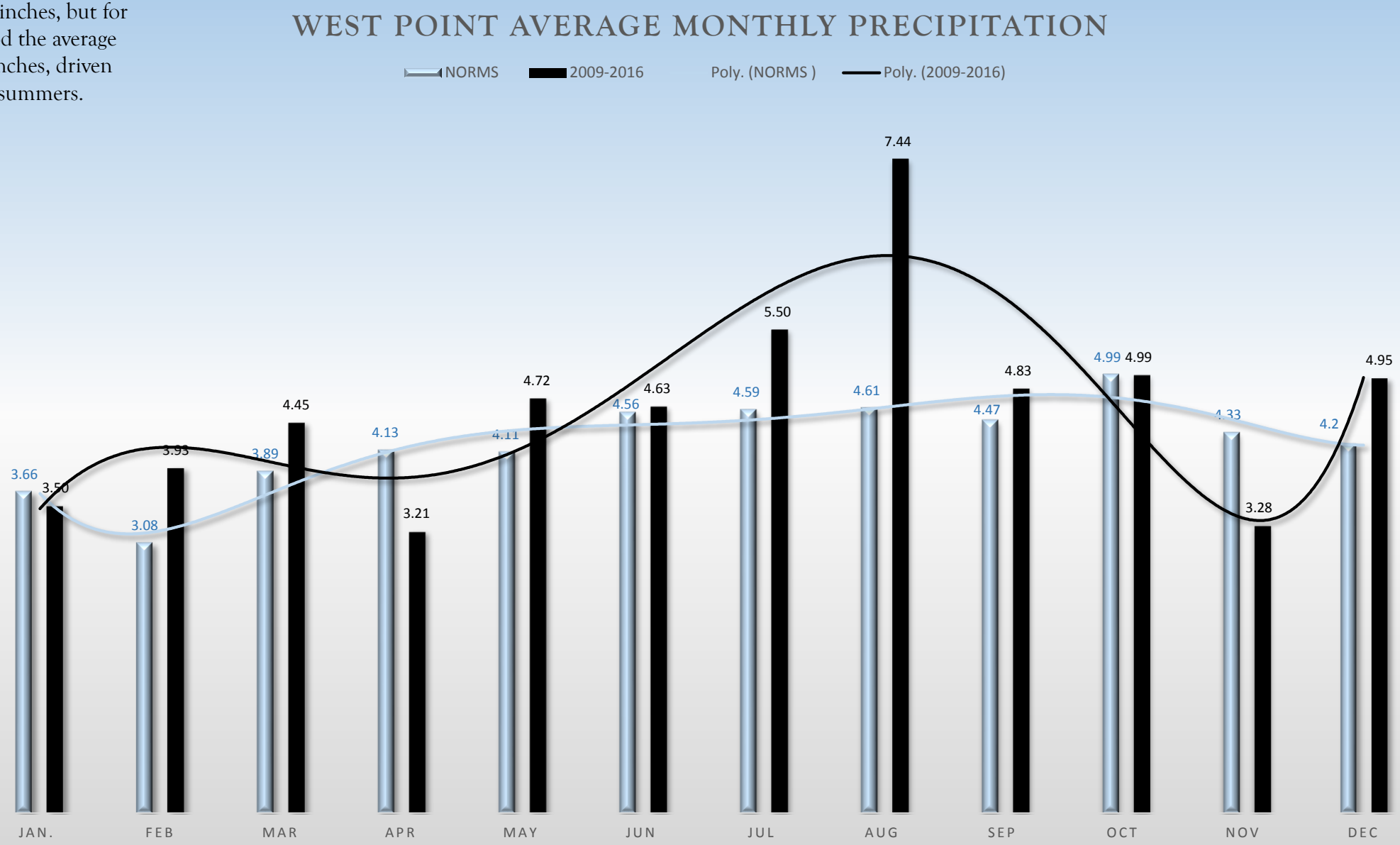


The airport data has trended toward drier fall and winter, and slightly wetter summer. However, its historical trends were already different than inland locations of West Point, Carmel and Peekskill.

The average precip for the recent period was 45.1 inches, or 4 inches less than historical average.



West Point's annual average precip was 50.6 inches, but for this recent period the average surged to 55.4 inches, driven by much wetter summers.



