

## U.S. Geological Survey Finds Improving Trends for Some Pollutants in Southwest New Jersey: Cohansey River, Maurice River, and Raccoon Creek

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In 2017, the U.S. Geological Survey released a report detailing trends over time for phosphorus and nitrogen in 32 watersheds in New Jersey (Hickman and Hirsch, 2017). Data were compiled from routine water quality measurements taken by U.S.G.S and N.J. D.E.P. from 1971 to 2011.

In the Southwest corner of the state, water quality stations included those in the Cohansey River, Maurice River, and Raccoon Creek watersheds. While the Salem River station in Woodstown is included in this data set, the report did not present any results for this location.

Complete data can be downloaded from USGS (2018 a-e).

### Cohansey River Watershed

#### USGS Station:

01412800

#### Station location:

South of Seeley Pond (Silver Lake Rd.)

#### Link to map:

[maps.google.com/maps?q=+39.4725,-75.25556](https://maps.google.com/maps?q=+39.4725,-75.25556)

#### Watershed description:

Includes the upper part of the Cohansey River watershed, from Silver Lake Rd. at the downstream end, north to past Bostwick Lake. Includes parts of Upper Deerfield, Hopewell, and Alloway. This sub-watershed is largely agricultural.

#### Size:

28 sq. mi.

#### Narrative:

#### *Phosphorus*

A decreasing trend in total phosphorus concentration was found for the Upper Cohansey watershed, between the 1980's and 2000's.



Figure 1. U.S. Geological Survey water quality stations in southern New Jersey. Image source: Hickman and Hirsch, 2017.

## Improving Water Quality Trends in Southwest New Jersey... continued

This is notable since phosphorus is currently listed as a source of non-attainment of the aquatic life designated use in some segments of the upper watershed (NJDEP, 2017).

For data from 2012 to current (not covered in the report), there was a decreasing trend in total phosphorus concentration (Figure 2), though this result should be considered preliminary.

Potential explanations for a decreasing phosphorus concentrations over the decades may include improved practices by agricultural operations, some of which were tied to projects by USDA–NRCS, Rutgers Cooperative Extension, Cumberland Salem Soil Conservation District, and, of course, individual landowners.

### Nitrogen

On the other hand, the USGS reported upward trends for the both total nitrogen concentration and nitrate plus nitrite concentration between the 1980's and 2000's. As nitrogen is implicated in the eutrophication of estuaries and is a pollutant of groundwater used for drinking, this trend is a concern. However, nitrogen is not listed as a cause of non-attainment of any designated use in the upper watershed (NJDEP, 2017).

For data from 2012 to current (not covered in the report), no trend was detected for either total nitrogen or nitrate plus nitrite concentrations (data not shown), though this result should be considered preliminary.



Bostwick Lake, in the headwaters of the Cohansey River. August 2018. Photo: Sal Mangiafico

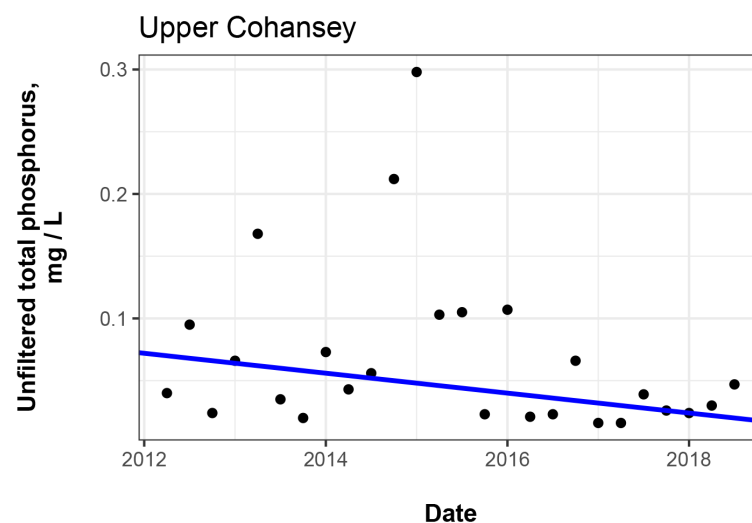


Figure 2. Total unfiltered phosphorus concentration for USGS station 01412800, upper Cohansey River, 2012 – 2<sup>nd</sup> quarter 2018. Data from USGS (2018b). Robust line by Theil–Sen–Siegel nonparametric regression (slope =  $-0.008$  / year,  $p = 0.00006$ ).

