



2009 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 planners in locating air monitoring stations.

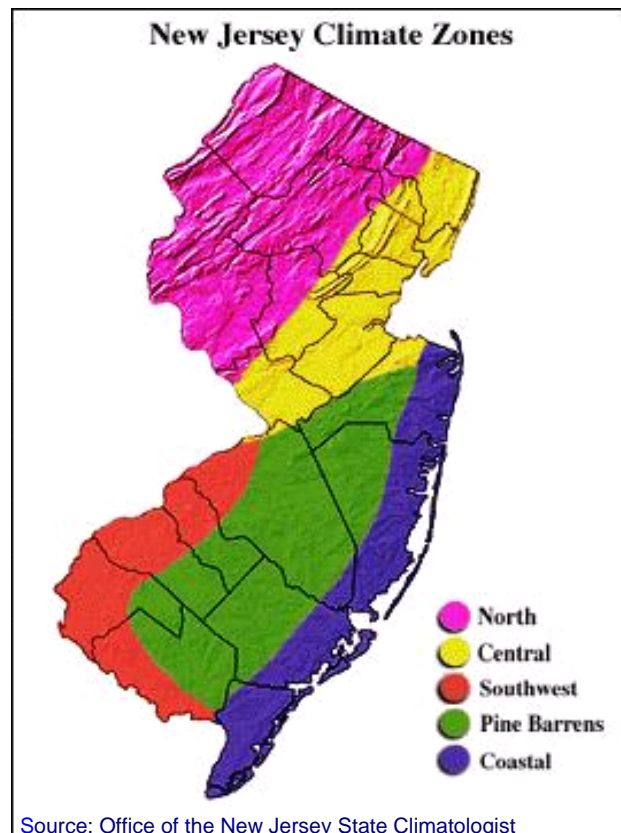
CLIMATOLOGY IN NEW JERSEY

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 wet, dry, hot, and cold airstreams, 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 the zones. These climate zones are shown in Figure 1.

Figure 1



MONITORING LOCATIONS

The NJDEP maintains a network of five meteorological monitoring locations. Not all meteorological parameters are measured at each site. These parameters are measured at Elizabeth Lab, East Orange, Chester, Flemington, and Rider University. Figure 2 provides a map of the monitoring stations. In addition, total weekly precipitation is measured in Washington Crossing and Ancora State Hospital.

NORTHERN METEOROLOGICAL STATIONS

The Elizabeth Lab meteorological station monitors wind speed and wind direction. The East Orange meteorological station monitors temperature and relative humidity. The Chester meteorological station monitors solar radiation. In Table 1, the 2009 meteorological data are combined in East Orange, Elizabeth Lab, and Chester, and are presented with the Flemington data. Figure 3 shows the monthly maximum, mean and minimum temperatures in East Orange, and Figure 4 compares the monthly mean temperature with the 30-year mean temperatures measured at Newark airport. The Flemington meteorological station monitors barometric pressure, temperature, relative humidity, wind speed, wind direction, and solar radiation. This data is summarized in Table 1. Figure 5 shows the monthly maximum, mean and minimum temperatures at Flemington, and Figure 6 compares the monthly mean temperature with the 30-year mean temperatures measured at the Lehigh Valley International Airport in Allentown, PA.

CENTRAL METEOROLOGICAL STATION

The Rider University meteorological station monitors barometric pressure, temperature, relative humidity, wind speed, wind direction, and solar radiation. This data is summarized in Table 2. Figure 7 shows the monthly maximum, mean and minimum temperatures at Rider University, and Figure 8 compares the monthly mean temperature with the 30-year mean temperatures measured at Philadelphia International airport.

