



2013 Meteorology Summary

New Jersey Department of Environmental Protection

AIR POLLUTION AND METEOROLOGY

Meteorology plays an important role in the distribution of pollution throughout the troposphere, the layer of the atmosphere closest to the earth's surface. Atmospheric processes such as wind speed and wind direction affect the transport and dispersion of air pollution. Weather phenomena, such as precipitation and solar radiation, influence chemical reactions and transformations in the atmosphere that affect air pollutants. By studying meteorological and air pollution data together, scientists and mathematicians have developed reasonably accurate models for predicting the fate of pollutants as they go through the stages of transport, dispersion, transformation and removal.

Scientists, engineers, and policy makers can use results of the air pollution models as a screening tool for comparison to the National Ambient Air Quality Standards (NAAQS), to determine the impacts of new and existing air pollution sources, and to design ambient air monitoring networks. The meteorological data collected by the New Jersey Department of Environmental Protection (NJDEP) can assist planners in preparing State Implementation Plans (SIPs), engineers in designing or evaluating air pollution permit applications and scientists in locating air monitoring stations.

CLIMATOLOGY IN NEW JERSEY

New Jersey is located about halfway between the Equator and the North Pole, on the eastern coast of the United States. Its geographic location results in the State being influenced by different air streams at different times (wet, dry, hot, cold), making for daily weather that is highly variable.

Although New Jersey is one of the smallest states in the Union, with a land area of 7,836 square miles, it has five distinct climate zones, which are classified as the Northern, Central, Pine Barrens, Southwest, and Coastal zones. The topography of the zones, their distance from the Atlantic Ocean, and the prevailing atmospheric flow patterns affecting those zones produce distinct variations in the daily weather between each of them. These climate zones are shown in Figure 1.

Figure 1
New Jersey Climate Zones



Source: Office of the New Jersey State Climatologist

MONITORING LOCATIONS

The NJDEP maintains a network of nine meteorological monitoring locations. In addition, total weekly precipitation is measured in Washington Crossing and Cattus Island Park. Not all meteorological parameters are measured at each site. Table 1 depicts the meteorological parameters measured at each site and Figure 2 depicts the 2013

Meteorological Monitoring Network. In Table 2, the 2013 meteorological data is summarized by site. Figures 3, 5, 7, 9, 11, 13, and 15 show the monthly maximum, mean, and minimum temperatures at the Camden Spruce Street, Columbia WMA, East Orange, Flemington, Newark Firehouse, Passaic, and Rider University meteorological stations respectively. Figures 4, 6, 8, 10, 12, 14, and 16 depict the observed average monthly temperature difference from the 30-year average monthly temperature, as measured by the State Climatologist, at the Camden Spruce Street, Columbia WMA, East Orange, Flemington, Newark Firehouse, and Rider University meteorological stations respectively. Figures 17 through 24 depict annual wind roses for Camden Spruce Street, Columbia WMA, East Orange, Elizabeth Trailer, Flemington, Newark Firehouse, Passaic and Rider University respectively.

TABLE 1
2013 METEOROLOGICAL MONITORING NETWORK PARAMETER SUMMARY

Measured Parameters							
Site Name	Temperature	Relative Humidity	Wind Speed	Wind Direction	Barometric Pressure	Solar Radiation	Precipitation
Camden Spruce Street	X	X	X	X	X		
Cattus Island							X
Chester						X	
Columbia WMA	X	X	X	X	X		
East Orange	X	X	X	X	X		
Elizabeth Lab			X	X			
Flemington	X	X	X	X	X	X	
Newark Firehouse	X	X	X	X	X	X	
Passaic	X	X	X	X	X		
Rider University	X	X	X	X	X		
Washington Crossing							X

Figure 2
 2013 Meteorological Monitoring Network

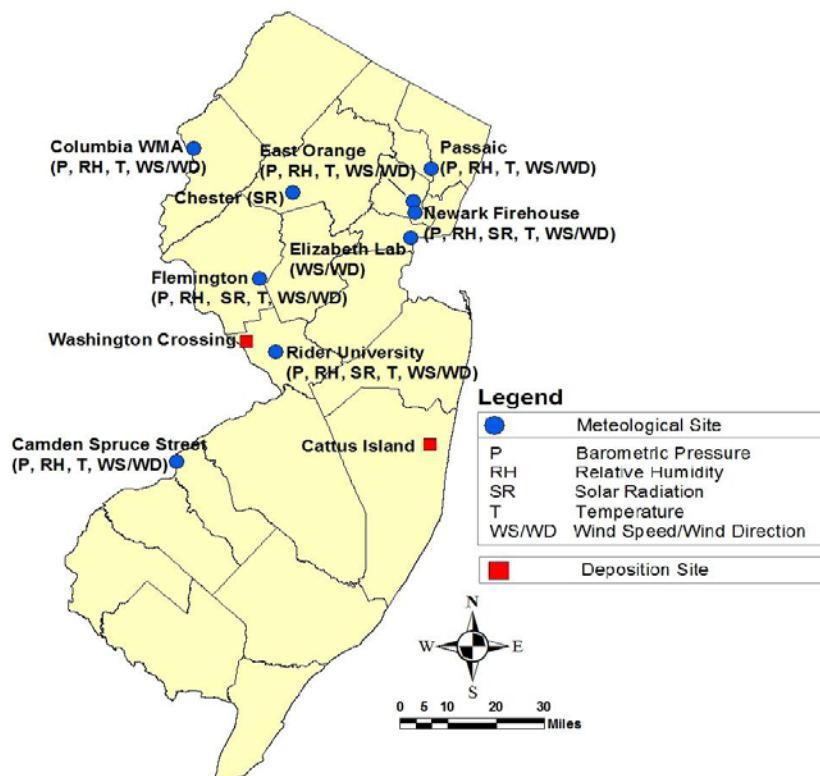


Table 2
Summary of Meteorological Monitoring Data - 2013

MONITORING SITES		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	YEAR
Camden Spruce Street														
Temperature: (°F)	Mean ⁵	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	66/62	72/71	79/76	74/74	67/67	59/56	44/47	38/37	62/54
	Min	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	44	56	63	59	49	39	24	22	22
	Max	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	92	91	96	87	91	85	70	67	96
Relative Humidity: %	Mean	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	60.1	65.8	66.1	65.9	60.6	63.6	53.4	64.4	62.5
	Min	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	21.3	25.3	31.7	30.1	25.2	31.1	17.5	33.9	17.5
	Max	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	96.4	95.2	94.2	92.5	92.5	91.9	93.1	93.0	96.4
Barometric Pressure (in of Hg)	Mean	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	29.98	29.90	30.00	30.00	30.00	30.04	30.16	30.09	30.02
	Min	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	29.68	29.38	29.57	29.69	29.64	29.60	29.38	29.42	29.38
	Max	No Data ⁴	No Data ⁴	No Data ⁴	No Data ⁴	30.25	30.29	30.32	30.39	30.40	30.37	30.72	30.57	30.72
Chester														
Solar Radiation: (Langleys)	Mean	0.087	0.133	0.205	0.323	0.342	0.349	0.342	0.287	0.268	0.171	0.103	0.064	0.223
	Max	0.874	1.085	1.412	1.493	1.557	1.632	1.521	1.505	1.375	1.122	0.900	0.594	1.632
Columbia WMA														
Temperature: (°F)	Mean ¹	30/29	29/32	36/39	49/50	58/60	67/69	74/74	67/72	60/65	53/53	39/44	30/34	49/52
	Min	5	9	23	28	33	45	55	49	39	28	15	7	5
	Max	61	50	59	80	89	89	94	85	90	82	68	62	94
Relative Humidity: %	Mean	65.2	64.2	57.8	54.2	67.3	72.8	74.5	77.5	73.5	70.4	59.3	69.4	67.2
	Min	26.5	29.8	17.4	17.3	18.5	27.7	37.2	35.3	32.5	21.0	19.9	36.3	17.3
	Max	92.9	91.1	91.2	92.1	92.7	92.8	93.1	93.0	93.2	92.2	91.8	92.5	93.2
Barometric Pressure (in of Hg)	Mean	29.58	29.45	29.39	29.58	29.53	29.4	29.51	29.51	29.51	29.53	29.63	29.56	29.51
	Min	28.55	28.99	28.95	29.07	29.16	28.96	29.08	29.19	29.16	29.12	28.89	28.98	28.55
	Max	29.99	29.93	29.82	30.08	29.93	29.78	29.83	29.89	29.91	29.88	30.19	30.03	30.19

- 1) Office of the New Jersey State Climatologist 30-year mean Northern NJ temperature data shown to the right of the slash.
- 2) Office of the New Jersey State Climatologist 30-year Southern NJ mean precipitation data.
- 3) Observed monthly precipitation collected by NJDEP at Washington's Crossing state park.
- 4) Commenced data collection, May 2013
- 5) Office of the New Jersey State Climatologist 30-year mean Southern NJ temperature data shown to the right of the slash.
- 6) Office of the New Jersey State Climatologist 30-year Coastal NJ mean precipitation data.
- 7) Observed monthly precipitation collected by NJDEP at Cattus Island State Park.
- 8) Commenced data collection, April 2013.