Snowfall Season Totals (November – March)

West Point data reports are inconsistent; Westchester Airport data are unavailable through normal reporting channels.

Peekskill		Carmel		Central Park	
2010-2011	55.6	2010-2011	60.8	2010-2011	61.9
2011-2012	21.6	2011-2012	26.3	2011-2012	7.4
2012-2013	43.9	2012-2013	54.6	2012-2013	26.1
2013-2014	54.1	2013-2014	61.8	2013-2014	57.4
2014-2015	41.8	2014-2015	62.3	2014-2015	50.3
2015-2016	18.3	2015-2016	23.7	2015-2016	32.1
2016-2017	43.4	2016-2017	52.9	2016-2017	30.2
Average	39.8”	Average	48.9”	Average	37.9”

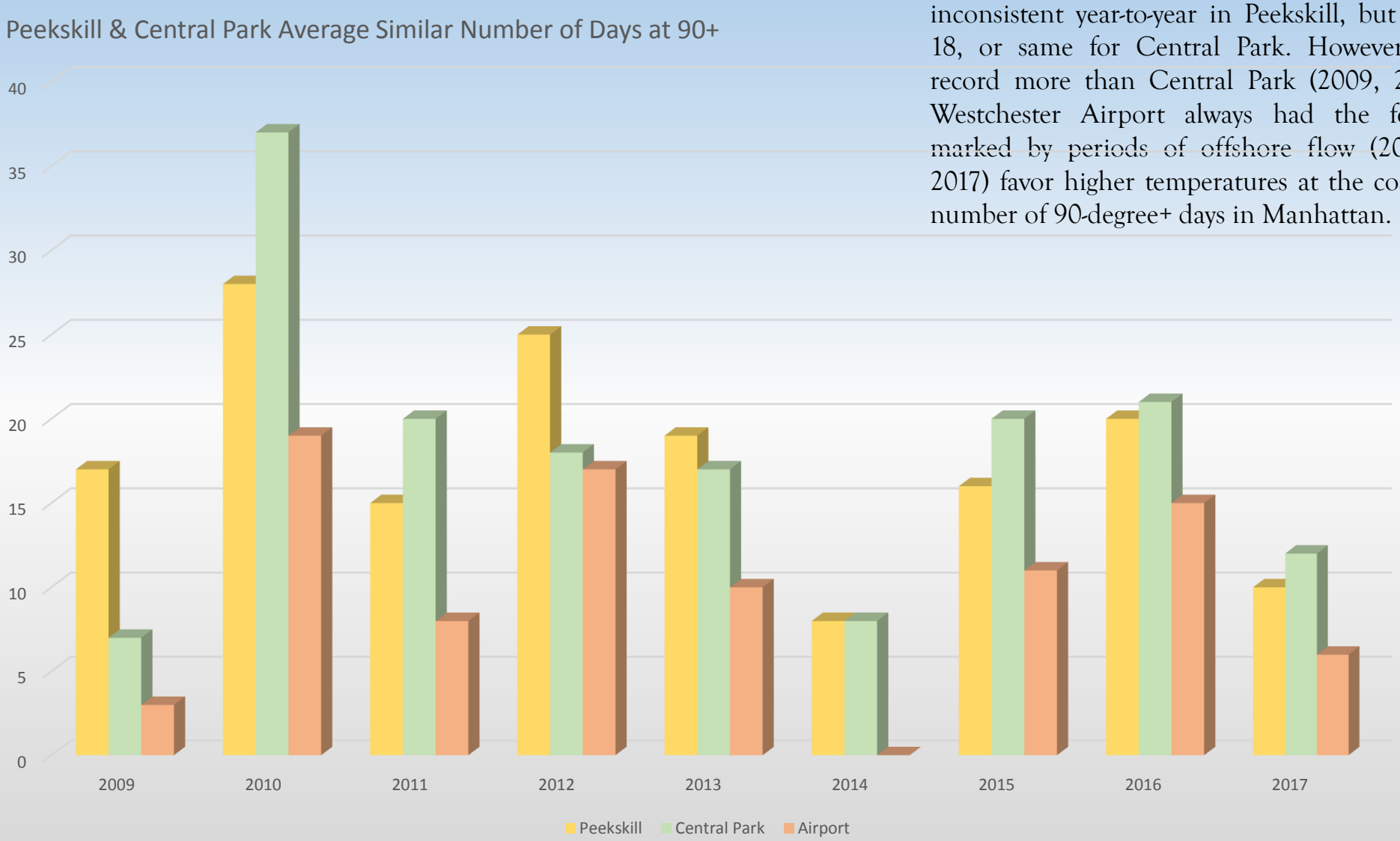
Analysis: Precipitation trends point to lower totals for Peekskill, Carmel and the airport, while West Point trended higher. Nonetheless, Peekskill, West Point and the airport all recorded their wettest year in 2011, compared with previous data, while Carmel did not. In 2011, Peekskill received 70.74 inches, West Point 80.37 inches and the county airport 73.29 inches of precip. These totals were largely driven by the remnants of two hurricanes along with several rounds of heavy thunderstorm activity during the year.