Figure 2
2009 Meteorological Monitoring Network

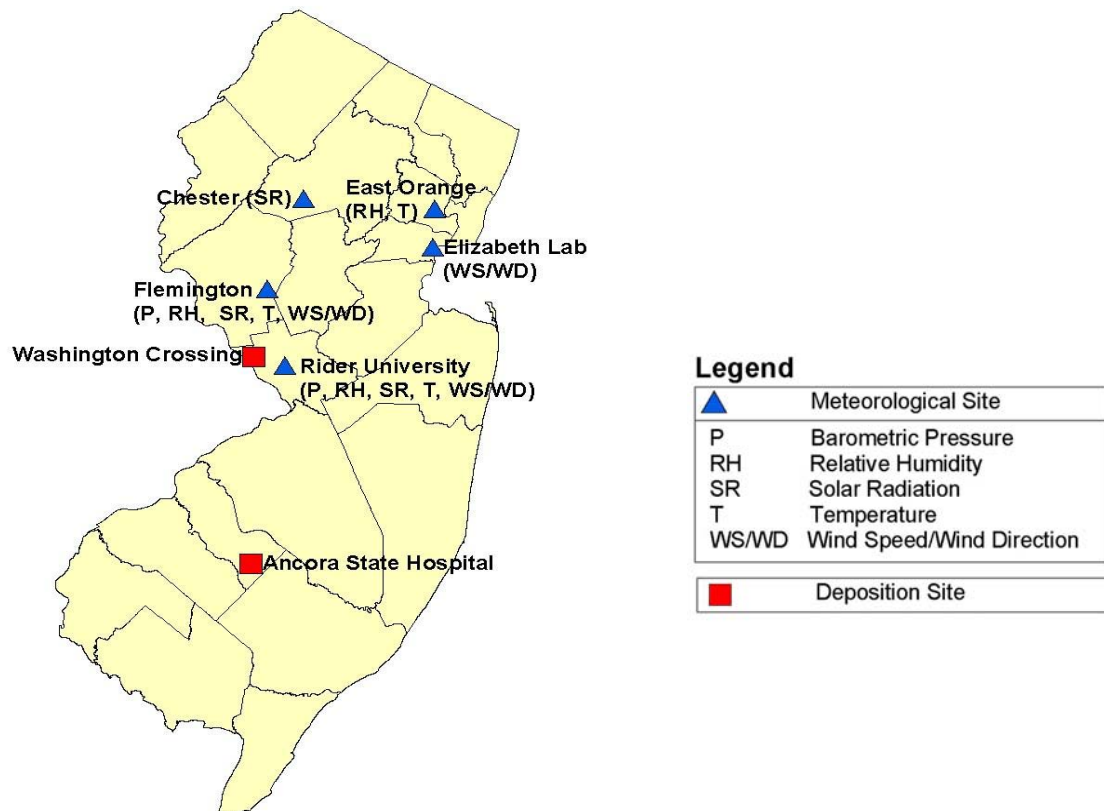


TABLE 1

SUMMARY OF METEOROLOGICAL MONITORING DATA - 2009
NORTHERN NEW JERSEYMONITORING SITESEast Orange and Chester

		<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>
Temperature: (°F)	Mean ¹	26/31	35/34	40/42	53/52	63/63	68/72	73/77	76/75	65/68	54/56	50/46	35/36	53/54
	Min	4	11	11	34	41	48	59	59	47	36	32	15	4
	Max	46	64	68	91	86	86	88	92	85	75	70	75	92
Relative Humidity: (%)	Mean	63.9	60.4	64.0	63.3	74.6	86.8	78.1	81.9	80.1	79.7	76.1	68.9	73.2
	Min	29.4	22.8	16.1	20.0	24.9	37.0	37.7	44.3	39.7	40.3	38.0	33.5	16.1
	Max	97.4	97.6	97.7	98.0	98.7	98.6	98.7	98.9	98.8	98.8	98.7	98.7	98.9
Solar Radiation: (Langleys)	Mean	0.105	0.185	0.230	0.286	0.301	0.276	0.353	0.295	0.231	0.150	0.104	0.078	0.216
	Max	0.976	1.190	1.372	1.478	1.575	1.546	1.553	1.406	1.380	1.170	0.922	0.724	1.575
Precipitation (inches)	Historical ²	3.98	2.96	4.21	3.92	4.46	3.40	4.68	4.02	4.01	3.16	3.88	3.57	46.25
	Observed ³	2.32	0.61	0.99	2.68	5.33	6.22	5.81	13.47	3.76	3.88	2.59	6.51	54.17

