

# The Delaware River Basin

## Basin Description

The headwaters of the Delaware River Basin originate in the Catskill Mountains of New York and flow in a generally southward direction, draining portions of south central New York State, eastern Pennsylvania, western New Jersey and northern Delaware before emptying into the Atlantic Ocean through the Delaware Bay. The upper seventy-nine miles of the Delaware River and the lower eight miles of the West Branch serve as the New York State border with Pennsylvania. Of the nearly 12,800 square mile Delaware River drainage area, approximately 2,390 square miles fall within New York State. This portion of the basin includes most of Sullivan County, much of Delaware County, and smaller parts of Orange, Ulster, Greene, Schoharie, Broome and Chenango Counties.

The population of the portion of the Delaware River Basin within New York State totals about 113,000 (1990), and is scattered among small towns and villages. The basin within the state is largely forested and includes about half of the Catskill Park and various other recreational lands. Much of the remainder of the basin is rural agricultural in character. The popularity of the basin for outdoor recreational activity – and its close proximity to the New York City area – make it subject to a significant influx of seasonal population during the summer months.

There are 4,062 miles of rivers and streams and 188 significant\* lakes, ponds and reservoirs (covering 24,932 acres) in the basin. Within New York State the Delaware River itself extends for a total of 79 miles. Other significant waterbodies in the basin include numerous high quality trout fishery waters and three New York City Water Supply System reservoirs. These three reservoirs – Pepacton, Cannonsville and Neversink Reservoirs – are the largest impoundments in the basin and represent nearly one-half (48%) of the total basin lake/reservoir acres.

## Water Quality Issues and Problems

The Delaware River Basin drains a largely forested, lightly populated area of the state with a few scattered generally population centers. Agricultural activity, though significant, has been declining in recent years. Not surprisingly, water quality in the basin is generally good to excellent. Only five waterbodies are listed as having impaired uses. Most of these impairments are a result of fish consumption concerns (see below). The high quality water resources of the basin support numerous recreational activities (fishing, swimming, boating) and significant tourism. The waters of the basin also provide New York City with a large portion of its drinking water supply. Much of the water quality concerns in the basin relate to threats to these high quality waters, rather than current impacts and impairments.

### *Fish Consumption Advisories*

A large percentage of the impaired waters of the Delaware River Basin are so listed as a result of waterbody-specific fish consumption advisories. A NYS Department of Health advisory recommends limiting consumption of small mouth bass taken from the Pepacton, Cannonsville and Neversink Reservoirs to no more than one meal per month due to mercury contamination. The source of the contamination is widely thought to be from atmospheric deposition. Another advisory is in place for waters of the Trout Creek (Cannonsville) watershed due to PCB contamination from a hazardous waste disposal landfill and affected stream sediments.

\* *Significant Lakes* are lake of 6.4 acres (0.01 square miles) or larger and are included in the New York State Lakes Gazetteer.

### *New York City Water Supply Reservoirs*

The three largest impoundments in the Delaware River Basin (Pepacton, Cannonsville and Neversink Reservoirs) are all part of the New York City Water Supply System – a system of reservoirs in the Catskill, Croton and Delaware Watersheds that provides drinking water to nearly half the residents of the state. The reservoir watersheds in the Delaware Basin are mostly forested with some agricultural land use and a few small villages and town centers. The NYC Department of Environmental Protection (NYC DEP) routinely monitors water quality in both the reservoir and tributary streams and reports generally high water quality. Additionally NYC DEP, in partnership with Watershed communities, has developed and entered into a Watershed Agreement which sets forth programs and funding to address water quality issues. Programs to address and improve water quality in the reservoirs/watersheds include agricultural BMPs, upgrading of municipal WWTPs, remediating failing and/or inadequate on-site septic systems (or connecting these systems to municipal WWTPs), stream corridor management and improved urban stormwater controls. Excessive nutrient loadings (discussed below) and their impact on water supply use are a particular concern on the Watershed. A Phase II TMDL for phosphorus for all the NYC reservoirs was approved by USEPA in October 2000. The Phase II TMDL indicates that reservoir phosphorus concentrations in two of the three reservoirs are well below acceptable limits. Required load reductions (though plant upgrades and other efforts) to meet TMDL limits in the Cannonsville Reservoir are expected to be met by the end of 2003.

As noted above, all three reservoirs have fish consumption impairments due to atmospheric deposition of mercury. In addition to this use impairment, the listing of water supply use of the reservoirs as being threatened is a more reflection of the value of this resource, rather than any specifically identified threats.