Peekskill also recorded its driest year (for 2009-2017 and 1945-1975 combined) at 31.6 inches in 2015. The airport did not beat a record low rainfall year in the recent period, however, four out of the past eight years recorded precip deficits of between 20% and 30%. The airport's rainfall totals surpassed its lower (recent) average twice in the past eight years and Peekskill did only once, meaning we were drier than average seven out of the past eight years.

This trend offers important implications. Should winters continue drier than historical records, it could result in less cost for snow removal. Winter parking regulations could also be altered to just be enacted for the occasional snow emergency between the months of December and March. But it also reflects a need for vigilance in forest and grass fire prevention during dry, warm periods during spring. On the other hand, with higher amounts of precipitation in summer months, much of which falls in "deluges" and flash flood events, this brings into question our storm water capacity, flood preparedness and civic responsibility to the Hudson River ecosystem. Also, with short duration, although heavy, rainfall episodes in summer, long dry spells increase the need for potable water supplies for residential and commercial landscape irrigation.

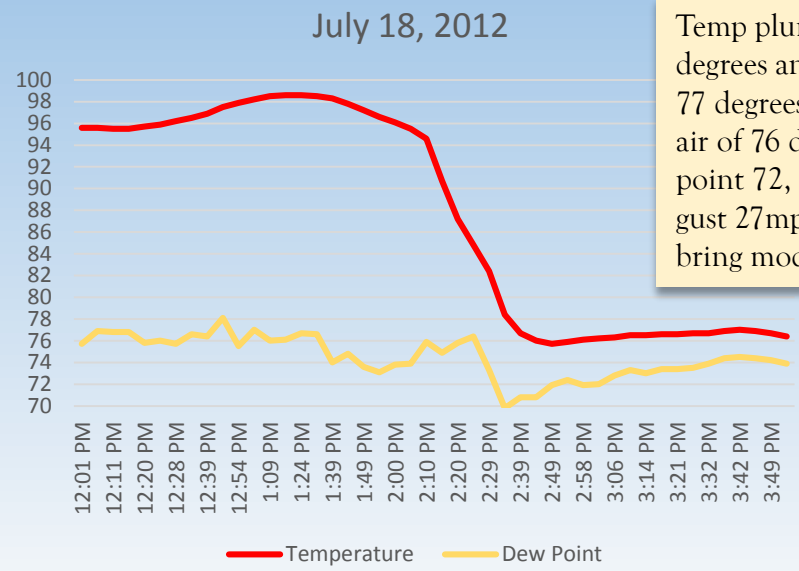
Fun observations about Peekskill's weather

Mean temperatures neglect to show the bigger picture. The number of uncomfortable days of 90+ are highly inconsistent year-to-year in Peekskill, but averaged out to 18, or same for Central Park. However, sometimes we record more than Central Park (2009, 2012, 2013), but Westchester Airport always had the fewest. Summers marked by periods of offshore flow (2010, 2011, 2015, 2017) favor higher temperatures at the coast and a greater number of 90-degree+ days in Manhattan.