Flemington

Temperature: (°F)	Mean ⁴	24/27	32/30	40/39	52/49	61/60	67/69	72/73	74/71	63/63	51/52	47/42	32/32	51/51
	Min	0	2	7	25	32	39	50	52	40	30	22	14	0
	Max	53	66	71	95	88	91	93	97	87	76	72	66	97
Relative Humidity: (%)	Mean	72.5	71.2	74.9	72.7	83.1	90.5	85.2	90.1	88.9	88.0	84.2	77.7	81.6
	Min	37.0	30.0	24.9	31.6	37.6	47.4	22.3	57.3	50.0	46.2	39.8	38.9	22.3
	Max	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	100.0	100.0	100.0	100.0	100.0
Solar Radiation: (Langleys)	Mean	0.120	0.180	0.219	0.273	0.292	0.267	0.356	0.291	0.240	0.150	0.121	0.108	0.218
	Max	0.869	1.033	1.256	1.354	1.418	1.402	1.388	1.300	1.245	1.097	0.793	0.781	1.418
Barometric Pressure (in of Hg)	Mean	30.10	30.13	30.24	30.04	30.11	29.94	30.03	30.10	30.18	30.12	30.18	30.14	30.11
	Min	29.24	29.40	29.37	29.21	29.62	29.56	28.46	29.80	29.54	29.60	29.52	29.27	28.46
	Max	30.67	30.58	30.67	30.58	30.55	30.37	30.43	30.37	30.48	30.48	30.54	30.62	30.67

1) Newark Airport 30-year mean shown to the right of the slash.

2) Historical monthly precipitation data for Newark Airport

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

4) Lehigh Valley International Airport (Allentown, PA) 30-year mean shown to the right of the slash.