Table 2 Continued
Summary of Meteorological Monitoring Data – 2013

MONITORING SITES		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	YEAR
East Orange														
Temperature : (°F)	Mean ¹	34/29	32/32	38/39	51/50	61/60	71/69	78/74	72/72	65/65	57/53	42/44	36/34	53/52
	Min	10	16	26	31	41	53	63	57	45	35	21	18	10
	Max	61	53	57	81	92	91	96	86	93	84	68	69	96
Relative Humidity: %	Mean	59.8	60.8	56.0	48.9	61.8	63.7	64.2	63.0	60.5	61.8	53.2	63.8	60.0
	Min	24.2	26.9	16.8	15.7	18.8	27.2	31.5	30.7	27.7	28.7	19.9	30.8	15.7
	Max	95.2	94.6	94.1	94.6	94.3	94.6	93.6	92.8	90.7	91.5	92.8	93.1	95.2
Barometric ⁴ Pressure (in of Hg)	Mean	29.93	29.79	29.73	29.97	29.87	29.72	29.83	29.83	29.83	29.87	29.97	29.91	29.85
	Min	28.88	29.32	29.29	29.44	29.49	29.28	29.38	29.52	29.46	29.44	29.18	29.25	28.88
	Max	30.34	30.31	30.20	30.45	30.29	30.12	30.15	30.21	30.25	30.23	30.56	30.39	30.56
Precipitation (inches)	Historical ²	3.49	2.90	4.12	4.31	4.37	4.51	4.78	4.13	4.49	4.36	3.90	4.00	49.37
	Observed ³	2.97	3.86	3.07	2.95	3.17	10.18	6.07	4.35	2.61	2.93	2.58	5.32	50.06
Flemington														
Temperature : (°F)	Mean ⁵	32/33	31/35	38/42	52/52	61/62	72/71	78/76	69/74	61/67	54/56	40/47	33/37	52/54
	Min	4	13	19	25	32	44	55	49	38	29	16	12	4
	Max	67	56	63	87	97	96	103	88	90	82	67	66	103
Relative Humidity: %	Mean	78.6	77.6	74.1	72.0	82.6	86.6	89.1	77.5	72.0	70.8	59.0	70.8	75.7
	Min	38.1	41.8	29.2	30.9	36.2	47.3	60.0	33.1	32.8	18.1	18.9	30.9	18.1
	Max	99.2	99.2	99.6	99.6	99.6	99.5	99.5	99.5	95.8	94.8	95.3	95.1	99.6
Solar Radiation: (Langleys)	Mean	0.111	0.149	0.209	0.317	0.335	0.348	0.331	0.285	0.286	0.180	0.137	0.083	0.231
	Max	0.963	1.048	1.204	1.371	1.430	1.456	1.338	1.349	1.232	1.052	0.864	0.779	1.456
Barometric ⁴ Pressure (in of Hg)	Mean	30.22	30.09	30.02	30.21	30.15	30.01	30.13	29.90	29.83	29.87	29.98	29.91	30.03
	Min	29.17	29.63	29.57	29.71	29.78	29.53	29.68	29.52	29.48	29.44	29.20	29.27	29.17
	Max	30.64	30.59	30.48	30.71	30.57	30.41	30.45	30.23	30.25	30.22	30.55	30.39	30.71

1) Office of the New Jersey State Climatologist 30-year mean Northern NJ temperature data shown to the right of the slash.

2) Office of the New Jersey State Climatologist 30-year Southern NJ mean precipitation data.

3) Observed monthly precipitation collected by NJDEP at Washington's Crossing state park.

4) Commenced data collection, May 2013

5) Office of the New Jersey State Climatologist 30-year mean Southern NJ temperature data shown to the right of the slash.

6) Office of the New Jersey State Climatologist 30-year Coastal NJ mean precipitation data.

7) Observed monthly precipitation collected by NJDEP at Cattus Island State Park.

8) Commenced data collection, April 2013.

Table 2 Continued
Summary of Meteorological Monitoring Data – 2013

MONITORING SITES		JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	YEAR
Newark Firehouse														
Temperature : (°F)	Mean ¹	35/29	33/32	39/39	52/50	62/60	72/69	80/74	73/72	66/65	59/53	44/44	37/34	55/52
	Min	11	17	27	32	42	55	64	59	47	36	21	18	11
	Max	62	55	58	83	93	93	97	88	95	85	70	70	97
Relative Humidity: %	Mean	57.5	58.5	53.3	49.5	59.8	62.0	61.3	60.5	58.0	59.8	50.9	62.7	57.8
	Min	18.3	22.8	13.6	12.7	14.5	22.9	27.2	28.0	24.5	24.2	14.6	26.6	12.7
	Max	94.3	93.9	91.7	94.0	94.0	92.6	90.8	90.9	88.9	91.1	92.1	93.8	94.3
Solar Radiation: (Langleys)	Mean	0.099	0.140	0.199	0.300	0.316	0.339	0.327	0.275	0.270	0.166	0.109	0.070	0.218
	Max	0.754	0.922	1.238	1.331	1.407	1.409	1.373	1.348	1.208	1.005	0.777	0.590	1.409
Barometric Pressure (in of Hg)	Mean	30.00	29.86	29.80	30.00	29.93	29.79	29.89	29.89	29.90	29.94	30.04	29.97	29.92
	Min	28.95	29.39	29.35	29.51	29.55	29.34	29.44	29.58	29.53	29.50	29.25	29.31	28.95
	Max	30.41	30.37	30.26	30.53	30.36	30.18	30.21	30.28	30.32	30.29	30.62	30.46	30.62
Passaic														
Temperature : (°F)	Mean ¹	No Data ⁸	No Data ⁸	No Data ⁸	53/50	62/60	72/69	79/74	73/72	68/65	55/53	43/44	36/34	60/52
	Min	No Data ⁸	No Data ⁸	No Data ⁸	37	41	53	63	57	47	36	21	18	18
	Max	No Data ⁸	No Data ⁸	No Data ⁸	70	93	94	98	89	95	74	69	69	98
Relative Humidity: %	Mean	No Data ⁸	No Data ⁸	No Data ⁸	48.0	60.9	62.7	63.7	62.1	59.6	60.3	53.3	64.4	60.3
	Min	No Data ⁸	No Data ⁸	No Data ⁸	15.8	18.2	24.0	30.4	28.9	26.3	23.1	20.5	31.0	15.8
	Max	No Data ⁸	No Data ⁸	No Data ⁸	89.4	96.1	94.6	93.5	92.7	91.6	91.4	93.9	94.2	96.1
Barometric Pressure (in of Hg)	Mean	No Data ⁸	No Data ⁸	No Data ⁸	30.15	29.97	29.82	29.93	29.93	29.92	29.97	30.07	30.01	29.97
	Min	No Data ⁸	No Data ⁸	No Data ⁸	29.55	29.59	29.4	29.50	29.59	29.56	29.54	29.29	29.37	29.29
	Max	No Data ⁸	No Data ⁸	No Data ⁸	30.59	30.40	30.19	30.30	30.3	30.35	30.34	30.68	30.51	30.68

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Table 2 Continued
Summary of Meteorological Monitoring Data – 2013

MONITORING SITES		<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUNE</u>	<u>JULY</u>	<u>AUG</u>	<u>SEPT</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>YEAR</u>
Rider University														
Temperature: (F°)	Mean ⁵	33/33	32/35	38/42	51/52	60/62	70/71	76/76	70/74	63/67	56/56	42/47	35/37	52/54
	Min	7	12	25	25	36	48	58	53	41	30	19	15	7
	Max	67	55	59	85	90	90	94	86	91	85	70	68	94
Relative Humidity: %	Mean	67.2	66.3	60.7	57.3	70.1	74.2	76.0	77.5	74.6	74.9	61.4	74.8	69.6
	Min	22.1	28.3	16.0	16.9	22.3	29.4	33.4	32.6	31.7	26	15.6	29.4	15.6
	Max	99.7	100.0	99.7	57.3	99.0	98.3	98.2	98.6	98.8	98.8	99.2	99.5	100.0
Solar Radiation: (Langleys)	Mean	0.092	0.130	0.189	0.292	0.316	0.327	0.316	0.267	0.259	0.162	0.114	0.069	0.211
	Max	0.721	0.831	1.106	1.285	1.332	1.337	1.360	1.386	1.147	0.939	0.707	0.572	1.386
Barometric Pressure (in of Hg)	Mean	30.36	30.21	30.14	30.35	30.29	30.13	30.25	30.24	30.24	30.28	30.40	30.33	30.27
	Min	29.27	29.70	29.66	29.85	29.90	29.61	29.79	29.92	29.86	29.82	29.58	29.63	29.27
	Max	30.80	30.73	30.61	30.35	30.72	30.56	30.60	30.65	30.67	30.64	31.00	30.84	31.00
Precipitation (Inches)	Historical ⁶	3.35	2.91	4.10	3.75	3.49	3.14	3.87	4.06	3.37	3.57	3.33	3.66	42.59
	Observed ⁷	2.48	4.42	4.27	3.06	2.87	9.50	4.27	4.31	1.07	2.86	2.63	4.64	46.38

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- 3) Observed monthly precipitation collected by NJDEP at Washington's Crossing state park.
- 4) Commenced data collection, May 2013
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- 6) Office of the New Jersey State Climatologist 30-year Coastal NJ mean precipitation data.
- 7) Observed monthly precipitation collected by NJDEP at Cattus Island State Park.
- 8) Commenced data collection, April 2013.