### *Nutrient (Phosphorus) Loadings*

Excessive nutrient inputs (particularly phosphorus) to the waters of the Delaware River Basin is a significant issue. Excessive phosphorus levels can result in algal blooms, aquatic weed growth, degraded aesthetics and increased water treatment costs. Municipal discharges, agricultural activity (current and historical) and inadequate septic systems have all been identified as nutrient sources. As discussed above, within the NYC Watershed various initiatives are in place to address all of these sources. The New York City Watershed Memorandum of Agreement with the watershed communities specifically identifies communities that may be experiencing water quality problems or threats due to failing septic systems in areas with poor soil conditions, inadequate lot sizes, and/or close proximity to streams and water courses. The MOA also indicates that NYC will provide funding to address the identified deficiencies. Many of these situations have been or are currently being addressed. However, existing funding is not sufficient to address all watershed communities. In addition, many other communities with similar problems lie outside the watershed and lack the necessary resources to correct these problems. These impacts can and do threaten other water supply reservoirs as well as individual wells. Nutrient-driven algal blooms and weed growth also impacts recreational uses (swimming, fishing, boating) basin lakes. Swinging Bridge, Mongaup Falls and Rio Reservoirs, and Lake Huntington, in particular, have past histories of significant algal/weed problems. More recent assessments suggest improving conditions throughout the basin, likely due to municipal plant upgrades, the loss of agricultural activity and other changes. However continued monitoring is necessary to verify that these improvements represent a long-term trend.

### *Streambank and Roadbank Erosion*

Streambank erosion and runoff from roadways have been also identified as water quality threats. The generally hilly topography of the basin has resulted in extensive development of the valley floors in close proximity to water courses. Many stream channels and adjacent flood plains have been altered and are unstable, leading to erosion and transport of excessive sediment loads.

### *Recreational Waters*

The Delaware River Basin includes a number of highly valued trout fisheries and other recreational waters. These include the Beaver Kill and Willowemoc, which support one of the most productive trout fisheries in the northeast, and the Delaware River itself, also considered a highly valued recreational water resource due to its status as a National Wild and Scenic River, as well as other waters. Although these waters generally support uses and have no significant water quality impacts, the highly valued uses of these resources warrant particular protection. That these waters are included on the DEC/DOW Priority Waterbodies List as having threats to water quality is more a reflection of the value of the resources, rather than any specifically identified threats.

The management of river flows in the Delaware to protect a highly regarded fishery resource and recreational activity is particularly challenging. While reservoir releases from the New York City water supply reservoirs on the East and West Branches are generally adequate to alleviate high summer temperatures, other conflicting water uses (NYC water supply, drought management) complicate the issue. Occasionally insufficient reservoir releases result in reduced flow that limits habitat, causes thermal stress, and negatively affects the trout fishery. This issue is discussed in considerable detail in the Draft Fishery Management Plan for the Upper Delaware Tailwaters. In other parts of the basin potential/possible sources that may threaten these resources include agricultural activity and small municipality wastewater disposal.

### *Agricultural Nonpoint Sources*

As mentioned previously, agriculture in the basin, though declining, remains an important water quality concern. The New York City Watershed Agreement includes programs to identify and address impacts from agricultural sources. Whole farm planning and implementation of best management practices are significant components of this effort. In areas outside the Watershed, local agencies are leading the effort to reduce the impact of agricultural activity on water quality.

### *Groundwater Resources*

Although groundwater resources are not specifically tracked through the WI/PWL, they are considered *Priority Waters* nonetheless. Ground water provides drinking water for about one-third of the population of New York State and is the source of base flow for most rivers and streams in the state. Management and protection of both the quantity and quality of this resource is critical for protecting public health, and is also a key element of surface water quality and wetland management efforts.

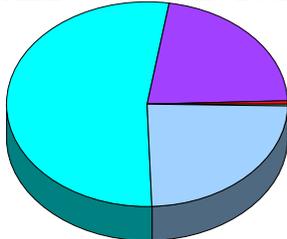
Groundwater is not incorporated into the WI/PWL because of the difficulties with regard to monitoring, assessing and even defining “waterbody segments.” In addition, the emphasis on *protection* of groundwater now (rather than *restoration* later) also makes the WI/PWL an inadequate tool to manage this resource. While the WI/PWL discusses water quality threats to some degree, the more typical WI/PWL approach tracks the need for periodic assessment, the determination of impacts and impairments, and the progress toward restoration of uses. While this approach is adequate for surface waters, the use of groundwater for drinking water supplies, the corresponding impact on public health, and the considerable difficulty in restoring groundwater resources once degraded, requires a different approach. The proper management of groundwater resources requires a greater emphasis on threats (both known and potential) than the WI/PWL provides, and less focus on restoration. In the Delaware River Basin, the more significant of these threats include agricultural sources, inadequately maintained and/or failing on-site septic systems and salt storage and application for road deicing.