Figure 3
2009 Maximum, Mean and Minimum Temperatures, East Orange

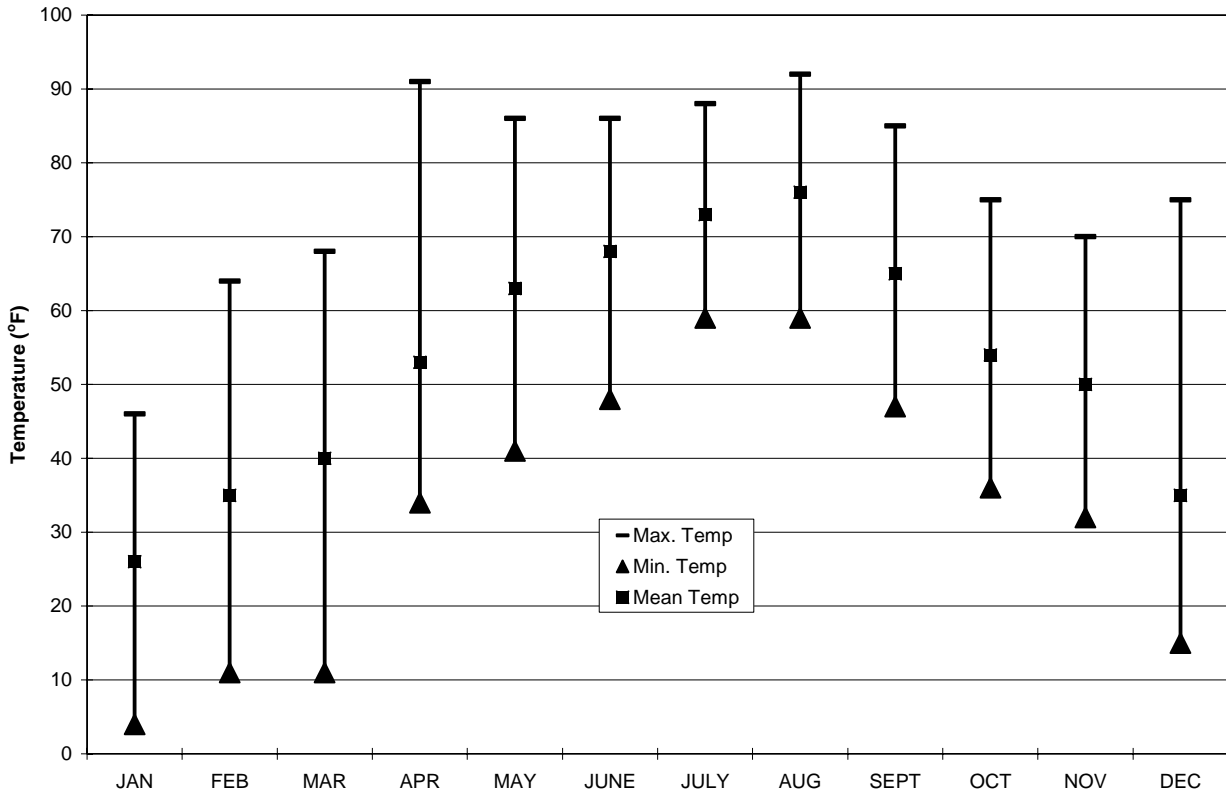


Figure 4
2009 Observed vs. 30-Year Mean Temperatures, East Orange

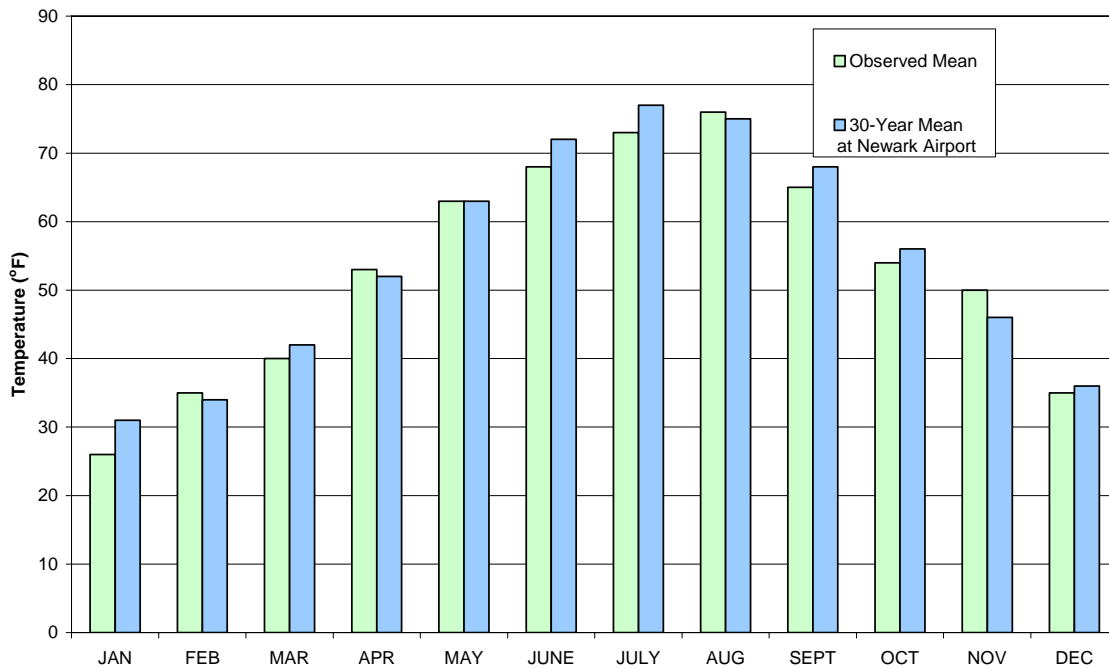


Figure 5
2009 Maximum, Mean and Minimum Temperatures, Flemington

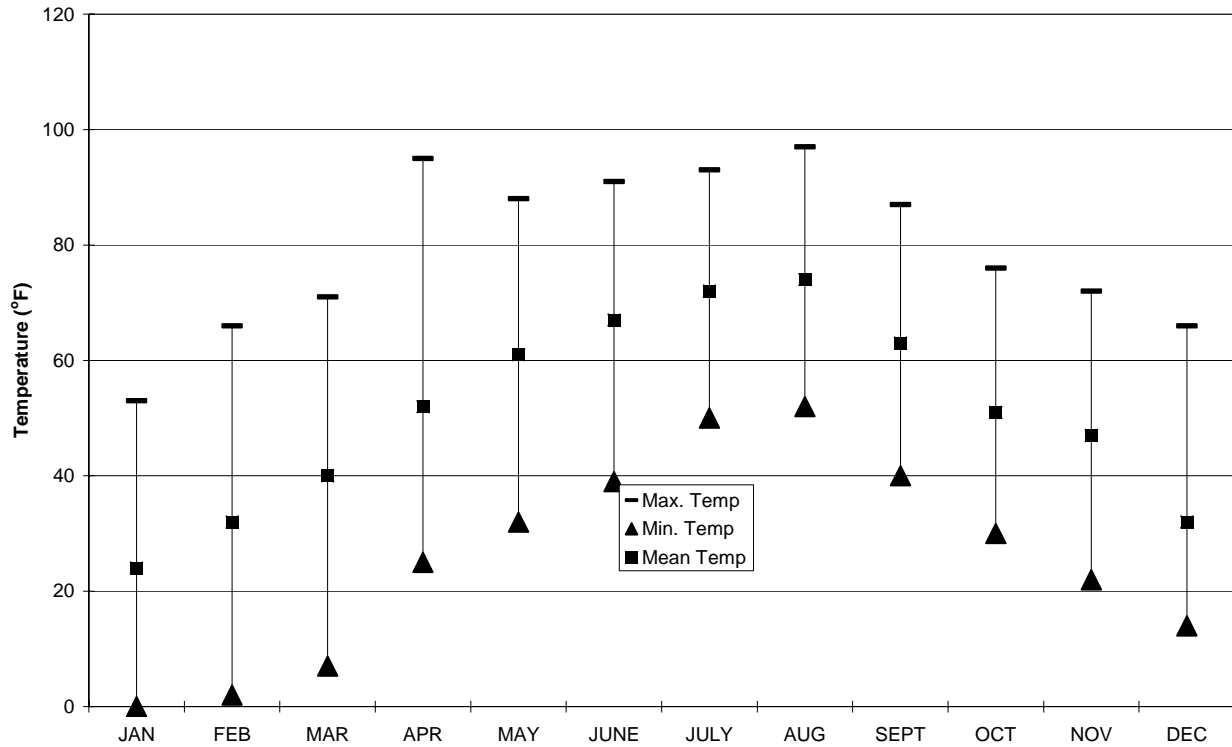


Figure 6
2009 Observed vs. 30-Year Mean Temperatures, Flemington

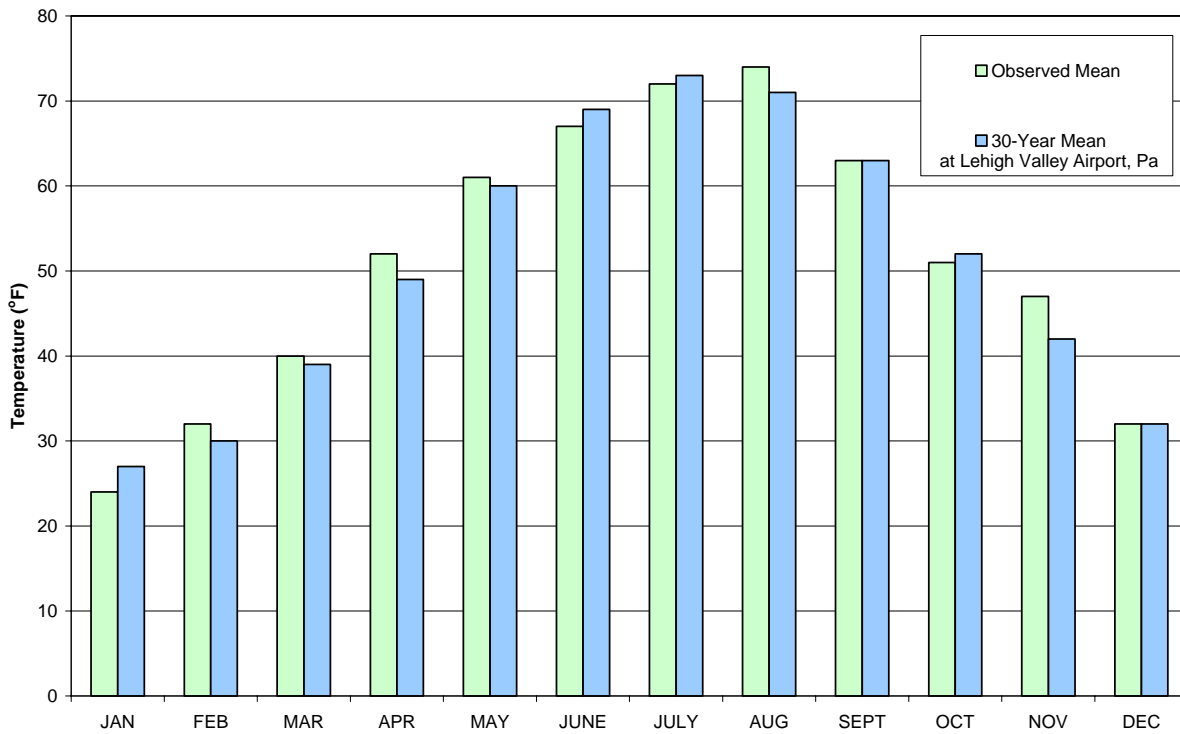


TABLE 2

SUMMARY OF METEOROLOGICAL MONITORING DATA - 2009
CENTRAL NEW JERSEY

Rider University		<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>