## Improving Water Quality Trends in Southwest New Jersey... continued

**Maurice River Watershed**USGS Station:

01411500

Station location:

Norma (Almond Rd.)

Link to map:[maps.google.com/maps?q=+39.49556,-75.07694](https://maps.google.com/maps?q=+39.49556,-75.07694)Watershed description:

Includes the upper part of the Maurice River watershed, from Almond Rd. at the downstream end, north to Clayton. Includes some areas of Brotmanville, Newfield, North Vine-land, Clayton, and Glassboro. This sub-watershed is mixed use, with land uses including agriculture, forest, and urban land uses.

Size:

112 sq. mi.

Narrative:*Phosphorus*

A decreasing trend in total phosphorus concentration was found for the Upper Maurice watershed, between the 1970's and 2000's. This is good news, though phosphorus is not currently listed as a source of non-attainment for any designated use in the upper watershed (NJDEP, 2017).

For data from 2012 to current (not covered in the report), there was no trend in phosphorus concentration (data not shown), though this result should be considered preliminary.

*Nitrogen*

On the other hand, the USGS reported upward trends for the both total nitrogen concentration between the 1970's and 2000's and nitrate plus nitrite concentration between the 1980's and 2000's. As nitrogen is implicated in the eutrophication of estuaries and is a pollutant of groundwater used for drinking, this trend is a concern. However, nitrogen is not listed as a cause of non-attainment of any



Canada geese lounge in the park at Franklinville Lake in the upper Maurice River watershed. August 2018. Photo: Sal Mangiafico.

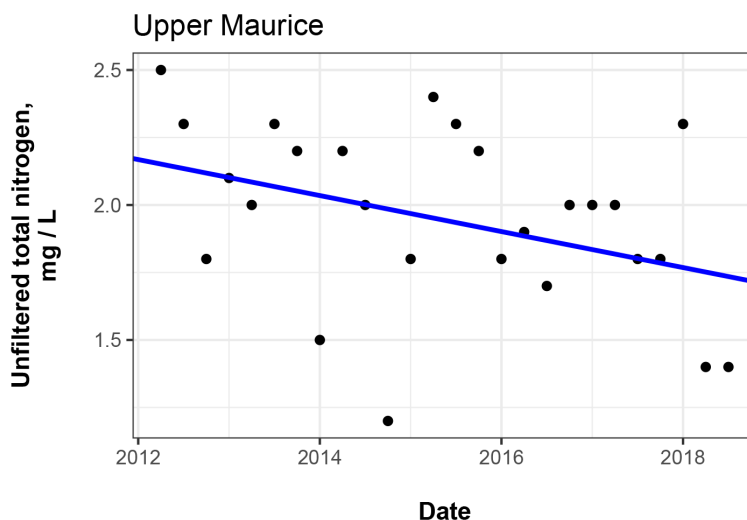


Figure 3. Total unfiltered nitrogen concentration for USGS station 01411500, upper Maurice River, 2012 – 2<sup>nd</sup> quarter 2018. Data from USGS (2018c). Robust line by Theil–Sen–Siegel nonparametric regression (slope =  $-0.067$  / year,  $p = 0.005$ ).



## Improving Water Quality Trends in Southwest New Jersey... continued

designated use in the upper watershed (NJDEP, 2017).

However, for data from 2012 to current (not covered in the report), there was a decreasing trend in total nitrogen concentration (Figure 3), though this result should be considered preliminary. There was no trend in nitrate plus nitrite.

### Raccoon Creek Watershed

#### USGS Station:

01477120

#### Station location:

Near Swedesboro. (Tomlin Station Rd.)