Figure 3
2013 Maximum, Minimum and Mean Temperatures, Camden Spruce Street

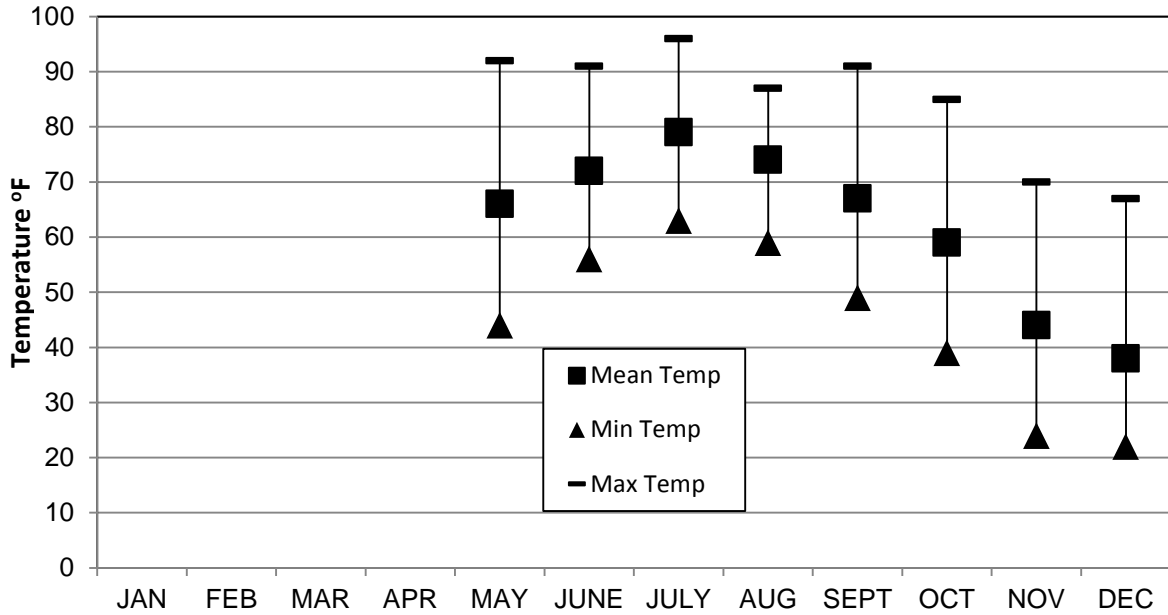
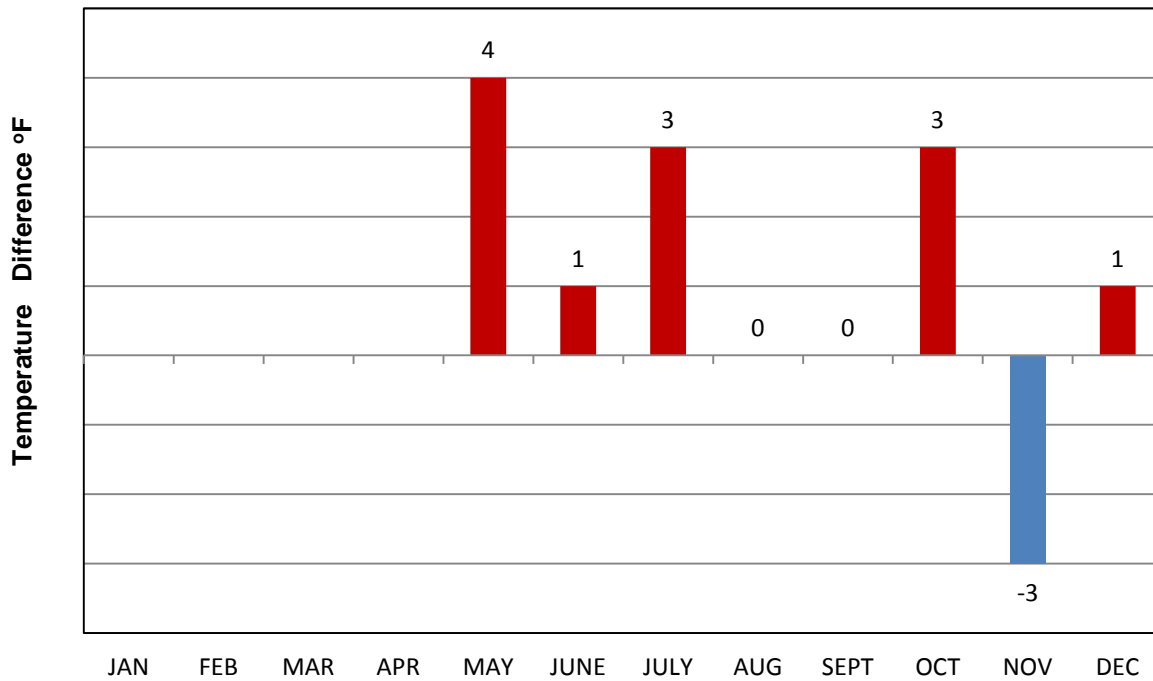


Figure 4
Camden Spruce Street 2013 Monthly Temperature Difference from New Jersey State Climatologist Southern New Jersey 30-Year Temperature Average



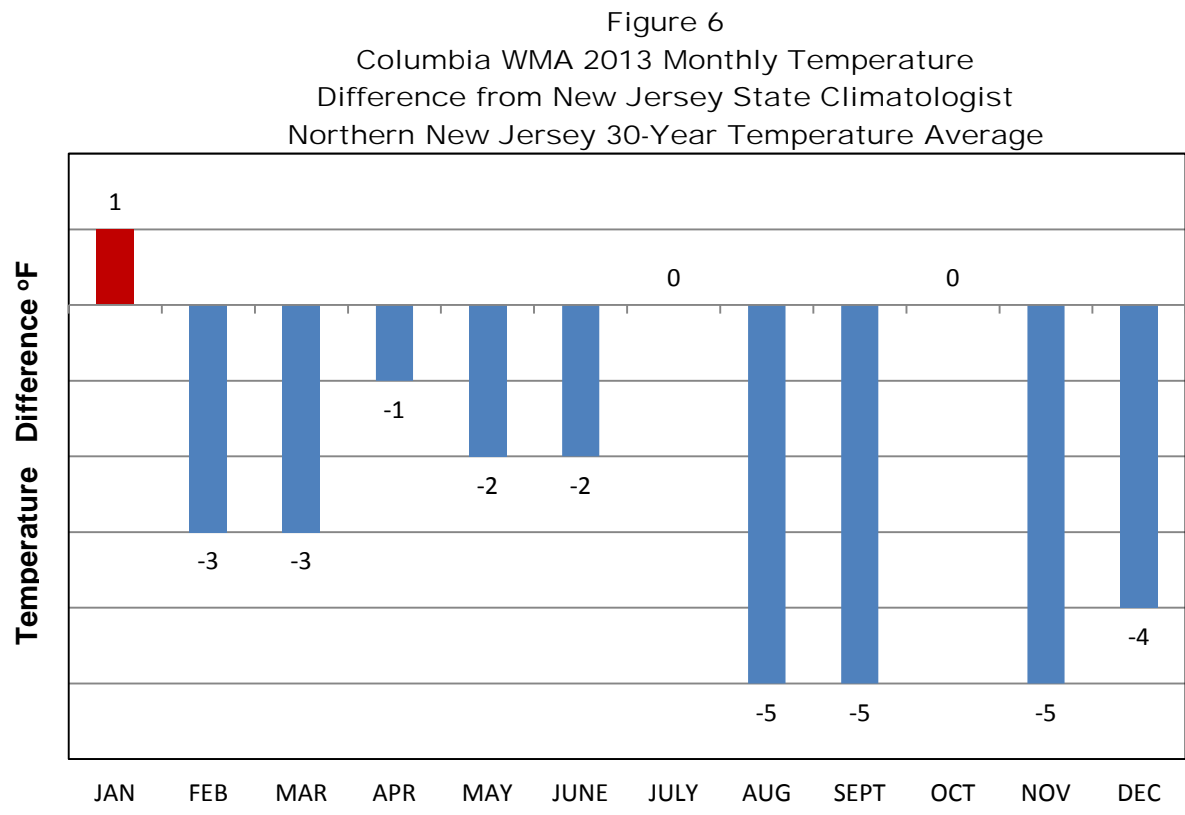
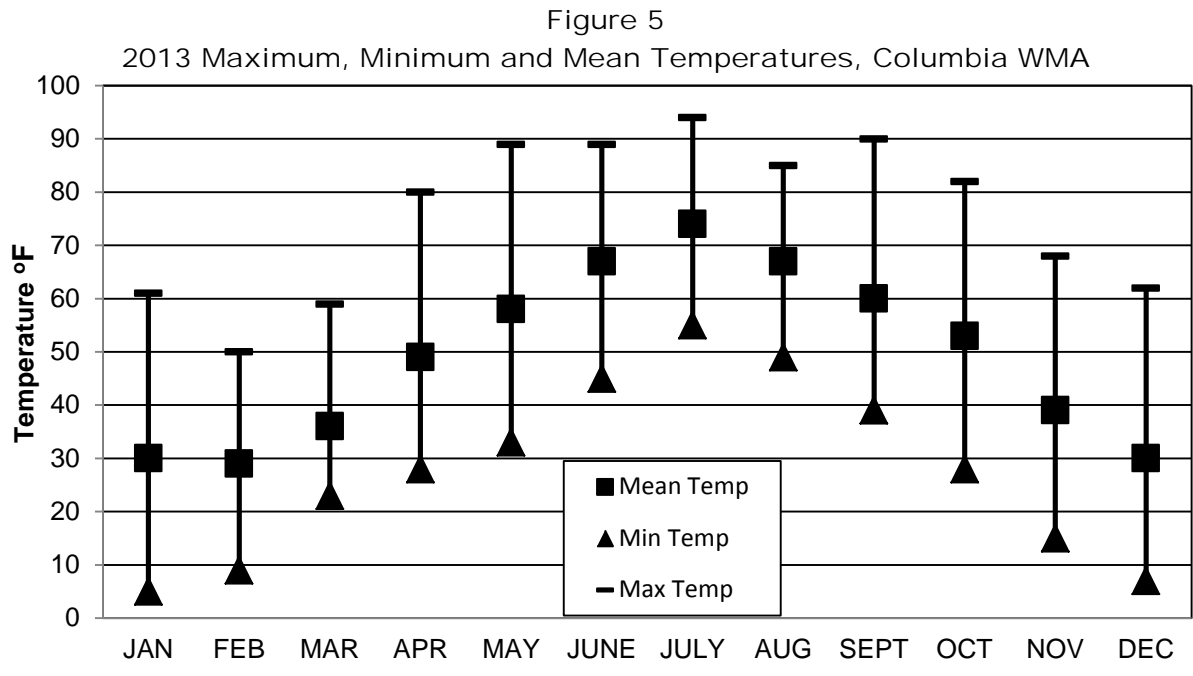


