

1.7 Surface Water Resources

Surface water is all water whose surface is exposed to the atmosphere. The surface water system is made up of rivers, streams, lakes, ponds, canals reservoirs, swamps, marshes and the ocean.

Water bodies serve as a kind of circulatory system providing nutrients and metabolizing waste materials. Wildlife and the aquatic community rely on waterways for these functions, as well as shelter and a place to rest and breed. Humans enjoy the added benefits of recreation, transportation and socio-economic opportunities.

The uppermost reach of a stream is called its headwaters. Streams in a watershed can be classified according to stream “order.” A small, unbranched stream, typically a headwaters stream, is a first-order stream. When two first-order streams join, they form a second-order stream. A third-order stream has tributaries that are first and second-order streams. The stream “order number” can be useful for classifying and characterizing streams and rivers for consideration of management options, and is discussed further in Section 8.1 of this report. Streams also can be classified as “gaining” or “losing.” A gaining stream accumulates water as it flows to lower elevations. Water seeps into a gaining stream from its banks and channel bottom. A losing stream loses water as it flows to lower elevations. Water seeps out of the sides and bottom of a losing stream and into its banks.

The US Geological Survey (USGS) operates and maintains seven (7) stream flow monitoring stations in WMA 3 that maintain historical flow data (some of which perform water quality sampling). Table 1.7.1 provides historical flow data at these gaging stations. It must be noted that the flow past the above stations can be affected by pumpage from wells, storage at reservoirs and gate operations at dams upstream of each site.

Each watershed is subdivided into smaller watersheds using a grouping called the Hydrologic Unit Code (HUC) that uses a series of numbers to describe the relationship of each smaller watershed to other watersheds with which it is associated. Using the 11-digit HUC for WMA 3, the subwatersheds are as follows (note that only the last three digits vary within WMA 3):

- Pequannock River Basin (02030103050)
- Ramapo River Basin (02030103100)
- Wanaque River Basin (02030103070)
- Pompton River Basin (02030103110)

Pequannock River Basin (02030103050) - The Pequannock River's headwaters begin in Hardyston Township and Vernon Township in Sussex County. The Pequannock River system at this location is controlled by the City of Newark, which owns approximately 80 percent of the land. The City of Newark has five reservoirs (Echo Lake Reservoir, Canistear Reservoir, Oak Ridge Reservoir, Charlottesburg Reservoir, and Clinton

Reservoir) that are supplied by the Pequannock Watershed. The five reservoirs have a combined capacity of 14 billion gallons. All the reservoirs feed into the Charlottesville Reservoir, and the outlet of this reservoir provides supply to the Pequannock River. The drainage area through the Charlottesville Reservoir is approximately 60 square miles. Below the Charlottesville Reservoir, the Pequannock River travels 9 miles easterly until it merges with the Pompton River. The Pequannock River Basin is approximately 87 square miles at the outlet to the Pompton River. The basin is divided into 8 HUC-14 subwatersheds that are indicated on Plate 1.1.2. A summary of stream information in this river basin is as follows (obtained from available NJDEP GIS datasets):

ORDER	STREAM MILES	%
1	72.55	47.35%
2	42.02	27.42%
3	16.53	10.79%
4	20.43	13.33%
5	1.69	1.10%
TOTAL	153.22	100.00%

From the NJDEP GIS datasets, there are 91 artificial lakes covering 2573 acres, and 55 natural lakes covering 581 acres. As mentioned previously, the City of Newark reservoirs are significant artificial lakes constructed for potable water supply.

Ramapo River Basin (02030103100) - The Ramapo River's headwaters begin from small streams and lakes originating in Harriman State Park (Town of Tuxedo, New York) and streams and lakes originating in the Town of Monroe, New York. The Ramapo River travels south approximately 25 miles and empties into the Pompton Lake in Wayne, Township, New Jersey. The river then continues below the lake, traveling south several more miles before joining with the Wanaque River and becoming the Pompton River. The Ramapo River Basin is approximately 152 square miles at the outlet to the Pompton River. Within New Jersey, the basin is divided into 7 HUC-14 subwatersheds that are indicated on Plate 1.1.2. A summary of the stream information in this river basin is as follows (applies only to New Jersey from NJDEP GIS datasets):

ORDER	STREAM MILES	%
1	57.32	56.06%
2	29.19	28.55%
3	4.29	4.20%
4	11.45	11.20%
TOTAL	102.25	100.00%

There are approximately 250 miles of stream network within New York and New Jersey within the Ramapo Basin.