Temperature: (°F)	Mean ¹	25/32	33/35	39/43	51/53	60/64	65/72	70/78	72/76	62/69	52/57	47/47	33/37	51/55
	Min	0	7	7	26	35	42	52	56	42	32	25	12	0
	Max	52	66	70	90	82	85	87	90	80	76	68	66	90
Relative Humidity: (%)	Mean	62.8	58.6	61.2	59.7	71.7	81.6	73.1	80.2	79.0	78.6	72.7	67.1	70.6
	Min	24.7	22.8	15.2	16.7	14.4	26.6	30.9	40.7	32.6	33.3	24.7	28.0	14.4
	Max	99.6	98.4	99.2	98.5	99.3	99.3	98.8	99.2	99.4	99.8	100.0	99.4	100.0
Solar Radiation: (Langleys)	Mean	0.091	0.150	0.190	0.247	0.265	0.254	0.328	0.272	0.214	0.139	0.098	0.082	0.194
	Max	0.738	0.900	1.144	1.227	1.323	1.329	1.325	1.266	1.164	0.946	0.748	0.585	1.329
Barometric Pressure (in of Hg)	Mean	30.21	30.24	30.35	30.15	30.22	30.03	30.11	30.18	30.27	30.21	30.28	30.25	30.21
	Min	29.28	29.50	29.41	29.26	29.71	29.63	29.82	29.86	29.60	29.68	29.61	29.34	29.26
	Max	30.81	30.70	30.79	30.71	30.69	30.47	30.54	30.45	30.57	30.60	30.66	30.76	30.81
Precipitation (inches)	Historical ²	3.52	2.74	3.81	3.49	3.89	3.29	4.39	3.82	3.88	2.75	3.16	3.31	42.05
	Observed ³	3.93	0.89	1.63	6.26	3.72	4.25	2.68	9.31	4.83	1.65	1.97	8.63	49.75

1) Philadelphia International Airport 30 year mean shown to the right of the slash.