Figure 7
2013 Maximum, Mean and Minimum Temperatures, East Orange

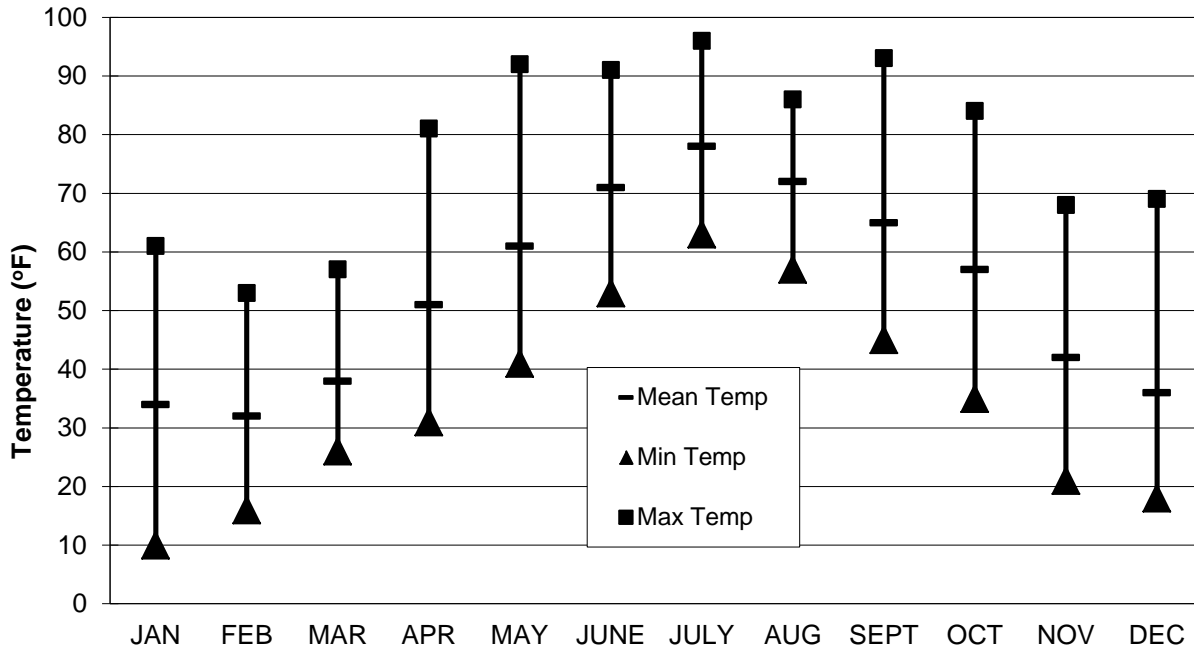


Figure 8
East Orange 2013 Monthly Temperature Difference from New Jersey State Climatologist Northern New Jersey 30-Year Temperature Average