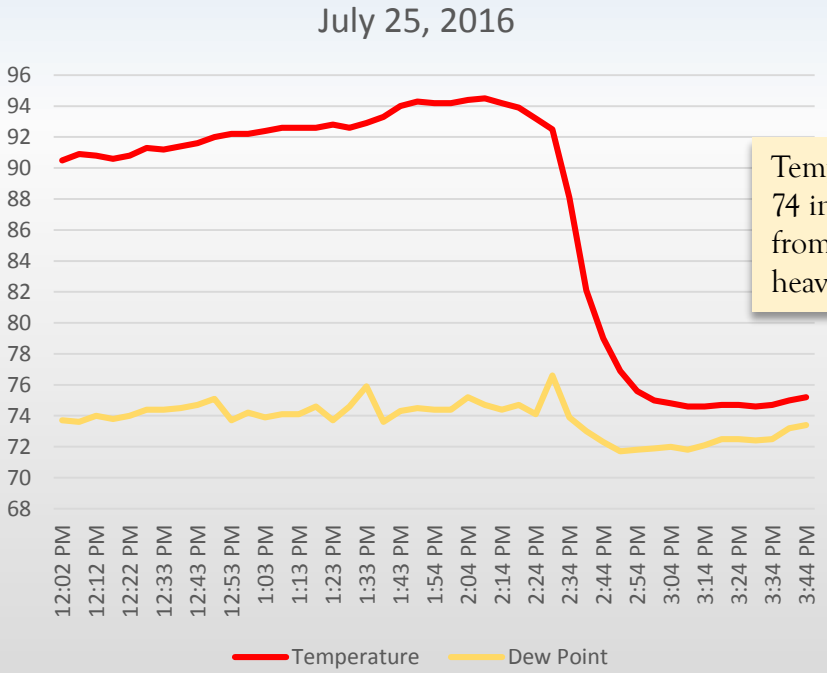


“The Peekskill Plunge”

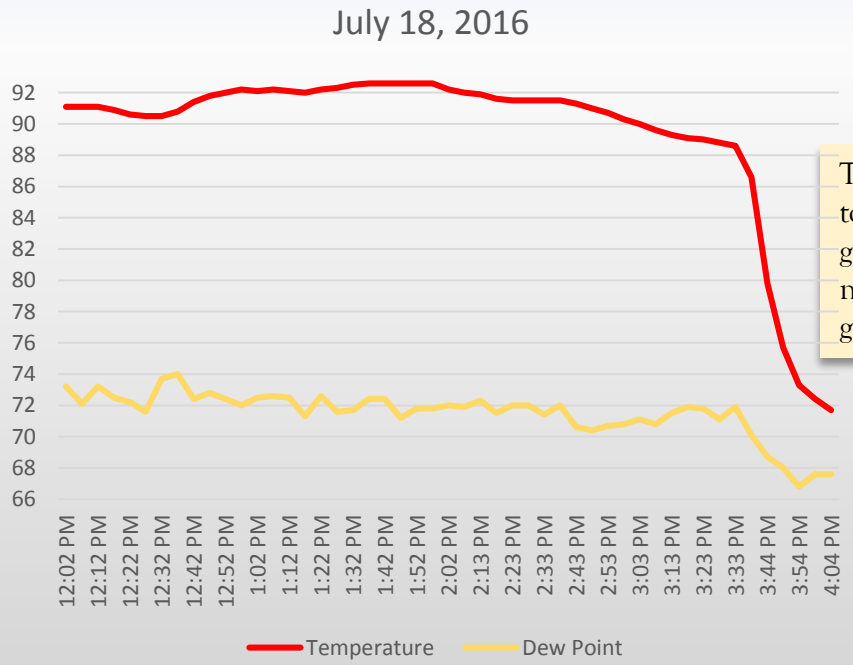
Our weather can play a trick on Manhattan commuters. High summertime temperatures can suddenly crash in the afternoon from thunderstorm activity, resulting in a refreshing 20~ degree drop prior to the evening trains’ arrival. But commuters mustn’t conclude that Peekskill was cooler than the city earlier in the day.



Temp plunges from 99 degrees and a dew point of 77 degrees at 12:30 p.m. to air of 76 degrees and dew point 72, at 1:40 p.m. Winds gust 27mph out of east and bring moderate rain.



Temp drops from 95 degrees to 74 in 45 minutes; wind gusts from the northwest at 32mph, heavy rain of 1.18 inches.