From the NJDEP GIS datasets, there are 67 artificial lakes covering 940 acres, and 22 natural lakes covering 450 acres. In New York, there are approximately another 50 lakes covering 1,800 acres. The Pompton Lake is a significant lake, below which the North

Jersey District Water Supply Commission (NJDWSC) can pump up to 150 million gallons per day from the Ramapo River to their Wanaque Reservoir for use as potable water supply.

Wanaque River Basin (02030103070) - The Wanaque River Basin is formed from the surface runoff into Greenwood Lake, Tuxedo Lake and Sterling Lake, which in turn feed streams that feed the Monksville and Wanaque Reservoirs. The Monksville and Wanaque Reservoirs are artificial lakes constructed by NJDWSC to provide potable water supply. From the Wanaque Reservoir, the Wanaque River travels south several miles and joins with the Pequannock River. Another mile further, the Wanaque River and the Ramapo River join to form the Pompton River. The Wanaque River Basin is 115 square miles in area and is located in the northwest of WMA 3. This subwatershed is further divided into 7 HUC-14 watersheds (in New Jersey) that are indicated on Plate 1.1.2. A summary of the stream information in this river basin is as follows (applies only to New Jersey from NJDEP GIS datasets):

ORDER	STREAM MILES	%
1	78.56	48.29%
2	46.70	28.71%
3	17.79	10.94%
4	19.61	12.06%
TOTAL	162.66	100.00%

There is approximately 190 miles of stream network within New York and New Jersey within the Wanaque River Basin.

From the NJDEP GIS datasets, there are 103 artificial lakes covering 3,450 acres, and 34 natural lakes covering 1,260 acres. In New York, there are approximately 19 additional lakes covering 1,900 acres. Tuxedo Lake in Tuxedo Village, New York, provides potable water supply for the Town of Tuxedo. As mentioned previously, NJDWSC uses the Monksville and Wanaque Reservoirs for potable supply. Greenwood Lake spans both New Jersey and New York and is a very large recreational lake covering approximately 1,900 acres.

Pompton River Basin (02030103110) - The Pompton River is formed by combining three major rivers in WMA 3: Wanaque River; Pequannock River; and Ramapo River. The Pompton River flows from the confluence of the Wanaque and Ramapo Rivers south approximately 6 miles and then joins the Passaic River. At this location WMA 3, 4 and 6 all meet. The Pompton River Basin is 24 square miles in area located in the southern portion of WMA 3. This subwatershed is further divided into 2 HUC-14 watersheds that are indicated on Plate 1.1.2. A summary of the stream information in this river basin is as follows (from NJDEP GIS datasets):

ORDER	STREAM MILES	%
1	29.33	58.85%
2	9.70	19.47%
3	3.40	6.82%
4	0.01	0.02%
5	7.40	14.85%
TOTAL	49.84	100.00%

From the NJDEP GIS datasets, there are 23 artificial lakes covering 372 acres, and 7 natural lakes covering 14 acres in the Pompton River Basin.

Both the Passaic Valley Water Commission (PVWC) and NJDWSC use the Pompton River for potable water supply. PVWC maintains the Point View Reservoir that is filled from the Pompton River via their Jackson Avenue Pump Station. PVWC can fill this reservoir during high flow periods and then release the water back to the river and collect it downstream for treatment at the Little Falls Treatment Plant (in Totowa, New Jersey).

During the summer season when the water quality in the river is of concern, PVWC may send the Point View Reservoir water directly to the Wanaque South Pump Station via the Wanaque South Aqueduct (when NJDWSC is not operating the Wanaque South Pumping) and then direct that water to its Little Falls Treatment Plant.”

While NJDWSC owns the Wanaque South Pump Station, both PVWC and NJDWSC use the facility, located on the Pompton River near the confluence with the Passaic River, for potable water supply. NJDWSC pumps water back to their Wanaque Reservoir, or directly to United Water for distribution in WMA5, and PVWC pumps water to their Little Falls Treatment Plant.