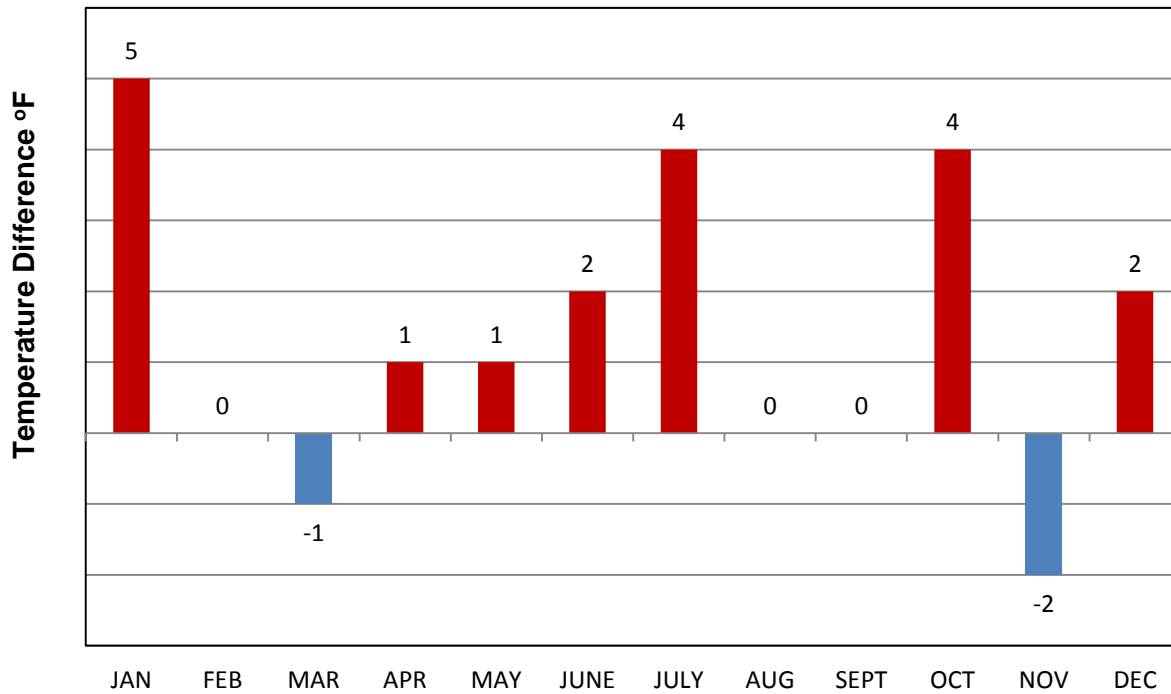


Figure 9
2013 Maximum, Mean and Minimum Temperatures, Flemington

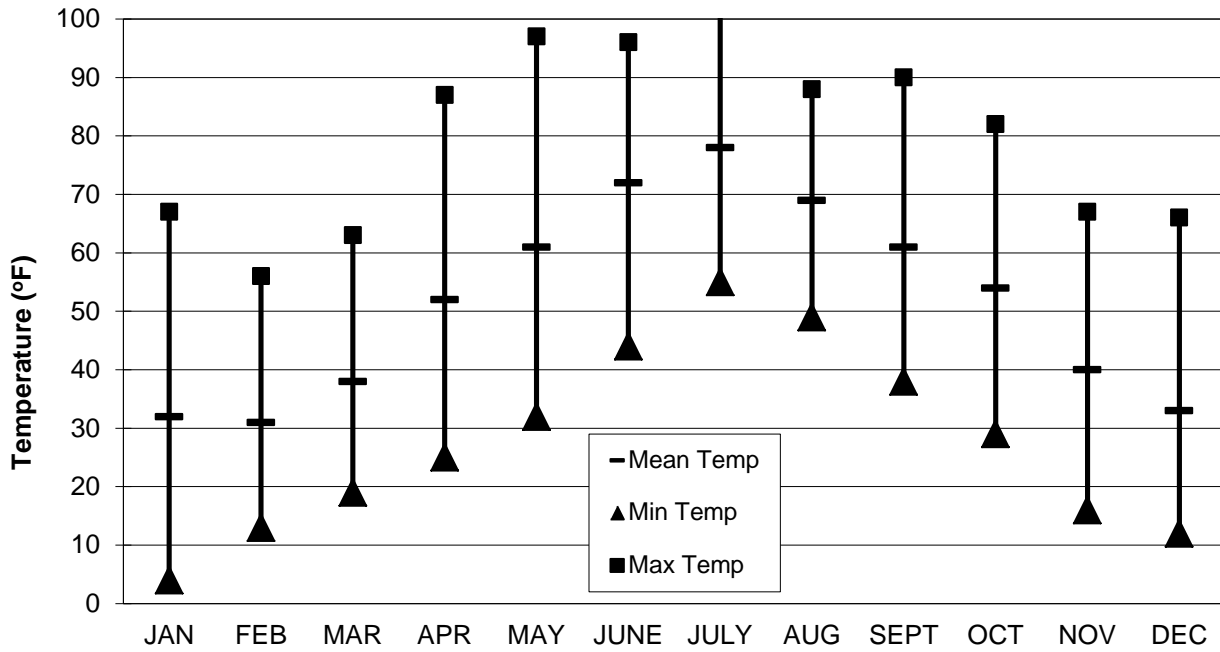


Figure 10
Flemington 2013 Monthly Temperature
Difference from New Jersey State Climatologist
Northern New Jersey 30-Year Temperature Average

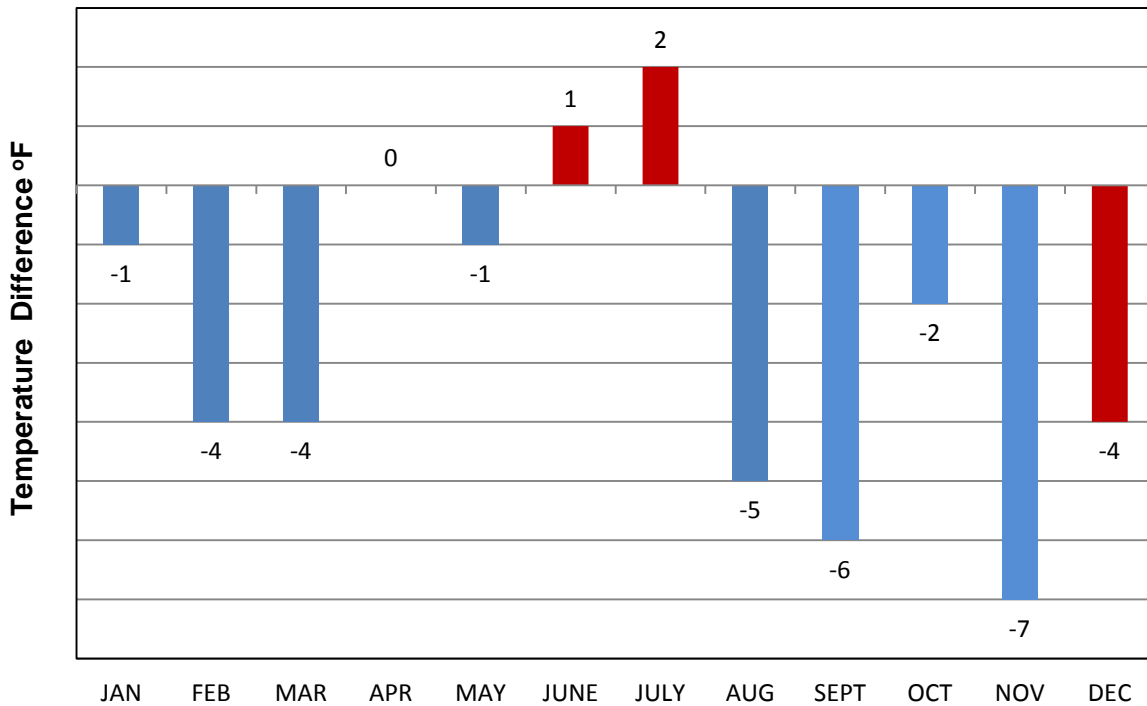


Figure 11
2013 Maximum, Minimum and Mean Temperatures, Newark Firehouse

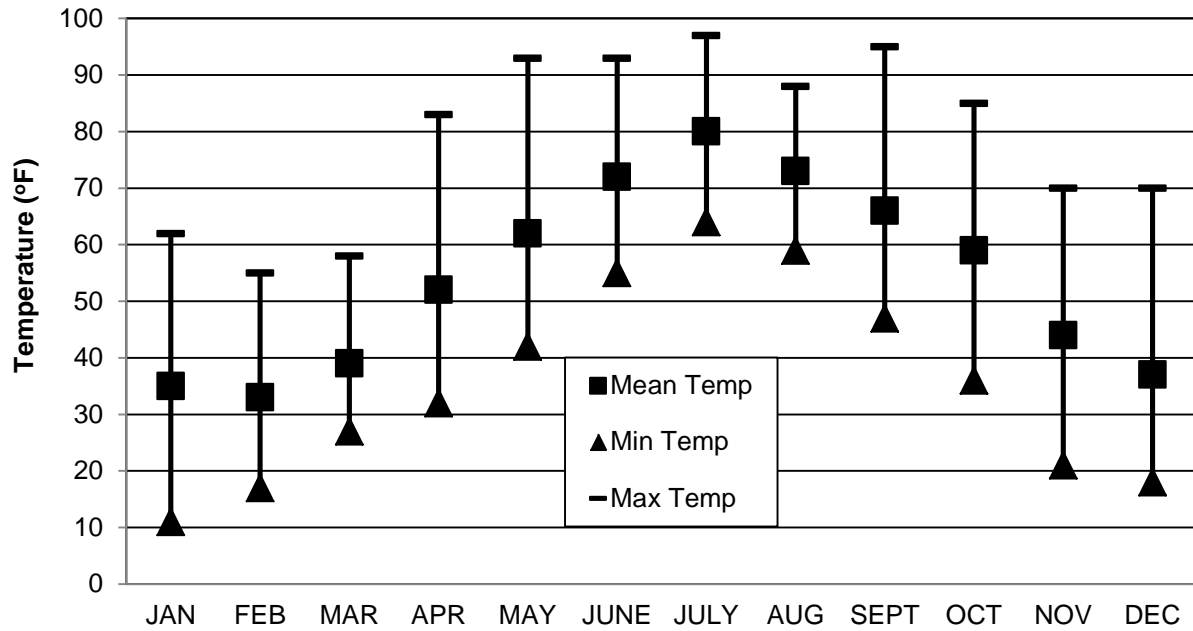


Figure 12
Newark Firehouse 2013 Monthly Temperature Difference from New Jersey State Climatologist Northern New Jersey 30-Year Temperature Average