Temp drops from 93 degrees to 72 in 20 minutes; wind gusts at 35 mph from the north, but just light rain greats commuters.

During the recent recording period (RRP) Peekskill experienced two days of 100+, while earlier periods (denoted with * in the table) report a high of 103. RRP lowest was -5, earlier period reports -14.

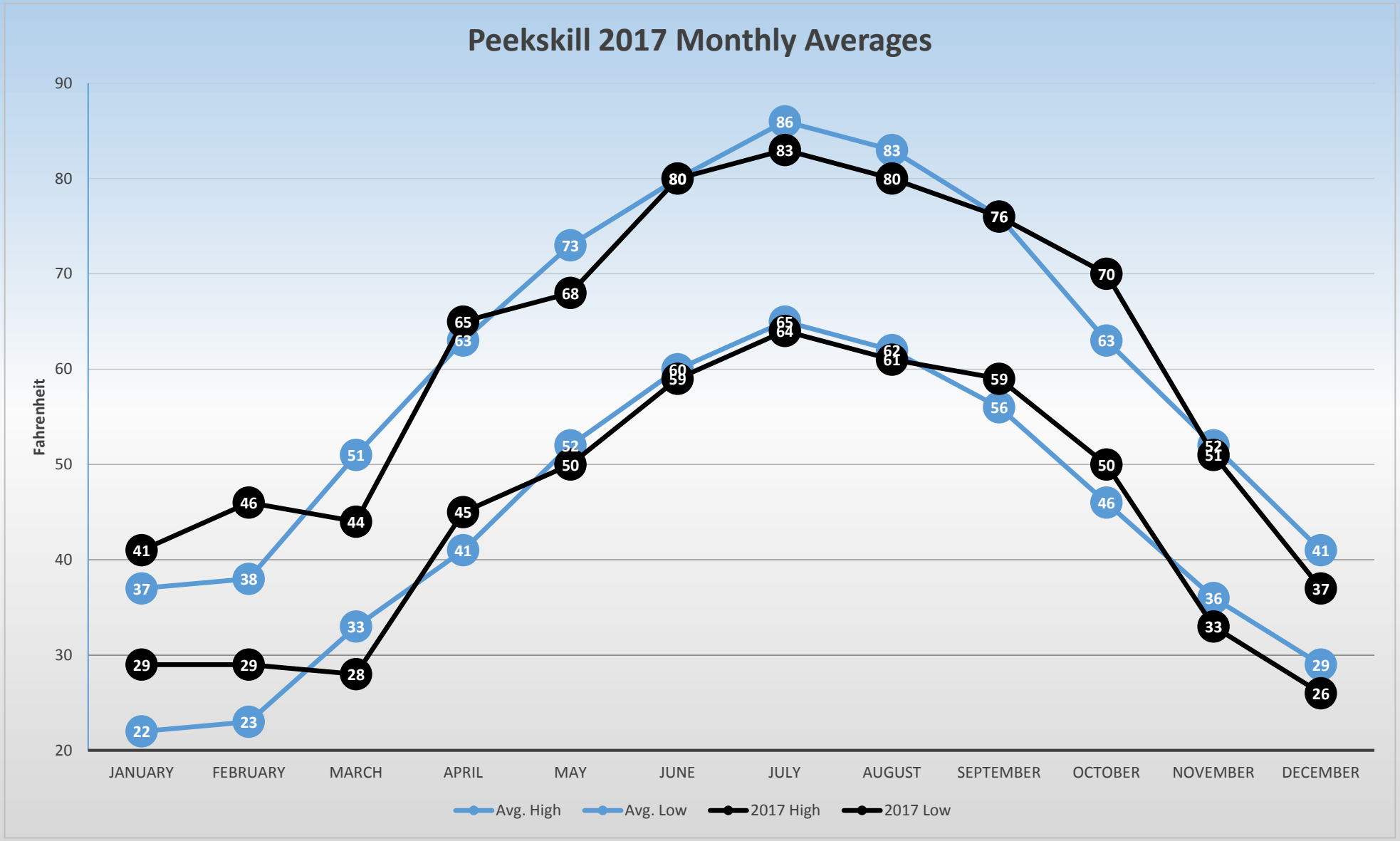
RRP highest wind gust at 68 mph and this has likely been topped previously.