2) Historical monthly precipitation data for Philadelphia International Airport

3) Observed monthly precipitation collected by NJDEP at Ancora State Hospital

Figure 7
2009 Maximum, Mean and Minimum Temperatures, Rider University

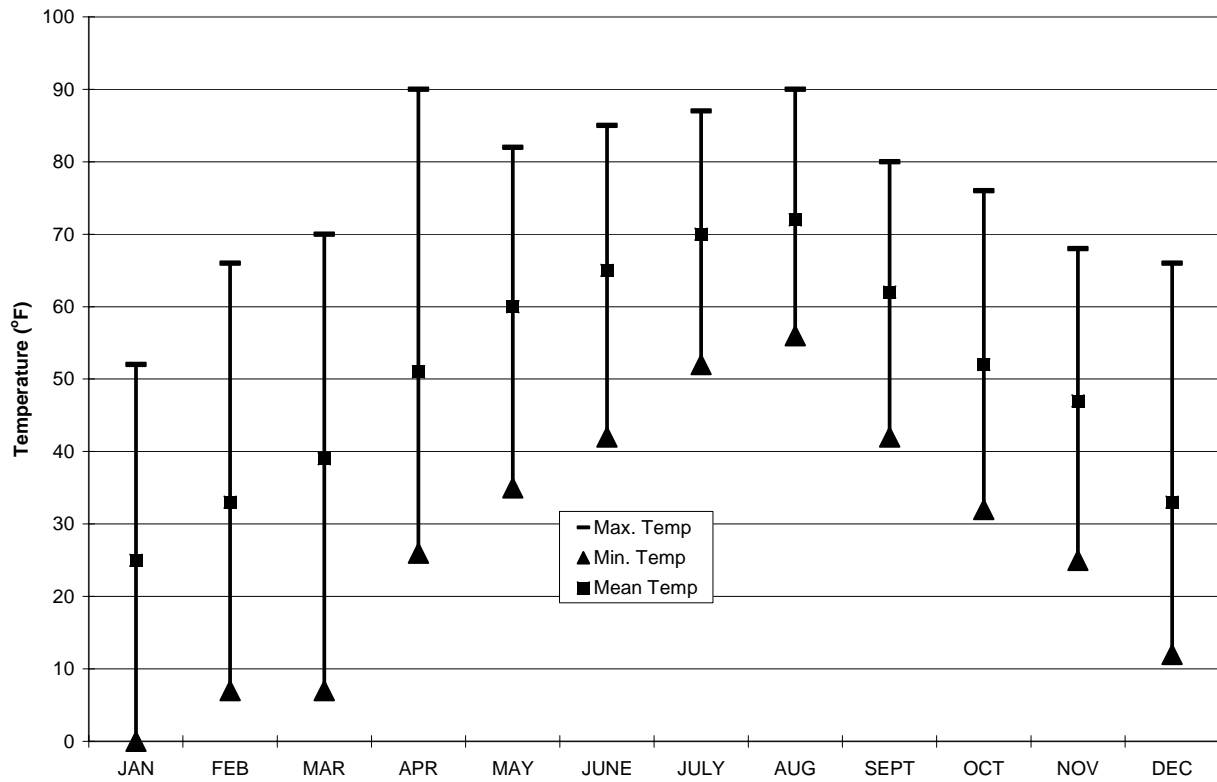
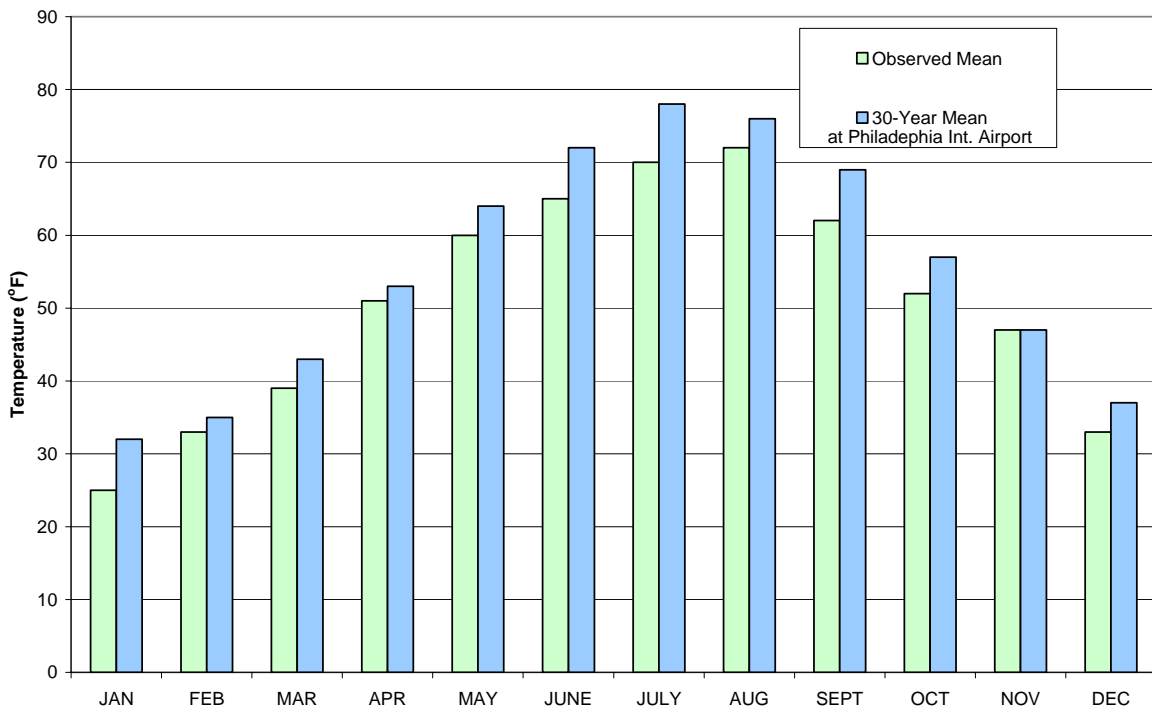


Figure 8
2009 Observed vs. 30-Year Mean Temperatures, Rider University



REFERENCES

The Climate of New Jersey, Office of the New Jersey State Climatologist, URL:
<http://climate.rutgers.edu/stateclim/?section=njcp&target=NJCoverview>

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