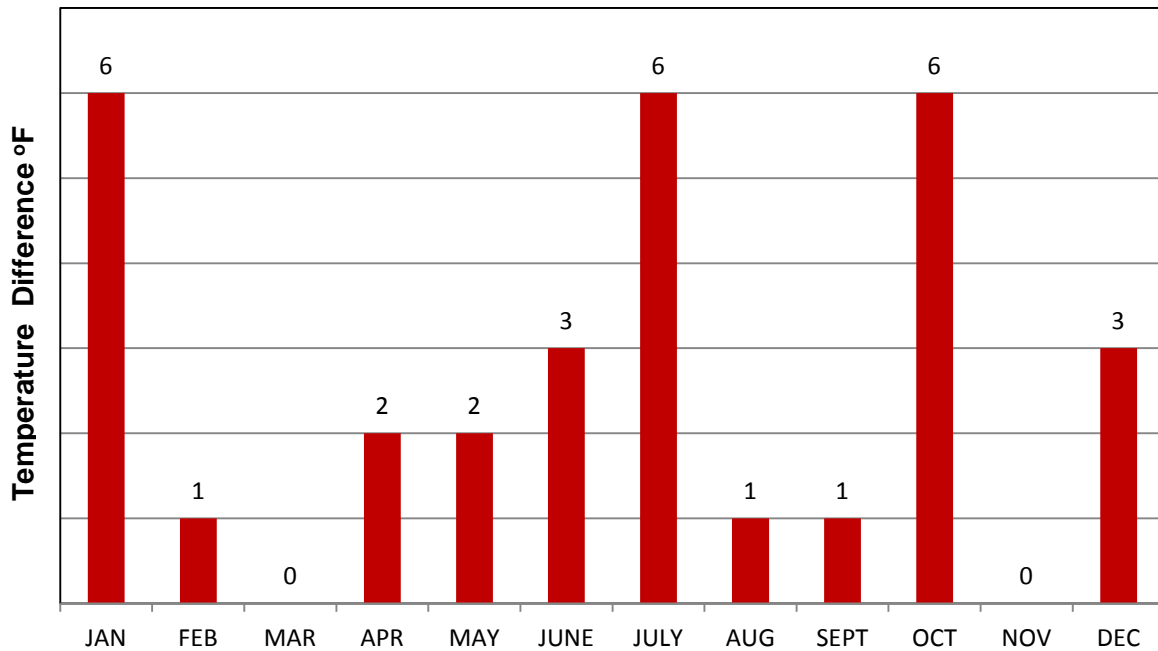


Figure 13
2013 Maximum, Mean and Minimum Temperatures, Passaic

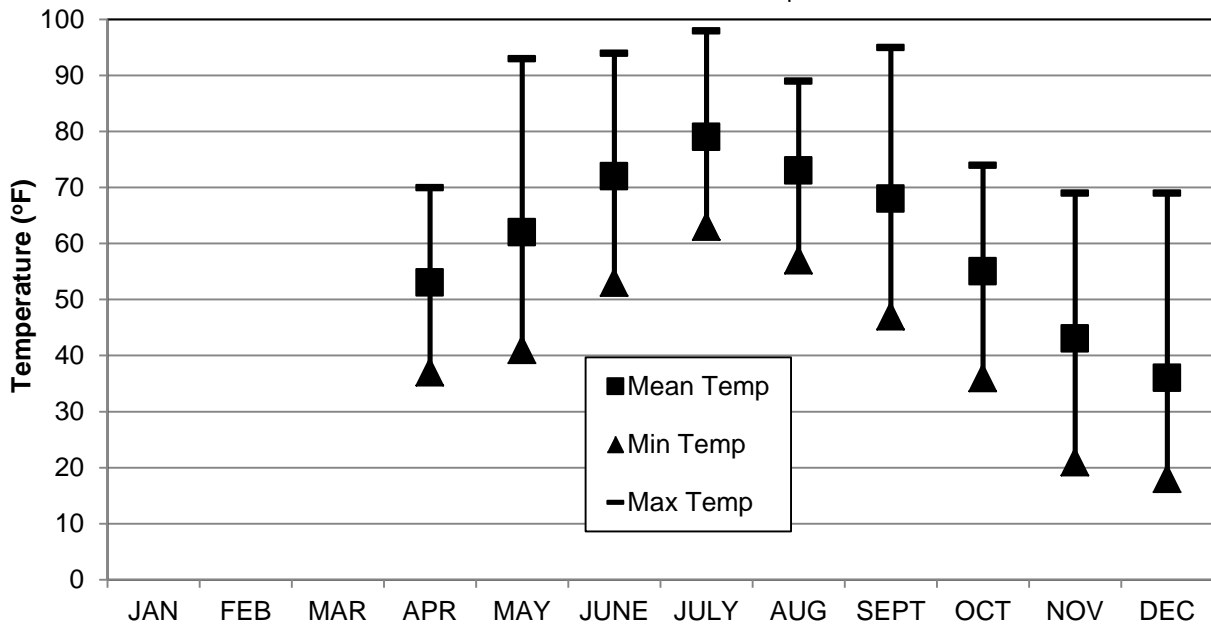


Figure 14
Passaic 2013 Monthly Temperature
Difference from New Jersey State Climatologist
Northern New Jersey 30-Year Temperature Average

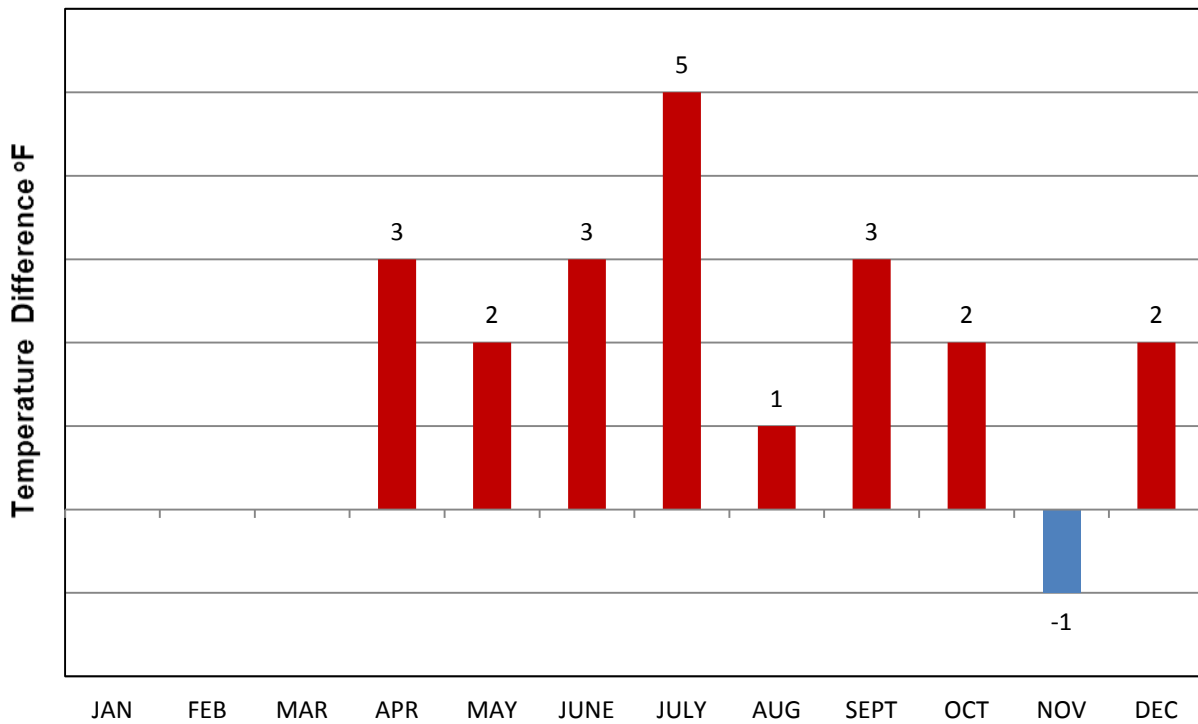


Figure 15
 2013 Maximum, Mean and Minimum Temperatures, Rider University

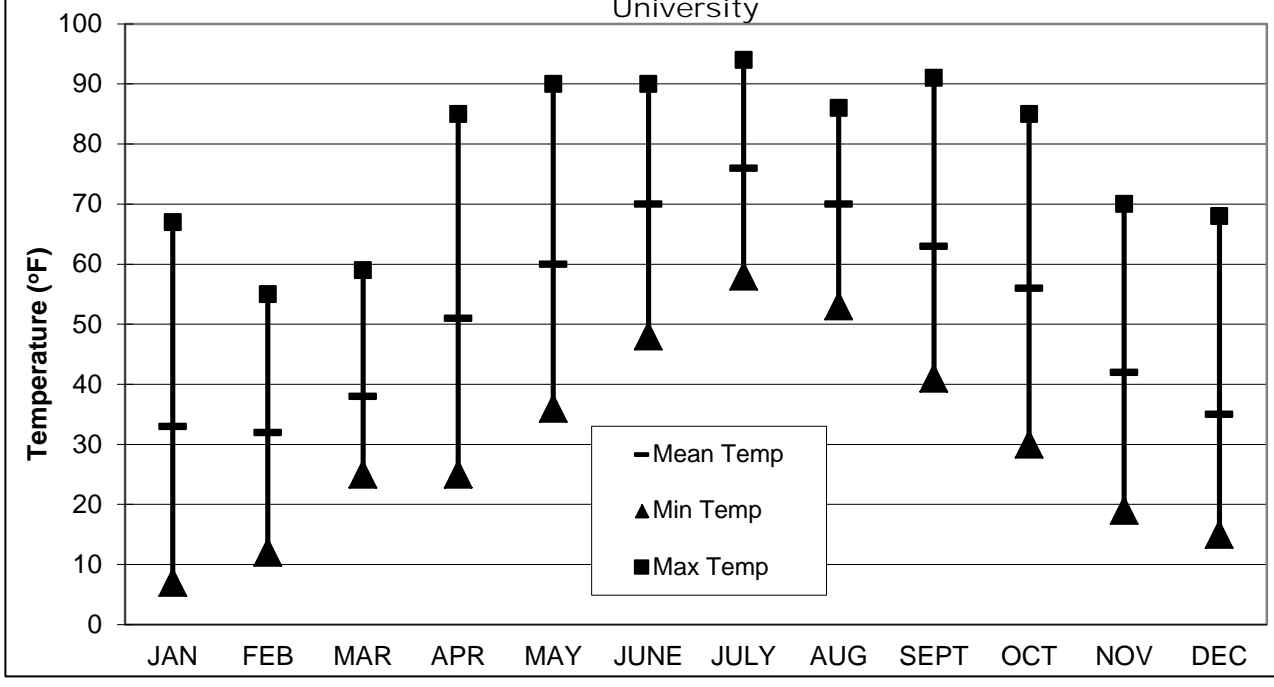


Figure 16
 Rider University 2013 Monthly Temperature Difference from New Jersey State Climatologist Southern New Jersey 30-Year Temperature Average