#### Link to map:

[maps.google.com/maps?q=+39.74056,-75.25917](https://maps.google.com/maps?q=+39.74056,-75.25917)

#### Watershed description:

Includes the upper part of the Raccoon Creek watershed, from Tomlin Station Rd. at the downstream end, east and south to the Ferrell and Glassboro. Includes parts of Mullica Hill and areas west of Glassboro. This sub-watershed is mixed use, with land use including agriculture, forest, and developed land uses.

#### Size:

27 sq. mi.

#### Narrative:

##### *Phosphorus*

No trends in total phosphorus concentration were found for the Upper Raccoon watershed. Phosphorus is currently listed as a source of non-attainment for the aquatic life designated use in some segments of the upper watershed (NJDEP, 2017).

However, for data from 2012 to current (not covered in the report), there was a decreasing trend in total phosphorus concentration (Figure 4), though this result should be considered preliminary.



A small lake near Mullica Hill in the upper Raccoon Creek watershed. August 2018. Photo: Sal Mangiafico.

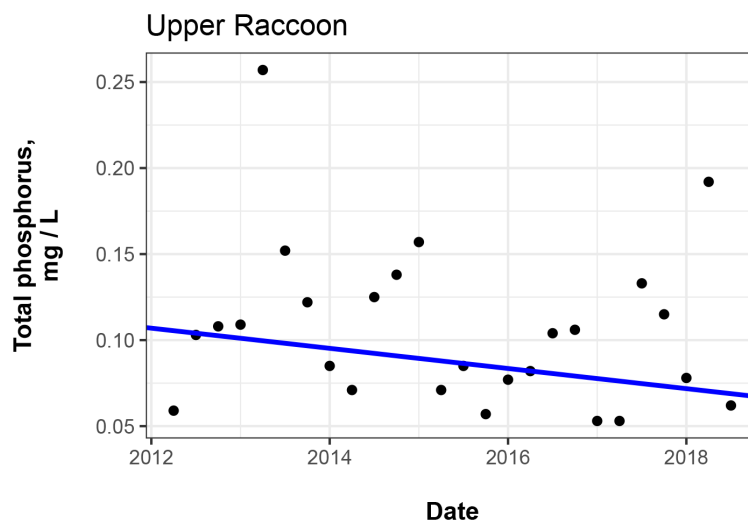


Figure 4. Total phosphorus concentration for USGS station 01477120, upper Raccoon Creek, 2012 – 2<sup>nd</sup> quarter 2018. Data from USGS (2018d). Robust line by Theil–Sen–Siegel nonparametric regression (slope =  $-0.006 / \text{year}$ ,  $p = 0.03$ ).

## Improving Water Quality Trends in Southwest New Jersey... continued

### Nitrogen

On the other hand, the USGS reported downward trends for both total nitrogen concentration between the 1980's and 1990's and nitrate plus nitrite concentration between the 1980's and 2000's. As nitrogen is implicated in the eutrophication of estuaries and is a pollutant of groundwater used for drinking, these trends are good news. However, nitrogen is not listed as a cause of non-attainment of any designated use in the upper watershed (NJDEP, 2017).

For data from 2012 to current (not covered in the report), there was a decreasing trend in total nitrogen concentration (Figure 5), and a decreasing trend in nitrate plus nitrite concentration (Figure 6), though these results should be considered preliminary.

### Discussion

These results are interesting in light of land uses in this sub-watershed. Fisher and Williams (2006) found that between 1986 and 2002, urban land use increased from 12% to 28% and agricultural land use decreased from 56% to 41% in this sub-watershed.

### Salem River Watershed

USGS Station:  
01482500

Station location:  
Woodstown (Mill St.)

Link to map:  
[maps.google.com/maps?q=+39.64389,-75.33028](https://maps.google.com/maps?q=+39.64389,-75.33028)

Watershed description:

Includes the upper part of the Salem River watershed, from Memorial Lake at the downstream end, east to about N.J. Route 77. Includes parts of Woodstown Pilesgrove, and Upper Pittsgrove. This sub-watershed is largely agricultural.