# Delaware River Basin Water Quality Assessment

The series of charts presented on the following page provide an overall assessment of water quality conditions in the entire Delaware River Basin. For each waterbody type (rivers/streams and lakes/reservoirs) the first pie chart reveals the percentage of the miles/acres of waters in the basin that fall into the various *Water Quality Assessment Categories*. The red slice of the first pie indicates the percentage of waters characterized as *Impaired Segments* which do not support appropriate uses. The purple slice represents segments with *Minor Impacts* and *Threatened Waterbody Segments*. Taken together, waters in all these categories (represented by the red and purple slices) comprise the *Priority Waterbodies* (for that waterbody type) within the basin. The percentage of miles/acres for the other Water Quality Assessment Categories – *Waterbodies Having No Known Impacts*, *UnAssessed Waterbodies*, and *Waterbodies with Impacts Needing Verification* – are shown in blue, light blue, and green respectively.

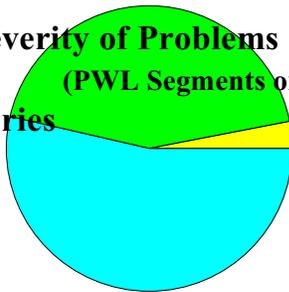
## Rivers/Streams

**Water Quality Assessment Categories**  
(for ALL Water in the Basin)



- PWL - Not Supporting Uses
- PWL - Other Minor Impacts
- No Known Impacts
- UnAssessed Waters
- Impacts Needing Verification

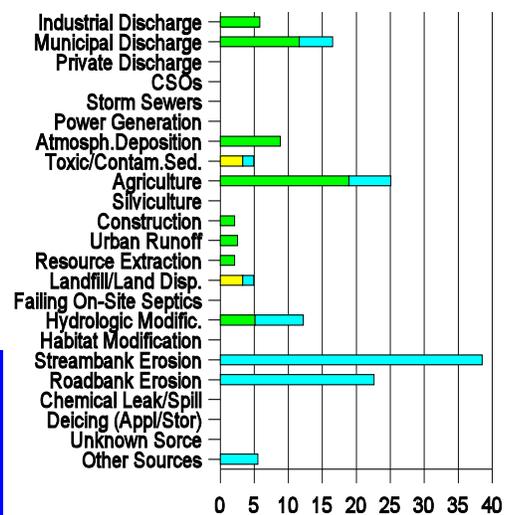
**Severity of Problems**  
(PWL Segments only)



- Precluded
- Impaired
- Stressed
- Threatened

**Delaware River Basin**  
Total River Miles: 4062  
Total PWL Miles: 923

**Major Sources - Priority Waterbodies**



Percent of PWL Waters Affected

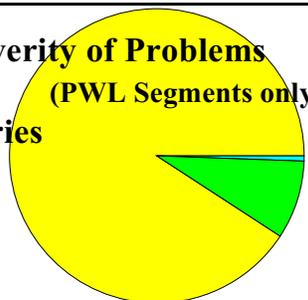
## Lakes/Reservoirs

**Water Quality Assessment Categories**  
(for ALL Water in the Basin)



- PWL - Not Supporting Uses
- PWL - Other Minor Impacts
- No Known Impacts
- UnAssessed Waters
- Impacts Needing Verification

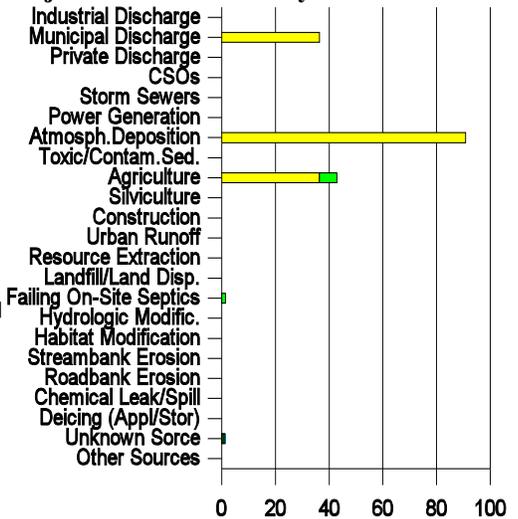
**Severity of Problems**  
(PWL Segments only)