RRP highest daily rainfall total of 5.93 inches has been topped before, at least with Floyd and perhaps other occasions.

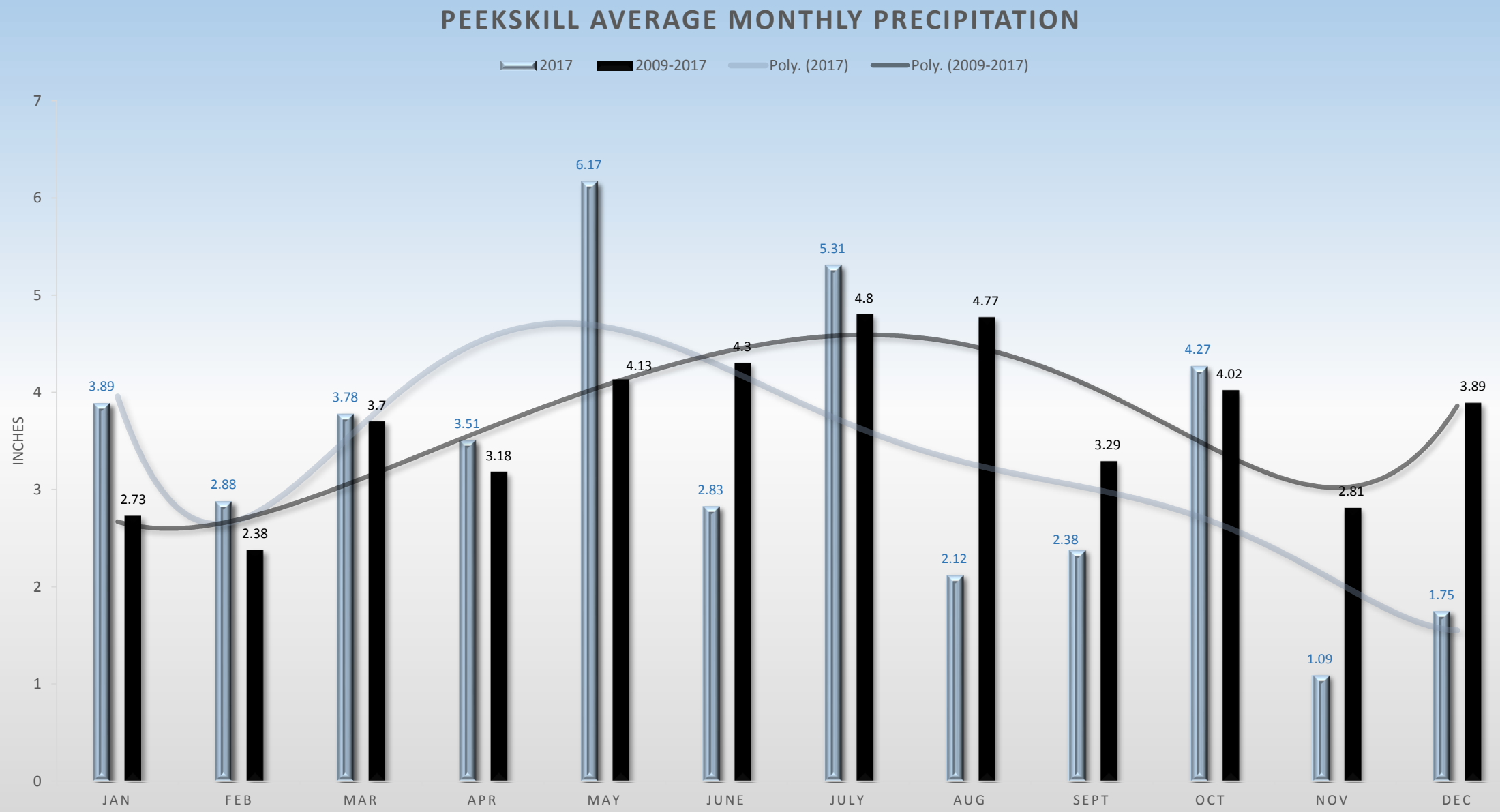
Snow data not included in this edition.