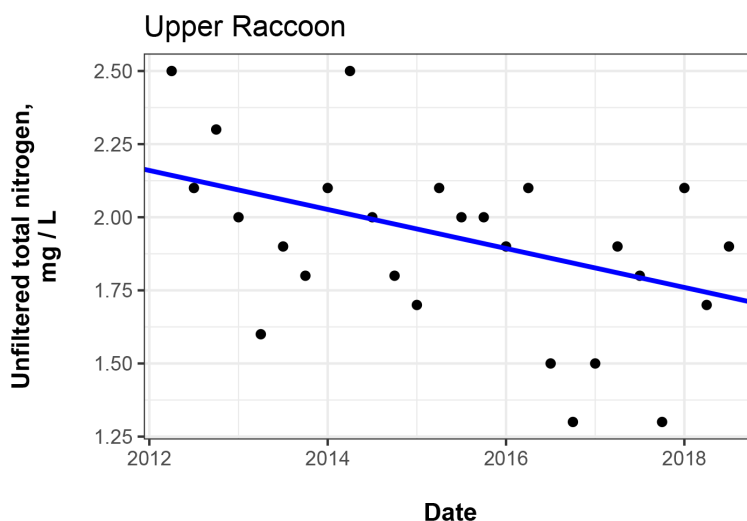


Figure 5. Total unfiltered nitrogen concentration for USGS station 01477120, upper Raccoon Creek, 2012 – 2<sup>nd</sup> quarter 2018. Data from USGS (2018d). Robust line by Theil-Sen-Siegel nonparametric regression (slope =  $-0.067$  / year,  $p = 0.0002$ ).

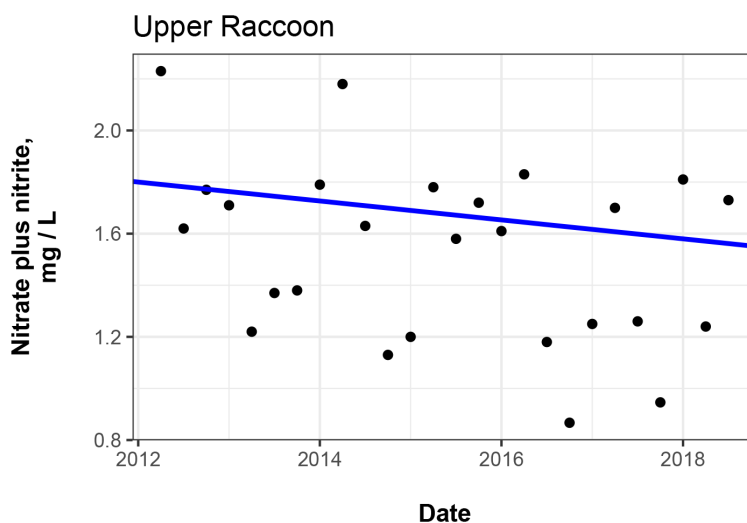


Figure 6. Nitrate plus nitrite concentration for USGS station 01477120, upper Raccoon Creek, 2012 – 2<sup>nd</sup> quarter 2018. Data from USGS (2018d). Robust line by Theil-Sen-Siegel nonparametric regression (slope =  $-0.037$  / year,  $p = 0.03$ ).

**Improving Water Quality Trends in Southwest New Jersey... continued.**Size:

15 sq. mi.

Narrative:

As mentioned, results for the Salem River Station were not included in this report.

For data from 2012 to current (not covered in the report), no trends were found for total phosphorus, unfiltered total nitrogen, or nitrate plus nitrite concentrations.

**References**

- Fisher, C., and C. Williams. 2006. Raccoon Creek Watershed: Comparison of Land Use Data 1986 - 1997 - 2002. Camden County Soil Conservation District. [www.nj.gov/dep/gis/mapcon19.html](http://www.nj.gov/dep/gis/mapcon19.html).
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- [USGS] U.S. Geological Survey. 2018e. Water Quality Samples for New Jersey: USGS 01482500 Salem River at Woodstown NJ. National Water Information System. [nwis.waterdata.usgs.gov/nj/nwis/qwdata/?site\\_no=01482500](http://nwis.waterdata.usgs.gov/nj/nwis/qwdata/?site_no=01482500).