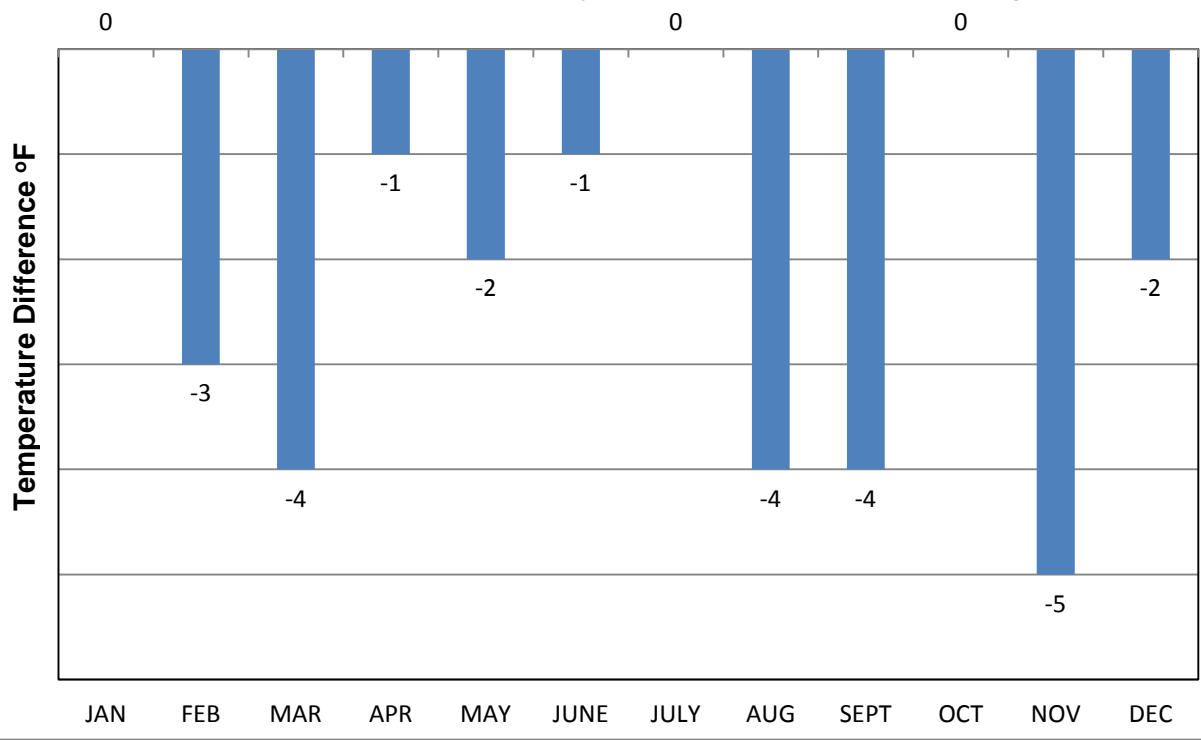


Figure 17
 Annual Wind Rose for Camden Spruce Street
 Displaying Distribution of Wind Speed & Wind Direction

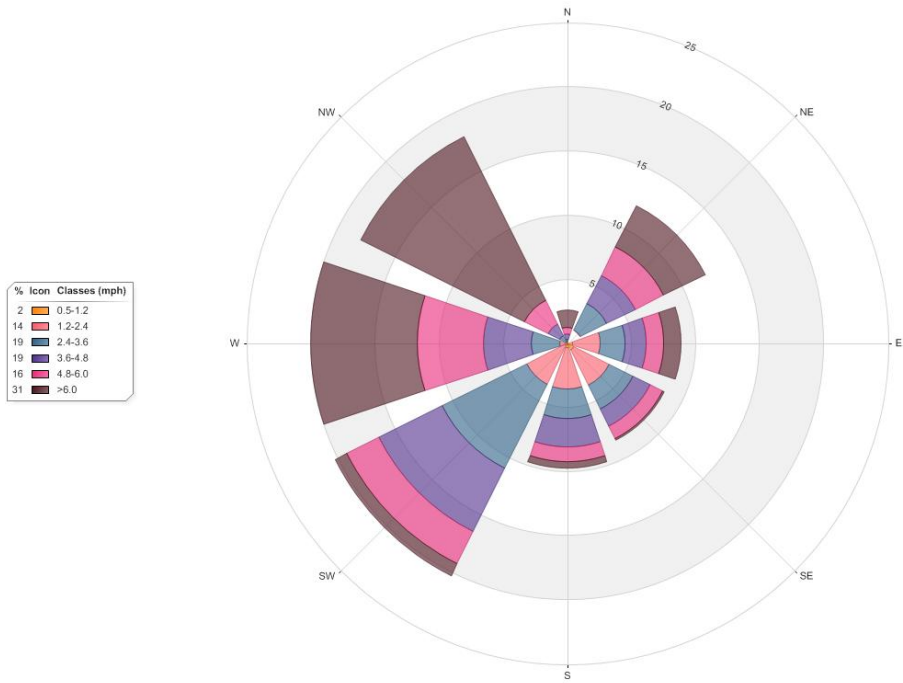


Figure 18
 Annual Wind Rose for Columbia WMA
 Displaying Distribution of Wind Speed & Wind Direction

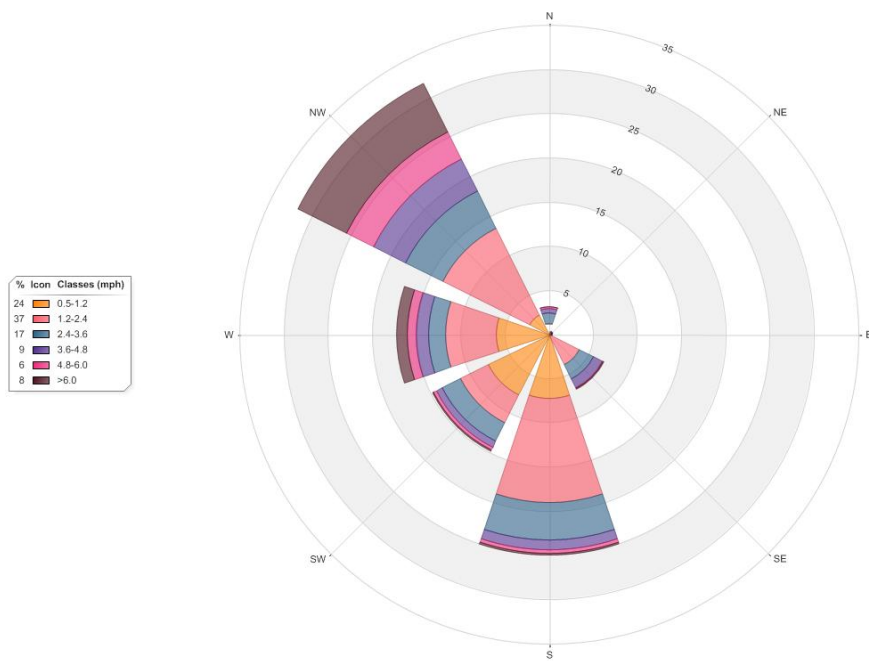


Figure 19
 Annual Wind Rose for East Orange
 Displaying Distribution of Wind Speed & Wind Direction

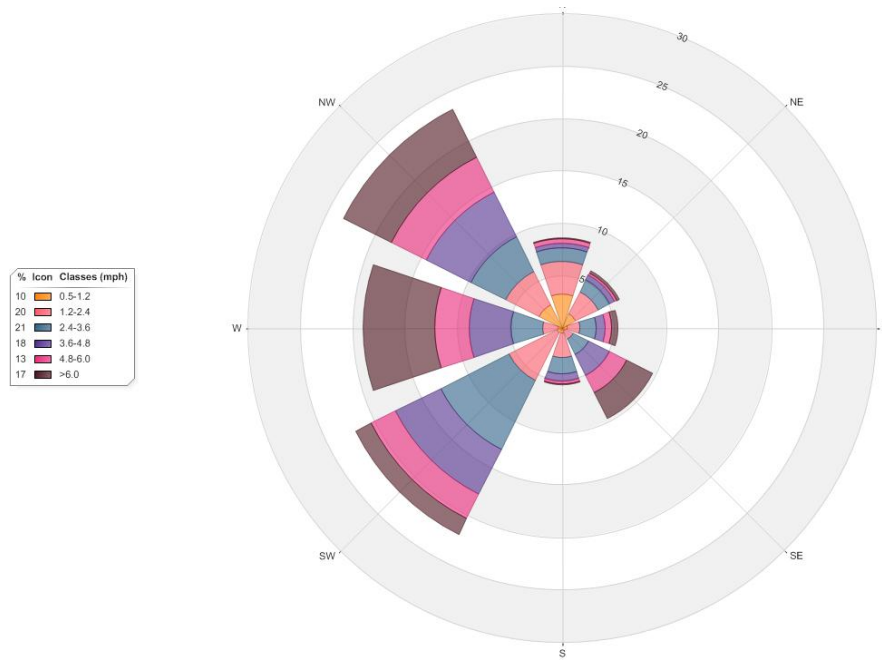


Figure 20
 Annual Wind Rose for Elizabeth Lab
 Displaying Distribution of Wind Speed & Wind Direction