January **1/4/14 : -2.8 lowest for the month** **1/7 /12: 60 highest for the month** **1/10/16: 60** **1/24/11: -1.4** **1/25/10: 2.15 in. most for month**	**April** **4/5/16: 22** **4/6 /16: 21.7 lowest for the month** **4/7/10: 91.7** **4/16/11: 2.42 in.** **4/22/11: 31.1 (last below 32 in RRP)** **4/25/09: 93.1** **4/26/09: 92.3** **4/27/09: 88** **4/28/09: 94.4 highest for the month** **4/30/14: 2.56 in. most for the month** **(Last freeze 15th – 18th)**	**July** **7/6 /10: 101.2 highest of RRP** **7/7/10: 97.6** **7/8/11: 2.12 in.** **7/12/37: 100+ for a week*** **7/12/73: 44*** **7/14/09: 50.3 lowest for RRP month** **7/18/12: 99** **7/17/09: 2.02 in.** **7/20/40: 103*** **7/21/12: 98.7** **7/21/10: 44 mph. gust** **7/22/11: 100** **7/29/71: Tornado in area.** **7/31/16: 2.50 in. highest for month**	**October** **10/1/10: 3.26 in. highest for month** **10/5/41: 91*** **10/13/12: 29 earliest freeze in RRP** **10/18/16: 83 highest for RRP month** **10/19/15: 25 lowest of RRP month** **10/28/36: 22*** **10/29/12: 47 mph (Sandy)** **10/31/11: 26.9** **(First freeze 18th – 23rd)**
February 2/1/12: 60.2 2/14/16: -4 2/16/16: 1.47 in. most in month 2/18/11: 64 highest for month 2/19/11: 46 mph. 2/21/15: -1.9 2/24/15: -5 lowest of RRP	May 5/2/10: 91.5 5/10/54: Severe hailstorm* 5/11/10: 33 lowest for the month 5/23/13: 2.12 in. most for the month 5/26/10: 93.4 highest for the month 5/30/13: 92.6 5/31/13: 92.7	August 8/14/11: 2.06 in. 8/15/12: 2.44 in. 8/15 50.8 lowest of RRP month 8/17/52: 5.19 in.* 8/17/09: 96.8 highest of RRP month 8/22/10: 3.49 in. 8/26/48: 102* 8/26/61: 5.33 in. * 8/28/11: 5.93 in. highest of RRP	November 11/2/14: 46 mph gust 11/2/50: 85* 11/6/15: 75 highest for RRP month 11/8/10: 59 mph gust 11/15/16: 2.71 in. 11/22/14: 17.2 11/27/32: 8* 11/27/13: 3.00 in. most in RRP month 11/29/14: 16.6 lowest in RRP month
March 3/1/14: 6.3 3/6/15: 5.6 lowest for the month 3/6/11: 3.70 in. most for the month 3/9/16: 78.4 highest for the month 3/19/12: 77.5 3/22/12: 77.4	June 6/1/09: 42.3 lowest for RRP month 6/5/25: 102* 6/6/45: 35* 6/7/13: 2.77 in. most for the month 6/9/11: 95.5 6/20/12: 97 highest for RRP month 6/21/12: 96.2	September 9/1/53: 99* 9/6/11: 2.45 in. highest of RRP month 9/8/15: 95.7 highest of RRP month 9/11/13: 48 mph gust 9/12/60: 4.17 in. * 9/18/12: 2.26 in. 9/26/16: 40.6 lowest of RRP month 9/27/47: 29* 9/30/10: 2.14 in.	December 12/1/10: 62.4 12/3/09: 65.8 12/21/13: 66.1 12/20/16: 7.5 lowest of RRP month 12/21/42: -14* 12/24/15: 69 highest of month 12/26/10: 68 mph gust highest of RRP 12/27/10: 59 mph gust 12/27/11: 1.97 in. most in RRP month 12/29/09: 48 mph gust 12/31/62: -2*