- Precluded
- Impaired
- Stressed
- Threatened

**Delaware River Basin**  
Total Lake Acres: 24,932  
Total PWL Acres: 13,178

**Major Sources - Priority Waterbodies**



Percent of PWL Waters Affected

The second pie chart shows the severity of the most significant use impact or restriction for *Priority Waterbodies*. The levels of severity are:

- Precluded*: waters do not support appropriate uses,
- Impaired*: waters frequently do not support appropriate uses,
- Stressed*: waters support appropriate uses, but other water quality impacts are apparent, and
- Threatened*: waters support uses and have no impacts, but activities threaten future use support.

More detailed descriptions of these levels of severity are outlined in [Appendix A - Assessment Methodology](#).

The bar charts indicate the pollutant sources that are most frequently cited as major contributors to the water quality impacts for *Priority Waterbodies* in the Delaware River Basin. The charts reflect the percentage of miles/acres of the total waterbody area on the Priority Waterbodies List where the source is listed as a major contributor to the water quality impact. For each source, the color shading of the bar indicates the severity (*Precluded, Impaired, Stressed, Threatened*) of the most significant water use impact to the waterbody.

### **Basin Water Quality Summary**

About 23% of the river/stream miles in the Delaware River Basin are listed on the Priority Waterbodies List. However nearly all (97%) of these miles are listed as *Stressed* (having minor impacts) or *Threatened* waters that fully support appropriate uses. Only three percent of basin river miles are *Impaired* and do not support appropriate uses. This impairment is a result of a fish consumption advisory in Trout Creek, a trib to the Cannonsville Reservoir.

A larger percentage (about 53%) of lake/reservoir acres in the basin are listed on the PWL. This higher percentage reflects the effects of water quality impacts to are few of the largest lakes in the basin. Specifically, impairments to the three largest lakes/reservoirs in the Delaware River Basin account for 91% of the lake acres on the PWL. All three of these reservoirs is listed due to fish consumption advisories; one – Cannonsville Reservoir – is also listed due to nutrient levels that impair drinking water supply use. Atmospheric deposition of mercury is the suspected source of the fish consumption impairment in these reservoirs. The impacts to drinking water supply use in the Cannonsville is attributed to municipal and agricultural inputs, which are being addressed by New York City Watershed programs.

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# The 2000 Delaware River Basin Waterbody Inventory/Priority Waterbodies List

This inventory of water quality information includes individual waterbody *Data Sheets* describing the water quality conditions in the New York State portion of the Delaware River Basin. Causes (pollutants) and sources of water quality problems for those waterbodies with known or suspected impacts are also outlined.

The *Data Sheets* on the following pages are compiled in hydrological order and grouped by US Geological Survey Hydrologic Unit Code (HUC) basin and smaller watersheds in the Delaware River Basin (see Figure 2). An outline of the specific waterbodies in each watershed is presented at the beginning of each Watershed Section. Data Sheets are included for each waterbody that has been assessed; that is, waterbodies listed as ***Impaired Segments, Segments with Minor Impacts, Threatened Waters***, waters with water quality impacts ***Needing Verification***, or waterbodies with ***No Known Impact***. ***UnAssessed*** waterbodies are listed in the hydrologic outline of waterbodies at the front of each Watershed Section; however, separate Data Sheets for these segments are not included.

The information outlined on the Data Sheets includes *Waterbody Location Information, Water Quality Problem/Issue Information, Resolution/Management Information* and *Further Details*. More explicit explanations of these data fields are outlined in Appendix B - Waterbody Inventory Data Sheet Background Information.

Note also that the inventory reflects the best available water quality information at the time of publication. Water quality information may be added or modified subsequent to the preparation of this edition of the Waterbody Inventory and Priority Waterbodies List. When water quality information is updated, the corresponding waterbody segment data sheet is issued with an appropriate revision date. The information on more recently revised data sheets supercedes the information in this listing.

In addition to the more detailed Data Sheets, a *Summary Listing of Priority Waters* provides a brief overview of all ***Priority Waterbodies*** (i.e., *Impaired Segments, Segments with Minor Impacts* and/or *Threatened Waters*). This listing follows the Data Sheet Section of the report.

Cross-referenced lists of the waterbody *Data Sheets* are included at the end of the report as Appendix C - County Index of Data Sheet Segments and Appendix D - Alphabetic Index of Data Sheet Segments.

**Figure 2**  
**Delaware River Drainage Basin**  
**Watershed Map**