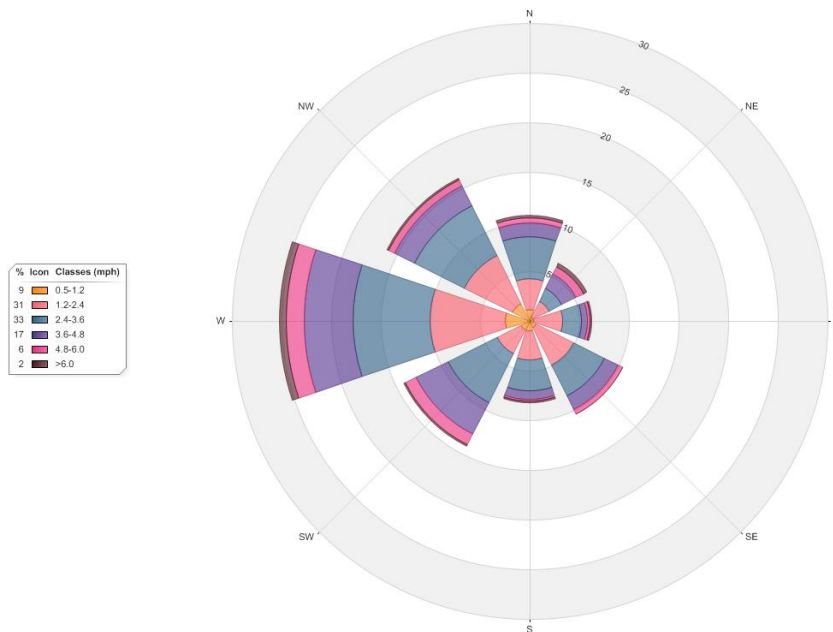


Figure 21
 Annual Wind Rose for Flemington
 Displaying Distribution of Wind Speed & Wind Direction

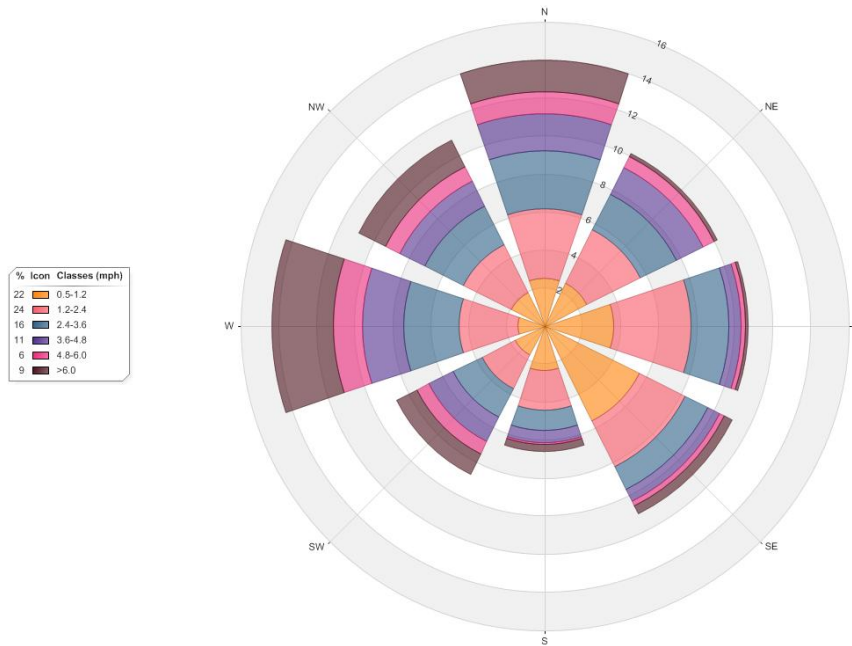


Figure 22
 Annual Wind Rose for Newark Firehouse
 Displaying Distribution of Wind Speed & Wind Direction

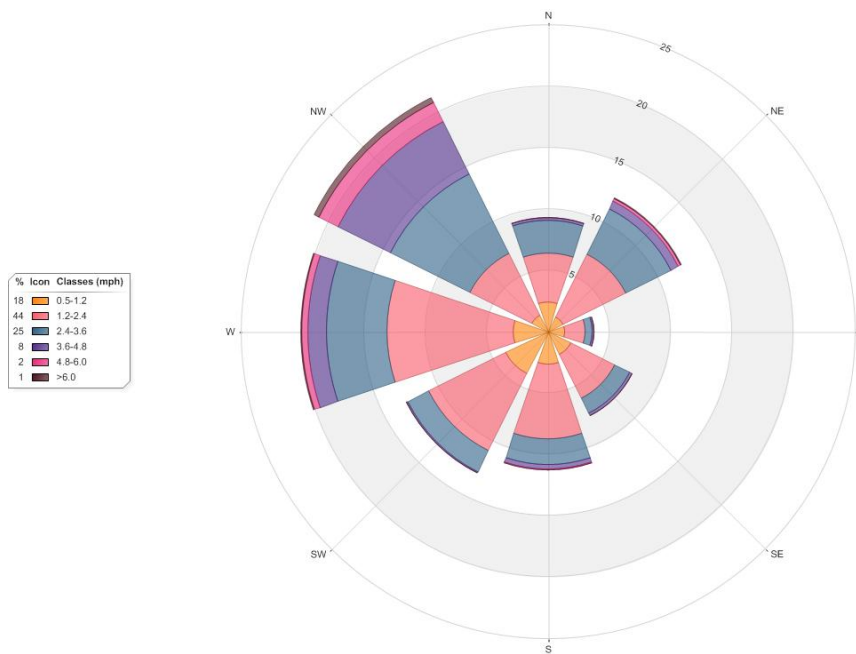


Figure 23
 Annual Wind Rose for Passaic
 Displaying Distribution of Wind Speed & Wind Direction

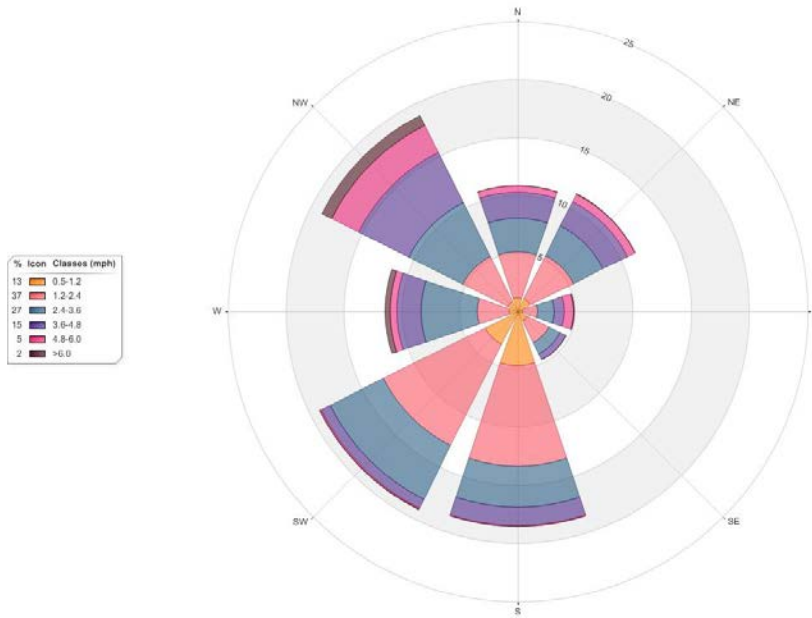
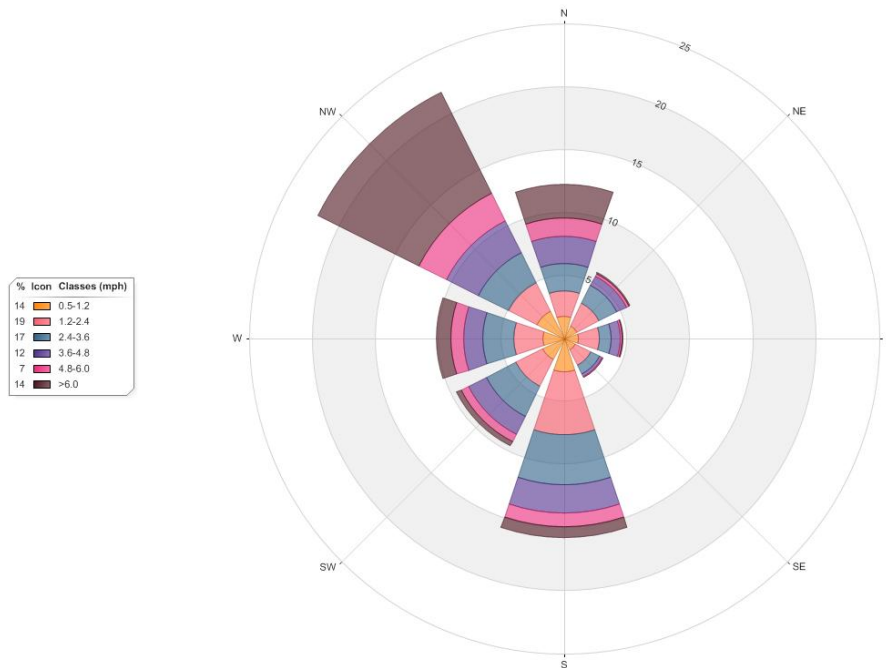


Figure 24
 Annual Wind Rose for Rider University
 Displaying Distribution of Wind Speed & Wind Direction



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