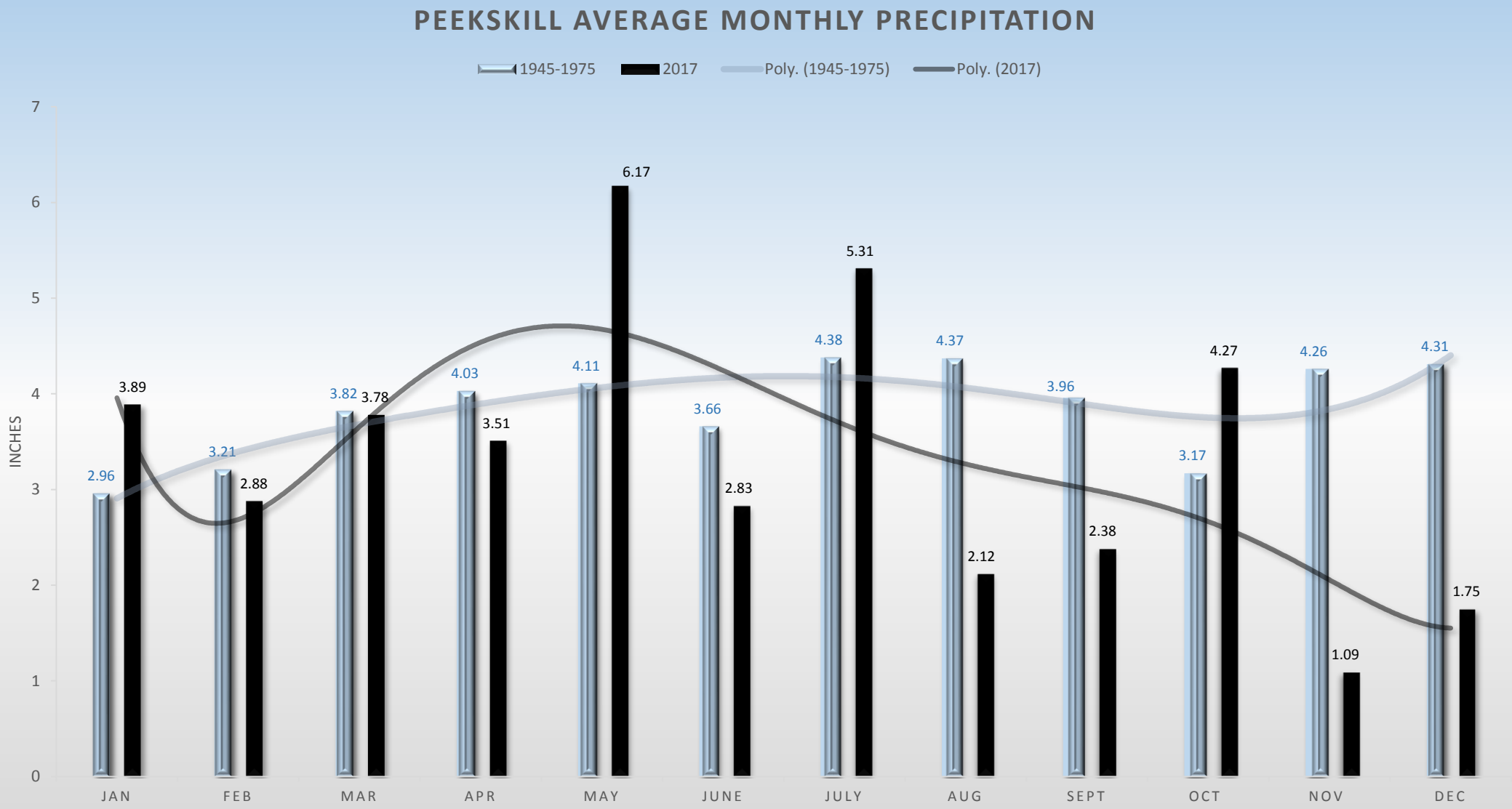
Common Council presentation slide 1



Common Council presentation slide 2



Common Council presentation slide 3



Next steps:

- Continue a monitoring program
- Install solar radiation equipment (watts/m2)
- Upgrade station/software/computing equipment
- Dive deeper into snowfall trends
- Establish alert system

References:

The Westchester Weather Book, Thaler, Jerome S., October 1977

National Weather Service Upton, NY station information for
- Westchester County Airport
- Carmel
- West Point
- Central Park

Data analysis conducted by Jeff Miller, MBA in Information Systems (May 2017) and vice chair of the Peekskill Conservation Advisory Council